JET ENGINE TEST CELL (SS-029)
SITE INVESTIGATION REPORT

PLATTSBURGH AIR FORCE BASE
PLATTSBURGH, NEW YORK

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DIVISION OF HAZARDOUS
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DECEMBER 1996

UNITED STATES DEPARTMENT OF THE AIR FORCE
INSTALLATION RESTORATION PROGRAM

PREPARED BY:

URS GREINER, INC.

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EXECUTIVE SUMMARY

The Jet Engine Test Cell (SS-029) is located within the central industrial corridor portion of Plattsburgh Air Force Base adjacent to the eastern edge of the flightline apron. The site was used to test jet aircraft engines by the Air Force from 1969 through 1993. Currently, the site has been leased to the Wood Group, an aviation company that will also utilize the site for engine testing. The main structures comprising the facility are Building 2820, an oil/water separator connecting the floor drains inside the building to the storm sewer, a 6,000 gallon JP-4 jet fuel underground storage tank, and a large above ground cooling water storage tank. The site occupies a relatively flat area and is immediately surrounded by a paved parking area and access road, and mowed lawn areas. The flightline and other industrial corridor facilities are nearby.

In May 1989, the oil/water separator leaked releasing approximately 0.75 gallon of JP-4 jet fuel. In December 1990 the leaking separator was replaced with a 1,000-gallon steel unit installed inside a partially buried concrete structure. A separate fiberglass holding tank is used for storing petroleum products from the separator.

The areas of concern at the site are the location of the oil/water separator and the piping leading into and out of the oil/water separator. Based on the past use of the building, the chemical compounds of concern at the site are benzene, toluene, ethylbenzene, xylenes, and other petroleum hydrocarbons associated with JP-4 jet fuel spills that may have occurred at the site.

In 1992, a Preliminary Assessment for SS-029 was completed and included a review of historical records, personnel interviews, and a site walkover. No visual evidence of contamination was noted at the site; however, an additional investigation was recommended for the areas of concern because of reported spills. This Site Investigation (SI) was initiated in the fall of 1994.

The specific objectives of the SI were to describe the physical conditions of the site, to evaluate the nature and extent of chemical contamination in the site groundwater and soils, to evaluate the risks posed by site contaminants to human health and the environment, and to determine if remedial or removal actions are warranted. Activities performed to satisfy these objectives included the collection and chemical analysis of 6 subsurface soil samples from borings advanced at three locations on site, the installation of 1 groundwater monitoring well, sampling and chemical analysis of groundwater from the SI monitoring well and an existing upgradient monitoring well, and the completion of a human health risk assessment.

The results of the soil and groundwater chemical analyses show no evidence of petroleum contamination associated with JP-4 jet fuel spills. None of the soils encountered in the SI borings exhibited elevated PID readings, visual contamination, or unusual odors. Soil samples from SS-029 were found to contain the organic chemicals methylene chloride, acetone, trichloroethene, toluene, three phthalate compounds, and nine polycyclic aromatic hydrocarbon compounds. None of these chemicals were present at concentrations that exceed regulatory limits. Four metals (arsenic, barium, chromium, and lead) were detected in the soil samples, all at concentrations below NYSDEC technical guidance values.

No volatile or semivolatile organic compounds were detected in the groundwater samples. Three of the 8 RCRA metals (arsenic, chromium, and selenium) were detected in the groundwater samples; the barium analytical results were rejected due to Quality Assurance/Quality Control deficiencies. Chromium and selenium were detected in the unfiltered (total) upgradient well (MW-02-047) sample at concentrations of 299 ppb and 6.2 ppb, respectively. The chromium concentration exceeds the 50 ppb regulatory limit for groundwater. Only arsenic and selenium were detected in the unfiltered (total) downgradient well (MW-29-001) sample at concentrations of 5.3 ppb and 10.1 ppb, respectively. Arsenic was detected below the regulatory limit, while selenium barely exceeded the 10 ppb regulatory limit. No metals were detected in the filtered (dissolved) groundwater samples.

