

Hazardous Waste Ground-Water Task Force

Evaluation of
IT Corporation

Vine Hill and Baker Facilities
Martinez, California



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



CALIFORNIA DEPARTMENT OF HEALTH SERVICES

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

November 21, 1988

UPDATE OF THE HAZARDOUS WASTE GROUND-WATER TASK FORCE
EVALUATION OF THE IT CORPORATION, VINE HILL AND FACILITIES
MARTINEZ, CALIFORNIA

The Hazardous Waste Ground-Water Task Force (Task Force) of the United States Environmental Protection Agency (EPA), in conjunction with the California Department of Health Services (DHS) and the California Regional Water Quality Control Board (RWQCB), conducted an evaluation of the ground-water monitoring program at the IT Corporation, Vine Hill and Baker hazardous waste disposal facilities, Martinez, California. The onsite field investigation was conducted during the period, June 2 through 12, 1987. The IT facilities are 2 of 58 hazardous waste treatment, storage and disposal facilities (TSDFs) evaluated by the Task Force. The Task Force effort came about in light of concerns as to whether operators of hazardous waste TSDFs are complying with the State and Federal ground-water monitoring requirements.

The objectives of the Task Force evaluation were to:

- Determine the facility's compliance with the interim status ground-water monitoring requirements of 40 CFR Part 265 and the equivalent state requirements
- Evaluate the ground-water monitoring program described in the RCRA Part B permit application for compliance with 40 CFR Part 270.14(c) and the equivalent State requirements, if applicable
- Determine if the ground water at the facility contains hazardous waste or hazardous 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 response actions

conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended

The Task Force prepared the accompanying evaluation report, which revealed a number of deficiencies in the ground-water monitoring program at the IT facilities. The Executive Summary of the report discusses the findings related to the objectives of the investigation.

In summary:

- The Sampling and Analysis Plans (SAPs) were deficient.
- It was not complying with the existing SAPs.
- It did not adequately characterize the hydrogeology of the sites.
- There were deficiencies in the ground-water assessment outlines and programs.
- The ground-water monitoring programs described in the Part B RCRA permit application were inadequate.
- Hazardous waste constituents are leaking to the ground-water from the hazardous waste surface impoundments.
- The facilities were not in compliance with the ground-water monitoring requirements for the CERCLA offsite policy and as such, may not receive CERCLA waste.

This update provides information on ground-water related activities by IT since the Task Force inspection. These activities are in response to measures taken by EPA Region 9 and State agencies (DHS and RWQCB) to bring the facilities into compliance with RCRA and other State regulations.

The Vine Hill and Baker facilities are presently subject to Clean-up and Abatement Orders (CAOs) issued by RWQCB which require the continued

monitoring and evaluation of ground-water quality and levels within and around the facility. While the CAOs were in effect at the time of the Task Force inspection, many reports in response to the CAOs were yet to be submitted. The CAOs required, among other things, that IT determine the initial background ground-water quality, that the SAPs be revised, that IT characterize the hydrogeology, and that IT investigate the contamination at Vine Hill and the waste constituent migration at Baker. IT has since submitted a number of reports pursuant to the CAOs. The IT submittals are currently being evaluated by RWQCB.

A consent agreement which was filed on April 1, 1987, by DHS with IT Corporation for the Vine Hill facility, required correction of numerous interim status operational requirements. These include those requirements pertaining to inspections, waste analysis and tracking, drum storage, closure plan and closure cost estimate, and financial assurance. As of this date, IT has submitted a response to all tasks required by the consent agreement. Discussions are continuing between IT and DHS on some of the submittals. A civil penalty of \$2.1 million has been paid by IT Corporation.

At the time of the Task Force inspection, in June and August of 1987, IT Corporation was seeking a permit to modernize and continue operations at the Vine Hill facility. Since that time, however, It has withdrawn the RCRA Part B permit applications for both the Vine Hill and Baker facilities and is pursuing closure at both sites.

On June 30, 1988, a Consent Decree was filed in the U.S. District Court for the Northern District of California (Civil Number D-87-2071 SC) for the Baker facility. The Consent Decree required, among other things, that IT Corporation cease acceptance of hazardous waste at the Baker facility, submit a closure plan for the purpose of obtaining closure plan approval, and complete implementation of the Agency-approved closure plan. IT Corporation paid a civil penalty of \$260,000.

A closure plan for both the Vine Hill and Baker facilities was previously submitted in December 1987 and April 1988. Further revisions to the closure

plan are still necessary. The revised closure plan is due for EPA and State regulatory authority review in November 1988.

IT Corporation is required by State law to remove all hazardous waste liquids from the surface impoundments by January 1, 1989. At the present time, 12 out of 22 surface impoundments have been emptied at the Vine Hill and Baker facilities and the reduction of the hazardous waste inventory is continuing. The primary goals of Federal and State regulatory authorities is to close the facilities in an environmentally sound manner and prevent degradation of both surface and ground waters.

This update completes the Task Force evaluation of the It Corporation, Vine Hill and Baker facilities in Martinez, California.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT AND COMPLIANCE MONITORING

EPA-330/2-89-006

GROUND-WATER MONITORING EVALUATION
IT CORPORATION
VINE HILL AND BAKER FACILITIES
Martinez, California

November 1988

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EXECUTIVE SUMMARY

INTRODUCTION

Concerns have been raised about whether 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),* as amended.** In question is the ability of existing or proposed ground-water monitoring systems to detect contaminant releases from waste management units at TSDFs. The Administrator of the Environmental Protection Agency (EPA) established a Hazardous Waste Ground-Water Task Force (Task Force) to determine the current compliance status of TSDFs. The Task Force comprises personnel from the Office of Solid Waste and Emergency Response (OSWER), Office of Enforcement and Compliance Monitoring (OECM), the National Enforcement Investigations Center (NEIC), EPA regional offices, and State regulatory agencies.

This report presents the results of the Task Force investigation of IT Corporation's Vine Hill and Baker facilities near Martinez, California 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 Part 270.14(c)
- Determine if the ground water at the facility contains hazardous waste or hazardous constituents
- Provide information to assist the Agency in determining if the TSDF meets EPA ground-water monitoring requirements for waste

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

** Includes Hazardous and Solid Waste Amendments of 1984 (HSWA)

management facilities receiving waste from response actions conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*

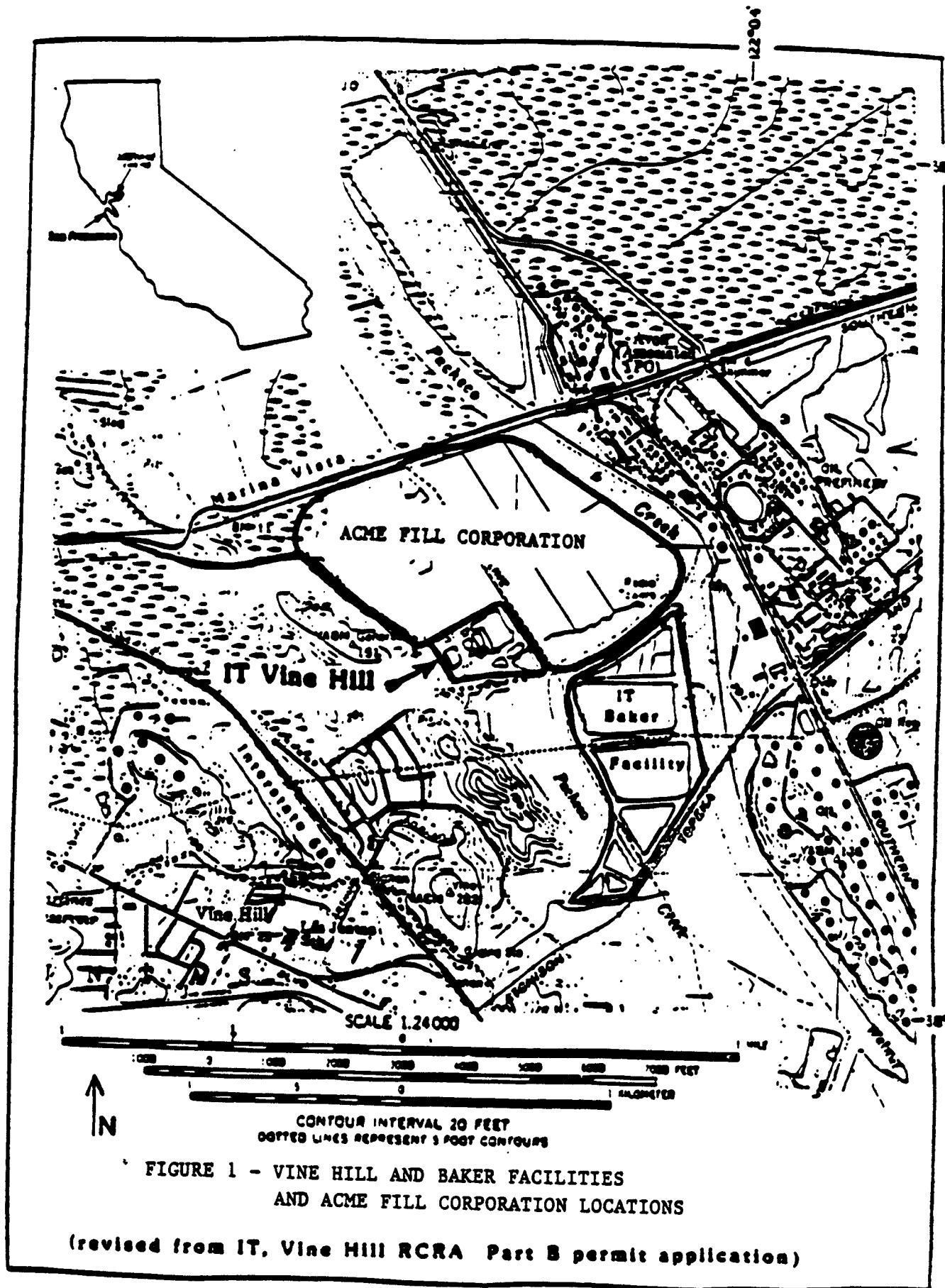
Each Task Force evaluation will determine if:

- Designated RCRA and/or State required monitoring wells are properly located and constructed.
- The facility has developed and is following an adequate ground-water sampling and analysis plan.
- Required analyses have been properly conducted on samples from the designated RCRA monitoring wells.
- The ground-water quality assessment program outline or plan (as appropriate) is adequate.
- The ground-water monitoring plan submitted in the company's RCRA Part B application meets the requirements of 40 CFR Part 270.14(c); however, IT has withdrawn the Part B and has notified the State that Vine Hill and Baker will be closed.
- The ground water at the facility contains hazardous waste or hazardous constituents.

The onsite inspections of the IT Corporation Vine Hill and Baker facilities [Figure 1], were conducted from June 2 through 12, 1987 and during the period of August 4 through 6, 1987. During the latter period, the Task Force observed IT's regular quarterly RCRA ground-water sampling procedures. The

Regulations promulgated under RCRA address hazardous waste management facility operations, including ground-water monitoring, to ensure that hazardous waste or hazardous waste constituents are not released to the environment.

The procedures for planning and implementing offsite response actions are specified in a May 6, 1985 memorandum from the Acting Assistant Administrator for Solid Waste and Emergency Response to Regional Administrators.



inspections were coordinated by NEIC personnel. Concurrently, the Task Force conducted an equivalent investigation of the Acme Fill Corporation* facility, which is north of and contiguous with the IT Vine Hill facility. In general, the investigations involved review of State, Federal, and facility records; facility inspection; ground-water sampling and analysis; water level measurements and an evaluation of the IT laboratories, which perform the ground-water sample analyses.

The Vine Hill and Baker facilities are located on about 35 and 135 acres, respectively, east of Martinez, California in Contra Costa County [Figure 1]. Access to the site(s) is from Marina Vista road off Interstate 680. The Vine Hill facility is bordered on the north and east by the Acme Fill Corporation property, to the south by the Martinez Gun Club, and also to the east by marshland and Pacheco Creek. The Baker site is bordered on the north and west by Pacheco Creek, to the south by the Central Contra Costa Sanitary District Treatment Plant and to the east by marshland. Both sites are located on filled tidal flats protected by levees. The nearest residential area is about a quarter mile southwest of both facilities.

The Vine Hill facility has been used for treatment and evaporation of chemical wastes since 1967. IT generates, treats, and disposes of hazardous wastes in unlined impoundments at the Vine Hill facility (EPA ID number CAD000094771) under a complex series of regulations, permits, licenses, and orders issued by several regulatory agencies, predominantly EPA Region IX, the California Department of Health Services (DOHS), and the California State and Regional Water Quality Control Boards (SWQCB) and (RWQCB), respectively. Various operating permits related to air emissions were also issued by the San Francisco Bay Area Air Quality Management District (BAAQMD). A chronology of applicable hazardous waste management regulations, permits, licenses, etc. from November 1980 to present, was compiled by NEIC through discussions with the various regulatory agencies and review of documentation [Tables 1 and 16].

* *Hazardous Waste Ground-Water Task Force - Evaluation of Acme Fill Corporation, Martinez California: EPA-330/2-88-042, July 1988*

Table 1
 CHRONOLOGY OF APPLICABLE HAZARDOUS WASTE
 MANAGEMENT REGULATIONS, PERMITS, ETC.
 IT, Vine Hill and Baker

Effective Dates	Regulations, Permits, etc. ¹
November 19, 1980 - April 5, 1981	40 CFR 265 ² ; CHWMR ³ (CAC ⁴ Title 22)
April 6, 1981 - June 3, 1981 ⁵	40 CFR 265; CHWMR (CAC, Title 22), Interim Status Document ⁶
June 4, 1981 - December 31, 1982	CHWMR (CAC, Title 22), Interim Status Document
January 1, 1983 - Title September 25, 1983	40 CFR 265; ⁷ CHWMR (CAC, 22), Interim Status Document
September 26, 1983 - Present	40 CFR 265, 40 CFR 264; ⁸ CHWMR (CAC, Title 22), Interim Status Document, Final Hazardous Waste Facility Permit ⁹

- ¹ Various operating permits related to air emissions were also effective during this time period but have not been listed here.
- ² Title 40, Code of Federal Regulations, Part 265 (interim status regulations)
- ³ California Hazardous Waste Management Regulations (promulgated under the California Hazardous Waste Control Act, CHWCA)
- ⁴ California Administrative Code
- ⁵ Date California received RCRA Phase I interim authorization.
- ⁶ Issued by California Department of Health Services
- ⁷ Article 5.5, 25159.5(b) of the CHWMA, effective January 1, 1983 incorporated all regulations promulgated under RCRA, including subsequent amendments.
- ⁸ Final regulations became effective for tank treatment and storage and container storage when the State issued IT the final Hazardous Waste Facility permit.
- ⁹ California issued permit for specified treatment and storage operations.

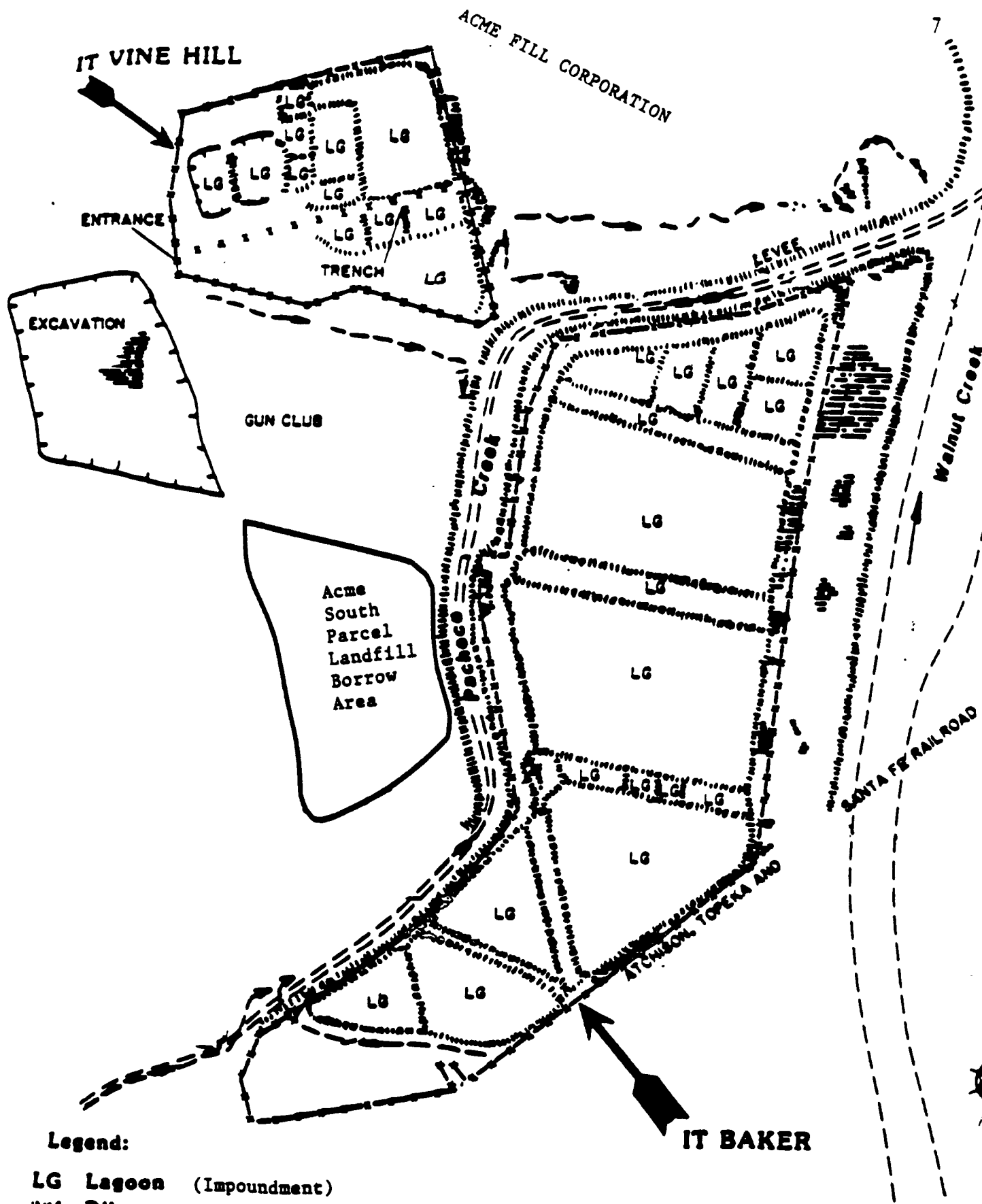
The Baker facility has been used for treatment (primarily evaporation) of treated wastewaters since 1970. IT generates, treats, and disposes of hazardous waste in unlined impoundments at the Baker facility (EPA ID number CAD089680250) under the same regulations as the Vine Hill facility. The Baker facility has its own Interim Status Document but does not have a Hazardous Waste Facility Permit.

The Vine Hill and Baker facilities are approximately one-fourth mile apart and are operated in conjunction with each other. In general, the Vine Hill facility receives liquid wastes and sludges which may contain heavy metals, acids, sulfides, phenols, formaldehyde, cyanides, oils, and solvents. Treatment capabilities at Vine Hill include oxidation, reduction, neutralization, stripping, metals precipitation and incineration. The unlined surface impoundments receive treated wastes and wastes requiring minimal treatment (e.g., solids separation). A centrifuge is used to facilitate sludge dewatering at Vine Hill. The Baker facility receives almost all of its waste by pipeline from Vine Hill. Occasionally, some liquid waste (e.g., bleach) is used directly in the unlined Baker surface impoundments for odor control. Incinerator ash and surface impoundment and tank sludges are shipped to an offsite landfill (IT Panoche facility at Benicia, California or the Chemical Waste Management, Inc., facility at Kettleman Hills, California).

Information regarding early Vine Hill site activity is limited; however, aerial photographs compiled by the Environmental Monitoring Systems Laboratory (EPA), Las Vegas, of the Vine Hill site taken in July 1958, show that most of the site was occupied by two large unlined surface impoundments. Subsequent photos show that these impoundments evolved into about 14 separate units by April 1968. In December 1972, there were only seven distinct units but the number was increased to eight by 1974. There were still eight distinct units in 1983 but their locations had changed to a configuration that is similar to that which was present during an NEIC-RCRA Compliance Investigation in March 1986 [Figure 2]. The IT unlined surface impoundments at Baker were constructed between 1974 and 1980 and their current configuration is also shown on Figure 2.

Initial waste handling activities at the Vine Hill facility began in the late 1950's or early 1960's and, according to IT personnel, involved management of used oils. This activity evolved into the now phased-out inactive IT Oil Reprocessing facility. Chemical waste treatment at Vine Hill began in October 1967. Early operations were apparently very similar to current activities, and

RCRA Compliance Investigation, IT Corporation, Vine Hill facility, Martinez, California: EPA-330/2-86-014, September 1986



Legend:

- LG Lagoon (Impoundment)
- /// Dike
- ≡ Standing Liquid
- ← Drainage
- Fenced Site Boundary

Approximate Scale, 1 inch equals 700 feet

**Overlay of February 22, 1984 Aerial Photograph of
IT Vine Hill and Baker Facilities, Martinez, California
Figure 2**

included waste storage and treatment in tanks and surface impoundments. In 1970, IT purchased 135 acres nearby which became the Baker facility and comprises a series of unlined surface impoundments used primarily to evaporate wastewater received via pipeline from the Vine Hill facility. All surface impoundments at both the Vine Hill and Baker facilities are unlined and engineering details were not available except as presented in this report.

In the early to mid-1970's, IT Vine Hill installed a fume (vent gases from tank treatment and storage) and liquid waste injection incinerator. The unit basically replaced an older "fume only" incinerator installed at some prior unknown date. A centrifuge operation for sludge dewatering was added in late 1984. In late 1985, IT acquired property immediately southeast of the Vine Hill facility known as the "Acme property." There are four inactive surface impoundments on this property.

IT Vine Hill has about 90 employees working 3 shifts, 5 days a week and usually one shift on weekends. The facility has an onsite analytical laboratory which performs waste acceptance and characterization analyses for this and several other IT waste management facilities. Waste treatment and disposal activities at the time of this inspection included storage, treatment and/or disposal in tanks, surface impoundments and the incinerator and centrifuge.

IT is subject to compliance with two Cleanup and Abatement Orders (85-004 and 86-014) issued by the California Regional Water Quality Control Board, San Francisco Bay Region.

SUMMARY OF FINDINGS AND CONCLUSIONS

The findings and conclusions presented here reflect conditions existing at the IT Vine Hill and Baker facilities in June 1987. Actions taken by the State, EPA Region IX and IT subsequent to June 1987 are summarized in the accompanying update.

Task Force personnel inspected the IT Vine Hill and Baker facilities from June 2 through June 12, 1987. From August 4 through August 6, 1987, Task Force personnel observed quarterly ground-water sampling by IT to evaluate whether IT personnel were properly implementing their RCRA sampling and analysis plan.

GROUND-WATER MONITORING DURING INTERIM STATUS

Task Force personnel evaluated the interim status ground-water monitoring program at the IT Vine Hill and Baker facilities for the period between November 1981, when RCRA and applicable provisions of the RCRA-equivalent California regulations became effective, and June 1987. The evaluation revealed that no RCRA-equivalent interim status ground-water monitoring program was implemented at either facility until October 1984. Some ground-water monitoring had been conducted starting as early as 1979, but was not equivalent to the Interim Status Document (ISD) (RCRA-equivalent State program) and was not based on an adequate sampling and analysis plan.

Monitoring, as required by RCRA regulations, has not been completed for the Vine Hill and Baker monitoring well networks. A review of facility and laboratory data records showed that some parameters were not reported for four quarters of background monitoring. Monitoring, as required by the sampling and analysis plans, was not completed within specified time periods.

Ground-Water Sampling and Analysis Plans

The most recent of several versions of the RCRA ground-water sampling and analysis plans (SAPs), which were in effect at the time of the Task Force inspection for both the IT Vine Hill and Baker facilities, are dated December

1986. Therefore, 1 year of monitoring data has not been collected under these December 1986 plans at the time of the Task Force inspection. The plans are identical except for selection of different wells for each facility. The plans lack specific procedures for field instrument calibration and decontamination of instruments and equipment between use in different wells. None of the plans indicate which wells are up and downgradient of specific waste management units.

Sampling and Analysis Procedures

The IT ground-water field sampling personnel who conducted the RCRA quarterly ground-water sampling at both the Vine Hill and Baker facilities did not follow the sampling and analysis procedures, as specified in the December 1986 plans and, therefore, did not comply with the requirements of 40 CFR Part 265.92(c). In addition to not following the designated sampling and analysis plans, the procedures used by IT were inadequate. IT personnel, conducting the sampling, were not familiar with the new sampling and analysis plan even though this was the third quarter since the current SAP was in effect. Observation of the sampling of one high producing well revealed that the well was purged with a submersible pump from near the bottom (adjacent to the screened interval) and sampled from the top of the water column with a bailer. Although three column volumes of water were purged from the aquifer, the standing column of water in the well prior to purging was not evacuated before sampling. Thus, the water which was sampled was not representative of water in the aquifer which was intended for sampling.

Task Force personnel inspected the IT laboratories at Cerritos, California and Export, Pennsylvania; these laboratories perform the interim status ground-water monitoring sample analyses. The laboratory evaluations revealed problems that could affect the quality of the data reported. The pH, conductance, total organic carbon (TOC) and total organic halides (TOX) data are suspect because of improper measurement procedures. Conductance data in some instances may be erroneous. TOC results actually represent the determination of nonpurgeable organic carbon (NPOC) and excluded purgeable organic carbon (POC). The analytical methods used in some instances were inappropriate for samples containing percent levels

(10,000 mg/L or greater) of dissolved solids. For some parameters, the laboratory could not justify the detection limits claimed, based on the data observed in the laboratory records. Furthermore, the detection limits specified did not satisfy the requirements of 40 CFR 265.92. The values reported for phenols on samples collected at IT Baker, may represent levels that would have been detected in blanks. However, no field or laboratory blanks were analyzed. The problems cited affected the reliability of the data in establishing background levels and in detecting releases of waste into the groundwater. The results of the laboratory evaluation are discussed in the Technical Report in the "Sample Analysis and Data Quality Assessment" section.

Ground-Water Monitoring Well Network

The uppermost aquifer and the hydrogeologic units that need to be monitored at the facilities have not been adequately identified by IT or their consultants, as required by 40 CFR 265.91 and 40 CFR 270.14(c)(2). Therefore, adequacy of the well locations (vertical and areal) cannot be verified because the ground-water flow zones, degree of hydraulic interconnection, and the direction and rate of ground-water flow have not been defined.

The ground-water monitoring well networks at IT Vine Hill and Baker facilities have evolved along with developing hydrogeologic definitions of the area, which are incomplete. The construction records are not adequate to determine whether the designated monitoring wells are capable of monitoring discreet water-bearing zones or whether they produce water from multiple zones. No determination of upgradient and downgradient well locations has been made by IT or their consultants. Ground-water mounding has been identified beneath some of the impoundments at both the Vine Hill and Baker facilities.

Monitoring well construction records do not correlate accurately to field measurements of well depths. For most wells, the "as constructed" records are not available. Thus, it is not possible to determine whether the ground-water samples are representative of formation water from specific zones intended for monitoring.

Some wells produced turbid purge water and samples. This indicates that the wells were improperly constructed or were inadequately developed. Under 40 CFR Part 265.91(a), it is required that the facility characterizes water-bearing formations and determine the degree of interconnection, hydraulic gradients, flow directions and flow rates in the uppermost aquifer and any interconnected aquifers in order to adequately locate monitoring wells. Efforts to make these determinations have not satisfied the requirements.

GROUND-WATER QUALITY ASSESSMENT PROGRAM

IT did not comply with the ground-water quality assessment program pursuant to 40 CFR 265.93(a) or the ISD (Section VIII) requirements. This program should have consisted of a ground-water quality assessment outline and assessment plan, as necessary. IT did not submit ground-water quality assessment outlines for either the Vine Hill or Baker facilities by November 18, 1981, as required. IT was issued a Cleanup and Abatement Order (85-004) and required to submit a ground-water assessment outline for each site by February 15, 1985. It complied with this requirement; however, both outlines were inadequate.

The assessment outline for the Vine Hill facility lacks information concerning:

- Circumstances under which additional monitoring wells would be necessary if the initial phase of the program reveals the presence of ground-water contamination
- How rate and extent of migration of hazardous constituents will be determined
- How the volume/concentration of released contaminants would be determined
- Use of an appropriate statistical analysis program

- How the facility would be sure that all potential contaminants were identified in the plume(s)
- How an assessment monitoring plan would be developed and the sampling frequency would be determined
- Designation of upgradient and downgradient wells
- Which aquifer(s) would be monitored
- Approximate schedules for the time needed to initiate assessment sampling, analyses, data evaluation, and report results
- How a determination would be made to return the facility to detection monitoring if contamination was not confirmed .

The Baker facility has a document titled "Ground-Water Quality Assessment Outline-IT Corporation Baker Facility"; however, this document does not address an assessment program, as required. Instead of describing a program which would start after statistical analysis of quarterly monitoring data triggered assessment, the outline describes modifications to the existing detection monitoring program. New wells are proposed "to help in early detection of problems," not to determine rate and extent of migration, as required during assessment.

The "assessment outline" describes work that is not yet completed, because of shortfalls of the detection system, rather than steps which will be taken if the detection monitoring system triggers assessment, via the statistical analyses of quarterly data. The statistical analysis program described is used only to determine "seasonal variance" in the water quality, and never implies that contaminants may be the cause of water quality fluctuations. The statistical analysis program proposed does not indicate which well(s) will be used for background ground-water quality determinations.

At the time of the Task Force inspection, ground-water interim status monitoring data was available which should have required IT to prepare an

assessment plan for the Vine Hill facility. The September 1986 Abatement Order (86-014) required that Vine Hill submit an assessment plan; however, this had not been done.

The 1985 Cleanup and Abatement Order required IT to submit an assessment plan for the Baker facility. The plan has been submitted but IT has not completed implementation of it. Furthermore, the tasks in the assessment plan are not based on the assessment outline, as required in 40 CFR 265.93. The implementation of the Baker assessment plan is in accordance with provisions and time tables specified in the Abatement Orders, which are more stringent than those specified in 40 CFR 265.93(d).

GROUND-WATER MONITORING PROGRAMS PROPOSED FOR RCRA PERMITS

The RCRA Part B permit applications for both the IT Vine Hill and Baker facilities, submitted to EPA Region IX on August 1, 1983 by IT, do not comply with the requirements of 40 CFR 264.97 and 270.14(c)(2).^{*} The proposed ground-water monitoring programs do not identify the uppermost aquifer nor do they describe which aquifer(s) are hydraulically interconnected and should be monitored.

The proposed programs do not designate monitoring wells to determine background ground-water quality, as required by 40 CFR 264.97, nor do they include consistent analytical methods to determine water quality, as required by 40 CFR 264.97(d).

IT proposed detection monitoring under 40 CFR 264.98 for both facilities. However, because organic contaminants have been detected in ground water and soils, the proposed programs should include provisions for compliance monitoring, as required under 40 CFR 264.99.

^{*} *The State of California was never granted authorization to issue RCRA disposal permits; therefore, Federal requirements are cited here. The State did have brief authority for issuing treatment and storage permits [Table 1].*

TASK FORCE SAMPLING AND MONITORING DATA EVALUATION

Results of the Task Force sampling and monitoring data evaluation indicate that hazardous waste constituents are leaking to the ground water from impoundments at both the Vine Hill and Baker facilities.

Organic and inorganic constituents were detected in several wells at each of the IT facilities. Wells MW-102 and MW-113 at the Baker facility exceeded the maximum contaminant level of 1.0 mg/L for barium. Organic analytical results indicate the presence of volatile and semi-volatile organic compounds in Vine Hill monitoring wells MW-203, MW-205, MW-215, MW-222, TB-515 and Baker wells MW-101, MW-125 and a ground-water seep. Details of these findings are discussed in the section of this report titled, "Evaluation of Monitoring Data for Indications of Waste Release."

In addition, ground-water analytical data in the RWQCB files indicate the presence of contaminants in ground water, which has leaked from some impoundments.

COMPLIANCE WITH CERCLA OFFSITE POLICY

The EPA offsite policy requires that any treatment, storage, or disposal facility (TSDF) used for land disposal of waste from CERCLA response actions must be in compliance with the applicable technical requirements of RCRA. Interim status facilities must have an adequate ground-water monitoring program to assess whether the facility has had a significant impact on ground-water quality. Neither the IT Vine Hill nor Baker facilities have complied with the technical ground-water monitoring requirements for waste management facilities.

TECHNICAL REPORT

INVESTIGATIVE METHODS

The Task Force evaluation of IT Vine Hill and Baker facilities consisted of:

- Reviewing and evaluating records and documents from EPA Region IX, California Department of Health Services (DOHS); Regional Water Quality Control Board (RWQCB), San Francisco Bay Region; State Water Quality Control Board (SWQCB); and IT
- Conducting onsite facility inspections June 2 through June 12 and August 4 through 6, 1987
- Evaluating two offsite laboratories
- Determining water level elevations in selected wells
- Sampling and subsequent analysis of ground water from selected wells

RECORDS/DOCUMENT REVIEW AND EVALUATION

Records and documents from EPA Region IX, DOHS, SWQCB, and RWQCB were reviewed prior to the onsite inspection. Facility records were reviewed to verify information currently in government files and supplement government information where necessary. Selected documents requiring further evaluation were copied by Task Force personnel during the inspection. Records were reviewed to obtain information about facility operations, locations and construction of waste management units and monitoring wells, and ground-water monitoring activities.

Specific documents and records that were requested and reviewed included the ground-water sampling and analysis plans, ground-water quality assessment program outlines, analytical results from ground-water sampling, monitoring well construction data and logs, site geologic reports, site operations plans, facility permits, unit design, and operation reports. Other records reviewed included selected personnel position descriptions and qualifications

(those related to the required ground-water monitoring), and operation records showing the general types and quantities of wastes disposed of at the facility and their locations.

FACILITY INSPECTION

A facility inspection was conducted to identify waste management units (past and present), current waste management operations and pollution control practices, and to verify the location of ground-water monitoring wells.

Company representatives supplied records and documents, answered questions about documents and explained: (1) past and present facility operations, (2) site hydrogeology, (3) the ground-water monitoring system, and (4) the ground-water monitoring sampling and analysis plans. Ground-water samples are collected and analyzed by EPA contractors. IT personnel demonstrated sampling techniques and were questioned regarding sample collection, handling, analysis, and document control. The need for the ground-water field sampling personnel to have greater familiarity with the applicable sampling and analysis plan and the need to adhere strictly to the requirements of the plan(s) were discussed with IT management officials.

LABORATORY EVALUATION

The IT laboratories in Cerritos, California and Export, Pennsylvania perform determinations for the majority of ground-water parameters for the Vine Hill and Baker facilities. The laboratories were evaluated June 10 to 12, 1987 and October 20 to 23, 1987 respectively, to assess their ability to receive, handle and analyze ground-water samples from the IT facilities. During the evaluations, analytical equipment was inspected and operating and analytical procedures were examined for adequacy. Laboratory records were reviewed for completeness, accuracy and compliance with State and Federal requirements. The results of the laboratory evaluation reviews are discussed in the section of this report titled, "Sample Analysis and Data Quality Assessment."

WATER LEVEL MEASUREMENTS AND SAMPLE COLLECTION

Sampling activities, at the IT facilities, during the investigation included the following:

- Measuring total depth and water levels in 66 monitoring wells, test borings and piezometers, including 6 monitoring wells at the Acme Fill Corporation facility adjacent to IT Vine Hill [Figure 3].
- Collecting ground-water samples from 34 monitoring wells, 1 test boring and 1 ground-water seep, and sampling liquid from 3 surface impoundments, as well as field blanks, equipment blanks, and a trip blank for quality assurance/quality control purposes
- Recording water levels in four monitoring wells continuously for approximately 24 hours

Task Force personnel measured water levels in 48 monitoring wells, borings, and piezometers surrounding the Vine Hill and Baker treatment ponds [Table 2] to verify past IT data. Wells adjacent to the IT Vine Hill facility and the six wells on the Acme Fill property (an adjacent hazardous waste management facility) were measured at approximately the same time to determine potential ground-water gradients between the Acme and Vine Hill facilities. Additional water level measurements were made on the wells sampled prior to purging and sampling to aid in determining water column volumes.

Samples were collected from 32 wells to determine if the ground water contained hazardous waste or hazardous constituents. Wells sampled were chosen for their proximity to hazardous waste management areas, depth of completion, wells which historically had shown the presence of hazardous constituents, when sampled by IT and to provide areal coverage. Wells screened at different depths and geologic formations were chosen to sample a variety of horizons. Several surface impoundments were sampled to identify the types of wastes treated onsite and the constituents that may be present in the ground water. Wells were sampled (G-6A, MW-115, MW-116, MW-117, MW-119 and MW-128) at the Acme facility to determine the quality of the ground water in the

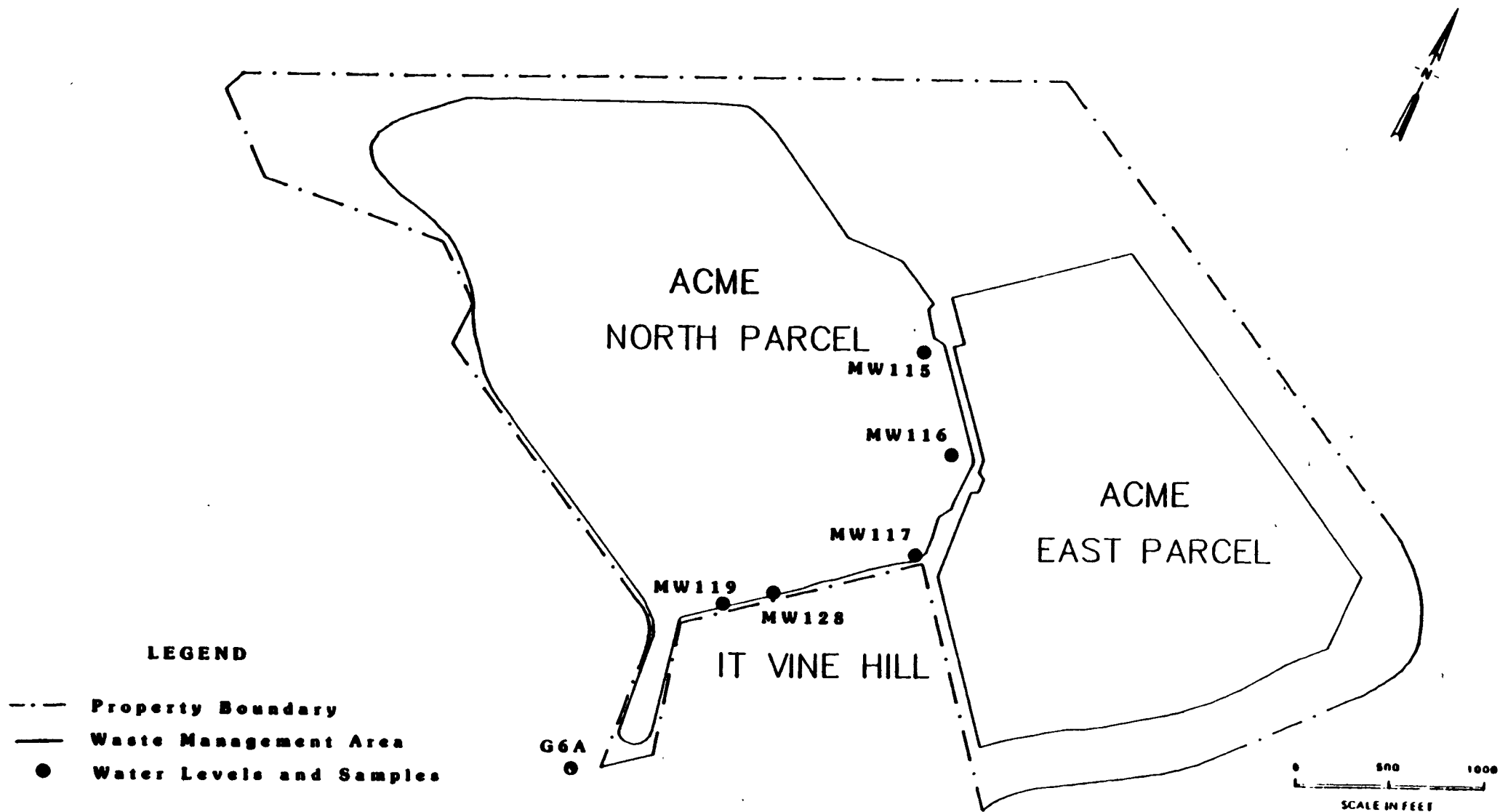


FIGURE 3

**Task Force Sampling Locations at Acme Fill
Corporation as part of the IT Investigation**

Table 2
WATER LEVEL MEASUREMENTS

Well No.	Water Level Depth (ft) ¹	Total Well Depth (ft)	Water Table Elevation (ft.) (MSL) ²	Date	Time ³
<u>IT Vine Hill Wells</u>					
MW-202	7.58	112.46	3.82	6/2/87	1445
MW-203	4.27	32.96	7.25	6/2/87	1455
MW-204	12.54	36.66	6.92	6/3/87	0800
MW-205	3.0	33.32	4.02	6/3/87	0950
MW-206	5.61	87.5	4.26	6/3/87	1000
MW-207	2.56	31.25	7.72	6/2/87	1630
MW-209	0.10	38.53	12.78	6/2/87	1420
MW-212	4.35	42.66	3.02	6/2/87	1545
MW-213	0.08	36.52	12.47	6/2/87	1430
MW-214	8.58	39.04	6.92	6/5/87	1245
MW-215	2.13	46.84	9.77	6/2/87	1345
MW-216	4.29	68.26	7.34	6/2/87	1400
MW-218	1.94	44.36	9.75	6/2/87	1410
MW-219	3.35	96.82	4.05	6/2/87	1550
MW-221	6.88	63.17	7.09	6/2/87	1605
MW-222	27.04	35.64	-13.24	6/2/87	1615
MW-227	15.08	31.85	-12.49	6/2/87	1645
TB-515	22.23	29.49	-7.40	6/5/87	1330
TB-517	6.32	35.54	7.53	6/2/87	1610
<u>Acme Wells</u>					
G-6A	29.26	36.44	6.88	6/3/87	0825
MW-115	4.97	37.54	15.08	6/3/87	1410
MW-116	2.12	36.95	15.00	6/3/87	1440
MW-117	6.20	26.59	4.98	6/2/87	1520
MW-119	4.82	41.29	14.28	6/2/87	1405
MW-128	5.72	65.50	7.43	6/2/87	1435

- 1 Measurement recorded in feet below top of surface casing.
 2 Elevations recorded in feet above/below mean sea level.
 3 Rounded to nearest 5 minutes.

