Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Texaco Hangar Site
Town of Harrison, Westchester County
Site Number 3-60-037

March 2002

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Texaco Hangar Site
Town of Harrison, Westchester County, New York
Site No. 3-60-037

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Texaco Hangar Class 2 inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law. The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Texaco Hangar inactive hazardous waste disposal site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is presented in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Texaco Hangar site and the criteria identified for evaluation of alternatives, the NYSDEC has selected soil vapor extraction (SVE) to remediate contaminated soil and chemical oxidation for contaminated groundwater. The components of the remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program;

- Installation of a soil vapor extraction (SVE) system;

- Pilot test for chemical oxidation to determine the most effective oxidant;

- During the pilot test, if the NYSDEC determines that chemical oxidation is not effective, a groundwater extraction and treatment system will be installed;

- Delivery of a chemical oxidant proven to be effective during the pilot test to contaminated groundwater to oxidize and convert the contaminants to innocuous compounds. The chemical oxidant will be introduced to the aquifer several times within the source area through a series of injection wells;

- Institutional controls in the form of existing use and development restrictions limiting the use of groundwater from the affected areas as a potable or process water without necessary water quality treatment as determined by the Westchester County Department of Health (WCDOH);

- Annual certification by the property owner to the NYSDEC that the site is in compliance with the institutional controls outlined in this PRAP; and

- A long term monitoring program will be instituted in order to track the progress of the remedy selected.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/26/2002
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

RECORD OF DECISION

Texaco Hangar Site
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Site No. 3-60-037
March 2002

SECTION 1: <u>SUMMARY OF THE RECORD OF DECISION</u>

The New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) has selected this remedy to address the significant threat to human health and/or the environment created by the presence of hazardous waste at the Texaco Hangar Class 2 inactive hazardous waste disposal site. As more fully described in Sections 3 and 4 of this document, chemical spills have resulted in the disposal of a number of hazardous wastes, including chlorinated volatile organic compounds (CVOCs) such as 1,1,1-trichloroethane (1,1,1-TCA) and tetrachloroethene (PCE), at the site. These disposal activities have resulted in the following significant threats to public health and/or the environment:

- a potential threat to human health associated with inhalation of vapors from CVOC contamination in on-site soils; and

- a significant environmental threat associated with the impacts of the contaminants to groundwater.

In order to eliminate or mitigate the significant threats to public health and/or the environment that the hazardous waste disposed at the Texaco Hangar site has caused, the following remedy was selected:

- Soil vapor extraction of source area soils;

- Pilot tests for in-situ chemical oxidation of contaminated groundwater, followed by full scale chemical oxidation, if effective; and

- If pilot tests demonstrate that chemical oxidation is not effective, groundwater extraction and treatment will be implemented.

The selected remedy, discussed in detail in Section 8 of this document, is intended to attain the remediation goals selected for this site, in Section 6 of this Record of Decision (ROD), in conformity with applicable standards, criteria, and guidance (SCGs).

SECTION 2: <u>SITE LOCATION AND DESCRIPTION</u>

The Texaco Hangar site is located at Hangar D, Bay 2 near the eastern boundary of the Westchester County Airport, in the Town of Harrison, Westchester County. The site is currently owned by the Airport and leased by Texaco. The site is approximately 1.6 acres in size and contains the hangar bay, aircraft pad, administrative offices and the area behind the hangar building.

The northeast boundary of the Airport is adjacent to the Fairfield County, Connecticut border, and undeveloped woodlands are located north, south and east of the Airport.

Blind Brook is located 5,000 feet south of the site and flows south to Long Island Sound. Rye

Texaco Hangar site. The site area is serviced by municipal water and sewer service. A location map and site map are attached as Figures 1 and 2.

SECTION 3: <u>SITE HISTORY</u>

3.1: <u>Operational/Disposal History</u>

The airport began operations in 1952 and Hangar D was also constructed in 1952. During the first 30 years of operation, the airport hangar was managed by Gulf Oil under a long term lease with Westchester County. Mobil Oil Corporation (now ExxonMobil) leased the space in Hangar D, Bay 2 from 1982 until 1990 as a base for corporate flight operations and other air travel related functions. The hangar space was used for routine aircraft maintenance. Other uses included analytical laboratories, an electronic laboratory, and a small paint booth used only for touch-up painting. On-site facilities also included administration offices, a pilot's briefing room, conference room and an executive lounge. The hangar was used by Mobil until the lease was transferred to Texaco, Inc. (Texaco) in 1990.
for aircraft operations.

During the lease transfer process, Texaco hired a consultant to perform an environmental review of the property. The investigation revealed that CVOCs were present in the shallow soils beneath the hangar floor in the area where drums of chlorinated solvents had previously been stored.

These CVOCs, primarily 1,1,1-TCA and PCE, were used by Mobil for routine aircraft maintenance. The area on the east/southeast side of the bay, near the dividing wall, was used for the storage of 55-gallon drums. This drum storage area is the suspected source of the contamination.

An underground No. 2 Fuel Oil tank is located behind the hangar building. No leaks were revealed during an integrity test performed on the tank.

3.2: Remedial History

From October 1990 through January 1991, a pre-leasing environmental assessment was completed for Texaco. The report of the findings was issued in January 1991. Also completed in January 1991 was a soil gas survey beneath the hangar floor slab. The results led to the need for additional investigation.

In March 1991, a subsurface investigation was conducted by Mobil Oil Corporation. The report was issued in May 1991 and revealed total CVOCs in the soil up to 54 parts per million (ppm) in the source area, where the solvent drums were previously stored.

In 1993, the NYSDEC placed the Texaco Hangar site on the NYS Registry of Inactive Hazardous Waste Disposal Sites (Registry) as a Class 2a site. Class 2a is a temporary designation for a site that requires additional investigation before a permanent listing can be assigned.

In 1994, a Preliminary Site Assessment (PSA) Consent Order was executed by Mobil Oil Corporation and the NYSDEC.

In May 1995, Preliminary Site Assessment activities were performed and the report of the findings (the PSA Report) was issued in August 1995. The results showed elevated levels of CVOCs in soils and groundwater. During the PSA, 122 soil samples were collected and the extent of the soil contamination was defined.

In November 1995, a Supplemental PSA was completed that delineated the horizontal extent of the shallow groundwater contamination. The report of the results was issued in February 1996.

In March 1996, the site was reclassified to a Class 2 site due to the contravention of groundwater standards and exceedance of soil guidance values. A Class 2 site presents a significant threat to public health or the environment and action is required.

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present at the site and to evaluate alternatives to address the significant threat to human health and the environment posed by the presence of hazardous waste, a Potential Responsible Party (PRP), ExxonMobil Oil Corporation (formerly Mobil Oil Corporation) has conducted a Remedial Investigation / Feasibility Study (RI/FS).

In March 1996, an Order on Consent requiring a RI/FS program was executed by Mobil Oil Corporation and the NYSDEC.

4.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

From 1996 through 2001, remedial investigation activities were performed. Six overburden monitoring wells and ten bedrock monitoring wells were installed at the site, and groundwater and soil samples were collected to delineate the extent of the contamination.

The RI was conducted in four phases. The first phase was conducted in November 1996, the second phase between April 1997 and July 1997, the third phase between November 1999 and June 2000, and the fourth phase between August 2001 and November 2001. A report entitled Remedial Investigation, Hangar D, Bay 2, Westchester County Airport dated December 2001 has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- *Geophysical survey to determine depth to bedrock;*

- *Installation of 16 monitoring wells and the collection of 8 soil samples and 30 soil gas samples for chemical analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions;*

- *A Soil Vapor Extraction (SVE) Pilot Study to determine the feasibility of SVE technology for contaminated soils; and*

- *A Chemical Oxidation Pilot Study using potassium permanganate to determine the feasibility*

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the RI analytical data were compared to environmental standards, criteria, and guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Texaco Hangar site are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part 5 of New York State Sanitary Code. For soils, NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 provides soil cleanup guidelines for the protection of groundwater, background conditions, and health-based exposure scenarios. In addition, for soils, site specific background concentration levels can be considered for certain classes of contaminants.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) for contaminants in groundwater and parts per million (ppm) for contaminants in soil. For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: Site Geology and Hydrogeology

The surficial materials in the vicinity of the site are comprised of various sands and compacted sand, silt and gravel deposits. Subsurface investigations completed at the site revealed heterogeneous subsurface soils consisting of up to 15 feet of fill that was likely placed as part of the airport construction. The material consists of poorly sorted sand and silt with occasional pockets of cobbles. The fill overlies glacial and fluvial sands and silts, which in turn overlie Mica Schist bedrock.

A buried stream channel is located beneath the center and northeast side of the hangar, approximately 20 feet below the ground. Bedrock in this area of the hangar is located approximately thirteen feet to thirty feet below grade. The stream channel generally trends north-south and terminates at Blind Brook, located immediately south of the airport. Bedrock from the center of the hangar to the southwest side of the hangar, which is not underlain by the former stream channel, is encountered at depths ranging from one foot to 11 feet below grade.

Groundwater that occurs in the unconsolidated fill material is primarily limited within the buried stream channel. Groundwater is located approximately seven feet to 13 feet below ground surface. The groundwater flow in the unconsolidated fill material follows the trend of the buried stream channel, flowing to the south-southeast. The hydraulic gradient of the shallow groundwater across the site is approximately 0.02 feet/foot and the average hydraulic conductivity is 0.000054 cm/s. A groundwater contour map is shown on Figure 2.

Blind Brook is located 5,000 feet south of the site and flows south to Long Island Sound. Rye Lake, which
Hangar site.

4.1.2: Nature of Contamination

As described in the RI report, many soil, soil gas and groundwater samples were collected at the site to characterize the nature and extent of contamination. The main categories of contaminants which exceed their SCGs are CVOCs. The primary CVOCs of concern are PCE, 1,1,1-TCA, trichloroethene (TCE), and their associated breakdown products.

4.1.3: Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in groundwater and soil and compares the data with the SCGs for the site. The following is a summary of the findings of the investigation of soil, soil gas and groundwater:

<u>Soil</u>

Soil investigations were conducted to assess the nature and extent of contamination beneath the hangar and to assess background soil conditions in the vicinity of the hangar. The extent of the soil contamination was clearly defined during the PSA, when a total of 122 soil samples were collected, with 100 analyzed for CVOCs and the majority being collected from beneath the Texaco Bay (Bay 2) and the adjacent bay (Bay 3). One additional soil boring was installed during the RI from which eight soil samples were collected and analyzed for CVOCs.

The most frequently detected CVOCs in site soils were 1,1,1-TCA with concentrations ranging from non-detect (ND) to 32 ppm, and PCE with concentrations ranging from ND to 24 ppm. The SCGs for these compounds are 0.8 ppm and 1.4 ppm, respectively. In the initial phases of investigation, petroleum hydrocarbons were detected at low levels in soil samples. However, subsequent investigations did not show significant levels of petroleum hydrocarbons above SCGs, and were therefore not considered contaminants of concern for the site.

