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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: DEC 31 1987

SUBJECT: Record of Decision for the American Thermostat Site

FROM: Stephen D. Luftig, Director
Emergency and Remedial Response Division

TO: Christopher J. Daggett
Regional Administrator

Attached, pleased find the American Thermostat site Record of Decision (ROD) prepared by my staff.

The American Thermostat Corporation site is located in the Catskill Creek Valley in South Cairo, Greene County, New York. Water in the area is supplied by private wells; there is no nearby public water supply.

American Thermostat Corporation commenced operations at the Site in 1954. The operations consisted of the manufacturing of thermostats for small appliances. In 1981, the New York State Department of Environmental Conservation (NYSDEC) discovered employees of AT improperly disposing of chemicals at the Site. Preliminary investigations by NYSDEC and the New York State Department of Law in 1981 revealed that for a number of years AT employees had been pouring waste organic solvents down drains connected to the septic system and that waste solvents and sludges were dumped on the parking lot. Sample analysis of the discharge from two facility outfalls by the New York State Department of Health ("NYSDOH"), detected elevated levels of tetrachloroethylene ("PCE") and trichloroethylene ("TCE"). Subsequent potable water sampling of homes within a quarter of a mile from the site, conducted in 1981 by NYSDOH, indicated the presence of PCE and TCE in five residential wells (Rath, Rivenburg, Lais, Nesensohn, and Briggs) and at the AT facility. The concentrations of PCE ranged from 130 ppb to 47,000 ppb; TCE concentrations were much lower. The highest concentration of PCE was detected at the Rath's well, adjacent to the AT facility. The affected residents were advised by NYSDOH not to utilize their well water for drinking or cooking purposes.

On February 17, 1983, AT signed an Interim Consent Order with the State of New York which stated that AT must provide for the installation, monitoring, and maintenance of carbon filtration systems, and must also supply bottled water for cooking and drinking purposes to the five affected homes. Other provisions called for the monitoring of two groups of private wells in order to ensure prompt identification of additional potable water contamination, and for a limited remedial investigation to determine the nature and extent of surface and subsurface contamination.

DESCRIPTION OF SELECTED REMEDY

The remedial alternative presented in this document is the first operable unit of a permanent remedy for the American Thermostat Corporation site. It will provide a permanent and reliable solution for the prevention of health risks to area residents associated with exposure to contaminated groundwater. The alternative selected involves extension of the Catskill water supply pipeline to the affected and potentially affected area. The specific waterline route will be determined during the design phase. Service connections will be provided to all residents currently utilizing contaminated or potentially threatened wells.

The contaminant plume and source or sources of contamination will be addressed in a subsequent remedial investigation/ feasibility study and Record of Decision.

DECLARATIONS

Consistent with CERCLA as amended, and the NCP, I have determined that the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, and is cost-effective.

The selected remedy represents a permanent solution for a portion of the problem posed by the site--namely, the threat posed to area residents as a result of exposure to contaminated groundwater. The selected remedy does not satisfy the statutory preference for remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element. The reason for this is that such treatment options were not found to be practicable or appropriate for this operable unit. Such options, including possible methods of treating the contaminated groundwater, will be considered in the next operable unit.

The State of New York has been consulted and agrees with the selected remedy, as is documented in the attached letter of concurrence.

I have also determined that the selected remedial action for the American Thermostat Corporation site is appropriate when balanced against the availability of Superfund monies for use at other sites.

JANUARY 7, 1988
Date

Christopher J. Daggett
Regional Administrator

Signed ROD

Declaration for the Record of Decision

Site Name and Location

American Thermostat site, South Cairo, Greene County, New York

Statement of Basis and Purpose

This decision document presents the selected remedial action for the American Thermostat site, located in South Cairo, Greene County, New York, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

Assessment of the Site

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

Description of the Selected Remedy

This operable unit is the second of two operable units for the site. The first operable unit involved the establishment of an alternate water supply for the residences affected and potentially affected by the groundwater contamination at the site. This final operable unit addresses the source of the soil and groundwater contamination at the site, the contamination inside the building standing at the site, as well as the contamination in the groundwater in the entire contaminated plume emanating from the site. This action addresses the principal threats remaining at the site by treating the most highly contaminated soil and waste materials, by decontaminating the building at the site, and by treating the contaminated groundwater in the plume emanating from the site. Treatment residuals will be disposed of off-site and treated soils that will be redeposited on-site will contain contaminants well below health-based levels, so that the site will not require any long-term management. Treatment of the groundwater will require a comprehensive management and maintenance program to ensure the effectiveness of the treatment and reinjection system throughout the treatment period which is estimated at 30 years.

The major components of the selected remedy include the following:

- Excavation and treatment, via on-site low temperature enhanced volatilization, of approximately 7,000 cubic yards of contaminated soil;
- Placement of the treated soils into the excavated areas;
- Extraction and treatment, via air-stripping and carbon adsorption, of the groundwater in the contaminated plume emanating from the site and reinjection to recharge the treated water into the ground. The combined volume of the contaminated groundwater in the bedrock and shallow aquifers is estimated to be 16,000,000 gallons;
- Decontamination of the on-site building via vacuuming, dusting and wiping of the contaminated surfaces and off-site treatment/disposal of the collected hazardous dust; removal and off-site treatment/disposal of 18 waste oil drums contaminated with hazardous materials stored in the building; and, removal and off-site treatment/disposal of sludges from drain pits inside the building; and
- Disposal of the treatment residuals at an off-site Resource Conservation and Recovery Act (RCRA) hazardous waste facility.

Declaration of Statutory Determinations

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

Regional Administrator

6/29/90
Date

DECISION SUMMARY

AMERICAN THERMOSTAT SITE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

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ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

The American Thermostat (AT) site is located in a rural residential area in the hamlet of South Cairo, the Town of Catskill, Green County, New York. The AT site is approximately 30 miles southwest of Albany, New York and 5 miles west of the Village of Catskill, New York.

The AT site, approximately 8 acres in area, is bordered on the north and south by Route 23 B and Route 23, respectively (see figure 1). A residential property (formerly Rath, now Hook) borders the site on the west and a property owned by the State of New York borders the site on the east. The site is not fenced. Access to the AT site is from Route 23 B.

A detailed site plan depicting existing AT site features is shown in Figure 1. As shown, the existing structure includes the former plant building, approximately 66,630 square feet in area. Additional structures include a pumphouse, located to the south of the plant and utility construction material storage sheds, located to the northeast and immediately west of the plant. The two structures shown within the vicinity of the pumphouse are temporary wooden sheds constructed to house air stripping equipment. The air stripping units were installed by the Environmental Protection Agency (EPA) as part of an ongoing emergency remedial response action initiated at the AT site in 1985.

Subsurface structures include three underground sanitary waste disposal systems, two coolant water disposal discharge lines and a roof drain. All known subsurface structures are shown in Figure 2. The area within the AT site vicinity is rural-residential in character. The surrounding area is sparsely developed by residences and vacation homes. The remaining tracts of land are vacant or are utilized for agricultural purposes. The American Thermostat Corporation is the only manufacturing property in the area. In addition, there are several small businesses, including restaurants and motels within the immediate site vicinity. All of the residences and businesses within the immediate vicinity of the AT site rely on groundwater for water supply.

South Cairo is primarily a residential community with approximately 5,500 people residing within a 3-mile radius of the site. It is estimated that approximately 250 persons reside within the immediate site vicinity. The population is primarily composed of elderly and retired persons who occupy their residences year round. Several residences within the immediate site vicinity are maintained as vacation homes and are occupied only during the summer months.

The topography within the vicinity of the AT site may be characterized as gently rolling foothills of the Catskill Mountains which are deeply incised by stream channels. The AT site is located on a slight ridge overlooking the Catskill Creek Valley. On-site ground surface elevations are relatively uniform but fall quickly to the Catskill Creek to the north and to two small tributaries on the east and west. Surface drainage follows the ground surface elevation with drainage from the site to the east, west and north. Catskill Creek, located within a quarter mile north of the site, is classified as a trout stream and therefore has considerable recreation value. Catskill Creek is also an auxiliary water supply for the Village of Catskill.

SITE HISTORY

From 1954 to 1985, the primary activity at the site was the assembly of thermostats for small appliances. In the plant operations, a series of chemicals including machine oils, lubricants and organic solvents such as tetrachloroethene (PCE) and trichloroethene (TCE) were used within the manufacturing process to operate and clean the plant machinery. During the 1960s and 1970s, waste PCE and TCE sludges were poured down drains inside the building septic systems and dumped outside on the plant ground for dust control. In March 1981, two AT employees were observed dumping solvents on plant property. This led to investigations into the company's waste handling practices by NYSDEC and the New York State Attorney General's Office.

During April and May 1981, water samples were collected from several residential wells in the vicinity of the AT site by the New York State Department of Health (NYSDOH). Analysis of the water samples indicated the presence of TCE and PCE in five wells. The affected residents were advised by NYSDOH not to use their water for cooking or drinking purposes. Several law suits were filed by the plant's neighbors in late 1981.

Because of high levels of PCE in several nearby wells, AT began supplying bottled water to local residents in April 1982. By November 1982, AT had installed carbon filters on its own well and the five affected wells. The nearest neighbors, the Raths, were connected to AT's water system.

In February 1983, New York State entered into an interim consent order with AT and Amro Realty Corporation (property owner) in which the companies agreed to clean up the site and its surroundings, to supply bottled water to the five affected residences for cooking and drinking purposes and to install, monitor and maintain carbon filter systems for these residences. The order also stipulated that two groups of bordering private wells had to be monitored to determine whether any contamination had spread beyond the original affected area.

In May 1985, AT ceased operations. Since June 1985, EPA and the State of New York have been sampling wells in the area and have been monitoring and maintaining the previously installed carbon filtration units. In addition, EPA installed two new carbons units on contaminated private wells and installed air stripping systems on two highly contaminated wells.

In April 1986, NYSDEC requested that EPA assume the responsibility for the operation and maintenance costs of the carbon filters that had been previously installed. EPA has also installed and operated airlift stripping systems at two existing wells. The stripping systems have treated, to date, over 7 million gallons of contaminated groundwater. PCE concentrations have been reduced, in the Rath well, from a high of 131,000 to 25,000 parts per billion (ppb) and, in the AT well, from 3,200 to 400 ppb.

A Focused Feasibility Study (FFS) for Alternate Water Supply was issued in November 1987 as the first operable unit for the AT site. The purpose of the FFS was to develop, screen and evaluate various alternatives for an alternate water supply system for the affected area and potentially affected residences at the AT site.

In January 1988, a Record of Decision (ROD) was signed, selecting the extension of the Village of Catskill's water supply to the affected and potentially affected residences.

Following the signing of the ROD, the Village of Catskill questioned the ability of its water system to handle the additional demand associated with adding the affected and potentially affected residences to the system. In response, EPA prepared a technical assessment of the Village of Catskill's water supply system. The assessment, which was finalized in June 1988, indicated that the Village's water supply had sufficient capacity to accommodate the demand associated with including the affected and potentially affected residences. Further work on the alternate water supply selected in the ROD was suspended while negotiations between EPA and the Village of Catskill continued. Recent meetings, from February to May 1990, between EPA, NYSDEC, NYSDOH, and the Town and the Village of Catskill have resulted in the resolution of the major issues regarding the alternate water supply. As a result, EPA intends to initiate the design of the alternate water supply this summer.

In January 1988, EPA initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of the contamination at and emanating from the AT site, and to evaluate remedial alternatives.

ENFORCEMENT ACTIVITIES

Four potentially responsible parties (PRPs) have been identified in connection with the AT site: Amro; AT; Mr. Harry Moskowitz and Mr. David Moskowitz. Amro is the owner of the property on which the AT facility is located. AT was the company which operated the manufacturing facility at the site. Harry Moskowitz was the president of the now bankrupt AT; he is also the president of Amro. David Moskowitz is the president of AT, and was formerly the vice president and executive vice president of AT.

EPA filed a proof of claim on December 12, 1986, in the bankruptcy proceeding of AT, seeking recovery of costs incurred at the site. In addition, on October 30, 1987, the United States commenced a civil action against Amro, Harry Moskowitz and David Moskowitz pursuant to Section 107 of CERCLA for recovery of EPA's costs at the site. EPA has also sent several notice letters to the PRPs offering them the opportunity to agree to conduct or finance various response actions at the site. To date, none of the PRPs have offered to undertake or finance such activities.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS Report and the Proposed Plan for the AT site were released to the public for comment on May 11, 1990. These two documents were made available to the public in both the administrative record and an information repository maintained at the EPA Docket Room in Region II, and at the Town of Catskill Offices, Cairo Town Hall, Village of Catskill offices and at the New York State Department of Environmental Conservation in Albany, New York. A public comment period on these documents was held from May 11, 1990 to June 11, 1990. In addition, a public meeting was held on May 23, 1990. At this meeting, representatives from EPA, NYSDEC and NYSDOH answered questions about problems at the site and the remedial alternatives under consideration. Responses to the comments received during the public comment period are included in the Responsiveness Summary, which is part of this ROD.

SCOPE AND ROLE OF RESPONSE ACTION

EPA has organized the work into two operable units (OUs):

- OU One: Alternate water supply
- OU Two: Contamination in soil, sediments, groundwater, surface water and building.

EPA has already selected a remedy for OU one (January 7, 1988, ROD). Since the contaminated groundwater is a principal threat to the residents in the vicinity of the site because of the direct ingestion of drinking water from wells that contain contaminants above health-based levels and because of the anticipated length of groundwater remediation, an alternate source of clean water has to be provided to the area residents. That remedy consists of the extension of an existing nearby water supply system (Village of Catskill water supply) to the affected and potentially affected residences in the vicinity of the site. Approximately 43 residences would be served by the alternate water supply. Implementation of this remedy has been delayed due to on-going negotiations with the owner of the water supply. Several meetings, from February to May 1990, between EPA, NYSDEC, NYSDOH and the Town and the Village of Catskill have resulted in the resolution of the major issues regarding the alternate water supply. The Town and the Village of Catskill passed resolutions on May 1 and May 8, 1990, respectively, agreeing in principal to implement the remedy. The design of the alternate water supply is anticipated to begin in the summer of 1990.

This ROD sets forth the following remedy for the second OU:

1. The contaminated soils in the southwestern portion of the site. This area of the site poses the principal threat to human health and the environment because of the risks from possible ingestion or dermal contact with the soils. Also, the treatment of soils to remove the mobile volatile organic contamination will result in the elimination of a long-term source of contamination of the groundwater, that is a source of drinking water for the local residents. Cleanup of the soils will also mitigate the risks to public health and the environment associated with the migration of the soil contaminants off-site via surface water run-off.

2. The contaminated groundwater throughout the contaminated aquifer. The contaminated groundwater poses a principal threat to human health and the environment because of ingestion of drinking water from contaminated wells in the area. Extraction and treatment of the contaminated groundwater will contain the migration of the contaminated plume and in time will achieve federal and state groundwater quality standards for the volatile organic contaminants by providing the required contaminant removal during treatment utilizing air stripping and carbon adsorption.

3. The contaminated surface water in the pond in the residential property adjacent to the site. The pond water will be treated along with the contaminated groundwater to meet federal and state standards.

4. The contaminated sediments in the bottom of the pond in the residential property adjacent to the site. These sediments will be treated along with the contaminated soils on-site.

5. The contamination in the AT building. So that the building can be utilized in the future, hazardous dust will be removed from contaminated surfaces and all hazardous waste materials stored in drums and drainage pits in the building will be transported off-site, treated and disposed.

The purpose of this response is to prevent current or future exposure to the contaminated soils, sediments and surface water, to ensure protection of the groundwater and surface water from the continued release of contaminants from soil, to decontaminate the AT building for future use and to restore the groundwater to levels consistent with state and federal water quality standards. This will be the final response action for this site.

SUMMARY OF SITE CHARACTERISTICS

The AT facility was constructed by the AT Corporation for the assembly of thermostats for small appliances. Site development began in 1954 and the plant was in continuous operation until its closure in 1985.

During plant operations, a series of chemicals were used within the manufacturing process to operate and clean the plant machinery. The chemicals known to be used were machine oils, lubricants and organic solvents including TCE and PCE.

During the 1960s and 1970s, waste TCE and PCE sludges were poured down the drains inside the building and dumped outside on the plant grounds for dust control. The drains were connected to the septic systems, shown in Figure 2, which discharged directly to a tributary of Catskill Creek.

The primary contaminants of concern (including volatile organic compounds used as solvents and degreasers for parts and equipment in the thermostat assembly process) are associated with the previous assembly process and waste handling practices at the AT site. Therefore, these activities are believed to be the source of contamination of the soil, surface water and groundwater at the site.

Soil

The soils investigation included the analysis of 22 surface soil samples obtained from the AT plant grounds and the adjoining residential property. An analytical summary is presented in Table 1.

Based on the analytical results, the extent of surface soil contamination is limited to on-site locations coincident with the reported dump area in the southwestern corner of the site property as shown in Figure 3. In addition to the surface soil samples, 22 subsurface soil samples were obtained from building foundation borings completed beneath the AT plant structure and from unconsolidated monitoring wells installed on the AT site and within the project study area. These locations are shown on Figures 3 and 4. An analytical summary is presented in Tables 2 through 4.

Volatile organics (TCE, PCE, 1,2-DCE and vinyl chloride) constituted the primary contaminants. Low levels of base/neutral extractables polynucleararomatic hydrocarbons (PAHs), pesticides, PCBs and toxic metals (lead and cadmium,) were also detected in the soil samples obtained from beneath the existing structure. The extent of soil contamination beneath the AT plant structure is limited to the southern portion of the building, corresponding to boring BF-04, as shown in Figure 3. Volatile organic, base/neutral extractable and toxic metal compounds were detected in the subsurface soil samples obtained from on-site well boring locations. Volatile organic and toxic metal compounds were detected in the subsurface soil samples obtained from the adjacent properties. PAH, pesticides and PCB compounds were not detected in any well boring samples. The nature and extent of surface soil contamination is directly attributed to the waste handling practices utilized at the AT facility except with respect to metal compounds which are attributed to background levels.

The extent of subsurface soil contamination is primarily limited to the southern portion of the site, coincident with the surface contamination and reported dump area. The extent of contaminated surface and subsurface soils in this area is estimated at 26,000 square feet to a depth of 7 feet (approximately 6,740 cubic yards) as shown in Figure 3. In this area, the detected PCE concentration in the soil exceeds 1.0 milligrams per kilogram (mg/kg). This area is considered to be the primary site source for contaminant migration into both surface water and groundwater.

Groundwater

Groundwater samples were obtained from both the unconsolidated and bedrock aquifers. The findings of the groundwater investigation indicate that both aquifers are contaminated mainly with volatile organic compounds. The well locations and the extent of the volatile organic contamination of the unconsolidated and bedrock aquifers are shown in Figures 5 and 6, respectively. Analytical summaries are presented in Tables 5 and 6. A total of eight samples were obtained from the unconsolidated aquifer and 33 samples were obtained from the bedrock aquifer, which included samples from the bedrock monitoring wells and from residential wells, designated as R-X in the figures and tables.

Within the bedrock aquifer, the extent of contamination is controlled by groundwater flow through the fractured bedrock. The volatile organic contamination within the bedrock aquifer is significant with respect to federal and state maximum contaminant levels (MCLs). The volatile organic contamination plume extends approximately 53 acres from the AT site with unknown depth, in a general northwesterly direction as shown in Figure 6. The maximum detected bedrock PCE concentration of 31,000 micrograms per liter (ug/l) was found in a residential well (R-14) adjacent to the site.

In the case of the unconsolidated aquifer, the contaminant plume extends approximately 26 acres in a general northwesterly direction, as shown in Figure 5. Within the contaminant plume, the entire unconsolidated aquifer (average 50-foot depth), is contaminated with PCE exceeding 5 ug/l (MCL). The volume of the contaminated plume in the unconsolidated aquifer is estimated at 1.72 x 10^8 gallons. The maximum detected PCE concentration in the unconsolidated aquifer of 24,000 ug/l was found in the on-site well established at BF-04.

The volatile organic compounds detected in the groundwater sample analyses are attributed to the former waste handling practices at the AT facility. As with the soil media investigated, the presence of toxic metal compounds in the groundwater is attributed to natural background levels. Elevated levels of toxic metal compounds were detected in the bedrock aquifer at the residential well (location R-14) adjacent to the site, as shown in Table 5. This anomaly in the data cannot be explained based on the current available data. It is possible that a suspension of fine particles from the soil into the water sample occurred during the purging of the well, and metals from the soil entered the liquid phase during preparation of the samples for analysis. Supplemental soil sampling around the old leaching cesspool area during the remedial design phase will be performed to define the source of heavy metals contamination.

Surface Water and Sediment

Surface water samples were analyzed from both on-site and off-site locations (Figure 7). All of the on-site surface water samples obtained were contaminated with volatile organics (TCE, PCE and 1,2-DCE). These sample locations include the swale south of the AT plant (SW-8), the leach field discharge pipe south of the AT plant (SW-26), the leach field drain pit east of the plant (SW-30), the leach field overflow east of the AT plant (SW-29) and the abandoned coolant water discharge swale (SW-28). The maximum total volatile organic concentrations (VOC) were detected in on-site samples obtained at location SW-8 (VOC = 48,800 ppb) and SW-26 (VOC = 1,700 ppb) as shown on Figure 7.