Human health risk calculations were performed to evaluate the risks associated with human exposure to contaminated media at SS-029. No unacceptable carcinogenic or noncarcinogenic human health risk is associated with exposure to chemicals detected in soil or groundwater at the site.

Based on the negligible impact to human health and the environment from compounds in the soil at SS-029, no remedial action is warranted to reduce or contain site contaminants. The data obtained during the SI appears to be sufficient to support a decision document specifying "no further action" for the site for both investigated media. Therefore, no further investigation is necessary.

1.0 INTRODUCTION

This Site Investigation (SI) Report presents, summarizes, and provides interpretations and conclusions regarding data gathered during SI field activities at the Jet Engine Test Cell site (SS-029) at the former Plattsburgh Air Force Base (AFB) in Clinton County, New York. Investigations and site remediations are being conducted at Plattsburgh AFB as part of the Department of Defense's Installation Restoration Program (IRP). The IRP was developed as a component of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The IRP at Plattsburgh AFB currently is being administered by the Department of Defense's Base Conversion Agency (BCA) and implemented according to an interagency Federal Facilities Agreement (Docket No. III - CERCLA - FFA-10201) among the United States Air Force (USAF), the United States Environmental Protection Agency (USEPA), and the New York State Department of Environmental Conservation (NYSDEC) that was signed on September 12, 1991.

Plattsburgh AFB is located in northeastern New York State (Figure 1-1). It is bordered by the City of Plattsburgh to the north, Lake Champlain to the east, lake shore communities to the southeast, the Salmon River and agricultural land to the south, and Interstate 87 to the west. Plattsburgh AFB was closed on September 30, 1995 and its reuse is being administered by the Plattsburgh Airbase Redevelopment Corporation (PARC) in coordination with the Air Force BCA. The site has currently been leased to the Wood Group.