The highest concentrations of CVOCs were detected from soil samples collected in the vicinity of the former solvent storage area, located along the southern wall of the bay. The highest contamination is concentrated in the top 6 inches of soil beneath the concrete hangar floor. The contamination in the source area is fairly localized, with some lower levels of CVOCs detected northeast of the solvent storage area. Figure 3 shows soil sample locations from the RI as well as the PSA.

Soil Gas

Thirty soil gas samples were collected from beneath the Texaco bay. The results of the soil gas sampling showed a similar distribution of contaminants as the soil samples.

Soil gas samples were collected from fifteen locations in July and December 1997, for a total of thirty soil gas samples. Samples were collected from 2 to 2.5 feet below ground surface (bgs). The compounds with the highest concentrations were 1,1,1-TCA with results ranging from ND to 871 ppb and PCE with results ranging from ND to 168 ppb. Figure 4 shows soil gas sample locations.

Groundwater

A total of 16 groundwater monitoring wells have been installed at the Texaco Hangar site. A total of four wells are located within Bay 2 of the hangar, six wells are located in the adjacent bay (Bay 3) and six wells are located in an area outside of the hangar building. Of the 16 wells, six are overburden wells, five are shallow bedrock wells and five are deep bedrock wells. The locations of the monitoring wells are shown in Figure 5.

The six overburden wells (MW-1 through MW-6) were installed to the top of bedrock, ranging in depth from 14 to 20 feet bgs. Sampling since 1996 has shown fairly consistent levels of CVOCs, with no significant trends noted. The CVOCs detected most frequently and at the highest concentrations during the most recent sampling year of 2001 include cis-1,2-DCE ranging from ND to 3400 ppb, 1,1-DCA ranging from ND to 2200 ppb and chloroethane ranging from ND to 2000 ppb. The SCGs for each of these compounds is 5 ppb.

The five shallow bedrock wells (MW-7S through 11S) were installed from 10 to15 feet into the top of bedrock, for a total depth of 20 to 40 feet bgs. Sampling of the shallow bedrock wells was completed during 2000 and 2001. The results have shown fairly consistent levels of CVOCs. The CVOCs detected most frequently and at the highest concentrations during 2001 include 1,1,1-TCA, PCE, and their breakdown products of TCE, 1,1-DCA, and cis-1,2-DCE. The range of concentrations of these CVOCs were ND to 920 ppb of 1,1,1-TCA, ND to 440 ppb of PCE, ND to

520 ppb of TCE, ND to 1500 ppb of 1,1-DCA, and ND to 1500 ppb of cis-1,2-DCE. The SCGs for each of these compounds is 5 ppb.

The five deep bedrock wells (MW-7D through MW-11D) were installed 20 to 40 feet into the bedrock, for a total depth of 40 to 60 feet bgs. Similar to the shallow bedrock wells, sampling of the deep bedrock wells was completed during 2000 and 2001. The results have also shown fairly consistent levels of CVOCs. The CVOCs detected most frequently and at the highest concentrations during 2001 include 1,1-DCA with results ranging from ND to 380 ppb and cis-1,2-DCE with results ranging from ND to 140 ppb. The SCGs for each of these compounds is 5 ppb.

Groundwater monitoring has indicated that the groundwater plume originates below the source area (former solvent storage area) and extends south in the direction of groundwater flow. There has been no contamination detected in wells located upgradient, and north of the solvent storage area. In addition, sampling indicates that the plume has not yet reached the far end of Hangar D, where two off-site bedrock wells, MW-11D and MW-11S, are located.

The highest concentration of CVOCs has been detected in the overburden groundwater. Based on analysis from the bedrock monitoring wells, the concentrations of CVOCs decreases with depth into the bedrock, indicating that the majority of the bedrock contamination is encountered in the shallow fractured bedrock rather than the deep bedrock. The maximum CVOC concentrations in the deep bedrock range from 450 ppb to approximately 700 ppb. The maximum concentrations of contaminants detected in the overburden and bedrock monitoring wells since 1996 are summarized in Table 2.

4.2: <u>Summary of Human Exposure Pathways</u>:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be found in Section 6 of the RI report.

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Pathways which are known to or may exist at the site include:

- Inhalation of soil gas;
- Ingestion of soil;
- Direct contact with subsurface soil;
- Direct contact with groundwater; or
- Ingestion of groundwater.

Ingestion of contaminated groundwater within the airport boundaries has been eliminated as an exposure pathway because the airport utilizes public water.

Residential properties, located approximately 0.75 miles to the south of the site and hydrogeologically downgradient of the site, utilize private drinking water wells installed into bedrock. Analysis of groundwater from monitoring wells indicate that the contaminant plume has not migrated outside of the Hangar D area.

Analysis of soil gas indicate there are elevated levels of contaminated vapors beneath the building. These levels are unlikely to pose a significant risk of inhalation of contaminated vapors by on site personnel or nearby residents. The hanger is paved. There are no cracks, crevices or holes compromising the integrity of the pavement, thus forming a barrier preventing the release of contaminant vapor on-site.

There are no exposed contaminated surface soils at the site. Direct contact and ingestion of subsurface soils could occur if excavation was performed beneath the hangar. Precautions would need to be taken if excavation was to occur in order to prevent exposure.

4.3: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures and ecological risks which may be presented by the site. The Fish and Wildlife Impact Assessment included in the RI presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources. For this site, no impact to fish or wildlife resources are expected. Soil contamination at the site is located beneath the hangar, which eliminates the possibility of exposure to soils by wildlife receptors.

The groundwater quality beneath the site has been degraded and cannot be used as a source of potable water unless contaminant levels are reduced. The extent of groundwater contamination is limited beneath the hangar. The nearest discharge point is Blind Brook. Blind Brook is located approximately one mile south of the site and groundwater sampling has shown that the contamination has not reached the Brook.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The NYSDEC and Mobil Oil Corporation entered into a Consent Order on March 21, 1996. The Order obligates Mobil Oil Corporation to implement a RI/FS. Upon issuance of the Record of Decision, the NYSDEC will approach the PRPs to implement the selected remedy under an Order on Consent.

The following is the chronological enforcement history of this site.

Date	Index No.	Subject of Order
1/25/94	D3-0001-93-09	PSA
3/21/96	W3-0740-95-11	RI/FS

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all SCGs and be protective of human health and the environment. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- *Eliminate, to the extent practicable, exposures to soil and groundwater;*
- *Eliminate, to the extent practicable, the migration of contaminants into the groundwater*;
- *Eliminate, to the extent practicable, ingestion of groundwater affected by the site that does not attain NYSDOH Part 5 Drinking Water Standards;*
- *Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria; and*
- *Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.*

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Texaco Hangar site were identified, screened and evaluated in the report entitled Feasibility Study Report, Hangar D, Bay 2, Westchester County Airport, dated December 2001.

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to construct the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

7.1: Description of Remedial Alternatives

The potential remedies are intended to address the contaminated soils and groundwater at the site. Alternatives 1, 2 and 3 address soil contamination and Alternatives 1, 4, 5 and 6 address groundwater contamination.

Alternatives 2 through 6 include institutional controls and annual site reviews. Institutional controls would involve existing use and development restrictions limiting the use of groundwater. Annual reviews would be performed by the property owner to certify to the NYSDEC that the site is in compliance with the institutional controls.

<u>Alternative 1: No Action</u>

The No Action alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment. Institutional controls, such as a deed restriction on affected soil and groundwater, and annual site reviews to certify compliance with the institutional controls would be implemented as part of this alternative.

<u>Alternative 2: Excavation and Off-Site Disposal of Contaminated Soil</u>

Present Worth: *$ 425,000*
Capital Cost: *$ 425,000*
Annual O&M: *$ 0*
Time to Implement: *3 months*

Alternative 2 would include excavation of the source area and surrounding soil to a depth of approximately 2 feet below ground surface (bgs), and possibly deeper in the source area. The soil source area is shown on Figure 6. The total soil volume to be excavated would be approximately 750 cubic yards. All soil above TAGM levels would be excavated.

The excavation would be conducted using conventional earthmoving equipment, such as backhoes and front end loaders. Equipment would be needed to break through the concrete hangar floor in order to expose the contaminated soil to be excavated. Shoring or other methods would be used in accordance with OSHA requirements for excavation over 5 feet deep. Sampling of the soils, either before or after excavation, would need to be performed in order to characterize the soils for disposal purposes before off site disposal. For cost estimating purposes, it is assumed that one sample per 250 cubic yards would be collected for characterization purposes.

Confirmatory sampling would be completed after excavation. It is estimated that at least six samples, four from the sidewalls and two from the base, would be collected based on the The samples would be analyzed for CVOCs to ensure that the remaining soils meet SCGs. If confirmatory sample results exceed SCGs, further excavation would be performed and further confirmatory samples collected until the soils showed levels within SCGs.

The excavated soil targeted for disposal would be staged on site on plastic sheets, and covered with plastic, until disposal. The soil would be loaded into trucks and transported to a permitted disposal facility.

After excavation of the area, clean backfill from off site would be placed into the excavation to bring the excavation to grade. Paving of the area would be completed to restore the hangar floor.

Alternative 3: Soil Vapor Extraction

Present Worth: *$ 325,000*
Capital Cost: *$ 150,000*
Annual O&M: *$ 100,000*
Time to Implement: *3 - 6 months*

Alternative 3 would include installation of a soil vapor extraction (SVE) system to treat CVOCs, which exist in the source area soil. The soil source area is shown on Figure 6. The SVE system would entail extraction of vapors containing CVOCs from soil in the unsaturated zone. The SVE system would be comprised of either a regenerative or a positive displacement type blower, slotted, vertical vapor extraction wells, underground piping connecting the blower to the extraction wells, a vapor treatment system, and required system controls. At least two SVE wells would be installed to a depth of approximately 10 feet, located in the source area near MW-1 and MW-2. A remedial equipment shed would be located outside of and adjacent to the hangar, and would house the blower, air treatment system, and system controls. It is estimated that the SVE system would operate for 2 years in order to meet remedial objectives. Remedial objectives would be TAGM levels. The SVE system would be operated until the NYSDEC determines it would no longer be feasible to operate.

An air/water separator and treatment of the extracted air from the SVE wells would be required for this alternative. Treatment would be performed by vapor phase carbon. The conceptual design layout of the SVE system at the site is shown on Figure 7 and a typical SVE system is shown on Figure 8.

Alternative 4: Monitored Natural Attenuation for Groundwater

Present Worth: *$ 80,000*
Capital Cost: *$ 10,000*
Annual O&M: *$ 7,000*
Time to Implement: *2 months*

Alternative 4 consists of monitored natural attenuation (MNA) of dissolved CVOCs in source area groundwater. Under certain conditions, MNA can be an appropriate remedial alternative for the treatment of groundwater.

It is estimated that three additional monitoring wells would be installed as part of this alternative. A groundwater monitoring plan would be developed to evaluate the continued effectiveness of the natural processes. Fifteen of the monitoring wells would be included in the monitoring program. These wells would be sampled on a quarterly basis and the results would be evaluated in quarterly reports to be submitted to the NYSDEC. The quarterly reports would be reviewed to ensure the continued protection of human health and the environment. It is estimated that the system would need to be monitored for at least 30 years.