Table 2 (cont.)
WATER LEVEL MEASUREMENTS

Well No.	Water Level Depth (ft) ¹	Total Well Depth (ft)	Water Table Elevation (ft.) (MSL) ²	Date	Time ³
<u>IT Baker Wells</u>					
MW-1A	5.88	32.31	8.74	6/8/87	1640
MW-5A	5.85	24.56	3.4	6/8/87	1325
MW-6A	4.21	23.35	4.07	6/8/87	1315
MW-8A	1.34	22.75	6.43	6/8/87	1255
MW-9A	5.54	22.22	2.91	6/8/87	1645
MW-14	4.35	21.33	4.99	6/8/87	1455
MW-15	2.75	101.92	4.58	6/8/87	1345
MW-16A	4.68	67.56	3.67	6/8/87	1230
MW-16B	4.83	44.07	4.42	6/8/87	1235
MW-101	5.46	38.00	3.83	6/8/87	1445
MW-102	5.33	38.38	3.81	6/8/87	1430
MW-103	3.31	26.37	3.72	6/8/87	1340
MW-104	4.0	32.04	5.17	6/8/87	1310
MW-105	7.42	37.38	7.43	6/8/87	1655
MW-106	10.12	29.43	3.75	6/8/87	1535
MW-110	2.52	36.15	10.22	6/8/87	1725
MW-112	9.25	44.00	3.01	6/8/87	1710
MW-113	1.40	33.99	5.42	6/8/87	1555
MW-118	16.07	42.73	-8.74	6/8/87	1545
MW-125	22.54	29.22	-16.45	6/8/87	1245
MW-126	25.32	36.36	-16.79	6/8/87	1230
MW-127	21.00	30.16	-13.11	6/8/87	1215
B-124	11.09	83.97	2.87	6/8/87	1620
B-125	10.07	64.03	3.87	6/8/87	1615
B-126	8.16	50.66	5.56	6/8/87	1630
B-127	14.74	32.54	-0.89	6/8/87	1630
B-128	11.75	88.17	3.13	6/8/87	1510
B-129	11.48	63.33	3.38	6/8/87	1515
B-130	25.21	36.33	-10.43	6/8/87	1520

- ¹ Measurement recorded in feet below top of surface casing.
² Elevations recorded in feet above/below mean sea level.
³ Rounded to nearest 5 minutes.

vicinity of the IT facility. The Acme facility has accepted a variety of wastes for landfilling including hazardous wastes and, therefore, there is concern as to the potential for subsurface migration of hazardous constituents from the Acme facility to IT Vine Hill and vice versa.

All samples were collected by an EPA contractor (Versar, Inc., of Springfield, Virginia) and sent to EPA contractor or NEIC laboratories for analysis. Analytical techniques and methods are presented in Appendices A and B. Duplicate volatile organic samples and splits of other sample parameters were offered to and accepted by IT. In addition to the aliquots collected for Task Force analysis and sample splits provided to IT, IT requested extra sample volumes for TOC, TOX and anion analysis as well as aliquots for mercury, nutrients and radionuclides. Samples for Task Force analysis did not include nutrients and radionuclides. These aliquots were collected at 25 wells (Vine Hill - MW-209, MW-212, MW-219, MW-214, MW-204, MW-205, and MW-206; Baker - MW-104, MW-1A, MW-101, MW-102, MW-14, MW-110, MW-6A, MW-8A, MW-106, MW-15, MW-103, and MW-5A; Acme - G-6A, MW-115, MW-116, MW-117, MW-119, and MW-128). The locations of the Acme wells are shown in Figure 3. The locations of Vine Hill and Baker wells are discussed in the section of this report titled "Monitoring Well Location, Number and Construction."

None of the IT wells were equipped with pumps; therefore, the EPA contractor supplied purging and sampling equipment for each well sampled. Sample collection procedures were as follows:

1. IT personnel unlocked the wellhead.
2. The open wellhead was checked for chemical vapors [Photovac TIP® and organic vapor analyzer (OVA®)].

* Unless specified differently, the EPA contractors conducted the work.
® Photovac TIP and OVA are registered trademarks and appear hereafter without ®.

3. The depth to ground water was measured using an oil/water sonic Interface Probe (Moisture Control Co., Inc. Model B2220-3) [Table 1] and recorded to the nearest 0.01 feet.
4. The Interface Probe was lowered through the water column until the bottom of the well was reached, and total depth recorded to the nearest 0.01 foot.
5. The Interface Probe was retrieved from the well bore. The cable and probe were decontaminated after each use with a pesticide-grade hexane wipe, followed by a distilled water rinse and wiped dry.
6. The well was relocked. The water levels were taken at selected wells on the first 2 days of the inspection at each facility and then locked until they were sampled later in the inspection.
7. When Task Force personnel were ready to sample a well, IT personnel reopened the wellhead.
8. Water level measurements were made, as discussed in steps 3 and 5 above.
9. Water column volumes were calculated using the height of the water column, well casing radius and a constant.
10. Three water column volumes were purged using equipment as indicated in Tables 3 and 4. The purge water was collected in a 4-gallon plastic bucket. Purge water was then poured into a drum and held for later disposal by IT personnel.
11. A sample aliquot was collected at the beginning, middle and end of the purge for temperature, specific conductance and pH measurements. Table 5 presents sample collection information.

Table 3
PURGING RECORD

Well Number	Total Well Depth¹	Top of Casing Elevation²	Water Level Elevation²	Total Volume of Water Purged (Gal.)	Date	Time³	Methods/Remarks
<u>Vine Hill Wells</u>							
MW203	32.96	11.4	7.25	21.75	06/08/87	0905-0935	Teflon® bailer, well purged dry, yellow colored water
MW204	36.66	19.46	6.92	47	06/03/87	0900-1005	Teflon bailer
MW205	33.32	7.02	4.02	60	06/03/87	1105-1205	Teflon bailer
MW206	87.5	9.87	4.26	160	06/03/87	1400-1605	Keck pump
MW207	31.25	10.28	7.72	20	06/03/87	1340-1420	Teflon bailer, well purged dry
MW209	38.53	12.8	12.78	43.5	06/04/87	1205-1250	Teflon bailer, dark green, strong odor
MW212	42.66	7.37	3.02	74	06/04/87	1605-1655	Teflon bailer, greenish color and oily sheen on water
MW214	39.04	15.51	6.92	59.5	06/05/87	1245-1340	Teflon bailer
MW215	46.84	11.90	9.77	25.5	06/04/87	0840-0930	Teflon bailer, well purged dry, greenish color and sheen on water
MW216	68.26	11.63	7.34	124	06/04/87	0850-1105	Teflon bailer
MW218	44.36	11.69	9.75	27	06/04/87	0905-0950	Teflon bailer, well purged dry, greenish color, strong sulfide odor
MW219	96.82	7.4	4.05	182	06/05/87	1130-1350	Teflon bailer
MW222	35.64	13.80	-13.24	13	06/08/87	0915-1000	Teflon bailer
MW227	31.84	2.59	-12.49	13	06/03/87	0900-0925	Teflon bailer, well purged dry
				4.5	06/04/87	0810-0825	Teflon bailer, well purged dry
TB515	29.5	14.85	-7.40	3.5	06/05/87	1535-1555	Teflon bailer, well purged dry, greenish tinge
				3.8	06/08/87	0820-0857	

- ¹ Measurements recorded in feet below the top of the inner casing by Task Force personnel
- ² Elevations recorded in feet above or below Mean Sea Level (MSL)
- ³ Rounded to the nearest 5 minutes
- ® Teflon is a registered trademark and will appear hereafter without ®.

Table 3 (cont.)
PURGING RECORD

Well Number	Total Well Depth ¹	Top of Casing Elevation ²	Water Level Elevation ²	Total Volume of Water Purged (Gal.)	Date	Time ³	Methods/Remarks
<u>Acme Wells</u>							
G6A	36.44	36.14	29.26	4.5	06/03/87	0855-0930	Teflon bailer, well purged dry
MW115	36.95	20.05	4.02	26	06/08/87	0820-0945	Teflon bailer, well purged dry
MW116	36.95	17.12	1.04	26.25	06/08/87	0755-0905	Teflon bailer, well purged dry, yellow silty purge water
MW117	26.59	11.18	4.85	18	06/05/87	1430-1445	Keck pump, well purged dry; yellow odiferous purge water
MW119	41.29	19.10	4.37	30	06/04/87	0955-1030	Keck pump, well purged dry
MW128	65.50	13.15	5.75	1.2	06/04/87	1435-1610	Keck pump
<u>Baker Wells</u>							
MW1A	32.31	14.63	8.74	18	06/10/87	1105-1150	Teflon bailer, water black, turbid, well purged dry
MW5A	24.56	9.25	3.4	36	06/10/87	1310-1435	Teflon bailer, water yellowish brown
MW6A	23.25	8.27	4.07	22	06/09/87	0850-0950	Teflon bailer, water yellow. Crew wore respirators, well purged dry
MW8A	22.75	7.77	6.43	37	06/09/87	1015-1130	Teflon bailer, purged to dryness
MW9A	22.22	8.45	2.91	33	06/10/87	1250-1340	Teflon bailer, gray water
MW14	21.33	9.34	4.99	13	06/11/87	1035-1110	Teflon bailer, well purged to dryness
MW15	101.92	7.33	4.58	194	06/10/87	0905-1130	Teflon bailer
MW101	38.0	9.28	3.83	51	06/11/87	1310-1415	Teflon bailer, water yellow, sulfur odor, purged dry

- 1 Measurements recorded in feet below the top of the inner casing by Task Force personnel
2 Elevations recorded in feet above or below Mean Sea Level (MSL)
3 Rounded to the nearest 5 minutes

Table 3 (cont.)
PURGING RECORD

Well Number	Total Well Depth ¹	Top of Casing Elevation ²	Water Level Elevation ²	Total Volume of Water Purged (Gal.)	Date	Time ³	Methods/Remarks
Baker Wells (Cont.)							
MW102	38.38	9.14	3.81	50	06/10/87	1305-1425	Teflon bailer, water yellow-black, well purged dry
MW103	26.37	7.03	3.72	20	06/10/87	0905-0950	Teflon bailer, well purged dry
MW104	32.04	9.17	5.17	54	06/09/87	1025-1130	Teflon bailer, water black
MW105	37.38	14.85	7.43	24	06/10/87	0845-0940	Teflon bailer, water yellow, well purged dry
MW106	29.43	13.87	3.74	38	06/10/87	1005-1050	Teflon bailer, water yellow, well purged dry
MW110	36.15	12.74	10.22	42	06/11/87	1140-1230	Teflon bailer, water yellow, well purged dry
MW112	44.0	12.26	3.01	28	06/09/87	0840-0920	Teflon bailer, well purged dry
MW113	33.99	6.82	5.42	43.5	06/11/87	0830-1005	Teflon bailer, water black, well purged dry
MW125	29.22	6.09	-16.45	7	06/12/87	0805-0825	Teflon bailer, well purged dry

- 1 Measurements recorded in feet below the top of the inner casing by Task Force personnel
2 Elevations recorded in feet above or below Mean Sea Level (MSL)
3 Rounded to the nearest 5 minutes

Table 4
SAMPLING RECORD

Well Number	Date	Time ¹	Sample Number	Methods/Remarks
<u>Vine Hill Wells</u>				
MW-203	06/08/87	1525-1625	MQB439	Teflon bailer, dry after TOC
MW-204	06/03/87	1025-1200	MQB423	Teflon bailer
MW-205	06/03/87	1345-1530	MQB422 MQB425 MQB426	Teflon bailer, triplicate sample
MW-206	06/03/87	1625-1700	MQB424	Teflon bailer
MW-207	06/03/87	1540-1605	MQB427	Teflon bailer, dry after POX
MW-209	06/05/87	0845-0940	MQB432	Teflon bailer
MW-212	06/05/87	1000-1055	MQB438	Teflon bailer, matrix spike
MW-214	06/05/87	1415-1505	MQB434	Teflon bailer
MW-215	06/04/87	1415-1445	MQB428	Teflon bailer, dry after four extractable organics
MW-216	06/04/87	1115-1200	MQB431	Teflon bailer
MW-218	06/04/87	1445-1535	MQB429	Teflon bailer, dry after TOX
MW-219	06/05/87	1355-1435	MQB433	Teflon bailer
MW-222	06/08/87	1630-1740	MQB441	Teflon bailer, dry after three extractable organics
MW-227	06/05/87	0820-0905	MQB437	Teflon bailer, dry after extractable organics
TB-515	06/08/87	1450-1510	MQB434	Teflon bailer, dry after POX
Field blank	06/04/87	0950-1100	MQB430	Poured at MW-216
Pond 101	06/08/87	1040-1140	MQB442	Poured from stainless steel bucket
Equipment blank	06/08/87	0720-0830	MQB435	Poured through Teflon bailer
<u>Acme Wells</u>				
G-6A	06/03/87 06/04/87	1550-1630 0820-1020	MQB402	Teflon bailer
MW-115	06/08/87 06/08/87	1130-1150 1550-1605	MQB413	Teflon bailer

¹ Time rounded to nearest 5 minutes

Table 4 (cont.)
SAMPLING RECORD - VINE HILL

Well Number	Date	Time ¹	Sample Number	Methods/Remarks
<u>Acme Wells (cont.)</u>				
MW-116	06/08/87	1045-1100	MQB412	Teflon bailer
	06/08/87	1620-1645		
MW-117	06/08/87	1515-1520	MQB415	Teflon bailer, sample very black and sediment filled, bailer oily
	06/09/87	0945-1015		
MW-119	06/04/87	1245-1335	MQB405	Teflon bailer, triplicate sample, sample very green/black
	06/05/87	0810-1020	MQB406	
			MQB407	
MW-128	06/04/87	1615-1655	MQB 409	Teflon bailer, matrix spike, sample is yellow but not turbid
<u>Baker Wells</u>				
MW-1A	06/10/87	1630-1730	MQB457	Teflon bailer, VOA through metals
	06/11/87	1430-1505		TOC through sulfides
MW-5A	06/10/87	1445-1535	MQB453	Teflon bailer
MW-6A	06/09/87	1515-1630	MQB446	Teflon bailer
MW-8A	06/10/87	1625-1730	MQB448	Teflon bailer
MW-9A	06/10/87	1350-1430	MQB451	Teflon bailer
MW-14	06/11/87	1440-1535	MQB456	Teflon bailer
MW-15	06/10/87	1130-1255	MQB447	Teflon bailer, triplicate sample
			MQB449	
			MQB452	
MW-101	06/11/87	1620-1705	MQB464	Teflon bailer, VOA through extractable organics, TOC, TOX
	06/12/87	0850-0900		Metals, phenol through sulfides
MW-102	06/11/87	1555-1645	MQB419	Teflon bailer, VOA through extractable organics, TOC, TOX

¹ Time rounded to nearest 5 minutes

Table 4 (cont.)
SAMPLING RECORD - VINE HILL

Well Number	Date	Time ¹	Sample Number	Methods/Remarks
<u>Baker Wells (cont.)</u>				
MW-102 (cont.)	06/12/87	0805-0830		Teflon bailer, metals and phenol through sulfides
MW-103	06/10/87	1435-1540	MQB454	Teflon bailer
MW-104	06/09/87	1130-1245	MQB443	Teflon bailer
MW-105	06/10/87	1520-1600	MQB455	Teflon bailer VOA through extractable organics, TOC
	06/11/87	1005-1040		metals, TOX (not enough sample to finish)
MW-106	06/10/87	1055-1145	MQB450	Teflon bailer
MW-110	06/12/87	0910-0930	MQB420	Teflon bailer, matrix spike
MW-112	06/09/87	1300-1400	MQB440	Teflon bailer, well dry after two extractables
MW-113	06/11/87	1045-1205	MQB459	Teflon bailer
MW-125	06/12/87	1225-1235	MQB460	Teflon bailer, well dry after two extractable organics
SI ² -D1	06/09/87	1510-1550	MQB444	Filled bottles directly from impoundment
SI ² -C.	06/09/87	1405-1445	MQB445	Filled bottles directly from impoundment
Field blank	06/11/87	0855-0920	MQB461	Poured near staging area
Eq. blank	06/11/87	0900-0925	MQB462	Deionized water poured through teflon bailer
G.W. seep	06/11/87	0935-0940	MQB458	Seep adjacent to SI ² -D1, sample poured from glass beaker
Trip blank	06/11/87	N/A	MQB421	Sample poured in lab

¹ Time rounded to nearest 5 minutes.
² Surface Impoundment

Table 5
ORDER OF SAMPLE COLLECTION,
BOTTLE TYPE AND PRESERVATION LIST

Parameter	Bottle	Preservative*
Volatile organic analysis (VOA)		
Purge and trap	Two 60-mL VOA vials	
Purgeable organic carbon (POC)	Two 60-mL VOA vials	
Purgeable organic halogens (POX)	Two 60-mL VOA vials	
Extractable organics	Six 1-qt. amber glass	
Dioxins/furans	Two 1-qt. amber glass	
Total metals	One 1-qt. plastic	HNO ₃
Total organic carbon (TOC)	One 4-oz. glass	H ₂ SO ₄
Total organic halogens (TOX)	One 1-qt. amber glass	
Phenol	One 1-qt. amber glass	CuSO ₄ + H ₃ PO ₄
Cyanide	One 1-qt. plastic	NaOH
Anions	One 1-qt. plastic	
Sulfides	One 1-qt. plastic	

* All samples were stored on ice immediately after collection and during transport to the analytical laboratories.

12. Sample containers were filled for the various parameters in the order shown in Table 5 using the equipment indicated in Table 3. All samples collected from the monitoring wells and impoundments were filled directly from the bailer or a bucket. Split samples were collected by filling one-third of each sample bottle for IT and the Task Force, respectively, from the bailer or bucket until each bottle was filled. If the volume in the bailer or bucket could not fill one-third of each bottle, the bailer was divided equally between the bottles.
13. Samples were placed on ice in an insulated cooler.
14. Contractor personnel took the samples, immediately after collection, to a staging area where the samples were preserved [Table 5].

The sequence of sample collection for some parameters was modified when slow recharge prevented collection of all aliquots in sequence without lapsed time between aliquots. In these cases (Vine Hill wells MW-203, MW-207, MW-215, MW-218, MW-222, MW-227, TB-51.5 and Baker wells MW-1A, MW-101, MW-102 and MW-105) organic samples were collected within 2 hours following purging; the remaining aliquots were collected, if possible, after allowing time for the wells to recharge.

The EPA contractor prepared field blanks for each analytical parameter group (e.g., volatiles, organics and metals) twice during the investigation [Vine Hill; (near well MW-216)] and [Baker; (near the sample staging area)] by pouring distilled, deionized water into sample containers. Two equipment blanks were poured, both through laboratory-cleaned Teflon bailers. One trip blank for each parameter group was prepared and submitted to the laboratory during the inspection. The blanks were submitted with no distinguishing labeling or marking to identify them as blanks, nor did the samples have any distinguishing labeling to identify them as samples. Hence, the laboratories could not determine sample locations or whether a sample was a blank or not. Thus, all aliquots submitted to laboratories for analysis were "blind" to aid in achieving quality assurance/quality control goals.

In addition to the blank samples, matrix spike and triplicate samples were taken for analytical quality assurance/quality control purposes. Two laboratory matrix spike samples, each consisting of two duplicate VOA vials and two 1-liter amber glass bottles, were collected (Vine Hill well MW-212 and Baker well MW-101). Three laboratory triplicates of all parameter groups were collected (Vine Hill well MW-205, Baker well MW-15, and Acme well MW-119).

During collection of all samples, Task Force personnel followed the safety procedures contained in EPA 1440-Occupational Health and Safety Manual (1986 edition); Agency orders and applicable provisions of the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual.

At the end of each day, Task Force samples were packaged and shipped to either of two EPA contract laboratories or the NEIC laboratory, according to applicable Department of Transportation (DOT) regulations (49 CFR Parts 171-177). IT personnel were given receipts for all samples collected. Task Force chain-of-custody procedures were followed during the handling, transfer, and shipping of all samples.

Following collection of all ground-water samples, Versar installed ISCO® meters to continuously record water levels in each of the four monitoring wells chosen [Table 6]. These wells were chosen by the Task Force for their proximity to the levee along a tidal reach of Walnut Creek, and represented the highest potential for detection of tidal influences, if present. Although no ground-water level fluctuations attributable to tidal effects were identified, if present, they could affect the direction and rate of migration of ground-water contaminants associated with waste disposal operations at the IT facilities. The procedures listed below were followed when assembling, calibrating, and operating the ISCO water level meters.

1. Versar personnel assembled the ISCO meters using Model 1870 meters and 1/4-inch ID (inside diameter) stainless steel tubing.

® *ISCO is a registered trademark and will appear hereafter without ®.*

Table 6
ISCO METER VERIFICATION

Date	Time	ISCO Display (feet)	Water Level (feet)
<u>Well MW-15</u>			
6/11	1140	1.026	2.97
6/12	0945	1.000*	
6/12	1300	0.987	3.03
<u>Well MW-103</u>			
6/11	1141	0.502	13.12
6/12	1255	5.160	8.38
<u>Well MW-126</u>			
6/11	1254	1.000	22.13
6/12	1009	2.109	
6/12	1225	2.213	20.91
<u>Well MW-127</u>			
6/11	1332	1.002	18.24
6/12	1013	1.91	
6/12	1235	1.998	17.25

* Replaced battery and reset to 1.000 display

2. The meters were calibrated as follows:
 - a. Chart recorder was set to a speed of 3, 4, or 12 inches per hour.
 - b. The bubbler was adjusted to release one air bubble per second.
 - c. The end of the stainless steel tubing was lowered into a graduated cylinder containing distilled water. The tip of the tubing was moved up and down in the water column while

the LED display on the ISCO meter was calibrated for depth of immersion.

3. The tubing was lowered into the well to a depth of approximately 1/2 or 1 foot below the water surface as indicated by the ISCO calibrated display (0.500 or 1.000, respectively).
4. The date, time, and ISCO display were recorded on the strip chart.
5. The water level was measured with the Interface Probe and recorded. The probe was decontaminated according to the procedures identified previously.
6. The wellhead was sealed with a plastic bag around both the well and the ISCO meter and taped. The tape was signed by the contractor to verify security between water level measurements.
7. Steps 4, 5, and 6 above were repeated daily to verify the accuracy of the ISCO meters [Table 6].

One of the four ISCO meters operated intermittently due to battery failure and measurements were terminated after 24 hours because other aspects of the investigation had been completed.

The ISCO meters recorded water level fluctuations for approximately a 24-hour period. The wells chosen by the Task Force for water level monitoring had also been sampled and were being developed during the Task Force inspection. The time period between sampling and periods of development and installation of the water level recorders was not great enough to record any water level fluctuations except those which can be attributed to water level recovery. No tidal effects were observed.

The average net annual evaporation rate for the area in 1984 and 1985 was about 30 to 40 inches. Prevailing wind direction is to the south and southwest.

FACILITY DESCRIPTION

WASTE ACCEPTANCE PROCEDURES - VINE HILL

The laboratory at the Vine Hill facility performs the waste stream predisposal and truck receiving analyses as well as monitoring onsite treatment/disposal processes. Equipment is available for taking samples of incoming waste loads as well as for conducting the required determinations, as specified in the Waste Analysis Plan.

Pre-Acceptance

Prior to accepting a waste load for storage/treatment/disposal, IT personnel obtain a representative sample of each candidate waste stream and submit it to the Vine Hill laboratory for physical and chemical characterization. All pre-acceptance analytical results are reviewed by the laboratory supervisor for acceptable quality control results. The pre-acceptance information is used to (1) determine whether or not Vine Hill can handle the waste and (2) compare the analytical results from any truck load to ensure that the waste actually received is the same as that approved during the pre-acceptance evaluation. When a waste stream is accepted for handling at Vine Hill, it is assigned a waste stream number and each load of the waste is identified by that waste stream number. In this way, IT can control the wastes it receives and determine that wastes that cannot be handled (PCBs and reactive waste) are not accepted.

The March 14, 1983 DOHS-approved Vine Hill Waste Analysis Plan (WAP)* indicates that at a minimum pH, normality, density, phase distribution, and hydrocarbon vapor pressure (HCVP) are determined on all pre-acceptance samples. These determinations are necessary to obtain a base characterization upon which the analytical results from truck loads will be matched to verify waste identification. Additional analyses may be conducted, based on identified characteristics and generator-supplied information, and may include flash-point, sulfide, cyanide, phenols, and metals. All oils are reportedly screened for

* *A part of the DOHS-Approved Operations Plan*

PCBs and priority pollutant metals. Fluoride is also reportedly determined on all acidic waste to preclude unknown acceptance of hydrofluoric acid, an extremely hazardous waste, as defined by 22 CAC, Article 11, Sections 66717 and 66720.

Pre-acceptance analytical results are recorded on the Hazardous Waste Disposal Evaluation form (HWDE) and put together with other information on the waste supplied by the generator (customer evaluation form) to form the "Job Jacket." Job jackets are maintained in the data processing section of the laboratory near the truck receiving station. Normally, the pre-acceptance procedure requires 2 weeks for completion. On occasion, trucks will arrive with loads without the required pre-acceptance analyses. In these cases, an analysis is conducted while the truck waits. The analysis normally takes about 4 hours.

Truck Receiving

Upon arrival of a waste load at Vine Hill, verification of waste characteristics and initiation of a waste tracking process begins. The shipping manifest is turned over to the facility and the truck driver assists in sampling the waste (usually opens the tank truck hatch). The HWPE form from the "Job Jacket" is attached to the manifest and the forms and samples are given to the laboratory personnel for analyses. The WAP requires that the laboratory conduct pH, normality, density, phase distribution, and HCVP on these samples. Also, all samples with an organic phase are required to be distilled to identify heavier-than-water solvents (usually chlorinated). Additional analyses, such as metals and spot tests for cyanide, sulfide, and phenols, are conducted as deemed necessary by IT. Analytical results of truck loads are recorded on the Disposal (or Treatment/ Disposal) Location forms.

WASTE TRACKING

Waste characterization before receipt at a TSDF and tracking after receipt are required under both RCRA and State interim status regulations. These are important in determining the constituents that could potentially be released from waste handling units. To determine whether IT sufficiently

characterizes waste it receives and records the disposal location, the Task Force reviewed the preacceptance and tracking records for 41 waste loads received in either October 1986 or January 1987.

The records review indicated that waste acceptance procedures are adequate. However, Tank Treatment Processing Records are often incomplete. No records are kept for several of the tanks and waste loads can often only be tracked to their initial unloading stations. IT has entered into a consent agreement, dated April 1, 1987, with the State to improve its operating record.

WASTE HANDLING UNITS AND FACILITY OPERATIONS

VINE HILL

The Vine Hill facility is a hazardous waste treatment, storage, and disposal facility currently using the following waste management units and processes [Figures 2 and 4].

- Container storage area - storage of laboratory waste
- Surface impoundments - storage, treatment, disposal
- Tanks - storage, treatment
- Incineration - treatment
- Centrifugation - sludge treatment

The Baker facility only has surface impoundments.

Waste materials received at Vine Hill are normally the by-products of chemical and manufacturing processes, predominantly from the following industries.

- Petroleum products
- Ferrous and non-ferrous metals
- Electronics equipment and components
- Resins, paints and pigments
- Pharmaceutical
- Food processing
- National defense

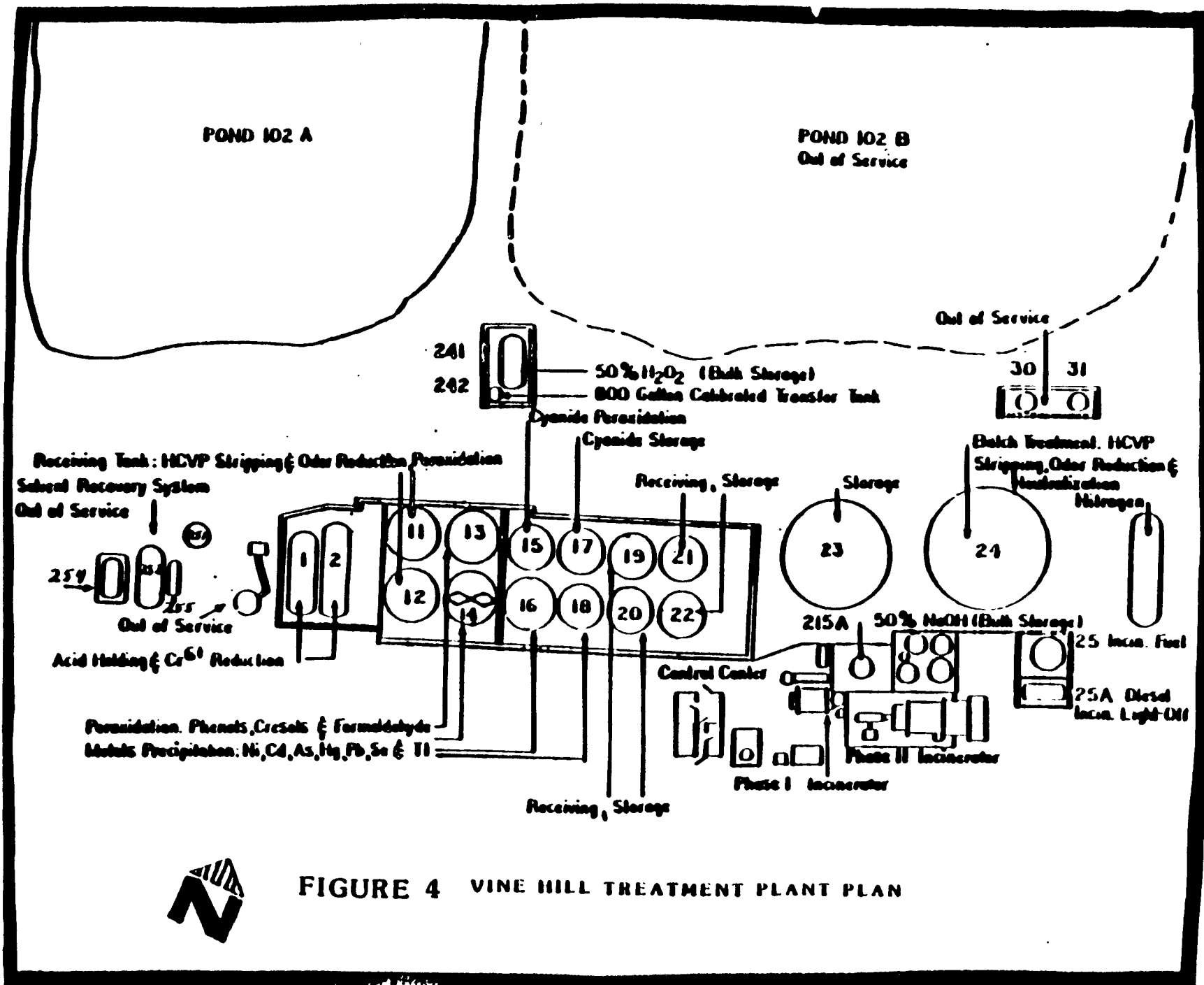


FIGURE 4 VINE HILL TREATMENT PLANT PLAN

- Metal finishing
- Photo processing
- Analytical laboratories

Spill cleanup residue and liquid from the surface impoundments of IT's Panoche (formally Benecia) landfill are also handled at this facility.

Primary treatment processes used at Vine Hill include:

- Cyanide, sulfide, and organic material (phenol, cresol, formaldehyde, etc.) oxidation
- Heavy metals precipitation
- Acid-base neutralization (pH adjustment)
- Solids/oil/water separation
- Chromium reduction
- Odor reduction
- Steam stripping
- Incineration
- Sludge dewatering (centrifugation and evaporation)
- Liquid waste reduction (evaporation)

In the fall of 1985, IT purchased land immediately south of the facility known as the "Acme Property." The area, formerly owned by Acme Fill Corporation, had four surface impoundments (Acme Ponds). IT personnel indicated that, except for the fact that scrap material had been stored there, they had no additional information about the past use of this area. Although IT indicated they are not currently using this property, IT has cleaned up scrap material and graded some of the land. Closure of the former Acme Property Ponds is included in the proposed modernization plan for the Vine Hill facility.

Prior to 1960, Acme used this property for disposal of industrial and sanitary wastes. The property was leased to IT in 1960 to use in conjunction with the Vine Hill facility. There was an enhanced potential for vertical migration of contaminants through the bay mud to the ground water because the impoundments were unlined. In 1970, IT stopped adding wastes to the Acme property impoundments.

As indicated earlier, IT treats, stores, and disposes of hazardous waste in containers, surface impoundments, tanks, incinerator, and/or by centrifuge at the Vine Hill facility. Following is a discussion of the various management areas and their operation.

Container Storage Area

The IT Vine Hill container storage area is located on a concrete pad inside a concrete bermed tank containment area located near surface impoundment 100. It is reported by IT to be used only to store laboratory waste such as spent solvents generated onsite prior to offsite disposal or, rarely as a drum accumulation area until the containers can be emptied into the appropriate surface impoundment or tank. Drums are stored on pallets within this 3-foot-high bermed area.

Surface Impoundments

All surface impoundments at both Vine Hill and Baker are unlined. Wastes placed in these impoundments include solvents, metals, phenols, cyanide, sulfides, organics, and other waste placed in them for solids separation and/or solar evaporation. Waste is also often pumped from pond to pond and all of the impoundments at both sites have contaminated ground water.

Vine Hill Facility

IT currently operates seven unlined surface impoundments* at Vine Hill for waste storage, treatment, and disposal, as described in Table 7. Five additional inactive impoundments are also described. An eighth unit, 102B, was used until about October 1984 when it was filled in and covered with gravel. According to IT, the area was being retained as a "support facility for

* IT refers to its surface impoundments as ponds and designates them 100 through 106.

Table 7
SURFACE IMPOUNDMENTS
Vine Hill Facility

Surface Impoundment Number	Surface Area (acres)	Calculated Depth ¹ (feet)	Capacity ² (gallons)	General Use Category
100	0.606	9	1,383,109	Lead containing sludge
101	10.727	9	24,467,612	General oily/aqueous waste
102A	1.104	8	2,158,338	Recoverable oily waste
102B ³	1.7	6	3,300,000	Oily sludges/sludge dewatering
103 ⁴	0.292	8	570,305	Acids and bases; low solids waste
104	1.585	10	4,082,919	Oil/water mixture
105	0.507	8	990,607	High solids waste
106	0.341	9	777,314	Aqueous; no oils, low solids waste (Baker feed)
201 ⁵	0.6	7.9		Inactive
202 ⁵	0.7	8.1		Inactive
203 ⁵	1.4	5.6		Inactive
204 ⁵	3.5	5.7		Inactive
TOTAL CAPACITY (not including 102B)			34,400,000	

¹ Calculated from given surface area and capacity, includes operating freeboard.

² Capacity represents maximum liquid/sludge volume maintaining 2 feet of freeboard.

³ This impoundment was filled between October 1984 through May 1985.

⁴ Pond 103 is reportedly maintained with 4 feet of freeboard to serve as containment for tank 24.

⁵ Information concerning these impoundments is from the IT Preliminary Hydrogeological Assessment Report dated June 1987.

above ground treatment and storage" during the 1986 NEIC-RCRA investigation, which included RCRA compliance other than ground-water monitoring.** However, a September 10, 1984 letter from IT to the California DOHS indicated the impoundment was "being converted from functioning as direct receipt and storage of materials, to a service of acting as a containment structure for additional tankage for plant modernization." The area was being used only for vehicle parking during the Task Force inspection. The unit (102B) was not closed under an approved RCRA closure plan and DOHS had requested additional information from IT. Similarly, IT has altered several other impoundments without DOHS' approval, as will be discussed on the following pages.

The Vine Hill surface impoundments, except for 101 and former Acme impoundments 203 and 204 have a diked northeast side, and are basically excavations into the area fill.* The units, except for 102A which is apart from the others, are separated by internal dikes of varying widths. The interior walls of the units, and some of the tops of the separation berms, do not have any protective covering. The outside of the northeast dike of impoundment 101 did have vegetative cover during the Task Force inspection.

IT indicated that impoundments 102A and 101 were reduced in size in May/June 1985 and sometime in 1981, respectively. This was accomplished by placing and compacting fill into the impoundments; sludge/liquid was not removed, only compacted/displaced by the added fill. IT did not report these changes to any regulatory agency. A chronology of impoundment construction events for both Vine Hill and Baker is presented in Table 8.

IT reported that the area of impoundment 101, an extension called "Charlie's Alley," was filled to "provide mobilization support and storage in connection with site drilling operations." During the NEIC inspection, this area was used for storage of out-of-service tanks, raw treatment chemicals, and

** This inspection included review and evaluation of: (1) past and present waste handling units and procedures, (2) onsite laboratory procedures, plans and documenttion for waste pre-acceptance, identification and verification, (3) selected waste tracking and disposal records and documents, and (4) selected facility inspection and personnel training records and the facility inspection and training plan.
The site was previously used as a landfill.

miscellaneous equipment. No further information was available for these "filling" activities.

Table 8
CHRONOLOGY OF IMPOUNDMENT CONSTRUCTION

Site Plan or Air Photo Date	Vine Hill and Baker Treatment Complex Status
10-08-52	No impoundments
05-04-57	Impoundment 102 in place
07-21-58	Impoundment 104 now in place
06-08-59	Impoundment T-1 now in place
07-16-63	Impoundment 101, 105 & 106 (Interconnected) now in place Impoundments 201, 202 & 203 (interconnected) now in place Impoundments T-5 and T-6 now in place
08-09-65	Impoundments 204, T-2, T-3 and T-4 now in place Impoundments 101, 105 & 106 no longer interconnected
05-20-69	Impoundment 103 now in place
09-02-70	No change
06-04-71	Impoundments 100 now in place Impoundments T-2, T-3, T-4, T-5 & T-6 now gone
03-04-74	Impoundments A (single unit), B and C now in place*
05-20-76	Impoundment T-1 now gone Impoundment 102 divided into 102A and 102B Impoundment Area 1 through 4 now in place Impoundment E now in place*
10-10-78	Impoundment D-1 now in place*
05-15-80	Impoundments 201, 202 & 203 no longer interconnected Impoundment A now divided into A-1, A-2, A-3, A-4 and A-5*
10-22-80	Impoundments D-1 and D-2/D-3 (interconnected) now in place* Impoundments D-2 and D-3 no longer interconnected* Narrow Arm of Impoundment 101 extending a long south side of Impoundment 100 is now gone
08-03-84	No change
08-12-86	Impoundment 102B now gone (this impoundment was emptied and backfilled with imported fill during the period from October 1984 to May 1985)

* Baker impoundments

Aerial photographs of the site indicate that 35 feet or more of the north portion of impoundment 102A was also filled in between December 5, 1983

and February 22, 1984. During the Task Force inspection, the area was used, at various times, for a roadway and truck parking. A southern portion of 102A was also filled sometime between March 1974 and December 1983. Current (1987) dimensions for Vine Hill impoundments are presented in Table 9. Embankment construction materials listed in Table 9 are defined in Table 10.