Off-site, the surface water was contaminated with volatile organic (TCE, PCE and 1,2-DCE) and toxic metal compounds including zinc, chromium and lead. The toxic metal compounds are attributed to background levels derived from area soils. Volatile organic contamination was found in both upgradient and downgradient surface water samples obtained in Tributaries A (SW-18 and SW-6) and B (SW-19 and SW-7) and in the pond in the residential property adjacent to the site (SW-20, SE-21). Volatile organic contamination was not detected in the Catskill Creek (SW-2, SW-3 and SW-5) or in springs flowing from the subsurface downgradient from the site (SW-24, SW-25).

Base/neutral extractable compounds, primarily phthalates, were detected in only one surface water sample obtained from a leach field overflow east of the site (SW-27). The leach field is operated by the National Guard armory located southeast of the site, and the leach field overflow discharges directly into Tributary A. The concentrations of these detected compounds are not considered hazardous based on the risk assessment.

Volatile organic compounds were detected in the sediment samples obtained from upgradient and downgradient locations in Tributary B (SW-7 VOC = 20 ppb and SW-2 VOC = 91 ppb) and from the downgradient location in Tributary A (SD-3 VOC = 70 ppb). Volatile organic contamination was detected in the sediment sample obtained from the pond location adjacent to the site (SD-8 VOC = 600 ppb).

Surface water and sediment analytical summaries are presented in Tables 7 through 9. Based on the above sample analytical results, significant surface water and sediment volatile organic contamination is limited to the stretch of Tributary B from the site to Route 23B and to the Rath pond adjacent to the site. The volume of water in the Rath pond is estimated at approximately 10,000 gallons.

Building

The building investigation included the analysis of eight samples obtained from building surfaces, five sludge samples obtained from interior building drain pits and eight waste liquid samples obtained from the existing 55-gallons drums stored inside the building. Sample locations are shown in Figure 8.

The building floor surfaces, totaling 66,630 square feet, were contaminated with 9 base/neutral extractable compounds, two pesticides, one PCB compound and toxic metals. The 8 dust wipe samples represent data which indicated that the compounds were present, although the precise amounts of the compounds present were not determined. The base/neutral extractable compounds detected include phenol, benzoic acid, dimethyl phthalate, diethylphthalate, di-n-butyl-phthalate, fluroanthrene, butyl benzylphthalate, bis (2-ethyl-hexyl) phthalate and di-n-octyl phthalate. Pesticides detected in the dust wipe samples included 4,4'-DDT and chlorodane. Arochlor 1245, a PCB compound, was detected in the dust wipe samples. The toxic metals detected in the dust samples included arsenic, cadmium, chromium, lead and mercury. On the basis of this data, it is not possible to delineate specific source areas within the building; therefore, floor decontamination would be required throughout the building prior to any reuse of the building.

Interior building drain pit sludges were contaminated with volatile organic compounds, including TCE, PCE and 1,2-DCE, as well as base/neutral extractables, pesticides, polychlorinated byphenyls (PCBs) and toxic metal compounds including arsenic, cadmium, chromium, lead and mercury. The quantity of sludge at the AT site is estimated to be less than 5 cubic yards, and is limited to the 3 identified drain pits located in the existing AT plant structure.

A total of 18 55-gallon steel drums of waste generated from AT's operations are currently stored within the AT plant (Figure 8). The materials contained within these drums are not considered hazardous based on federal standards, and on the New York State Identification and Listing of Hazardous Wastes, 6 NYSDEC Part 371. Eight drum samples were contaminated primarily with waste oil and grease. TCE was detected in two of the drum samples (DR-004 and 005). One base/neutral extractable and one pesticide compound were detected in one drum sample (DR-003A). Analytical summaries of the existing facilities sampling data for the sludge and drum samples are presented in Tables 10 and 11.

SUMMARY OF SITE RISKS

The baseline public health evaluation in the RI report evaluated 11 exposure pathways to define cumulative risks from carcinogenic and noncarcinogenic chemicals detected during the AT site field investigation. Six risk evaluation scenarios assumed current uses, including: 1) ingestion of treated residential well water; 2) ingestion of untreated residential groundwater; 3) inhalation of volatilized organics while showering (treated and untreated groundwater); 4) direct contact with on-site soils (assuming young adult receptors); 5) inhalation of volatilized organics from on-site surface soils (children) and 6) direct contact with on-site and off-site surface water and sediments. Five scenarios were evaluated for future risks' assuming industrial development of the AT site. These included: 1) ingestion of on-site groundwater; 2) ingestion of off-site groundwater; 3) inhalation of volatilized organics while showering (on-site and off-site groundwater); 4) direct contact with on-site soils (assuming adult worker receptors); and 5) inhalation of volatilized organics from on-site surface soils (adults). Potential risks associated with future surface water and sediment exposures were assumed to be the same as for current use.

CONTAMINANT IDENTIFICATION

The risk assessment for the AT site has identified 13 contaminants of concern. These include three non-carcinogenic and ten carcinogenic compounds. These compounds or elements were selected because of their highly toxic effects, frequency of detection, potentially critical exposure pathways and higher concentrations present in comparison to other contaminants. The indicator chemicals (contaminants of concern) selected for each exposure pathways are summarized in Table 12.

Seven volatile organic compounds were selected as indicator chemicals for the groundwater pathways. TCE and PCE are the primary contaminants in groundwater exhibiting high concentrations and high frequencies of detection and are known carcinogens. The remaining VOCs were selected on the basis of their toxic effects and/or elevated frequencies of detection. N-nitrosodiphenylamine was selected as an indicator chemical on the basis of its elevated frequency and the fact that it is a potential human carcinogen. Finally, the four inorganics were selected as indicators because of their elevated frequencies of detection in groundwater and because in many instances their concentrations exceeded federal and state standards.

For surface water, three VOCs were selected as indicator chemicals (PCE, TCE and vinyl chloride) on the basis of their high frequency of detection and the fact that the majority of the detected concentrations exceeded the ambient water quality criteria (AWQC) for fish (ingestion) and drinking water.

The indicator chemicals selected for the sediments included the three VOCs selected for surface water and one metal compound (lead). Lead was chosen as a noncarcinogenic indicator because of its relatively high concentrations.

For the surface and subsurface soils, two VOCs (TCE, and PCE) one semi-volatile (bis (2-ethylhexyl) phthalate) and one metal (lead) were chosen as indicator chemicals. The VOCs were selected because of their high concentrations, their frequency of detection and their toxic effects. The semivolatile compound was chosen because of its high frequency and its toxic effect. Finally, lead was chosen on the basis of its elevated concentrations, which were above site-specific and regional background levels.

EXPOSURE ASSESSMENT

Groundwater

Results from the AT field investigation indicated that groundwater in the vicinity of the site was heavily contaminated with PCE and TCE. Exposure to groundwater contaminants either through direct ingestion or contaminant volatilization during showering are primary pathways of concern as all residences within one-half mile of the site use private wells.

Baseline risks have been developed for direct ingestion of groundwater and volatilization of contaminants during showering, assuming current use of contaminated groundwater. The current use scenario takes into account the fact that the contaminated wells are equipped with organic contaminant reduction devices (carbon filters) that are being monitored by EPA and NYSDOH. Only TCE and PCE were measured during the monitoring program. Therefore, current ingestion pathway risk calculations represent only risks associated with these two contaminants. Because only these two organics were monitored, upper and lower bound risks associated with each exposure pathway have been developed, utilizing contaminant concentrations upstream and downstream of the removal devices respectively.

Two future risk scenarios for each groundwater exposure pathway have been developed. The first scenario applies on-site monitoring well results to calculate best-estimate and reasonable maximum exposures. The second future use groundwater exposure pathway uses off-site monitoring well data to calculate upper bounds on the risk calculations (worst case scenario). Exposure assumptions for groundwater ingestion and inhalation of volatilized contaminants during showering are defined as follows:

[1] Current and Future Use Pathway: Groundwater Ingestion (GI)

	Carcinogens (Adult)	Noncarcinogens (Children)
Body Weight:	70 Kilograms (kg) [154 Pounds (lbs)]	35 Kg [77 lbs]

Exposure Period:	70 years	Continuous subchronic exposure
Ingestion Rate:	2 liters/day	1 liter/day
GI Absorption:	100%	100%

[2] Current and Future Use Pathway: Inhalation of Volatilization Contaminants While Showering

Assumed receptors, body weights and exposure periods are the same as those defined above for groundwater ingestion. Additional assumptions include:

Inhalation Rate:	Children :	1.7 cubic meters per hour (m^3/hr)
	Adults :	1.3 m^3/hr
Exposure Duration:		10 min/shower
Lung Absorption:		100%

Surface Water and Sediments

Surface water bodies in the drainage area of the AT site include Catskill Creek and Tributaries A and B. On-site surface water bodies are limited to drainage swale and septic system overflow areas. Off-site, three impoundments lie within the drainage basin of Tributary B: the Schmidt, Rath, and mueller ponds. The Rath pond, located within 50 feet of the western site boundary, is not currently known to be used for recreational purposes. However, horses and geese regularly use the Schmidt pond (located in an open field immediately west and downgradient from the Rath property) and the Muller pond has been stocked with fish.

Assuming the potential attraction of these standing water bodies to children, incidental ingestion and dermal contact with contaminants detected in surface water and sediments have been evaluated. While the likelihood of children playing on the site is low, worst case risks associated with surface water ingestion of on-site drainage swales have been evaluated. More probable exposure pathways assume recreational use of any of the off-site impoundments. Exposure assumptions utilized for all surface water and sediment pathway scenarios are summarized in Table 13.

Soils

Surface and subsurface soils at the AT site are contaminated with TCE and PCE as a result of prior dumping activities. The site, which is unfenced and contains a large empty manufacturing building, is located in an area sparsely developed with residences and vacation homes. Individuals from adjacent residences could potentially be exposed to contaminants in surface and shallow subsurface soils (e.g., children playing/digging on-site). Specific pathways of exposure include incidental ingestion and/or dermal contact. Given potential reuse of the existing building, a future use scenario has also been developed which assumes subsequent industrial development of the American Thermostat property. Specific exposure assumptions for both current (children) and future (adult worker) pathways are defined below.

[1] Current Use Pathway: Soil Contact/Ingestion

Table 14 summarizes exposure assumptions associated with current use direct contact exposures. Although the current asphalt pavement and vegetative surface cover at the site would probably limit exposure magnitudes, the analysis conservatively assumes that surface soils are exposed. Average (best estimate) and upper bound assumptions are defined for exposure frequencies, durations and intake rates.

[2] Future Use Pathway: Soil Contact/Ingestion

Table 15 presents average and upper bound assumptions for exposures to adult workers given future industrial development of the site. Assumed frequencies, contact rates and receptor characteristics for dermal contact with and incidental ingestion of surface and subsurface soils are summarized.

Inhalation Pathways

Given the magnitude of PCE and TCE contamination in on-site soils, potential inhalation exposures to volatile organics released from soils were evaluated for both current and future site uses. Inhalation exposures to children playing/digging on-site have been assumed concurrent with direct contact exposures defined above. Inhalation exposures to adult workers were also evaluated, assuming future industrial use of the site property. Best estimate and reasonable maximum inhalation exposures were evaluated for both current and future use pathways.

Groundwater Ingestion Exposure Contact Concentrations

Current ingestion pathway risks were evaluated for TCE and PCE only. Minimum, median and maximum contaminant concentrations measured in residential wells during the residential well monitoring program (1986-1987) were used to define a range of potential risks associated with exposures to both "raw" and treated groundwater.
Future risk calculations used contaminant levels quantified during the field investigation. Geometric mean and maximum contaminant concentrations were used to represent average and worst-case exposures to both on-site and off-site groundwater. In calculating geometric means, values reported below detectable levels were assumed to be equivalent to half the detection limit value.

Inhalation of Volatilized Organics While Showering

Exposure point concentrations assumed for groundwater ingestion, as defined above, were used to derive contaminant concentrations in indoor air resulting from showering. Additional assumptions include:

Volatilization rate:	100%
Bathroom Volume:	12 m^3
Liters used/shower:	95 liters

Resulting contaminant concentrations in air, expressed in milligrams per cubic meter (mg/m^3), were then used to determine chronic daily intake rates.

Surface Water and Sediment Exposure Point Concentrations

Due to the limited number of off-site surface water and sediment sample collections, contaminant exposure point concentrations assumed for the Schmidt and Mueller ponds used the single respective measurements. Two surface water/sediment samples were collected in the Rath pond. The average of these two measurements is used to calculate representative exposures; the maximum is assumed for calculation of worst case risks. Average and worst-case concentrations assumed for on-site surface water exposures are median and maximum reported contaminant concentrations, respectively.

Soil Ingestion/Dermal Contact Exposure Point Concentrations

Contact concentrations for both current and future use direct contact pathways are the contaminant-specific geometric mean concentrations reported for on-site surface soil samples.

Inhalation Exposure Point Concentrations

For those pathways that involved on-site inhalation of vapors, contaminant release and transport models were required to estimate average and peak release rates of TCE and PCE from surface soils using representative (geometric mean) and maximum surface soil concentrations. Associated models and calculations are summarized in Table 16.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfD will not underestimate the potential for adverse noncarcinogenic effects to occur.

The cancer potency factors and the RfDs for the contaminants of concern at the AT site are listed in Tables 17 and 18.

RISK CHARACTERIZATION SUMMARY

Risk characterization for the AT site included an assessment of risk associated with exposures to noncarcinogens and carcinogens.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1\text{x}10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1\text{x}10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The context within which to judge the relative risk from each of the pathways has been established by EPA. For carcinogens, the target risk range is a 10^{-6} to 10^{-4} excess lifetime cancer risk. For noncarcinogens, where the sum of expected dose/RfD ratios exceeds unity, observed concentrations pose unacceptable risks of exposure.

The results of the risk characterization for each pathway of exposure evaluated are summarized below:

Groundwater

[1] Groundwater Ingestion: Current and Future Uses

The most plausible current exposure risk calculations used residential well data downstream of the organic removal devices and resulted in a baseline, current use risk estimate of $4.69\text{x}10^{-9}$. Given EPA's acceptable risk from carcinogens which ranges from 10^{-6} to 10^{-4}, calculated risks to residents adjacent to the American Thermostat site using the control devices are minimal. Worst-case estimates, which assumed no treatment and used contaminant concentrations measured upstream of the control device, ranged from $1.77\text{x}10^{-9}$ to $1.92\text{x}10^{-4}$, indicating the need to maintain control measures.

The analysis for future ingestion of groundwater with no treatment resulted in unacceptable risks attributable to exposure to carcinogenic and noncarcinogenic groundwater contaminants. Average and upper-bound cancer risks associated with on-site groundwater exposures were $1.2\text{x}10^{-3}$ and 3.710^{-2}, respectively which represent increased risk levels above current usages due to increased ingestion by plant workers, assuming the site is developed for industrial use in the future. Associated hazard indices ranged from 2.52 to 5.44, both exceeding unity. The average cancer risk associated with off-site groundwater exposures was $5.5\text{x}10^{-4}$, almost an order of magnitude lower than that associated with on-site exposures.

Hazard indices for average and worst-case noncarcinogen exposures were 2.96 and 52.2, respectively. These noncarcinogen risks associated with off-site exposures are directly attributable to the elevated concentrations of lead and arsenic measured in certain off-site residential wells (particularly the residence adjacent to the site).

[2] Contaminant Volatilization While Showering: Current and Future Uses

Current use volatilization exposures represented risks for treated groundwater ($2.05\text{x}10^{-9}$) and for untreated water ($2.35\text{x}10^{-5}$) that are within EPA's acceptable risk range. Calculated risks associated with future residential household use of untreated, contaminated groundwater indicated unacceptable risks from groundwater contaminant concentrations representative of both on and off-site groundwater.

Surface Water/Sediment [Current and/or Future Uses]

[1] Rath Pond [Direct Contact by Children]

Cumulative excess cancer risks associated with dermal contact and incidental ingestion of surface water in the Rath pond, based on two observations, were 3.3×10^{-5} and 3.7×10^{-4} for best estimate and reasonable maximum exposures, respectively. The risk associated with average exposure scenarios falls within EPA's target risk range. However, the reasonable maximum cumulative risk is 3.7×10^{-4}, which indicates the need to remediate the water contamination in the pond.

Cumulative excess cancer risks associated with direct contact with sediments in the Rath pond were negligible: 1.7×10^{-11} and 8.1×10^{-10} for best estimate and reasonable maximum exposures, respectively. HIs calculated for lead exposures were similarly low, ranging from 0.004 to 0.7, both of which are below the target HI criterion of 1.0.

[2] __Schmidt Pond__ [Direct Contact by Children]

Cumulative excess cancer risks associated with dermal contact and incidental ingestion of surface water in the Schmidt pond, based on a single observation, are 3.4×10^{-6} and 3.8×10^{-5} for best estimate and reasonable maximum exposures, respectively. Both values fall within EPA's target risk range.

Cumulative excess cancer risks associated with direct contact with sediments in the Schmidt pond were negligible: 8.9×10^{-12} and 2.6×10^{-10} for best estimate and reasonable maximum exposures, respectively. HIs calculated for lead exposures were similarly low, ranging from 0.002 to 0.03, both of which are below the target HI criterion of 1.0.

[3] __Mueller Pond__ [Direct Contact by Children]

Cumulative excess cancer risks associated with dermal contact and incidental ingestion of surface water in the Mueller Pond were negligible. Based on a single observation, cumulative risks are 4.7×10^{-8} and 5.2×10^{-7} for best estimate and reasonable maximum exposures, respectively. Values are within the EPA's target risk range.

[4] __On-site Drainage Swale__ [Direct Contact by Children]

Cumulative excess cancer risks associated with dermal contact and incidental ingestion of surface water in on-site drainage areas ranged from 2.2×10^{-8} to 8.0×10^{-5}, with a best estimate (based on the median detected on-site concentration) of 8.0×10^{-5}. All values fall within EPA's target risk range.

__Soils__

[1] __Current Use; Dermal Contact/Soil Ingestion by Children__

Cumulative cancer risks associated with average and upper bound exposures were 2.7×10^{-8} and 3.2×10^{-6}, respectively. Exposures to tetrachloroethene accounted for the majority (>99%) of calculated risks. HIs for noncarcinogens were less than one for both scenarios, ranging from 0.005 to 0.112. These results indicate that soil exposure risks to children at the AT site are within EPA's target risk range.

[2] Future Use: Dermal Contact/Soil Ingestion by Industrial Workers

Cumulative risks to industrial workers from exposure to carcinogens in American Thermostat soils ranged from $8.9x10^{-9}$ to $1.5x10^{-4}$ for average and reasonable maximum exposures. Exposures to noncarcinogens did not indicate any unacceptable health risks from noncarcinogens as hazard indices are both less than one, ranging from 0.005 to 0.11. Cancer risks associated with assumed worker exposures, though not significant for average exposure scenarios, are at the higher limit of EPA's target risk range under assumed upper-bound exposure conditions ($1.5x10^{-4}$). The latter conclusion indicates the need for "hot-spot" mitigation of on-site soils to reduce potential contaminant exposures.

Air

[1] Current use: Inhalation of Volatile Organics from Soils

Carcinogenic risks associated with volatilized PCE and TCE exposures to children playing on the AT site were $6.7x10^{-8}$ and $9.2x10^{-5}$ for average and reasonable maximum exposures, respectively. Both values are within the EPA target risk range.

[2] Future use: Inhalation of Volatile Organics by Industrial Workers

Carcinogenic risks associated with volatilized PCE and TCE potential future exposures to workers on-site were $3.4x10^{-8}$ and $4.6x10^{-5}$ for average and reasonable maximum exposures, respectively. Both values are within the EPA target risk range. Therefore, potential risks posed for both current and future use volatilization pathways are not considered significant.

CLEANUP LEVELS FOR CONTAMINATED MEDIA

Groundwater

The groundwater at the AT site is classified as Class I, which indicates that the water is suitable as a drinking water supply. The RI has determined that contaminants from the site have contaminated the on-site groundwater and that a plume of contaminated groundwater emanating from the site has resulted in the contamination of residential wells in the vicinity of the site extending over an area of 53 acres for the bedrock (deep) aquifer and 26 acres for the unconsolidated (shallow) aquifer. The remedial response objectives, therefore, include the following:

- ensure protection of groundwater from the continued release of contaminants from soils and

- restore groundwater in the affected area to levels consistent with state and federal groundwater standards.

Table 19 presents the chemical concentrations and action levels (Applicable or Relevant and Appropriate Requirements (ARARs)) for contaminants of concern at the AT site. Chemical concentrations are expressed as the geometric mean and maximum contaminant concentrations in on-site and off-site groundwater samples taken, which were applied in the Risk Assessment. Table 19 indicates that geometric mean and maximum concentrations of PCE, TCE, vinyl chloride, arsenic and 1,1,2,2-tetrachloroethane in on-site groundwater exceed most ARARs and nearly all risk-based criteria.

Lead is the only noncarcinogenic parameter evaluated that exceeds ARARs (25 ug/l) in both the geometric mean (95.8 ug/l) and maximum (1,610 ug/l) observed concentrations for both on- and off- site groundwater samples. As shown in Table 19, chromium and cadmium ARAR exceedances correspond to maximum observations only.

The health-based levels are more stringent than ARARs for carcinogens, but because they are below instrument detection limits (typically 1-5 ug/l for volatile organics), the most stringent of the ARARs (New York State MCLs and groundwater standards) shall be used as the cleanup objectives for all contaminants in AT groundwater.