Natural attenuation parameters would be measured from the monitoring wells to evaluate the extent of dechlorination of CVOCs, and therefore, the effectiveness of MNA. Each parameter would provide information concerning key attributes of MNA, including general water quality, the presence of daughter products, and indication of reducing conditions. As mentioned previously, these parameters would be measured from monitoring wells on a quarterly basis to track the progress and effectiveness of MNA.

Alternative 5: Groundwater Extraction and Treatment

Present Worth: $ 1,200,000
Capital Cost: $ 200,000
Annual O&M: $ 90,000
Time to Implement: 1 year

Alternative 5 would provide hydraulic containment and treatment of contaminants via extraction of source area groundwater and subsequent ex-situ treatment. The extraction system would include a network of extraction wells. Overburden and shallow bedrock groundwater would be extracted and treated. It would not be efficient nor cost effective to treat the concentrations of contaminants in the deep bedrock. In addition, once the source of contamination is removed and the overburden and shallow bedrock groundwater is treated, the concentrations in the deep bedrock will naturally attenuate.

At least two extraction wells would be installed approximately 10 feet into the bedrock, for a total depth of approximately 20 feet bgs. The extraction wells would be located near MW-1 and MW-2. Extracted groundwater would be treated in a treatment shed, located outside of and adjacent to the hangar. Treatment would consist of an air stripper in series with liquid phase carbon adsorption to remove CVOCs. If necessary, air stripper off-gases would be treated using carbon adsorption. Treated groundwater would be re-injected into the aquifer or other permitted discharge locations. This alternative would require the construction of an on-site treatment plant, long-term operation and maintenance, and the installation of an injection well for groundwater discharge. Carbon and wastes generated during the groundwater treatment process would require off-site disposal. A groundwater monitoring plan and periodic site reviews would also be components of this alternative.

It is estimated that the extraction and treatment system would need to be operated for 30 years in order to meet remedial objectives. The extent of the groundwater plume is shown on Figure 6. A conceptual design layout of the extraction and treatment system at the site is shown on Figure 9.

Alternative 6: In-Situ Chemical Oxidation

Present Worth: $ 350,000
Capital Cost: $ 50,000
Annual O&M: $ 100,000
Time to Implement: 1 year

This Alternative involves the delivery of chemical oxidants to the contaminated groundwater in the overburden and shallow bedrock. The oxidants destroy the contaminants by converting them to innocuous compounds commonly found in nature, such as carbon dioxide and water. In-situ chemical oxidation is currently being used for groundwater, sediment and soil remediation and can be applied to a variety of soil types and sizes. The most common oxidants applied to date have typically been hydrogen peroxide (H_2O_2), hydrogen peroxide radicals utilizing Fenton's Reactants, potassium permanganate ($KMnO_4$), sodium permanganate ($NaMnO_4$) and ozone (O_3).

The volume and chemical composition of individual treatments are based on the contaminant levels and volume, subsurface characteristics, and pre-application laboratory test results. The methods for delivery of the chemical may vary. The oxidant can be injected through a well directly into the subsurface, mixed with a catalyst and injected, added as a liquid solution, or introduced as a solid/slurry application.

The chemical oxidant to be used for this site would be determined from pilot tests. A Pilot Study for the injection of $KMnO_4$ was completed at the site in August 2001. The results of post injection groundwater monitoring have shown reductions within the pilot test target area. Sampling was completed before injection of the $KMnO_4$, one month after injection and three months after injection. A summary of the results from selected monitoring wells, and the percent reduction of concentrations, are shown in Table 3. During the pilot study, a short term reduction in the concentrations of CVOCs occurred, followed by a rebound to almost original contaminant concentrations. This rebound may have been due to contamination in the soil vadose zone or the surrounding groundwater.

Under this alternative, the chemical oxidant would be introduced to the aquifer several times within the source area through a series of injection wells. Four additional monitoring wells and eight injection wells were installed in the hangar for use in the pilot study completed in August 2001. The injection wells for the pilot study were installed to the top of bedrock and the chemical oxidant was injected in liquid form using a pressure pump into the overburden groundwater. These injection wells and monitoring wells would be used for further pilot testing of different oxidants to determine the most effective oxidant for use at the site. Additional injection wells would be installed into the shallow bedrock for injection of the oxidant into the shallow bedrock groundwater. Additional monitoring wells would also be installed as necessary. It would not be efficient nor cost effective to treat the concentrations of contaminants in the deep bedrock. In addition, once the source of contamination is removed and the overburden and shallow bedrock groundwater is treated, the concentrations in the deep bedrock will naturally attenuate. The extent of the groundwater plume is shown on Figure 6.

Chemical oxidation results in the decrease of CVOC concentrations in groundwater over time. A post-injection groundwater monitoring plan would be a component of this alternative in order to evaluate the effectiveness of the chemical oxidation treatment. The monitoring plan would consist of quarterly sampling of 15 monitoring wells for CVOCs, chloride and water quality parameters. It is estimated that chemical oxidation would take approximately 4 years to meet remedial objectives.

7.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1 would not achieve compliance with SCGs for the site, including the New York State soil cleanup objectives and the groundwater standards.

Soils: Alternatives 2 and 3 would both achieve compliance with SCGs. Alternative 2 would removed contaminated soils, and would achieve SCGs faster than Alternative 3, since Alternative 3 would require a treatment system.

Groundwater: For Alternatives 4 and 5, an extended time frame would be required to achieve SCGs. For Alternative 6, pilot studies would determine the effectiveness of chemical oxidation to meet SCGs. If a particular oxidant was found to be effective, Alternative 6 would achieve SCGs in a shorter period of time than Alternatives 4 and 5.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

In comparing the six remedial alternatives, Alternative 1 would be the least protective of human health since no active remedy would be implemented and potential exposures to soil and groundwater would continue to exist.

Soils: Alternatives 2 and 3 would be protective of human health and the environment since they involve active remediation and would remove contamination from the site by excavation or treatment.

Groundwater: Alternative 4 provides no protection of human health or the environment since it includes only monitoring of the plume and would require institutional controls to prevent human exposure to contaminants. Alternatives 5 and 6 would be protective of human heath and the environment since both would remove the contaminants from the site groundwater. Alternative 6 would remove contaminants in less time than Alternative 5.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon

the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

No short term impacts would result from the implementation of Alternative 1 as this alternative would not include any active remediation of contaminated soil and groundwater. Alternative 1 would not meet remedial objectives.

Soils: Alternative 2 would have greater short term impacts than Alternative 3 since excavation would be required. Dust would be generated from excavation, staging and trucking of the soil off site. Other short term impacts associated with trucking of soil would include increased traffic, noise and exhaust vapor. Alternative 3 would have some short-term impact associated with the installation of an SVE system, including drilling of the SVE wells. Although both alternatives would meet objectives in a timely manner, Alternative 2 would achieve remedial objectives within 3 months, while Alternative 3 would require 2 years. A Community Air Monitoring Plan (CAMP) would be prepared for both alternatives, which would provide measures to mitigate impacts.

Groundwater: Alternative 4 would have minimal short term impacts, with the exception of drilling of additional monitoring wells. Alternatives 5 and 6 would also have impacts associated with installation of monitoring wells. Alternative 5 would require installation of a treatment building and permanent equipment. Alternative 6 would possibly have impacts from dust associated with a chemical oxidant if a dry oxidant was used. Groundwater remediation would be achieved in a shorter amount of time for Alternative 6 than Alternatives 4 and 5. Alternatives 4 and 5 would have extended time frames (30 years) to meet remedial objectives, as opposed to Alternative 6, which would meet objectives in approximately four years. All three alternatives would require a CAMP since drilling would be performed.

4. <u>Long-term Effectiveness and Permanence</u>. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 1 would provide the least long-term effectiveness and permanence as contaminated soil and groundwater would remain on site.

Soils: Alternatives 2 and 3 would be equally effective long term remedies since both would permanently remove contamination from the site.

Groundwater: Alternative 4 would not be highly effective long-term since no active remediation would be performed and it would take an extended period of time for SCGs to be met, although the breakdown of the contamination via MNA would be permanent. Alternatives 5 and 6 would be effective long-term, and are both permanent, although Alternative 5 would require an extended period of time to meet SCGs. Alternatives 4, 5 and 6 would include long term monitoring, which would be used to evaluate long term effectiveness for site cleanup.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 1 would not achieve reduction in the toxicity, mobility or volume of contamination present, as no action would be taken and contaminants would remain on site.

Soils: Alternative 2 would not decrease the toxicity of the contamination, although it would be removed from the site so it would no longer be mobile and the volume would be reduced. Alternative 3 would reduce the toxicity, mobility and volume by removing contaminants from the soil and destroying them via treatment.

Groundwater: Alternative 4 would not reduce the toxicity, mobility or volume of the contamination in the groundwater, since contamination would remain untreated and not contained. Alternative 5 would provide reduction in toxicity, volume and mobility through plume containment by ex-situ treatment of contaminated groundwater. Alternative 6 would also result in a reduction in toxicity, mobility and volume of contaminants because the contaminated groundwater would be treated, and therefore, contaminants would be removed.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

Alternative 1 would be the easiest to implement as it would maintain the current conditions at the site and would add institutional measures.

Soils: Alternatives 2 and 3 would be equally easy to implement since both technologies and equipment are readily available. However, both would require activities within the hangar, which is an actively used building.

Groundwater: Alternative 4 would be easy to implement since it would also maintain the current conditions at the site and add institutional measures, although additional monitoring wells, and monitoring and evaluation of the groundwater would be required. Although Alternatives 5 and 6 would be more difficult to implement than Alternative 4, equipment and skilled labor are readily available for these alternatives. Alternative 6 has been pilot tested at the site, and some of the required injection and monitoring points for this Alternative are already in place within the hangar building.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 4.

Alternative 1, No Action, would have the lowest estimated present worth cost since no action would be taken.

Soils: Alternative 2 has a higher estimated present worth cost ($425,000) than Alternative 3 ($325,000).

Groundwater: Alternative 4 has a lower estimated present worth cost ($80,000) than either Alternative 5 or 6. Alternative 6 has a lower estimated present worth cost ($350,000) than Alternative 5 ($1.2 million). Alternative 5 is the most costly of the Alternatives due to the extensive capital and operation and maintenance costs.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the Department's response to the concerns raised.

In general the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting the implementation of Alternative 3 for soil contamination and Alternative 6 for groundwater contamination. This remedial program includes SVE of source area soils and in-situ chemical oxidation of contaminated groundwater. Pilot studies will be completed to determine the most effective oxidant for use at the site prior to implementation of Alternative 6. If pilot testing does not demonstrate the effectiveness of chemical oxidation, then Alternative 5 consisting of a groundwater extraction and treatment system, will be implemented to address contaminated groundwater. This remedy will address both contaminated soils and groundwater at the site.

This selection is based on the evaluation of the six alternatives developed for this site. With the exception of the No Action alternative, Alternative 1, and the Monitored Natural Attenuation alternative, Alternative 4, each of the alternatives would comply with the threshold criteria. In addition, all alternatives are similar with respect to the majority of the balancing criteria. The only major differences between these alternatives are time to meet the SCGs and cost. Alternatives 3 (SVE) and 6 (In-situ chemical oxidation) were the lowest cost alternatives for soil and groundwater, respectively.