Wastes received at Vine Hill for treatment and evaporation in surface impoundments are normally received in impoundments 102A, 103, 105 or 106 (102B was also used for direct waste receipts). From these impoundments, waste can be pumped to any other unit at Vine Hill, as well as to the Baker facility impoundments. The Vine Hill impoundments are not dedicated to specific wastes or treatment processes but are used interchangeably for storage and treatment including waste dewatering (evaporation), waste phase separation, pH adjustment and metals precipitation. However, as will be described later, some of the impoundments have patterns of "normal" use. The high volume of waste receipts necessitates that liquid from the major receiving units (impoundments 103, 105, 102A and 106) be moved to impoundments 101 and 104 as well as to the Baker impoundments as soon as possible. The apparent intent of the Vine Hill impoundments, except for 100 and possibly 101 and 104, is primary treatment of the wastewater, while the Baker impoundments are used for final treatment and evaporation. Table 11 identifies waste constituents received in the various Vine Hill surface impoundments and tanks.*

When sludge in the impoundments accumulates to levels which limit liquid management, it is normally pumped (submersible pumps) to impoundment 105 where it is removed and dewatered by an onsite mobile centrifuge (see Centrifuge Discussion). The centrifuge has also been moved to some of the other impoundments to remove sludge directly. IT uses a floating pump/suction system with a flexible 6-inch pipe to move sludge.

IT reportedly follows Article 15 (Land Disposal Restrictions) of the California Hazardous Waste Management Regulations to determine which incoming wastes are placed in the surface impoundments and which must be placed in the tanks.

* *From a review of shipping manifests and Disposal Location forms*

TABLE 9
EMBANKMENT DIMENSIONS
VINE HILL IMPOUNDMENTS

Impoundment	Embankment	Inboard Height (ft)	Inboard Slope (H:V)	Outboard Height (ft)	Outboard Slope (H:V)	Length (ft)	USCS Symbol
100	a	13.0	1.5:1	11.9	1.2:1	280	CL,SP,GP,GM,GC
	b	11.6	1.9:1	12.6	1.9:1	130	ML,SC,GP,CL
	c	11.8	2.7:1	0	-	280	SC,CL,SM,CH
	d	10.8	5.8:1	0	-	130	CL,GC,SM,GP
101	a	12.0	1.3:1	0	-	630	CL,ML,SW,GW
	b	13.1	2.5:1	10.4	2.1:1	650	CL,SC,CH
	c	12.2	1.5:1	12.9	1.9:1	480	CL,SM,GP,GC,SP,GW
	d	12.5	2.1:1	13.7	1.6:1	530	CL,SC,SM,ML,CH,GP
	e	12.5	2.0:1	13.6	1.0:1	200	CL,GC,SM,SC,ML
	f	11.8	3.0:1	13.8	2.6:1	110	GC,SM,CL,GM
102A	a	12.5	1.5:1	0	-	170	CL,GC
	b	12.1	3.3:1	0	-	240	GC,SM,ML,CL
	c	12.6	2.1:1	0	-	150	(1)
	d	12.0	2.4:1	0	-	250	SM
103	a	12.1	1.3:1	12.3	1.6:1	100	SC,GP,SM,CL
	b	13.5	1.4:1	12.6	1.4:1	120	CL,GC,SM,GP
	c	12.3	1.0:1	0	-	120	CL,GP
	d	14.1	1.4:1	0	-	150	SC,GP
104	a	13.6	1.0:1	12.5	2.0:1	200	CL,GC,SM,SC,ML
	b	13.7	1.6:1	12.5	2.1:1	320	CL,SC,SM,CH,ML
	c	11.9	1.2:1	13.0	1.5:1	240	CL,SP,GP,GM,GC
	d	12.6	1.4:1	13.5	1.4:1	350	CG,CL,SM,CH
105	a	12.4	1.5:1	11.5	1.6:1	160	GC,SM
	b	13.4	1.0:1	11.9	1.7:1	200	CL,SM,CH,GC
	c	12.3	1.6:1	12.1	1.3:1	100	SC,GP,SM,CL
	d	12.1	2.0:1	0	-	170	SC,GP
106	a	13.4	1.4:1	0	-	150	ML,GC,GP,CL,GM
	b	13.8	2.6:1	11.8	3.0:1	120	GC,SM,ML,GP
	c	11.5	1.6:1	12.4	1.5:1	150	GC,SM
	d	12.0	2.3:1	0	-	130	ML,GP

TABLE 9 (cont.)
EMBANKMENT DIMENSIONS
VINE HILL IMPOUNDMENT

Impoundment ¹	Embankment ¹	Inboard Height (ft)	Inboard Slope (H:V)	Outboard Height (ft)	Outboard Slope (H:V)	Length (ft)	USCS Symbol
201	a	9.3	1.9:1	0	-	250	SC,CL,ML,GM,OH
	b	5.5	2.5:1	7.1	2.1:1	190	(1)
	c	5.9	3.0:1	8.7	2.9:1	120	SW,CL,ML
	d	6.9	2.6:1	0	-	250	SW,GM,CL,ML
202	a	10.0	2.0:1	11.4	2.7:1	220	SM,CL,GP,SP
	b	5.9	3.3:1	6.8	1.9:1	190	(1)
	c	8.3	1.5:1	9.7	1.8:1	190	OH,SM
	d	7.1	2.1:1	5.5	2.5:1	190	(1)
203	a	12.9	1.9:1	12.2	1.5:1	310	CL,SM,GC,GW,SC
	b	10.6	2.1:1	4.5	5.6:1	180	CL,ML,SM
	c	8.2	1.9:1	8.5	1.8:1	330	OH,SM,CL
	d	6.8	1.9:1	5.9	3.3:1	190	(1)
204	a	8.5	1.8:1	8.2	1.9:1	640	OH,SW,SM,CL
	b	9.8	2.1:1	6.3	2.0:1	500	CL,SM,ML
	c	10.6	1.7:1	0	-	750	CL

¹ No data available

Table 10
UNIFIED SOIL CLASSIFICATION SYSTEM CHART

<u>Coarse-Grained Soils</u>		
Clean gravels (little or no fines)	GW	Well-graded gravels, gravel-sand mixture, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
Gravels with fines (appreciable amount of fines)	GM	Silty gravels; gravel-sand-silt mixtures
	GC	Clayey gravels; gravel-sand-clay mixtures
Clean sands (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly-graded sands, gravelly sands, little or no fines
Sands with fines (appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
<hr/>		
<u>Fine-Grained/Highly Organic Soils</u>		
Silts and clays liquid limit (less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sand clays
	OL	Organic silts and organic silty clays of low plasticity
Silts and clays liquid limit (greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils	PT	Peat, humus, swamp soils with high organic contents

INCOMING WASTE CONSTITUENTS RECEIVED IN VINE HILL HAZARDOUS WASTE UNITS*Pond 102S

Aluminum hydroxide
Aluminum phosphate
Animal fat
Caustic
Detergent
Diesel
Gasoline
Lead
Lubricant
Machine coolant, oil base
Metal sludge
Mud
Oil
Paint waste
Silicate
Sludge
Solvent
Solvent (kerosene based)
Soybean oil
Water

Pond 102B

Ammonia
Boiler Wash Sludge
Boron
Cadmium
Calcium chloride
Carbon
Caustic liquid
Chlorine
Chromium
Copper
Corrosive liquid
Cyanide
Diesel
Ferric chloride
Latex polymer paint
Lead
Lime sludge
Mud
Nickel
Oil
Oil/water separator sludge
Phosphorous
Potassium permanganate
Selenium
Silver
Sodium hydroxide
Sulfur
Tin
Vanadium
White glue (PVA resin)
Zinc

Pond 103

Acetic acid

Acetone
Acrylic paint thinner
Alkaline cleaners
Alkaline liquid
Alkaline salts
Aluminum
Aluminum sulfate
Amines
Ammonia
Ammonium bisulfate
Ammonium bromide
Ammonium citrate
Ammonium ferric EDTA
Ammonium fluoride
Ammonium hydroxide
Ammonium thiosulfate
Anthraquinone-2,6-disulfonic acid
Antimony
Arsenic
Barium
Bentonite
Benzene
Biodegradable soap
Bismaleimide
Brine
Butoxyethanol
Butyl carbitol
Cadmium
Calcium carbonate
Calcium fluoride
Calcium hydroxide
Carbitol
Caustic brine rinse
Caustic soda
Chloroform
Chlorine
Chromate
Chromium
Cobalt
Copper
Copper chloride
Copper hydroxide
Copper oxide
Copper sulfate
Cyanide
Cyclohexanone
Detergents
Diazinon
1,2-Dichloroethane
Diesel
Dyes (unspecified)
Ethanolamine
Ferrous hydroxide
Ferrous sulfate
Fertilizer
Fluorides
Formaldehyde
Formic acid

Freon
Gallium arsenic
Gasoline
Gravel
Hydrochloric acid
Hydrazine
Hydrofluoric acid
Hydrogen peroxide
Hydroquinone
Hydroxyacetic acid
Ink sludge
Inorganic salts
Iron
Iron phosphate
Isodecanes
Isopropyl alcohol
Kerosene
Lacquer thinners
Latex emulsion
Lead
Lead chloride
Lignon sulphonate
Lime
Manganese
Mercaptan
Mercaptoaniline
Mercury
Methanol
Methylene chloride
Methyl ethyl ketone
Molybdenum
Monoethanol amine
Mud
Muratic acid
N-butyl acetate
Neutral salts
Nickel
Nickel hydroxide
Nitrate
Nitric acid
Nitrilotriacetic
Nitrosodimethylamine
Oil
Oil sludge
Organic bases
Paint
Paint skins
Paint sludge
Paint thinners
PCBs (<50ppm)
Permanganate
Petroleum solvents
Phenols
Phosphates
Phosphoric acid
Phosphorous acid
Polymer solids
Potassium

* Only includes those wastes directly off-loaded into units. Does not account for waste pumped from other areas within the IT facility.

Table 11 (Cont.)

INCOMING WASTE CONSTITUENTS RECEIVED IN VINE HILL HAZARDOUS WASTE UNITS*

Potassium ammonium
 Potassium hydroxide
 Pyrophosphate
 Rust and scale
 Silica
 Sodium chromate
 Sodium chloride
 Sodium ferrocyanide
 Sodium hydroxide
 Sodium hypochlorite
 Sodium nitrate
 Sodium nitrite
 Sodium sulfate
 Solvents
 Sugar
 Sulfides
 Sulfite
 Sulfur
 Sulfuric acid
 Surfactants
 Tallow
 Tetrachloroethylene
 Thimersal
 Titanium
 Toluene
 Trichloroethane
 Triethanolamine
 Turbine fuel
 Unspecified alcohol
 Vanadium
 Vanadium pentoxide
 Water
 Xylene
 Zinc
 Zinc chloride
 Zinc sulfide sludge

Pond 105

Acetic acid
 Acrylic latex paint
 Acrylic resin
 Activated carbon pellets
 Alkaline cleaning compound
 Alkaline sludge
 Alkaline water
 Almond oil
 Alodine sludge
 Aluminum
 Aluminum hydroxide
 Aluminum oxide
 Aluminum phosphate
 Ammonia
 Ammonium iodine
 Animal fat
 Antifreeze
 Arsenic
 Barium
 Bentonite

Bismaleimide
 Bleach
 Bordens glue
 Butyl alcohol
 Butyl carbitol
 Cadmium
 Calcium
 Calcium carbonate
 Calcium chloride
 Calcium fluoride
 Calcium hydroxide
 Carbon
 Casein
 Caustic soda
 Chlorides
 Chromium
 Clay
 Cobalt
 Copper
 Copper chloride
 Copper hydroxide
 Copper oxide
 Copper sulfate
 Cresol
 Detergent
 Diesel
 Diesel soaked sawdust
 Enamel paint
 Ferric chloride
 Ferrous sulfate
 Fluoride
 Fluoride salt
 Formaldehyde
 Gasoline
 Glue
 Grease
 Hydrated alumina sludge
 Hydraulic fluid
 Hydrochloric acid
 Iron
 Iron hydroxide
 Kerosene
 Latex paint
 Lead
 Lead chloride
 Lead hydroxide
 Lead oxide
 Lime sludge
 Machine coolant, oil base
 Mercaptans
 Mercury
 Metal sludge
 Mineral oils/spirits
 Molasses
 Molybdenum
 Monoethanol amine
 Mud
 Neutralized acids in lime sludge

Nickel
 Nickel hydroxide
 Nitrates
 Nitric acid
 Oil
 Organic compounds
 Organic pigments
 Oxalic acid
 Paint sludge
 Paint thinners
 Paper pulp
 Phenols
 Phosphoric acid
 Polyvinyl alcohol
 Pulp slurry
 Rosin resin
 Silane (silicon tetrahydride)
 Silicon
 Silver
 Soda Ash
 Sodium androxide
 Sodium bisulfate
 Sodium hydroxide
 Sodium phosphates
 Sodium sulphate
 Solvents
 Starches
 Styrofoam
 Sugar
 Sulfates
 Sulfides
 Sulfur
 Sulfuric acid
 Tin
 Tin sulfate
 Titanium dioxide
 Trimsol
 Unspecified volatile residue
 Vanadium
 Vanadium pentoxide
 Villin black liquor
 Water
 Waterbase ink
 Waterbase paint
 Wax emulsions
 White glue (PVA resins)
 Zinc
 Zinc chloride
 Zinc phosphate
 Zinc sulfide

Pond 106

Alkaline cleaner
 Ammonia
 Ammonium fluoride
 Cumene hydroperoxide
 Grease
 Hydrofluoric acid

Table 11 (Cont.)

INCOMING WASTE CONSTITUENTS RECEIVED IN VINE HILL HAZARDOUS WASTE UNITS*

Mercury
Oil
Organic peroxide
Polyglycol
Sludge (unspecified)
Sulfolane (tetramethylene sulfone)
Sulfur
Water

Tank 1

Acetic acid
Alodine
Amines
Ammonia
Ammonia hydroxide
Ammonium fluoride
Ammonium persulfate
Arsenic
Boric acid
Cadmium
Caustic
Chromic acid
Chromium
Copper
Copper sulfate
Ferric chloride
Fluoroboric acid
Fluoride
Hexavalent chrome
Hydrochloric acid
Hydrofluoric acid
Iron
Iron phosphate
Iron sulfate
Lead
Lead fluoborate
Metals
Molybdenum
Nickel
Nitric acid
Nonchlorinate solvent
Paint sludge
Paint waste in water
Palladium
Phosphoric acid
Photo chemicals
Polyphosphoric acid
Potassium persulfates
Sodium ash
Sodium carbonate
Sodium chloride
Sodium dichromate
Sodium hydroxide
Sodium nitrate
Stannous chloride
Sulfamic acid
Sulfonic acid
Sulfuric acid

Thiourea
Tin
Tin fluoroborate
Toluene
Zinc sulfate

Tank 2

Accelator
Acetic Acid
Alkaline water
Aluminum
Ammonia
Ammonium fluoride
Ammonium persulfate
Arsenic
Bleach
Cadmium
Chromates
Chromic acid
Chromium
Chromium trioxide
Cobalt
Copper
Copper sulfate
Electro-polish solution
Ferric chloride
Fluoroboric acid
Gallium arsenic
Hydrochloric acid
Hydrofluoric acid
Iron
Lead
Nickel
Nitric acid
Potassium dichromate
Selenium
Sodium dichromate
Sodium hydroxide
Sulfite⁻³ (a Betz product)
Sulfuric acid
Zinc

Tank 11

Acetic acid
Acetone
Alpha olefin
Agricultural fertilizer
Alcohol
Ammonia
Ammonium fluoride
Brine
Cadmium
Casein
Caustic soda
Chromium
Dicyclopentadiene
Dimethyl silixane
Diesel

Enamel paint
Epoxy acrylate sulfate
Ethylene glycol monoethyl ether
Fuel oil
Gasoline
Hydrofluoric acid
Iron
Isopropanol
Jet fuel
Lead
Methanol
Methyl ethyl ketone
Naptha
N-butyl acetate
Nitrosohexamethyleneimine
Oil
Paint thinner
PCB (<50 ppm)
Phenols
Rust and scale
Silver
Soap
Sodium hydroxide
Sodium nitrate
Sodium sulfate
Solvents
Sulfuric acid and lime
Tetraethyl lead
1,1,1-trichloroethane
Unspecified coolant
Wastewater (unspecified)
Zylene
Zinc

Tank 12

Acetone
Alcohols (unspecified)
Alkaline detergent
Ammonia
Aniline
Benzene
Butanol
Caustic soda
Chromium
Combustible liquid
Copper
Diesel
Dipropylaniline
Formaldehyde
Gasoline
Glycol
Hydrochloric acid
Inks
Isopropanol
JP-4 fuel
Kerosene
N-butyl acetone
Nitric acid

Table 11 (Cont.)

INCOMING WASTE CONSTITUENTS RECEIVED IN VINE HILL HAZARDOUS WASTE UNITS*

Oil
Oil sludge
Paint sludge
Paint thinner
Phenol
Phosphoric acid
Rust and scale
Silver
Sludge (unspecified)
Sodium acetate
Sodium fluoride
Sodium hydroxide
Sodium nitrate
Solvents (unspecified)
Sulphuric acid
Tetraethyl lead
Unspecified coolant
Wastewater (unspecified)
Xylene
Xylol
Zinc

Tank 13

Acid sludge with metals
Acids
Aluminum
Ammonium persulfate
Cadmium
Calcium carbonate
Carbon
Caustic (unspecified)
Chromate
Chromic acid
Chromium
Cobalt
Copper sulfate
Fluoroboric acid
Formaldehyde
Gasoline
Grease
Hydrochloric acid
Hydrofluoric acid
Iron
Lactic acid
Latex emulsion
Lead
Lime
Methylene chloride
Mud
Nickel
Nickel chloride
Nickel sulfate
Nitric acid
Oil
Phenols
Phosphoric acid
Rust and scale
Sodium dichromate

Sodium hydroxide
Sodium hypophosphite
Sulfides
Sulfur
Sulfuric acid
Tin
Vanadium

Tank 14

Acetic acid
Acetone
Acid sludge
Ammonium fluoride
Ammonium nitrate/phosphate
Ammonium persulfate
Arsenic
Cadmium
Chromic acid
Chromium
Cobalt sulfate
Cresol
Detergent
Ethyl acetate
Ethylene glycol
Epoxy
Fluoroboric acid
Formaldehyde
Gasoline
Hydrochloric acid
Hydrofluoric acid
Iron
Isopropanol
Lactic acid
Lead
Machine sump wastewater
Manganese
Methyl ethyl ketone
Methylpyrrolidinone
Mud
Muratic acid
Nickel
Nickel plating solution
Nickel sulfate
Nitric acid
Oil
Phenols
Phosphates
Phosphoric acid
Printing waste
Selenium
Sodium carbonate
Sodium citrate
Sodium chloride
Sodium hydroxide
Sodium hypophosphate
Sodium phosphate
Sodium sulfate
Sulfides

Sulfuric acid
Water
Water-soluble paint
Wax
Xylene

Tank 15

Ammonia
Ammonium thiosulfate
Chromium
Copper
Cyanide
Diesel
Iron
Lead
Mercury
Nickel
Phenols
Potassium cyanide
Silver
Sodium copper cyanide
Sodium cyanide
Sodium ferrocyanide
Sodium hydroxide
Sodium nickel cyanide
Sodium sulfate
Sulfite
Zinc

Tank 16

Amines
Ammonia
Ammonia hydroxide
Arsenic
Carbon
Chromium
Copper
Detergent
Formaldehyde
Gasoline
Grease
Halogenated inorganic salts
of zinc and tin
Lead
Nickel
Nickel sulfate
Nitric acid
Oil
Rust and scale
Plating waste
Sodium hydroxide
Sodium hypophosphate
Solvents
Sulfides
Sulfur
Sulfuric acid
Tank cleaning sludges (sulfides)
Tetraethyl lead

Table 11 (Cont.)

INCOMING WASTE CONSTITUENTS RECEIVED IN VINE HILL HAZARDOUS WASTE UNITS*

Vanadium
Water
Water-soluble paint
Zinc

Tank 17

Copper
Cyanide
Silver
Water

Tank 18

Acetone
Alcohol
Algecide and fungicide
Aluminum
Ammonia
Cobalt
Copper
Detergent
Gasoline sludge
Heavy metals
Kerosene
Latex
Lead
Leaded gasoline
Methyl ethyl ketone
Nickel
Oil
Organic Compounds
Paint
Paint thinners
Resin
Solvents
Sulfides
Xylene

Tank 19

Acetone
Alcohols (unspecified)
Ammonia
Aniline
Arsenic
Brine
Butyl carbitol
Butyl cello acetate
Butyl cellosolve
Cellosolve acetate
Chromium
Detergent
Diesel
Epoxy resin
Ethanol
Gasoline
Hydrochloric acid
Isopropyl alcohol
Mercaptoaniline
Methanol

Methyl butyl ketone (2-hexanone)
Methyl ethyl ketone
N-butyl acetate
N-butyl alcohol
Nickel
Oil
Organic solvents
Oxygenated solvents
Phenols
Photo-resistant resins
Pyridine
Rust scale
Sodium hydroxide
Solvents
Sulfides
Tetraethyl lead
Toluene
Trimethane
Water
Xylene

Tank 20

Acetone
Alcohol (unspecified)
Cresol
Diesel
Formaldehyde
Gasoline
Jet fuel
Kerosene
N-Butyl acetate
Oil
Paint residue
Paint thinner
Phenol
Rust and scale
Sodium hydroxide
Solvent
Sulfides
Toluene
Xylene

Tank 21

Acetone
Ammonia
Brine
Carbon
Cyanide
Diesel
Ethyl acetate
Ethylene dibromide
Ethylene dichloride
Ferrous sulfate
Flexographic printing waste
Gasoline
Glycol
Hydrocarbon resin
Isopropyl alcohol

Jet fuel
Laquer thinner
Latex paint
Lead
Machine sump wastewater
Methyl ethyl ketone
Mineral spirits
Naphthas
Nitrosohexamethylenemine
Oil
Oil/water vacuum pump waste
Paint solids
Paint solvents
Paint thinner
Petroleum distillant
Phenols
Sodium hydroxide
Solvents
Sulfide
Tars
Tetraethyl lead
Tetrahydrofuran
Toluene
Unleaded fuel
Water
Water-base adhesives
Water-base inks

Tank 22

Gasoline
Hydraulic fluid
Oil
Water

Tank 24

Acrolein
Activated carbon
Arsenic
Arsenic sulfide
Arsenic trisulfide
Ammonia
Caustic
Ethyl glycol
Filter aid
Hydrochloric acid
Methanol
Nitric acid
Oil
Phosphoric acid
 β -picoline
Silicate
Sulfuric acid
Water

Starting in December 1984, pH measurements were reportedly taken daily of impoundment contents to assist in properly segregating incompatible waste. No other routine analytical characterization of impoundment contents is conducted. Records for 1985 were only 51% complete and for 1986 they were 67% complete.

Freeboard requirements for the Vine Hill surface impoundments are established at 2 feet or greater by California Regional Water Quality Control Board Discharge Order 76-68, California State regulations (Article 26, Section 67310), the State-issued interim status document (issued April 6, 1981) and Federal interim status regulations (40 CFR 265.222). Although IT requested a waiver from these requirements in August 1984, it had not been granted at the time of the Task Force inspection.

Because these surface impoundments are basically excavations without dikes for run-on protection, they receive substantial quantities of rainwater from the surrounding facility. Recently, IT has covered several of the impoundments with waterproof covers to collect run-on before it makes contact with the waste. The covers are not removed during warm periods, which impedes evaporation.

Following is a brief description of each of the impoundments as observed during the Task Force inspection.

Impoundment 100

Surface impoundment 100 is used solely for the storage of tetraethyl-lead sludge received at Vine Hill between about 1957 and 1970 and collection of stormwater runoff. At least 1 foot of protective liquid cover is reportedly maintained over the sludge by an automatic float valve. When the water level drops to about 12 inches, the float drops and opens a valve which adds city water to maintain the minimum of 1 foot of water over the sludge. IT anticipates removing this sludge from storage and properly disposing of it in the near future.

At the time of the inspection, this impoundment was covered with a waterproof cover to prevent run-on to the impoundment.

Impoundment 101

Surface impoundment 101 is the major dewatering (evaporation) impoundment at Vine Hill. It receives waste input from the other impoundments, as well as from tank processing. An arm of impoundment 101, extending south and adjacent to impoundment 100, known as "Charlie's Alley" was filled in 1981. This area is currently used to store old tanks, other equipment and drums of raw materials. At the time of the inspection, surface impoundment 101 was covered with a waterproof cover to prevent run-on to the impoundment.

Impoundment 102A

Impoundment 102A receives loads of oily waste for phase separation. Surface oil is periodically skimmed from the impoundment and sent to the adjacent oil reprocessing facility for blending with other oils for resale. Liquid is also removed from below the surface and pumped to other Vine Hill impoundments for evaporation. Impoundment 102A was formed sometime between March 1974 and December 1983 by dividing a larger impoundment (102) into two smaller ones (102A and 102B) by construction of an internal dike.

Impoundment 102A was reduced in size on at least three occasions since it was formed. IT reported that in May/June 1985 portions had been filled in with compacted material. Aerial photographs indicate that at least 30 feet of the southeastern portion of the impoundment was filled in sometime between 1974 and 1983. This apparently allowed construction of, and access to, the hydrogen peroxide storage area. A northern portion of at least 35 feet of impoundment 102A was filled in sometime between December 5, 1983 and February 22, 1984. This filled in area was being used interchangeably for truck receiving (parking) and as an access roadway during the 1986 NEIC-RCRA inspection. At the time of the Task Force inspection, this impoundment was covered with a waterproof cover to prevent run-on to the impoundment.

Impoundment 103

Impoundment 103 is used for direct receiving of low-solids containing aqueous waste (less than about 10%) and waste from tank treatment. It also

receives "excess water" (caused by rainwater run-on) pumped from adjacent impoundment 100. The operation of impoundment 103 was temporarily stopped during the 1986 NEIC investigation. The State required IT to analyze sludge and liquid from the impoundment for tetraethyl lead. A letter dated March 20, 1986, from IT to the State DOHS, indicated that, although the sludge in impoundment 103 did contain organic lead, the aqueous phases from impoundment 103, as well as 100, had less than 10 ppm tetraethyl lead. Operation of impoundment 103 was subsequently continued with the consent of DOHS.

IT also reports that impoundment 103 is the secondary containment for tanks 23 and 24 and indicates that a minimum of 4 feet of freeboard is maintained on this impoundment for this purpose (see Tank discussion). Liquid level in this impoundment was very low during the Task Force inspection.

Impoundment 104

Impoundment 104 is a major evaporation (dewatering) impoundment at the Vine Hill facility. The unit is not normally used for direct unloading of trucks but has received liquid from the tank treatment processes and adjacent impoundment 100. Liquid from any other impoundment can be pumped to impoundment 104 as capacity dictates. At the time of the Task Force inspection, this impoundment was covered with a waterproof cover to prevent run-on to the impoundment.

Impoundment 105

Impoundment 105 normally receives direct receipts of waste with high solids content (greater than about 10%) and sludge from other surface impoundments. A mobile centrifuge set up to the west of this impoundment is used to remove and further dewater the sludge for offsite disposal. Liquid level in this impoundment was low during the Task Force inspection.

Impoundment 106

Impoundment 106 receives aqueous waste directly from trucks and tank treatment. It is normally used to contain liquid just prior to pumping to the Baker facility. The centrifuge has been used to dewater sludge from this impoundment and centrate from the centrifuge operation is often discharged to this impoundment.

Impoundments 201, 202, 203 and 204 Former Acme Property (Acme Ponds)

These impoundments are inactive. Some liquid was in pond 203 during the Task Force inspection. IT plans to construct a new treatment plant on the former Acme property and would close these ponds as part of the modernization plan which is subject to approval by county, State and Federal authorities.

Tanks

During the Task Force inspection, IT reported that they had 15 active tanks at the Vine Hill facility used for storage and/or treatment of hazardous waste [Table 12]. Eight additional tanks are currently out of service (inactive), many apparently due to the lack of secondary containment. Some of these inactive tanks were used for a solvent recovery operation (distillation), a solids/or/water separation process, and an old cyanide treatment operation. There are also 11 tanks used to store process reagents and fuels [Table 13]. Except for a few exceptions, the hazardous waste handling tanks are not dedicated to a specific purpose, and thus, may be used for waste receiving, storage and/or treatment as capacity and need dictate.

Table 12
HAZARDOUS WASTE STORAGE AND TREATMENT TANKS
IT Vine Hill

Tank Number	Approximate Capacity (Gallon)	General Use	Dimensions (Dia. and Ht.)	Shell Construction	Lining	Vapor Recovery
1	15,282	Waste acid (out of service)	10'0"x26'	Mild steel	Hypalon	Yes
2	18,220	Waste acid (out of service)	10'0"x30'	Mild steel	Hypalon	Yes
5	10,549	Out of service	9'1"x22'10"	Mild steel	None	No
11	23,018	Waste caustic	18'1"x12'	Mild steel	None	Yes
12	22,512	Waste caustic	18'0"x11'10"	Mild steel	None	Yes
13 ^a	22,512	Waste caustic	18'0"x11'10"	Mild steel	None	Yes
14 ^a	22,512	Waste caustic	18'x12'	Mild steel	Americoat 75 ^b	Yes
15	17,699	Cyanide treatment	15'10"x12'1"	Mild steel	None	Yes
16 ^a	17,879	Waste caustic	15'10"x12'2"	Mild steel	Americoat 75	Yes
17	17,879	Cyanide receiving	15'10"x12'2"	Mild steel	None	Yes
18	17,757	Waste caustic	15'10"x12'1"	Mild steel	None	Yes
19	17,849	Waste solvent	15'10"x12'2"	Mild steel	None	Yes
20	17,879	Waste solvent	15'10"x12'2"	Mild steel	None	Yes
21	17,939	Waste fuel	15'20"x12'2"	Mild steel	Placite	Yes
22	17,939	Waste fuel	15'10"x12'2"	Mild steel	None	Yes
23 ^c	254,672	Stripper feed tank	46'6"x20'	Mild steel	None	Yes
24	340,000	Batch treatment	42'6"x40'	Mild steel	None	Yes
25 ^d	8,598	Waste fuel	10'0"x12'd	Mild steel	None	Yes
26	7,200	Out of service	9'4"x23'7"	Mild steel	None	Yes
27	6,700	Out of service	9'4"x23'7"	Mild steel	None	Yes
61 ^c	493,400	Out of service	49'x35'	Mild steel	None	Unknown ^e
201	11,780	Out of service	13.0'6"x12"	Mild steel	None	No
251	11,508	Out of service	9'0"x23'10"	Mild steel	None	Yes
252	10,878	Out of service	9.0'x22'	Mild steel	None	Yes
254	3,192	Out of service	6'4"x16'5"	Mild steel	None	Yes
255	756	Out of service	4'2"x9'9"	Mild steel	None	Yes

^a Tanks 13, 14 and 16 are also used to receive, store and/or treat waste loads containing sulfides, phenols, formaldehyde, cresote, mercaptans, etc. and metal precipitation by means of oxidation using 50% hydrogen peroxide. These tanks are also used for neutralizing waste acid loads using calcium hydroxide or other caustic (virgin and/or waste) material.

^b Corrosion-barrier

^c Note information on tanks 23 and 61 were not included in IT's April 15, 1985 RCRA Part B application submittal.

^d The April 27, 1984 tank certification indicates that tank 25 is 25 feet in diameter and 10 feet high.

^e Although IT indicated that this tank was connected to the facility fume incineration system, the tank certification indicated it is an atmospheric tank (see text).

Table 13
FUEL/REAGENT STORAGE TANKS*

Tank Number	Use
25A	Diesel fuel (supplemental incinerator fuel)
D-1	Diesel fuel - for plant equipment
212	Water storage tank - softened water
213	Pre-heater tank - softened water
214	Brine tank - for water softeners
223	Post scrubber bath - for Phase I incinerator
203	Alum tank - for oil separator - 5,368 gallons (out of service)
204	Mixing tanks for Na_2S , $\text{Na}_2\text{S}_2\text{O}_5$, FeSO_4 - 500 gallons
241	Hydrogen peroxide (H_2O_2) - storage tank - 7,000 gallons
242	H_2O_2 feed tank - 600 gallons
215A	Caustic holding tank (virgin NaOH) - 10,000 gallons

* From April 5, 1985 RCRA Part B completeness check

General tank treatment processes at IT Vine Hill include:

- Cyanide, sulfide, and organic material (phenol, cresol, formaldehyde, etc.) oxidation
- Heavy metals precipitation
- Acid-base neutralization
- Chromium reduction
- Solids/oil/water separation
- Odor reduction
- Steam stripping

All of the currently active tanks reportedly vent through an exhaust fan to the main (Phase II) facility incinerator. Negative pressure is maintained on the tank head space by the fan to assist venting to the incinerator. The incinerator supplies process heat (steam) back to the treatment facility for steam stripping.

Tank treatment is normally conducted on a batch basis with known amounts of reagent mixed with the waste. IT reported that, following calculated

times for reaction completion, a waste sample is sent to the laboratory to verify that the waste has been treated below pondable limits.* Although spot field tests can also be conducted to determine the extent of reaction, IT indicated that laboratory analyses are always conducted prior to tank discharge. Following treatment and analysis, waste is discharged to either the onsite Vine Hill surface impoundments or the Baker impoundments. Because many of the tanks have floating suction pumps which cannot pick up the bottom 2 feet of material in a tank, some waste from the previous treatment will remain in the tank after most of the treated waste has been pumped to the impoundments.

An operations building, located next to the tank processing area, contains monitoring equipment and is used as a support and control facility for the treatment plant.

Prior to unloading a tank truck of waste to a facility tank, the truck driver contacts IT personnel at the operations building. An operator accompanies the truck to the appropriate unloading station and the waste is unloaded. A copy of the Disposal Location form,* filled out by IT to identify and track the waste, is placed on the tank status board in the operations building to identify the tank into which the waste load is received. The tank status board has a set of hooks for each tank where the Disposal Location forms are hung. When a tank is unloaded, the Disposal Location forms are removed from the original location on the tank status board and either replaced on the board or correlated with the tank and the surface impoundment into which the waste was transferred.

Waste treatment in the tanks normally occurs by recirculating waste material in the tank and injecting prescribed amounts of reagent into the recirculation lines for neutralizing the waste. Some waste must be pumped through several tanks and receive multiple treatments prior to discharge. IT maintains "Tank Processing Records" which track some waste movements between tanks as well as tank discharges to the surface impoundments. IT has been cited previously for failure to track all wastes more thoroughly.

* "Pondable limits" are reportedly concentrations of specific parameters as identified in 22 CAC Article 15, Land Disposal Restrictions.

* The Disposal Location forms are completed by the laboratory when the truck is accepted at the facility

IT normally uses waste caustic and waste acid for pH adjustment; however, when waste material is not available, purchased sodium hydroxide or hydrochloric acid is used. Dry reagents, such as metal bisulfide for chrome reduction, are liquified in mixing tank 240 prior to addition to the waste. Hydrogen peroxide, used for oxidation reactions is stored in tank 241 and put into metering tank 242 for measurement prior to contact with the waste.

Following is a brief description of each tank, and the associated operations.

Tanks 1 and 2

Tanks 1 and 2 are horizontal, hypalon-lined tanks used to receive and store acid and chrome waste. Tank 1 is also used to reduce hexavalent chrome to the trivalent state. There are no automatic feed cutoff controls or high-level alarms on these units to prevent overfilling. Available tank capacity is reportedly determined by maintaining a running total of receipts/removals on the tank status board in the operations building and daily manual level determinations of the tanks using a calibrated stick. Tanks 1 and 2 share the same containment area and are set on concrete with no monitoring beneath the tanks, although there are daily visual inspections.

Hexavalent chrome reduction in tank 1 is accomplished by recirculating a metal bisulfide solution through the tank until the chrome is reduced to the trivalent state. A sample is taken to the laboratory and, if analysis indicates satisfactory reduction (below the maximum level allowed in surface impoundments), the waste is discharged to the surface impoundments. At the time of the inspection, tanks 1 and 2 were out of service and had been shipped offsite to be relined with a rubber coating.

Tank 5

Tank 5, used for waste acid receiving and storage, has been out of service, at least since the NEIC inspection in 1986, reportedly due to lack of secondary tank containment.

Tanks 11 and 12

Tanks 11 and 12 are receiving tanks for waste having high levels of volatile organic compounds; this is usually alkaline material. Waste is stored in these tanks until pumped to treatment, normally to tank 23 or 24 for eventual steam stripping. No formal treatment reportedly occurs in these units. Neither tank has automatic feed cutoff control and available capacity is determined by daily stick gauging and maintenance of a running tally of receipts/removals. These tanks share a concrete containment area with tanks 13 and 14.

Tanks 13, 14, 16 and 18

Tanks 13, 14, 16 and 18 receive, store and treat a variety of waste usually containing sulfides, phenols, formaldehydes, creosotes, mercaptans, or other organics to be oxidized. These tanks can also be used to neutralize acidic waste and precipitate metals. Tanks 13 and 18 are unlined steel tanks while tanks 14 and 16 are steel covered with a corrosion-resistant coating (Ameri-coat 75®).

Tanks 14 and 16 have continuous waste level indicators which read out in the nearby operations building. Tanks 13 and 18 have Shannon-Jewers® floating line level detectors which read out at the tank. IT indicated that none of these tanks have high waste level alarms, automatic waste feed shutoff valves or pressure and temperature sensors. Tanks 13 and 14 share secondary containment with tanks 15, 17, 19, 20, 21 and 22.

Organic materials are oxidized and metals precipitated in all four tanks by injecting premeasured amounts of reagents (hydrogen peroxide, sodium sulfide), determined by waste strength, into the recirculation lines of the tanks. Pumps keep the waste circulating through the lines and back into the tanks to facilitate mixing. Additionally, tank 14 has a mechanical agitator for mixing. Acid neutralization is conducted by one of two methods: (1) offloading acid

® *Ameri-coat-75 and Shannon-Jewers are registered trademarks and will appear hereafter without ®.*

waste into the tanks, which are reportedly prepared with highly alkaline material for protection of the tank or (2) injecting acid waste from tanks 1 or 2 into the recirculation lines followed by subsequent mixing in the tanks.

Tank 15

Tank 15 is dedicated to receive, store, and treat cyanide-containing waste. The tank is equipped with a total waste level indicator, with remote readout in the operations building, a high-level alarm (audible) and a high-level alarm which automatically closes the waste-receiving valves. Valves on tank 15 are locked at all times when the tank is inactive. Tank 15 shares a common secondary containment area with tanks 16, 17, 18, 19, 20, 21 and 22.

Cyanide is oxidized in tank 15 with the addition of premeasured amounts of hydrogen peroxide injected into the tank recirculation lines. A catalyst, ferrous chloride, is added to waste that is difficult to treat.

Tank 17

Tank 17 is dedicated to receiving and storing of cyanide-containing waste. It is equipped with an automatic high/high level alarm (audible) activated when the waste level nears tank capacity. Waste is pumped from tank 17 to tank 15 for treatment. Tank 17 shares a secondary containment area with tanks 15, 16, 18, 19, 20, 21 and 22.

Tanks 19, 20, 21 and 22

Tanks 19, 20, 21 and 22 are all receiving and storage tanks for waste with high concentrations of volatile organic material to be incinerated or steam stripped. Some phase separation of organics/water/solids occurs in these tanks during storage. Waste received and stored in tanks 19, 20 and 21 is normally pumped to tank 22. Material from the top of tank 22 goes to tank 25 for eventual incineration while bottom material from tank 22 is usually pumped to tank 23 for storage until it can be steam stripped in tank 24.

These tanks all share a common concrete secondary containment area with tanks 15, 16, 17 and 18. None of these units have automatic waste feed shutoff valves although tanks 21 and 22 have high-level alarms (audible) for overflow protection. All of the tanks have Shannon-Jewers float-line level indicators reading out at the tanks.

Tank 23

Tank 23 is the receiving and storage tank for waste to be steam stripped. This tank normally receives waste from tanks 19, 20 or 21 but can receive material by pumping directly from trucks. Waste from tank 23 is pumped to tank 24 for steam stripping.