Soil

Table 20 summarizes the calculated soil action levels that correspond to an acceptable risk of 10^{-6} for three carcinogenic chemicals detected in AT site soils: PCE and TCE and (bis 2-ethylhexyl) phthalate. The cleanup action levels were not derived for lead, the only noncarcinogenic indicator evaluated for soil exposure pathways. The baseline Risk Assessment indicated that levels of lead detected in the AT site soils present no significant risk based on current and/or future site uses. (HIs were all less than one).

Table 20 indicates that only PCE concentrations in AT site soils exceed the health-based cleanup objectives under both current and future exposure assumptions. Geometric mean (2.41 mg/kg) risks and median (4.65 mg/kg) PCE concentrations are well below action levels derived for current and future use scenarios (18.6 mg/kg and 893.5 mg/kg). However, both upper quartile (1200 mg/kg) and maximum (2700 mg/kg) PCE concentrations found in the hot spot area greatly exceed action levels derived using best estimate and upper bound exposure assumptions for both current and future pathway scenarios. As shown in Table 20, maximum concentrations of trichloroethene (9.3 mg/kg) and bis(2-ethylhexyl) phthalate (0.4 mg/kg) were less than both best estimate and upper bound (10^{-6} risk) action levels assuming current and/or future site uses.

Therefore, to include a margin of safety, an allowable exposure level based on risk assessment of 18 mg/kg for tetrachloroethene is established for site soils.

Cleanup Objectives Derived from ARARs

In order to eliminate future ingestion of groundwater contaminants, it is necessary to remediate volatile organic contaminants detected in the soil to concentrations low enough to ensure that residual leaching of such contaminants will not result in groundwater contamination which exceeds federal drinking water and state groundwater standards.

PCE and TCE were selected as indicator chemicals for this assessment because of their frequency of occurrence and relatively high concentrations detected on site.

Based on calculations utilizing EPA's Multimed fate and transport model and assuming that, following clean up of the soil, the groundwater will have to meet the federal and state standards at the first receptor well at a distance of more than 200 feet downgradient of the area of soil contamination, it was determined that the soil cleanup levels would have to be:

PCE	1.0 mg/kg
TCE	0.4 mg/kg

The soil cleanup levels were compared to the contaminant concentrations identified in the reported dumping area south of the AT plant. Any samples with contaminant concentrations below the cleanup levels are considered clean.

Since the soil cleanup criteria derived from ARARs (1.0 mg/kg of PCE and 0.4 mg/kg of TCE) are much lower than the criteria derived from the health-based risk assessment for exposure to contaminated soils (18.6 mg/kg of PCE and 86.5 mg/kg for TCE) soil cleanup criteria of 1 mg/kg for PCE and 0.4 mg/kg for TCE are established for the AT site. Thus, a cancer risk level of less than 10^{-6} will be achieved. Based on these cleanup levels the approximate boundary of soil contamination includes the area depicted in Figure 3.

The depth of contamination varies from location to location. For a conservative estimate, it is assumed that contamination has reached the unconsolidated aquifer, which is approximately 7 feet below existing site ground surface elevations. For source control remediation it is not necessary to excavate and remediate soil below the water table, as any contaminated soil below the water table will be mitigated by the groundwater management of migration alternative. Therefore, the depth of contamination for the source control alternatives will be defined as 7 feet below the surface. The volume of contaminated soil is estimated to be 6,440 cubic yards.

Surface Water and Sediment

Among the surface water bodies investigated on-site and off-site, only the pond in the residence adjacent to the site (Rath pond) exhibited carcinogenic risks that exceeded EPA's acceptable levels.

No enforceable federal or state ARARs exist for surface water which is not used as a drinking water source. However, federal Ambient Water Quality Criteria (AWQC) provide a basis for evaluating concentrations of chemicals in surface waters on or adjacent to the AT site. In addition, there are State Surface Water Guidance Values that are more stringent in some cases which should also be considered.

A comparison of the concentrations of contaminants of interest detected in Rath pond with Federal AWQC and State Surface Water Guidance Values for the protection of human health are presented below.

Contaminant	Maximum Detected Concentration in Rath Pond (ug/1)	Federal AWQC (ug/1)	State Surface Water Guidance Values (ug/1)
PCE	1,000	0.8	0.7
TCE	200	2.7	3.0
Vinyl chloride	31	2.0	0.3

Note: AWQC values correspond to a risk of 10^{-6}. AWQC values for all carcinogens are otherwise zero.

This comparison indicates that the contamination in Rath pond water exceeds levels that are considered protective of human health. Although Rath pond water in not currently used as a drinking water or fishing source, because it exceeds these acceptable levels there is an ongoing potential risk to human health if ingestion were to occur. For this reason, the Rath pond will be remediated to below 5 mg/l for each compound listed above, which is the analytical detection limit for the compounds listed above.

Sediments in the Rath pond, although they present no health risk, will be removed and remediated in accordance with the soil cleanup levels described above, in order to eliminate another source of groundwater contamination through leaching.

Building

No federal or state standards exist for contaminated dust in buildings. In order to ensure that the building can be reused in the future, the contaminants in the hazardous dust in the building floor will be removed to below the analytical detection limits for these compounds.

NEED FOR REMEDIATION

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

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the proposed plan.

DESCRIPTION OF ALTERNATIVES

A total of eleven alternatives were evaluated in detail for remediating the site. Four alternatives for addressing the contaminated soils that contribute to groundwater contamination at the AT site were evaluated. A fifth alternative, Alternative SC-2, capping of the contaminated soil, was preliminarily evaluated in the FS and was eliminated from further consideration, as it was determined that it would not prevent the migration of the volatile organics to the groundwater and to the air. In addition, five remedial alternatives for addressing the contamination in the groundwater were evaluated. A sixth alternative, Alternative GW-5, treatment of the groundwater via activated carbon adsorption, was preliminarily evaluated in the FS and was eliminated from further consideration since it was determined that it would be less effective in removing the groundwater contaminants and more costly than the combined air stripping/carbon adsorption alternatives. Finally, two alternatives are evaluated for the decontamination of the AT building.

These alternatives are:

SOIL ALTERNATIVES

Alternative SC-1: No Action

The Superfund program requires that the "no-action" alternative be considered at every site. Under this alternative, EPA would take no further action to control the source of contamination. However, long-term monitoring of the site would be necessary to evaluate the performance of Alternative SC-1, and to monitor contaminant migration. Monitoring would consist of annual soil, sediment, and surface water sampling and analyses for a variety of contaminants. Samples would be analyzed for Target Compound List parameters. Finally, an eight foot high chainlink fence would be installed around the site.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions might be implemented at the time to remove or treat wastes.

The estimated present worth cost for this alternative is $736,800.

Alternative SC-3: Excavation/On-Site Incineration/On-Site Redeposition

This alternative would include the excavation and on-site treatment by incineration of 6,740 cubic yards of contaminated soil. The treated soil would be used as backfill and the disturbed areas would be regraded and revegetated to prevent erosion.

The approximate area of contaminated soil that would be excavated is shown in Figure 3.

Soil excavation using a backhoe would remove the contaminated soil from the hot spot area (approximately 26,000 ft^2 including the old leaching field) to a depth of about 7 feet. The length of time it will take to excavate this soil will be determined by the processing rate of the incinerator which is approximately 48 tons per day (2 tons per hour).

The six 55-gallon drums which contain contaminated soil generated from the RI activities would be emptied and treated together with the contaminated soil. The Rath pond sediments would also be treated with contaminated soil. Sediments upstream of Tributary B would be resampled during remediation. If contaminant concentrations exceed cleanup level they would be treated with the contaminated soil.

The incineration process consists of a feed system, rotary kiln incineration unit, secondary combustion chamber and three stage scrubber. The excavated contaminated soil and the soil from RI drums would be placed in the feed hopper with a backhoe. Soil would then conveyed from the hopper to the rotary kiln. The incinerator would be operated at a temperature of 650 to 760°C (1200 to 1400°F). The soil would be incinerated in the rotary kiln. Exhaust gases from the kiln would enter a secondary chamber afterburner operating at temperatures between 760°C and 1316°C (1400°F and 2400°F) to complete oxidation of the combustible waste. Prior to release to the atmosphere, exhaust gases from the afterburner would pass through air pollution control units for particulate and acid gas removal. Ash residue and soils would be discharged at the bottom end of the kiln and are quenched to cool the residue.

Listed RCRA hazardous wastes are contained in the contaminated soil. The soil will no longer be deemed to contain hazardous wastes after it is treated below health-based levels and the treatment standards required by RCRA Land Disposal Restrictions (LDRs). The treated soil will be subjected to the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether it still contains any listed RCRA hazardous wastes above the treatment standards, required by the LDRs. All soil emerging from the treatment that fails the TCLP test will be retreated so as to meet these standards. All soil will be treated so that it does not RCRA hazardous wastes above the health based levels determined by the risk assessment. Because the soil will no longer contain any listed RCRA hazardous wastes above health-based levels, and because it will meet the LDR treatment standards (TCLP concentrations) it will not be subject to regulation under Subtitle C of RCRA and may be used to backfill the excavated areas on-site.

The 53 55-gallon drums which contain non-hazardous soil generated from the RI activities would be emptied and also used to backfill the excavation areas on-site. TCLP tests would be used to ensure that these drums contain non-hazardous soil. If they were found to be hazardous, they would be incinerated on-site with contaminated soil. The particulates and water from acid gas scrubbing collected in the air pollution control systems and the waste water used in the quenching processes would be shipped for treatment and disposal at an off-site facility.

The estimated present worth cost for this alternative is $8,322,800. The estimated time to implement the alternative is approximately 3 years (including design).

Alternative SC-4: Excavation/Off-Site Incineration/Backfill With Clean Soil

This alternative would include the excavation and off-site thermal treatment of 6,740 cubic yards of contaminated soil. The excavated material would be placed in dump trailers or drummed, covered and transported to a licensed thermal treatment facility. The facility would be responsible for disposing of the treated soil.

Following excavation, the contaminated materials would be placed into 20 cubic yard trucks for shipment. The loaded trucks would proceed to the nearest available incinerator permitted to receive bulk solid wastes. The receiving facility would be responsible for proper disposal of the incinerator ash. Clean fill would be used to backfill the excavation area, and the site would be regraded and revegetated. No long-term monitoring would be required.

Incineration of the contaminated soil at the off-site facility would be conducted in conformance with all applicable RCRA requirements.

The estimated present worth cost for this alternative is $17,918,700. The estimated time for the implementation of this alternative is 2.5 years (including design).

Alternative SC-5: Excavation/Low Temperature Enhanced Volatilization/On-Site Redeposition

This alternative would include the excavation and on-site treatment, using low temperature enhanced volatilization, of 6,740 cubic yards of contaminated soil. The excavated soil would be fed to a mobile thermal treatment unit brought to the site, where hot air injected at a temperature above the boiling points of the organic contaminants of concern would allow the moisture and the organic contaminants to be volatilized into gases and escape from the soil. The organic vapors extracted from the soil would then be treated in an air pollution control unit to ensure acceptable air quality emissions. Several thermal treatment methods (such as heated screw conveyors, rotary calcination devices, etc.) may be applicable. A variety of air pollution control options are also available, including after-burners, activated carbon absorbers, and condensers. The specific type of the thermal treatment method and of the air pollution control would be determined in the remedial design phase through engineering design and analysis and the competitive bidding process.

All the residuals from the treatment (such as spent carbon from the carbon adsorption units) would be sent to an off-site hazardous waste facility for treatment and disposal. Air pollution control systems would be an integral part of the treatment plant to limit emissions to within the regulatory requirements.

The soil would be treated so that it would no longer contain hazardous wastes above health-based standards and LDR treatment standards. As discussed above, for Alternative SC-3, after such treatment the soil will no longer be subject to Subtitle C of RCRA and may be used to backfill excavated areas. Since all contaminated soil above the cleanup level would be treated to below health-based levels and the existing data indicates that the treated soil would pass the TCLP test and meet the LDRs, it is expected that clean closure of the site would be achieved.

At the completion of the implementation of this alternative, the most mobile of the organic contaminants in the soil would be reduced to concentrations that would result in groundwater levels below the federal and state standards at the receptor nearest to the site when leached to the groundwater through rainwater infiltration. The estimated present worth cost of this alternative is $2,772,400. The estimated time to implement this alternative is approximately 2 years (including design).

GROUNDWATER ALTERNATIVES

All groundwater alternatives, with the exception of Alternative GW-1, assume that the operation and maintenance of the existing individual treatment systems (5 carbon filters and 2 air strippers) will continue until either the implementation of the alternate water supply selected in the 1988 ROD, or the cleanup of the aquifer by means of a particular groundwater alternative.

Alternative GW-1: No Further Action

Under the No Further Action Alternative, the existing individual treatment systems operated and maintained by EPA would be terminated. This alternative would consist of restricting the use of contaminated groundwater, to the extent possible, by deed restrictions and other institutional controls. A long-term monitoring program and distribution of fact sheets that would explain the monitoring results and would include warnings and recommendations for water usage would be established.

This alternative was not considered to be protective of human health and the environment and it was not evaluated as a viable alternative for implementation. This alternative was used only as a baseline for comparison to the remaining alternatives being analyzed.

This alternative would also require a five-year review because the contaminants would remain on-site. The estimated total present worth cost for this alternative would be $757,000.

Alternative GW-2: Limited Action

The Limited Action alternative for the contaminated groundwater aquifers includes both a long-term monitoring program and an institutional control program to regulate the use of the aquifers. This alternative would continue operation and maintenance of existing carbon filters at five houses and two air-stripping systems, one at the Rath residence and one at the AT Pumphouse. In addition, new individual carbon filters would be installed at 25 other houses and operated for at least 30 years. The long-term monitoring program would consist of semiannual sampling for Target Compound List (TCL) metals and TCL volatile organics at six existing bedrock aquifer wells and three existing unconsolidated aquifer wells. In addition, two new wells would be installed to the east and west (one on each side) of the unconsolidated aquifer plume area. The information gathered would be used to check whether the concentrations of contaminants of concern have been lowered to levels below the federal and state standards through natural attenuation and to monitor potential migration of contaminants downgradient of the site. Institutional management would also be required to monitor and review the site every five years as required by CERCLA.

The present worth cost for this alternative is estimated to be $8,911,300.

Alternative GW-3: Pumping/Pretreatment/Air Stripping/ Reinjection

The major features of this alternative would include pumping, treatment, and reinjection of treated groundwater and a performance monitoring program. Groundwater would be extracted from both the unconsolidated and bedrock aquifers and would be pumped through a series of air strippers (2 air strippers). The treated water would be reinjected into the ground. This alternative would also include treatment of surface water from the Rath Pond and the drums containing contaminated water generated during the Remedial Investigation. These drums would be emptied and mixed with groundwater in an equalization tank before treatment.

The treatment system would consist of a pretreatment system for metals removal by chemical precipitation, flocculation, clarification and filtration, followed by an air stripping system for volatile organic contaminants removal.

Groundwater extracted from wells placed over the entire area overlying the contaminated aquifer would enter the air stripping unit. The air laden with volatile organics would leave the air strippers and enter vapor phase carbon absorber (1000 lb carbon each) equipped with a duct heater/dehumidifier. The exiting vapor stream from the vapor phase carbon unit would be free of volatile organic compounds and could be discharged to the atmosphere. The treated groundwater from the air stripping tower would be collected in a 2500 gallon water sump. From here water would be pumped through a second stage air stripper identical to the first one. It should be noted that the system described above is a representative air stripper system. The exact specifications for the air stripper at the AT site would be determined during the remedial design phase of the project.

The estimated annual amount of carbon required for the vapor phase adsorber would be 16 tons. The spent carbon would be collected by the carbon supplier and shipped for off-site disposal or regeneration and reuse. The treated groundwater would be collected in a collection tank. From here the groundwater would be discharged into leaching fields for reinjection.

The treated groundwater would be reinjected through an existing leaching field located just south of Route 23B and a new leaching field proposed just north of Route 23 near the building. In addition, six existing wells along the western boundary of the site would be used for reinjection.

Environmental monitoring would be required during the life of the treatment process. In addition, monitoring of the groundwater at the site would be conducted for a period of 3 years after completion of the remediation, to ensure that the goals of the remedial action have been met.

The present worth cost of this alternative is estimated at $18,821,900. The time estimated for completion of this alternative is 30 years.

Alternative GW-4: Pumping/Pretreatment/Air Stripping/ Carbon Adsorption/Reinjection

The process options used in this alternative are similar to that of Alternative GW-3 with the exception of the volatile organics removal system. Organics removal is achieved by air stripping followed by a carbon adsorption system in this alternative compared to the two stage air stripping system in Alternative GW-3.

Groundwater would be extracted from both the unconsolidated and bedrock aquifers, pretreated for removal of metals and particulates and pumped to an air stripper. Contaminated groundwater would enter the air stripper which would be designed to strip out the VOCs. The air and VOC mixture exiting the air stripper would then be treated by a vapor phase carbon adsorption unit for the removal of the stripped VOCs. The clean air would be emitted to the atmosphere. The treated groundwater would be directed to a reinjection system as described under Alternative GW-3.

Environmental monitoring would be required during the life of the treatment process. In addition, monitoring of the groundwater at the site would be conducted for a period of 3 years after completion of the remediation to ensure that the goals of the remedial action have been met.

Groundwater would be treated to drinking water standards before reinjection. The discharges from the air stripper would meet the requirements of federal and state laws, regulations and policy including, 52 FR 3748, 6 NYCRR 201, 211 and 212, and Air Guide 1. The residues resulting from the treatment system include filtered suspended solids (precipitated metallic hydroxides and fine particles) and spent carbon. The filtered suspended solids would be shipped to an off-site RCRA facility for treatment and disposal. The estimated annual carbon usage would be approximately 14.5 tons for vapor phase carbon and 10 tons for the liquid phase granular activated carbon adsorption process. The spent carbon would be collected by the carbon supplier and shipped for off-site disposal or regeneration and reuse.

The present worth cost for this alternative is estimated to be $23,044,900. The time required to complete the implementation of this alternative is 30 years.

Alternative GW-6: Pumping/Pretreatment/UV Oxidation/Reinjection

The major features of this alternative would include pumping, treatment, and reinjection of the treated groundwater and a performance monitoring program as in the case of Alternatives GW-3 and GW-4. The process options used in this alternative are similar to that of Alternative GW-3 with the exception of the organic removal system. Organic removal is achieved by an ultraviolet light UV-chemical oxidation system in this alternative compared to the air stripping system in Alternative GW-3.

Groundwater pumping and collection in this alternative would be the same as that outlined in Alternatives GW-3 and GW-4. Groundwater treated for metals removal would then be pumped to a ultraviolet (UV) chemical oxidation reactor. Hydrogen peroxide would be used as the oxidizing agent. The UV/chemical oxidation system includes a stainless steel oxidation chamber equipped with UV lamps and hydrogen peroxide feed system. Before the pretreated groundwater enters the oxidation chamber, it is mixed with a 50% hydrogen peroxide solution. Hydrogen peroxide is readily converted to hydroxyl radicals under the influence of UV light. High intensity UV light and the hydroxyl radials synergistically promote rapid breakdown of organic molecules of the organic contaminants of concern. With a retention time of 4 minutes in this oxidation chamber, the organic contaminants are converted to CO_2, H_2O and chlorides. Most of these are highly soluble. Potential volatile organic emissions from the reactor are negligible with UV/hydrogen peroxide systems. All the volatile organic contaminants would be removed to below the target groundwater cleanup levels, and the treated groundwater would be reinjected into the ground as discussed under Alternatives GW-3 and GW-4.

The pretreatment residues from metal removal would be disposed of off-site in a RCRA facility.

The estimated present worth cost for this alternative is $21,845,200. The time estimated for completion of this alternative is 30 years.

BUILDING DECONTAMINATION ALTERNATIVES

Alternative BD-1: No Action

Remedial action would not be taken other than a long-term building security and maintenance program. Fact sheets would be distributed in order to increase public awareness. The estimated present worth cost for this alternative is $4,600.

Alternative BD-2: Building Decontamination/Waste Treatment and Disposal

This alternative includes decontamination of the building to remove contaminated dust, sludges, RI drums, and waste oil drums and off-site disposal of the dust, sludges, and waste oil. It is not anticipated that the walls and the ceiling of the building would require decontamination. However, a supplemental quantitative sampling would be conducted during remediation to confirm this. Confirmatory sampling will also be conducted following remediation. Hazardous dust would be removed using a dusting, vacuuming and wiping procedure for off-site treatment and disposal. No cleanup levels are available for the building. However, contaminant concentrations would be reduced below detection levels. Waste oil drums would be removed by a contractor for off-site disposal. The hazardous RI drums would be treated on-site along with source control and groundwater treatment alternatives. The non-hazardous drums would be consolidated on site for eventual on-site redeposition. Sludges would be removed and disposed of at an off-site treatment and disposal facility.

The estimated present worth cost of for this alternative is $284,000. The estimated time for implementation of this alternative is seven months.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility or volume (including the statutory preference for treatment), short-term effectiveness, implementability, cost, state acceptance and community acceptance.

Each criterion will be briefly addressed with respect to the alternatives for the remediation of the soil, the groundwater, and the decontamination of the building.

SOIL

A. Overall Protection of Human Health and the Environment

Alternative SC-5, treatment of soils to remove the volatile organic contaminants, will result in the elimination of a long-term source of groundwater contamination and will mitigate the risks to public health and the environment associated with the presence of those contaminants in the soil on-site and with their migration. Alternative SC-5 would effectively mitigate those risks by removing the most mobile wastes from the soil leaving the treated soil to be landfilled on-site.