For soils, Alternative 3 will actively treat the compounds of concern (COCs) which are contributing to groundwater contamination. Alternative 3 is less costly than Alternative 2 and is easier to implement. Alternative 2 would require excavation of the concrete hangar and would cause greater disruptions to airport operations than Alternative 3.

For groundwater, Alternatives 5 and 6 will actively treat the groundwater contamination. Pilot tests for Alternative 6 will first be completed to gage the effectiveness of this technology. If Alternative 6 is not found to be effective, then Alternative 5 will be implemented. Alternative 5 will require pumping tests to determine extraction rates and the radius of influence before installation of the extraction and treatment system, in order to effectively capture and treat the groundwater plume. Alternative 5 will require a longer period of time to meet SCGs than Alternative 6. Alternative 6 will provide for the destruction of contaminants in the groundwater through oxidation of the compounds into inert substances.

The estimated present worth cost to implement the remedy with Alternatives 3 and 6 is $675,000. The cost to construct the remedy is estimated to be $200,000 and the estimated average annual operation and maintenance cost is $200,000 for the first 2 years and $100,000 for the next 2 years. The remedy is expected to be completed in 4 years.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

2. Installation of a soil vapor extraction (SVE) system including a regenerative or a positive displacement type blower, slotted, vertical vapor extraction wells, underground piping connecting the blower to the extraction wells, a vapor treatment system, and required system controls.

3. Pilot test for chemical oxidation to determine the most effective oxidant.

4. During the pilot test, if the NYSDEC determines that chemical oxidation is not effective, Alternative 5 will be implemented. Pumping tests will be performed to determine the parameters of the groundwater extraction and treatment system.

5. Delivery of a chemical oxidant determined during the pilot test to contaminated groundwater to oxidize and destroy the contaminants by converting them to innocuous compounds. The chemical oxidant will be introduced to the aquifer several times within the source area through a series of injection wells. Pilot tests previously completed at the site have indicated that chemical oxidation will be successful. However, if chemical oxidation does not satisfactorily remediate the plume, groundwater extraction wells will be installed and a groundwater treatment system will be constructed. The groundwater will be extracted, treated and re-injected into the aquifer. A groundwater monitoring program will be implemented for either chemical oxidation or extraction and treatment.

6. Institutional controls in the form of existing use and development restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the Westchester County Department of Health (WCDOH) from the affected areas.

7. Annual certification by the property owner to the NYSDEC that the site is in compliance with the institutional controls outlined in this PRAP.

8. A long term monitoring program will be instituted in order to track the progress of the remedy selected. Monitoring will occur quarterly at 15 of the monitoring wells in order to ensure the continued decrease of contaminant concentrations. Groundwater will be analyzed for CVOCs and trends in concentrations will be evaluated. A groundwater monitoring report presenting the results and an evaluation of the results will be provided to the NYSDEC quarterly. Remedial goals for the remedial system will be TAGM levels, and yearly site reviews will be conducted to evaluate the remedy with respect to these goals. The remedial system will operate until the NYSDEC determines it will no longer be feasible. This program will allow the effectiveness of the remedy to be monitored and will be a component of the operation and maintenance for the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established;
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties;
- In July 2001 a Fact Sheet was mailed describing the investigation;
- In February 2002, a Fact Sheet was mailed announcing the availability of the PRAP and the public meeting;
- On March 12, 2002 a public meeting was held at the Town of Harrison Town Hall to discuss the PRAP; and
- In March 2002 a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.

Table 1
Nature and Extent of Contamination

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs	SCG (ppb)
Groundwater	Chlorinated Volatile Organic Compounds (CVOCs)	Tetrachloroethene	ND to 500	58 of 126	5
		1,1,1-trichloroethane	ND to 990	53 of 126	5
		Trichloroethene	ND to 600	59 of 126	5
		cis-1,2-dichloroethene	ND to 3400	84 of 117	5
		trans-1,2-dichloroethene	ND to 39	35 of 114	5
		1,1-dichloroethene	ND to 280	63 of 114	5
		1,1-dichloroethane	ND to 5800	80 of 126	5
		1,2-dichloroethane	ND to 13	12 of 114	5
		chloroethane	ND to 5500	50 of 114	5
		vinyl chloride	ND to 15	22 of 114	2
MEDIUM	**CATEGORY**	**CONTAMINANT OF CONCERN**	**CONCENTRATION RANGE (ppm)**	**FREQUENCY of EXCEEDING SCGs**	**SCG (ppm)**
Soils	Chlorinated Volatile Organic Compounds (CVOCs)	Tetrachloroethene	ND to 24	13 of 108	1.4
		1,1,1-trichloroethane	ND to 33	9 of 108	0.8
		1,1-dichloroethene	ND to 1.6	1 of 97	0.4
		1,1-dichloroethane	ND to 6.8	6 of 108	0.2
		cis-1,2-dichloroethene	ND to 0.4	2 of 108	0.3

Table 2
Maximum Concentrations Detected in Groundwater

WELL	CONTAMINANT OF CONCERN	MAXIMUM CONCENTRATION (ppb) 1996 - 1999	MAXIMUM CONCENTRATION (ppb) 2000	MAXIMUM CONCENTRATION (ppb) 2001
Overburden Wells (MW-1 through MW-6) 14' - 20' bgs	Tetrachloroethene	135	60	79
	1,1,1-trichloroethane	835	980	160
	Trichloroethene	220	600	71
	cis-1,2-dichloroethene	1900	2700	3400
	trans-1,2-dichloroethene	39	19	23
	1,1-dichloroethene	190	130	90
	1,1-dichloroethane	5800	2500	2200
	1,2-dichloroethane	10	8	13
	chloroethane	5500	1200	2000
	vinyl chloride	15	7	13
Shallow Bedrock Wells (MW-7S through MW-11S) 20' - 40' bgs	Tetrachloroethene	Not Installed	500	440
	1,1,1-trichloroethane	Not Installed	740	920
	Trichloroethene	Not Installed	480	520
	cis-1,2-dichloroethene	Not Installed	690	1500
	trans-1,2-dichloroethene	Not Installed	ND	ND
	1,1-dichloroethene	Not Installed	200	150
	1,1-dichloroethane	Not Installed	1100	1500
	1,2-dichloroethane	Not Installed	ND	ND
	chloroethane	Not Installed	140	290
	vinyl chloride	Not Installed	ND	ND

Table 2
Maximum Concentrations Detected in Groundwater
(Continued)

WELL	CONTAMINANT OF CONCERN	MAXIMUM CONCENTRATION (ppb) 1996 - 1999	MAXIMUM CONCENTRATION (ppb) 2000	MAXIMUM CONCENTRATION (ppb) 2001
Deep Bedrock Wells (MW-7D through MW-11D) 40' - 60' bgs	Tetrachloroethene	Not Installed	140	22
	1,1,1-trichloroethane	Not Installed	ND	15
	Trichloroethene	Not Installed	14	40
	cis-1,2-dichloroethene	Not Installed	66	140
	trans-1,2-dichloroethene	Not Installed	ND	ND
	1,1-dichloroethene	Not Installed	46	100
	1,1-dichloroethane	Not Installed	180	380
	1,2-dichloroethane	Not Installed	ND	ND
	chloroethane	Not Installed	ND	18
	vinyl chloride	Not Installed	ND	ND

Table 3
Pilot Test Results

WELL	CONTAMINANT OF CONCERN	Pre-Test Concentration (ppb)	Post-Test 1 (1 Month) Concentration (ppb)	Post-Test 2 (3 Month) Concentration (ppb)	Percent Change after 1 Month	Percent Change after 3 Months
MW-1	Tetrachloroethene	30	<5	<5	->80%	->80%
	1,1,1-trichloroethane	13	<5	<5	->62%	->62%
	Trichloroethene	52	<5	<5	->90%	->90%
	cis-1,2-dichloroethene	480	120	210	-75%	-56%
	1,1-dichloroethane	120	69	49	-42%	-59%
	chloroethane	<5	15	<5	--	--
	vinyl chloride	8	<5	<5	->38%	->38%
MW-2	Tetrachloroethene	41	79	39	(+93%)	-5%
	1,1,1-trichloroethane	110	48	140	-56%	(+27%)
	Trichloroethene	29	33	24	(+14%)	-17%
	cis-1,2-dichloroethene	3400	2900	2700	-15%	-20%
	1,1-dichloroethane	2200	1300	1600	-41%	-27%
	chloroethane	1300	2000	1400	(+54%)	(+8%)
	vinyl chloride	8	<5	<5	->38%	->38%
MW-8S	Tetrachloroethene	330	62	190	-81%	-42%
	1,1,1-trichloroethane	99	24	70	-76%	-19%
	Trichloroethene	28	10	45	-64%	(+62%)
	cis-1,2-dichloroethene	280	210	240	-25%	-14%
	1,1-dichloroethane	94	81	100	-14%	(+6%)
	chloroethane	<5	<5	<5	--	--
	vinyl chloride	<5	<5	<5	--	--

Table 3
Pilot Test Results
(Continued)

WELL	CONTAMINANT OF CONCERN	Pre-Test Concentration (ppb)	Post-Test 1 (1 Month) Concentration (ppb)	Post-Test 2 (3 Month) Concentration (ppb)	Percent Change after 1 Month	Percent Change after 3 Months
GP-2B	Tetrachloroethene	150	90	72	-40%	-52%
	1,1,1-trichloroethane	<5	<5	<5	--	--
	Trichloroethene	43	43	59	0%	(+37%)
	cis-1,2-dichloroethene	280	260	260	-11%	-11%
	1,1-dichloroethane	110	100	99	-9%	-10%
	chloroethane	<5	9	6	(+>80%)	(+>20%)
	vinyl chloride	6	8	7	(+33%)	(+17%)
GP-3	Tetrachloroethene	330	140	240	-58%	-27%
	1,1,1-trichloroethane	58	11	23	-81%	-60%
	Trichloroethene	48	52	55	(+8%)	(+15%)
	cis-1,2-dichloroethene	260	260	220	0%	-15%
	1,1-dichloroethane	120	110	97	-8%	-19%
	chloroethane	<5	5	<5	--	--
	vinyl chloride	5	7	<5	(+40%)	--

Table 4
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
Alternative 1: No Action	$0	$0	$0
Alternative 2: Excavation and Off-Site Disposal of Soil	$425,000	$0	$425,000
Alternative 3: Soil Vapor Extraction	$150,000	$100,000	$325,000
Alternative 4: Natural Attenuation for Groundwater	$10,000	$7,000	$80,000
Alternative 5: Groundwater Extraction and Treatment	$200,000	$90,000	$1,200,000
Alternative 6: In-Situ Chemical Oxidation	$50,000	$100,000	$350,000