Tank 23 is equipped with a Shannon-Jewers floating-line level indicator. There is no secondary containment area surrounding tank 23 and the area immediately surrounding this tank consists of porous gravel and soil. Leaked material could flow to several areas including north over the process area access roadway to the area of the old impoundment 102B, west into the concrete containment area for tanks 15 through 22, and/or east across the facility's main roadway and could infiltrate through the ground into underlying ground water. A spill could prevent access to adjacent tank 24. Information on tank 23 was not included in Table III.2 of IT's April 5, 1985 RCRA Part B Completeness Check submitted to EPA Region IX. IT maintains that impoundment 103 provides secondary containment for both tanks 23 and 24.

Tank 24

Tank 24 is the steam stripping tank. It receives waste from the bottom of tank 23 and uses steam (from the onsite incinerator) mixed with nitrogen (from an onsite storage tank truck) to strip organics from waste. The pH of the waste can also be adjusted in tank 24 by caustic or acid addition. Following treatment, the waste is usually discharged to the Baker impoundments. Fumes generated from the stripping process are withdrawn by a negative pressure fan to the incinerator for treatment. A vent gas oxygen analyzer on the fume gas collector of tank 24 automatically adjusts nitrogen input (to the steam) to limit oxygen concentration in the vent gas to less than about 8% to prevent waste

ignition. Waste level in tank 24 is monitored continually and automatically with readout in the operations building.

Tank 24 has a high-level alarm (audible) which is activated when waste level approaches tank capacity. If waste level continues to rise, a high-level detector automatically shuts off the waste feed valve. The tank is also equipped with a flame arrestor, emergency vents, and automatic steam/nitrogen shutoff.

Tank 24, like adjacent tank 23, does not have a surrounding secondary containment area. The area immediately surrounding tank 24 consists of porous gravel and soil. Leaked material would flow over this area spreading in several directions including west over the main facility roadway, eventually to impoundment 103 (more than 100 feet from tank 24) and possibly to impoundment 100; north over the process area access roadway to the old impoundment 102B area; and east past tank 23 and into the concrete secondary containment for tanks 17 through 22 and could infiltrate through the ground into underlying ground waters. A leak could prevent access to tank 23 and to the adjacent nitrogen gas storage tank.

Tank 25

Tank 25 is the waste storage and feed tank to the Phase II incinerator. This tank normally receives waste from the top of tank 22. Waste from tank 22 is reportedly sampled and analyzed for waste constituents prior to pumping to tank 25. Tank 25 shares a concrete containment area with tank 25A, the incinerator supplemental fuel (diesel) storage tank, and a fuel feed pump. Because the waste feed rate to the incinerator is not continuously monitored, as required by 40 CFR 265.347, periodic waste level determinations in tank 25 are the only source of incinerator feed rate information.

Tanks 26 and 27

These tanks are no longer in service at IT and have been removed. They were located just west of tank 24 and were used to store waste for incineration.

Tanks 30 and 31

Tanks 30 and 31 were associated with a past cyanide treatment (chlorine addition) process. Neither are currently used for waste handling. Tank 31 was the treatment tank and is currently inactive and empty. Tank 30 was to be used for cyanide waste storage but was never put into service; it is now used to store water as an emergency water supply source.

Tank 61

Tank 61 is a large vertical tank located in the northwest portion of the site about 15 feet from the western boundary of the IT facility, away from the other waste processing units. As part of the IT Oil Reprocessing facility, it was used for receipt and storage of various waste including those with high concentrations of volatile organics to be steam stripped or incinerated, as reported in the 1986 NEIC report. Waste was pumped between the Vine Hill process area and this tank, as tank capacity dictated. The secondary containment area for this tank consists of a soil/gravel berm of varying heights surrounding the tank. A calculation of secondary containment volume, based on estimated measurements of the bermed area, indicates maximum containment of less than 3% of total tank capacity.

Tank 61 was not represented on the tank status board in the operations building and, thus, information on the type and amount of waste in the unit is not readily available and apparently not accurately tracked. Also, freeboard for this unit was not noted on the status board or on the daily tank inspection forms.

Although IT reported that tank 61 was connected with the tank fume recovery system at the process plant (and, thus, subject to negative pressure), the tank certification of August 25, 1983 [Exhibit E] indicates the tank is under atmospheric pressure. As a result of a consent agreement between IT and the State, tank 61 is no longer in service.

Tanks 251, 252, 254 and 255

These tanks were used for a solvent recovery operation which is out of operation; there is no secondary containment for these units. All tanks had been repaired or replaced and the solvent recovery operation was resumed for a short period of time. At the time of the Task Force inspection, the solvent recovery system was empty and not in operation pending approval by the DOHS.

Temporary Water Collection Tanks

IT has installed two temporary water collection tanks on the Acme property. Water collecting on top of covered ponds is tested and, if uncontaminated, pumped to the temporary water collection tanks. Contaminated water is placed in tanks for treatment or directly into ponds depending on level of contamination.

Incineration

IT Vine Hill has two incinerators, a small 'Phase I' unit and a larger 'Phase II' unit. While the Phase I unit can only oxidize limited fumes (waste gas), the larger Phase II incinerator treats both fumes and liquid waste. Currently, the Phase I unit is reportedly used only when the larger unit is not operating. However, only the Phase II unit has the capacity to handle all of the fumes from the tanks and steam stripping in tank 24; IT claimed that the small unit is undersized for such operation.

Phase I Incinerator

This horizontal, diesel-fueled unit has no temperature controls and little information was available regarding its construction. It is piped in parallel with the larger incinerator and fumes are blown into the unit near the fuel injection nozzle. A packed stack-gas scrubber recirculates alkaline water to treat incinerator gas. No records are kept of incinerator activity although IT reported that it can normally be assumed that, when the big unit is not operating, the smaller one will be manually started and operated for fume incineration.

However, IT did indicate that there are times when neither unit is operating. In these cases, the vent gas removal system is shut off and tank gas is no longer removed.

Phase II Incinerator

The Phase II incinerator is the major onsite incinerator. It was built in the early to mid-1970's and is used for fume and liquid waste incineration. A tube-type boiler attached to the incinerator captures heat to produce steam for the steam stripping operation. Liquid waste is fed to the unit from tank 25 and fumes are blown into the incinerator through a manifold near the waste feed injection nozzle at the front end of the unit with a 1,000-cubic-foot-per-minute standard blower.

Based on incinerator unit blue prints, this incinerator is a horizontal, single chambered, brick-lined unit with an inner diameter of about 6 feet 10 inches and length of approximately 14 feet. Liquid waste is injected through a multi-orificed air-atomized burner nozzle at the front end of the unit. The boiler is attached to the end of the incineration chamber and is about 14 feet long. Stack gases vent through a 40-foot-high plenum. There are no stack-gas emission controls on this unit. IT reports in their RCRA Part A application that the estimated operating capacity of the unit is 250 gallons per hour.* Normal operating temperature is reportedly between 1500 and 1700 °F. Electronic readout of incinerator temperature on March 6, 1986 was 1719 °F. Startup procedures are reportedly as follows. Diesel fuel is used to raise temperature to about 1500 °F. After about 5 minutes at steady-state temperature, the waste feed supply is turned on. The incinerator is reportedly automatically prevented from burning waste fuel or tank fumes at temperatures less than about 1200 °F. Temperature is reportedly maintained by a series of automatic controls. High temperatures cause reduction in waste feed rates, tank fume feed rates and air/nitrogen mixture injection to tank 24 (to reduce fumes generated by steam stripping). Temperature probes for incinerator control are located about 12 feet

* IT operating records indicate that waste has been burned at an estimated average rate of 35 to 40 gallons per hour.

downstream from the burner tip. This is near the end of the combustion chamber near the boiler entrance.

Four continuous monitors relay operating information regarding plenum temperature, stack-gas oxygen concentration, combustion chamber temperature and fume gas vent line pressure to a readout board in the operations building. Liquid waste feed rate is not continuously monitored, although a rough estimate can be determined using changes in waste level in tank 25, the waste feed tank. Waste levels of tank 25 are only recorded approximately four or five times over a 24-hour period while the incinerator is operating. Liquid waste is incinerated on a semi-batch basis so, when the waste level in tank 25 gets low, a new batch of waste is pumped in from the top of tank 22.

The waste at various levels in tank 22 is reportedly sampled for lead, mercury, halogenated compounds, sulfur, and heating value of waste prior to discharge to tank 25. Because waste is normally blended in tanks 22 and 25 prior to incineration, the exact time and date of incineration of a particular waste load is not known. Also, because of this blending, the quality and, thus, oxidation characteristics of the waste is not consistent.

Centrifugation (Sludge Dewatering)

IT uses a mobile centrifuge to dewater surface impoundment sludge for eventual offsite land disposal. Although the unit has been moved to dewater sludges at various onsite impoundments, it is normally located adjacent to the west side of impoundment 105. In this position, it can treat sludge from impoundments 103, 105, and 106. The centrifuge basically took the place of surface impoundment 102B which was reportedly used extensively for sludge drying. The centrifuge normally operates 6 days a week, Monday through Saturday, 24 hours a day. The unit is operated by IT-Motech, a division of IT separate from the division that operates the rest of the Vine Hill facility. Although DOHS reported that the centrifuge was operating prior to February 24, 1984, the earliest centrifuge records IT was able to provide NEIC were dated September 1984.

The centrifuge is a flow-through operation. A submersible pump first moves sludge from an impoundment to a grinder (mazorator) to reduce the size of sludge particles. The sludge then goes to a variable speed 20-inch-diameter centrifuge bowl, rotating at up to 2,500 revolutions per minute (rpm), which spins out the liquid or centrate. The centrate is returned to a surface impoundment while the sludge cake is continuously removed by a centrifuge conveyor and deposited in a truck for eventual offsite disposal. Air is pulled through the centrifuge bowl at about 100 cubic feet per minute and vented through a 2-ton granular carbon filter for emissions control. An emulsion-type polymer can be added to the sludge to enhance centrifugation, if necessary. The total unit is mounted on a 40-foot truck trailer. Sludge processing capacity is reportedly 250 gallons per minute.

Information on centrifuge operating conditions is recorded on the Centrifuge Operations Log. This includes sludge feed rate, bowl speed, oil conditions, etc. A Centrifuge Field Analyses Log is used to record information on treatment efficiency (feed solids/centrate solids) and identifies the surface impoundment being treated. IT reports that there is no sludge sampling to determine chemical and physical properties of the sludge, except for determining percent solids of the feed and infrequent pH measurements. There is no Project Sample Log, as indicated in the October 15, 1984 Operations Plan for this unit.

Air samples of vent gases are reportedly taken about every 2 weeks with Drager tubes to monitor the condition of the carbon filter. Results are reported on one of the centrifuge logs. If "detectable levels" of phenol (0.5 ppm), benzene (5 ppm), toluene (25 ppm) or hydrogen sulfide (1 ppm) are found, the carbon is reportedly changed.

BAKER FACILITY

The Baker site is about 500 feet (across Pacheco Creek) from the Vine Hill facility. It consists of a series of surface impoundments which receive aqueous waste from Vine Hill as well as directly from generating facilities for evaporation of liquids. Waste is transported to the Baker surface impoundments from Vine Hill via a pipeline.

IT currently operates 11 unlined surface impoundments at the Baker facility for solar evaporation of water from effluent pumped from Vine Hill, as described in Table 14. Four additional unlined impoundments identified as impoundments 1, 2, 3, and 4, located between impoundments C and D-1 have been used periodically for waste treatment. IT would not provide operational information concerning Baker because of current litigation concerning the Baker impoundments. Further information is provided in the update to this report.

The Baker surface impoundments, except for cut-off walls, keyed fill and/or slurry walls for the east embankment of impoundment D-1, southwest corner of impoundment C, and portions of impoundments D-2, D-3 and E embankments, are levee construction with little excavation. Some of the levees were constructed with Corps of Engineers channel dredgings. The impoundments are separated by internal dikes of differing widths. The interior walls of the impoundments, and some of the tops of the separation berms, do not have any protective coverings.

The following is a brief description of each of the impoundments as observed at Baker during the Task Force inspection. Ground-water contamination exists, as discussed previously.

Impoundments A-1 through A-5

Surface impoundments A-1 through A-5 are used routinely as receiving impoundments at Baker. If odor problems are noted, bleach is sometimes added by tank trucks to reduce odors. Waste can be pumped to any of the impoundments via interconnecting pipelines. At the time of the inspection, impoundments A-2 through A-5 were covered with waterproof covers to prevent run-on to the impoundments.

Table 14
EMBANKMENT DIMENSIONS
BAKER IMPOUNDMENTS

Impoundment	Embankment ¹	Inboard Height (ft)	Inboard Slope (H:V)	Outboard Height (ft)	Outboard Slope (H:V)	Length (ft)	USCS Symbol
A-1	a	9.5	1.5:1	6.5	2.2:1	440	CL
	b	6.2	2.3:1	6.2	4.4:1	310	(2)
	c	9.4	1.2:1	6.7	1.3:1	480	CL
	d	9.5	0.8:1	5.9	1.4:1	170	CL
A-2	a	9.6	2.6:1	4.9	2.0:1	260	CL
	b	7.2	6.4:1	6.5	1.7:1	420	(2)
	c	9.2	1.8:1	5.8	1.7:1	260	CL
	d	6.2	4.4:1	6.2	2.3:1	310	(2)
A-3	a	7.8	1.6:1	6.5	2.1:1	250	CL
	b	5.2	1.5:1	7.2	3.2:1	550	(2)
	c	8.1	1.2:1	7.6	1.3:1	200	CL
	d	6.5	1.7:1	7.2	6.4:1	420	(2)
A-4	a	5.5	2.7:1	6.7	2.7:1	300	(2)
	b	7.4	2.9:1	7.1	1.5:1	320	CL
	c	7.9	1.4:1	6.0	1.5:1	330	CL
	d	6.0	3.2:1	6.3	3.3:1	300	(2)
A-5	a	8.9	1.7:1	7.5	1.4:1	360	CL
	b	9.5	2.6:1	6.4	2.3:1	400	CL
	c	6.7	2.7:1	5.5	2.7:1	300	(2)
	d	7.2	3.2:1	5.2	1.5:1	250	(2)
B	a	9.4	1.3:1	7.8	1.7:1	1290	CL
	b	9.7	1.4:1	10.1	1.7:1	650	CL
	c	9.4	1.2:1	8.0	1.9:1	1290	CL
	d	10.1	1.9:1	7.6	2.2:1	780	CL
C	a	10.4	1.7:1	7.7	1.8:1	1360	ML,CL
	b	10.4	1.7:1	8.2	2.3:1	830	CL,ML
	c	10.2	1.3:1	10.2	1.5:1	1070	CL
	d	9.9	1.2:1	6.7	2.4:1	920	CL

Table 14 (cont.)
 EMBANKMENT DIMENSIONS
 BAKER IMPOUNDMENTS

Impoundment	Embankment ¹	Inboard Height (ft)	Inboard Slope (H:V)	Outboard Height (ft)	Outboard Slope (H:V)	Length (ft)	USCS Symbol
D-1	a	6.6	2.1:1	10.6	1.3:1	1050	CL
	b	6.7	1.9:1	7.8	2.0:1	1250	CL
	c	6.8	1.4:1	9.1	1.5:1	1000	CL
D-2	a	9.3	2.4:1	7.8	1.7:1	810	CL,CH
	b	9.1	1.9:1	8.0	1.6:1	700	CL,CH
	c	9.4	2.1:1	8.4	2.1:1	670	CL
D-3	a	10.2	4.9:1	7.8	1.6:1	870	CL,CH
	b	9.7	1.4:1	7.1	2.4:1	750	CL
	c	9.9	2.9:1	9.3	3.2:1	480	CL
E	a	9.3	3.2:1	9.9	2.8:1	480	CL
	b	8.9	1.4:1	9.2	2.2:1	620	CL,SC,GC
	c	9.5	2.0:1	9.5	1.9:1	610	CL

Notes: (1) See Figure 4-1
 (2) No data available

Impoundments B and C

Surface impoundments B and C are large solar evaporation impoundments. At the time of the inspection, several aerators were operating in impoundment C. The aerators can be moved from one impoundment to another and are used to help prevent odor problems.

Impoundments D-1 through D-3

Surface impoundments D-1 through D-3 are used for solar evaporation. At the time of the inspection, there was a mound of sludge in the corner of each of these impoundments. Aerators were operating in impoundment D-1 and there was a boom for foam containment in impoundment D-3.

Impoundment E

Surface impoundment E is normally used for solar evaporation. However, at the time of the inspection, impoundment E was covered with a waterproof cover to prevent surface run-on.

Impoundments 1 through 4

Surface impoundments 1 through 4 are reportedly used for treatment impoundment for experiments in odor or foam control. At the time of the inspection, there was liquid in all four impoundments. The liquid in impoundment 1 was a deep maroon color. IT personnel declined to provide information regarding use of these impoundments because of pending litigation concerning the Baker site.

SITE HYDROGEOLOGY

INTRODUCTION

The hydrogeological information presented in this report summarizes data and interpretations derived from IT consultant reports and does not imply Task Force concurrence. Because of the uncertainties regarding well construction, hydrogeological site characterization, well testing methods and duration, and well completion methods, much of the data and IT consultant's interpretations are questionable.

The wide range of permeabilities reported for different zones throughout the facilities should be considered only as averages (order-of-magnitude estimates) for small radii around specific wells and should not be relied upon as being representative of aquifer characteristics throughout the IT Vine Hill and Baker facilities.

To adequately design and construct a technically sound integrated ground-water monitoring system for the IT Vine Hill and Baker facilities, it is necessary that IT be further required to provide:

- Information which establishes credible physical correlation of stratigraphic units underlying both the Vine Hill and Baker facilities. This information should include aquifer hydraulic response data and interpretations throughout the facilities.
- Vertical and horizontal hydraulic communication (or isolation) data between stratigraphic zones to establish the potential for contaminant migration pathways. The slug test and pumping test data presented by IT's consultants are not adequate to determine the hydraulic interconnection (or isolation) of the saturated permeable zones beneath the sites. Data from longer duration pump tests to determine the degree of hydraulic interconnection between aquifer zones should be provided.

- Diffinitive hydraulic head distribution data to reliably determine hydraulic gradients across both the Vine Hill and Baker facilities in each of the stratigraphic units present
- Credible points of compliance for each hazardous waste unit for both the Vine Hill and Baker facilities

At the time of the Task Force inspection, IT did not have sufficient information available to adequately characterize the hydrogeology of the Vine Hill and Baker sites. In August 1987, consultants for IT Corporation submitted a hydrogeologic report for the Vine Hill and Baker facilities in response to Cleanup and Abatement Order Number 86-014 from the California Regional Water Quality Control Board, San Francisco Bay Region.* Most of the hydrogeological information described in this report is from the October 1987 revision of that report. Information provided in that report is derived primarily from logs of borings, test holes, wells, and piezometers drilled between 1978 and 1987; geophysical and piezocone logs, and aquifer and laboratory tests.

HYDROGEOLOGIC UNITS

The Vine Hill and Baker facilities are located in Contra Costa County, California, in a physiographic province known as the Bay Plain. The facilities are located near the mouth of the Ygnacio Valley, approximately 10,000 feet south of Suisun Bay.

The land surface elevation around the Vine Hill and Baker facilities ranges from about 0.5 foot [National Geodetic Vertical Datum of 1929 (NGVD)] to 282 feet NGVD at the top of Vine Hill. Major water courses near the facilities include Walnut Creek and Pacheco Creek. Walnut Creek lies about 500 feet east of the Vine Hill facility and is adjacent to the western border of the Baker facility. Pacheco Creek, a tributary of Walnut Creek, is adjacent to the Baker facility on the western and northern sides. The confluence of Walnut Creek and Pacheco Creek is about 50 feet northeast of the Baker facility. Downstream of

* McCulley, Frick & Gilman, Inc., Hydrogeologic Report, IT Corporation Baker and Vine Hill Facilities, Contra Costa County, California. August 1987, Revised October 1987. Project XADGO1.

the confluence, the water course is known as Pacheco Creek. Both water courses are influenced by ocean tides.

The region around the Vine Hill and Baker facilities is underlain by unconsolidated valley fill of Quaternary age comprising the younger bay mud (Qybm*) deposited in the Holocene epoch, and the older bay mud (Qobm), consisting of estuarine and alluvial deposits of the Pleistocene epoch. The deposits consist of interbedded and interfingered clay, silt, sand, and gravel. Some of the deposits can be correlated over a broad area; some are discontinuous.

In this physiographic region, indurated deposits of Tertiary and Cretaceous age, known as "bedrock" (Kp) underlie the Quaternary bay mud and alluvial deposits. These rocks, including the Panoche and Martinez Formations, consist of sandstone, siltstone, and/or shale, and generally strike to the northwest, dipping steeply to the southwest. The surface of the bedrock forms buried "hills and valleys," over which the Quaternary sediments were deposited.

Intersecting joint sets (fractures caused by earth movements and weathering) have been observed in the Panoche Formation outcrop west of Pacheco Creek. These joint sets are reportedly poorly developed, but potentially could provide pathways for ground-water flow and contaminant migration.

The inferred location of the Concord fault is east of the Baker facility along the scarp (cliff) on the east side of Walnut Creek. Right lateral movement along the Concord fault has been observed south of the facilities near Concord, California.

At the Vine Hill and Baker facilities the geology may be described as Quaternary bay mud deposited upon the structurally deformed Panoche

* *"Informal" geologic unit designations used by consultants to IT are:*

Qybm: Quaternary younger bay mud

Qobm1: Upper section of the Quaternary older bay mud

Qobm: Quaternary older bay mud

Kp: Bedrock (Panoche Formation)

Formation bedrock. Low hills of the Panoche Formation flank the site on the west.

The contact between the bedrock and the overlying bay mud is an "angular unconformity," representing a historical period of erosion and weathering of the bedrock prior to deposition of the bay mud. Characteristically, portions of the upper bedrock exhibit enhanced permeability caused by weathering. At Vine Hill, the weathered zone at the top of the bedrock is about 15 feet thick.

In the overlying sediments, an unconformity (erosional surface) separates the Quaternary older bay mud and the overlying younger bay mud. These units are characterized by differences in consolidation, grain size, water content, and natural organic content including peat beds, which are discontinuous.

Beneath the Vine Hill and Baker facilities, the older bay mud consists of a fining-upward alluvial and estuarine deposit of gravels, sands, and silty clays. A continuous, firm silty clay in the upper part of the older bay mud sequence is marine in origin and has been informally designated "Qobm1." In the remainder of this report, the lower section of the older bay mud is designated "Qobm."

The Qobm is thicker and more extensive at the Baker facility than at Vine Hill. Maximum thickness of the Qobm is about 180 feet at the north end of the Baker facility. The Qobm contains both an upper and lower sand and gravel bed of some lateral extent. The lower sand and gravel bed is thicker, ranging up to 45 feet thick, and the upper sand and gravel bed is typically about 20 feet thick. The upper sand and gravel bed is just below the Qobm1 unit. Consultants to IT state that these sand and gravel beds, together with minor sand units in the Qybm, are the only units which could be characterized as "aquifers," according to the RCRA definition.

The Task Force hydrogeologists have concluded that the IT Vine Hill and Baker facility sites have not been adequately characterized with respect to hydrogeology. Further, the Task Force concluded that, in addition to the shallow unconsolidated deposits, more definition of the water bearing

properties of the upper weathered/fractured bedrock is needed before a determination can be made as to which zones are aquifers and how they should be monitored. Therefore, IT's consultants' conclusions are untenable.

The Qobm1 ranges from 0 to 38 feet in thickness beneath the facilities and overlies the Qobm except in isolated areas on the western side of Baker and where the Qobm is absent in the area of the bedrock high, which outcrops at Vine Hill.

The Qybm consists of marine to brackish organic clay with sand and peat beds of limited extent. Thickness of this unit ranges from 0 feet at the bedrock outcrop at the Vine Hill facility to more than 50 feet. The Qybm contains few sand lenses, and a few sand units occur predominantly along the western side of the Baker facility.

At the surface, some areas of the Vine Hill and Baker facilities have received fill material composed of old landfill materials (soils and various types of refuse), soil fill placed in old impoundments, and clayey to sandy soils that make up the containment dikes around a number of the impoundments. The fill was placed over the younger bay mud sediments or over remnants of thin outwash sediments deposited by a prior diversion of Walnut Creek.

GROUND-WATER FLOW, DIRECTION, AND RATES

The August 1987 hydrogeologic report does not identify the uppermost aquifer beneath the Vine Hill and Baker facilities for compliance with requirements in 40 CFR 265.90 and 270.14. The report does contain hydraulic information derived from drilling, boring, and geophysical logs, water level data, aquifer tests (slug, packer, and pumping tests) and laboratory permeameter tests for the geologic units described.

The report states the evaluation of potentiometric (water level) data and other hydrogeologic conditions precluded the construction of potentiometric maps for the fill, the bedrock or the older bay mud at the Baker facility. The ground-water flow direction(s) in these units is poorly understood. The results

of this evaluation do not allow for developing potentiometric head distribution maps.

Water levels and constituent concentrations for wells bordering the IT Vine Hill/Acme property boundary were compared to determine if any conclusions could be drawn regarding ground-water flow directions and/or the degree of contaminant migration. The majority of water levels cannot be compared because the wells are not completed in the same horizons. The remaining data are inclusive.

Hydraulic conductivities for the hydrostratigraphic units have been estimated using slug, packer, pumping and laboratory permeameter test data. Representative results of these tests appear in Table 15.

Table 15
MEASURED RANGES OF HYDRAULIC CONDUCTIVITY VALUES (cm/sec)

Hydrostratigraphic Unit	Vine Hill		Baker	
	Kv ^{1 2}	Kh ^{3 4}	Kv ^{1 2}	Kh ^{3 4}
Fill	10 ⁻⁸ - 10 ⁻⁴		10 ⁻⁸ - 10 ⁻⁴	
Qybm	10 ⁻⁹ - 10 ⁻⁶	10 ⁻⁷ - 10 ⁻³	10 ⁻⁹ - 10 ⁻⁴	10 ⁻⁷ - 10 ⁻³
Qybm/Qobm 1		10 ⁻⁶ - 10 ⁻³		10 ⁻⁴
Qybm/Qobm 1/Kp				10 ⁻⁴
Qybm/Kp				10 ⁻⁵ - 10 ⁻⁴
Qobm 1	10 ⁻⁸ - 10 ⁻⁵	10 ⁻⁴ - 10 ⁻³	10 ⁻⁹ - 10 ⁻⁶	10 ⁻⁴
Qobm 1/Qobm				10 ⁻⁵ - 10 ⁻²
Qobm	10 ⁻⁸	10 ⁻⁵ - 10 ⁻¹	10 ⁻⁹ - 10 ⁻²	10 ⁻⁵ - 10 ⁻³
Kp		10 ⁻⁷ - 10 ⁻²	10 ⁻⁹ - 10 ⁻⁵	10 ⁻⁸ - 10 ⁻³

¹ Kv = Vertical Hydraulic Conductivity

² Permeameter test data

³ Kh - Horizontal Hydraulic Conductivity

⁴ "Slug" test data (includes ranges of results from pumping tests)

SOURCE: October 1987 revised Hydrogeologic Report

Bedrock (Kp)

According to IT consultants, the structural orientation (steeply dipping beds) and layered sediments of the bedrock precluded drawing equipotential lines depicting ground-water levels and flow directions for this unit. Wells drilled into bedrock encountered several stratigraphic horizons. Hydraulic connection or isolation of these horizons has not been adequately determined, and adjacent monitoring wells may not be completed in the same horizon. Secondary permeability from fractures and weathering of the bedrock may influence flow directions and provide for preferential flow paths. Consequently, a potentiometric map may not represent existing conditions. Flow patterns in the bedrock are unknown and flow velocity has not been determined.

Quaternary Older Bay Mud (Qobm)

At Vine Hill, the apparent hydraulic gradient across the facility is toward the east-northeast, and the shallow gradient ranges from approximately 0.003 to 0.007.

At Vine Hill, the ground-water velocity in the Qobm has been estimated to be on the order of 60 to 140 feet per year toward the east. These figures were computed using the formula:

$$V = K/P \times dH/dL, \text{ where:}$$

- V = Average linear flow velocity (cm/sec)
- K = Hydraulic conductivity (cm/sec)
- P = Effective porosity (dimensionless)
- dH/dL = Hydraulic gradient (dimensionless)

The estimation assumes a horizontal hydraulic conductivity of 3×10^{-3} cm/sec, and an average effective porosity of 0.15.

Quaternary Younger Bay Mud (Qybm)

At Vine Hill, a ground-water mound may exist near piezometer TB-513, where relatively high water levels were measured. Potentiometric levels in the

Qybm at this facility are highest along the northern boundary and decrease to the east-northeast and south.

The potentiometric elevations in the older bay mud at Baker show very little gradient and no perceptible sustained flow pattern; therefore, consultants to IT conclude that ground-water flow conditions in this unit are stagnant.

The ground-water flow velocity in the Qybm at Vine Hill has been estimated to be about 5 to 6 feet per year.

The potentiometric elevations in the younger bay mud at Baker show that ground-water mounding exists beneath impoundments B, C, and D-1. Smaller mounds may be present beneath impoundments D-2 and D-3. Ground-water mounds are not evident beneath the A impoundments or impoundment E. The presence of ground-water mounds induce artificial gradients and radial flow away from the waste management units.

A potentiometric high exists in the Qybm at Baker near impoundment A-5. The high is coincident with the dike forming the north and east sides of the A-5 impoundment.

At Baker, the ground-water flow velocity (away from the impoundments) in the Qybm has been estimated to be 4 to 5 feet per year; assuming that the average horizontal hydraulic conductivity is 4×10^{-6} cm/sec, the effective porosity is 0.05, and the hydraulic gradient is 0.06.

The hydrogeological conditions underlying and surrounding the IT Vine Hill and Baker facilities have not been adequately characterized for the purpose of ground-water monitoring. The purpose of a hydrogeological characterization of hazardous waste sites is to identify the uppermost aquifer, as defined in 40 CFR Part 260.10, and to determine the direction and rate of ground-water flow (hydraulic gradient). Both must be characterized to enable the development of a monitoring well network, which complies with the requirements of 40 CFR Part 265.91, or equivalent in the ISD (i.e., monitoring ground-water quality in the uppermost aquifer, installation of at least one upgradient well and three downgradient wells, and which are capable of yielding representative ground-water samples for analysis). The facilities have

not been fully characterized with respect to defining the uppermost aquifer and ground-water gradients have not been adequately defined to establish direction(s) and rate(s) of ground-water movement and contaminant migration.

The degree of hydraulic interconnection between stratigraphic layers underlying the IT facilities, and potential preferred paths of pollutant migration have not been established. Because the impoundments at the IT facilities are unlined and are located on top of old landfill material and underlying poorly defined strata of differing permeabilities, the potential for pollutant migration is high; however, it has not been adequately evaluated.

GROUND-WATER MONITORING PROGRAM DURING INTERIM STATUS

REGULATORY AUTHORITY

The regulatory authorities and effective dates that have applied to the IT Vine Hill and Baker facilities during interim status are listed in Table 16.

REQUIREMENTS AND EVENTS DURING INTERIM STATUS AT IT VINE HILL AND BAKER

June 6, 1978	California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, issued Waste Discharge Requirements (WDRs) for the Vine Hill and Baker facilities; Order No. 78-76. The WDRs include self-monitoring specifications and ground-water sampling locations.
March 6, 1981	California Department of Health Services (DOHS) issued an Interim Status Document (ISD) to IT Baker, specifying ground-water monitoring requirements and requiring a ground-water quality assessment outline to be prepared by November 19, 1981. The ground-water monitoring requirements in the ISD were in effect until January 17, 1984.
April 6, 1981	DOHS issued an ISD to IT Vine Hill specifying ground-water monitoring and requiring a ground-water quality assessment outline to be prepared by November 19, 1981. The ground-water monitoring requirements in the ISD were in effect until January 17, 1984.
October 19, 1982	IT requested a waiver of the ISD ground-water monitoring requirements.
August 1, 1983	IT submitted a Part B application for Vine Hill.
January 17, 1984	RWQCB granted IT a ground-water monitoring waiver of the ISD ground-water monitoring requirements at Vine Hill and Baker, provided that IT implement the self-monitoring program specified in the WDRs and add EPA interim primary drinking water standards to the list of analyses for the next six quarters of monitoring. The waiver was in effect until January 16, 1985. As of this date, the ISD ground-water monitoring requirements no longer applied.

Table 16
FEDERAL AND STATE REGULATORY AUTHORITY FOR INTERIM
STATUS GROUND-WATER MONITORING AT THE IT VINE HILL
AND BAKER HAZARDOUS WASTE FACILITIES

Effective Dates	Regulations, Permits and Orders ¹
Sept. 19, 1978 - Present	Waste Discharge Requirements (WDRs) Order No. 78-76 ² for Vine Hill and Baker
Nov. 1980 - Present	40 CFR 265 ³ ; CHWMR (CAC, Title 22) ⁴
March 6, 1981 - Present	Baker Interim Status Document ⁵
April 6, 1981 - Present	Vine Hill Interim Status Document ⁵
June 3, 1981 - Jan. 31, 1986	California had RCRA Phase I interim authorization; 40 CFR 265 and CHWMR (CAC, Title 22) still apply for ground-water monitoring
Jan. 11, 1983 - Jan. 31, 1986	California granted interim authorization for Phase II, Component A (authority to permits for treatment, storage of hazardous wastes in tanks, containers, waste piles and surface impoundments).
Jan. 16, 1985 - Sept. 30, 1986	Cleanup and Abatement Order No. 85- 004 for Vine Hill and Baker ²
Feb. 7, 1985 - Jan. 31, 1986	California granted an extension of interim authorization.
Sept. 30, 1986 - April 15, 1987	Cleanup and Abatement Order No. 86- 014 for Vine Hill and Baker ²
April 15, 1987 - Present	Cease and Desist Order No. 87-037 ^{2 6}

- ¹ Various permits for operations other than ground-water monitoring were also effective during interim status but are not listed here.
- ² Issued by the California Regional Water Quality Control Board
- ³ Title 40, Code of Federal Regulations, Part 265 (interim status regulations)
- ⁴ California Hazardous Waste Management Regulations, California Administrative Code Title 22, promulgated under the California Hazardous Waste Control Act
- ⁵ Issued by the California Department of Health Services
- ⁶ Issued under the authority of the State of California Toxic Pits Cleanup Act of 1984

August 3, 1984	EPA Region IX issued a Notice of Violation (NOV) to IT, citing ground-water violations noted in an ISD inspection on April 12 and 13, 1984.
September 27, 1984	EPA Region IX issued a Determination of Violation (DOV), indicating IT was violating the requirements of the ISD.
November 8, 1984	IT submitted a ground-water monitoring report (by Leroy Crandall & Associates) identifying a ground-water mound beneath ponds C and D-1 at Baker, and elevated concentration of chloride and total dissolved solids beneath these units. The report also concluded that Vine Hill did not have enough wells to establish ground-water movement and quality.
January 16, 1985	RWQCB issued a Cleanup and Abatement Order (85-004) to IT to investigate violations identified by EPA in the September 1984 DOV. The Order required IT to submit a ground-water quality assessment outline by February 15, 1985, determine the extent of contamination at Baker, certify the integrity of existing monitoring wells, modify and submit an amended ground-water sampling and analysis plan for each site, conduct monthly sampling for 6 months and certify the adequacy of the ground-water monitoring program for both the Vine Hill and Baker facilities. This Order revoked the ground-water monitoring waiver approved January 16, 1984.
February 8, 1985	IT submitted the first assessment outline to EPA Region IX and DOHS for the Baker facility (as Appendix XIII-2 of the Part B permit application).
March 3, 1985	IT submitted a "Recommended Ground-Water Assessment Plan."
April 4, 1985	IT submitted Part B application revisions for ground-water monitoring.
September 23, 1985	IT submitted the first assessment outline to EPA and DOHS for Vine Hill.
October 30, 1985	RWQCB inspection
September 30, 1986	Cleanup and Abatement Order (No. 86-014) was issued on the basis of noncompliance with issues identified in the April and October 1985 inspections.

GROUND-WATER SAMPLING AND ANALYSIS PLANS

Between May 1983 and May 1987, IT and their consultants prepared and submitted nine Ground-Water Sampling and Analysis Plans (SAPs) to meet the requirements of Federal and State laws and regulations including U.S. EPA regulations at 40 CFR 265.92 and State regulations at Title 23 California Administrative Code (CAC), Chapter 3, Subchapter 15, Article 5.

IT prepared identical SAPs dated May 3, 1983 for the IT Vine Hill and Baker facilities. These SAPs were submitted as parts of the respective Part B permit applications for each facility on August 1, 1983. These SAPs were determined to be deficient by EPA Region IX. Subsequently EPA issued two compliance orders, one for each facility (EPA Docket Numbers RCRA 09-84-0041 and RCRA 09-84-0042). In response, IT prepared and submitted, on October 29, 1984, revised SAPs for each facility including explanations for some deficiencies which they could not correct because of inadequate site hydrogeologic characterization. Again, in March 1985, IT submitted essentially the same SAPs for each facility along with Part B Application Revisions.

In December 1986, IT revised the SAP for the Vine Hill facility in response to comments by RWQCB, San Francisco Bay Region. Also, in December 1986, IT revised the SAP for the Baker facility to address comments made by the RWQCB in their Compliance Monitoring Evaluation (CME) dated June 30, 1986. This revised plan was submitted to fulfill the partial requirements of Task 4, Cleanup and Abatement Order (CAO) No. 86-014 pursuant to Section 13304 of the California Water Code.

Another SAP was prepared, dated May 18, 1987, to cover requirements of the CAO Field Program at both the Vine Hill and Baker facilities.

None of the SAPs noted above indicate which well(s) are designated as being hydraulically upgradient or downgradient of either the Vine Hill or Baker facilities. Such designation is required by 40 CFR 265.91(a)(1)(i) and (ii) and 265.91(a)(2).

Weaknesses in the plans include items such as the field instruments being calibrated in the laboratory each day before the field sampling personnel go to the field and no provision is made to recalibrate these instruments periodically between sampling stations during the day. Also, the SAPs indicate that the headspace in wells will be checked annually or more frequently, as scheduled by the IT Treatment and Disposal Department. Annual monitoring of the well headspace is too infrequent. The plans do, however, indicate that the headspace air will be monitored prior to any water level measurement, purging or water sampling. This is principally a safety precaution, although it may serve as an indicator of contaminant migration. The plans do not include procedures for decontamination of instruments and other downhole equipment between use in different wells.

IT SAMPLE COLLECTION AND HANDLING PROCEDURES

Task Force staff returned to the IT Vine Hill facility on August 4 and 6, 1987 to evaluate ground-water sample collection and handling procedures practiced by IT personnel during the routine quarterly RCRA ground-water monitoring sample collection field work. The evaluation included observing water level and well depth measurements, well purging procedures, field data collection and sample collection, preservation, and packaging. IT procedures were evaluated for technical soundness and for compliance with the sampling and analysis plan (SAP), as required by CAC, Title 22, Article 22, Section 67193 and 40 CFR Part 265.93. Task Force staff noted that in several instances, IT personnel did not follow the procedures, as specified in the sampling and analysis plan.

IT personnel, assigned to perform ground-water sampling at the Vine Hill and Baker facilities, were also responsible for sampling at other IT facilities and for sampling to fulfill specific requirements of a Cleanup and Abatement Order dated September 30, 1986. Because there are several SAPs which were developed for compliance with differing requirements, IT field personnel were uncertain about which SAP followed the routine RCRA quarterly ground-water sampling and did not adhere strictly to the requirements of any single plan.

IT officials provided the Task Force with copies of the December 1986 SAPs for both the Vine Hill and Baker facilities. However, IT field sampling personnel appeared to be unfamiliar with some of the procedures specified in the plans. The SAPs for these two facilities are identical except for the wells which are designated to be measured and sampled at each facility.

Wellhead Measurements

At the wellhead, the security cap was removed and an organic vapor sensor was used to determine the presence or absence of potentially dangerous volatile organic vapors. IT personnel then measured the depth to water below the top of the internal PVC casing using an electrical oil/water immiscible layer probe (Marine Moisture Control, Model B2220-3, serial number 1675). The instrument was capable of determining the depth to water within the accuracy of 0.01 foot as specified in the SAP. However, the tops of the casing in some wells are not cut evenly and no designated measuring point was marked. Therefore, measurements made by different personnel at different times may not be strictly comparable.