Alternatives SC-3 and SC-4 also would mitigate the risks to public health and the environment associated with the leaching of contaminants into the groundwater and their migration off-site. Under Alternative SC-1, contaminants would continue to leach from the soil into the groundwater and continued off-site migration of contaminants would occur. Monitoring would be implemented to observe contaminant migration, but an indeterminate amount of time would elapse between detection and the implementation of mitigating measures.

B. Compliance with ARARs

All technologies proposed for use in Alternatives SC-3 through SC-5 would be designed and implemented to satisfy all action-specific regulations including all air emission standards. No federal or New York State regulations specify cleanup levels for contaminants in the soil. In terms of achieving target levels for soils for the purpose of removing potential sources of groundwater contamination, Alternative SC-5, along with Alternatives SC-3 and SC-4, would be quite effective.

C. Long-Term Effectiveness and Permanence

Alternative SC-5 would effectively treat the volatile organic compounds in on-site soil, thus reducing the hazards posed by the contaminated soils and permanently removing the source of groundwater and surface water contamination. Alternatives SC-3 and SC-4 also would provide a high degree of effectiveness, since the contaminated soil would be treated or removed from the site. In contrast, under Alternative SC-1, the contaminants would be left untreated in the soil, and a long-term monitoring program would be implemented to determine if the contamination was migrating from the site.

D. Reduction of Toxicity, Mobility and Volume

Alternative SC-5 and Alternatives SC-3 and SC-4 would result in comparable reductions in the toxicity, mobility or volume of the treated material. Alternative SC-1 would provide no reduction in toxicity, mobility or volume.

E. Short-Term Effectiveness

All alternatives, with the exception of the no-action alternative, include activities such as contaminated soil excavation and transport that could result in potential exposure of residents to volatilized contaminants and contaminated dust. However, mitigative measures to reduce the probability of exposure would be implemented. In addition to excavation, Alternative SC-4 includes off-site transport of contaminated soils.

Both Alternative SC-5 and Alternative SC-3 provide treatment on-site, thereby reducing potential risks to residents along transportation routes. Furthermore, Alternative SC-5 would not result in the generation of significant quantities of treatment byproducts (stack emissions, particulates) that would be generated by Alternative SC-3.

Alternatives SC-3, SC-4 and SC-5 might result in worker exposure to volatilized contaminants and dermal contact with contaminated soils during waste excavation and handling. In addition, Alternatives SC-3 and SC-5 might result in additional low-level emissions exposure from the on-site treatment unit. The threat to on-site workers, however, would be mitigated through the use of protective equipment by the on-site workers, and control of emissions would be accomplished by emissions treatment. Additionally, scrubber wastewater produced by Alternatives SC-4 and SC-5 would be treated on-site or transported off-site for treatment and disposal.
Alternatives SC-3, SC-4 and SC-5 could be implemented in about 3, 2.5 and 2 years, respectively, with actual remediation times of 15, 12 and 9 months, respectively.

F. Implementability

All of the alternatives would utilize relatively common construction equipment and materials. Little construction difficulty would be encountered with any of the alternatives.

The technologies proposed for use in the alternatives are proven and reliable in achieving the specified process efficiencies and performance goals. Low temperature thermal extraction, has been successfully pilot tested and has performed on a full-scale basis with similar organic contaminants.

G. Cost

The present-worth cost of Alternative SC-5 is $2,772,400. The lowest cost alternative is Alternative SC-1 at $736,800. The highest cost alternative is Alternative SC-4 at $17,918,700. Alternative SC-3 has a present worth cost of $8,322,800.

The amount of additional organic contaminants removed by Alternatives SC-3 and SC-4 above the amount of organic contaminants removed by Alternative SC-5 is insignificant when compared to the substantial difference in cost between these Alternatives.

Table 21 lists all of the costs for the five soil alternatives for comparison purposes.

GROUNDWATER

A. Overall Protection of Human Health and the Environment

Alternative GW-4 would provide the highest protection to human health and the environment among the three treatment alternatives. It would remove and treat the organic contaminants found in groundwater and would prevent their migration off-site. The higher degree of protection associated with Alternative GW-4 in comparison to Alternative GW-6 is due to the higher certainty for contaminant treatment associated with the air stripping and carbon adsorption technologies versus the UV/oxidation treatment technology of Alternative GW-6.

In comparison to Alternative GW-3, Alternative GW-4 offers a higher degree of protection as a result of the additional carbon adsorption treatment of the contaminated groundwater following air stripping.

The limited action alternative would provide protection of the health of the affected residents. However, it would not ensure protection of the health of future users of the aquifers and would not prevent continued migration of contamination.

B. Compliance with ARARs

Alternative GW-4, as well as Alternative GW-3, would achieve federal drinking water and state groundwater standards for the organic contaminants by providing the required contaminant removal during the treatment stage utilizing air stripping and carbon adsorption.

The ability of Alternative GW-6 to achieve the groundwater standards for the organic contaminants is of a lower certainty than the preferred alternative's because of limited experience with the UV/oxidation treatment process.

Alternative GW-1 would not comply with state or federal drinking water standards or criteria or those ARARs required for protection of the groundwater resources. Alternative GW-2 would achieve chemical-specific ARARs for drinking water, but would not achieve any groundwater standards for the contaminated plume.

C. Long-Term Effectiveness and Permanence

Alternative GW-4, GW-3 and GW-6 would effectively reduce the potential risks associated with the migration of contaminants into the groundwater by extracting the contaminated groundwater, treating it to remove contaminants and returning the treated water to the aquifer.

Alternative GW-1 does not provide treatment but would attempt to restrict usage of contaminated groundwater. Alternative GW-2 provides a safe permanent water supply to the affected residents but would not restore the contaminated aquifer for future use.

D. Reduction in Toxicity, Mobility and Volume

Alternatives GW-4, GW-3 and GW-6 would effectively reduce the toxicity, mobility, and volume of the organic contaminants in the groundwater. Alternative GW-4, utilizing liquid phase carbon adsorption, would provide the greatest reduction in toxicity of all alternatives under consideration. Alternative GW-2 would reduce the toxicity, mobility and volume for the individual water supplies of the affected residents. Alternative GW-1 would not reduce the toxicity, mobility and volume of contaminants.

E. Short-Term Effectiveness

Alternatives GW-4, GW-3 and GW-6 include activities that could result in potential exposure of residents and workers to volatilized contaminants during the installation of the groundwater extraction and reinjection systems. However, mitigative measures to reduce the probability of exposure would be implemented.

The implementation of Alternatives GW-1 and GW-2 would result in no additional risk to the community during implementation.
Alternatives GW-4, GW-3 and GW-6 would require a 30 year remediation time. EPA projects that it would take Alternative GW-2 well in excess of 30 years and Alternative GW-1 more than a thousand years to achieve the cleanup levels.

F. Implementability

All components (extraction, treatment and reinjection) of Alternative GW-4, as well as of Alternative GW-3, utilize relatively common construction equipment and materials and could be easily implemented. In addition, the air stripping and carbon adsorption technologies that comprise the treatment are proven and reliable in achieving the specified performance goals and are readily available.

In contrast, the treatment technology for Alternative GW-6 (UV/oxidation), although successful in pilot runs, has had limited full scale use to date. Therefore, site-specific pilot scale studies would be required to confirm its adequacy for the American Thermostat site. In addition, UV/oxidation is currently available from only two sources nationwide.

All components of Alternatives GW-1 and GW-2 would be easily implemented.

G. Cost

The present worth cost of Alternative GW-4 is $23,044,900. The lowest cost alternative is Alternative GW-1 at $757,000. The present worth cost for GW-2 is $8,911,300. For Alternatives GW-3 and GW-6 the present worth cost is $18,821,900 and $21,845,200 respectively.

The costs of the alternatives and their overall effectiveness were compared to determine whether the costs were proportional to the effectiveness achieved. The additional treatment provided by the carbon adsorption system, within the context of consideration of the other factors discussed above, was deemed to justify the increased costs that would be incurred by selecting the preferred alternative.

Table 21 lists all of the costs for the six groundwater alternatives for comparison purposes.

BUILDING DECONTAMINATION

A. Overall Protection of Human Health and the Environment

Under Alternative BD-2, all hazardous materials would be removed from the building. Therefore, this alternative would be fully protective of public health and the environment.

Under Alternative BD-1 hazardous materials would be left in the building. Human health and the environment would remain protected as long as building security could be effectively enforced and building integrity maintained.

B. Compliance with ARARs

Alternative BD-2 would comply with the relevant action-specific ARARs. No chemical-specific ARARs exist for building contamination. By definition, no action-specific ARARs apply to the no-action alternative.

C. Long-term Effectiveness and Permanence

Alternative BD-2 would remove all hazardous materials from the building for either off-site disposal or on-site treatment and disposal, so that long-term exposure risks from the building are eliminated. Alternative BD-1 would only maintain the building in its present condition, so that hazardous materials would remain in the building. Public protection would rely on maintaining building security.

D. Reduction in Toxicity, Mobility and Volume

Alternative BD-1 provides no reduction in toxicity, mobility or volume of the contaminants. Alternative BD-2 provides for complete reduction in toxicity, mobility and volume, since all contaminated material would be removed from the building.

E. Short-term Effectiveness

Since Alternative BD-2 involves removal and transport of the contaminants from the building, there are some public exposure risks as well as environmental impacts from potential waste spills resulting from a possible transport accident during remedial activities. Implementation of Alternative BD-1 should result in no additional risks to the community or the environment as long as building security and integrity could be maintained.

F. Implementability

Both alternatives are readily implementable. Methods and services for building decontamination under Alternative BD-2 are technically feasible and readily available. Alternative BD-1 would require institutional management of the long-term building maintenance program, whereas Alternative BD-2 would not require any long-term management.

G. Cost

The present worth costs for Alternatives BD-1 and BD-2 are $4,600 and $284,900, respectively (see Table 21).

State Acceptance

NYSDEC concurs with the preferred soil, groundwater and building decontamination alternatives.

Community Acceptance

The community has expressed support for the alternatives selected for remediation of the soil and the groundwater and the decontamination of the building.

THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, both EPA and NYSDEC have determined that Alternative SC-5, Low Temperature Enhanced Volatilization, for treatment of the contaminated soil, Alternative GW-4, Air Stripping and Carbon Adsorption, for treatment of the groundwater, and Alternative BD-2, Decontamination of the AT Building, is the appropriate remedy for the American Thermostat site. The major components of the selected remedy are as follows:

- Approximately 6,500 cubic yards of soil contaminated with VOCs will be excavated from the southwestern portion of the site in the former dumping area between the AT building and Route 23. The lateral extent of the excavation will be more precisely defined by additional sampling to determine the extent of the area where contaminant soil concentrations exceed the soil cleanup levels set to protect the groundwater during the design phase of the remediation. Soil in the contaminated area will be excavated down to the water table (approximately 7 feet below the ground surface). Fugitive emissions will be controlled during the excavation by such techniques as water spraying, vapor suppression forms, etc.

- The VOCs in the soil will be treated using a low temperature enhanced volatilization technology.

- Contaminated sediments from the Rath pond will be removed and will be treated with the contaminated soils. Confirmatory sediment samples will be collected from the Schmidt and Mueller ponds and from Tributaries A and B (upgradient and downgradient of the site) during the remedial design. Analysis will be for TCL metals only. In addition, should the confirmatory sampling during the design phase indicate that the sediments in Tributary B immediately upgradient of the AT site are indeed contaminated with PCE and TCE above the soil cleanup levels, those sediments in Tributary B will also be treated with the contaminated soil. It is estimated that 300 cubic yards of contaminated sediments will be removed for treatment.

- The treated soils and sediments which will still contain some less mobile organic compounds and metals, will be tested for TCLP toxicity to determine whether they constitute a RCRA hazardous waste and will be placed back into the excavation areas from which they were removed. Clean top soil will be placed on the fill areas. These areas will be regraded.

- The treated soils and sediments will be subjected to the TCLP to determine whether all the RCRA hazardous wastes contained in them meet the LDR treatment standards (TCLP concentrations). Since the treated soils and sediments which pass the test will meet the LDR standards and will no longer contain hazardous wastes above health based levels, as determined by the risk assessment, they will not be subject to regulation under Subtitle C of RCRA (including the land disposal restrictions imposed by the Hazardous and Solid Waste Amendments to RCRA) and may be replaced into the areas from which they were removed.

- In the unlikely event that the treated soils do not pass the TCLP toxicity test, they will be further treated to meet the TCLP requirements prior to their placement in the excavated areas.

- Contaminated groundwater will be removed from the unconsolidated and bedrock aquifers by a system of extraction wells, located over the entire area of the contaminated plume. It will be treated on-site for removal of the VOCs using a combination of air stripping and carbon adsorption technologies, and the treated water will be reinjected in the ground through a reinjection system. The groundwater will be treated to drinking water standards before recharge. The exact number and location of the extraction wells, the pumping routes and the type of the reinjection system will be specified during the design phase.

- Contaminated surface water from the Rath pond will be removed and treated with the groundwater. Treated water will be used to refill the pond.

- The groundwater treatment will continue until federal and state standards for the organic contaminants have been achieved in the groundwater throughout the contaminated plume area or until a point has been reached at which contaminant concentrations in the groundwater "level off". At that point, the remedy will be reevaluated for its effectiveness.

- Hazardous dust would be removed from the building floor by dusting, vacuuming and wiping.

- The sludges from the drain pits inside the building and 18 waste oil drums from previous AT operations will be removed and shipped to an off-site facility for treatment and disposal.

- The drums containing wastes generated during the RI that have been identified as hazardous will be treated on-site with the soil and groundwater treatment systems. RI drums that contain solid matter, other than soil, will be shipped off-site for disposal at a licensed facility.

- All residuals from the treatment of the soil and of the groundwater will be shipped to an off-site RCRA hazardous waste facility.

- Air monitoring will be performed prior to, during, and following construction at the site. Air emissions from the treatment units during both the soil and groundwater remediation will meet the air emission ARARs. Environmental monitoring will be required during the life of the treatment process. In addition, monitoring of the groundwater at the site will be conducted for a period of 3 years after completion of the remediation, to ensure that the goals of the remedial action have been met.

Remediation Goals

The purpose of this response action is to reduce the present risk to human health and the environment due to the contamination of the on-site soil, to restore the groundwater underlying the site and throughout the contaminated plume to levels consistent with state and federal ARARs and to ensure protection of the ground and surface water in the vicinity of the site from the continued release of contaminants from soils. Since no federal or state ARARs exist for soil, the action level for the VOCs in soil was determined through a site-specific analysis. This analysis used fate and transport modeling to determine levels to which VOCs in soils should be reduced in order to ensure no contaminants leach into the groundwater above MCL levels. Reduction to these levels also would ensure that no excessive risk would result from human contact with soil at the site. Finally, this response action will result in decontaminating the AT building so as to make it suitable for future use.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through the removal and treatment of the organic contaminants in groundwater, using air stripping and carbon adsorption. In addition, treatment of the contaminated soils through a low temperature enhanced volatilization process will remove the most mobile wastes from the soil, resulting in the elimination of a long-term source of surface water and groundwater contamination, and it will mitigate the risks to public health and the environment associated with the migration of those contaminants off-site. There are no short-term threats associated with the selected remedy that cannot be readily controlled.

Compliance With Applicable or Relevant and Appropriate Requirements

The selected remedy of excavation and on-site low temperature enhanced volatilization of contaminated soils along with air stripping and carbon adsorption of the groundwater will comply with all chemical-, action-, and location-specific ARARs.

Cost Effectiveness

The selected remedy is cost effective because it provides overall effectiveness proportional to its cost; the net present worth value being $26,102,200. The cost of the soil treatment component of the selected remedy ($2,772,400) is only 33 percent of the cost of the excavation and on-site incineration alternative and only 15 percent of the cost of the alternative involving off-site incineration, and yet the selected remedy mitigates, as effectively as those alternatives, all the risks posed by the contaminants at the site. The cost of the groundwater component of the remedy is approximately 5.5 percent higher than the cost for the UV/oxidation alternative and 22 percent higher than the air stripping option, but it offers a much higher degree of certainty with regard to the effective removal of all the VOCs from the contaminated groundwater.

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

EPA and New York State have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final source control operable unit at the American Thermostat site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and NYSDEC have determined that this selected remedy best balances the goals of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, and cost, also considering the statutory preference for treatment as a principal element and considering state and community acceptance. With regard to the most mobile soil wastes that pose the major risks at the site, the selected remedy will offer as high a degree of long-term effectiveness and permanence as the other treatment alternatives, involving incineration, by permanently removing the source of groundwater contamination and reducing the risk to human health and the environment. The selected remedy will result in significant reductions in the toxicity of the contaminated material (comparable to the reductions achieved by incineration) through thermal destruction of the organic contaminants. The selected remedy is as effective as the other remedial action alternatives and, compared to the off-site incineration alternative, in the short-term it offers the additional advantage of on-site treatment thereby reducing the potential risks to residents along transporta-tion routes. Also, compared to the on-site incineration, the selected remedy offers the advantage of reduced stack emissions and release of particulates, thereby reducing short-term risks to residents. Implementing the selected remedy is the least costly treatment option that is protective of public health and the environment.

The decision to treat the contaminated soil is consistent with program requirements that state that highly toxic and mobile wastes should be treated to ensure the long-term effectiveness of a remedy. Since all of the alternatives provide approximately the same long-term effectiveness, the toxicity, mobility, volume reductions achieved, and implementability are the major factors that provide the basis for the selection of the soil portion of the remedy are short-term effectiveness and cost. The selected remedy can be implemented with less risk to the area residents and at less cost than the other remedial action alternatives and, therefore, is determined to be the most appropriate solution for the contaminated soils at the American Thermostat site.

The selected remedy for the groundwater offers as high a degree of long-term effectiveness and permanence as the other treatment options of air stripping and UV/oxidation, and it reduces the toxicity, mobility and volume to a greater extent than air stripping or UV/oxidation through the destruction of organic contaminants.

The selected remedy is as effective in the short-term as air stripping and UV/oxidation. With regard to implementability, the components of the selected remedy and of the air stripping alternative are easily implemented, proven technologies and are readily available. In contrast, the treatment technology for UV/oxidation, although successful in pilot runs, has had limited use to date. In addition, UV/oxidation is currently available from only two sources nationwide.

The cost of the selected remedy is slightly higher than the other treatment options (22% higher than the cost of the air stripping option and only 5.5% higher than the UV oxidation option).

Since all treatment options for the groundwater are reasonably comparable with respect to long-term effectiveness, short-term effectiveness, and cost, the major consideration that provides the basis for the selection of the air-stripping and carbon adsorption alternative as the remedy for the groundwater is implementability when compared to the UV/oxidation option, and toxicity reduction when compared to the air stripping option. The technology for the selected remedy is proven and readily available, and the carbon adsorption system when added to the air stripping option ensures complete removal of contaminants.

Preference for Treatment as a Principal Element

The selected remedy addresses the principal threats posed by the site through the use of treatment technologies by treating the VOC-contaminated soils in a low temperature enhanced volatilization unit and by treating the groundwater by air stripping and carbon adsorption. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

APPENDIX 1

TABLES

TABLE 1

SURFACE SOIL SAMPLE ANALY. .AL SUMMARY

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/kg)				
Methylene Chloride	2/19	3.0	7.0/SS-9	5.0
1,2-Dichloroethene (Total)	2/19	35.0	36.0/SS-2	35.5
Trichloroethene	6/19	6.0	9,300.0/SS-3	3,084.8
Tetrachloroethene	16/19	3.0	2,700,000.0/SS-3	547,096.6
BNA (ug/kg)				
Phenanthrene	3/11	15.0	160.0/SS-	84.6
Fluoranthrene	2/11	70.0	160.0/SS-3	115.0
Pyrene	3/11	51.0	270.0/SS-3	129.0
Benzo(a)anthracene	2/11	41.0	140.0/SS-3	90.5
Bis(2-ethylhexyl)phthalate	3/11	58.0	3,800.0/SS-14	119.3
Chrysene	3/11	11.0	170.0/SS-3	73.6
Benzo(b)fluoranthene	3/11	22.0	170.0/SS-3	75.3
Benzo(k)fluoranthene	2/11	45.0	220.0/SS-3	132.5
Benzo(a)pyrene	3/11	12.0	160.0/SS-3	69.6
Indeno(1,2,3-CD)pyrene	1/11	140.0	140.0/SS-3	140.6
Benzo(g,h,i)perylene	1/11	190.0	190.0	
Pest/PCB (ug/kg)				
BETA-BHC	1/11	100.0	100.0/SS-4	100.0
Inorganics (mg/kg)				
Aluminum	20/20	7,370.0	16,200.0/SS-11	9314.0
Arsenic	20/20	3.4	28.0/SS-15	7.2
Barium	20/20	30.0	106.0/SS-15	45.7
Beryllium	2/4	0.4	0.4/SS-13	0.4
Cadmium	6/20	0.9	36.0/SS-11	8.0
Calcium	18/18	524.0	28,700.0/SS-5	9,884.1
Chromium	20/20	10.0	19.0/SS-10	13.6
Cobalt	19/19	5.7	18.0/SS-12	9.2
Copper	16/26	11.0	201.0/SS-3	35.8
Iron	20/20	14,400.0	32,400.0/SS-11	19,655.0
Lead	20/20	8.2	87.0/SS-12	24.4
Cyanide	2/20	0.8	1.1	0.9
Magnesium	20/20	1,940.0	9,360.0/SS-9	4,366.0
Manganese	20/20	171.0	786.0/SS-9	451.1
Nickel	20/20	15.0	38.0/SS-3	24.3
Potassium	9/14	308.0	1,170.0/SS-3	688.6
Selenium	5/20	0.4	0.9/SS-9	0.7
Sodium	10/15	279.0	1,170.0/SS-9	584.4
Vanadium	20/20	10.0	22.0/SS-14	16.0
Zinc	18/20	44.0	118.0/SS-7	77.6

(1) *Frequency = number of detections per number of valid analyses.*

TABLE 2

WELL BORING SAMPLE ANALYTICAL SUMMARY: OFF-SITE

Compound	Frequency(1)	Minimum Detected Concentrarion	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/kg)				
Methylene Choloride	3/6	7.0	57.0/WB-3	25.3
Acetone	6/6	27.0	290.0/WB-3	122.8
Toluene	4/6	14.0	44.0/WB-2	29.2
Total Xylenes	2/6	4.0	4.0/WB-1	4.0
Inorganics (ug/kg)				
Aluminum	6/6	7,270.0	11,100.0/WB-3	9,168.3
Arsenic	6/6	4.1	10.4/WB-3	6.2
Barium	1/1	45.1	45.1/WB-1	45.1
Beryllium	4/4	1.3	1.3/WB-2	1.3
Calcium	6/6	1,610.0	51,300.0/WB-1A	27,256.6
Chromium	6/6	9.8	19.1/WB-1	15.6
Cobalt	2/2	11.6	15.0/WB-3	13.3
Copper	6/6	18.4	58.6/WB-2	31.4
Iron	6/6	17,300.0	27,900.0/WB-1	22,666.6
Lead	6/6	7.3	11.6/WB-1	9.5
Magnesium	6/4	4,670.0	9,050.0/WB-1A	6,770.0
Manganese	6/4	161.0	822.0/WB-2	566.0
Nickel	6/4	23.5	39.1/WB-3	27.4
Potassium	2/1	1,100.0	1,130.0/WB-2	1,115.0
Vanadium	5/5	11.2	16.9/WB-1	13.5
Zinc	6/6	50.8	80.8/WB-1	66.0

(1) Frequency = number of detections per number of valid analysis.