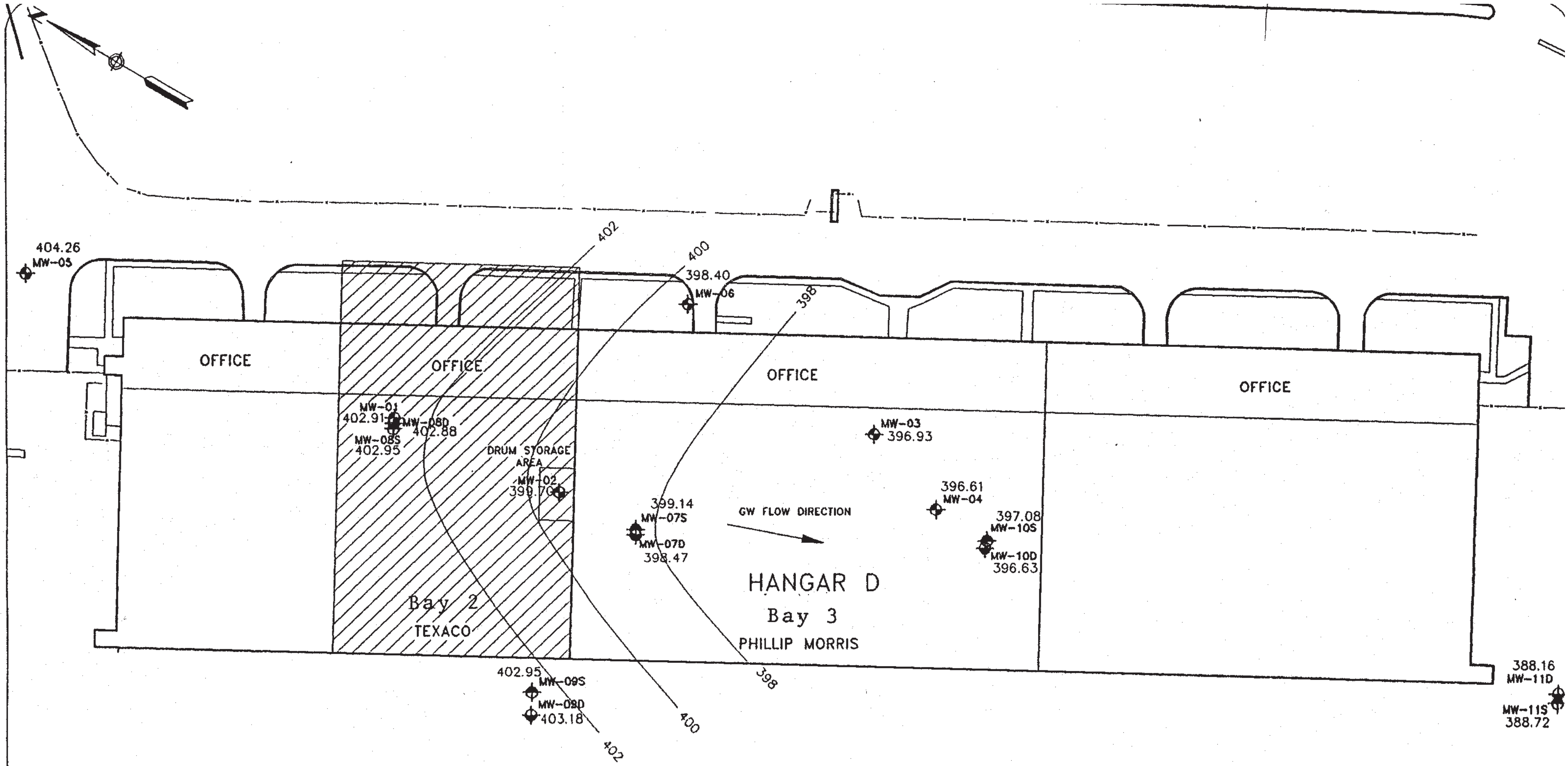
FIGURE 1

SITE LOCATION MAP

Texaco Hangar (Former Mobil Corporation)

Westchester County Airport

Site Number 360037



NOTES

1. ALL LOCATIONS & DIMENSIONS OF SITE FEATURES, PROPERTY LINES & SAMPLING LOCATIONS ARE APPROX.
2. BASE MAP PROVIDED ELECTRONICALLY FROM XDD, INC. IN FEBRUARY 2001.

LEGEND

MW-01 402.91 – OVERBURDEN MONITORING WELL, GROUNDWATER ELEVATION MEASURED IN WELL

MW-08S – SHALLOW BEDROCK MONITORING WELL

MW-08D – DEEP BEDROCK MONITORING WELL

398 — – GROUNDWATER COUNTOUR

EXTENT OF TEXACO HANGAR SITE

DES.BY: JWO	DR.BY: JWO	CK.BY: --

WESTCHESTER COUNTY AIRPORT
WHITE PLAINS, NY

REMEDIAL INVESTIGATION REPORT

FIGURE 2
SITE PLAN

SCALE: 1" = 80'	JOB NO.: 205265
DATE: JANUARY 2002	SHEET: Fig 2

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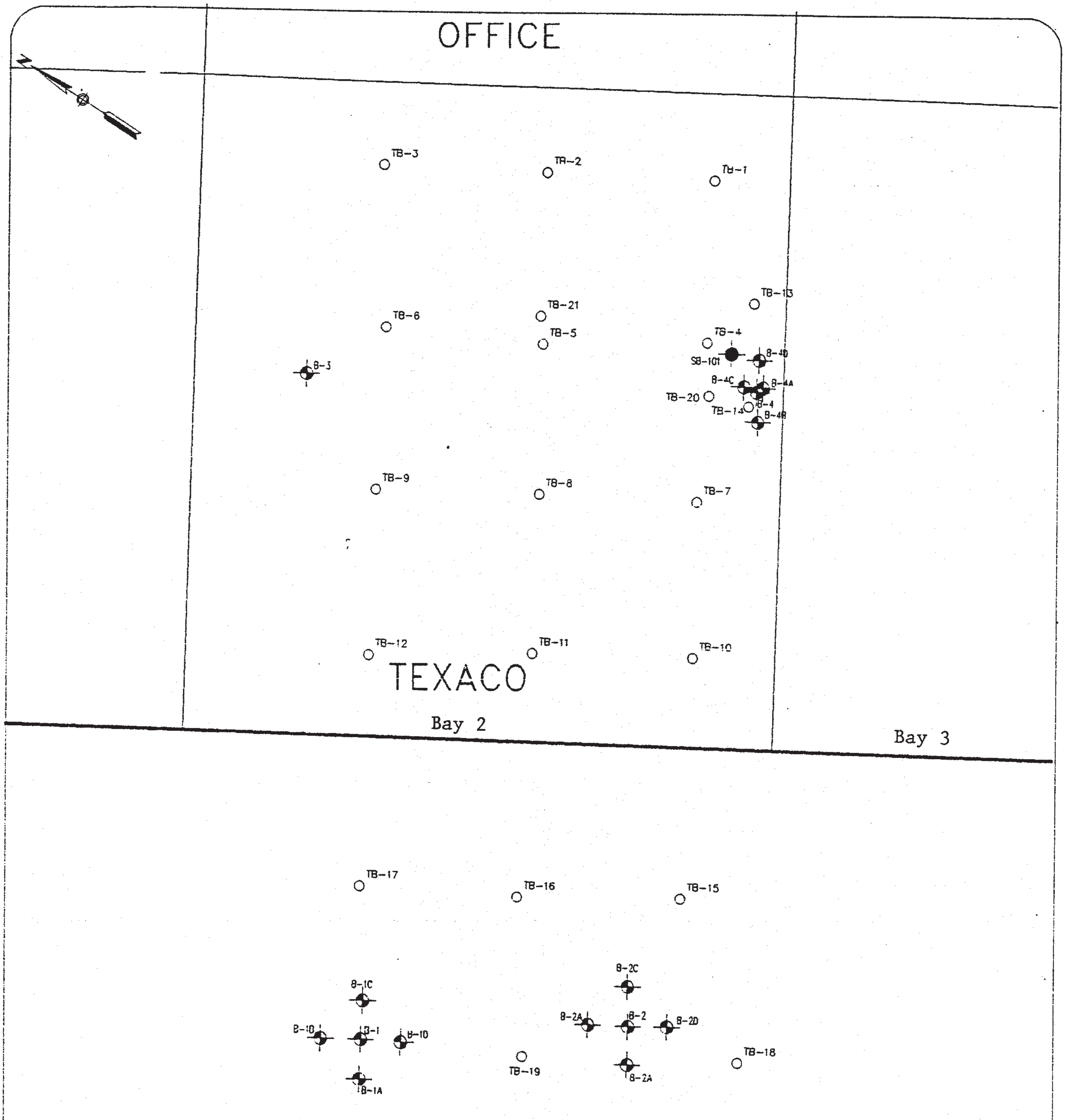

LEGEND

B-3 - SOIL BORING COMPLETED BY PILKO & ASSOCIATES AS PART OF PSA

TB-6 - SOIL BORINGS COMPLETED BY LBG AS PART OF PSA

SB-101 - SOIL BORING COMPLETED BY LBG AS PART OF RI

DES.BY: JWO	DR.BY: JWO	CK.BY: --

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

REMEDIAL INVESTIGATION REPORT

FIGURE 3

SOIL BORING LOCATIONS

SCALE: 1" = 30'	PROJECT NO: 205265	
DATE: DECEMBER 2001	FIGURE 1	RI FIGURE 2

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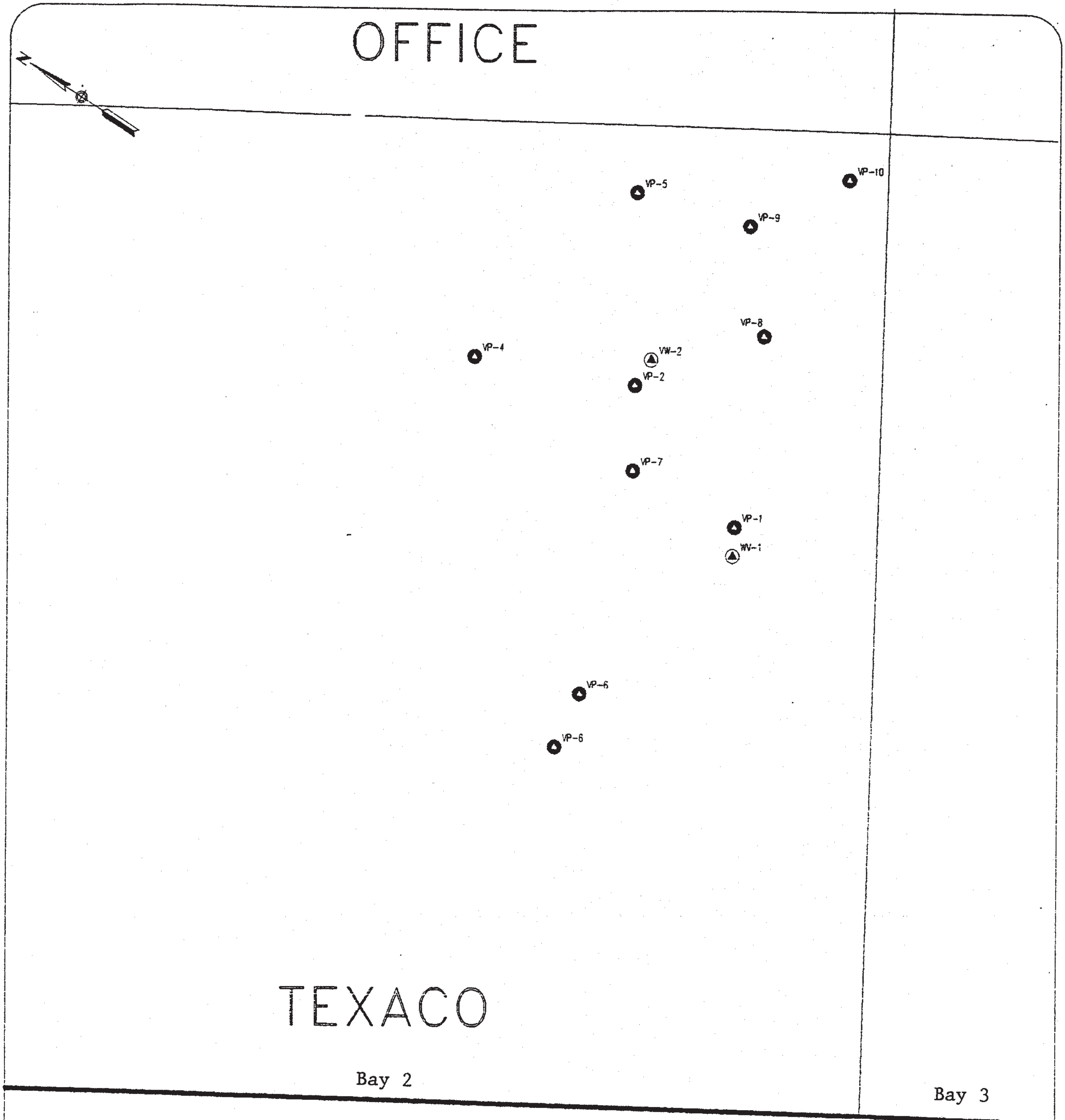