An effort was made to sound the depth of the well using the immiscible layer probe and subsequently calculate the fluid (water) column volume in the well and to determine whether an immiscible layer was present near the bottom of the well. This calculation is needed to determine the amount of water required to be purged from the well prior to sampling. However, the cable on the probe was not long enough to reach the well bottom; hence, neither of the above determinations could be made with the instrument used. IT field sampling personnel indicated that this instrument had been leased because the one the Company had ordered had not yet been delivered. However, since the December 1986 SAP, in which the use of this instrument was specified, there should have been two regular RCRA quarterly ground-water monitoring events. Furthermore, the field personnel did not appear to be familiar with the calibration and operating procedures for this instrument.

Subsequently, a Gould submersible stainless steel impeller pump was lowered into the well, suspended on a flexible plastic hose, plastic rope and an electrical power supply cord. The total depth of the well was determined by

sounding with the suspended pump. The column volume was calculated, the pump was raised to a position adjacent to the screened interval, just above the bottom of the well, and purging began. After purging slightly more than three water column volumes into storage drums beside the well, the pump, rope, hose, and cord were pulled from the well and placed in a plastic garbage bag prior to being decontaminated before use in another well.

In situ well water quality measurements were measured in the well by lowering a Martek instrument (MARK XIV) into the well at approximate screen depth. This instrument is designed to measure pH, temperature, dissolved oxygen (DO), and specific conductance. IT field personnel indicated that the instrument had been calibrated at IT's laboratory at the nearby Benicia facility and they did not recheck or recalibrate the instrument in the field. While making duplicate measurements the pH readings did not stabilize. The MARK XIV parameter measurements before and after sampling in well MW-219 were as follows:

	Before	After
pH	5.36	5.98
DO	1.82	2.51
Temperature	16.2 °C	20 °C, 18.4 °C, 17.3 °C (three measurements 5 minutes apart)
Specific Conductance	2110	2550

These changes suggest unexpectedly rapid changes in well water quality, inadequate instrument calibration, instrument instability or inexperienced instrument operators. The differences in readings were not resolved in the field. Eh (oxidation-reduction potential) measurements were not made in the field, as specified in the SAP.

Purging of Monitoring Wells

The SAP indicates that dedicated Teflon bladder pumps or Teflon bailers with fluorocarbon resin-coated wire or single strand stainless steel wire will be used for well sampling. The SAP indicates that if a bailer is used it will be dedicated to a specific well and it will remain in the well, suspended from the well cap, between sampling events. These procedures were not followed during the Task Force inspection.

Sampling of Monitoring Wells

Monitoring well MW-219 is a rapidly producing well about 96 feet deep, and while observing the purging of this well, the water level drew down only a few feet. After the purge pump was removed from the lower (screened) section of the well, a Teflon bailer was used for sample collection. Even though three column volumes of water had been evacuated from the well adjacent to the screen, the samples were collected from the top of the water column which, most probably, was the same standing water which occupied the well prior to purging. Thus, the purpose of purging (to provide samples which are representative of aquifer water quality) probably was not accomplished. In addition, the *in situ* well water quality measurements near the bottom of the well would not be expected to be comparable with laboratory analytical data resulting from samples collected from the top (unpurged) portion of the water column.

Sample Parameters

The parameter sampling order observed during the inspection was different than that specified in the SAP. Samples were collected for volatile organics analysis (VOA) from the first well (MW-219) where sampling was observed by the Task Force. However, at a subsequent well (MW-218) IT personnel indicated that they do not collect VOA samples at the Vine Hill facility and had been given sample bottles for VOAs by mistake for sampling of well MW-219.

The SAP indicates that four separate determinations of dissolved oxygen (DO), pH, and electrical conductance (EC) will be made for each sample and that temperature and turbidity will be measured only once for each sample. These procedures were not consistently followed by IT field personnel during the Task Force inspection.

IT personnel indicated that the sample bottle preparation is provided for them by their laboratory and usually comes from Export, Pennsylvania although, on occasion, some sample containers are provided by staff at the nearby IT Benicia facility. The use of preservatives and sample handling and packaging practices observed were adequate.

Although not required in the SAP, no equipment blank samples were collected during the inspection. Rigorous field sampling procedures should include occasional equipment blanks to assure that field equipment cleaning procedures are sufficient to preclude sample contamination from equipment which is used repeatedly. Field blanks were collected but were poured at the decontamination area rather than adjacent to a well site being sampled, as specified in the SAP.

The Groundwater Monitoring Well Sampling Information form used by IT field personnel during the Task Force inspection was not the same form as provided in the SAP. This form omitted spaces for some field data and had additional spaces for other data. Either form would be acceptable as long as it is consistent with the SAP narrative. The form provided in the SAP is preferable because it has more spaces for field data than the form used during the inspection.

Adequacy of Handling Procedures

At various times during the inspection, IT field personnel allowed downhole equipment, such as instrument cables and ropes, to touch the ground or get tangled in weeds. This practice, although accidental, could lead to the introduction of foreign (surface) contaminants into wells.

Decontamination of downhole equipment and instruments between use in different wells was performed at a centralized decontamination pad away from sampling locations but was outdoors within the general waste management area of the Vine Hill facility. Bailers, ropes, cables, etc. were washed with tap water and detergent and rinsed twice with tap water. They were subsequently steam cleaned with steam derived from tap water. Equipment was then wrapped in plastic before moving to a well site for use in sampling. Just prior to using equipment at a well, it was removed from the plastic wrapping and rinsed with deionized water. Some of the deionized water used for this rinsing during the inspection was labeled, "Rodgers Purified Water - purified by deionization." Other bottled water, which was also used, was labeled "Superior Quality Artesian Drinking Water from Napa Valley." Whether this water was deionized is unknown. No solvents were used in the cleaning process which would assure that organic contaminants, which might be present, were removed.

To determine the adequacy of the decontamination procedures used by IT, a set of equipment blank samples should be collected and analyzed each day that sampling is conducted. The equipment blanks should consist of rinse water from the last rinse before the equipment is used.

The IT field ground-water sampling personnel were not as familiar with the SAP provided and the procedures to be followed as they should have been to assure that representative samples were obtained or that field measurements would have the necessary integrity.

GROUND-WATER QUALITY ASSESSMENT PROGRAM

The IT Vine Hill and Baker facilities were issued Interim Status Documents (ISDs) on April 6 and March 6, 1981, respectively. Section VIII of each ISD specified the ground-water monitoring requirements, including those for ground-water quality assessment outline(s), and required the outline to be prepared by November 19, 1981.

IT requested a waiver of the ISD ground-water monitoring requirements in a letter dated October 19, 1982, citing a low potential for migration of hazardous waste or hazardous waste constituents from the facility, via the uppermost aquifer. These are the only grounds for approval of a waiver request provided in the ISD [Section VIII(5)]. RWQCB approved the IT waiver request, in a letter dated January 17, 1984, but did not make a determination that a low potential for migration of hazardous waste existed. Instead, RWQCB found that the Self Monitoring Program, specified under the Waste Discharge Requirements (Order 78-76), would satisfy the ground-water monitoring requirements, if IT added the EPA interim primary drinking water standard parameters to the list of analyses for the next six quarters of monitoring.

EPA Region IX inspected the site on April 12 and 13, 1984 and, based on the inspection, issued a Notice of Violation on August 3, 1984 and a Determination of Violation on September 27, 1984 indicating IT was violating the requirements of the State ISD. Following the EPA action, RWQCB determined that the potential for migration of hazardous waste from the IT facilities existed and required IT to fully implement the ISD ground-water monitoring program as part of a Cleanup and Abatement Order (85-004) issued on January 16, 1985, to investigate the violations identified by EPA.

The Cleanup and Abatement Order required IT to submit a ground-water quality assessment outline for each site, by February 15, 1985, which complied with the requirements of 40 CFR Part 265.93(a). The assessment outline is required to describe a more comprehensive ground-water monitoring program than the one for interim status detection monitoring and must be capable of determining:

- Whether hazardous waste or hazardous waste constituents have entered the ground water
- The rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water
- The concentrations of hazardous waste or hazardous waste constituents in the ground water

The first assessment outlines for the IT facilities were submitted to EPA Region IX and DOHS on September 23, 1985 for the Vine Hill facility and February 8, 1985 for the Baker facility (as Appendix XIII-2 of the Part B permit application). These outlines were also identified by IT personnel as the most recent outlines and were provided to the Task Force by IT in a letter dated July 24, 1987. These outlines were evaluated by the Task Force and are very different, but both are inadequate.

VINE HILL FACILITY ASSESSMENT OUTLINE AND PLAN

The outline submitted for the Vine Hill facility on September 23, 1985 lacks information required in 265.93. In addition to the information submitted, the outline should contain the following:

- Circumstances necessitating additional monitoring wells would be necessary if the initial phase of the program indicates contamination. The outline specifies that two piezometers would be installed in the vicinity of any wells with statistically significant pH increases (or decreases). The outline, however, states that wells would not be installed because of the rate of ground-water movement. The outline does not address how these piezometers would be used to determine the rate and extent of contaminant migration, as required.
- How volume/concentration of released contaminants would be determined
- What the facility would do to make sure that all potential contaminants are identified in the plume. The IT "Hierarchial Analysis Protocol" should be included rather

than referenced, since the protocol is referenced as the sole means of determining the universe of constituents to be analyzed in assessment. The analytical parameters to be sampled should be listed.

- How an assessment monitoring plan would be developed and what the projected sampling frequency would be
- Which aquifer(s) would be monitored
- Approximate schedules for the time needed to initiate assessment sampling, analysis, data evaluation, and report results. The starting schedule is included but a time frame should be given which estimates the time necessary to complete stated tasks
- How a determination would be made to return the facility to detection monitoring if contamination was not confirmed

The Vine Hill facility was ordered to comply with the requirements of Compliance and Abatement Order 86-013 following a May 1985 report by Leroy Crandall Associates, describing elevated levels of TOC, TOX, phenolics, and boron in well MW-203. IT responded that assessment was not justified because they did not believe the facility was the source of the contaminants. The well in question is on the boundary of the Acme Fill Corporation/IT Vine Hill border and IT contends that Acme is the source of the contaminants. The September 1986 Cleanup and Abatement Order (86-014) also applied to the contaminants found on the Vine Hill facility. The Order required IT to complete an investigation into the source of the contaminants and to respond to other violations found during RWQCB inspections.

A 1981 DuPont study of Vine Hill impoundment number 100, revealed the presence of tetraethyl lead (TEL). The September 1986 Abatement Order also required further investigation of the TEL identified in 1981 as well as the other contaminants identified in 1985.

At the time of the Task Force investigation no assessment plan had been prepared by IT.

BAKER FACILITY ASSESSMENT OUTLINE AND PLAN

The Baker outline is titled "Ground-Water Quality Assessment Outline-IT Corporation Baker Facility," but does not address an assessment program as defined by 40 CFR Part 265.93(a) or the ISD (Section VIII). Instead of describing a program which would start after statistical analysis of quarterly monitoring data triggered assessment, the outline describes modifications to the existing detection monitoring program. The outline describes the need for additional wells to determine background ground-water quality, evaluate water quality beneath the impoundments and monitor deeper zones. New wells are proposed "to help in early detection of problems," not to determine rate and extent of migration, as required during assessment.

The "assessment outline" describes work that is not yet completed, because of shortfalls of the detection system, rather than steps which will be taken if the detection monitoring system triggers assessment, via the statistical analyses of quarterly data. The outline describes sampling and analysis and other detection monitoring procedures, ending with the need for statistical analysis. The statistical analysis program described is used only to determine "seasonal variance" in the water quality, and never implies that contaminants may be the cause of water quality fluctuations.

The statistical analysis program proposed does not indicate which well(s) will be used for background ground-water quality determinations. The outline states that the current background well (MW-112) is inadequate and a new well is proposed. The "assessment outline" prepared for the Baker facility does not address any of the requirements specified in 40 CFR Part 265.93(a), and is not adequate as an assessment outline.

In addition, the assessment outline for the Baker facility should also contain the following information:

- Circumstances necessitating additional monitoring wells would be necessary if the initial phase of the program indicates contamination. The outline specifies that two piezometers would be installed in the vicinity of any wells with statistically significant

pH increases (or decreases). The outline, however, states that wells would not be installed because of the rate of ground-water movement. The outline does not address how these piezometers would be used to determine the rate and extent of contaminant migration, as required.

- How volume/concentration of released contaminants would be determined
- What the facility would do to make sure that all potential contaminants are identified in the plume. The IT "Hierarchical Analysis Protocol" should be included rather than referenced, since the protocol is referenced as the sole means of determining the universe of constituents to be analyzed in assessment. The analytical parameters to be sampled should be listed.
- How an assessment monitoring plan would be developed and what the projected sampling frequency would be
- Which aquifer(s) would be monitored
- Approximate schedules for the time needed to initiate assessment sampling, analysis, data evaluation, and report results. The starting schedule is included but a time frame should be given which estimates the time necessary to complete stated tasks
- How a determination would be made to return the facility to detection monitoring if contamination was not confirmed

IT submitted a monitoring report for the Baker facility on November 8, 1984. The report, prepared by Leroy Crandall and Associates (LCA), identified elevated chloride and total dissolved solids (TDS) concentrations in the ground water, primarily beneath impoundments C and D-1. The report also describes a ground-water mound under the impoundments that, according to LCA, closely corresponded to the chloride concentrations.

Following review of the report and the EPA inspections, the RWQCB issued a Cleanup and Abatement Order (Number 85-004) dated January 16, 1985, which required IT to identify: (1) the extent of contamination at Baker, (2) locate appropriate upgradient wells and (3) certify the adequacy of the ground-water monitoring program for both the Vine Hill and Baker facilities. In response to the Order, IT submitted both the Assessment Outline (previously discussed) and a document titled "Recommended Ground-Water Assessment Plan," dated March 3, 1985.

Two inspections (April 19, 1985 and October 30, 1986) of the IT facilities were conducted by RWQCB personnel and inspection evaluations described problems with the sampling and analysis plan, hydrogeologic characterization, statistical analysis, background/upgradient wells, etc. Inspection evaluations were sent to IT regarding compliance with the ground-water requirements (dated June 19, 1985 and June 30, 1986). IT had reportedly complied with most portions of the January 1985 Abatement Order; however, the additional non-compliance required issuance of an additional Cleanup and Abatement Order (No. 86-014), dated September 30, 1986.

IT has not completed implementation of the assessment plan submitted in March of 1985 for the Baker facility. The Abatement Orders are the driving force for evaluation of the contaminants detected at Baker. The tasks have been modified significantly from those proposed by IT in the assessment plan. The tasks required in the abatement program include the aspects required of an assessment program under RCRA including, all the aspects of an assessment outline plus:

- The number, location, and depth of wells
- Sampling and analytical methods for those hazardous wastes or hazardous waste constituents in the facility
- Evaluation procedures, including any use of previously gathered ground-water quality information
- A schedule of implementation

The implementation of the assessment (abatement program) program is in accordance with provisions and time tables specified in the Abatement Orders (85-004 and 86-014).

GROUND-WATER MONITORING PROGRAMS PROPOSED FOR RCRA PERMITS

Task Force personnel reviewed the ground-water monitoring programs proposed in the RCRA Part B permit applications for both the Vine Hill and Baker facilities. The ground-water monitoring programs proposed for the final RCRA permits were incomplete on several counts, as described below.

VINE HILL FACILITY

The original Part B permit application for IT Vine Hill is dated August 1, 1983. IT submitted a partial revision to EPA on April 4, 1985. By the time of the Task Force investigation in 1987, the ground-water monitoring program in the application had not been revised to correct deficiencies identified earlier, although hydrogeologic investigations were continuing.

The proposed ground-water monitoring program does not identify the uppermost aquifer or which aquifer(s) are hydraulically interconnected to one another or need to be monitored [40 CFR 264.97, 270.14(c)(2)]. The application does identify several permeable zones but does not provide a basis for the decision to monitor given zones. The application does not include determinations of ground-water flow directions and rates [40 CFR 270.14(c)]. Adequate placement of monitoring wells depends upon proper identification of permeable ground-water zones and flow directions and rates. In light of hydrogeologic investigations done since the Part B submittal, IT needs to include the more recent and complete information in the permit application.

The proposed monitoring program does not designate monitoring wells for determining the background ground-water quality (40 CFR 264.97). Neither does the program include consistent analytical methods for determining water quality, as required by 40 CFR 264.97(d).

The monitoring well system proposed in the Part B application is insufficient in that well location and construction information is general and incomplete. The application needs to contain specific well completion

information, including well design and the monitored permeable zone for each well.

The ground-water monitoring program in the Part B application proposes detection monitoring (40 CFR 264.98) for the term of the RCRA permit. Considering that organic compounds have been detected in ground water and in soils, IT needs to include provisions for compliance monitoring under 40 CFR 264.99.

The proposed sampling and analysis plan does not mention using locked containers for samples in the chain-of-custody procedures. Containers used for holding samples need to be locked when they are not in the immediate presence of the sample custodian. Preservatives used for ground-water samples need to be listed in the plan instead of incorporated by reference.

BAKER FACILITY

The original Part B permit application for IT Baker is dated August 1, 1983. IT submitted a partial revision to EPA on April 4, 1985. At the time of the Task Force investigation in 1987, the ground-water monitoring program in the application had not been revised a second time; however, hydrogeologic investigations were continuing.

The proposed ground-water monitoring program does not identify the uppermost aquifer or which aquifer(s) are hydraulically interconnected [40 CFR 264.97, 270.14(c)(2)]. IT does identify several permeable zones and presents an estimated range of permeabilities based upon "slug" and laboratory test data; however, which zones these values represent is not clear. At best, these data are representative of near-well conditions only.

Water level data presented in the application are difficult to interpret because it is not clear which permeable zone(s) are being monitored by each well. As a result, the slope(s) and direction(s) of the hydraulic gradients, as represented, are suspect.

The application presents estimates of flow velocity based on the limited permeability and water level data. Although the ranges of flow velocity seem reasonable for the types of deposits in the area, the velocities need to be computed again using reliable data derived from specific, accurately defined water-bearing zones.

The proposed monitoring program does not designate monitoring wells for determining the background ground-water quality (40 CFR 264.97).

The monitoring well system proposed in the Baker Part B application is insufficient in that well location and construction information is incomplete. The application includes general well construction specifications which lack such details as grout and sand filter pack types and the zone monitored.

As for Vine Hill, the ground-water monitoring program in the Baker Part B application proposed detection monitoring under 40 CFR 264.98 for the term of the RCRA permit. Hazardous waste constituents have been detected in ground-water samples. Therefore, IT needs to include provisions for compliance monitoring under 40 CFR 264.99.

EVALUATION OF MONITORING DATA FOR INDICATIONS OF WASTE RELEASE

This section presents an analysis of Task Force and IT Corporation monitoring data regarding indications of waste releases to ground water from the IT Vine Hill and Baker facility impoundments. Field and laboratory analytical results from samples collected by Task Force (EPA contractors) personnel are presented in Appendices A (Vine Hill) and B (Baker), together with an indication of the analytical methods used.

The data indicates that hazardous constituents are present in the ground water in the vicinity of the Vine Hill and Baker surface impoundments. The majority of the constituents identified were not found in the ground water at the adjacent Acme Fill Corporation facility; therefore, these constituents most probably have leaked from the IT surface impoundments. The data for the inorganic parameters and indicator parameters (pH, specific conductance, TOC, and TOX) from the Task Force samples correlate well with the historic data reported by IT during interim status monitoring. Wells MW-102 and MW-113 at the Baker facility exceeded the maximum contaminant level of 1.0 mg/L for barium. Organic results from the Task Force investigation indicate the presence of volatile and semi-volatile organic compounds in monitoring wells, and in the surface impoundments sampled. The following sections discuss in detail the findings for the Vine Hill and Baker facilities, respectively.

In addition, data in the files of the RWQCB, San Francisco Bay Region, show evidence of ground-water contamination due to leakage from impoundments at the IT Vine Hill and Baker facilities.

ORGANIC RESULTS - VINE HILL FACILITY

Organic compounds were detected in several wells and a surface impoundment at the Vine Hill facility. The designated upgradient/background wells MW-216 and MW-219 were sampled during the Task Force investigation and found to be virtually free of chromatographable organic compounds. The designated downgradient wells MW-203, MW-205, MW-212, MW-215, MW-222, TB-515 and the surface impoundment (pond 101) contained organic

constituents above the limits of quantitation [Table 17]. No correlation could be made between the constituents found in pond 101 and those found in the wells. Samples were not taken from the other surface impoundments during the Task Force investigation and the facility has not historically submitted organic analytical results as part of interim status, so the source of the constituents in the wells could not be identified.

ORGANIC RESULTS - BAKER FACILITY

Organic compounds were detected in several wells, a surface impoundment, and a ground-water seep at the Baker facility. Well MW-112, designated by the facility as an upgradient/background well, was virtually free of chromatographable organic compounds. Apparently, downgradient wells (MW-101 and MW-125), although not designated as such by IT, a surface impoundment (D-1), and a ground-water seep showed detectable organic compounds. The concentration of benzoic acid in the surface impoundment was an estimate because of the dilution necessary before analysis [Table 18]. The constituents identified in well MW-125 may be indicative of leaks in the A-series of impoundments or the B impoundment. Samples were not taken from these impoundments during the Task Force investigation and the facility has not historically submitted organic analytical results as part of interim status, so the source of the constituents in MW-125 could not be identified.

Table 17
 SELECTED VOLATILE ORGANIC CONSTITUENTS PRESENT IN TASK FORCE SAMPLES
 IT Corporation
 Vine Hill Facility
 Martinez, California

Constituent - µg/L	Well MW203	Well MW205	Well MW215	Well MW222	Well TB515	Surface Impoundment
1,2-dichloroethane	ND*	320.	ND	ND	ND	ND
Benzene	11.	22.**	6.	ND	ND	ND
Toluene	2.**	17.**	2.**	16.	9.	170*
Vinyl acetate	93.	240.	ND	ND		ND
Phenol	17.	ND	8.**	ND	ND	8,000.
2-methyl phenol	13.	ND	ND	ND	ND	ND
Vinyl chloride	ND	350.	ND	ND	9.**	ND
Xylenes	3.**	ND	13.	ND	13.	ND
Trans-1,2-dichloroethene	ND	ND	ND	ND	8.	160.**
Trichloroethene	ND	ND	ND	ND	1.**	26.**
4-methylphenol	6.**	ND	ND	ND	ND	680.
Ethylbenzene	ND	ND	ND	ND	6.	ND
Chlorobenzene	ND	ND	ND	ND	7.	ND

* ND = Not Detected
 ** Estimated, below LOQ

Table 18
 SELECTED VOLATILE ORGANIC CONSTITUENTS PRESENT IN TASK FORCE SAMPLES*
 IT Corporation
 Baker Facility
 Martinez, California

Constituent µg/L	Upgradient Well MW112	Well MW9A	Well MW101	Well MW125	Pond C	Pond D-1	Ground-Water Seep
Toluene	1.*	ND	ND	5.	ND	ND	ND
Acetone	ND**	ND	ND	99.	ND	ND	ND
bis (2-Ethylhexyl) phthalate	2.*	2.*	180.	11.	210.	ND	29.
Benzoic acid	ND	ND	ND	140.	ND	3,800.	ND
Phenol	ND	ND	ND	240.	ND	ND	ND
1,4-Naphthoquinone	ND	7.*	ND	26.	ND	ND	ND
2,4,5-TP	ND	0.28	ND	ND	ND	ND	0.7
di-n-Butyl phthalate	1.*	2.*	ND	ND	ND	ND	ND

* Detected but estimated, below Limits of Quantitation (LOQ)

** ND = Not Detected

MONITORING WELL LOCATION, NUMBER, AND CONSTRUCTION

The monitoring well networks used for ground-water monitoring at the IT Vine Hill and Baker facilities have changed significantly over time. The following sections address the monitoring well networks for each facility and respective compliance under both the self-monitoring and interim status monitoring programs.

LOCATION AND NUMBER

The ISD [Section VIII(1)] and RCRA (40 CFR Part 265.91) requirements are identical regarding the location and number of monitoring wells, and require:

- Monitoring wells (at least one) installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the waste management area. Their number, locations and depth must be sufficient to yield ground-water samples that are:
 - Representative of background ground-water quality in the uppermost aquifer near the facility
 - Not affected by the facility
- Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) at the limit of the waste management area. Their number, locations, and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous constituents that migrate from the waste management area to the uppermost aquifer.

The facility has not fully complied with these requirements.

VINE HILL FACILITY SELF-MONITORING PROGRAM WELLS

The self-monitoring program for Vine Hill facility is also found in Waste Discharge Requirements Order 78-76 and contains requirements similar to those for the Baker facility, except required ground-water monitoring wells were to be located according to specifications in Table 19.

Table 19
SELF-MONITORING PROGRAM WELLS
Vine Hill Facility

Well No.	Description/Specifications
G-18	A well located within 50 feet of the northeast corner of the Vine Hill site waste disposal impoundment area. The depth shall be to the first available ground water.
G-19	A well located within 300 feet northerly and 300 feet easterly from the northeasterly corner of the Vine Hill site waste disposal impoundment area. The depth shall be to the first available ground water (formerly well C).
G-21	A well located within 800 feet easterly and about 300 feet southerly from the northeasterly corner of the Vine Hill site waste disposal impoundment area. The depth shall be to the first available ground water. (formerly well E).
G-22	A well located within 50 feet of the easterly corner of the Vine Hill site waste disposal impoundment area. The depth shall be to the first available ground water.
G-23	A well located at the southwesterly corner of the Vine Hill site (in the area described as the "Shell Oil parcel") waste disposal impoundment area. The depth shall be to the first available ground water.

Like the wells at Baker, there is little, if any, information available regarding the construction of the self-monitoring wells. A letter from IT to EPA Region IX, dated May 1983, stated that boring logs were not available for wells 21, 22, and 23 [Figure 5]. The only available construction information is depicted in Figure 6. As-built diagrams are not available for individual wells, therefore, the adequacy of the wells cannot be evaluated. Varying lengths of blank PVC casing were installed below the screened interval, and the gravel pack extended through both the length of the screen and the blank casing to the total depth of the well. Multiple flow zones were intercepted using this construction method. None of the wells were designated as background/upgradient.

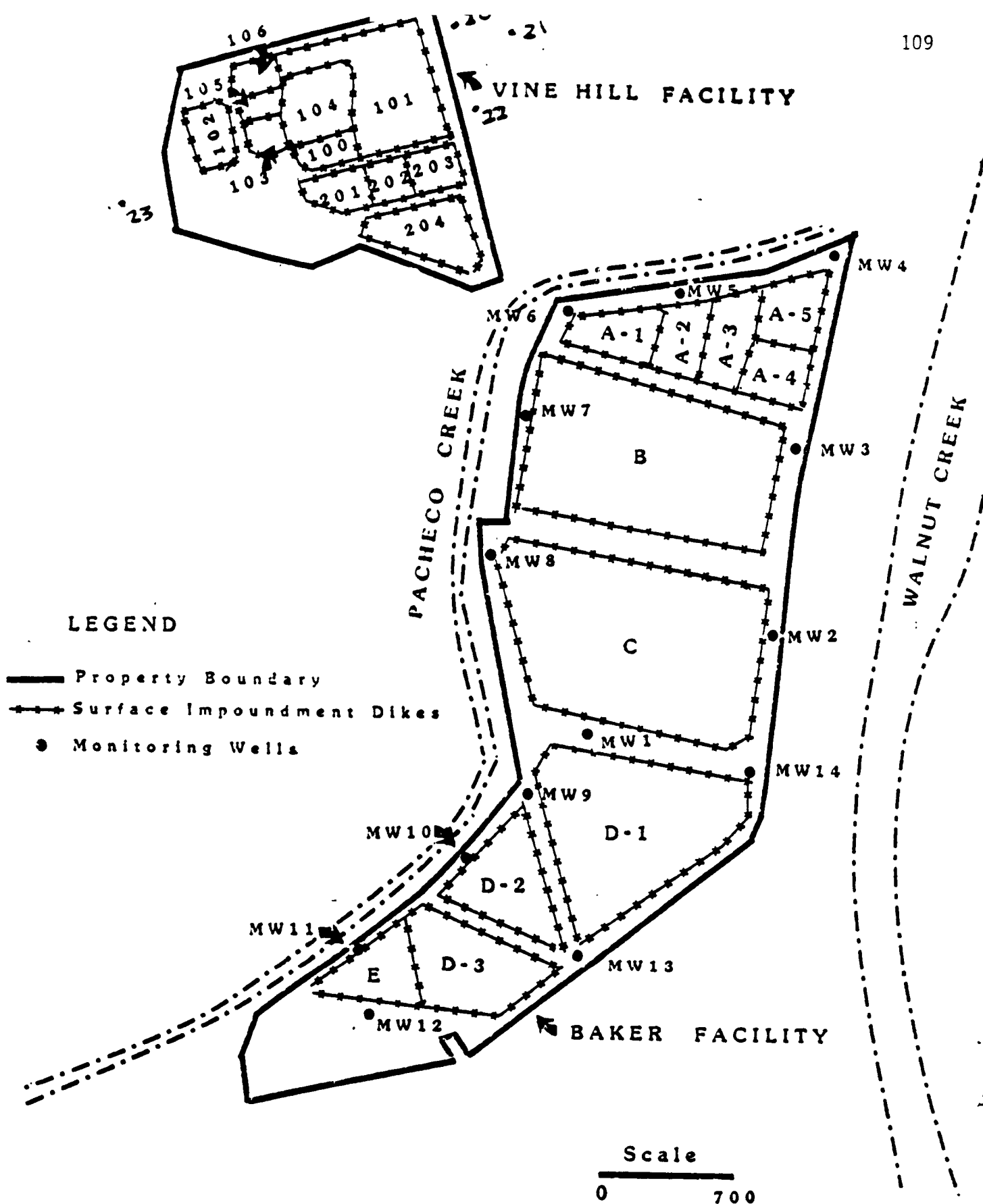


FIGURE 5

SELF MONITORING PROGRAM

WELL NETWORK

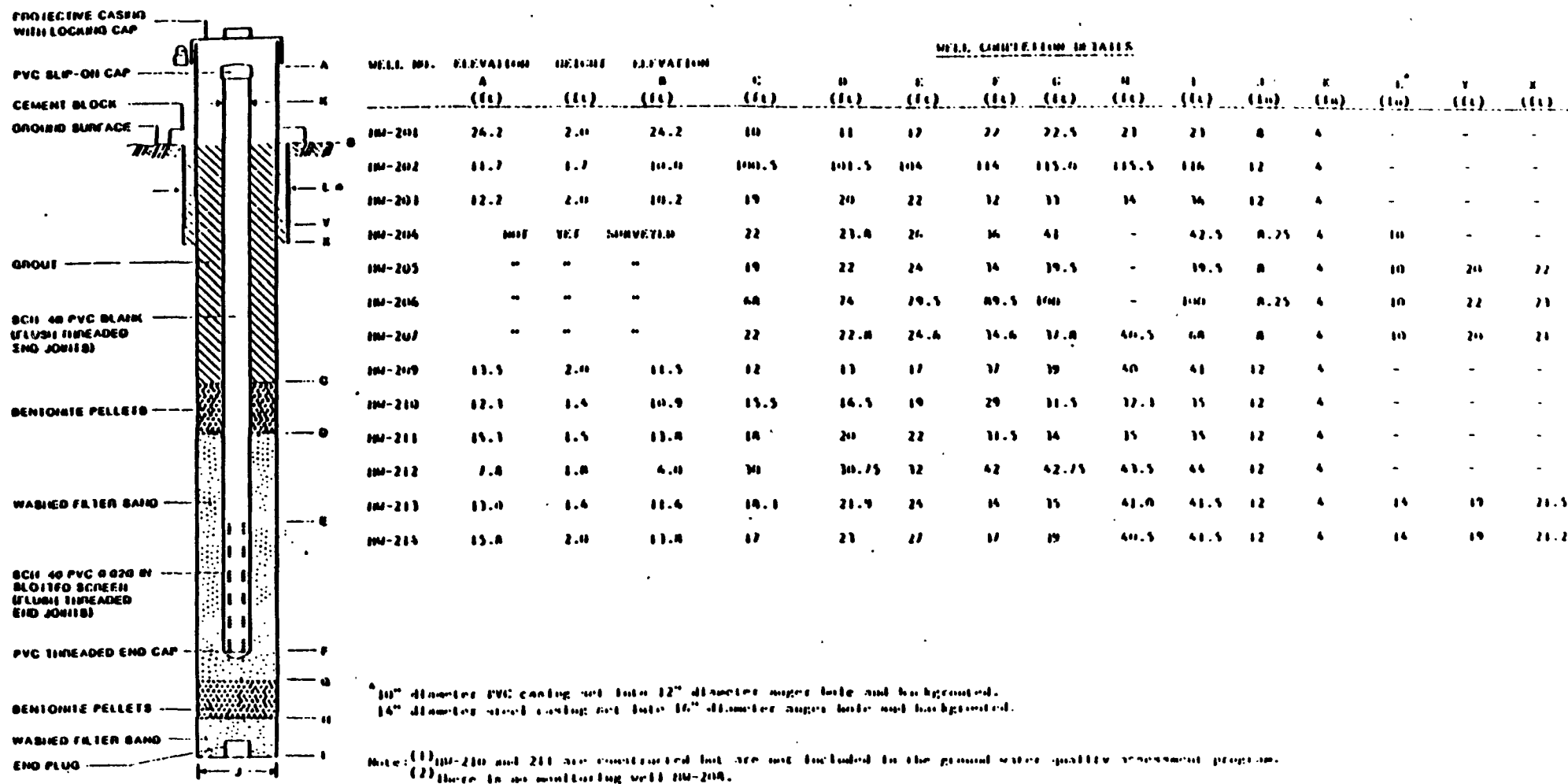


FIGURE 6

VINE HILL INTERIM STATUS MONITORING WELL COMPLETION DETAILS

Construction records are not available, therefore, a determination cannot be made of whether the wells conform to the contractor specifications. Wells 20, 22, and 23 were proposed to be abandoned in October 1984. Well 21 was to be retained as a piezometer, even though the May 1983 letter stated that construction information was not available for this well. Documentation could not be located during the Task Force investigation to verify that wells 20, 22, and 23 were ever properly abandoned or that wells 18 and 19 were ever drilled, as required by the self-monitoring program.

VINE HILL FACILITY INTERIM STATUS MONITORING WELLS

Location and Number

The ISD and RCRA requirements are the same for the Vine Hill and Baker facilities. Between November 1984 and January 1985, 12 interim status wells were drilled at the Vine Hill facility. The wells were numbered MW-201 through MW-207 and MW-209 through MW-214. Wells MW-210 and MW-211 were found to be contaminated with oily fill residues during construction and were replaced by wells MW-213 and MW-214, respectively. None of the wells were designated as upgradient, although the location of the wells were selected to "assure that an upgradient well is installed," according to IT reports.

Additional interim status wells were drilled between October 1985 and March 1986. These wells were numbered MW-215 through MW-219. Wells MW-215, MW-216 and MW-218 were designated by IT as upgradient wells, monitoring the bay mud (MW-215 and MW-218) and sand and gravel units (MW-216). Well MW-215 was discontinued as an upgradient well because drilling crews were unable to properly develop the well for sampling. Figure 7 identifies the locations of the Vine Hill interim status wells. At the time of the Task Force investigation the direction of ground-water flow and the vertical and areal extent of the uppermost aquifer (particularly for the fill and bedrock zones) had not been characterized, therefore, the location and number of wells necessary to monitor the uppermost aquifer, upgradient or downgradient of the hazardous waste management areas (as required by 40 CFR Part 265.91 and the ISD) is not adequate.

Construction Details- Interim Status Wells*

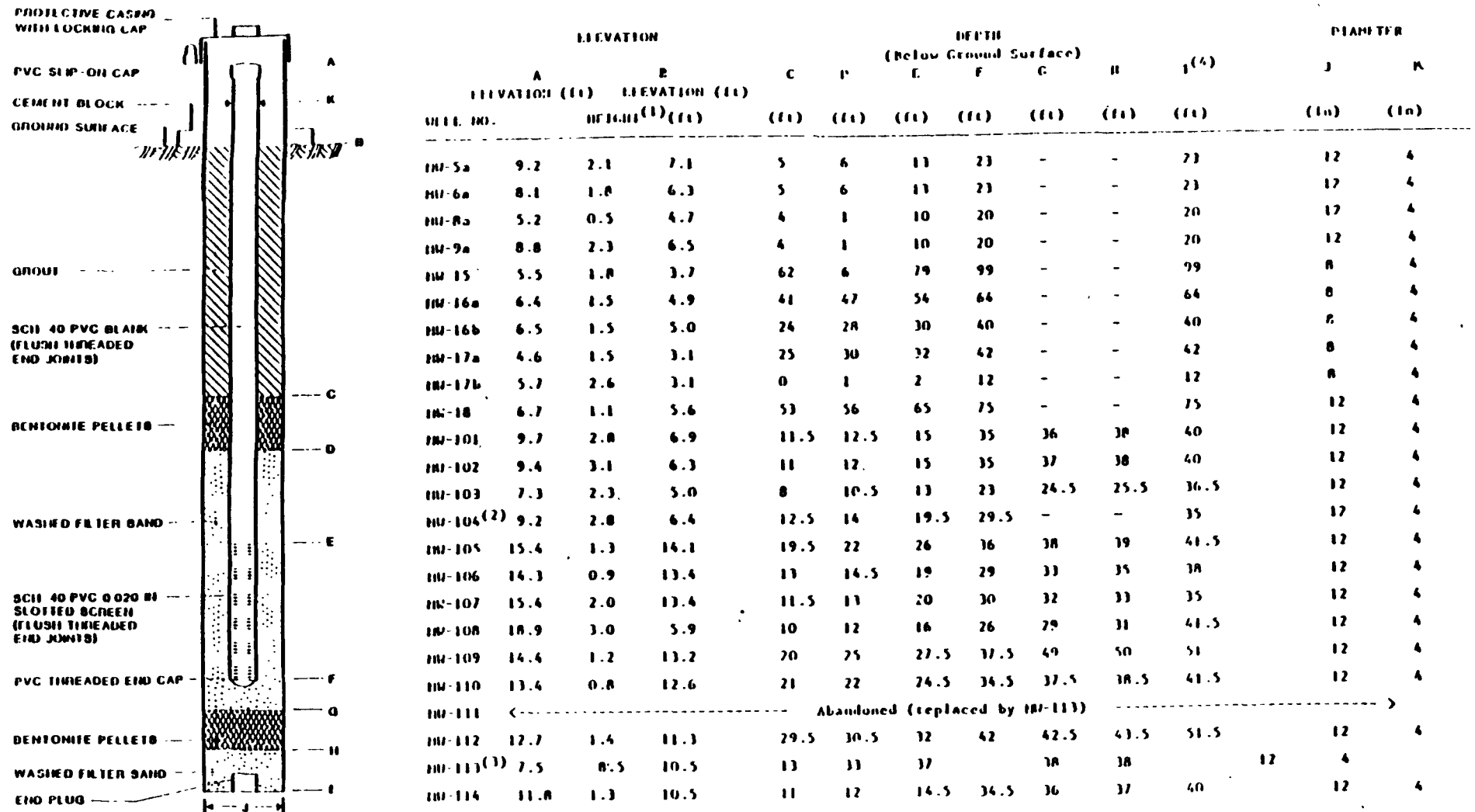


FIGURE 7
BAKER INTERIM STATUS MONITORING WELL COMPLETION DETAILS

Datum is Mean Sea Level

Notes:

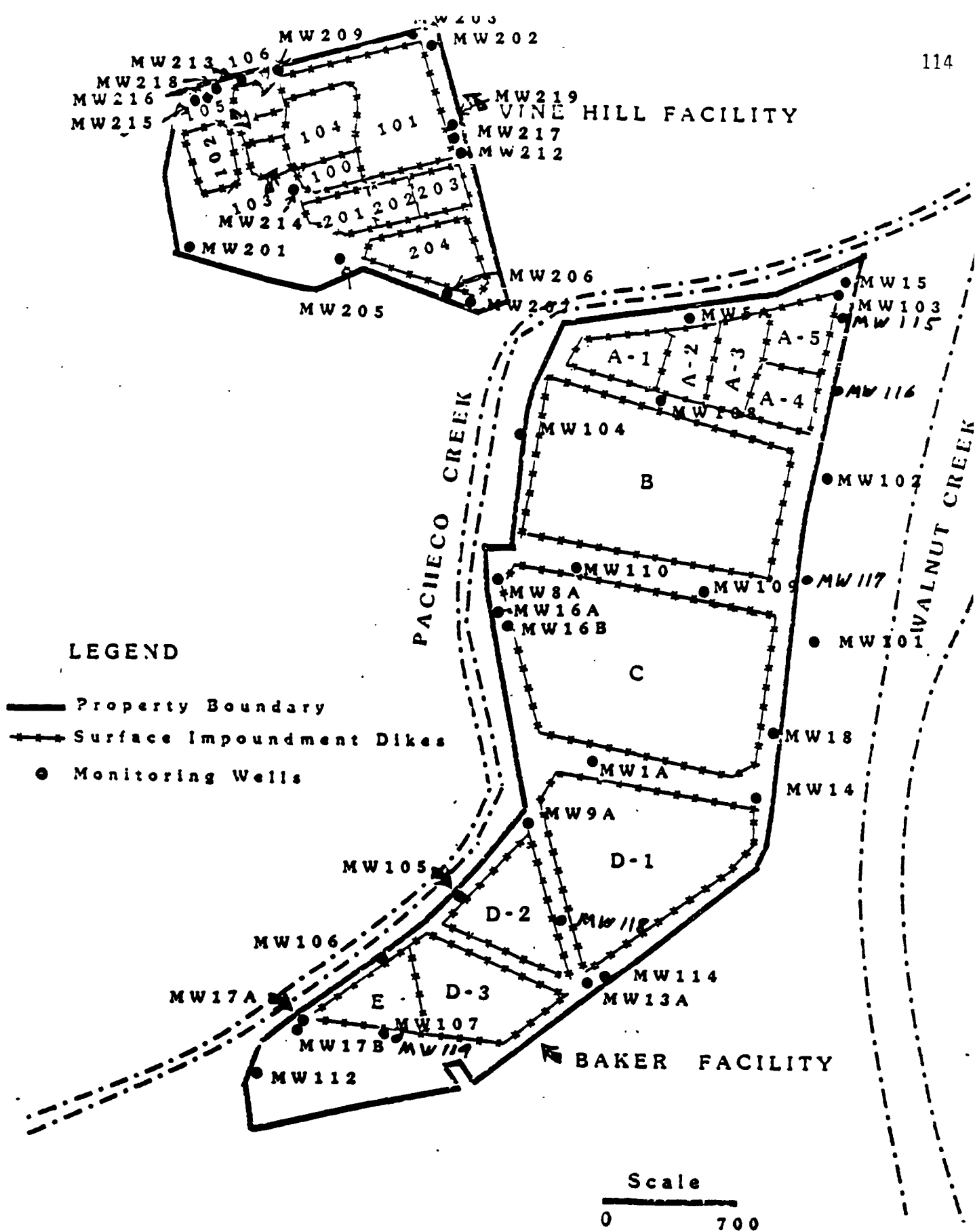
- (1) Height of PVC casing; measuring point above ground surface.
- (2) HW-104 not constructed with lower bentonite seal; screen on bottom of hole at 29.5 feet; hole then caved to 21.5 feet; washed filter sand placed from 14 to 21.5 feet.
- (3) HW-113 not constructed with lower washed filter sand; lower bentonite seal sits directly on native soil.
- (4) HW-5a, 6a, 8a, 9a, 15, 16a, 17a, 17b and 18 not constructed with lower washed filter sand and bentonite seal; screen sits directly on native soil (1).