1.1 Purpose of the Report

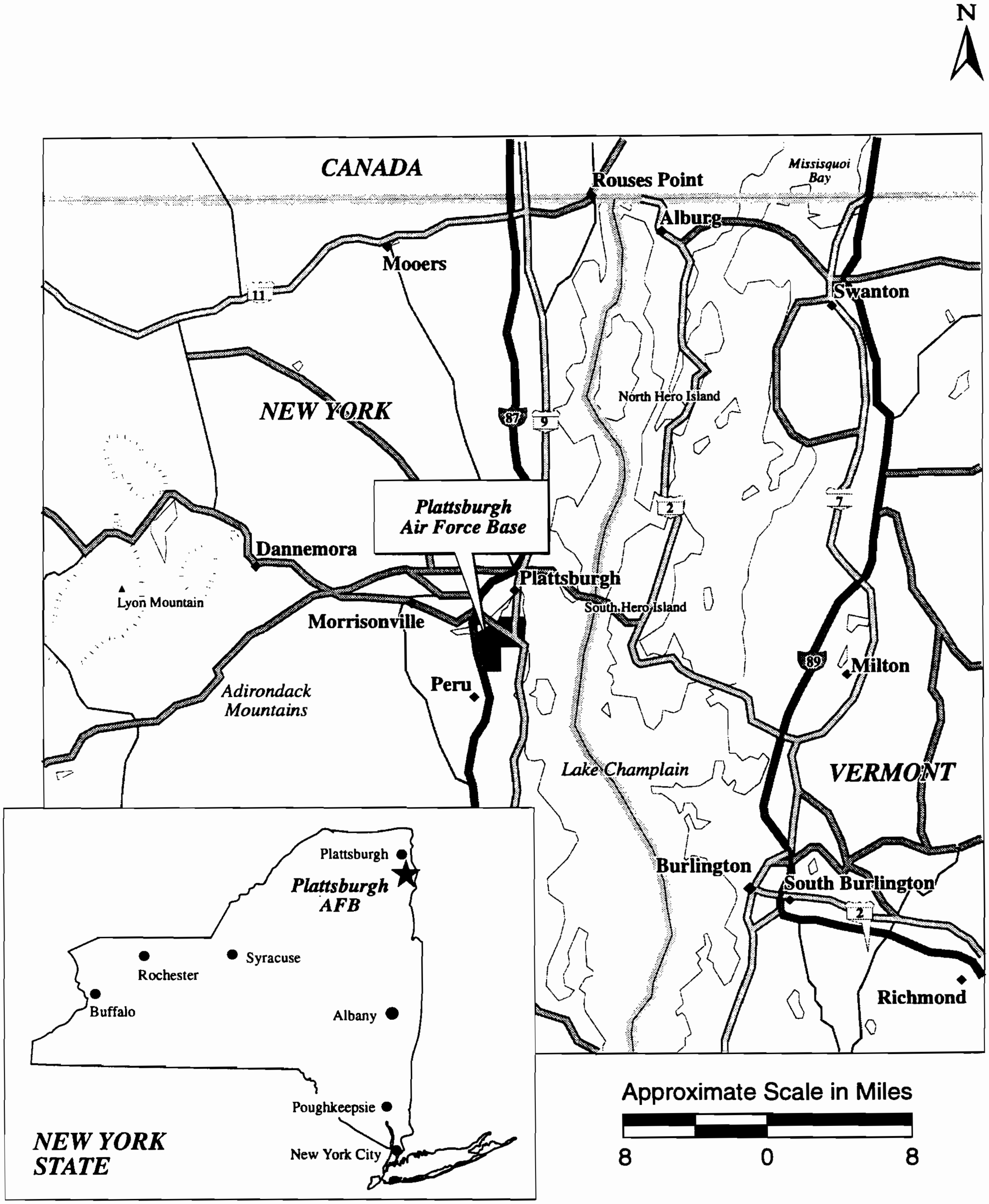
The specific objectives of the SI were: 1) to describe the physical conditions of the site; 2) to evaluate the nature and extent of chemical contamination in the site groundwater and soils; 3) to evaluate the risks posed by site contaminants to human health and the environment; and 4) to determine if remedial or removal actions are warranted. Activities performed to satisfy these objectives included the advancement of test borings to obtain subsurface soil samples, the installation of a monitoring well, the chemical analysis of soil and groundwater, and a human health risk assessment.

1.2 Site Description and History

The Jet Engine Test Cell site is located at the west end of Colorado Street adjacent to the flightline apron within the central industrial corridor portion of Plattsburgh AFB (Figure 1-2). The facility reportedly was constructed in 1969 and deactivated in 1993 (Tetra Tech 1994). In the summer of 1996, Building 2020 was leased by PARC to the Wood Group, an aviation firm that will use the site to test jet engines.

Site features are shown on Figure 1-3 and in Photos 1 through 6. Building 2820 is the main structure associated with the SS-029 facility. This building was used to test jet aircraft engines and, as a result, spills of JP-4 jet fuel and lubricating oils occasionally may have occurred. An oil/water separator is located northeast of Building 2820 as shown on Figure 1-3. Floor drains within Building 2820 discharge to the oil/water separator. The aqueous discharge from the oil/water separator eventually flows to a storm sewer line located along Colorado Street and oil from the separator flows to a separate fiberglass storage tank.

A separator, first installed at this site in 1971, was reported to have been leaking in May 1989 and consequently was replaced. No soil contamination was reported and no contaminated soils were removed during the separator replacement.