TABLE 23

WELL BORING SAMPLE ANALYTICAL SUMMARY: ON-SITE

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/kg)				
Acetone	2/4	53.0	71.0/WB-5	62.0
Tetrachloroethene	2/4	31.0	18,000.0/WB-5	9,015.5
Inorganics (ug/kg)				
Aluminum	4/4	7,700.0	11,400.0/WB-5	9,397.5
Arsenic	4/4	7.6	12.7/WB-5	9.6
Barium	1/1	45.7	45.7/WB-4	45.7
Beryllium	6/4	1.2	1.3/WB-5	1.2
Calcium	3/3	1,480.0	37,600.0/WB-5	21,693.3
Chromium	4/4	12.5	16.2/WB-4	14.9
Cobalt	2/2	11.0	13.5/WB-5	12.2
Copper	4/4	22.8	65.1/WB-4	35.7
Iron	4/4	20,000.0	25,900.0/WB-5	23,325.0
Lead	4/4	9.6	19.4/WB-5	13.0
Magnesium	4/4	3,040.0	5,710.0/WB-4	3,912.5
Manganese	4/4	602.0	912.0/WB-4	751.2
Nickel	4/4	22.4	28.0/WB-4	25.6
Potassium	1/1	1,150.0	1,150.0/WB-4	1,150.0
Vanadium	3/3	11.1	17.0/WB-5	13.6
Zinc	4/4	60.1	81.2/WB-5	68.2

(1) Frequency = number of detections per number of valid analysis.

TABLE 4

BUILDING FOUNDATION BORING SAMPLE ANALYTICAL SUMMARY

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/kg)				
Methylene Chloride	1/12	47.0	47.0/BF-4	47.0
Acetone	6/12	22.0	840.0/BF-4	241.8
Carbon Disulfide	1/9	0.6	0.6/BF-2	0.6
1,1,1-Trichloroethane	2/12	0.7	1.0/BF-5	0.8
Tetrachloroethene	6/12	4.0	390.0/BF-4	71.3
Toluene	7/12	0.7	74.0/BF-4	26.2
Ethylbenzene	2/12	1.0	3.0/BF-5	2.0
Total Xylenes	3/12	1.0	13.0/BF-5	6.3
BNA (ug/kg)				
Bis(2-ethylhexyl)phthalate	2/3	600.0	1,100.0/BF-5	850.0
Pest/PCB (ug/kg)				
BETA-BHC	1/3	6.4	6.4/BF-5	6.4
Arochlor 1260	1/3	510.0	510.0/BF-5	510.0
Inorganics (mg/kg)				
Aluminum	11/11	6,880.0	13,700.0/BF-5	9,921.8
Arsenic	11/11	3.8	13.2/BF-4	7.8
Barium	5/5	46.6	65.8/BF-5	54.6
Beryllium	7/7	1.2	1.4/BF-4	1.2
Cadmium	1/9	1.5	1.5/BF-4	1.5
Calcium	9/9	1,310.0	36,300.0/BF-4	9,580.0
Chromium	11/11	11.9	22.7/BF-5	15.3
Cobalt	6/6	11.5	13.9/BF-2	12.5
Copper	8/8	10.8	44.7/BF-4	29.5
Iron	11/11	19,200.0	29,500.0/BF-2	23,390.9
Lead	11/11	10.2	30.8/BF-3	17.0
Magnesium	10/11	2,510.0	4,600.0/BF-5	3,365.0
Manganese	11/11	516.0	1,170.0/BF-2	781.8
Nickel	11/11	19.2	31.3/BF-5	23.9
Vanadium	9/9	10.8	23.9/BF-5	16.2
Zinc	11/11	37.2	79.1/BF-5	59.7

(1) Frequency = number of detections per number of valid analysis.

TABLE 5

GROUNDWATER SAMPLE ANALYTICAL SUMMARY: ON-SITE

Compound	Frequency (1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/l)				
Vinyl Chloride	2/15	19.0	150.0/BF-4	84.5
Chloroethane	1/15	6.0	6.0/WB-5	6.0
1,1-Dichloroethene	5/15	0.0	2.0/WB-4	0.6
1,2-Dichloroethene (Total)	7/15	1.0	9.0/I-29	5.0
Chloroform	2/15	0.9	6.0/BF-4	3.4
1,2-Dichloroethane	2/15	4.0	5.0/WB-4	4.5
1,1,1-Trichloroethane	1/15	1,500.0	1,500.0/R-14	1,500.0
Trichloroethene	10/15	0.9	440.0/BF-4	230.0
Tetrachloroethene	15/15	4.0	31,000.0/R-14	7,712.8
Toluene	2/14	2.0	3.0/WB-4	2.5
1,1,2,2-Tetrachloroethane	3/15	26.0	100.0/I-29	57.3
BNA (ug/l)				
N-Nitrosodiphenylamine	5/7	2.0	14.0	5.6
Inorganics (ug/l)				
Aluminum	15/15	557.0	326,000.0/R-14	51,686.4
Antimony	1/13	119.0	119.0/R-14	119.0
Arsenic	2/3	109.0	245.0/R-14	177.0
Barium	3/13	257.0	2,490.0/R-14	1,685.6
Beryllium	3/12	5.9	20.2/R-14	15.2
Cadmium	2/13	6.7	32.2/R-14	19.4
Calcium	12/12	5,960.0	106,000.0/BF-4	36,060.0
Chromium	12/14	11.0	521.0/R-14	117.0
Cobalt	3/8	51.2	641.0/R-14	440.0
Copper	10/11	36.0	629.0/R-14	180.3
Iron	10/10	24,200.0	658,000.0/R-14	173,780.0
Lead	15/15	27.2	1,610.0/R-14	303.4
Magnesium	9/9	6,930.0	146,000.0/R-14	41,794.4
Manganese	15/15	171.0	6,120.0/R-14	1,607.3
Mercury	1/15	0.6	0.6/R-14	0.6
Nickel	6/11	53.4	1,080.0/R-14	398.8
Potassium	3/7	6,980.0	30,400.0/R-14	18,593.3
Sodium	10/10	18,900.0	142,000.0/MW-4	96,460.0
Vanadium	2/5	107.0	458.0/R-14	282.5
Zinc	15/15	294.0	4,960.0/R-14	1,206.5

(1) Frequency = number of detections per number of valid analysis.

TABLE 6

GROUNDWATER SAMPLE ANALYTICAL SUMMARY: OFF-SITE

Compound	Frequency(1)	Minimum Detected Concentration Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/l)				
Chloromethane	1/29	2.0	2.0/WB-1A	2.0
Methylene Chloride	3/16	3.0	4.0/R-26	3.3
1,1-Dichloroethene	4/19	0.6	0.2/R-19	0.1
1,2-Dichloroethene (Total)	5/29	0.0	2.4/R-6	0.6
Chloroform	3/29	0.9	220.0/R-11	82.3
1,2-Dichloroethane	5/29	3.0	4.0/WB-3	3.4
Carbon Tetrachloride	1/29	2.0	2.0/R-16	2.0
Trichloroethene	11/28	0.0	85.0/R-6	15.7
2-Hexanone	2/26	4.0	10.0/WB-1A	7.0
Tetrachloroethene	18/29	0.0	1,800.0/R-11	374.2
Toluene	3/27	2.0	6.0/R-26	4.3
1,1,2,2-Tetrachloroethane	1/29	4.0	4.0/R-19	4.0
Inorganics (ug/l)				
Aluminum	19/21	165.0	163,000.0/WB-1A	26,342.6
Antimony	1/24	68.9	68.9/WB-3	68.9
Arsenic	5/11	10.2	60.4/WB-3	36.7
Barium	7/9	115.0	1,080.0/WB-2	481.1
Beryllium	4/23	5.2	7.8/WB-3A	6.7
Cadmium	7/24	5.1	23.4/R-31	10.4
Calcium	25/25	5,750.0	507,000.0/WB-2	77,629.6
Chromium	11/24	9.3	511.0/WB-2	105.6
Cobalt	3/23	90.8	179.0/WB-3	142.6
Copper	10/21	32.0	2,870.0/R-11	656.7
Iron	25/25	300.0	343,000.0/WB-2	94,502.0
Lead	27/27	10.6	420.0/R-26	137.7
Magnesium	20/20	5,450.0	130,000.0/WB-2	23,121.5
Manganese	28/29	30.0	10,900.0/WB-2	1,340.6
Mercury	1/29	0.2	0.2/WB-1A	0.2
Nickel	3/20	250.0	469.0/WB-2	369.6
Potassium	8/12	838.0	45,600.0/WB-1A	3,824.7
Sodium	26/26	7,370.0	175,000.0/MW-5	56,206.5
Vanadium	4/26	50.1	329.0/WB-2	231.7
Zinc	28/26	24.7	2,020.0/R-19	623.7

(1) Frequency = number of detections per number of valid analysis.

TABLE 7

SURFACE WATER SAMPLE ANALYTICAL SUMMARY: ON-SITE

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/l)				
Vinyl Chloride	2/5	5.0	7.0/SW-8	6.0
Methylene Chloride	1/5	210.0	210.0	210.0
Acetone	1/5	4.0	4.0	4.0
1,1-Dichloroethene	2/5	0.7	2.0	1.3
1,2-Dichloroethene (Total)	2/5	270.0	640.0//SW-8	455.0
1,2-Dichloroethane	1/5	3.0	3.0	3.0
Trichloroethene	4/5	2.0	320.0/SW-26	127.2
1,1,2-Trichloroethane	1/5	3.0	3.0	3.0
Tetrachloroethene	1/5	0.8	48,000.0/SW-8	9,937.9
Toluene	1/5	1.0	1.0/SW-30	1.0
BNA (ug/l)				
Benzoic Acid	1/1	4.0	4.0/SW-26	4.0
Inorganics (ug/l)				
Aluminum	2/3	483.0	563.0/SW-30	523.0
Calcium	5/5	6,160.0	71,100.0/SW-26	36,844.0
Copper	2/4	54.7	77.5/SW-28	66.1
Iron	2/2	703.0	1,360.0/SW-30	1,031.5
Magnesium	1/1	8,470.0	8,470.0/SW-29	8,470.0
Sodium	5/5	41,000.0	145,000.0/SW-28	90,940.0
Zinc	2/3	638.0	3,760.0/SW-28	2,199.0

(1) Frequency = number of detections per number of valid analyses.

TABLE 8

SURFACE WATER SAMPLE ANALYTICAL SUMMARY: OFF-SITE

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/l)				
Vinyl Chloride	4/17	0.3	31.0/SW-21	13.4
Methylene Chloride	2/14	5.0	6.0/SW-18	5.5
Carbon Disulfide	1/17	15.0	15.0/SW-27	15.0
1,1-Dichloroethene	3/17	0.1	0.4/SW-20	0.2
1,2-Dichloroethene (Total)	4/17	7.0	510.0/SW-21	220.2
Trichloroethene	5/17	0.0	200.0/SW-21	80.8
Tetrachloroethene	5/17	3.0	1,000.0/SW-20	472.6
BNA (ug/l)				
Phenanthrene	1/1	13.0	13.0/SW-27	13.0
Anthracene	1/1	3.0	3.0/SW-27	3.0
Fluoranthrene	1/1	18.0	18.0/SW-27	18.0
Pyrene	1/1	13.0	13.0/SW-27	13.0
Benzo(a)anthracene	1/1	6.0	6.0/SW-27	6.0
Chrysene	1/1	5.0	5.0/SW-27	5.0
Di-n-octyl Phthalate	1/1	1.0	1.0/SW-27	1.0
Benzo(b)fluoranthene	1/1	3.0	3.0/SW-27	3.0
Benzo(k)fluoranthene	1/1	4.0	4.0/SW-27	4.0
Benzo(a)pyrene	1/1	4.0	4.0/SW-27	4.0
Indeno(1,2,3-CD)pyrene	1/1	2.0	2.0/SW-27	2.0
Benzo(G,H,I)perylene	1/1	4.0	4.0/SW-27	4.0
Inorganics (ug/l)				
Aluminum	5/10	21.0	1,060.0/SW-22	508.8
Barium	3/5	8.0	26.0/SW-22	14.0
Cadmium	2/17	6.7	8.7/SW-19	7.7
Calcium	17/7	18,900.0	80,600.0/SW-27	39,094.1
Chromium	1/17	11.0	11.0/SW-22	11.0
Copper	2/14	3.0	7.0/SW-22	5.0
Iron	7/10	101.0	1,630.0/SW-22	427.5
Lead	3/15	2.3	7.3/SW-27	4.9
Magnesium	11/11	3,150.0	10,200.0/SW-27	5,629.0
Manganese	10/12	18.3	407.0/SW-18	116.8
Mercury	1/15	0.3	0.3/SW-22	0.3
Potassium	6/7	900.0	5,920.0/SW-25	2,698.3
Silver	2/17	5.8	18.0/SW-18	11.9
Sodium	17/17	4,000.0	77,100.0/SW-27	26,110.5
Zinc	4/15	21.0	68.8/SW-23	33.9

(1) Frequency = number of detections per number of valid analyses.

TABLE [illegible]

SEDIMENT SAMPLE ANAL [illegible] AL SUMMARY

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (ug/kg)				
Vinyl Chloride	1/9	37.0	37.0/SW-20	37.0
Methylene Chloride	1/9	26.0	26.0/SW-6	26.0
Acetone	3/7	21.0	91.0/SW-7	52.0
1,2-Dichloroethene (Total)	4/9	3.0	530.0/SW-20	175.7
2-Butanone	2/9	6.0	13.0/SW-20	9.5
Trichloroethene	3/9	4.0	32.0/SW-20	20.6
Tetrachloroethene	3/9	12.0	53.0/SW-22	26.6
BNA (ug/kg)				
4-Methylphenol	1/7	180.0	180.0/SW-20	180.0
Phenanthrene	3/7	43.0	340.0/SW-6	147.6
Di-n-butylphthalate	1/7	31.0	31.0/SW-20	31.0
Fluoranthrene	1/7	230.0	230.0/SW-6	230.0
Pyrene	1/7	220.0	220.0/SW-6	220.0
Benzo(a)anthracene	2/7	35.0	50.0/SW-20	42.5
Chrysene	2/7	53.0	88.0/SW-20	70.5
Benzo(b)fluoranthene	2/7	46.0	79.0/SW-20	62.5
Benzo(k)fluoranthene	2/7	54.0	76.0/SW-20	65.0
Benzo(a)pyrene	2/7	43.0	69.0/SW-20	56.0
Inorganics (mg/kg)				
Aluminum	11/11	7,260.0	21,400.0/SW-8	12,452.7
Antimony	1/10	27.0	27.0/SW-18	27.0
Arsenic	11/11	1.9	36.1/SW-5	11.0
Barium	10/10	49.0	120.0/SW-19	77.7
Beryllium	7/11	0.5	2.7/SW-8	1.4
Cadmium	4/11	2.2	3.4/SW-20	2.9
Calcium	9/9	1,330.0	14,000.0/SW-23	4,576.6
Chromium	11/11	9.5	30.8/SW-23	18.9
Cobalt	4/5	8.1	12.0/SW-18	9.5
Copper	10/10	16.0	144.0/SW-8	51.3
Iron	11/11	15,000.0	45,000.0/SW-8	24,672.7
Lead	9/9	12.0	114.0/SW-20	54.2
Magnesium	11/11	1,930.0	7,130.0/SW-8	3,652.7
Manganese	11/11	90.0	3,150.0/SW-8	812.4
Mercury	2/11	3.9	12.0/SW-19	7.9
Nickel	10/11	12.0	88.7/SW-8	32.1
Potassium	4/5	227.0	601.0/SW-22	405.5
Selenium	1/6	2.8	2.8/SW-23	2.8
Silver	2/11	16.0	100.0/SW-18	58.0
Sodium	5/5	14.5	637.0/SW-20	371.1
Vanadium	11/11	10.0	32.7/SW-8	17.2
Zinc	11/11	42.0	1,530.0/SW-8	234.5

(1) Frequency = number of detections per number of valid analyses.

TABLE 10

SLUDGE SAMPLE ANALYTICAL SUMMARY

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration
Volatiles (mg/kg)				
1,2-Dichloroethene (Total)	3/5	6.8	1,000.0/SL-1	352.6
Trichloroethene	1/5	5.6	5.6/SL-1	5.6
Tetrachloroethene	5/5	1.0	28.0/SL-1	10.1
BNA (mg/kg)				
Di-n-Butyl phthalate	3/5	21.0	44.0/SL-1	36.0
Butyl Benzyl Phthalate	5/5	2.0	650.0/SL-1	305.4
Bis(2-Ethylhexyl)Phthalate	4/5	5.0	240.0/SL-1	143.7
Di-n-Octyl Phthalate	1/5	11.0	11.0/SL-1	11.0
Pest/PCB (mg/kg)				
Arochlor 1254	4/5	7.8	22.0	14.9
Inorganics (mg/kg)				
Aluminum	5/5	8,430.0	24,400.0/SL-3	17,186.0
Barium	4/5	289.0	3,150.0/SL-1	1,492.2
Cadmium	4/5	19.0	160.0/SL-1	82.0
Calcium	5/5	4,620.0	45,700.0/SL-3	18,610.0
Chromium	5/5	29.0	764.0/SL-1	306.4
Copper	5/5	4,100.0	32,700.0/SL-1	13,922.0
Iron	5/5	14,800.0	72,600.0/SL-1	39,880.0
Lead	5/5	422.0	1,880.0/SL-1	1,111.8
Cyanide	1/5	2.0	2.0	2.0
Magnesium	5/5	2,860.0	13,900.0/SL-1	9,342.0
Manganese	5/5	110.0	555.0/SL-3	306.6
Mercury	5/5	1.6	4.8/SL-2	2.3
Nickel	5/5	140.0	3,020.0/SL-1	1,219.0
Zinc	5/5	2,690.0	12,800.0/SL-1	7,304.0

(1) Frequency = number of detections per number of valid analyses.

TABLE 11

DRUM SAMPLE ANALYTICAL SUMMARY

Compound	Frequency(1)	Minimum Detected Concentration	Maximum Detected Concentration	Mean Detected Concentration
Volatiles (ug/l)				
Trichloroethene	2/8	210.0	230.0	220.0
BNA (ug/l)				
Phenanthrene	1/6	6.9	6.9	6.9
Pest/PCB (ug/l)				
Chlordane	1/6	20.0	20.0	20.0
Inorganics (ug/l)				
Aluminum	1/8	3,540.0	3,540.0	3,540.0
Antimony	7/8	12.0	12.0	12.0
Arsenic	7/8	2.0	2.0	2.0
Calcium	2/8	1,140.0	1,190.0	1,165.0
Chromium	2/8	2.0	2.0	2.0
Copper	2/8	5.0	53.0	29.0
Iron	3/8	386.0	6,520.0	2,688.6
Lead	1/8	100.0	100.0	100.0
Mercury	8/8	0.0	2.8	0.4
Nickel	7/8	40.0	40.0	40.0
Selenium	7/8	1.0	1.0	1.0

(1) Frequency = number of detections per number of valid analyses.