* Figure from "Proposed Ground-Water Monitoring Program" Attachment 3, Appendix B, May 1985.

Construction

The construction of the Vine Hill facility wells is similar to that described for the Baker facility interim status wells. There are no as-built construction diagrams available for wells MW-201 through MW-207 and MW-209 through MW-214. Well MW-207 was not logged during drilling because of its proximity to well MW-206, therefore, drilling records are also not available. The well completion details provided by IT [Figure 8] do not agree with the available drilling logs. The depths in the construction records do not agree with the drilling logs (e.g., MW-201 and MW-203). There are also no records available regarding the volumes of filter pack, material, or cement used in construction. There are no records of grain size analyses performed to verify whether the selection of screen size or filter pack materials are appropriate for the formations screened. Wells MW-218 and MW-219 are the only wells with a justification for the screen slot selected. The filter packs around the screen and the blank casing sections, extend for 1 to 5 feet above the screened interval. When the thickness of formations screened are added to the zones intercepted by the sand pack and blank casing, multiple zones having different compositions and water-bearing properties are being sampled for 12 wells (wells MW-201, MW-202, MW-204, MW-206, MW-212, MW-213, MW-214, MW-215, MW-216, MW-217, MW-218 and MW-219).

Additional potential problems with the well construction were identified at several wells during Task Force sampling. Wells MW-203 and MW-209 were not completed with a concrete pad, creating the potential for surface contamination to enter these wells. Well MW-218 was missing a casing cap, and the surface casing annulus for well MW-213 was filled with water, indicating possible leaks in the casing or other structural problems. When measured by Task Force personnel, the depth of wells MW-202, MW-203, MW-204, MW-205, MW-206, MW-207, MW-209, MW-212, MW-213, MW-214, MW-216, MW-218 and MW-219 differed more than 0.5 feet shallower or deeper than the depths reported in IT construction records indicate. In summary, numerous wells have construction problems which make their use for sampling as interim status monitoring wells subject to questions.



Additional wells were drilled at the Vine Hill facility following the 1986 Cleanup and Abatement Order (wells MW-220 through MW-227). Information describing the drilling, completion, and construction of these wells was not available at the time of the Task Force investigation, therefore, the adequacy of these wells was not evaluated.

BAKER FACILITY SELF-MONITORING PROGRAM WELLS

The self-monitoring program (Waste Discharge Requirements Order No. 78-76) specified the location, number and approximate depth (to the first ground water) of each monitoring well. The program did not specify the construction standards for the wells. The monitoring well network specified in the order, consisted of 14 wells numbered G-1 through G-14. IT installed the specified number of wells; however, compliance with the order cannot be determined because drilling logs and available maps do not correlate with the descriptions given. The self-monitoring program did not require designated upgradient and downgradient wells or statistical analysis of analytical data, as required in the ISD and RCRA ground-water monitoring program.

The construction of the self-monitoring program wells is suspect because few details are available regarding the formations penetrated, well construction or screened intervals. The available well construction data is confusing because boring numbers on the drilling logs, assigned by the drilling contractors, do not correspond to the monitoring well (MW) numbers assigned by IT on the maps.

Most of the self-monitoring program wells were replaced between 1982 and 1985 due to damage (well casings broken) or uncertainties regarding construction, as identified by RWQCB personnel. Well number MW-8 was abandoned in 1982; wells numbered MW-1, MW-5 and MW-13 were abandoned in 1984 and wells numbered MW-2, MW-3, MW-4, MW-7, MW-10, MW-11, and MW-12 were replaced in 1985. Records could not be located regarding the abandonment of well MW-6 other than that the replacement well MW-6A was drilled in July of 1985. Each of the self-monitoring wells were reportedly abandoned by drilling through the entire length of the well, removing the PVC casing and filling the entire length of the hole with cement grout.

BAKER INTERIM STATUS MONITORING WELLS

Location and Number

In May of 1985, IT submitted a report titled "Proposed Ground Water Monitoring Program." The monitoring program consisted of 23 new wells (MW-5A, MW-6A, MW-8A, MW-9A, MW-15, MW-16A, MW-16B, MW-17A, MW-17B, MW-18 and MW-101 through MW-110, MW-112 through MW-114) [Figure 6] and two existing wells (MW-1A, which was a replacement for MW-1 and MW-14). Twelve of the 23 new wells were drilled as replacement wells for the self-monitoring program network and were reportedly completed in the same zone and located within 10 feet of the previous wells. The remaining 11 wells were newly located wells. In September 1985, five monitoring wells were added to the program to assess the extent of contaminant migration in response to the Cleanup and Abatement Order No. 85-004. These wells were numbered MW-115 through MW-119 [Figure 8].

Well MW-112 was intended to be the background/upgradient well for the interim status program. This well was located offsite because of a mounding effect documented by IT consultants in the vicinity of the impoundments. At the time of the submission of the monitoring program proposal, this well was suspected to be inadequate as a background well. The well is screened in a zone which may not correlate with the remaining monitoring wells drilled in the shallow zone (silty clay/peat zone described by IT as the Bay Mud).

The 1985 monitoring program proposal suggested that another well be located on the Vine Hill facility, for monitoring background water quality with respect to the Baker facility. No well was ever drilled to supply background water quality data for Baker. Facility personnel still considered well MW-112 to be the upgradient well at the time of the second RWQCB Cleanup and Abatement Order (number 86-014), issued September 1986, even though additional concerns arose about whether its location was also within the influence of the ground-water mound created by the surface impoundments.

The proposal also reported that there was no upgradient/background well within the Baker facility boundary for the deep ground-water zone (lower

part of the older bay mud, sand and gravel zone). Well MW-206 on the Vine Hill facility was proposed as an alternate well.

The proposed ground-water monitoring program (dated May 1985) is inadequate for monitoring the upgradient/background ground-water conditions at the Baker facility and, therefore, does not comply with the requirements for location and number of upgradient wells. The Cleanup and Abatement Orders issued in January 1985 and September 1986 also identified the need to determine background water quality at the Baker facility. At the time of the Task Force inspection, IT had not identified an appropriate upgradient/background well or wells.

Construction

The interim status monitoring well network was constructed between July and November 1984. The shallow wells (MW-5A, MW-6A, MW-8A, MW-9A, MW-101 through MW-110 and MW-112) were drilled with 12-inch and 8-inch diameter hollow stem augers. The wells were sampled at 5-foot intervals with a barrel sampler or a modified California Drive sampler. The 12-inch auger was used to make it possible to install and backfill the wells through the annular space between the well casing and the auger.

PVC screen (4-inch diameter) and blank PVC casing were installed through the augers. The annular space was backfilled with filter sand until the sand was a few feet above the top of the screen. A bentonite seal, 1 to 2 feet in length, was placed on top of the sand pack. The boring annulus was then backfilled to the surface with a grout comprised of Portland cement and bentonite. Steel surface casing, with a locking cap, was emplaced around the PVC casing to protect the well. A concrete slab was constructed around the base of the steel casing to provide a surface seal.

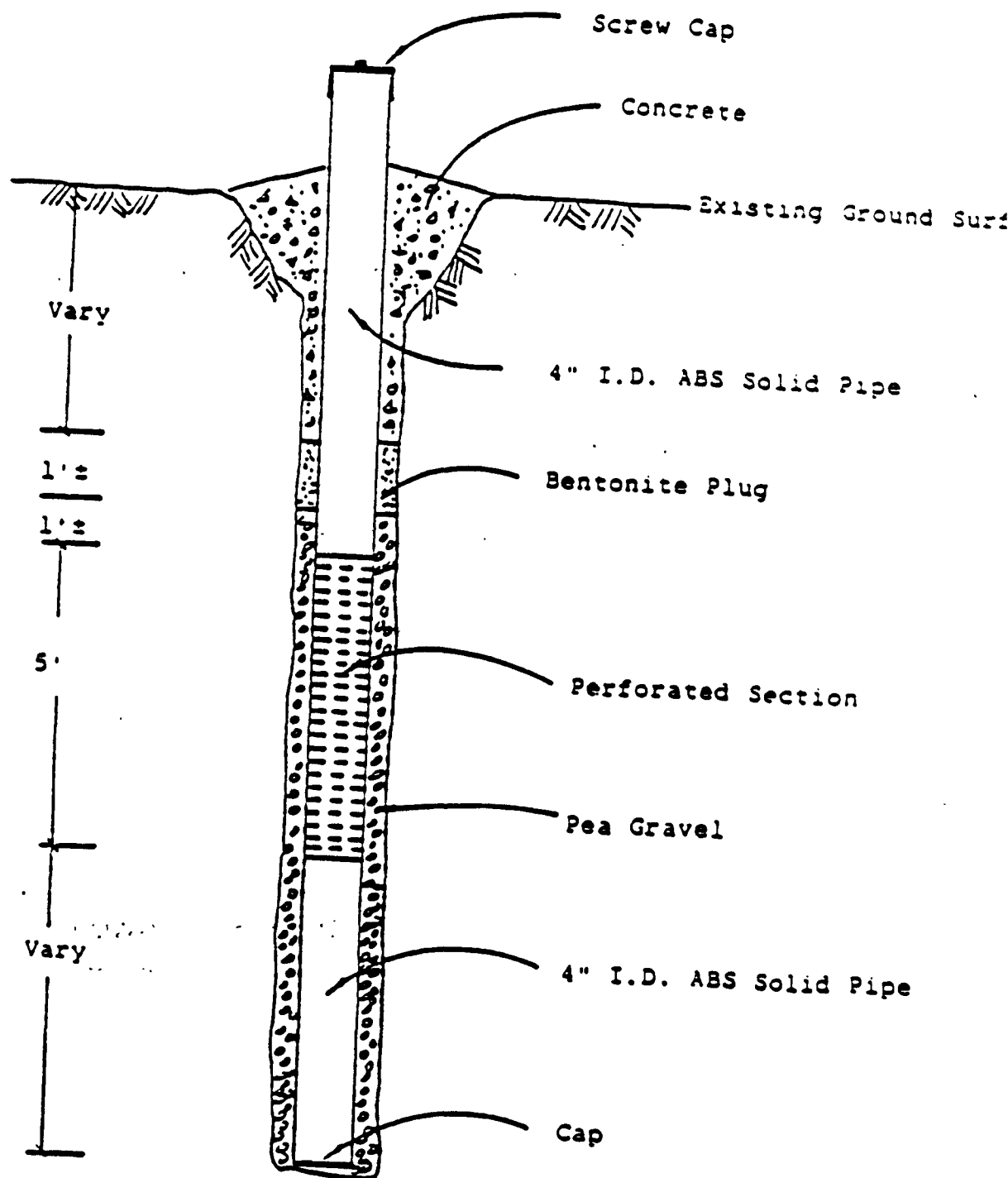
The deep wells (MW-15, MW-16A, MW-16B, MW-17A, MW-17B, and MW-18) were drilled using a 4-inch rotary wash drilling method, utilizing a biodegradable mud which was circulated during drilling to stabilize the boring walls. This practice may affect subsequent well water sample quality. Boring logs were prepared using continuous Shelby Tube samplers for the first 25 feet

and then collected at 5-foot intervals thereafter. Following completion of the logging and sampling, the borings were reamed to either 8-inch or 12-inch diameters using rotary wash techniques. The deeper wells were completed with similar materials used for the shallow wells, but were constructed in a mud filled hole. Refer to Figure 9 for the construction details (schematic).

The adequacy of the construction of the interim status wells cannot be adequately evaluated because there are no as-built diagrams or driller's completion records available for each well. The summary table prepared for all the wells does not always agree with the boring logs [e.g., the total depths of some wells do not agree with the boring logs (e.g., MW-8A, MW-9A, MW-101, MW-102, MW-104, and MW-107)]. Wells numbered MW-8A, MW-9A and MW-15 have conflicting data for depths to the cement grout and the bentonite seals. It is also unclear how the tops of the sand packs, bentonite seals, etc., were verified from the completion description and there are no records available regarding the volumes of filter pack material or cement used in construction. There are no records of grain-size analyses performed to determine whether the selection of screen size or filter pack materials are appropriate.

There is no construction information for wells numbered MW-1A, MW-13A, and MW-14 and, therefore, the construction of these wells cannot be evaluated. Because well MW-14 is one of the original self-monitoring program wells, this well also does not have boring logs available and, therefore, the well should not be included in the interim status program because the construction cannot be verified.

The screened intervals and sand pack intervals in many of the interim status wells are not appropriate to monitor a single formation. The screened intervals for 16 wells (MW-8A, MW-15, MW-16B, MW-17A, MW-17B, MW-18, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-109, MW-110, MW-112, and MW-114) penetrate zones of multiple permeabilities, porosities and composition. Numerous wells have more than the specified 2 feet of filter pack above the top of the screen. Some wells were completed with as much as 9 feet of sand pack above the screened interval (MW-8A, MW-9A and MW-18).



IT/BAKER DISPOSAL SITE
MARTINEZ, CALIFORNIA

FIGURE 9
TYPICAL BAKER WELL PROFILE (Schematic)

and, therefore, may produce water from zones, in addition to the intended zone for monitoring.

Additional potential problems were noted for several wells during the course of the Task Force collection of water levels and samples, as follows:

- The total well depths measured differ as much as +2.57 feet (deeper) to -0.6 feet (shallower) from depths reported by IT. The well depths differed more than 0.5 feet from the depths reported in the construction records for 11 of the 17 wells measured during the Task Force inspection (wells MW-5A, MW-8A, MW-15, MW-16A, MW-16B, MW-102, MW-103, MW-106, MW-110, MW-112, and MW-114).
- The PVC casing was broken on well MW-16B.
- The concrete apron around well 16B was severely cracked creating the potential for contamination from surface sources to be introduced into the well.

The interim status monitoring network is not capable of determining the background/upgradient water quality conditions and many of the downgradient wells are suspect because of conflicting/questionable construction data, or inability to determine the monitored formation because the screens and/or filter packs penetrate more than one flow zone.

Following the 1986 Cleanup and Abatement Order (86-014), 12 additional wells, numbered MW-120 through MW-131, were drilled for the Baker facility. These wells were drilled between March and July 1987. At the time of the Task Force investigation several of the wells had not been drilled and most had not been fully developed. Construction records were not available for these wells and the adequacy of the construction and completion of these wells was, therefore, not evaluated by Task Force personnel.

SAMPLE ANALYSIS AND DATA QUALITY ASSESSMENT

This section provides an evaluation of the quality and completeness of interim status ground-water monitoring data gathered by IT for the Vine Hill and Baker facilities between January 1985 and June 1987. Sampling and field measurements during this time period were conducted by IT personnel. The IT Export laboratory (Export, Pennsylvania) was primarily responsible for analyzing the ground-water samples for RCRA, State, and site specific parameters. From 1985 to 1987, IT Export subcontracted the analysis of some samples for TOC and TOX to Kemron Environmental (Williamstown, West Virginia) and the analysis of some samples for radiochemicals were made by IT Knoxville (Knoxville, Tennessee). In November 1985, samples analyzed for radiological parameters were sent to Controls for Environmental Pollution (Santa Fe, New Mexico) by IT Export. In 1987, the State parameters for IT Baker included the substances listed in the California Administrative Code, Title 23, Appendix III (CAC-Appendix III). The IT Cerritos laboratory (Cerritos, California) analyzed samples from the Vine Hill and Baker facilities for some CAC-Appendix III substances in 1987. The IT laboratories in Export and Cerritos were evaluated by Task Force personnel and the findings of those evaluations are discussed in this section. During the laboratory evaluations, operating and analytical procedures and data records were reviewed and analytical equipment was inspected. The data records reviewed include quarterly monitoring reports and associated internal data reports, raw data, and quality control data.

The laboratory evaluations revealed problems that could affect the quality of the data reported. The pH, conductance, TOC, and TOX data may not be reliable because of improper measurement procedures and the values may be biased toward not detecting ground-water contamination. Conductance data in some instances may be erroneous. Total organic carbon (TOC) results actually represent the determination of nonpurgeable organic carbon (NPOC) and excluded purgeable organic carbon (POC). The analytical methods used in some instances were inappropriate for samples containing percent levels (10,000 mg/L or greater) of dissolved solids. The detection limits for some parameters were either not based on data generated by the laboratory or the limits were inadequate to detect contaminants at low concentrations. The

values reported for phenols on samples collected at Baker may represent contamination that would have been detected in blanks. The problems cited could affect the reliability of the data in establishing background levels and in detecting releases of waste into the ground water. These problems are discussed in the following sections.

This report evaluates data generated under three Sampling and Analysis Plans prepared by IT for the Vine Hill and Baker facilities to meet the requirements of Federal and State regulations (40 CFR 265.92 and California Administrative Code, Title 23, Chapter 3, Subchapter 15, Article 5). The Sampling and Analysis Plans include different monitoring parameters for each facility, but the laboratories performing the analyses for both facilities were the same. Where monitoring requirements were different, each facility will be addressed separately. The methods used to determine individual parameters were the same for both facilities. Therefore, the analytical problems cited apply to both Vine Hill and Baker.

The three sampling and analysis plans are dated October 29, 1984; May 28, 1985; and December 1986 [Table 20 and 21] and include the development of a ground-water monitoring plan covering the current well networks. The plan prepared prior to 1984 describes ground-water monitoring for wells (with incomplete drilling and development records) that are no longer a part of the current well network.

Monitoring, as required by RCRA regulations, has not been completed for the Vine Hill and Baker monitoring well networks. A review of facility and laboratory data records showed that some parameters were not reported for four quarters of background monitoring. Monitoring, as required by the sampling and analysis plans, was not completed within some specified time periods.

The Vine Hill facility did not complete four quarters of background monitoring for the drinking water parameters fluoride and nitrate [40 CFR 265.92(b)(1) and (c)(1)]. In 1987, the Vine Hill facility did not report quarterly results for fluoride, nitrate, antimony, boron, zinc, color, odor, turbidity, sulfide, cyanide, dissolved oxygen content (DOC), oxidation/reduction potential (Eh),

Table 20

GROUND-WATER MONITORING ACCORDING TO SAMPLING AND ANALYSIS PLANS FOR
JANUARY 1985 TO JUNE 1987
IT Vine Hill Facility

Plan:	October 29, 1984	May 28, 1985	December 1986
Sampling:	Jan.-June 1985 ^a	July-Dec. 1985 Jan.-Dec. 1986 ^b	Jan.-June 1987 ^c
Parameters Required	Testing Frequency Required		
<hr/>			
<u>RCRA</u>			
40 CFR 265.92(b)(1)	Q	Q ^d	Q ^e
40 CFR 265.92(b)(2)	Q	Q	Q(A)
40 CFR 265.92(b)(3)	Q	Q	Q(S)
<u>Site Specific</u>			
Antimony	-	-	Q ^f
Boron	-	X	Q ^f
Calcium	-	A	Q
Copper	-	X	Q
Magnesium	-	A	Q
Nickel	-	X	Q
Potassium	-	A	Q
Zinc	-	X	Q ^f
Temperature	-	Q	Q ^f
Color/Odor	-	X	Q ^f
Turbidity	-	-	Q ^f
Total Dissolves Solids (TDS)	-	A	Q
Total Suspended Solids (TSS)	-	X	Q
Sulfide	-	-	Q ^f
Cyanide	-	-	Q ^f
Alkalinity	-	A	Q
Chemical Oxygen Demand (COD)	-	-	Q
Dissolved Oxygen Content (DOC)	-	-	Q ^f
Oxydation/Reduction Potential (Eh)	-	-	Q ^f
Acetone	-	-	Q ^f
n-Butanol	-	-	Q ^f
2-Butanol	-	-	Q ^f
2-Butanone	-	-	Q ^f
Cyclohexanone	-	-	Q ^f
Isopropanol	-	-	Q ^f
Methylene Chloride	-	-	Q ^f
Tetrahydrofuran	-	-	Q ^f
Chlorinated Pesticides (>0.05 ppm)	-	-	Q

- Q Quarterly
 - Not required
 X Frequency not clearly specified in plan
 A Annually
 S Semiannually
 () Frequency required by RCRA if four quarters of background monitoring has been completed.
 fp Field parameter
- ^a 11 wells - MW (201 through 207, 209, 212 through 214)
^b Background monitoring begun on MW (218, 219) in April 1986; completed in April 1987.
^c Results from one sampling episode located
^d Only two quarters of background monitoring for fluoride and nitrate completed by December 1985.
^e Only three quarters of background monitoring for fluoride and nitrate completed by December 1986.
^f Parameter not reported for quarterly monitoring, as required by the 1986 plan.

GROUND-WATER MONITORING ACCORDING TO SAMPLING AND ANALYSIS PLANS FOR
JUNE 1985 TO JUNE 1987
IT Baker Facility

Plan:	October 29, 1984	May 28, 1985	December 1986*
Sampling:	Jan.-June 1985 ^a	July-Dec. 1985 Jan.-Dec. 1986 ^{b c}	Jan.-June 1987 ^d
Parameters Required	Testing Frequency Required		
<u>RCRA</u>			
40 CFR 265.92(b)(1)	Q	Q ^e	Q ^{g h}
40 CFR 265.92(b)(2)	Q	Q ^e	Q(A) ^{g h}
40 CFR 265.92(b)(3)	Q	Q	Q(S) ⁱ
<u>Site Specific</u>			
Antimony	-	-	Q
Boron	-	X	Q
Calcium	-	X	Q
Copper	-	X	Q
Magnesium	-	X	Q
Nickel	-	X	Q
Potassium	-	X	Q
Zinc	-	-	Q
Temperature	-	X	Q ^{b j}
Color/Odor	-	X	Q ^{b j}
Turbidity	-	-	Q ^{b j}
Total Dissolves Solids (TDS)	-	X	Q
Sulfide	-	-	Q
Cyanide	-	-	Q ⁱ
Alkalinity	-	X	Q
Chemical Oxygen Demand (COD)	-	-	S ⁱ
Dissolved Oxygen Content (DOC)	-	-	Q ^{b j}
Oxydation/Reduction Potential (Eh)	-	-	Q ^{b j}
Acetone	-	-	Q
n-Butanol	-	-	Q
2-Butanol	-	-	Q
2-Butanone	-	-	Q
Cyclohexanone	-	-	Q
Isopropanol	-	-	Q
Methylene Chloride	-	-	Q
Tetrahydrofuran	-	-	Q
Chlorinated Pesticides (>0.05 ppm)	-	-	A
CA - Appendix III	-	-	A

- Q Quarterly
- Not required
X Frequency not clearly specified in plan
A Annually
S Semiannually
() Frequency required by RCRA if four quarters of background monitoring has been completed.
• New wells will be monitored monthly for 6 months then quarterly for 2 quarters in initial year of monitoring.
fp Field parameter
- a 26 wells - MW (1A, 5A, 8A, 9A, 13A, 14, 15, 16A and B, 17A and B, 18, 101 through 110, 112 through 114)
b No monitoring data located for MW113 after August 1985.
c Background monitoring begun for MW117, 118 and 119 in October 1985; four quarters not completed by June 1987.
d Results from one sampling episode located
e Only two quarters of background monitoring for all RCRA parameters completed by December 1985.
f Four quarters of background monitoring for RCRA not completed by December 1986; not acceptable for facility to proceed to annual monitoring.
g Facility had not completed four quarters of background monitoring for some RCRA parameters initiated in 1985.
h All parameter not reported for quarterly monitoring, as required by the 1986 Sampling and Analysis Plan.
i Sampling of semiannual monitoring completed by June 1987.
j Parameter not reported for quarterly monitoring, as required by the 1986 plan.

and volatile organics, as specified by the December 1986 Sampling and Analysis Plan.

The Baker facility did not complete four quarters of background monitoring for drinking water parameters (arsenic, barium, lead, nitrate, silver, pesticides, herbicides, and radionuclides), nor for ground-water quality parameters (iron and manganese). In 1987, the Baker facility did not report quarterly results for all the parameters required by the December 1986 sampling plan. The parameters not reported were arsenic, barium, lead, nitrate, silver, pesticides, herbicides, radionuclides, iron, manganese, temperature, color, odor, turbidity, sulfide, cyanide, chemical oxygen demand (COD), DOC, and EH.

INITIAL YEAR OF MONITORING

RCRA regulations [265.92(c)] require quarterly monitoring of all wells during the initial year to establish background values. Quarterly monitoring of the upgradient wells must include quadruplicate measurements for the four parameters used as indicators of ground-water contamination [40 CFR 265.92(b)(3), pH, specific conductance, TOC, and TOX]. Quarterly monitoring of all wells must include measurement for the parameters establishing ground-water quality [40 CFR 265.92(b)(2)] and for the parameters characterizing the ground water suitable as a drinking water supply [40 CFR 265.92(b)(1)].

Vine Hill Facility

The facility completed the testing specifically required in the 1984 and 1985 Sampling and Analysis plans during the initial year of monitoring for all parameters except fluoride and nitrate [40 CFR 265.92(b)(1), drinking water suitability parameters]. The facility had reported two quarters of results for these parameters by December 1985. The facility did not statistically evaluate the downgradient indicator parameters against the upgradient parameters because no wells were designated as upgradient.

In January 1985, Vine Hill initiated quarterly monitoring pursuant to 40 CFR 265.92(c) on the RCRA well network consisting of 11 wells numbered

MW-201 to MW-207, MW-209 and MW-212 through MW-214. None of the wells were specifically designated upgradient or downgradient at that time. The facility took quadruplicate measurements for the indicator parameters on all wells. Beginning in July, the 1985 Sampling and Analysis Plan required that the well samples be analyzed annually for parameters pursuant to State requirements (calcium, magnesium, potassium, alkalinity); temperature measurements were required quarterly. Additional parameters listed in the May 1985 plan include: boron, copper, nickel, zinc, color/odor, total dissolved solids, sulfide, and cyanide. The frequency of monitoring for these parameters was unclear, therefore, no assessment could be made as to whether monitoring for these additional parameters was completed.

Baker Facility

The Baker facility did not complete four quarterly sampling periods of background monitoring for drinking water parameters (arsenic, barium, lead, nitrate, silver, pesticides, herbicides, and radionuclides) nor for ground-water quality parameters (iron and manganese).

In January 1985, Baker initiated quarterly monitoring pursuant to 40 CFR 265.92(c). The Baker RCRA/ISD well network consisted of 25 wells (MW-1A, MW-5A, MW-6A, MW-8A, MW-9A, MW-13A, MW-14, MW-15, MW-16A and B, MW-17A and B, MW-18, MW-101 through MW-110 and MW-112 through MW-114). The well numbered MW-112 was tentatively designated as upgradient at that time. Beginning July 1985, 25 wells (excluding MW-13A) were monitored. This well network consisted of 23 new wells and 2 original wells. The facility completed four quarters of testing for the RCRA indicator parameters in 1985. The facility completed two quarters of testing for the ground-water quality parameters and drinking water suitability parameters in 1985. The four quarters of background monitoring for ground-water quality parameters (specifically, iron and manganese) and drinking water parameters (specifically, arsenic, barium, lead, nitrate, silver, pesticides, herbicides, and radionuclides) had not been completed by December 1985. (Background monitoring for these parameters had not been completed by June 1987.) No monitoring data could be located for MW-113 after August 1985. The facility began collecting background monitoring data for MW-117, MW-118, and

MW-119 in October 1985 (four quarters of data for all RCRA parameters had not been collected by June 1987).

In July 1985, the facility began to monitor the wells monthly for parameters pursuant to State requirements (boron, calcium, copper, magnesium, nickel, potassium, temperature, color, odor, solids, and alkalinity). The frequency of the monitoring required for these parameters was not clearly stated in the May 1985 Sampling and Analysis Plan and, therefore, no assessment could be made as to whether the monitoring for these State parameters was completed.

Laboratory Performance

The pH, conductance, TOC, and TOX data reported by the facilities may be unreliable because of improper measurement procedures. The facility followed the 1984 and 1985 Sampling and Analysis plans which describe procedures for measuring pH, conductance, TOC, and TOX in four replicate samples instead of taking four replicate measurements from a single sample, as required by 40 CFR 265.92(c)(2). Using the procedure in the facility plans affects the statistical evaluation of the analytical data and, thus, the detection of ground-water contamination. The evaluation of results from four different samples could theoretically show larger scatter (because of differences in the samples taken) than the results from measuring a single sample in replicate. The results reported by the facilities could be biased toward not detecting ground-water contamination.

Field specific conductance values reported for the Vine Hill and Baker facilities may be erroneous. The field value reported for MW-203 (Vine Hill) was 129,500 $\mu\text{mhos/cm}$ and the laboratory value (found in the internal laboratory report) was 40,600 $\mu\text{mhos/cm}$; the field values reported for other samplings at MW-203 in 1985 ranged from 38,000 to 52,000 $\mu\text{mhos/cm}$. Field specific conductance values reported for Baker well water samples in April 1985 (wells MW-14, MW-16B, and MW-103) may be erroneous. For example, the field conductance values reported were three to four times the values reported in the other quarters for most of these wells. The value reported for MW-16B (Baker) was 10 times less than the values reported in the other quarters for this well.

The field value reported for MW-16B was 440 $\mu\text{mhos/cm}$ while the laboratory value was 40,700 $\mu\text{mhos/cm}$; the other field values reported in 1985 for this well ranged from 31,600 to 52,800 $\mu\text{mhos/cm}$. The field value reported for MW-14 (Baker) was <100,000 $\mu\text{mhos/cm}$, while the laboratory value (located in the internal laboratory report) was 61,300 $\mu\text{mhos/cm}$; the field values reported for other samplings at MW-14 in 1985 ranged from 52,800 to 88,000 $\mu\text{mhos/cm}$. These questionable field values were also not supported by changes in the levels of the major ions measured for the samples.

The results for TOC may be biased low. The values reported for TOC represent only NPOC because of the analytical method used. The method involved acidifying the sample and purging it with nitrogen gas before determining the organic carbon content. This procedure results in the loss of purgeable (volatile) organic carbon. Total Organic Carbon (TOC) can be defined as the sum of NPOC and POC. In order to indicate that NPOC results are equivalent to TOC results, the laboratory must measure POC to establish that the level of POC is not a significant contributor to TOC. No volatile organic results were located for these samples in 1985 to indicate that the level of POC was not significant.

The results reported for TOX may be unreliable as an indicator of low level ground-water contamination by halogenated organics. Some samples analyzed contained percent levels of dissolved salts (as indicated by chloride data) which can contribute to apparent TOX. The TOX values reported were based on the detection limit published in the analytical method and not on the limit that was achievable in the laboratory for the samples analyzed. An estimate of the limit achievable for these samples can be calculated using chloride levels since, typically, 50 mg/L chloride could result in an apparent TOX of 1 $\mu\text{g/L}$. For example, in Baker well MW-1A, with average chloride levels of 30,000 mg/L, the apparent TOX contributed by chloride could be 0.6 mg/L (600 $\mu\text{g/L}$); in Vine Hill well MW-204, with average chloride levels of 25,000 mg/L. The apparent TOX contributed by chloride could be 0.5 mg/L (500 $\mu\text{g/L}$). These values would also approximate the achievable detection limits for these samples. The values and detection limits reported for TOX from these wells (in all quarters) do not appear to reflect the contribution of inorganic chloride and may be erroneous. TOX measurements, using standard methodology, are

inappropriate for determining low level halogenated organics in samples containing percent levels of dissolved salts. Purgeable organic halide (POX) measurements could be used as an indicator of low level volatile organic halides.

Replicate measurements for TOX on Vine Hill samples were imprecise. This imprecision could have been caused by taking measurements from four sample containers instead of from one sample, as the regulations require. For example, well MW-203 showed replicate measurements of 3.5 to 5.2 mg/L in June 1985 and 5.9 to 7.9 mg/L in December 1985.

The results reported for phenols from samples collected at the Baker facility may be unreliable. No blank sample data were found to support the values reported in 1985. The levels reported may represent contamination that could have been detected in blanks. The results reported for Vine Hill samples based on detection limits less than 0.002 mg/L (chloroform extraction method) should be considered unreliable. The detection limits reported in 1985 were not supported by the levels and variability of blank values. Blank values, using this method, were as high as 0.004 mg/L meaning the laboratory could not reliably report values less than 0.004 mg/L.

The chloride results reported for Baker well MW-1A in January 1985 may be erroneous. The value of 284,000 mg/L is approximately 10 times the value reported for this well in other quarters during 1985. This questionable value is also not supported by a comparable change in conductance.

The sulfate values in January 1985 for Baker well numbers MW-15 and MW-103 may be incorrect. The value reported for MW-15 was 5.6 mg/L, but the range of values reported in 1985 for this well was 160 to 260 mg/L. The value reported for MW-103 was 240 mg/L; the range of values reported in 1985 was <1 to 6 mg/L.

Some of the elemental constituents determined using atomic absorption (AA) techniques should be considered suspect. Selected elements were determined by graphite furnace AA (arsenic, barium, cadmium, chromium, lead, selenium, and thallium). The other elements (except mercury) were determined

by flame AA. For samples determined by graphite furnace, high dissolved solids concentrations can cause so much molecular background that the analyte signal cannot be reliably distinguished from background. The method of standard addition was not used, when samples were analyzed by graphite furnace, to mitigate matrix effects present as a result of high levels of dissolved solids. Arsenic and selenium should have been determined by hydride generation flame AA, because this method is more capable of achieving the limits required by the regulations in samples containing high concentrations of dissolved solids. For samples determined by the flame technique, ionization interference can be significant. The high dissolved solids concentrations present in some samples probably interfered with the determinations made by flame AA since no ionization reagents were reportedly used by the laboratory during the analyses.

Some elemental constituents for Vine Hill ground-water samples were reported at detection limits greater than allowed by the ground-water protection limits for wells in the fourth quarter of 1985. In some instances, the results for arsenic, selenium, and lead (graphite furnace) from Vine Hill wells MW-201, MW-202, MW-203, MW-205, MW-206, and MW-214 were inadequate for establishing background levels near or below the regulatory limits. The results showed instances of silver (flame) being reported at detection limits greater than the regulatory limits in wells MW-201, MW-203, and MW-209. The results also showed instances of chromium and lead (graphite furnace) being reported at the regulatory limits in the fourth quarter. Thus, background levels near or below the regulatory limit were not reliably established for these elemental constituents.

The results reported for pesticides and herbicides may not be adequate for establishing background levels near or below the regulatory limits. The detection limits reported for these parameters are published values and do not necessarily represent values achievable in the IT Export laboratory. The methods used to determine these parameters require that the detection limits reported represent what is achievable in the laboratory.

The methodology used for determining gross alpha and gross beta was inappropriate for samples containing high dissolved solids. However, most

by flame AA. For samples determined by graphite furnace, high dissolved solids concentrations can cause so much molecular background that the analyte signal cannot be reliably distinguished from background. The method of standard addition was not used, when samples were analyzed by graphite furnace, to mitigate matrix effects present as a result of high levels of dissolved solids. Arsenic and selenium should have been determined by hydride generation flame AA, because this method is more capable of achieving the limits required by the regulations in samples containing high concentrations of dissolved solids. For samples determined by the flame technique, ionization interference can be significant. The high dissolved solids concentrations present in some samples probably interfered with the determinations made by flame AA since no ionization reagents were reportedly used by the laboratory during the analyses.

Some elemental constituents for Vine Hill ground-water samples were reported at detection limits greater than allowed by the ground-water protection limits for wells in the fourth quarter of 1985. In some instances, the results for arsenic, selenium, and lead (graphite furnace) from Vine Hill wells MW-201, MW-202, MW-203, MW-205, MW-206, and MW-214 were inadequate for establishing background levels near or below the regulatory limits. The results showed instances of silver (flame) being reported at detection limits greater than the regulatory limits in wells MW-201, MW-203, and MW-209. The results also showed instances of chromium and lead (graphite furnace) being reported at the regulatory limits in the fourth quarter. Thus, background levels near or below the regulatory limit were not reliably established for these elemental constituents.

The results reported for pesticides and herbicides may not be adequate for establishing background levels near or below the regulatory limits. The detection limits reported for these parameters are published values and do not necessarily represent values achievable in the IT Export laboratory. The methods used to determine these parameters require that the detection limits reported represent what is achievable in the laboratory.

The methodology used for determining gross alpha and gross beta was inappropriate for samples containing high dissolved solids. However, most

standard procedures, including those referenced in EPA publications, do not reliably meet the ground-water protection limits for gross alpha and beta in the presence of high amounts of dissolved solids. Methodology (Whittaker, 1985) has been suggested for analyzing these samples; it would be necessary to validate its use on these particular samples.

Some gross alpha and beta results are also suspect because values were reported at detection limits that are not theoretically achievable in the presence of high amounts of dissolved solids. For example, in Baker well number MW-1A and Vine Hill well number MW-203 (quarters one and two, 1985) gross alpha concentrations were reported as not detected at 2 picocuries per liter (pCi/L). This detection limit is theoretically not achievable for samples like those from wells MW-1A and MW-203, shown historically to contain dissolved solids at 50,000 mg/L and 30,000 mg/L, respectively. Using standard methodology, it is probably not possible to achieve a detection limit of less than 100 pCi/L for gross alpha for these samples. Many of the gross beta results should also be considered suspect for the reasons just stated.

MONITORING IN 1986

RCRA regulations [265.92(c)] require semiannual monitoring for the indicator parameters (including quadruplicate measurements on all RCRA wells) and annual monitoring for ground-water quality parameters on the wells when background monitoring is complete.

Vine Hill Facility

The Vine Hill facility completed the semiannual/annual monitoring in 1986 for the wells numbered MW-201 to MW-207, MW-209 and MW-212 through MW-214 (11 wells). The facility began background monitoring on three additional wells numbered MW-216, MW-218, and MW-219 in April 1986 and completed the testing required in April 1987. The Vine Hill facility reported one additional quarter of background monitoring (begun in 1985 on the original RCRA network of 11 wells) for fluoride and nitrate. By December 1986, the facility had completed only three quarters of background monitoring (of the original 11 wells) for these parameters.