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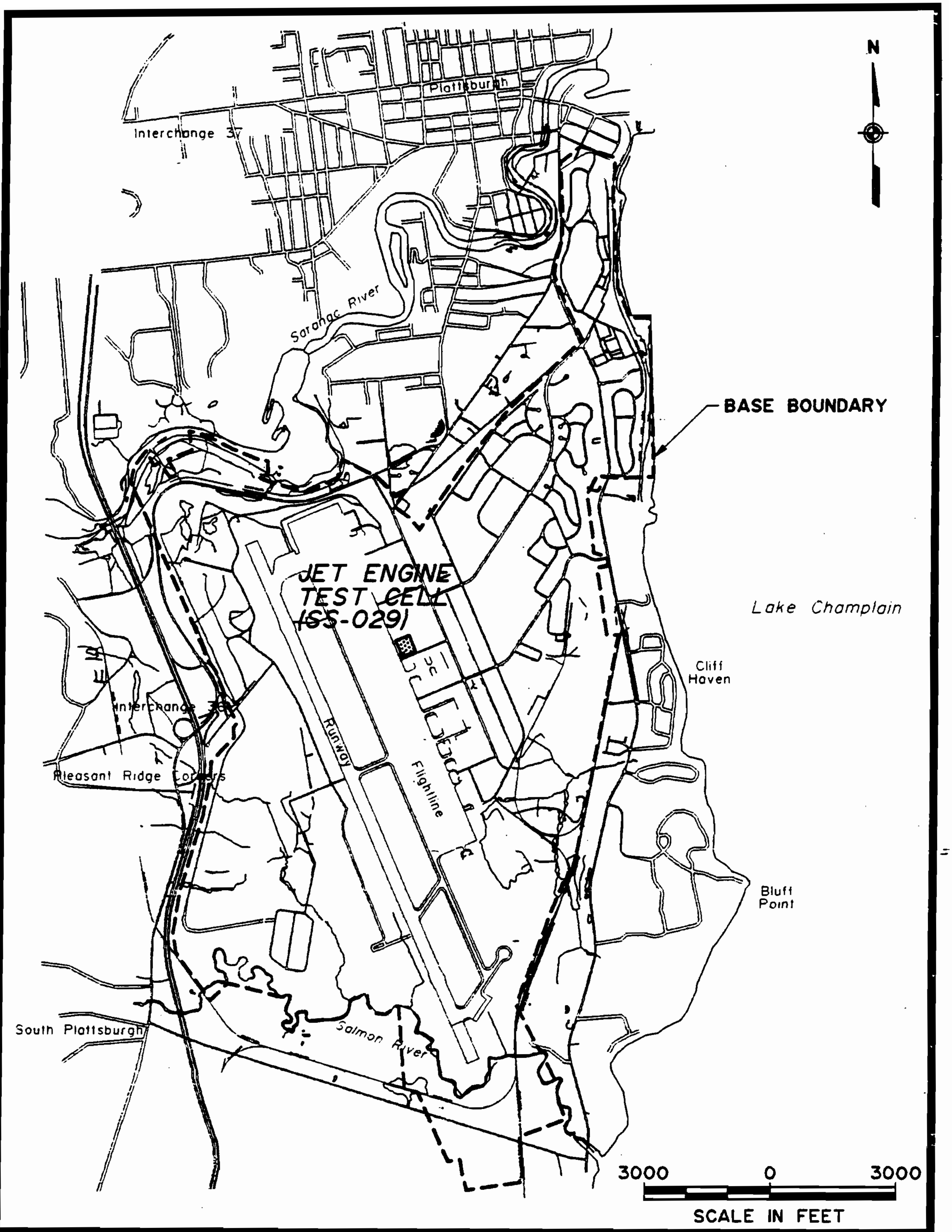
VICINITY LOCATION MAP

FIGURE 1-1



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PLATTSBURGH AFB
LOCATION OF IRP SITE SS-029