EXHIBIT 12

AMERICAN THERMOSTAT SITE
SUMMARY OF INDICATOR CHEMICALS IN AREA MATRICES

	Groundwater	Surface/ Subsurface Soils	Surface Water	Sediments
VOLATILES				
Tetrachloroethylene	X	X	X	X
Trichloroethylene	X	X	X	X
Chloroform	X	-	-	-
1,2 Dichloroethane	X	-	-	-
1,1-Dichloroethene	X	-	-	-
1,1,2,2-Tetrachloroethane	X	-	-	-
Vinyl Chloride	X	-	X	X
INORGANICS				
Arsenic	X	-	-	-
Cadmium*	X	-	-	-
Chromium*	X	-	-	-
Lead*	X	X	-	X
BASE NEUTRAL/ACID EXTRACTABLES				
Bis(2-ethylhexyl)Phthalate	-	X	-	-
N-Nitrosodiphenylamine	X	-	-	-

X: Indicates compound was detected above site and relevant background levels and has been selected as an indicator for the medium.

-: Indicates compound was not selected as an indicator for the medium.

*: Indicates noncarcinogenic indicator chemical. All remaining contaminants listed above are potential carcinogens.

TABLE 13

AMERICAN THERMOSTAT SITE

EXPOSURE ASSUMPTIONS FOR DIRECT CONTACT WITH SURFACE WATER AND SEDIMENTS

Parameter	Most Probable Case	Realistic Worst Case
Age During Exposure	6-15 yrs	6-15 yrs
Duration of exposure	5 yrs	9 yrs
Frequency of exposure (events per year)	36 days/yr	60 days/yr
Average Body Weight	35 kg[a]	35 kg[a]
Sediments		
Sediment Ingestion Rate	25 mg/dy	100 mg/day
Gastrointestinal Adsorption	50%	100%
Sediment Adherence Rate Surface area exposed mg/cm^2	0.5 mg/cm^2	1.0
Dermal Adsorption Rate	0.6%	0.12%
Surface Water		
Amount Accidently Ingested	100 ml	150 ml
Surface Area Exposed		
On-Site Drainage Areas	1200 cm^2	4890 cm^2
Schmidt/Roth Ponds	7700 cm^2	7700 cm^2
Hours Exposed	1	3

SOURCES:
1 Anderson, et al., 1985
2 USEPA <u>Exposure Assessment Manual</u>, 1988

NOTE: Average and upper bound surface water evaluations assume whole body exposures assuming average and upper 90%ile body surface areas (for children). Average sediment exposure evaluations assume exposure to hands and feet only; worst-case evaluations assume exposures to hands, legs and feet.

TABLE 14

AMERICAN THERMOSTAT SITE

ASSUMPTIONS USED TO ESTIMATE EXPOSURES TO ON-SITE SURFACE SOILS (0-1')
DIRECT CONTACT AND INHALATION PATHWAYS
CURRENT USE SCENARIOS: CHILDREN

Parameter	Average Exposure Best Estimate	Maximum Case	Source
Age During Exposure	6-15 yrs	6-15 yrs	——
Duration of Exposure	5 yrs	9 yrs	——
Frequency[1]	72 events/yr	150 events/yr	——
Average Body Weight[2]	35 kg	27 kg	USEPA, 1985
Soil Ingestion Rate[3]	100 mg/event	100 mg/event	USEPA, 1989
Ingestion Bioavailability[4]	50%	100%	Poiger and Schlatter, 1980
Dermal Contact Rate	752.5 mg/event	5500 mg/event	——
Soil Adherence Rate	0.5 mg/cm^2	1.0 mg/cm^2	Schaum, 1985
Surface Area Exposed Exposed	1505 cm^2	5500 cm^2	USEPA, 1985
Dermal Absorption Factor[5]	0.6%	1.2%	Yang et al., 1986a, 1986b
Respiratory Volume (m^3/hr)	1.5 m^3/hr	5.7 m^3/hr	USEPA, 1988
Inhalation Absorption Factor	25%	100%	USEPA, 1988

[1] Frequencies given for average exposure scenarios assume a child visits the site 2 days/week for 9 months of the year. Assumed maximum values are approximately two times greater.

[2] Mean body weights for assumed age distributions. Source: Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessments (USEPA, 1985).

[3] Soil ingestion rates, assumed to be 100 mg/day for all age groups, were taken from recently promulgated USEPA guidance (1989).

[4] Absorption factors are based on studies of TCDD (dioxin) absorption from soil and fly ash (Poiger and Schlatter, 1980).

[5] Dermal absorption factors cited above also include a dermal bioavailability factor of 15% per Poiger and Schlatter (1980).

TABLE 15

AMERICAN THERMOSTAT SITE

ASSUMPTIONS USED TO ESTIMATE EXPOSURES TO SURFACE AND SUBSURFACE SOILS (0-1') DIRECT CONTACT AND INHALATION PATHWAYS FUTURE INDUSTRIAL USE SCENARIOS: ADULT WORKERS

Parameter	Average Exposure Best Estimate	Maximum Case	Source
Age During Exposure	Adult	Adult	——
Duration	10 yrs	40 yrs	——
Frequency[1]	230 d/yr	230 dys/yr	——
Average Body Weight	70 kg	70 kg	USEPA, 1985
Soil Ingestion Rate[2]	100 mg/day	100 mg/day	USEPA, 1989
Ingestion Bioavailability[3]	50%	100%	Poiger & Schlatter, 1980
Dermal Contact Rate	1080 mg/event	8700 mg/event	——
Soil Adherence Rate	0.5 mg/cm^2	1.0 mg/cm^2	Schaum, 1985
Surface Area Exposed	2160 cm^2	8700 cm^2	USEPA, 1985
Dermal Absorption Factor[4]	0.6%	1.2%	Yang et al., 1984a, 1986b
Respiratory Volume	1.3 m^3/hr	7.1 m^3/hr	USEPA, 1988
Inhalation Absorption Factors	25%	100%	USEPA, 1988

[1] Frequencies for both average and maximum exposure scenarios assume an adult works on-site in the absence of remediation 5 days/week for 11.5 months (accounts for 2 week vacation).

[2] Soil ingestion rates, assumed to be 100 mg/day for all age groups, were taken from recently promulgated USEPA guidance (1989).

[3] Absorption factors are based on studies of TCDD (dioxin) absorption from soil and fly ash (Poiger and Schlatter, 1980).

[4] Dermal absorption factors cited above include a dermal bioavailability factor of 15% per Poiger and Schlatter (1980).

TABLE 16
AMERICAN THERMOSTAT SITE
SURFACE SOIL VOLATILIZATION PATHWAYS: EXPOSURE POINT CONCENTRATIONS
EMISSION RATE CALCULATIONS FOR SURFACE SOILS

MISSION RATE EQUATION: E = D*Cs*A*(P^4/3)M/d
ARAMETER DEFINITIONS:
E = emission rate of compound from soil (g/sec)
D = diffusion coefficient of compound in air (cm^2/sec)
Cs = saturation vapor concentration of componenet (g/cm^3)
A = source area (cm^2)
P = total soil porosity (dimensionless)
M = fraction of compound in the soil/waste (g mole/g mole)
d = effective depth of soil cover: 15 cm (0.5 ft)

PARAMETER	D DIFF COEF CM^2	VAPOR PRESSURE mm Hg	MOL WGHT g/mole	Cs SATURATION VAPOR PR G/CM^3	A SOURCE AREA cm^2	P SOIL POROSITY	P^4/3 SOIL POROSITY ^4/3	M CONTAM FRACTION g/g	d DEPTH SOIL cm	E EMISSION RATE g/sec	Oy LATERAL DISPERSION COEF (m)	Oz VERTICAL DISPERSION COEF (m)	WIND SPEED m/sec	C GROUND LEVEL CONCENTRATION g/m^3
G MEAN PCE	0.07404	14	165.83	0.0001270	9000000	0.3	0.200910	2.41E-06	15	2.73E-06	7	4.7	4.6	5.74E-09
G MEAN TCE	0.08116	57.9	131.39	0.0004163	9000000	0.3	0.200910	9.00E-09	15	3.66E-08	7	4.7	4.6	7.71E-11
UPPER 25% PCE	0.07404	14	165.83	0.0001270	9000000	0.3	0.200910	1.20E-03	15	1.36E-03	7	4.7	4.6	2.86E-06
UPPER 25% TCE	0.08116	57.9	131.39	0.0004163	9000000	0.3	0.200910	7.00E-09	15	2.85E-08	7	4.7	4.6	6.00E-11
MAXIMUM PCE	0.07404	14	165.83	0.0001270	9000000	0.3	0.200910	2.70E-03	15	3.06E-03	7	4.7	4.6	6.44E-06
MAXIMUM TCE	0.08116	57.9	131.39	0.0004163	9000000	0.3	0.200910	9.30E-06	15	3.79E-05	7	4.7	4.6	7.97E-08

GROUND LEVEL CONCENTRATION EQUATION: C = E\(Oy*Oz*3.14*WS)
PARAMETER DEFINITIONS:
C = concentration of substance in g/m^3 (assumed 100m downwind of the site)
E = emission rate of compound from soil (g/sec)
Oy = dispersion coefficient in the lateral direction (m) [Assumes Stability Class D]
Oz = dispersion coefficient in the vertical direction (m) [Assumes Stability Class D]
WS = wind speed, 4.7 m/sec
Pi = 3.14

d = effective depth of soil cover: 15 cm (0.5 ft)

EXHIBIT 17

AMERICAN THERMOSTAT SITE

CANCER POTENCY FACTORS AND WEIGHT OF EVIDENCE CLASSIFICATIONS: CARCINOGENS

CHEMICAL	CANCER POTENCY FACTOR (mg/kg/day) ORAL	INHALATION	WEIGHT OF EVIDENCE[1]	SOURCE[2]
ARSENIC	1.8E+00	1.5E+01	A	CAG
CADMIUM	NA	6.1E+00	B1	CAG
CHROMIUM (HEXAVALENT)	NA	4.1E+01	A	CAG
N-NITROSODIPHENYLAMINE	4.9E-03	NA	B2	CAG
1,2 DICHLOROETHANE	9.1E-02	9.1E-02	B2	CAG
1,1 DICHLOROETHYLENE	5.8E-01	1.16E+00	C	HEA
1,1,2,2 TETRACHLORO-ETHANE	2.0E-01	2.0E-01	C	CAG
TETRACHLORO-ETHYLENE	5.1E-02	NA	B2	CAG
TRICHLORO-ETHYLENE	1.1E-02	4.6E-03	B2	CAG

[1] Cancer potency factor for each exposure route as defined by IRIS (EPA, 1989). EPA Weight of Evidence classifications are defined as follows:

Group A - Human Carcinogen. Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.

Group B1 - Probable Human Carcinogen. Limited evidence of carcinogenicity in humans from epidemiologic studies.

Group B2 - Probable Human Carcinogen. Sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogencity in humans.

Group C - Possible Human Carcinogen. Limited evidence of carcinogenicity in animals.

[2] Source: HEA = Health Effects Assessment Document
CAG = Carcinogen Assessment Group

NOTE: For those compounds where inhalation criteria are not available, the oral criteria will be used as the cancer potency factor in evaluating potential risk posed by those compounds.

EXHIBIT 18

AMERICAN THERMOSTAT SITE
TOXICITY CRITERIA USED FOR NONCARCINOGENIC CHEMICALS

CHEMICAL	REFERENCE DOSE (mg/kg/day)	USEPA SOURCE
CADMIUM (WATER)	5.0E-04	RfD
CADMIUM (FOOD)	1.0E-03	RfD
ARSENIC	1.0E-03	RfD
MERCURY (INORGANIC)	2.0E-03	HEA
CHROMIUM (HEXAVALENT)	5.0E-03	RfD
CHLOROFORM	1.0E-02	RfD
TETRACHLOROETHYLENE	1.0E-02	RfD
BIS(2-ETHYL-HEXYL) PHTHALATE	2.0E-02	RfD
CHROMIUM (TRIVALENT)	1.0E+02	RfD
LEAD	1.1E-03	MCL

NOTES:

1) RfD VALUES PERTAIN TO CHRONIC INTAKE.

2) SOURCES ARE EITHER USEPA REFERENCE DOSE WORK GROUP (RfD) OR USEPA HEALTH EFFECTS ASSESSMENT GROUP (HEA)

3) CHEMICALS IN BOLDFACE ALSO EXHIBIT CARCINOGENIC TOXICITY

TABLE 19
AMERICAN THERMOSTAT SITE
PROPOSED GROUNDWATER ACTION LEVELS
CURRENT AND FUTURE SITE USES:
CARCINOGENS AND NONCARCINOGENS

	On-Site Concentrations		Off-Site Concentrations				"Recommeded" Action Level		Carcinogenic Contaminants At GW Concentration: Action Level Ratios			
									On-Site		Off-Site	
Carcinogenic Parameter	Geometric Mean ug/l	Maximum ug/l	Geometric Mean ug/l	Maximum ug/l	Cancer Potency -1 mg/kg/day	10-6 Risk Action Level ug/l	Ground-water Conc. ug/l (1)	Source	Geom Mean ug/l	Max ug/l	Geom Mean ug/l	Max ug/l
Tetrachloroethene	548.185	24000	23.73	310000	5.10E-02	0.69	5.0	NYS MCL(1)	109.6	4800.0	4.7	62000.0
Trichloroethene	25.6	440	3.18	240	1.10E-02	3.18	5.0	NYS MCL(1)	5.1	88.0	0.6	48.0
Vinyl Chloride	7.42	150.000	3.75	5.0	2.00E-01	0.18	2.0	NYS MCL(1)	3.7	75.0	1.9	2.5
Arsenic	5.5	9.900	8.72	245.0	1.80E+00	0.02	25.0	NYS MCL(1)	1.1	2.0	1.7	49.0
1,1,2,2-Tetrachloroethane	5.27	100.000	2.48	2.5	2.00E-01	0.18	5.0	NYS MCL(1)	1.1	20.0	0.5	0.5
1,2-Dichloroethane	2.75	5	2.62	4	9.10E-02	0.38	5.0	NYS MCL(1)	0.6	1.0	0.5	0.8
1,1-Dichloroethane	1.63	2	1.38	2.5	5.80E-01	0.06	5.0	NYS MCL(1)	0.3	0.4	0.3	0.5
N-Nitrosodiphenylamine	5.4	14	ND	5	4.90E-03	7.14	50.0	NYS MCL(1)	0.1	0.3	ND	0.1
Chloroform	2.3	2.5	3.00	200	6.10E-03	5.74	100.0	NYS MCL(1)	0.02	0.03	0.03	2.2

	On-Site Concentrations		Off-Site Concentrations				"Recommeded" Action Level		Carcinogenic Contaminants At GW Concentration: Action Level Ratios			
									On-Site		Off-Site	
Noncarcinogenic Parameter	Geometric Mean ug/l	Maximum ug/l	Geometric Mean ug/l	Maximum ug/l	Cancer Potency -1 mg/kg/day	10-6 Risk Action Level ug/l	Ground-water Conc. ug/l (1)	Source	Geom Mean ug/l	Max ug/l	Geom Mean ug/l	Max ug/l
Lead	83.24	170	95.78	1610	1.14E-03	39.9	25	NYS MCL(2)	3.3	6.8	3.8	66.4
Chromium (VI)	20.391	90.4	13.94	521	5.00E-03	175.0	50	NYS MCL(2)	0.4	1.8	0.3	10.4
Cadmium	2.83	52.2	4.07	23.4	5.00E-04	17.5	10	NYS MCL(2)	0.3	0.7	0.4	3.2

(1) Source: NYSDOH Bureau of Public Water Supply and Protection Regulations for Standards Limiting Organic Chemical Containation in Drinking Water, November 23, 1988 (10 NYCRR 5).
(2) Source: NYSDEC-NYS Ambient Water Quality Standards and Guidance Values, April 1987.

TABLE 20
AMERICAN THERMOSTAT SITE
PROPOSED SOIL ACTION LEVELS
CURRENT AND FUTURE SITE USES:
DIRECT CONTACT WITH SOILS

	On-Site Surface Soil Concentration					Recommended Soil Action Levels: PPM			
						Current Use Exposures		Future Use Exposures	
Carcinogenic Parameter	Geometric Mean mg/kg	Median mg/kg	Upper Quartile mg/kg	Maximum mg/kg	Cancer Potency mg/kg/day^{-1}	Best Estimate Exposures mg/kg	Upper Bound Exposure mg/kg	Best Estimate Exposure mg/kg	Upper Bound Exposure mg/kg
Tetrachloroethylene	2.406	4.650	1200.0	2700.0	5.10E-02	893.5	84.9	270.0	18.6
Trichloroethylene	0.009	0.003	7.0	9.3	1.10E-02	4142.4	393.5	1251.6	85.5
Bis(2-ethylhexyl)-phthalate	0.021	0.183	0.4	0.4	6.84E-04	66616.9	6327.9	20128.5	1390.5

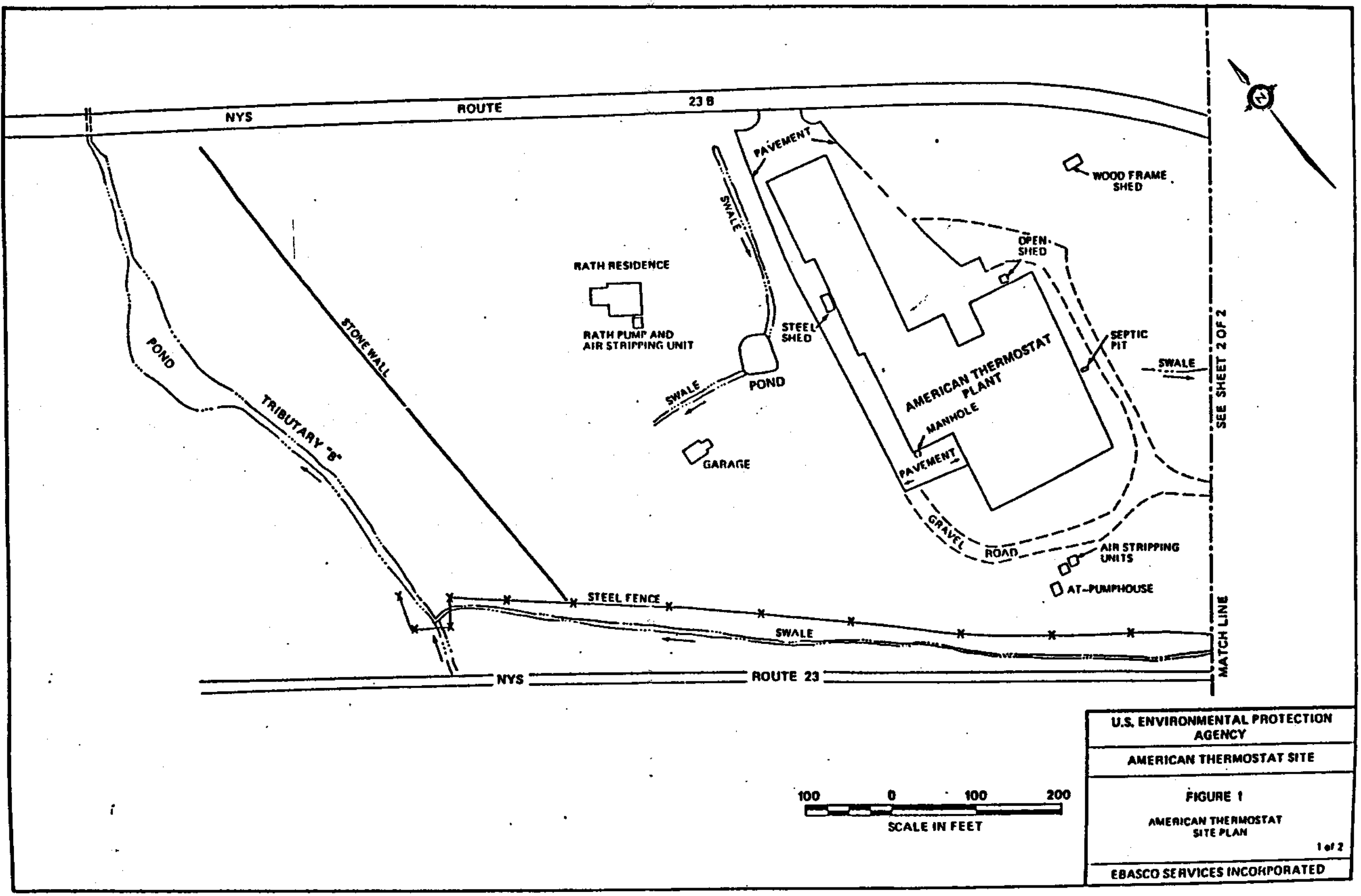
TABLE 21

COST ESTIMATE SUMMARY OF ALTERNATIVES

SOIL Alternative	Capital Cost	Annual O & M	Total Present Worth 5% Discount Rate
SC-1 - No Action	$ 26,500	$ 44,400	$ 736,800
SC-3 - On-Site Incineration	$ 8,322,800	0	$ 8,322,800
SC-4 - Off-Site Incineration	$17,918,700	0	$17,918,700
SC-5 - Low Temperature Enhanced Volatilization	$ 2,772,400	0	$ 2,772,400
GROUNDWATER ALTERNATIVES			
GW-1 - No Action	$ 22,100	$ 46,000	$ 757,000
GW-2 - Limited Action	$ 234,800	$ 577,900	$ 8,911,300
GW-3 - Air Stripping	$ 2,635,200	$1,053,000	$18,821,900
GW-4 - Air Stripping/ Carbon Adsorption	$ 2,995,200	$1,304,300	$23,044,900
GW-6 - UV Oxidation	$ 3,263,500	$1,208,800	$21,845,200
BUILDING DECONTAMINATION ALT.			
BD-1 - No Action	0	$ 300	$ 4,600
BD-2 - Decontamination	$ 284,900	$ 0	$ 284,900