Vine Hill well water samples were also required to be analyzed annually for the same State parameters as in 1985; this monitoring was completed. The facility reported results quarterly for the additional parameters listed in the May 1985 plan. No assessment was made as to whether monitoring was completed for these additional parameters, because the frequency required by the plan was unclear.

Baker Facility

The Baker facility completed the semiannual monitoring for the indicator parameters required in 1986. The facility did not complete the two quarters of background monitoring for ground-water quality and drinking water parameters remaining from the 1985 RCRA requirements and, therefore, could not proceed to annual monitoring for ground-water quality parameters. The facility reported results for four out of six (chloride, phenols, sodium, and sulfate) of the ground-water parameters.

The Baker facility well water samples were also required to be analyzed for the same State parameters as in 1985. The frequency of the monitoring required was unclear for the Baker wells in the 1985 Sampling and Analysis Plan, so no assessment could be made as to whether the monitoring for the State parameters was completed. The facility reported results quarterly for the State parameters in 1986.

Laboratory Performance

In 1986, the elemental constituents (except arsenic, selenium, and mercury) were determined after digestion using Inductively Coupled Atomic Emission Spectroscopy (ICP). The ICP technique is inadequate for meeting ground-water protection limits when determining cadmium, chromium, and lead in the presence of high levels of dissolved solids. These elements could possibly be determined by ICP within the regulatory limits by using the method of standard additions. These elements could potentially be determined within the limits by using graphite furnace AA with Zeeman background correction, the L'vov platform or matrix modifiers such as palladium or ascorbic acid.

The other findings of field and laboratory procedures discussed in the initial year of monitoring are also applicable to the data reported for both facilities in 1986, since most procedures and methods did not change.

MONITORING IN 1987 - JANUARY TO JUNE

Vine Hill Facility

RCRA regulations require semiannual/annual monitoring, as in 1986. In January 1987, the facility was required by the December 1986 Sampling and Analysis Plan to begin quarterly monitoring for the RCRA parameters and site specific parameters. The site specific parameters include the following inorganic and miscellaneous parameters: antimony, boron, calcium, copper, magnesium, nickel, potassium, zinc, temperature, color, odor, turbidity, total dissolved solids, sulfide, cyanide, alkalinity, chemical oxygen demand (COD), dissolved oxygen content (DOC), and oxidation/reduction potential (Eh). The facility was also required to begin quarterly monitoring for the following volatile organic parameters: acetone, n-butanol, 2-butanol, 2-butanone, cyclohexane, isopropanol, methylene chloride, tetrahydrofuran, and chlorinated pesticides (exceeding 0.05 ppm).

Review of raw data records and internal reports at the facility and at IT Export laboratory indicate that one sampling of semiannual monitoring for RCRA indicator parameters was completed in 1987 along with the annual monitoring for RCRA ground-water quality parameters. The monitoring for site specific parameters was not completed. The field values for color, odor, turbidity, DOC, and Eh were not located. The December 1986 Sampling and Analysis Plan requires that samples be analyzed for fluoride, nitrate, antimony, boron, zinc, sulfide, cyanide, and volatile organics in 1987; no records could be found to show this.

The findings of field and laboratory procedures discussed in the previous years for the IT Export laboratory were also applicable in 1987.

Baker Facility

RCRA regulations require semiannual/annual monitoring as in 1986 if background monitoring has been completed. The facility had completed one sampling of the semiannual monitoring required for indicator parameters by June 1987. The Baker facility still had not completed four quarters of background monitoring for all the ground-water quality parameters (specifically iron and manganese) and drinking water parameters (specifically arsenic, barium, lead, nitrate, silver, pesticides, herbicides, and radionuclides) that was initiated in 1985.

In January 1987, the facility was required by the 1986 Sampling and Analysis Plan to begin quarterly monitoring for the RCRA parameters and site specific parameters. The site specific parameters include the following inorganic and miscellaneous parameters: antimony, boron, calcium, copper, magnesium, nickel, potassium, zinc, temperature, color, odor, turbidity, total dissolved solids, sulfide, cyanide, alkalinity, chemical oxygen demand (COD), dissolved oxygen content (DOC), and oxidation/reduction potential (Eh). The facility was also required to begin quarterly monitoring for the following volatile organic parameters: acetone, n-butanol, 2-butanol, 2-butanone, cyclohexanone, isopropanol, methylene chloride, and tetrahydrofuran. The facility was required to begin annual monitoring for chlorinated pesticides (exceeding 0.05 ppm) and for the substances in CAC-Appendix III:

The only sampling results located for January to June 1987 showed complete results for the RCRA indicator parameters and incomplete results for the ground-water and drinking water parameters required by the 1986 plan. The ground-water monitoring reports showed that the results listed for the site specific parameters were also not complete. The report did not include measurements for temperature, color, odor, turbidity, sulfide, cyanide, COD, DOC, Eh, nor any organic parameters. However, results for the volatile organic parameters were found in the Export laboratory data records for February 1987. The facility submitted results for the majority of the substances listed in CAC-Appendix III.

The results for the volatile organic compounds reviewed at Export may be unreliable. These organics were analyzed by using gas chromatography/mass spectrometry (GC/MS). The results were tabulated based on published detection limits, not on limits known to be achievable in the laboratory. The analytical method used required that the values reported be based on detection limits determined by statistically evaluating low level standard data and blank data generated using the same procedures and instruments used to analyze the samples.

The other findings of field and laboratory procedures discussed in the initial year of monitoring are also applicable to the data reported in 1987, as most procedures and methods did not change.

Analyses for California Appendix III Substances

The IT Cerritos laboratory submitted analytical results for the majority of the substances listed in CAC-Appendix III in a report to the State in June 1987. The report contained results for wells from both Vine Hill and Baker, even though analysis for CAC-Appendix III compounds were not required at Vine Hill by the December 1986 Sampling and Analysis Plan. The report covered samples taken at the facilities from January to March 1987. The CAC-Appendix III incorporates parameters from EPA 40 CFR 261, Appendix VIII list of hazardous substances plus additional parameters listed by the State and includes approximately 800 elements and compounds and 70 wastes. The laboratory reported quantitative results for 50% of the substances listed and possible qualitative results for an additional 20% of the substances listed using established and modified standard methods. The remaining 30% of the listed materials were not determined because suitable methods could not be found, developed or implemented or standards located in the time allotted for the analyses. The substances determined at the Cerritos laboratory include elemental constituents, anions, sulfide, cyanide, volatile, and semivolatile organic compounds, chlorinated pesticides, PCBs, herbicides, amines, hydrazines, peroxides, and formaldehyde. The Cerritos laboratory personnel compiled data from other IT laboratories and other private laboratories that analyzed the samples for dioxins, aflatoxins, asbestos, organophosphorous pesticides, carbamates, alcohols, creosote, coal tar, urea, and nitriles. The

problems affecting the data quality of parameters determined at Cerritos are discussed in the following paragraphs.

The elemental constituents determined by graphite furnace AA and ICP are suspect in some instances because the methods were inappropriate for samples containing high levels of dissolved solids. The methods were inappropriate for the reasons previously mentioned. Arsenic, selenium, lead, and thallium were determined by graphite furnace, while other elements (except mercury, potassium and sodium) were determined by ICP. The laboratory did not have a defined method for establishing detection limits when using these techniques, as required by the State. The documentation of the standards used in ICP determinations was not adequately maintained for inspection and review, as required by the State.

The Ion Chromatography determinations of anions were incomplete. The strong acid anions (bromide, chloride, fluoride, iodide, nitrite, nitrate, phosphate, and sulfate) were determined but were not supported by verifiable detection limits, as required by the State. The weak acid anions (i.e., formate, acetate, and tartrate) were not determined, although required.

The sulfide and cyanide results may be biased low because of improper handling of the samples. The samples were not checked for pH upon arrival at the laboratory to ensure that sufficient preservative had been added in the field in order to prevent the loss of these species prior to analysis.

REFERENCES

1. Whittaker, E. L., "*Test Procedure for Gross Alpha Particle Activity in Drinking Water Interlaboratory Collaborative Study*," October 1985

APPENDICES

- A SPECIFIC ANALYTICAL RESULTS - VINE HILL
- B SPECIFIC ANALYTICAL RESULTS - BAKER

APPENDIX A
Specific Analytical Results
IT Vine Hill Facility
Martinez, California

Table A-1	Sample Preparation, Analytical Techniques and Methods
Table A-2	Organic Results
Table A-3	Limits of Quantitation for Organic Compounds
Table A-4	Total Metal Results
Table A-5	Field Measurements and General Analytical Parameters

APPENDIX A
IT Vine Hill Facility
Martinez, California

SPECIFIC ANALYTICAL RESULTS

Table A-1 lists the Sample Preparation, Analytical Techniques and Methods used by the contract laboratory (CL). Table A-2 shows the Organic Results for samples in which at least one compound was detected. Table A-3 lists the limits of quantitation (LOQ) achieved for the organic analyses; the LOQs for the dioxins/dibenzofurans represent estimated values calculated by NEIC using the lowest standard concentration analyzed by the CL. Table A-4 lists metals analysis results. Table A-5 lists field measurements and general analysis results.

Table A-1
SAMPLE PREPARATION AND ANALYSIS TECHNIQUES AND METHODS
 IT Vine Hill Facility
 Martinez, California

Parameter	Preparation Technique	Analysis Technique	Method Reference
<u>Specific Organic Constituents</u>			
Volatiles	Purge and trap	Gas Chromatography - Mass Spectroscopy	CLP Method ^a
Semi-volatiles	Methylene chloride extraction	Gas Chromatography - Mass Spectroscopy	CLP Method
Pesticides/PCB	Methylene chloride/hexane extraction	Gas Chromatography with Electron Capture Detection	CLP Method
Herbicides	Diethyl ether extraction/methylation	Gas Chromatography with Electron Capture Detection	Method 8150 ^b
Dioxins and Diobenzofurans	Methylene chloride/hexane extraction	Gas Chromatography - Mass Spectroscopy	Method 8280 ^b
<u>Non-specific Organic Parameters</u>			
POX	None	Purgable combusted, Microcoulometry	EPA 600/4-84-008
TOX	Carbon absorption	Carbon combusted, Microcoulometry	Method 9020 ^b
POC	None	Purgable combusted, Non-dispersive Infrared	No reference
NPOC	Acidify and purge	UV Persulfate, Non-dispersive Infrared	Method 415.1 ^c
<u>Elemental Constituents</u>			
Mercury	Wet digestion for dissolved and total	Cold Vapor Atomic Absorption Spectroscopy	CLP Method
As, Pb, Se and Ti	Acid digestion for total	Furnace Atomic Absorption Spectroscopy	CLP Method
Other Elements	Acid digestion for total	Inductively Coupled Plasma Emission Spectroscopy	CLP Method
<u>Field Measurements</u>			
Conductance	None	Electrometric, Wheatstone Bridge	Method 120.1 ^c
pH	None	Potentiometry	Method 150.1 ^c
Turbidity	None	Nephelometric	No reference
<u>General Constituents</u>			
Nitrate	None	Ion Chromatography	EPA Method 300.0
Sulfate	None	Ion Chromatography	EPA Method 300.0
Chloride	None	Ion Chromatography	EPA Method 300.0
Nitrite	None	Ion Chromatography	EPA Method 300.0
Bromide	None	Ion Chromatography	EPA Method 300.0
Fluoride	None	Ion Chromatography	EPA Method 300.0
Sulfide	None	Ion Chromatography	EPA Method 300.0
Phenol	Automated distillation	Iodometric, Titration	Method 9030 ^b
Cyanide	Manual distillation	Colorimetric, Distillation, Automated 4-AAP	Method 9066 ^b
		Pyridine Pyrazolone Colorimetry	Method 9010 ^b

a) Contract Laboratory Program, IFB methods

b) Test Methods for Evaluating Solid Wastes, SW-846

c) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020

Table A-2
SPECIFIC ORGANIC CONSTITUENTS
IT Vine Hill Facility
Martinez, California

STATION: SMO NO.	MW-115 MQB413	MW-116 MQB412	MW-117 MQB415	MW-119** MQB405	MW-203 MQB439
COMPOUND	µg/L	µg/L	µg/L	µg/L	µg/L
Carbon disulfide	ND	ND	3. a	2. a	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	2. a
Benzene	3. a	ND	ND	4. a	11.
Toluene	13.	ND	5.	ND	2. a
Xylenes	ND	ND	ND	ND	3. a
4-Methyl-2-pentanone	ND	ND	ND	ND	4. a
Vinyl acetate	84.	ND	ND	ND	93.
di-n-Butyl phthalate	ND	ND	3. a	ND	1. a
Benzoic acid	ND	ND	4. a	ND	ND
Phenol	100.	2. a	ND	ND	17.
2-Methylphenol	ND	ND	ND	ND	13.
4-Methylphenol	6. a	ND	ND	ND	3. a
2,4-Dimethylphenol	ND	ND	ND	ND	7. a
LOQ FACTORS ^b					
Volatile	1X	1X	1X	1X	1X
Semivolatile	2X	2X	2X	2X	2X
Pesticide	1X	1X	1X	1X	1X
Dioxins and Furans	NA c	NA c	NA c	1X	1X

* No organic compounds were detected in MW-204, MW-214, and MW-219

** Monitoring well MW-119 was sampled and analyzed in triplicate (MQB405, 406, 407); results were averaged for report.

ND Compound was not detected.

a Estimated concentration. Compound was detected, but the concentration was below the Limit of Quantitation (LOQ).

b LOQ Factor is the factor that the LOQ must be multiplied by to correct the LOQ for dilutions.

c Sample not analyzed.

Table A-2 (cont.)
SPECIFIC ORGANIC CONSTITUENTS
IT Vine Hill Facility
Martinez, California

STATION: SMO NO.	MW-205 [*] MQB422	MW-206 MQB424	MW-207 MQB427	MW-209 MQB432	MW-212 MQB438	MW-215 MQB428	MW-216 MQB431
COMPOUND	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Chloroform	21. ^a	ND	ND	ND	ND	ND	ND
Carbon disulfide	ND	2. ^a	ND	2. ^a	ND	ND	ND
1,2-Dichloroethane	320.	ND	ND	ND	ND	ND	ND
Vinyl acetate	240.	ND	ND	ND	ND	ND	ND
Vinyl chloride	350.	ND	ND	ND	ND	ND	ND
Benzene	22. ^a	1. ^a	1. ^a	ND	ND	6.	ND
Toluene	17. ^a	3. ^a	ND	ND	ND	2. ^a	ND
Xylenes	ND	ND	ND	ND	ND	13.	ND
Ethylbenzene	ND	ND	ND	3. ^a	ND	3. ^a	ND
4-Methyl-2-pentanone	ND	ND	ND	2. ^a	6. ^a	ND	ND
di-n-Butyl phthalate	ND	ND	ND	2. ^a	ND	ND	1. ^a
Phenol	ND	ND	ND	ND	ND	8. ^a	ND
2,4,5-TP	ND	ND	NA	ND	0.2	ND	ND
LOQ FACTORS ^b							
Volatile	1X	1X	1X	1X	1X	1X	1X
Semivolatile	5X	2X	2X	2X	2X	2X	2X
Pesticide	1X	1X	NA ^c	1X	1X	1X	1X
Dioxins and Furans	1X	1X	NA ^c	1X	1X	NA ^c	1X

- ^{*} Monitoring well MW-205 was sampled and analyzed in triplicate (MQB405, 406, 407); results were averaged for report.
- ND Compound was not detected.
- ^a Estimated concentration. Compound was detected, but the concentration was below the Limit of Quantitation (LOQ).
- ^b LOQ Factor is the factor that the LOQ must be multiplied by to correct the LOQ for dilutions.
- ^c Analysis not requested

Table A-2 (cont.)
 SPECIFIC ORGANIC CONSTITUENTS
 IT Vine Hill Facility
 Martinez, California

STATION:	MW-218	MW-222	MW-227	G-6	TB-515	Surface Impoundment MQB442
SMO NO.	MQB429	MQB441	MQB437	MQB402	MQB436	
COMPOUND	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Carbon disulfide	ND	ND	3. a	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	1. a	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	8.	160. a
Trichloroethene	ND	ND	ND	ND	1. a	ND
Vinyl chloride	ND	ND	ND	ND	9. a	ND
Benzene	3. a	ND	ND	ND	ND	ND
Toluene	ND	16.	2. a	ND	9.	170. a
Xylenes	ND	ND	ND	ND	13.	ND
Ethylbenzene	ND	ND	ND	ND	6.	ND
Chlorobenzene	ND	ND	ND	ND	7.	ND
di-n-Butyl phthalate	ND	1. a	ND	2. a	NA	ND
Phenol	ND	ND	ND	ND	NA	8000.
4-Methylphenol	ND	ND	ND	ND	NA	680. a
LOQ FACTORS (b)						
Volatile	1X	1X	1X	1X	1X	100X
Semivolatile	2X	2X	2X	2X	NA c	200X
Pesticide	1X	1X	1X	1X	NA c	1X
Dioxins and Furans	1X	NA c	1X	1X	NA c	1X

ND Compound was not detected.

a Estimated concentration. Compound was detected, but the concentration was below the Limit of Quantitation (LOQ).

b LOQ Factor is the factor that the LOQ must be multiplied by to correct the LOQ for dilutions.

c Analysis not requested

Table A-3
LIMITS OF QUANTITATION FOR ORGANIC COMPOUNDS
IT Vine Hill Facility
Martinez, California

$\mu\text{g/L}$	$\mu\text{g/L}$	$\mu\text{g/L}$	$\mu\text{g/L}$
<u>Volatile Compounds</u>	<u>Volatile Compounds (cont.)</u>	<u>Semi-Volatile Compounds (cont.)</u>	<u>Semi-Volatile Compounds (cont.)</u>
Bromomethane 10.	2-Hexanone 10.	2,6-Dinitrotolulene 10.	Fluoranthene 10.
Dibromomethane 5.	4-Methyl-2-pentanone 10.	N-Nitrosodimethylamine 10.	Pyrene 10.
Chloromethane 10.	2-Chloroethyl vinyl ether 10.	N-Nitrosodiethylamine 10.	Indeno (1,2,3-c,d)pyrene 10.
Iodomethane 5.	Ethyl cyanide 50.	N-Nitrosomethylethylamine 10.	Isophorone 10.
Bromodichloromethane 5.	1,4-Dioxane 5,000.	N-Nitrosodiphenylamine and/or 10.	Naphthalene 10.
Dibromochloromethane 5.	Styrene 5.	Diphenylamine 10.	2-Chloronaphthalene 10.
Dichlorodifluoromethane 5.	Vinyl Acetate 10.	N-Nitroso-di-n-butylamine 10.	2-Methylnaphthalene 10.
Trichlorofluoromethane 5.	Crotonaldehyde 50.	alpha, alpha-Dimethylphenethylamine 50.	Phenanthrene 10.
Bromoform 5.	<u>Semi-Volatile Compounds</u>	1-Naphthylamine 10.	3-Methylcholanthrene 10.
Chloroform 5.	Pentachloroethane 10.	2-Naphthylamine 10.	Methapyrilene 50. a
Carbon tetrachloride 5.	Hexachloroethane 10.	bis(2-Chloroethyl) ether 10.	5-Nitro-o-toluidine 10.
Carbon disulfide 5.	1,2-Dibromo-3-chloropropane 10.	4-Chlorophenyl phenyl ether 10.	o-Toluidine 10.
Chloroethane 10.	Hexachloropropene 10.	4-Bromophenyl phenyl ether 10.	2-Picoline 10.
1,2-Dibromoethane 5.	trans-4-Dichloro-2-butene 10.	bis(2-Chloroisopropyl) ether 10.	N-Nitrosopiperidine 10.
1,1-Dichloroethane 5.	2-Hexanone 10.	bis(2-Chloroethoxy) methane 10.	Safrole 10.
1,2-Dichloroethane 5.	Acetophenone 10.	Hexachloroethane 10.	1,4-Naphthoquinone 10.
1,1,1-Trichloroethane 5.	4-Methyl-2-pentanone 10.	Hexachlorobutadiene 10.	Pyridine 10.
1,1,2-Trichloroethane 5.	Aniline 10.	Hexachlorocyclopentadiene 10.	Methyl Methacrylate 10.
1,1,1,2-Tetrachloroethane 5.	4-Chloroaniline 10.	bis(2-Ethylhexyl) phthalate 20.	Ethyl Methacrylate 10.
1,1,2,2-Tetrachloroethane 5.	2-Nitroaniline 50.	Butyl benzyl phthalate 10.	p-Dimethylaminoazobenzene 10.
1,1-Dichloroethene 5.	3-Nitroaniline 50.	di-n-Butyl phthalate 10.	4-Aminobiphenyl 10.
trans-1,2-Dichloroethene 5.	4-Nitroaniline 50.	di-n-Octyl phthalate 10.	Pronamide 10.
Trichloroethene 5.	4-Methyl-2-nitroaniline 10.	Dimethyl phthalate 10.	Isosafrole 10.
Tetrachloroethene 5.	3,3'-Dichlorobenzidine 20.	Dimethyl phthalate 10.	N-Nitrosopyrrolidine 10.
Methylene chloride 5.	3,3'-Dimethylbenzidine 100. a	Acenaphthene 10.	Cyclophosamide 10.
Vinyl chloride 10.	3,3'-Dimethoxybenzidine 10.	Acenaphthylene 10.	Phenacetin 10.
1,2-Dichloropropane 5.	Benzyl alcohol 10.	Anthracene 10.	Methyl methane sulfonate 10.
1,2,3-Trichloropropane 5.	1,2-Dichlorobenzene 10.	Benzo(a)anthracene 10.	4,4'-Methylene-bis (2-chloroaniline) 10.
1,2-Dibromo-3-chloropropane 5.	1,3-Dichlorobenzene 10.	7,12-Dimethylbenz(a)anthracene 10.	N-Nitrosomorpholine 10.
3-Chloropropene 5.	1,4-Dichlorobenzene 10.	Benzo(b)fluoranthene and/or 10.	Benzoic Acid 50.
trans-1,3-dichloropropene 5.	1,2,4-Trichlorobenzene 10.	Benzo(k)fluoranthene 10.	Phenol 10.
1,4-Dichloro-2-butene 50.	1,2,4,5-Trichlorobenzene 10.	Benzo(g,h,i)perylene 10.	2-Chlorophenol 10.
Benzene 5.	Pentachlorobenzene 10.	Benzo(a)pyrene 10.	2,4-Dichlorophenol 10.
Chlorobenzene 5.	Hexachlorobenzene 10.	Dibenzo(a,e)pyrene 10. a	2,6-Dichlorophenol 10.
Toluene 5.	Pentachloronitrobenzene 10.	Dibenzo(a,h)pyrene 10. a	2,4,5-Trichlorophenol 50.
Xylenes 5.	Nitrobenzene 10.	Dibenzo(a,i)pyrene 10. a	2,4,6-Trichlorophenol 10.
Ethylbenzene 5.	Dinitrobenzene 10.	Chrysene 10.	2,3,4,6-Tetrachlorophenol 10.
2-Methyl-1-propanol 50.	2,4-Dinitrotolulene 10.	Dibenzo(a,h)anthracene 10.	Pentachlorophenol 50.
Acetone 10.		Dibenzofuran 10.	4-Chloro-3-methylphenol 10.
2-Butanone 10.			

Table A-3 (cont.)
LIMITS OF QUANTITATION FOR ORGANIC COMPOUNDS
IT Vine Hill Facility
Martinez, California

	µg/L		µg/L		µg/L
<u>Semi-Volatile Compounds</u>		<u>Chlorinated Pesticides/PCBs</u>		<u>Organo-phosphate Pesticides</u>	
2-Methylphenol	10.	Aldrin	0.05	Phorate	5.
4-Methylphenol	10.	alpha-BHC	0.05	Disulfoton	5.
2,4-Dimethylphenol	10.	beta-BHC	0.05	Parathion	5.
4,6-Dinitro-2-methylphenol	50.	gamma-BHC (Lindane)	0.05	Famphur	20.
2-Nitrophenol	10.	delta-BHC	0.05		
4-Nitrophenol	50.	Chlordane	0.5	<u>Herbicides</u>	
2,4-Dinitrophenol	50.	4,4'-DDD	0.1	2,4-Dichlorophenoxy	
		4,4'-DDE	0.1	acetic acid	1.
		4,4'-DDT	0.1	2,4,5-T	0.1
		Dieldrin	0.1	2,4,5-TP (Silvex)	0.1
		Endosulfan I	0.05	Chlorobenzilate	1.
		Endosulfan II	0.1		
		Endosulfan sulfate	0.2	<u>Dioxins/Dibenzofurans</u>	
		Endrin	0.1	TCDD (Tetra)	10. ^b
		Endrin aldehyde	0.1	PeCDD (Penta)	10. ^b
		Heptachlor	0.05	HxCDD (Hexa)	10. ^b
		Heptachlor epoxide	0.05	HpCDD (Hepta)	20. ^b
		Toxaphene	1.	OCDD (Octa)	20. ^b
		Methoxychlor	0.5	PeCDF (Penta)	10. ^b
		Endrin ketone	0.2	HxCDF (Hexa)	10. ^b
		PCB-1016	0.5	HpCDF (Hepta)	20. ^b
		PCB-1221	0.5	OCDF (Octa)	20. ^b
		PCB-1232	0.5		
		PCB-1242	0.5		
		PCB-1248	0.5		
		PCB-1254	1.		
		PCB-1260	1.		
		Kepone	1.		
		Chlorobenzilate	1.		
		Isodrin	0.05		

^a Estimated value; standard not available at the time of analysis.

^b Estimated value for an individual isomer of the compound class; calculated by NEIC using the lowest standard concentration analyzed by CL

Table A-4
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS*
IT Vine Hill Facility
Martinez, California

Station: SMO No.:	MW-115 MOB413		MW-116 MOB412		MW-117 MOB415	
	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L
Element						
Al	297.	5,600. <i>b,c</i>	58.	15,700. <i>b,c</i>	122.	2,380. <i>b,c</i>
Sb	300. <i>a,b</i>	17.	<30. <i>b</i>	<4.	<60. <i>b</i>	<60.
As	<3. <i>b</i>	<50. <i>b</i>	27. <i>b</i>	<45. <i>b</i>	<45. <i>b</i>	54. <i>b</i>
Ba	1,230.	1,230. <i>b,c</i>	846.	895. <i>b,c</i>	785.	774. <i>b,c</i>
Be	<1.	1.	<1.	<1.	<1.	<1.
Cd	<25. <i>b</i>	<5. <i>b</i>	<2. <i>b</i>	<5. <i>b</i>	<.4 <i>b</i>	<5. <i>b</i>
Ca	2,810,000.	2,860,000.	496,000.	482,000.	504,000.	720,000.
Cr	<9.	<9.	<9.	37.	<9.	<9.
Co	<23.	<23.	<23.	<23.	<23.	<23.
Cu	<7.	12	<7.	25.	<7.	12.
Fe	144.	4,380. <i>c</i>	65.	20,100. <i>c</i>	<45.	14,200. <i>c</i>
Pb	<25.	<25. <i>b</i>	12.	<25. <i>b</i>	<25.	<25. <i>b</i>
Mg	181,000. <i>b</i>	195,000. <i>c</i>	474,000. <i>b</i>	518,000. <i>c</i>	478,000. <i>b</i>	1,860,000. <i>c</i>
Mn	5.	61. <i>c</i>	2,820.	3,010. <i>c</i>	410.	449. <i>c</i>
Hg	<.4	<.4 <i>b</i>	<.4	<.4	<.4 <i>b</i>	<.4 <i>b</i>
Ni	<20.	36.	<20.	67.	<20.	20.
K	296,000. <i>c</i>	259,000. <i>c</i>	158,000. <i>c</i>	156,000. <i>c</i>	259,000. <i>c</i>	246,000. <i>c</i>
Se	<25. <i>b</i>	<25. <i>b</i>	<25. <i>b</i>	<25. <i>b</i>	<25. <i>b</i>	<25. <i>b</i>
Ag	7.	<7.	<7.	<7.	<7.	<7.
Na	12,400,000.	12,800,000.	4,370,000.	4,740,000.	4,440,000.	10,800,000.
Tl	<10. <i>b</i>	<50. <i>b</i>	<10. <i>b</i>	<10. <i>b</i>	<50. <i>b</i>	<10. <i>b</i>
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	19.	37.	62.	95.	18.	24.
Zn	19.	45.	68.	79.	21.	31.

- * Analysis not requested for MW-203, MW-207, MW-215, MW-218, MW-222, MW-227 and TB-515.
a Sample concentration is less than X at 99% confidence.
b Batch spike sample recovery was not within control limits indicating possible bias.
c Estimated value; interference present causing possible bias.

Table A-4 (cont.)
 DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
 IT Vine Hill Facility
 Martinez, California

Station: SMO No.:	MW-119*			MW-128			MW-204		
	MOB405, 406, 407			MOB409			MOB423		
Element	Dissolved Value, µg/L	Total Value, µg/L		Dissolved Value, µg/L	Total Value, µg/L		Dissolved Value, µg/L	Total Value µg/L	
Al	145.	3,510.	b,c	77.	132.	b,c	181.	173.	b,c
Sb	<6.	<4.		<60.	<60.		<300.	<60.	
As	20.	<10.	b	15.	<10.		45.	<45.	b
Ba	1,800.	1,670.	b,c	2,700.	2,920.	b,c	35.	32.	b,c
Be	<1.	<1.		<1.	<1.		<1.	<1.	
Cd	<2.	<5.	b	<2.	<5.		<5.	<9.	
Ca	494,000.	454,000.		444,000.	392,000.		384,000.	365,000.	
Cr	11.	<9.		<9.	<9.		<9.	<9.	
Co	<23.	<23.		<23.	<23.		<23.	<23.	
Cu	<23.	10.		<7.	<7.		<7.	<7.	
Fe	527.	9,340.	c	5,860.	13,000.	c	59.	178.	c
Pb	<20.	<5.	b	<20.	<25.	b	<25.	<25.	b,c
Mg	1,130,000.	1,270,000.	b	870,000.	969,000.	c	1,060,000.	1,070,000.	c
Mn	1,440.	1,520.	b	1,020.	926.	c	7,990.	7,720.	c
Hg	<.4	<.4	b	<.4	<.4	b	<.2	<.2	b
Ni	36.	<20.		<20.	<20.		<20.	<20.	
K	219,000.	198,000.	c	82,100.	73,700.	c	112,000.	123,000.	c
Se	<25.	<25.	b	<25.	<20.	b	<25.	<25.	b,c
Ag	<7.	<7.		<7.	<7.		<7.	<7.	
Na	7,330,000.	8,090,000.		4,680,000.	5,260,000.		9,750,000.	9,870,000.	
Tl	<10.	<50.	b	<10.	<50.	b	<50.	<50.	b
Sn	<32.	<32.		<32.	<32.		<32.	<32.	
V	<15.	27.		<15.	<15.		<15.	<15.	
Zn	84.	35.		32.	<11.		<11.	<11.	

* Average of replicate analyses

a Sample concentration is less than X at 99% confidence.

b Batch spike sample recovery was not within control limits indicating possible bias.

c Estimated value; interference present causing possible bias.

Table A-4 (cont.)

DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Vine Hill Facility
Martinez, California

Station: SMO No.:	MW-205 ^a MOB422 425 426		MW-206 MOB424		MW-209 MOB432	
	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	223.	199. <i>b,c</i>	160.	132. <i>b,c</i>	235.	421. <i>b,c</i>
Sb	<30. <i>b</i>	<60	<300. <i>b</i>	<60.	<300. <i>b</i>	<60.
As	<10. <i>b</i>	<45. <i>b</i>	11. <i>b</i>	<10. <i>b</i>	56. <i>b</i>	43. <i>b</i>
Ba	68.	78. <i>b,c</i>	552. <i>b</i>	619. <i>b,c</i>	588.	548. <i>b,c</i>
Be	<1.	<1.	<1.	<1.	<1.	<1.
Cd	<5.	1.8 <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<2. <i>b</i>	<5. <i>b</i>
Ca	804,000.	787,000.	703,000.	663,000.	767,000.	761,000.
Cr	<9.	<9.	<9.	<9.	<9.	<9.
Co	<23.	<23.	<23.	<23.	<23.	<23.
Cu	<7.	<7.	<7.	<7.	<7.	<7.
Fe	4,380.	6,100. <i>c</i>	1,210.	1,570. <i>c</i>	369.	5,580. <i>c</i>
Pb	<25.	<25. <i>b,c</i>	<20.	<25. <i>b</i>	<4.	<25. <i>b</i>
Mg	994,000. <i>b</i>	982,000. <i>c</i>	859,000. <i>b</i>	836,000. <i>c</i>	1,920,000. <i>b</i>	1,980,000. <i>c</i>
Mn	7,280.	8,450. <i>c</i>	4,980.	4,770. <i>c</i>	2,680.	2,610. <i>c</i>
Hg	<.2 <i>b</i>	<.2 <i>b</i>	<.2 <i>b</i>	<.2 <i>b</i>	.4 <i>b</i>	<.4 <i>b</i>
Ni	<20.	<20.	<20.	<20.	<20.	<20.
K	78,300. <i>c</i>	88,400. <i>c</i>	26,100. <i>c</i>	26,700. <i>c</i>	236,000. <i>c</i>	215,000. <i>c</i>
Se	<25. <i>b</i>	<25. <i>b,c</i>	<20. <i>b</i>	<5. <i>b</i>	<25. <i>b,c</i>	48. <i>b</i>
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	5,830,000.	5,690,000.	4,020,000.	3,830,000.	10,300,000.	10,300,000.
Tl	<10. <i>b</i>	<50.	<10. <i>b</i>	<50. <i>b</i>	<10. <i>b</i>	<50. <i>b</i>
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	<15.	<15.	<15.	<15.	<15.
Zn	<11.	<11.	15.	<11.	19.	<11.

^a Average of replicate analyses

a Sample concentration is less than X at 99% confidence

b Batch spike sample recovery was not within control limits indicating possible bias.

c Estimated value; interference present causing possible bias.

Table A-4 (cont.)
 DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
 IT Vine Hill Facility
 Martinez, California

Station: SMO No.:	MW-212 MOB438		MW-214 MOB434		MW-216 MOB431	
	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L
Element						
Al	137. <i>b</i>	191. <i>bc</i>	151.	89. <i>b,c</i>	143.	218. <i>b,c</i>
Sb	<30.	<60.	<6. <i>b</i>	<60.	<300. <i>b</i>	<600.
As	<10. <i>b</i>	<10. <i>b</i>	<10. <i>b</i>	<100. <i>b</i>	13. <i>b</i>	<10. <i>b</i>
Ba	79.	162. <i>bc</i>	61.	58. <i>b,c</i>	422.	419. <i>b,c</i>
Be	<1.		<1.	<1.	<1.	<1.
Cd	<2. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>
Ca	706,000.	741,000.	760,000.	821,000.	592,000.	555,000.
Cr	11.	<9.	<9.	<9.	<9.	<9.
Co	<23.	<23.	<23.	23.	<23.	<23.
Cu	<7.	<7.	<7.	<7.	<7.	<7.
Fe	10,800	31,000. <i>c</i>	<45.	90. <i>c</i>	4,030.	4,880. <i>c</i>
Pb	<20. <i>b</i>	<25. <i>b</i>	<45.	<25. <i>b</i>	<5.	<25.
Mg	1,290,000. <i>b</i>	1,370,000. <i>c</i>	1,060,000. <i>b</i>	1,150,000. <i>c</i>	1,030,000. <i>b</i>	1,000,000. <i>c</i>
Mn	2,890.	2,610. <i>c</i>	20,400.	20,400. <i>c</i>	6,230.	6,050. <i>c</i>
Hg	<.4 <i>b</i>	<4. <i>b</i>	<.2 <i>b</i>	<.2 <i>b</i>	<.2 <i>b</i>	<.2 <i>b</i>
Ni	46.	46.	<20.	23.	<20.	26.
K	145,000. <i>c</i>	129,000. <i>c</i>	17,800. <i>c</i>	19,800. <i>c</i>	74,900. <i>c</i>	73,800. <i>c</i>
Se	<25. <i>b,c</i>	<5. <i>b</i>	<25. <i>b</i>	<20. <i>b</i>	<25. <i>b,c</i>	<5. <i>b</i>
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	6,000,000.	6,390,000.	6,130,000.	6,780,000.	6,480,000.	6,240,000.
Tl	<50. <i>b</i>	<50. <i>b</i>	<10 <i>b</i>	<50. <i>b</i>	<50. <i>b</i>	<50. <i>b</i>
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	<15.	<15.	<15.	<15.	<15.
Zn	14.	<11.	27.	17.	11.	11.

a Sample concentration is less than X at 99% confidence.

b Batch spike sample recovery was not within control limits indicating possible bias.

c Estimated value; interference present causing possible bias.

Table A-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Vine Hill Facility
Martinez, California

Station: SMO No.:	MW-219 MOB433		G-6 MOB402		SURFACE IMPOUNDMENT MOB433	
	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L
Element						
Al	55.	120. <i>b,c</i>	111.	5,360. <i>b,c</i>	<260.	589.
Sb	<60. <i>b</i>	<60.	<60. <i>b</i>	<4.	<300.	44.
As	28. <i>b</i>	<45. <i>b</i>	<10. <i>b</i>	<10. <i>b</i>	1,300.	1,140. <i>d</i>
Ba	358.	318. <i>b,c</i>	366.	390. <i>b,c</i>	52.	57.
Be	<1.	<1.	<1.	<1.	<5.	<1.
Cd	<4. <i>b</i>	<4. <i>b</i>	<5.	<5. <i>b</i>	<2.	<5. <i>b</i>
Ca	493,000.	438,000.	124,000.	111,000.	59,500.	57,600. <i>c</i>
Cr	<9.	<9.	<9.	<9.	2,220.	2,280.
Co	<23.	<23.	<23.	<23.	<115.	97.
Cu	<7.	<7.	<7.	7.	88.	203.
Fe	1,840.	2,420. <i>c</i>	<45.	5,220. <i>c</i>	2,100.	2,620. <i>c</i>
Pb	16.	<25. <i>b</i>	<5.	8.3 <i>b</i>	<20.	<25. <i>b</i>
Mg	710,000. <i>b</i>	783,000. <i>c</i>	80,600. <i>b</i>	70,800. <i>c</i>	98,200.	89,900.
Mn	4,110.	3,530. <i>c</i>	169.	177.	3,000.	2,720. <i>c</i>
Hg	<2. <i>b</i>	<2. <i>b</i>	.3 <i>b</i>	<2. <i>b</i>	<1. <i>b</i>	<1.
Ni	<20.	<20.	<20.	<20.	4,580.	4,370. <i>c</i>
K	10,600. <i>c</i>	9,690. <i>c</i>	5,020. <i>c</i>	5,010. <i>c</i>	413,000.	364,000.
Se	<25. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<5. <i>b</i>	<25. <i>b,c</i>	6.6 <i>b</i>
Ag	<7.	<7.	<7.	<7.	<25.	<7.
Na	3,750,000.	4,100,000.	97,100.	88,000.	10,000,000.	9,540,000.
Tl	<10. <i>b</i>	<50. <i>b</i>	<2. <i>b</i>	<2. <i>b</i>	<50. <i>b</i>	<50. <i>b</i>
Sn	<32.	<32.	<32. <i>b</i>	<32.	<160.	<32.
V	<15.	<15.	<15.	<15.	1,550.	1,390. <i>c</i>
Zn	15.	<11.	23.	59.	510.	842.

a Sample concentration is less than X at 99% confidence
b Batch spike sample recovery was not within control limits indicating possible bias
c Estimated value; interference present causing possible bias
d Duplicate analysis not within control limits

Table A-5
FIELD MEASUREMENTS and
GENERAL CONSTITUENT ANALYSIS
IT Vine Hill Facility
Martinez, California

Station: SMO No.		MW-115 MQB413	MW-116 MQB412	MW-117 MQB415	MW-119* MQB405 406, 407	MW-128 MQB409	MW-203 MQB439	MW-204 MQB423	MW-205* MQB422 425, 426	
Parameter	Units	Value	Value	Value	Value	Value	Value	Value	Value	LOD ^a
pH	Units	11.0	7.0	6.7	6.7	6.7	6.7	6.7	6.5	
Conductance	umhos/cm	46,900.	22,000.	49,000.	27,600.	23,600.	>20,000.	>20,000.	>20,000.	
Temperature	C	21.	20.	NA	20.	19.	NA	19.	21.	22.
Turbidity	NTU	72.	116.	130.	208.	128.	340.	.6	77.	
POX	µg/L CL	90.	<5.	3,900.	4,500.	<5.	<5.	<5.	131.	5.
TOX	µg/L CL	335.	115.	400.	483.	NA ^b	NA ^c	243.	502.	5.
POC	µg/L C	5,160.	5,300.	2,460.	12,700.	15,520.	5,670.	100.	8,000.	10.
NPOC	µg/L C	60,000.	42,000.	77,000.	508,000.	60,000.	93,000.	26,000.	12,000.	1,000.
Bromide	mg/L	58.	23.	50.	35.	22.	NA ^c	50.	29.	1.
Chloride	mg/L Cl-	18,800.	7,100.	18,600.	11,700.	7,300.	NA ^c	14,200.	9,500.	1.
Nitrate	mg/L N	<.3	<.3	<.3	<.3	<.3	NA ^c	<.3	<.3	.3
Sulfate	mg/L SO4=	1,380.	34.	630.	22.	<1.	NA ^c	2,800.	873.	1.
Nitrite	mg/L	<.3	<.3	<.3	<.3	<.3	NA ^c	<.3	<.3	.3
Cyanide	µg/L	<10.	<10.	NA	20.	<10.	NA ^c	<10.	<10.	10.
Phenol	µg/L	<50.	<50.	<50.	<50.	<50.	NA ^c	<50.	<50.	50.
Sulfide	mg/L	290.	190.	36.	98.	<1.	NA ^c	<1.	580.	1.
Fluoride	mg/L F-	32.	16.	34.	31.	17.	NA ^c	30.	17.	1.