FIGURE 1-2

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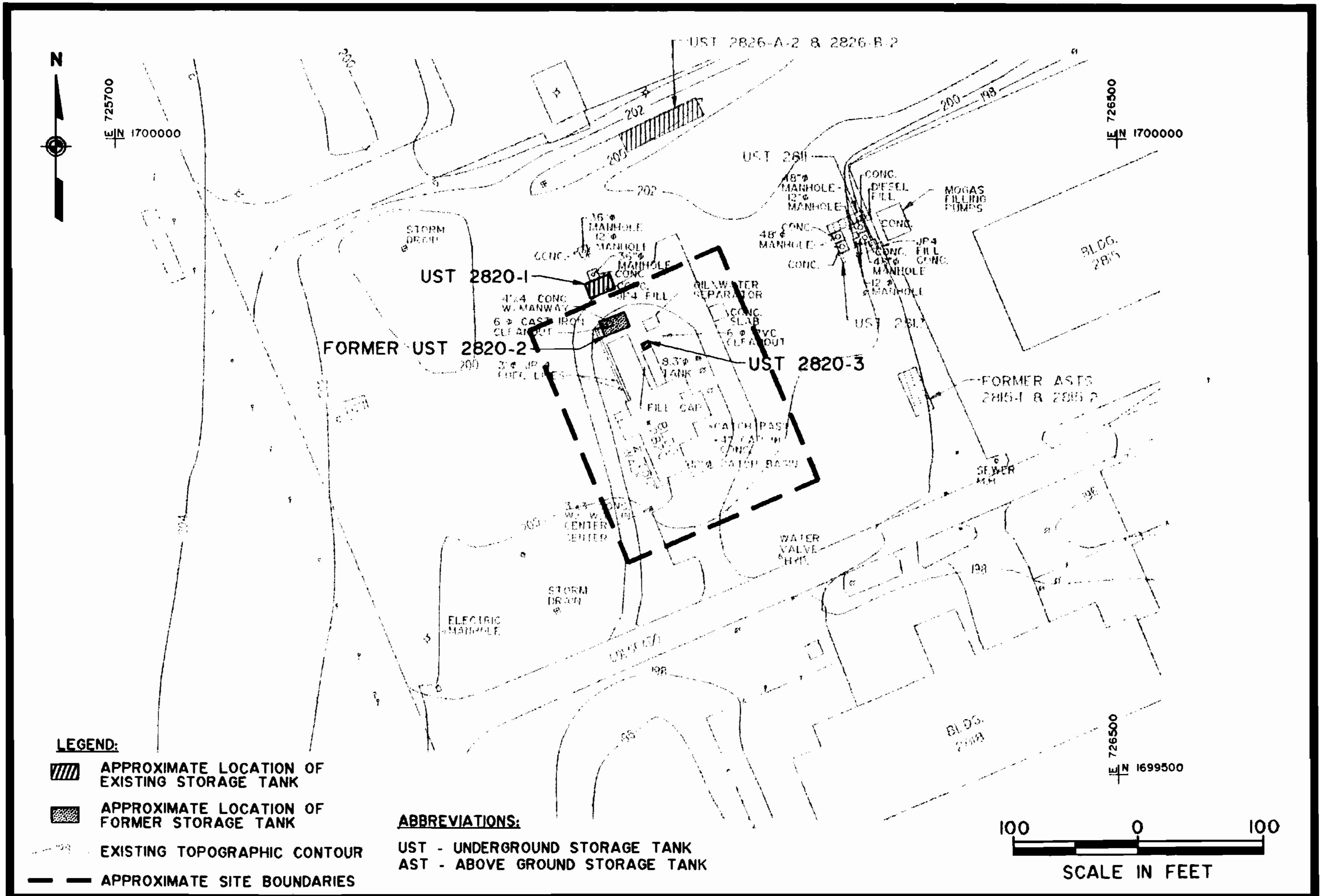

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JET ENGINE TEST CELL (SS-029)
SITE FEATURES

FIGURE 1-3

PHOTO 1 - **A westward view of the east side of the Jet Engine Test Cell (Building 2820).**

PHOTO 2 - **A southwestward view of the northeast end of Building 2820 showing the oil/water separator housing, the cooling water tank, and two soil boring locations (orange-flagged stakes) .**