LEGEND

VW-2 – PERMANENT VAPOR WELL INSTALLED BY VAPEX

VP-2 – PERMANENT VAPOR SAMPLING POINT INSTALLED BY VAPEX

DES.BY: JWO	DR.BY: JWO	CK.BY: --

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

REMEDIAL INVESTIGATION REPORT

FIGURE 4

SOIL GAS SAMPLING LOCATION

SCALE: 1" = 20'	PROJECT NO: 205265	
DATE: DECEMBER 2001	FIGURE 1	RI FIGURE 2

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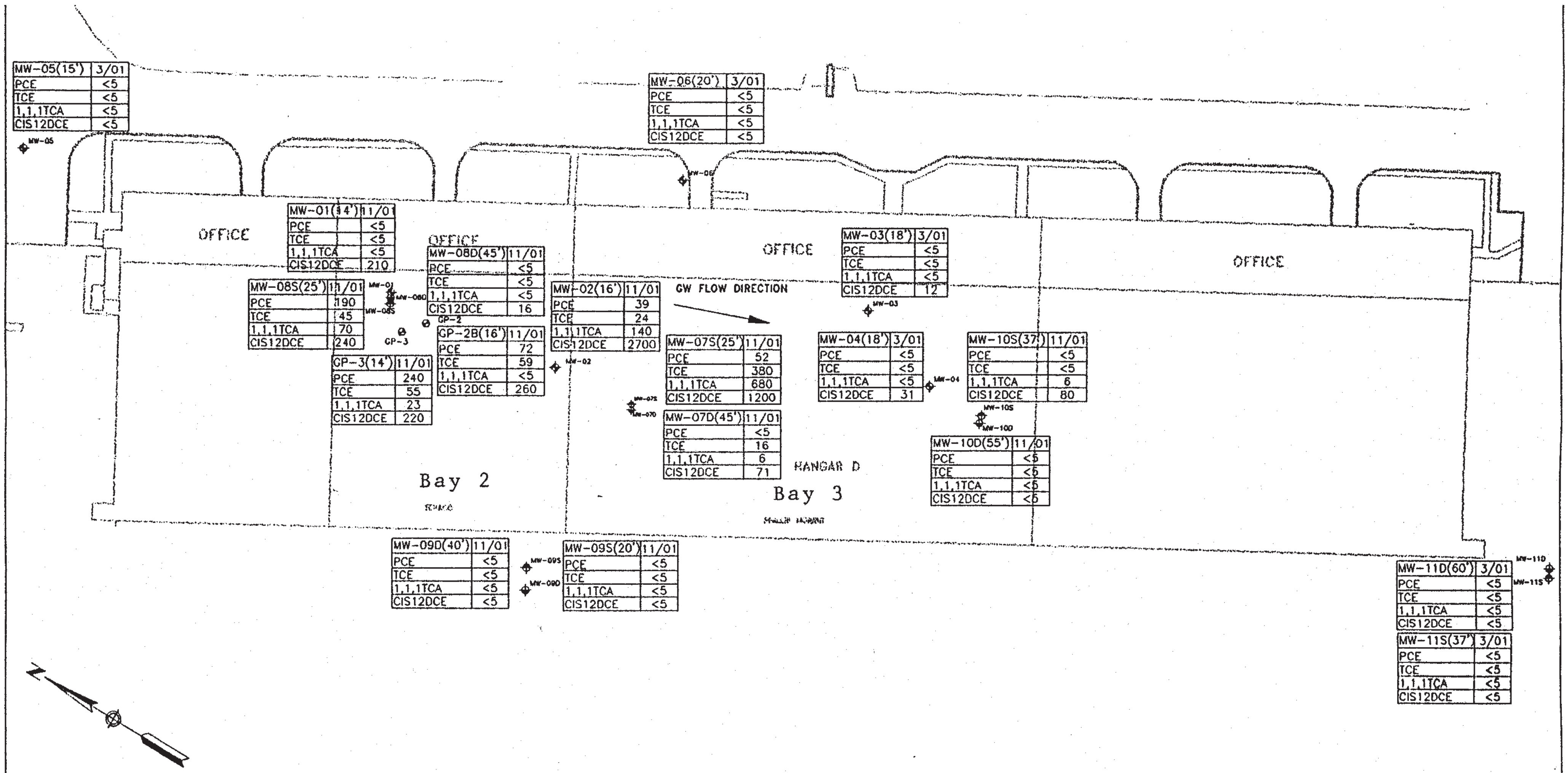

NOTES

1. ALL LOCATIONS & DIMENSIONS OF SITE FEATURES, PROPERTY LINES & SAMPLING LOCATIONS ARE APPROX.
2. BASE MAP PROVIDED ELECTRONICALLY FROM XDD, INC. IN FEBRUARY 2001.
3. REFER TO FIGURE 1-2 FOR ADDITIONAL NOTES AND LEGEND.
4. RESULTS FOR MONITORING WELLS MW-05, MW-06, MW-09s, MW-09d, MW-11S AND MW-11D HAVE NOT BEEN INCLUDED SINCE THE RESULTS ARE ALL BELOW THE METHOD DETECTION LIMIT FOR THE COMPOUNDS PRESENTED

LEGEND

WELL ID
S INDICATES SHALLOW BEDROCK WELL
D INDICATES DEEP BEDROCK WELL
NO LETTER INDICATES OVERBURDEN WELL

DEPTH TO BOTTOM OF BORING FROM GROUND SURFACE

DATE THE DATA COLLECTED IN 2001

MW-07S(25')	11/01	
PCE	52	TETRACHLOROETHENE CONCENTRATION IN PPB
TCE	380	TRICHLOROETHENE CONCENTRATION IN PPB
1,1,1TCA	680	1-1-1, TRICHLOROETHANE CONCENTRATION IN PPB
CIS12DCE	1200	CIS-1,2-DICHLOROETHENE CONCENTRATION IN PPB

DES.BY: JWO | DR.BY: JWO | CK.BY: MED

WESTCHESTER COUNTY AIRPORT
WHITE PLAINS, NY

REMEDIAL INVESTIGATION REPORT

FIGURE 5
GROUNDWATER RESULTS

SCALE: 1" = 50' | JOB NO.: 205265
DATE: JANUARY 2002 | SHEET: FIG 5

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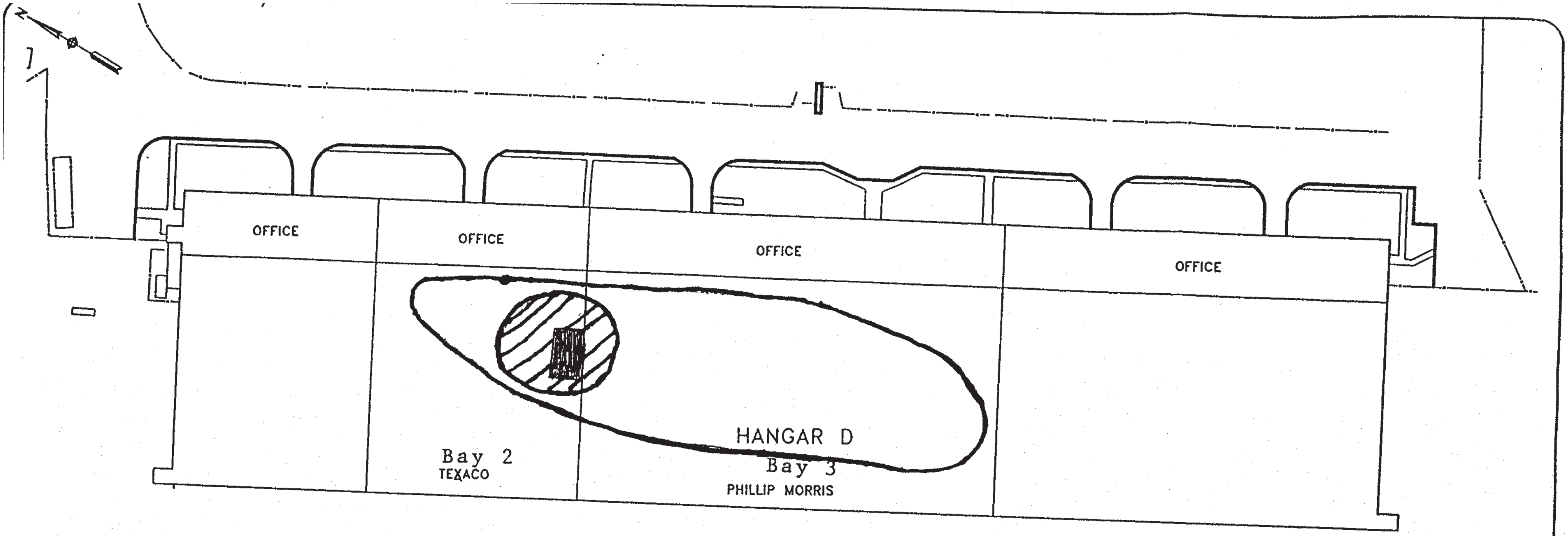

NOTES

1. ALL LOCATIONS & DIMENSIONS OF SITE FEATURES, PROPERTY LINES & SAMPLING LOCATIONS ARE APPROX.
2. BASE MAP PROVIDED ELECTRONICALLY FROM XDD, INC. IN FEBRUARY 2001.