* Results of replicate analysis

a) Limit of Detection; not corrected for dilution

b) Sample not analyzed; sample container broken

c) Analysis not requested

Table A-5 (cont.)
**FIELD MEASUREMENTS and
GENERAL CONSTITUENT ANALYSIS**
IT Vine Hill Facility
Martinez, California

Station: SMO No.		MW-206 MQB424	MW-207 MQB427	MW-209 MQB432	MW-212 MQB438	MW-214 MQB434	MW-215 MQB428	MW-216 MQB431	MW-218 MQB429	
Parameter	Units	Value	Value	Value	Value	Value	Value	Value	Value	LOD ^a
pH	Units	6.9	7.4	6.8	6.7	6.6	7.	6.6	7.1	
Conductance	umhos/cm	>20,000.	>20,000.	20,000.	18,5000.	>20,000.	>20,000.	18,000.	>20,000.	
Temperature	C	21.	22.	18.	19.	21.	20.	20.	20.	
Turbidity	NTU	14.	70.	185.	NAC	NAC	380.	56.	780.	
POX	µg/L CL	<5.	<5.	1,740.	<5.	<5.	4,940.	<5.	4,380.	5.
TOX	µg/L CL	178.	NAB ^b	870.	820.	185.	NAB ^b	91.	863.	5.
POC	µg/L C	36,500.	49,400.	16,700.	9,120.	210.	25,300.	90.	23,900.	10.
NPOC	µg/L C	23,000.	13,000.	110,000.	98,000.	11,000.	NAB ^b	171,000.	162,000.	1,000.
Bromide	mg/L	21.	NAB ^b	62.	24.	35.	NAB ^b	33.	NAB ^b	1.
Chloride	mg/L Cl-	7,200.	NAB ^b	16,800.	6,400.	10,600.	NAB ^b	10,200.	NAB ^b	1.
Nitrate	mg/L N	<.3	NAB ^b	<.3	<.3	<.3	NAB ^b	<.3	NAB ^b	.3
Sulfate	mg/L SO4=	350.	NAB ^b	1,600.	6,000.	980.	NAB ^b	890.	NAB ^b	1.
Nitrite	mg/L	<.3	NAB ^b	<.3	<.3	<.3	NAB ^b	<.3	NAB ^b	.3
Cyanide	µg/L	<10.	NAB ^b	<10.	<10.	<10.	NAB ^b	<10.	NAB ^b	10.
Phenol	µg/L	<50.	NAB ^b	50.	<50.	<50.	NAB ^b	<50.	NAB ^b	50.
Sulfide	mg/L	8.	NAB ^b	46.	34.	<1.	NAB ^b	<1.	NAB ^b	1.
Fluoride	mg/L F-	15.	NAB ^b	36.	22.	24.	NAB ^b	24.	NAB ^b	1.

^a Limit of Detection; not corrected for dilution

^b Analysis not requested

^c Sample not analyzed

Table A-5 (cont.)
 FIELD MEASUREMENTS and
 GENERAL CONSTITUENT ANALYSIS
 IT Vine Hill Facility
 Martinez, California

Station:		MW-219	MW-222	MW-227	G-6	Surface Impoundments	TB-515	
SMO No.		MQB433	MQB441	MQB437	MQB438	MQB442	MQB436	
Parameter	Units	Value	Value	Value	Value	Value	Value	LOD ^a
pH	Units	6.7	6.6	6.7	6.9	NA ^b	7.1	
Conductance	umhos/cm	>20,000.	16,500.	14,600.	1,650.	NA ^b	>20,000.	
Temperature	°C	19.	19.	18.	14.	NA ^b	21.	
Turbidity	NTU	26.	NA ^b	NA ^b	88.	NA ^b	46.	
POX	µg/L CL	<5.	<5.	<5.	<5.	28,600.	<5.	5.
TOX	µg/L CL	197.	NA ^c	NA ^c	74.	12,000.	NA ^c	5.
POC	µg/L C	90.	4,170.	18,800.	160.	1,140.	2,310.	10.
NPOC	µg/L C	11,000.	NA ^c	NA ^c	61,000.	4,420,000.	NA ^c	1,000.
Bromide	mg/L	21.	NA ^c	NA ^c	<1.	10.	NA ^c	1.
Chloride	mg/L Cl-	6,100.	NA ^c	NA ^c	153.	8,000.	NA ^c	1.
Nitrate	mg/L N	<.3	NA ^c	NA ^c	.5	<.3	NA ^c	.3
Sulfate	mg/L SO4=	188.	NA ^c	NA ^c	38.	380.	NA ^c	1.
Nitrite	mg/L	<.3	NA ^c	NA ^c	<.3	<.3	NA ^c	3.
Cyanide	µg/L	<10.	NA ^c	NA ^c	<10.	50,000.*	NA ^c	10.
Phenol	µg/L	<50.	NA ^c	NA ^c	<50.	9,500.	NA ^c	50.
Sulfide	mg/L	130.	NA ^c	NA ^c	58.	300.	NA ^c	1.
Fluoride	mg/L F-	15.	NA ^c	NA ^c	2.	350.	NA ^c	1.

^a Limit of Detection; not corrected for dilution

^b Sample not analyzed

^c Analysis not requested

APPENDIX B
Specific Analytical Results
IT Baker Facility
Martinez, California

Table B-1	Sample Preparation, Analytical Techniques and Methods
Table B-2	Organic Results
Table B-3	Limits of Quantitation for Organic Compounds
Table B-4	Total Metal Results
Table B-5	Field Measurements and General Analytical Parameters

APPENDIX B
Specific Analytical Results
IT Baker Facility
Martinez, California

Table B-1	Sample Preparation, Analytical Techniques and Methods
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Table B-4	Total Metal Results
Table B-5	Field Measurements and General Analytical Parameters

APPENDIX B
IT Baker Facility
Martinez, California

SPECIFIC ANALYTICAL RESULTS

Table B-1 lists the Sample Preparation, Analytical Techniques and Methods used by the contract laboratory (CL). Table B-2 shows the Organic Results for samples in which at least one compound was detected. Table B-3 lists the limits of quantitation (LOQ) achieved for the organic analyses; the LOQs for the dioxins/dibenzofurans represent estimated values calculated by NEIC using the lowest standard concentration analyzed by the CL. Table B-4 lists metals analysis results. Table B-5 lists field measurements and general analysis results.

Table B-1
SAMPLE PREPARATION AND ANALYSIS TECHNIQUES AND METHODS
IT Baker Facility
Martinez, California

Parameter	Preparation Technique	Analysis Technique	Method Reference
<u>Specific Organic Constituents</u>			
Volatiles	Purge and trap	Gas Chromatography - Mass Spectroscopy	CLP Method ^a
Semi-volatiles	Methylene chloride extraction	Gas Chromatography - Mass Spectroscopy	CLP Method
Pesticides/PCB	Methylene chloride/hexane extraction	Gas Chromatography with Electron Capture Detection	CLP Method
Herbicides	Diethyl ether extraction/methylation	Gas Chromatography with Electron Capture Detection	Method 8150 ^b
Dioxins and Diobenzofurans	Methylene chloride/hexane extraction	Gas Chromatography - Mass Spectroscopy	Method 8280 ^b
<u>Non-specific Organic Parameters</u>			
POX	None	Purgeable combusted, Microcoulometry	EPA 600/4-84-008
TOX	Carbon absorption	Carbon combusted, Microcoulometry	Method 9020 ^b
POC	None	Purgeable combusted, Non-dispersive Infrared	No reference
NPOC	Acidity and purge	UV Persulfate, Non-dispersive Infrared	Method 415.1 ^c
<u>Elemental Constituents</u>			
Mercury	Wet digestion for dissolved and total	Cold Vapor Atomic Absorption Spectroscopy	CLP Method
As, Pb, Se and Ti	Acid digestion for total	Furnace Atomic Absorption Spectroscopy	CLP Method
Other Elements	Acid digestion for total	Inductively Coupled Plasma Emission Spectroscopy	CLP Method
<u>Field Measurements</u>			
Conductance	None	Electrometric, Wheatstone Bridge	Method 120.1 ^c
pH	None	Potentiometry	Method 150.1 ^c
Turbidity	None	Nephelometric	No reference
<u>General Constituents</u>			
Nitrate	None	Ion Chromatography	EPA Method 300.0
Sulfate	None	Ion Chromatography	EPA Method 300.0
Chloride	None	Ion Chromatography	EPA Method 300.0
Nitrite	None	Ion Chromatography	EPA Method 300.0
Bromide	None	Ion Chromatography	EPAMethod 300.0
Fluoride	None	Ion Chromatography	EPA Method 300.0
Sulfide	None	Ion Chromatography	EPA Method 300.0
Phenol	Automated distillation	Iodometric, Titration	Method 9030 ^b
Cyanide	Manual distillation	Colorimetric, Distillation, Automated 4-AAP	Method 9066 ^b
		Pyridine Pyrazolone Colorimetry	Method 9010 ^b

^a Contract Laboratory Program, IFB methods

^b Test Methods for Evaluating Solid Wastes, SW-846

^c Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020

Table B-2
 SPECIFIC ORGANIC CONSTITUENTS*
 IT Baker Facility
 Martinez, California

STATION: SMO NO.	MW-1A MQB457	MW-9A MQB451	MW-101 MQB464	MW-103 MQB454	MW-104 MQB443
PARAMETER	µg/L	µg/L	µg/L	µg/L	µg/L
Carbon disulfide	2. a	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND
Xylenes	1. a	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND
di-n-Butyl phthalate	2. a	2. a	ND	ND	1. a
bis(2-Ethylhexyl) phthalate	ND	ND	170.	ND	ND
Benzoic acid.	ND	ND	ND	ND	ND
Phenol	3. a	ND	ND	3. a	ND
2,4,5-TP	ND	0.28	ND	ND	ND
LOQ FACTORS ^b					
Volatile	1X	1X	1X	1X	1X
Semivolatile	2X	2X	2X	2X	2X
Pesticide	1X	1X	1X	1X	1X
Dioxins and Furans	1X	1X	1X	NA c	1X

* No organic compounds were detected in MW-5A, MW-6A, MW-8A, MW-14, MW-15, MW-102, MW-106 and Surface Impoundment C

ND Compound was not detected.

a Estimated concentration. Compound was detected, but the concentration was below the Limit of Quantitation (LOQ).

b LOQ Factor is the factor that the LOQ must be multiplied by to correct the LOQ for dilutions.

c Sample not analyzed.

Table B-2 (cont.)
SPECIFIC ORGANIC CONSTITUENTS
IT Baker Facility
Martinez, California

STATION:	MW-105	MW-110	MW-112	MW-113	MW-125	GW Seepage MQB458	Surface Impoundment-D1 MQB444
SMO NO.	MQB455	MQB420	MQB440	MQB459	MQB460		
PARAMETER	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	1. a	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	4. a	ND	ND
Xylenes	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	96.	ND	ND
di-n-Butyl phthalate	ND	ND	1. a	ND	ND	ND	ND
bis(2-Ethylhexyl) phthalate	ND	ND	ND	ND	6.	24.	ND
Benzoic acid	ND	ND	ND	ND	130.	ND	320. a
Phenol	3. a	ND	ND	3. a	240.	ND	ND
1,4-Naphthaquinone	ND	ND	ND	ND	20.	ND	ND
2,4,5-TP	ND	ND	ND	ND	ND	0.7	ND
LOQ FACTORS ^b							
Volatile	1X	1X	1X	1X	1X	1X	1X
Semivolatile	2X	2X	2X	2X	2X	2X	20X
Pesticide	1X	1X	1X	1X	1X	1X	1X
Dioxins and Furans	NA c	1X	NA d	NA c	NA d	NA c	1X

ND Compound was not detected.

a Estimated concentration. Compound was detected, but the concentration was below the Limit of Quantitation (LOQ).

b LOQ Factor is the factor that the LOQ must be multiplied by to correct the LOQ for dilutions.

c Sample not analyzed.

d Analysis not requested.

Table B-3
LIMITS OF QUANTITATION FOR ORGANIC COMPOUNDS
IT Baker Facility
Martinez, California

µg/L	µg/L	µg/L	µg/L
<u>Volatile Compounds</u>	<u>Volatile Compounds (cont.)</u>	<u>Semivolatile Compounds (cont.)</u>	<u>Semivolatile Compounds (cont.)</u>
Bromomethane 10.	Acetone 10.	Pentachloronitrobenzene 10.	Dibenzo(a,e)pyrene 10. a
Dibromomethane 5.	2-Butanone 10.	Nitrobenzene 10.	Dibenzo(a,h)pyrene 10. a
Chloromethane 10.	2-Hexanone 10.	Dinitrobenzene 10.	Dibenzo(a,j)pyrene 10. a
Iodomethane 5.	4-Methyl-2-pentanone 10.	2,4-Dinitrotolulene 10.	Chrysene 10.
Bromodichloromethane 5.	2-Chloroethyl vinyl ether 10.	2,6-Dinitrotolulene 10.	Dibenzo(a,h)anthracene 10.
Dibromochloromethane 5.	Ethyl cyanide 50.	N-Nitrosodimethylamine 10.	Dibenzofuran 10.
Dichlorodifluoromethane 5.	1,4-Dioxane 5,000.	N-Nitrosodiethylamine 10.	Fluoranthene 10.
Trichlorofluoromethane 5.	Styrene 5.	N-Nitrosomethylethylamine 10.	Pyrene 10.
Bromoform 5.	Vinyl Acetate 10.	N-Nitrosodiphenylamine and/or 10.	Indeno (1,2,3-c,d)pyrene 10.
Chloroform 5.	Crotonaldehyde 50.	Diphenylamine 10.	Isophorone 10.
Carbon tetrachloride 5.		N-Nitroso-di-n-butylamine 10.	Naphthalene 10.
Carbon disulfide 5.	<u>Semivolatile Compounds</u>	alpha, alpha-Dimethylphenethylamine 50.	2-Chloronaphthalene 10.
Chloroethane 10.	Pentachloroethane 10.	1-Naphthylamine 10.	2-Methylnaphthalene 10.
1,2-Dibromoethane 5.	Hexachloroethane 10.	2-Naphthylamine 10.	Phenanthrene 10.
1,1-Dichloroethane 5.	1,2-Dibromo-3-chloropropane 10.	bis(2-Chloroethyl) ether 10.	3-Methylcholanthrene 10.
1,2-Dichloroethane 5.	Hexachloropropene 10.	4-Chlorophenyl phenyl ether 10.	Methapyrene 50. a
1,1,1-Trichloroethane 5.	trans-4-Dichloro-2-butene 10.	4-Bromophenyl phenyl ether 10.	5-Nitro-o-toluidine 10.
1,1,2-Trichloroethane 5.	2-Hexanone 10.	bis(2-Chloroisopropyl) ether 10.	o-Toluidine 10.
1,1,1,2-Tetrachloroethane 5.	Acetophenone 10.	bis(2-Chloroethoxy) methane 10.	2-Picoline 10.
1,1,2,2-Tetrachloroethane 5.	4-Methyl-2-pentanone 10.	Hexachloroethane 10.	N-Nitrosopiperidine 10.
1,1-Dichloroethene 5.	Aniline 10.	Hexachlorobutadiene 10.	Salrole 10.
trans-1,2-Dichloroethene 5.	4-Chloroaniline 10.	Hexachlorocyclopentadiene 10.	1,4-Naphthoquinone 10.
Trichloroethene 5.	2-Nitroaniline 50.	bis(2-Ethylhexyl) phthalate 20.	Pyridine 10.
Tetrachloroethene 5.	3-Nitroaniline 50.	Butyl benzyl phthalate 10.	Methyl Methacrylate 10.
Methylene chloride 5.	4-Nitroaniline 50.	di-n-Butyl phthalate 10.	Ethyl Methacrylate 10.
Vinyl chloride 10.	4-Methyl-2-nitroaniline 10.	di-n-Octyl phthalate 10.	p-Dimethylaminoazobenzene 10.
1,2-Dichloropropane 5.	3,3'-Dichlorobenzidine 20.	Diethyl phthalate 10.	4-Aminobiphenyl 10.
1,2,3-Trichloropropane 5.	3,3'-Dimethylbenzidine 100. a	Dimethyl phthalate 10.	Pronamide 10.
1,2-Dibromo-3-chloropropane 5.	3,3'-Dimethoxybenzidine 10.	Acenaphthene 10.	Isosalrole 10.
3-Chloropropene 5.	Benzyl alcohol 10.	Acenaphthylene 10.	N-Nitrosopyrrolidine 10.
trans-1,3-dichloropropene 5.	1,2-Dichlorobenzene 10.	Anthracene 10.	Cyclophosphamide 10.
1,4-Dichloro-2-butene 50.	1,3-Dichlorobenzene 10.	Benzo(a)anthracene 10.	Phenacetin 10.
Benzene 5.	1,4-Dichlorobenzene 10.	7,12-Dimethylbenz(a)anthracene 10.	Methyl methane sulfonate 10.
Chlorobenzene 5.	1,2,4-Trichlorobenzene 10.	Benzo(b)fluoranthene and/or 10.	4,4'-Methylene-bis (2-chloroaniline) 10.
Toluene 5.	1,2,4,5-Trichlorobenzene 10.	Benzo(k)fluoranthene 10.	N-Nitrosomorpholine 10.
Xylenes 5.	Pentachlorobenzene 10.	Benzo(g,h,i)perylene 10.	Benzoic Acid 50.
Ethylbenzene 5.	Hexachlorobenzene 10.	Benzo(a)pyrene 10.	Phenol 10.
2-Methyl-1-propanol 50.			

a Estimated value; standard not available at the time of analysis

b Estimated value for an individual isomer of the compound class; calculated by NEIC using the lowest standard concentration analyzed by CL.

Table B-3 (cont.)
LIMITS OF QUANTITATION FOR ORGANIC COMPOUNDS
IT Baker Facility
Martinez, California

µg/L		µg/L		µg/L	
<u>Semivolatile Compounds (cont.)</u>		<u>Chlorinated Pesticides/PCBs</u>		<u>Organo-phosphate Pesticides</u>	
2-Chlorophenol	10.	Aldrin	0.05	Phorate	5.
2,4-Dichlorophenol	10.	alpha-BHC	0.05	Disulfoton	5.
2,6-Dichlorophenol	10.	beta-BHC	0.05	Parathion	5.
2,4,5-Trichlorophenol	50.	gamma-BHC (Lindane)	0.05	Famphur	20.
2,4,6-Trichlorophenol	10.	delta-BHC	0.05		
2,3,4,6-Tetrachlorophenol	10.	Chlordane	0.5		
Pentachlorophenol	50.	4,4'-DDD	0.1	<u>Herbicides</u>	
4-Chloro-3-methylphenol	10.	4,4'-DDE	0.1	2,4-Dichlorophenoxy	
2-Methylphenol	10.	4,4'-DDT	0.1	acetic acid	1.
4-Methylphenol	10.	Dieldrin	0.1	2,4,5-T	0.1
2,4-Dimethylphenol	10.	Endosulfan I	0.05	2,4,5-TP (Silvex)	0.1
4,6-Dinitro-2-methylphenol	50.	Endosulfan II	0.1	Chlorobenzilate	1.
2-Nitrophenol	10.	Endosulfan sulfate	0.2		
4-Nitrophenol	50.	Endrin	0.1	<u>Dioxins/Dibenzofurans</u>	
2,4-Dinitrophenol	50.	Endrin aldehyde	0.1	TCDD (Tetra)	10. b
		Heptachlor	0.05	PeCDD (Penta)	10. b
		Heptachlor epoxide	0.05	HxCDD (Hexa)	10. b
		Toxaphene	1.	HpCDD (Hepta)	20. b
		Methoxychlor	0.5	OCDD (Octa)	20. b
		Endrin ketone	0.2	PeCDF (Penta)	10. b
		PCB-1016	0.5	HxCDF (Hexa)	10. b
		PCB-1221	0.5	HpCDF (Hepta)	20. b
		PCB-1232	0.5	OCDF (Octa)	20. b
		PCB-1242	0.5		
		PCB-1248	0.5		
		PCB-1254	1.		
		PCB-1260	1.		
		Kepone	1.		
		Chlorobenzilate	1.		
		Isodrin	0.05		

^a Estimated value; standard not available at the time of analysis

^b Estimated value for an individual isomer of the compound class; calculated by NEIC using the lowest standard concentration analyzed by CL.

Table B-4
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS*
IT Baker Facility
Martinez, California

Station: SMO No.:	MW-1A MOB457		MW-5A MOB453		MW-6A MOB446	
Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	380.	1,480.	177.	422.	130.	3,020.
Sb	<300. ^a	<300.	<20.	<300.	<20.	<45.
As	<10. ^b	<20.	28. ^b	44.	<10. ^b	<50.
Ba	659.	826.	174.	230.	254.	508.
Be	<1.	<1.	<1.	<1.	<1.	<1.
Cd	<5. ^b	<5. ^b	15. ^b	<4. ^b	<5. ^b	<5. ^b
Ca	1,930,000.	2,060,000.	642,000.	711,000.	279,000.	244,000.
Cr	<9.	<9.	<9.	<9.	40.	<9.
Co	<23.	<23.	47.	51.	<23.	<23.
Cu	9.	<7.	<7.	<7.	<7.	9.
Fe	65,800.	105,000.	127,000.	143,000.	8,360.	44,000.
Pb	<25. ^b	<25. ^b	<25. ^b	<25. ^b	24. ^b	<5. ^b
Mg	2,260,000.	2,360,000.	969,000.	1,040,000.	640,000.	732,000.
Mn	39,900.	42,200. ^b	36,900.	40,100. ^b	7,940. ^b	7,080. ^b
Hg	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b
Ni	<20.	<20.	55.	57.	32.	<20.
K	139,000.	137,000.	85,300.	80,500.	115,000.	106,000.
Se	<30.	<5.	<50.	<5.	<5.	<25.
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	11,500,000.	11,700,000.	6,670,000.	7,190,000.	3,990,000.	4,660,000.
Ti	<50. ^{b,c}	<50. ^{b,c}	<50. ^{b,c}	<50. ^b	<50. ^{b,c}	<50. ^b
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	<15.	<15.	<15.	<15.	<15.
Zn	58.	17.	16.	<11.	24.	18.

* Analysis not requested for MW-105, MW-112 and MW-125
^a Sample concentration is less than X at 99% confidence
^b Batch spike sample recovery was not within control limits indicating possible bias.
^c Estimated value; interference present causing possible bias.

Table B-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Baker Facility
Martinez, California

Station: SMO No.:	MW-8A MOB448		MW-9A MOB451		MW-14 MOB456	
Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	<52. ^a	239.	276.	378.	394.	2,300.
SB	<300.	<45.	<20.	<225.	<20.	<20.
As	<4. ^b	<10.	<50. ^b	36.	<50. ^b	16.
Ba	73.	71.	172.	247.	220.	266.
Be	<1.	<1.	<1.	<1.	1.	<1.
Cd	<5. ^b	<4. ^b	<5. ^b	<5. ^b	2.6 ^b	<4. ^b
Ca	33,400.	29,500.	840,000.	928,000.	2,420,000.	2,840,000.
Cr	9.	<9.	<9.	<9.	9.	<9.
Co	<23.	<23.	43.	40.	74.	82.
Cu	<7.	<7.	<7.	<7.	<7.	<7.
Fe	<45.	2,110.	5,720.	51,600.	16,100.	55,000.
Pb	25. ^b	<5. ^b	<25. ^b	<5. ^b	<25. ^b	<25. ^b
Mg	68,800.	61,200.	1,010,000.	1,070,000.	2,510,000.	2,810,000.
Mn	57.	54. ^b	57,200.	62,200. ^b	76,000.	86,000. ^b
Hg	<4. ^b	<4. ^b	<4. ^b	<4. ^b	<4. ^b	<4. ^b
Ni	<20.	<20.	84.	84.	80.	84.
K	40,300.	33,500.	81,400.	80,000.	77,400.	75,100.
Se	<5.	<25.	<250.	<5.	<25.	<25. ^c
Ag	<7.	<7.	<7.	<7.	15.	<7.
Na	1,160,000.	1,250,000.	4,140,000.	4,460,000.	11,700,000.	13,300,000.
Tl	<50. ^b	<10. ^b	<50. ^{b,c}	<50. ^b	<50. ^{b,c}	<50. ^{b,c}
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	18.	<15.	<15.	<15.	<15.
Zn	26.	20.	<11.	<11.	49.	18.

^a Sample concentration is less than X at 99% confidence.

^b Batch spike sample recovery was not within control limits indicating possible bias.

^c Estimated value; interference present causing possible bias.

Table B-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Baker Facility
Martinez, California

Station: SMO No.:	MW-15 ^a MOB447, 449, 452		MW-101 MOB464		MW-102 MOB419	
Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	105.	140.	153.	1,120.	92.	300.
Sb	<60. ^a	<60.	<20.	<60.	<300.	<4.
As	<10. ^b	<4.	35. ^b	80.	12. ^b	32.
Ba	212.	203.	740.	960.	918.	1,120.
Be	<1.	<1.	<1.	<1.	<1.	<1.
Cd	<.4 ^b	<5. ^b	<.4 ^b	<5. ^b	<5. ^b	<5. ^b
Ca	490,000.	438,000.	405,000.	420,000.	414,000.	405,000.
Cr	<9.	<9.	<9.	16.	9.	<9.
Co	<23.	<23.	<23.	<23.	<23.	<23.
Cu	<7.	<7.	8.	<7.	<7.	<7.
Fe	84.	301.	2,350.	9,930.	6,630.	20,200.
Pb	<5. ^b	<5. ^b	<5. ^b	<5. ^b	<5. ^b	<5. ^b
Mg	426,000.	454,000.	745,000.	824,000.	889,000.	977,000.
Mn	4,000.	3,510. ^b	1,070.	985. ^b	823.	728.
Hg	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b
Ni	<20.	<20.	<20.	<20.	<20.	<20.
K	8,210.	8,170.	114,000.	111,000.	139,000.	132,000.
Se	<50.	<5.	<25.	<5.	<25.	<50. ^c
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	2,130,000.	2,260,000.	4,610,000.	5,120,000.	5,610,000.	6,250,000.
Tl	<50. ^b	<50. ^b	<50. ^b	<10. ^b	<50. ^b	<50. ^b
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	<15.	<15.	22.	<15.	17.
Zn	<11.	<11.	86.	11.	24.	<11.

^a Average of replicate analyses

^a Sample concentration is less than X at 99% confidence.

^b Batch spike sample recovery was not within control limits indicating possible bias.

^c Estimated value; interference present causing possible bias.

Table B-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Baker Facility
Martinez, California

Station: SMO No.:	MW-103 MOB454		MW-104 MOB443		MW-106 MOB450	
Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	64.	1,520.	138.	198.	175	138.
Sb	6.4	<60.	<20.	12.	<300. ^a	<60.
As	<50. ^{a,b}	<20.	<10. ^b	<10.	<4. ^b	66.
Ba	293.	400.	774.	750.	535.	543.
Be	<1.	<1.	<1.	<1.	<1.	<1.
Cd	<4. ^b	<5. ^b	2.8 ^b	<5. ^b	<5. ^b	<5. ^b
Ca	221,000.	198,000.	287,000.	262,000.	291,000.	281,000.
Cr	<9.	11.	<9.	<9.	10.	<9.
Co	<23.	<23.	<23.	<23.	<23.	<23.
Cu	<7.	<7.	<7.	12.	7.	7.
Fe	4,210.	14,800	45.	1,070.	94.	170.
Pb	<5. ^b	18. ^b	<25. ^b	<5. ^b	<5. ^b	<25. ^{b,c}
Mg	481,000.	561,000.	762,000.	842,000.	743,000.	822,000.
Mn	1,380.	1,420. ^b	662.	618. ^b	625.	577. ^b
Hg	<4. ^b	<4. ^b	<4. ^b	<4. ^b	<4. ^b	<4. ^b
Ni	<20.	21.	<20.	<20.	53.	21.
K	96,800.	84,500.	131,000.	121,000.	137,000.	136,000.
Se	<50.	<25. ^c	<25.	<25.	<50. ^c	<25.
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	2,880,000.	3,290,000.	5,220,000.	5,810,000.	4,750,000.	5,380,000.
Tl	<50. ^b	<50. ^b	<50. ^{b,c}	<50. ^b	<50. ^{b,c}	<10. ^b
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	23.	18.	<15.	<15.	<15.	<15.
Zn	<11.	13.	<11.	<11.	34.	<11.

^a Sample concentration is less than X at 99% confidence.

^b Batch spike sample recovery was not within control limits indicating possible bias.

^c Estimated value; interference present causing possible bias.

Table B-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Baker Facility
Martinez, California

Station: SMO No.:	MW-110 MOB420		MW-113 MOB459		GW SEEP MOB458	
Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value µg/L
Al	<52.	313.	235.	1,040.	1,480.	3,060.
Sb	<300.	<4.	<40. ^a	<300.	<1,500.	600.
As	<10. ^b	<10.	<10. ^b	34.	<10.	<50. ^c
Ba	483.	530.	1,040.	1,410.	331.	395.
Be	<1.	<1.	<1.	<1.	<1.	<1.
Cd	<25. ^b	<5. ^b	<.4 ^b	<5. ^b	<5. ^b	<50. ^b
Ca	288,000.	281,000.	1,360,000.	1,600,000.	4,430,000.	5,410,000.
Cr	10.	<9.	<9.	<9.	<9.	10.
Co	<23.	<23.	<23.	<23.	27.	37.
Cu	<7.	<7.	<7.	13.	9	14.
Fe	333.	4,740.	4,700.	43,200.	23,000.	27,400.
Pb	<25. ^{b,c}	<5. ^b	<20. ^b	<25. ^b	<25. ^b	<50. ^{b,c}
Mg	172,000.	168,000.	1,500,000.	1,670,000.	9,140,000.	9,430,000.
Mn	355.	332. ^b	14,200.	15,400. ^b	68,600.	76,900. ^b
Hg	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b	<.4 ^b
Ni	<20.	<20.	46.	36.	517.	534.
K	96,100.	93,900.	116,000.	122,000.	399,000.	449,000.
Se	<25.	<25. ^c	<15.	<25. ^c	<15.	<50.
Ag	<7.	<7.	<7.	<7.	<7.	<7.
Na	3,160,000.	3,450,000.	7,710,000.	8,390,000.	39,900,000.	40,600,000.
Tl	<50. ^b	<50. ^b	<50. ^{b,c}	<100. ^b	<100. ^{b,c}	<500. ^b
Sn	<32.	<32.	<32.	<32.	<32.	<32.
V	<15.	<15.	<15.	<15.	<15.	<15.
Zn	29.	<11.	62.	19.	20.	20.

^a Sample concentration is less than X at 99% confidence.

^b Batch spike sample recovery was not within control limits indicating possible bias

^c Estimated value; interference present causing possible bias.

Table B-4 (cont.)
DISSOLVED AND TOTAL METALS ANALYSIS RESULTS
IT Baker Facility
Martinez, California

Station: SMO No.:	SURFACE IMPOUNDMENT C MOB445			SURFACE IMPOUNDMENT D1 MOB444		
	Element	Dissolved Value, µg/L	Total Value, µg/L	Dissolved Value, µg/L	Total Value, µg/L	
	Al	<260. a	682.	<260.	818.	
	Sb	560. b	229.	545. b	<200.	
	As	950.	870.	1,820.	1,020.	
	Ba	130.	94. b,c	75.	85. b,c	
	Be	<5.	<1. b	<5.	<1. b	
	Cd	<25. b	18. b	17. b	<25. b	
	Ca	595,000. c	369,000. b,c	272,000. c	233,000. b,c	
	Cr	10,300. c	8,870. c	9,880. c	8,920. c	
	Co	2,000.	1,540. c	2,110.	1,560. c	
	Cu	19,600.	20,600.	18,600.	20,900.	
	Fe	11,500.	8,530. c	6,830.	7,070. c	
	Pb	<200.	<50. b	<200.	<50. b	
	Mg	65,700. c	47,300. b,c	76,400. c	54,600. b,c	
	Mn	14,700.	9,900.	10,400.	9,180.	
	Hg	<1. b	<1. b	<.4 b	<1. b	
	Ni	42,200.	44,700.	43,600.	49,000.	
	K	1,660,000.	1,510,000.	1,830,000.	1,730,000.	
	Se	66. d	<50. b,c	540. d	<50. b	
	Ag	<35.	<7.	<35.	<7.	
	Na	46,200,000.	44,200,000.	50,800,000.	49,300,000.	
	Tl	<100. b,c	<20. b	<100. b,c	<20. b	
	Sn	<160.	48. b	<160.	64. b	
	V	7,240. c	5,920. c	7,470. c	5,730. c	
	Zn	6,640.	5,760. c	5,040. c	4,740. c	

a Sample concentration is less than X at 99% confidence
b Batch spike sample recovery was not within control limits indicating possible bias
c Estimated value; interference present causing possible bias

Table B-5
FIELD MEASUREMENTS AND
GENERAL CONSTITUENT ANALYSIS
IT Baker Facility
Martinez, California

STAT. No. SMO. NO.		MW-1A MQB457	MW-5A MQB453	MW-6A MQB446	MW-8A MQB448	MW-9A MQB451	MW-14 MQB456	MW-15* MQB447, 449, 452	MW-101 MQB464	
Parameter	Units	Value	Value	Value	Value	Value	Value	Value	Value	LOD ^a
pH	Units	6.7	6.4	6.9	7.3	6.6	6.6	7.0	6.9	
Conductance	umhos/cm	>20,000.	>20,000.	19,500.	5,800.	>20,000.	>20,000.	8,000.	19,500.	
Temperature	C	17.	16.	18.	18.	18.	18.	20.	18.	
Turbidity	NTU	240.	180.	198.	24.	350.	270.	NA ^b	48.	
POX	µg/L CL	<5.	<5.	<5.	<5.	<5.	<5.	<5.	<5.	5.
TOX	µg/L CL	160.	307.	107.	43.	81.	11,900.	74.	250.	5.
POC	µg/L C	3,620.	32.	11.	37.	670.	20.	20.	<10.	10.
NPOC	µg/L C	80,000.	71,000.	46,000.	10,000.	130,000.	60,000.	5,000.	89,000.	1,000.
Bromide	mg/L	56.	36.	20.	3.8	27.	49.	12.	22.	1.
Chloride	mg/L Cl-	16,400.	10,200.	6,000.	1,380.	7,250.	22,500.	3,680.	7,600.	1.
Nitrate	mg/L N	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3	.3
Sulfate	mg/L SO4=	1,240.	670.	66.	170.	720.	2,400.	248.	250.	1.
Nitrite	mg/L	<.3	<.3	<.3	<.3	<.3	<.3	<.3	<.3	.3
Cyanide	µg/L	<10.	<10.	<10.	<10.	<10.	<10.	<10.	<10.	10.
Phenol	µg/L	<50.	<250.	<100.	<50.	<100.	<50.	<100.	<50.	50.
Sulfide	mg/L	7.2	<1.	<1.	660.	<1.	13.	<1.	63.	1.
Fluoride	mg/L F-	34.	27.	12.	3.6	22.	48.	6.8	28.	1.

* Average of replicate analyses

^a Limit of Detection; not corrected for dilution

^b Sample not analyzed

Table B-5 (cont.)
FIELD MEASUREMENTS AND
GENERAL CONSTITUENT ANALYSIS
IT Baker Facility
Martinez, California

STAT NO. SMO NO.		MW-102 MQB419	MW-103 QB454	MW-104 MQB443	MW-105 MQB455	MW-106 MQB450	MW-110 MQB420	MW-112 MQB440	MW-113 MQB459	
Parameter	Units	Value	Value	Value	Value	Value	Value	Value	Value	LOD ^a
pH	Units	7.0	6.8	NA ^b	6.9	6.5	7.5	6.8	6.8	
Conductance	umhos/cm	>20,000.	11,500.	NA ^b	>18,000.	>20,000.	>11,000.	>18,000.	>20,000.	
Temperature	C	17.	19.	NA ^b	18.	18.	19.	19.	20.	
Turbidity	NTU	250.	90.	125.	32.	34.	35.	54.	170.	
POX	µg/L CL	343.	<5.	10.	91.	6,560.	<5.	<5.	<5.	5.
TOX	µg/L CL	17.	82.	179.	97.	1,980.	<8.	NA ^c	230.	5.
POC	µg/L C	2,270.	230.	170.	<10.	114.	15.	23.	2,620.	10.
NPOC	µg/L C	111,000.	47,000.	18,000.	50,000.	89,000.	73,000.	45,000.	174,000.	1,000.
Bromide	mg/L	24.	14.	23.	NA ^c	22.	13.	NA ^c	40.	1.
Chloride	mg/L Cl-	8,750.	4,440.	37,000.	NA ^c	7,900.	4,600.	NA ^c	14,400.	1.
Nitrate	mg/L N	<.3	<.3	<.3	NA ^c	<.3	<.3	NA ^c	<.3	.3
Sulfate	mg/L SO4=	600.	4.	29,000.	NA ^c	192.	270.	NA ^c	1,000.	1.
Nitrite	mg/L	<.3	<.3	<.3	NA ^c	<.3	<.3	NA ^c	<.3	.3
Cyanide	ug/L	<10.	<10.	<10.	NA ^c	<10.	<10.	NA ^c	10.	10.
Phenol	ug/L	<50.	<50.	<50.	NA ^c	<50.	125.	NA ^c	<50.	50.
Sulfide	mg/L	42.	<1.	110.	NA ^c	75.	<1.	NA ^c	9.	1.
Fluoride	mg/L F-	24.	5.	20.	NA ^c	20.	11.	NA ^c	22.	1.

^a Limit of Detection; not corrected for dilution

^b Sample not analyzed

^c Analysis not requested

Table B-5 (cont.)
 FIELD MEASUREMENTS AND
 GENERAL CONSTITUENT ANALYSIS
 IT Baker Facility
 Martinez, California

STAT No.		MW-125	GW SEEP	Surface Impoundment D1	Surface Impoundment C	
SMO NO.		MQB460	MQB458	MQB444	MQB445	
Parameter	Units	Value	Value	Value	Value	LOD ^a
pH	Units	7.0	NA ^b	NA ^b	NA ^b	
Conductance	umhos/cm	19,000.	NA ^b	NA ^b	NA ^b	
Temperature	°C	17.4	NA ^b	NA ^b	NA ^b	
Turbidity	NTU	150.	NA ^b	NA ^b	NA ^b	
POX	µg/L CL	1,740.	<5.	<5.	<5.	5.
TOX	µg/L CL	NA ^c	4,050.	8,000.	8,540.	5.
POC	µg/L C	3,150.	270.	600.	920.	10.
NPOC	µg/L C	NA ^c	1,135,000.	12,300,000.	11,500,000.	1,000.
Bromide	mg/L	NA ^c	224.	158.	133.	1.
Chloride	mg/L Cl-	NA ^c	81,000	19,000.	37,000.	1.
Nitrate	mg/L N	NA ^c	<.3	<.3	<.3	.3
Sulfate	mg/L SO4=	NA ^c	4,800.	35,000.	29,000.	1.
Nitrite	mg/L	NA ^c	<.3	<.3	<.3	.3
Cyanide	µg/L	NA ^c	<20 .	21,000.*	49,000.*	10.
Phenol	µg/L	NA ^c	<50.	1,450.	1,650.	50.
Sulfide	mg/L	NA ^c	<1.	360.	240.	1.
Fluoride	mg/L F-	NA ^c	136.	600.	700.	1.

* Average of replicate analyses

a Limit of Detection; not corrected for dilution

b Sample not analyzed

c Analysis not requested

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