SITE PHOTOS - SS-029

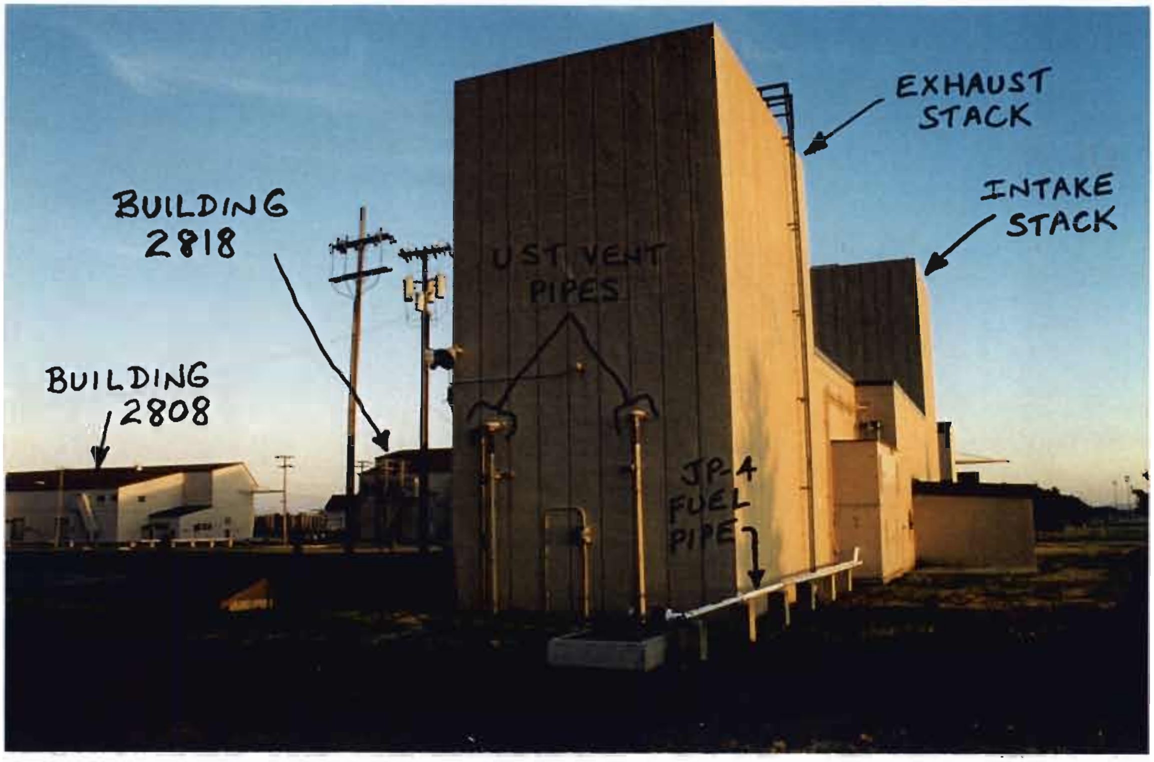


PHOTO 3 - A southeastward view of the north end of Building 2820 showing the oil/water separator housing and piping associated with JP-4 UST 2820-1.

PHOTO 4 - An eastward view of well MW-29-001 with Building 2815 (Aerospace Ground Equipment Facility) in the background.

SITE PHOTOS - SS-029

PHOTO 5 - A northward view of the south end of Building 2820 showing: the paved parking area and access road that surrounds the building; mowed lawn areas surrounding the building; and the nearby flightline.

PHOTO 6 - A typical floor drain inside building 2820.

SITE PHOTOS - SS-029

Several underground storage tanks (USTs) and above ground storage tanks (ASTs) are/were located at or near the SS-029 site as shown on Figure 1-3. Available information on these tanks is summarized in Table 1-1. This information is being included for a broader picture of site SS-029 and its adjoining parcels and all UST & AST sites are being investigated under the auspices and oversight of NYSDEC Region V. The tanks reportedly contain(ed) JP-4 jet fuel, unleaded gasoline, No. 2 fuel oil, and diesel fuel to support various fueling and storage facilities at SS-029 and adjacent sites. The ASTs have been removed and there was reportedly was no evidence of surface contamination associated with these tanks. In 1992 the USTs (with the exception of UST-2820-3 shown in Table 1-1) were replaced and no evidence of contamination reportedly was observed during their removal (Tetra Tech 1994). Therefore, the locations of these current and former USTs and ASTs are not considered areas of concern where the potential for soil and/or groundwater contamination exists.