LEGEND

- SOURCE AREA
- EXTENT OF SOIL IMPACTED AREA
- EXTENT OF GROUNDWATER IMPACTED AREA

DES.BY: JWO	DR.BY: JWO	CK.BY: MED
WESTCHESER COUNTY AIRPORT WHITE PLAINS, NY REMEDIAL INVESTIGATION REPORT FIGURE 6 SITE CONCEPTUAL MODEL		
SCALE: 1" = 60'	PROJECT NO: 205265	
DATE: NOVEMBER 2001	FIGURE 1	RI FIGURE 2

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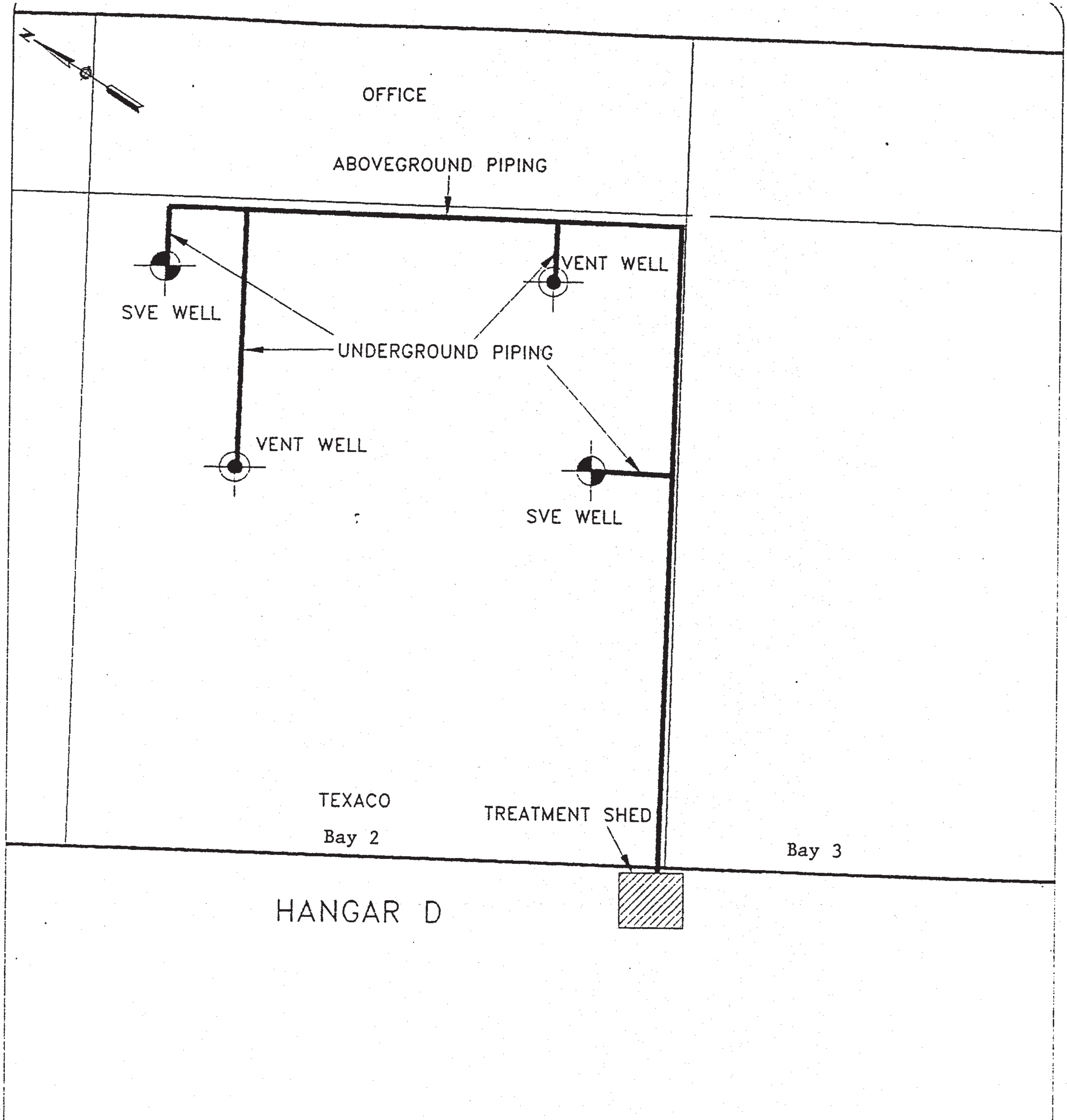

LEGEND

PROPOSED PIPING LEADING FROM WELLS TO TREATMENT SHED

PRELIMINARY SOIL VAPOR EXTRACTION WELL

PRELIMINARY SOIL VAPOR VENT WELL

NOTES

1. THIS FIGURE PRESENTS A DESIGN THAT IS CONSIDERED PRELIMINARY. IT WILL BE FINALIZED DURING REMEDIAL DESIGN STAGE. THE LAYOUT PRESENTED ON THIS FIGURE MAY CHANGE IN ANY WAY DUE TO SITE CONDITIONS OR DESIGN ISSUES IN THE FUTURE.

DES.BY: MED	DR.BY: JWO	CK.BY: MED

WESTCHESTER COUNTY AIRPORT
REMEDIAL INVESTIGATION REPORT

FIGURE 7
PRELIMINARY SVE CONCEPTUAL DESIGN

SCALE: 1"=30'	PROJECT NO: 205265
DATE: JANUARY 2002	FIG_6.DWG

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TYPICAL SVE SYSTEM

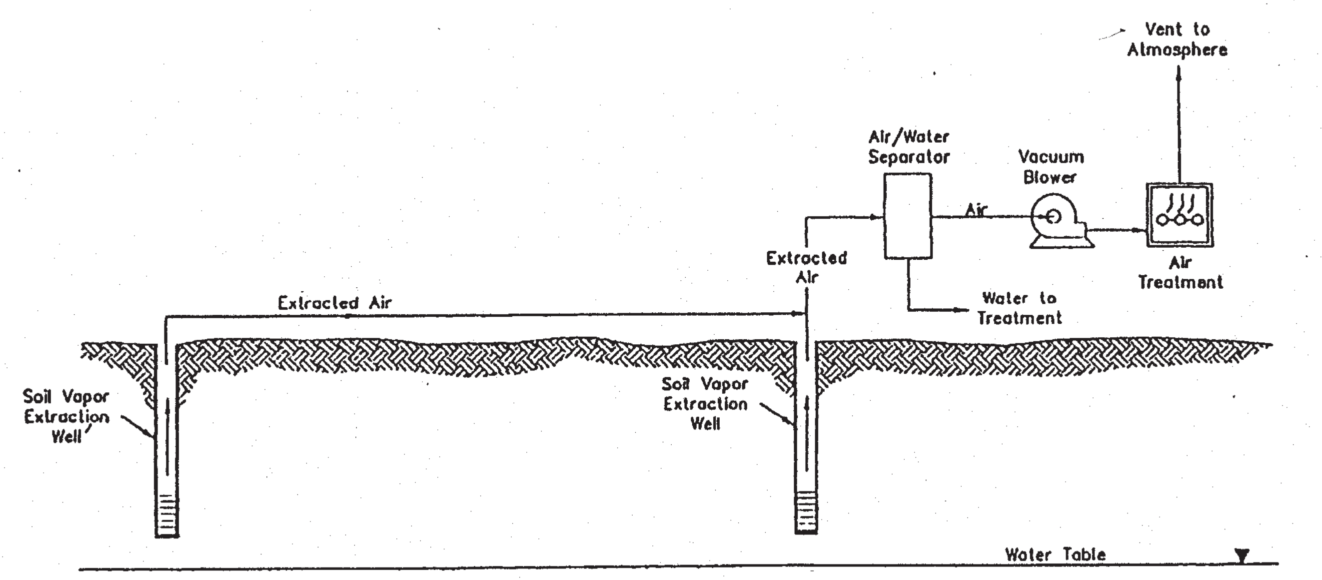
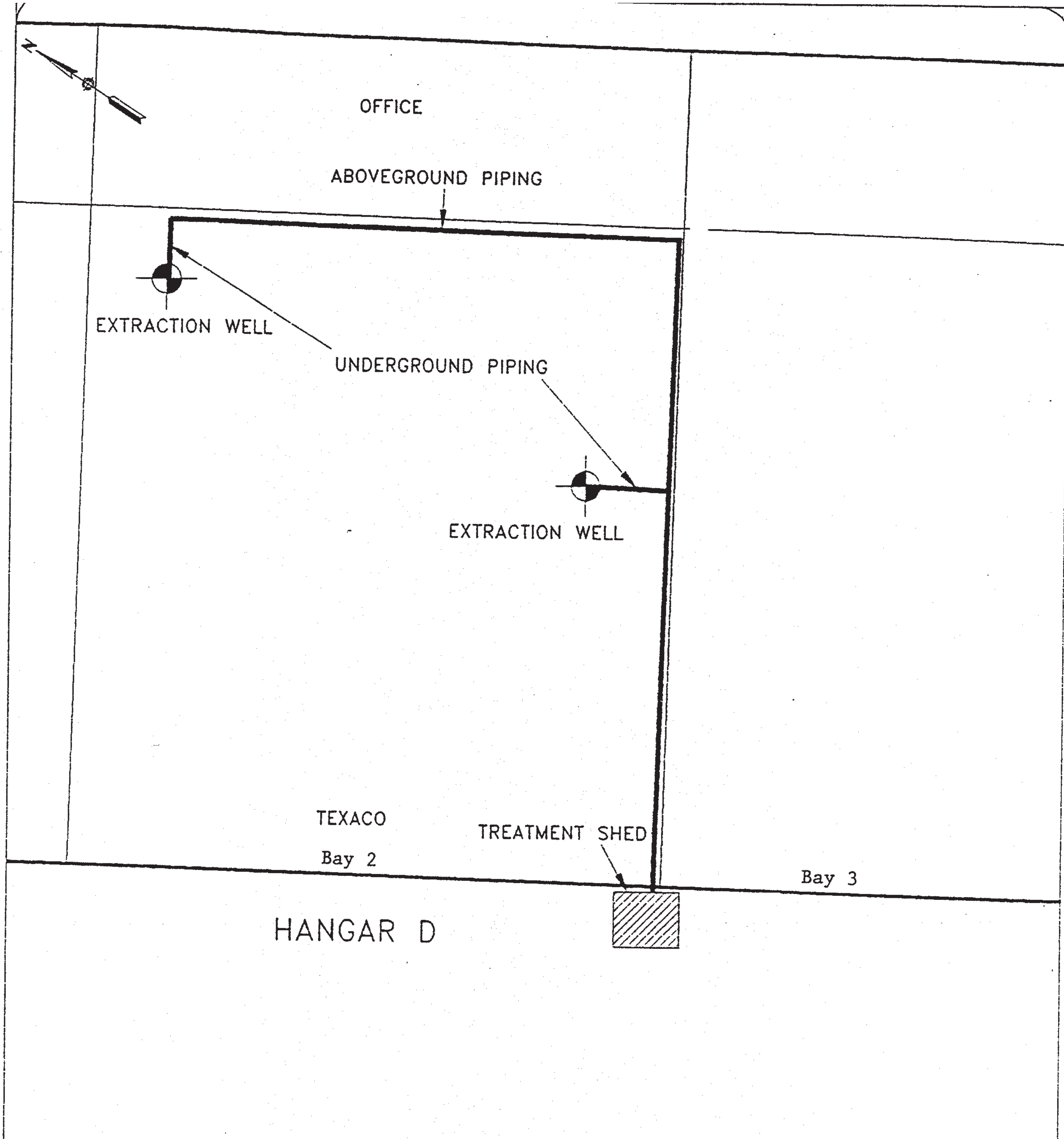


FIGURE 8 TYPICAL
SOIL VAPOR EXTRACTION SYSTEM



LEGEND

- PROPOSED PIPING LEADING FROM WELLS TO TREATMENT SHED
- PRELIMINARY GROUNDWATER EXTRACTION WELL

NOTES

1. THIS FIGURE PRESENTS A DESIGN THAT IS CONSIDERED PRELIMINARY. IT WILL BE FINALIZED DURING REMEDIAL DESIGN STAGE. THE LAYOUT PRESENTED ON THIS FIGURE MAY CHANGE IN ANY WAY DUE TO SITE CONDITIONS OR DESIGN ISSUES IN THE FUTURE.