APPENDIX 2

FIGURES



U.S. ENVIRONMENTAL PROTECTION AGENCY

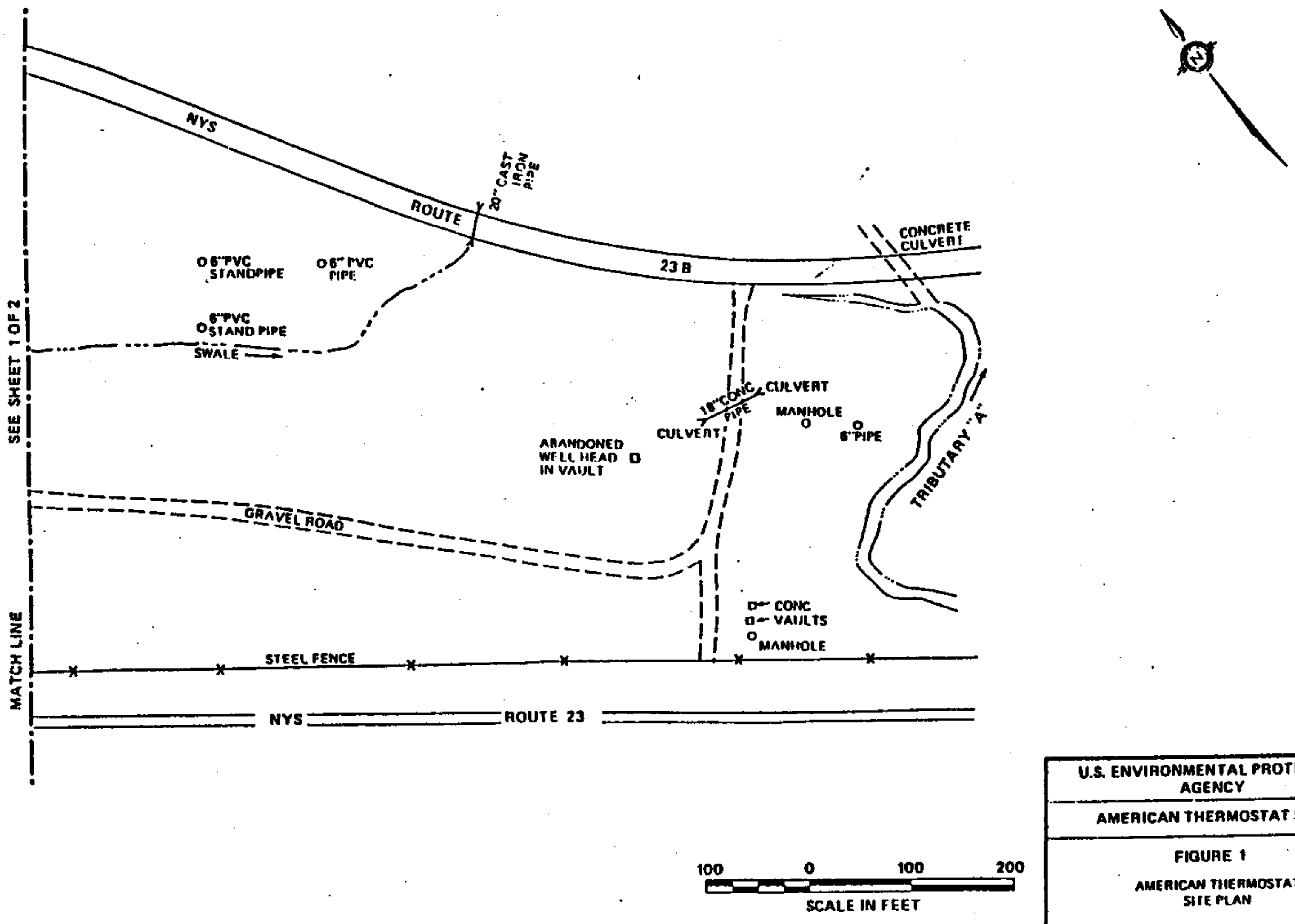
AMERICAN THERMOSTAT SITE

FIGURE 1

AMERICAN THERMOSTAT SITE PLAN

1 of 2

EBASCO SERVICES INCORPORATED



U.S. ENVIRONMENTAL PROTECTION AGENCY

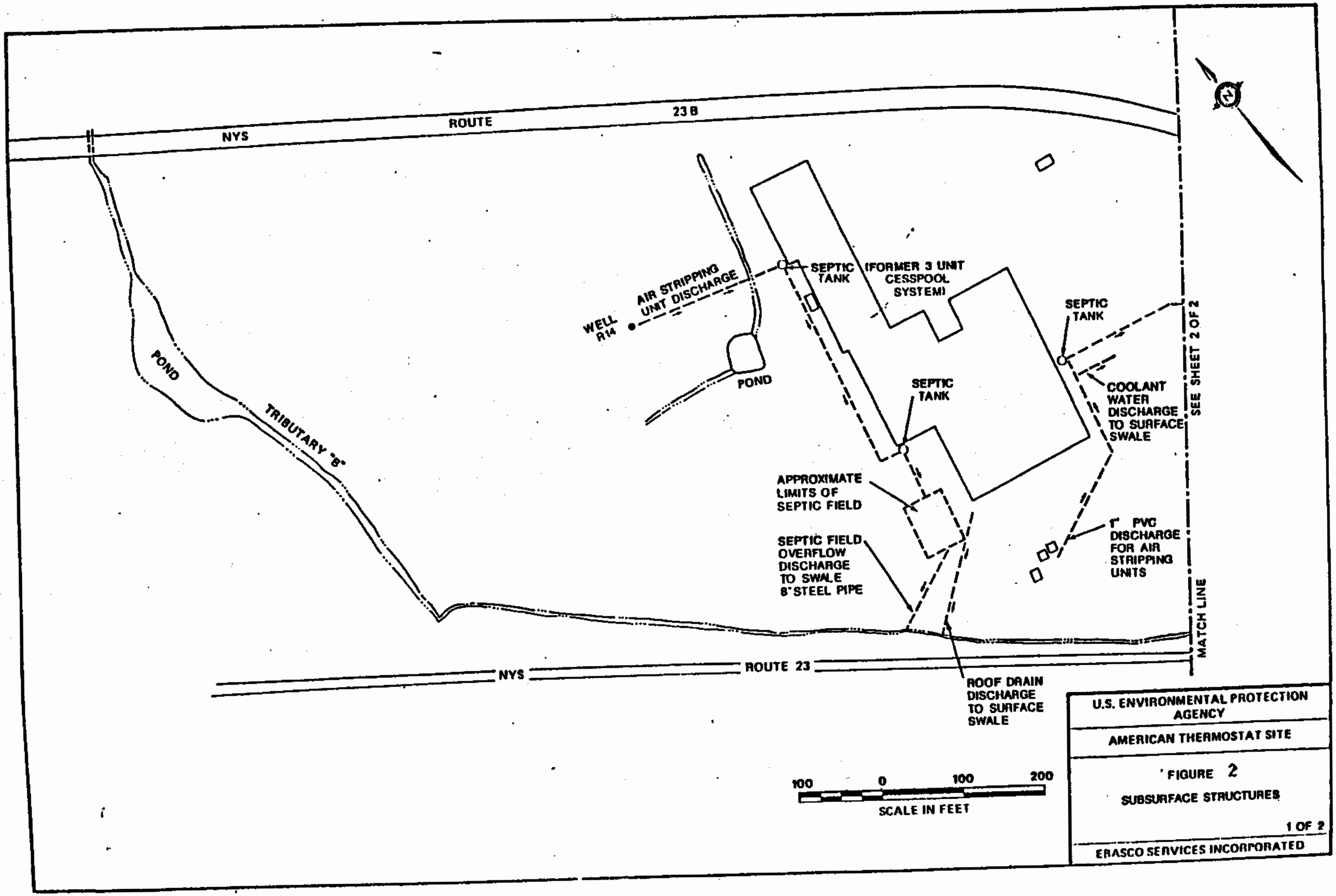
AMERICAN THERMOSTAT SITE

FIGURE 1

AMERICAN THERMOSTAT SITE PLAN

2 of 2

ERASCO SERVICES INCORPORATED



U.S. ENVIRONMENTAL PROTECTION AGENCY

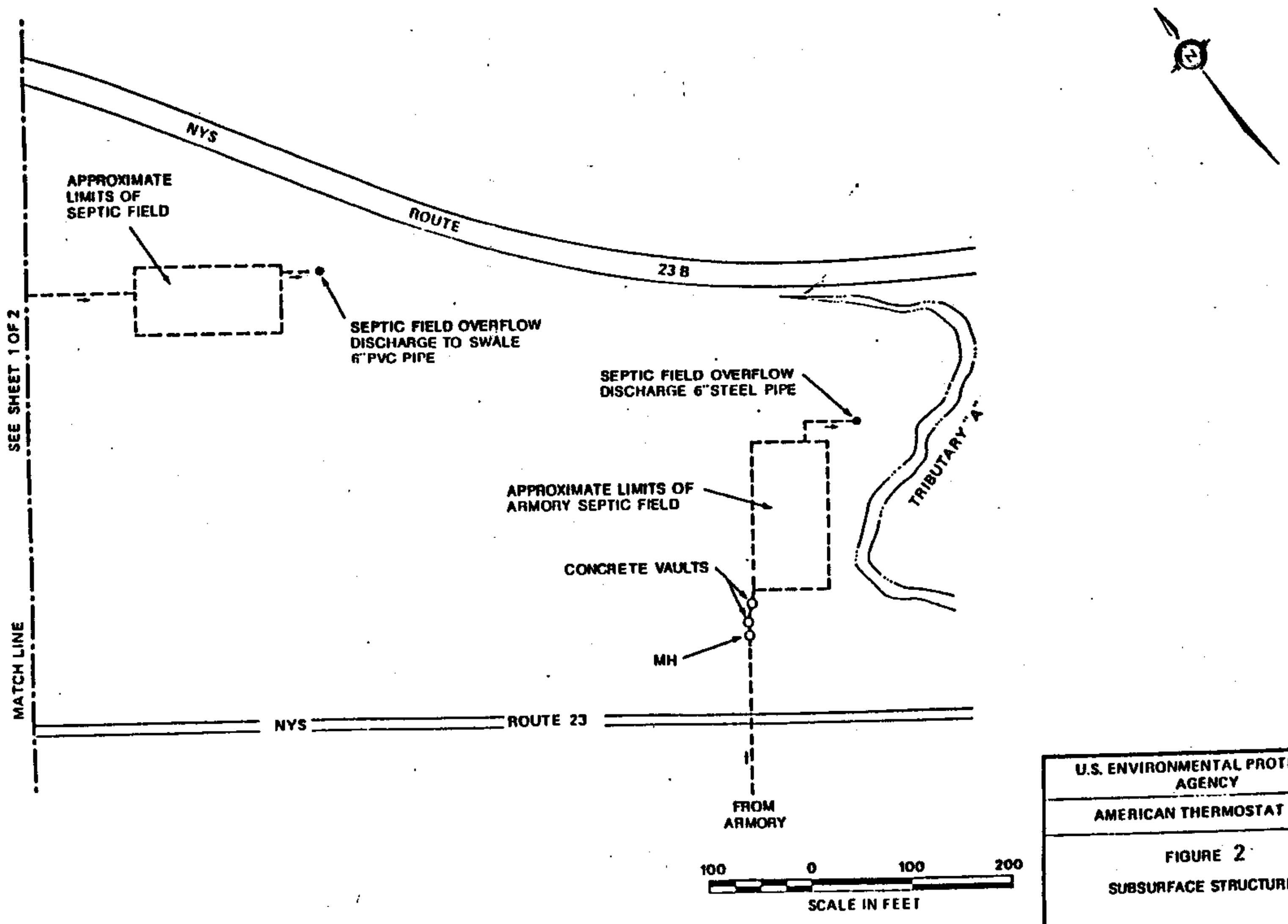
AMERICAN THERMOSTAT SITE

FIGURE 2

SUBSURFACE STRUCTURES

1 OF 2

EBASCO SERVICES INCORPORATED



U.S. ENVIRONMENTAL PROTECTION AGENCY

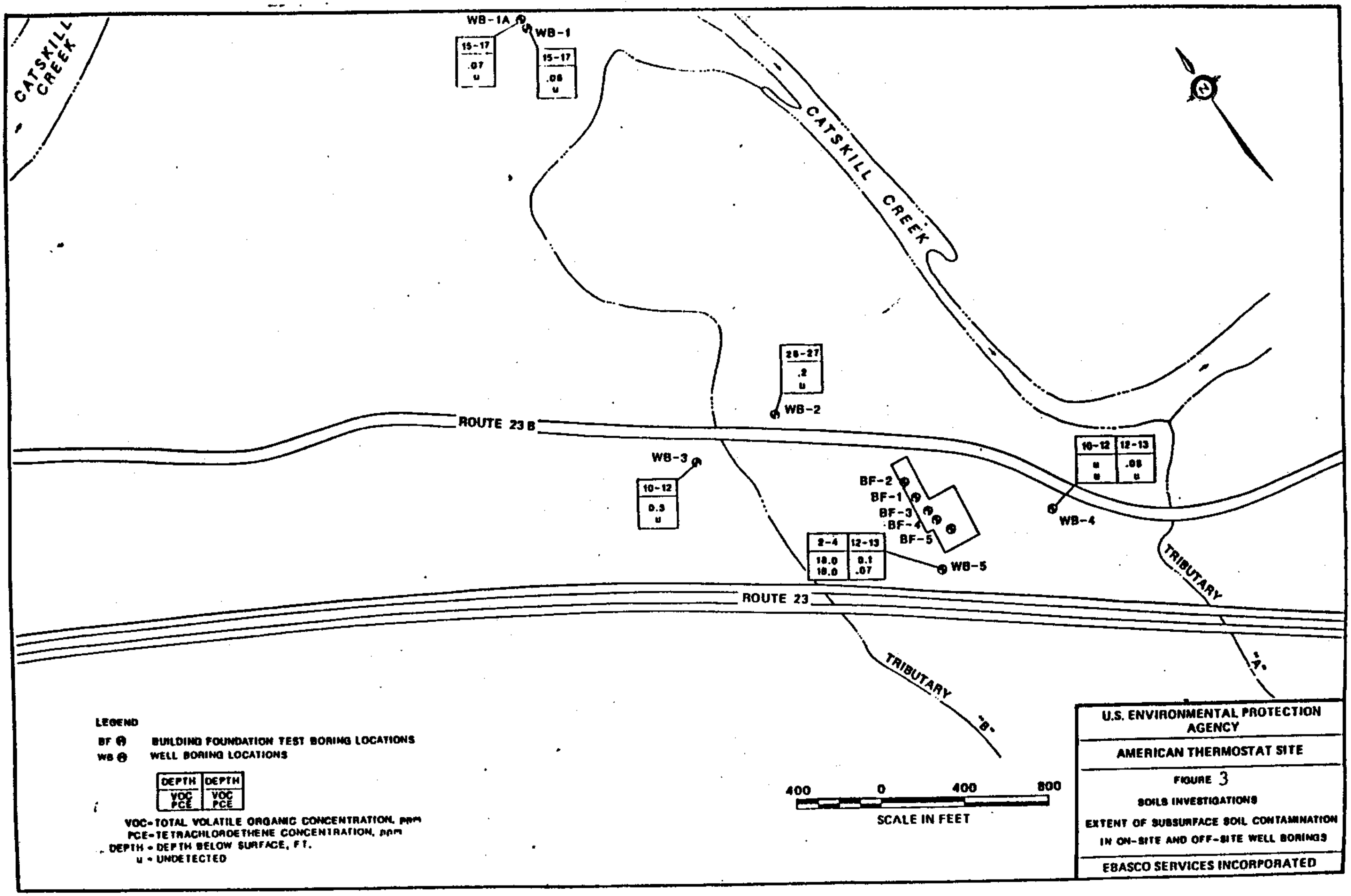
AMERICAN THERMOSTAT SITE

FIGURE 2

SUBSURFACE STRUCTURES

2 OF 2

EBASCO SERVICES INCORPORATED



U.S. ENVIRONMENTAL PROTECTION AGENCY

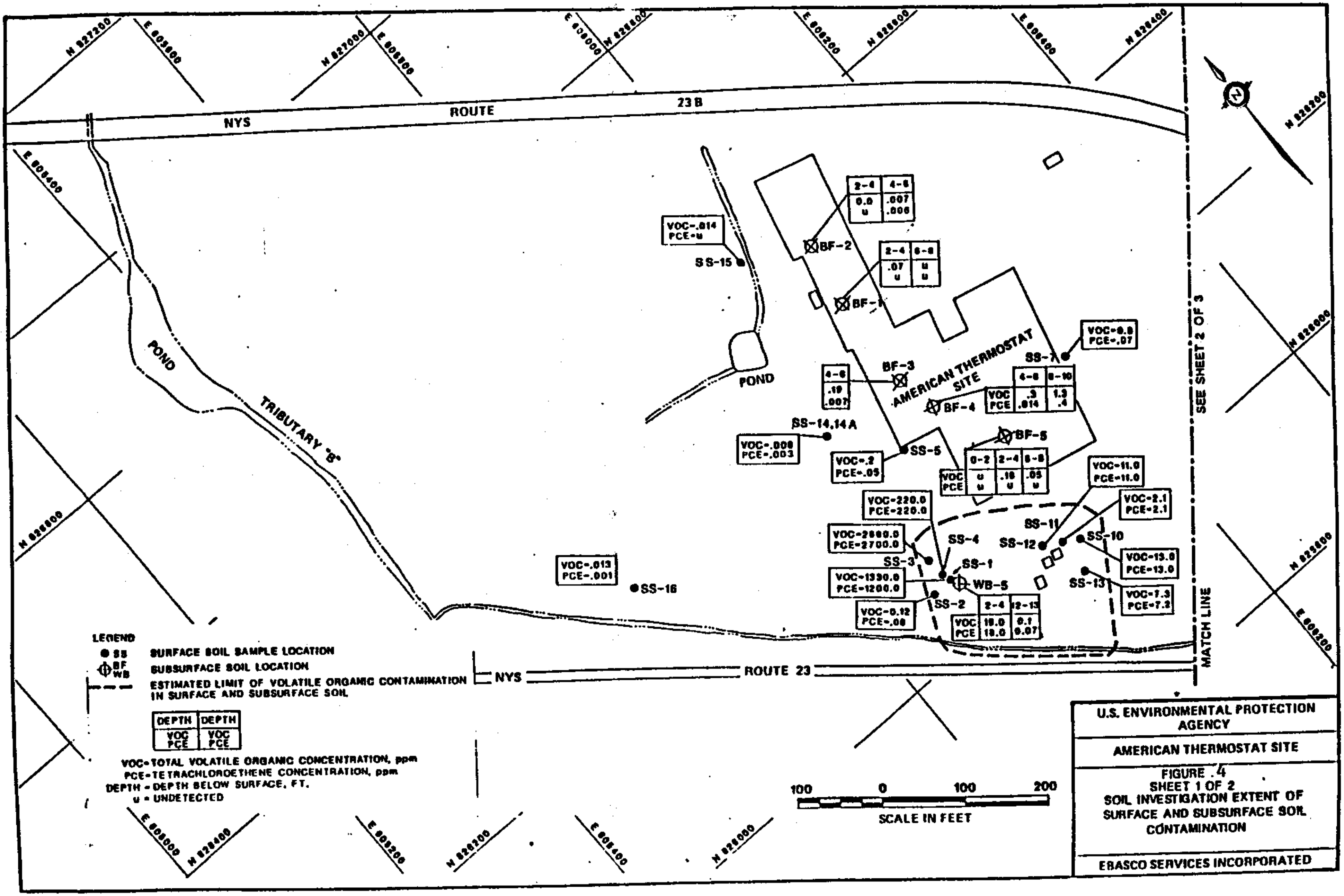
AMERICAN THERMOSTAT SITE

FIGURE 3

SOILS INVESTIGATIONS

EXTENT OF SUBSURFACE SOIL CONTAMINATION IN ON-SITE AND OFF-SITE WELL BORINGS

EBASCO SERVICES INCORPORATED

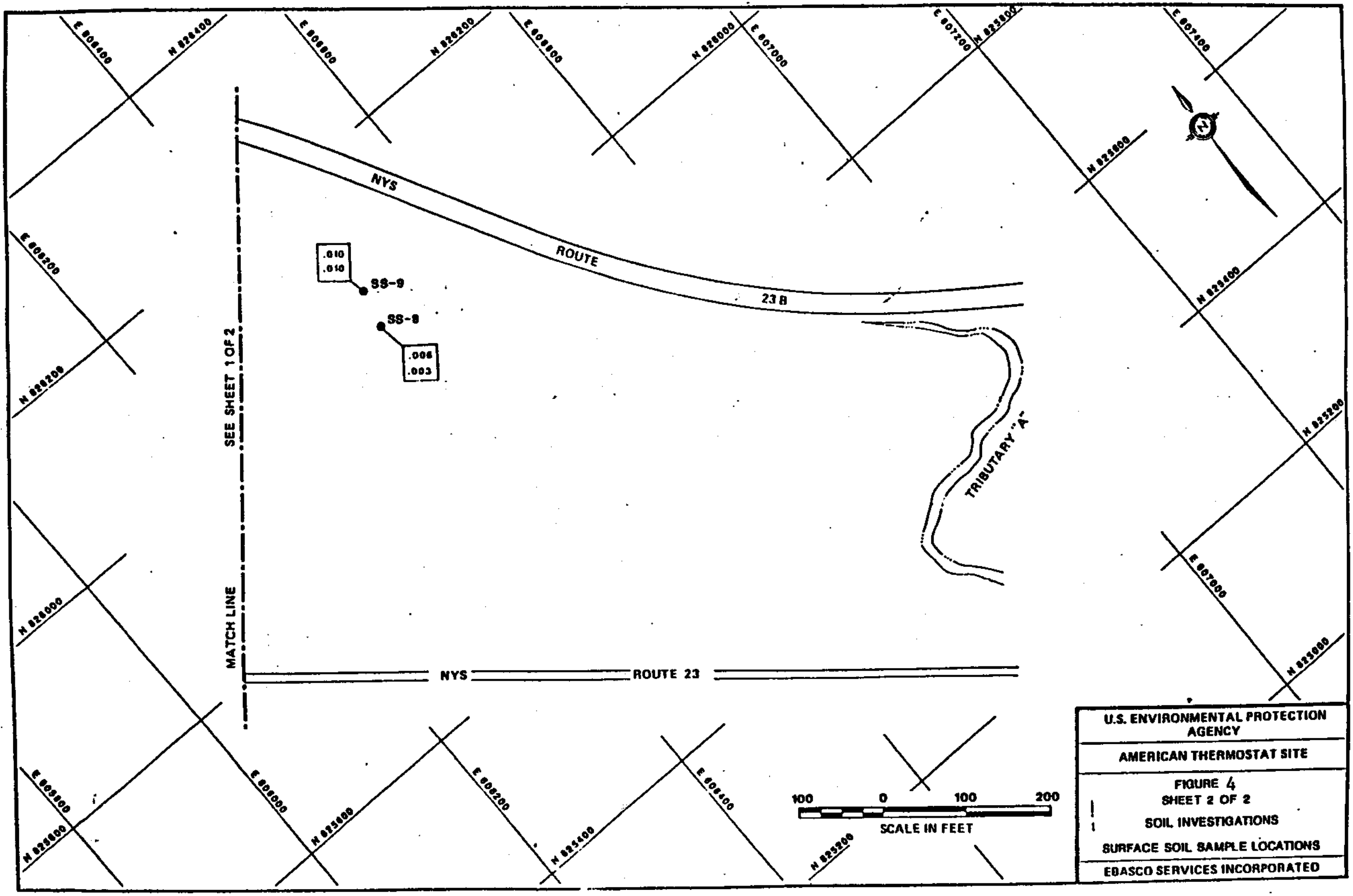


U.S. ENVIRONMENTAL PROTECTION AGENCY

AMERICAN THERMOSTAT SITE

FIGURE 4
SHEET 1 OF 2
SOIL INVESTIGATION EXTENT OF SURFACE AND SUBSURFACE SOIL CONTAMINATION

EBASCO SERVICES INCORPORATED



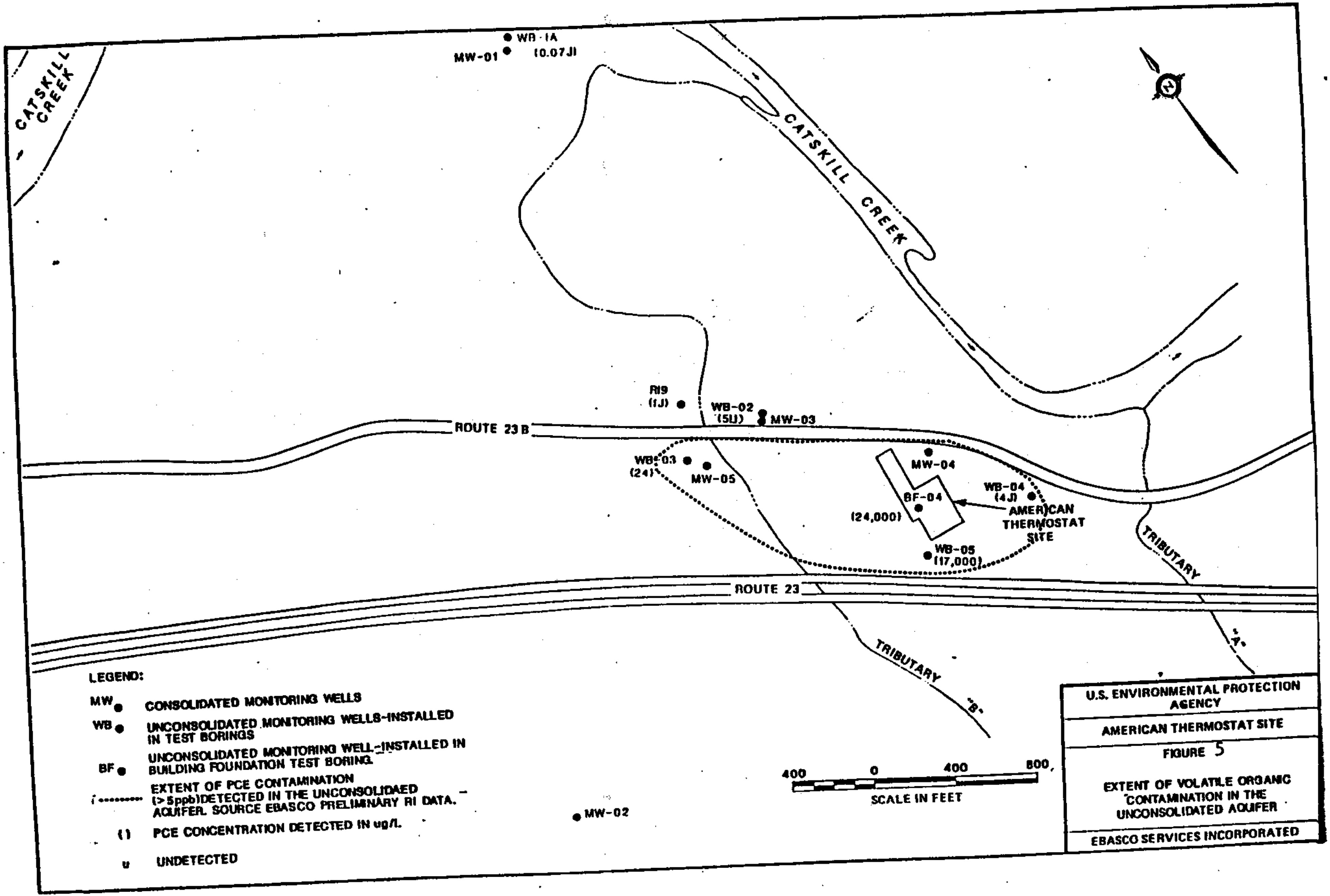
U.S. ENVIRONMENTAL PROTECTION AGENCY

AMERICAN THERMOSTAT SITE

FIGURE 4
SHEET 2 OF 2
SOIL INVESTIGATIONS

SURFACE SOIL SAMPLE LOCATIONS

EBASCO SERVICES INCORPORATED



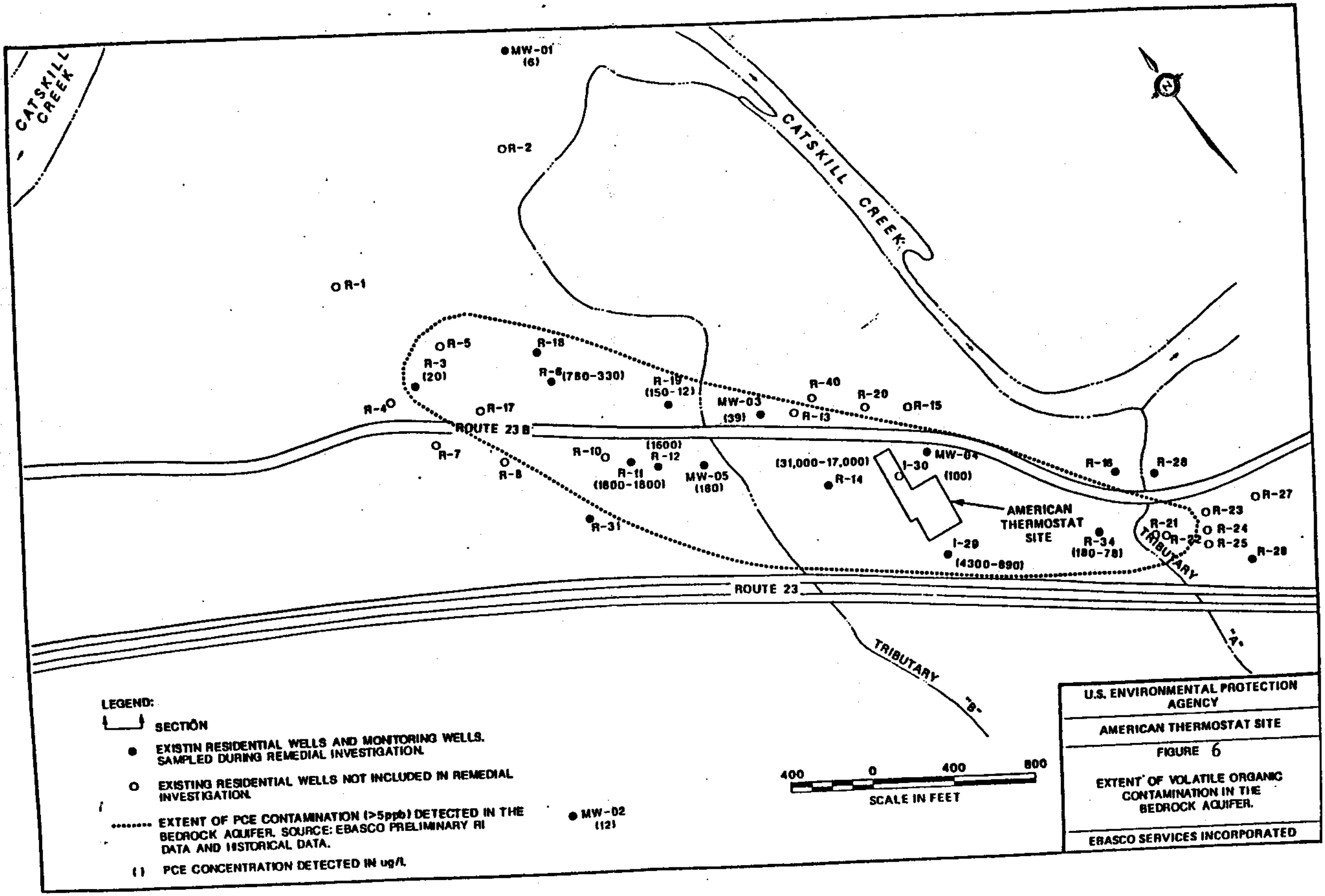
U.S. ENVIRONMENTAL PROTECTION AGENCY

AMERICAN THERMOSTAT SITE

FIGURE 5

EXTENT OF VOLATILE ORGANIC CONTAMINATION IN THE UNCONSOLIDATED AQUIFER

EBASCO SERVICES INCORPORATED



LEGEND:

SECTION

● EXISTIN RESIDENTIAL WELLS AND MONITORING WELLS. SAMPLED DURING REMEDIAL INVESTIGATION.

○ EXISTING RESIDENTIAL WELLS NOT INCLUDED IN REMEDIAL INVESTIGATION.

.... EXTENT OF PCE CONTAMINATION (>5ppb) DETECTED IN THE BEDROCK AQUIFER. SOURCE: EBASCO PRELIMINARY RI DATA AND HISTORICAL DATA.