DES.BY: MED	DR.BY: JWO	CK.BY: MED

WESTCHESTER COUNTY AIRPORT
REMEDIAL INVESTIGATION REPORT

FIGURE 9

PRELIMINARY GROUNDWATER PUMP AND TREAT CONCEPTUAL DESIGN

SCALE: 1"=30'	PROJECT NO: 205265
DATE: JANUARY 2002	FIG_8.DWG

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APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Texaco Hangar
Record of Decision
Town of Harrison, Westchester County
Site No. 360037

The Proposed Remedial Action Plan (PRAP) for the Texaco Hangar Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on February 14, 2002. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and groundwater at the Texaco Hangar Site. The preferred remedy is soil vapor extraction (SVE) for remediation of contaminated soils and chemical oxidation for remediation of contaminated groundwater.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on March 12, 2002 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. A written comment was received from Robert Porto.

The public comment period for the PRAP ended on March 22, 2002.

This Responsiveness Summary responds to all questions and comments raised at the March 12, 2002 public meeting and to the written comment received.

The following are the comments received at the public meeting, with the NYSDEC's responses:

<u>COMMENT 1</u>: In 1996, when the Texaco Hangar site became a Class 2 site, why wasn’t the proper notification given?

<u>RESPONSE 1</u>: The notice regarding listing of the Site as a Class 2 was erroneously sent to the County Clerk and the City of White Plains Clerk. The contact information has been corrected and changed to the Town of Harrison. Both the Town Clerk and the abutting property owners were notified of the availability of the PRAP in the February 2002 Fact Sheet.

<u>COMMENT 2</u>: Were the abutting property owners identified, including those in Connecticut, and advised of the PRAP?

<u>RESPONSE 2</u>: Yes. A Fact Sheet announcing availability of the PRAP and the public meeting was sent to abutting property owners, including those in Connecticut.

<u>COMMENT 3</u>: Has any investigation of Blind Brook been completed? Is Blind Brook monitored for contamination as it leaves the Airport? Is it tested for metals?

<u>RESPONSE 3</u>: Blind Brook is routinely sampled as part of the Airport wide sampling effort and is overseen by the Westchester County Department of Health. Chlorinated volatile organic compounds (CVOCs) are included in the list of chemicals that are analyzed. While no specific investigation of the Brook relative to the Texaco Hangar site was conducted, release of CVOCs from the site would have been detected in the Brook. No such release has been detected to date. The Brook is also tested for metals.

<u>COMMENT 4</u>: Where is the Blind Brook culvert in reference to the Texaco Hangar Site and the Fuel Farm? Where is the Site in relation to the Fuel Farm?

<u>RESPONSE 4</u>: Blind Brook flows in a southerly direction under the Fuel Farm in a 54 inch round concrete pipe and continues its flow under the parking lot adjacent to Hangar D. Blind Brook does not pass through the site. A drawing showing the location of the Brook culvert will be developed during the Remedial Design. The site is located directly south/southwest of the Fuel Farm, and at a distance of approximately 300 feet.

<u>COMMENT 5</u>: Were large cracks found in the bedrock that could act as a migration pathway?

<u>RESPONSE 5</u>: No preferential migration pathways in the bedrock were discovered during the RI.

<u>COMMENT 6</u>: What happens to the off gas of the SVE system? What monitoring will be performed to ensure there is no exposure to employees?

<u>RESPONSE 6</u>: The soil-gas extracted by the SVE system will be collected in a closed system and treated prior to discharge to the atmosphere in accordance with applicable state and federal regulations. Air monitoring, as required by the health and safety plan, will be conducted during construction and operation of the remedial system to minimize the potential for exposures to construction workers, employees and users of the hangar.

<u>COMMENT 7</u>: How long will there be disruption to the hangar and hangar operations? Does trenching have to be performed within the hangar? Can horizontal drilling be performed instead of trenching?

<u>RESPONSE 7:</u> There is expected to be minimal disruption to the hangar and hangar operations, with actual construction activities expecting to be no longer than 2 months for the installation of the SVE system. Once the system is installed, routine maintenance and monitoring will be conducted. The chemical oxidation activities will be confined to one section of the hangar, will be periodic, and will not disrupt continuous hangar operations. Trenching will have to be performed within the hangar in order to install utility piping for the SVE system. Trenching, which would be the most disruptive aspect of the construction, is expected to last no longer than 2 weeks. The possibility of horizontal drilling will be explored during the Remedial Design.

<u>COMMENT 8:</u> Why is the contaminated soil not being excavated and disposed of off site instead?

<u>RESPONSE 8</u>: The option of excavation of the soil source area was evaluated during the Feasibility Study. Excavation was not chosen as the final remedy due to the difficulty of implementation. Since the residual contamination in the bedrock after excavation would require treatment, no significant amount of time would be saved when compared to the selected remedy that combines SVE and chemical oxidation of contaminants in the saturated zone.

<u>COMMENT 9</u>: Why has it taken so long since the contamination was first detected for it to be cleaned up?

<u>RESPONSE 9</u>: The investigation of the site began with little information on the amount of waste released, the period over which the release occurred or the exact location of the release. Knowledge of the exact location of the release is critical for the cleanup of the soil above the groundwater table. In addition, contamination below the groundwater table requires the gathering of information including a site-specific flow pattern, soil stratigraphy, depth and nature of bedrock and concentration of the contamination in the groundwater. This information was gathered through the installation of monitoring wells. Additional data to evaluate the feasibility of potential remedial technologies were gathered concurrently with these investigations and as supplemental work.

This site, since it was a newly discovered site, required a preliminary site assessment to determine whether the site posed a significant threat to public health or the environment. The potentially responsible party (PRP), was requested to enter into an order on consent which serves as an enforcement instrument. The initial reluctance of the PRP to perform work that would hamper the operation or harm the economic viability of the facility

When the presence of 1,1,1-trichloroethane in the soil below the floor slab at the site was detected in 1990, the data was not sufficient to determine if the site could be placed on the Registry of Inactive Hazardous Waste Disposal Sites. Two specific periods of delay since then need special mention. The first lasted from 1990 to 1993 when the additional information required to evaluate the significance of the threat to public health and the environment was not forthcoming from the PRP, who was a different corporation than the current PRP due to a merger. The NYSDEC then placed the site on the Registry as a Class 2a, a temporary classification until the significance of threat could be determined.

The second period lasted from 1997 to 1999 when, because of the confined and static nature of the plume the PRP's consultant suggested that a natural bioremedial action is taking place and requested that a monitoring phase be permitted to verify this assumption. Periodic testing of groundwater quality did not support the assumption of natural bioremediation.

Considering the limited range of remedial alternatives in the early nineties, the poor efficiency of the groundwater extraction and treatment system frequently used then, and the need to search for a better alternative which involved a few more iterations of investigation, the project has followed a typical time frame barring the two significant delays described above.

COMMENT 10: Can we identify where the downgradient drinking water wells are located?

RESPONSE 10: The downgradient drinking water wells have been identified as being located in Connecticut, approximately 0.75 miles from the site. There are monitoring wells located between the Texaco Hangar site and the private wells. These monitoring wells are routinely sampled to ensure the contamination is not migrating to the private wells.

COMMENT 11: Can we control the migration of the chemical oxidant to ensure it will not go off site?

RESPONSE 11: Yes. The chemical oxidation process will be closely monitored to ensure the chemical oxidant does not travel off site. If the oxidant were traveling off site, pumping and other containment measures will be implemented to stop the migration.

COMMENT 12: What kind of institutional controls will be needed?

RESPONSE 12: The institutional controls refer to restrictions that will be placed on the use of groundwater at the site. Restrictions will be placed on the groundwater that limits its use as a potable or process water without necessary water quality treatment as determined by the Westchester County Department of Health.

A letter dated March 14, 2002 was received from Roberto Porto, which included the following comment:

COMMENT 13: It is extremely important to remove all of the contaminated soil because it is 3500 feet from his drinking water.

RESPONSE 13: The contaminated soil is not mobile, since it is confined to a small area and is covered by the concrete floor of the hangar. The SVE system will clean up the contaminated soil. The groundwater flow direction is not toward the Kensico Reservoir, which is his drinking water supply. Please see Response 8.

A copy of Mr. Porto's letter is attached to the Responsiveness Summary.

RECEIVED
MAR 18 2002

March 14, 2002

Gianna Aiezza
NYSDEC-DER
21 South Putt Corners Road
New Paltz, NY 12561-1696

Dear Ms Aiezza:

In Reference to the Remedial Action Plan at Texaco Hanger Site 3-60-037, I feel that it is extremely important to **remove all of the contaminated soil** because it is 3500 feet from my drinking water .

I am not trying to make things hard, and I appreciate your efforts in thoroughly cleaning up this rapidly growing mess.

This incident does however seem to serve as a stellar example of bureaucracy run amuck. The length of time & money spent without remediation is ridiculous. It is a great example of why expansion of the airport can not happen… It only takes one good spill to kill Rye Lake.

TheCorporations involved at Westchester County Airport must acknowledge and take responsibility for the airports close proximity to the water that I and my family drink & bath In.

Please respond so I know you received this letter.

Thank You,

Robert Porto
1 Allen Place
Harrison, NY 10528

APPENDIX B

Administrative Record

Administrative Record

TEXACO HANGAR
Record of Decision
Town of Harrison, Westchester County
Site No. 3-60-037

1. Order on Consent Index # W3-0740-95-11: In the Matter of the Development and Implementation of a Remedial Investigation/Feasibility Study for an Inactive Hazardous Waste Disposal Site, New York State Department of Environmental Conservation, March 1996

2. Work Plan for Remedial Investigation, Malcolm Pirnie, Inc, May 1996

3. Work Plan to Perform a Potassium Permanganate Pilot Study, Woodard & Curran, Inc, July 2001

4. Technical Memorandum - Results Summary In-Situ Chemical Oxidation Pilot Test, Woodard & Curran, Inc, December 2001

5. Remedial Investigation Report, Woodard & Curran, Inc, December 2001

6. Feasibility Study Report, Woodard & Curran, Inc, December 2001

7. Proposed Remedial Action Plan, New York State Department of Environmental Conservation, February 2002