( ) PCE CONCENTRATION DETECTED IN ug/l.

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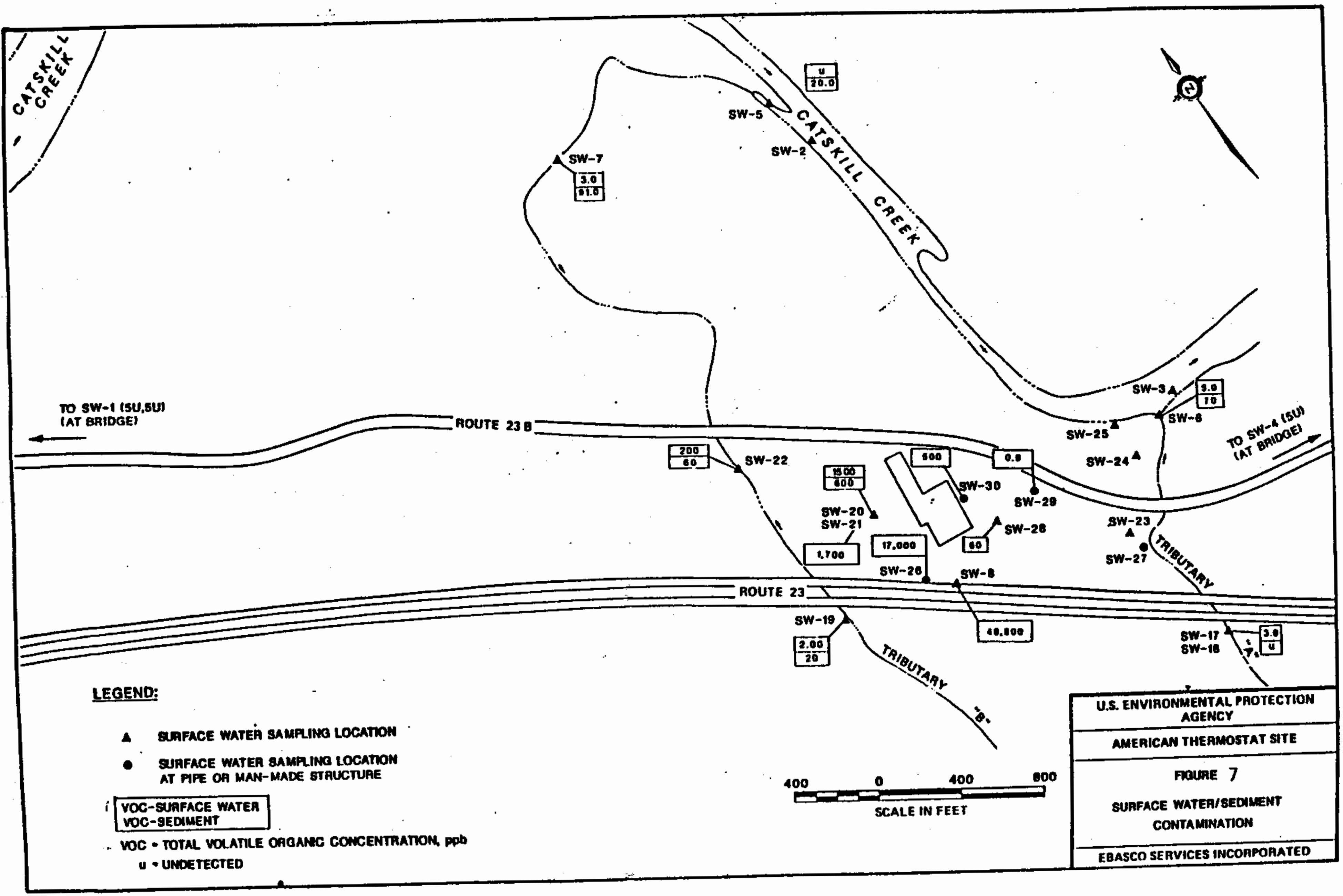
AMERICAN THERMOSTAT SITE

FIGURE 6

EXTENT OF VOLATILE ORGANIC CONTAMINATION IN THE BEDROCK AQUIFER.

EBASCO SERVICES INCORPORATED



LEGEND:

- ▲ SURFACE WATER SAMPLING LOCATION
- ● SURFACE WATER SAMPLING LOCATION AT PIPE OR MAN-MADE STRUCTURE
- VOC-SURFACE WATER / VOC-SEDIMENT

VOC = TOTAL VOLATILE ORGANIC CONCENTRATION, ppb
u = UNDETECTED

U.S. ENVIRONMENTAL PROTECTION AGENCY

AMERICAN THERMOSTAT SITE

FIGURE 7

SURFACE WATER/SEDIMENT CONTAMINATION

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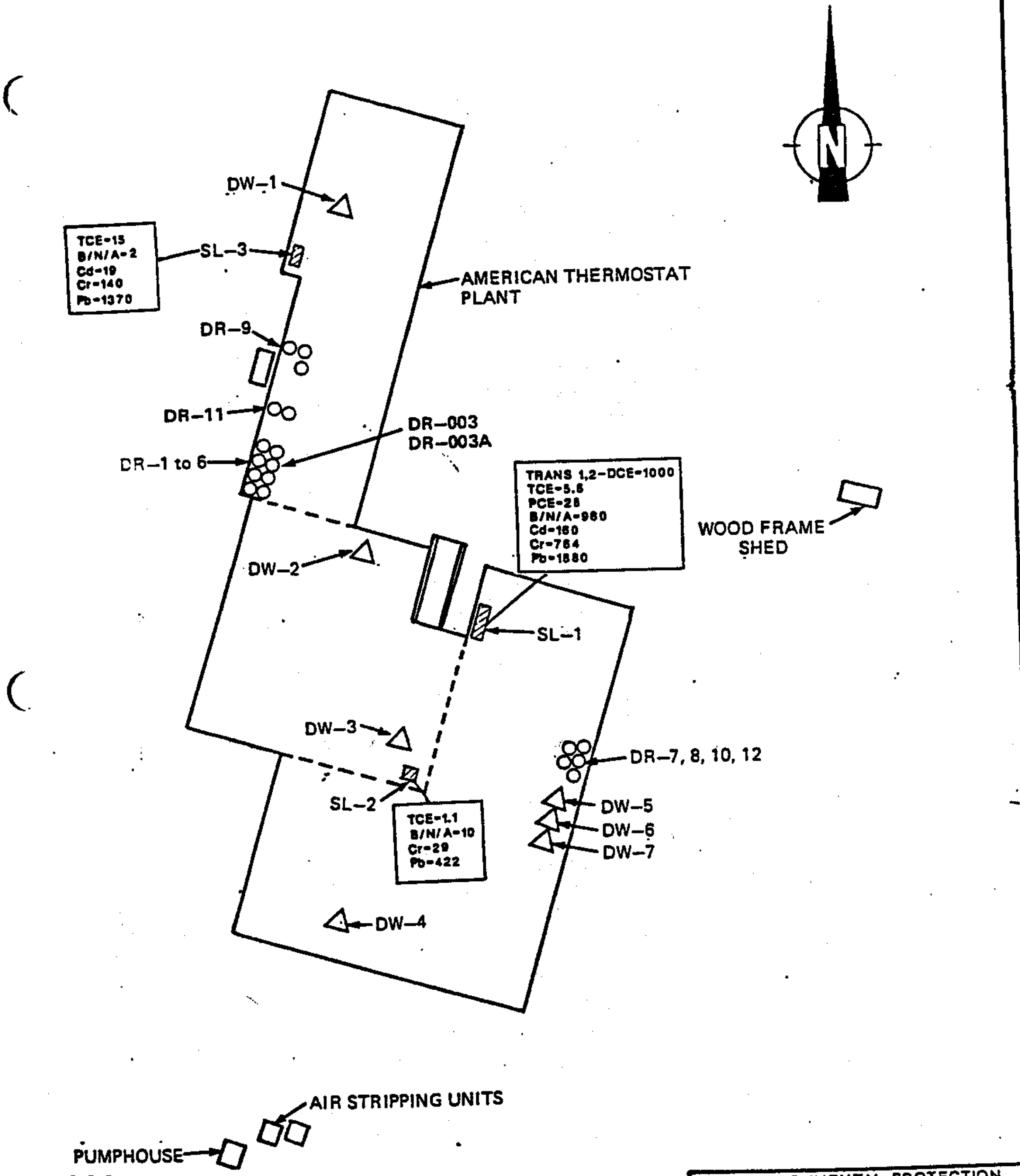

LEGEND

△ DUST WIPE SAMPLE LOCATIONS
○ DRUM SAMPLE LOCATIONS
▨ SLUDGE SAMPLE LOCATIONS
TRANS 1,2–DCE–TRANS–1,2–DICHLOROETHENE CONCENTRATION, ppm
TCE–TRICHLOROETHENE CONCENTRATION, ppm
PCE–TETRACHLOROETHENE CONCENTRATION, ppm
B/N/A – TOTAL BASE/NEUTRAL/ACID EXTRACTABLE ORGANIC CONCENTRATION, ppm
Cd – CADMIUM CONCENTRATION, ppm
Cr – CHROMIUM CONCENTRATION, ppm
Pb – LEAD CONCENTRATION, ppm

ENVIRONMENTAL PROTECTION AGENCY

AMERICAN THERMOSTAT SITE

FIGURE 8

EXISTING FACILITIES INVEST. SAMPLE LOCATIONS

EBASCO SERVICES INCORPORATED

APPENDIX 3 - ADMINISTRATIVE RECORD INDEX

APPENDIX 4 - NYSDEC LETTER OF CONCURRENCE

ew York State Department of Environmental Conservation
0 Wolf Road, Albany, New York 12233 -7010

Thomas C. Jorling
Commissioner

Mr. Constantine Sidamon-Eristoff
Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

JUN 2 8 1990

Dear Mr. Sidamon-Eristoff:

Re: American Thermostat
NYSDEC Id. No. 420006

I am pleased to advise you that the New York State Department of Environmental Conservation concurs with the remedial alternatives specified in the Record of Decision for the American Thermostat site.

We look forward to participating in the design of the remedies, and urge you to commence at the earliest date.

Sincerely,

Edward O. Sullivan
Deputy Commissioner