Chemicals of potential concern at this site are those associated with JP-4 jet fuel spills, such as benzene, toluene, ethylbenzene, xylene, (BTEX compounds) and other petroleum hydrocarbons. Areas of concern are the locations of the former oil/water separator, and the lines leading into and out of the oil/water separator. Potential contaminant migration pathways include soil and groundwater.

1.3 Previous Investigations

The Jet Engine Test Cell site was added to the IRP in 1991 when it was included in a Preliminary Assessment (PA) of a number of areas of concern (Malcolm Pirnie 1992a). The assessment was completed in 1992 and no visual evidence of contamination at the site was apparent. However, the PA recommended further investigation of the site's areas of concern, including the collection and analysis of soil and groundwater samples.

TABLE 1-1
JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
PETROLEUM STORAGE TANKS IN THE VICINITY OF SS-029
DATA SUMMARY

ID No.	PAFB Tank No.	Year Installed	Year Removed	Description
UNDERGROUND STORAGE TANKS				
UST-2811	2811-New	1992	1996	Former aerospace Ground Equipment Facility 6,000-gallon Unleaded Gasoline Underground Storage Tank. Tank was located west of Building 2815. Replacement for a 5,000-gallon tank installed in 1983 and removed in 1992. No evidence of contamination was observed associated with the tank replaced in 1992. The more recent tank removed in 1996 will not be replaced. A report describing this tank removal is currently being prepared for NYSDEC Region V.
UST-2812	2812-New	1992	1996	Former Aerospace Ground Equipment Utility 6,000-gallon JP-4 Jet Fuel Underground Storage Tank. Replacement for a 5,000-gallon tank installed in 1983 and removed in 1992. No evidence of contamination was observed associated with the tank replaced in 1992. The 6,000-gallon tank recently removed will not be replaced. A report describing this tank removal is currently being prepared for NYSDEC Region V.
UST-2820-1	2820-New	1992	Currently in use	Jet Engine Test Facility 6,000-gallon JP-4 Jet Fuel Underground Storage Tank. Tank is located north of Building 2820, across the road. No evidence of contamination was observed associated with the tank replaced in 1992.
UST-2820-2	2820	1967	1992	Jet Engine Test Facility 6,000-gallon JP-4 Jet Fuel Underground Storage Tank. Tank was located north of Building 2820. The tank was replaced by UST-2820-1 in a different location. No evidence of contamination was observed associated with the tank at the time of removal.
UST-2820-3	--	Unknown	No date of tank removal is available	Jet Engine Test Facility 500-gallon No. 2 Fuel Oil Underground Storage Tank. Tank identified from historic drawings and the 1985 Phase I-Records Search (Radian Corporation). Tank was located northeast of Building 2820 at the position of boring SB-29-01. The tank is not listed on current Plattsburgh AFB tank inventories and there are no indications of the tank on site. A 1996 excavation found only the steel hold-down straps for the tank.
UST-2826-1	2826A-New	1992	Replaced with active tank No. 2826-A-2	Snowbarn-Pavements-Grounds Maintenance 6,000-gallon Unleaded Gasoline Underground Storage Tank. Tank is located south of Building 2827. This is a replacement for a 6,000-gallon tank installed in 1983 and removed in 1992. No evidence of contamination was observed associated with the tank replaced in 1992.
UST-2826-2	2826B-New	1992	Replaced with active tank No. 2826-B-2	Ground Maintenance 6,000-gallon Diesel Underground Storage Tank. Tank is located south of Building 2827. This is a replacement for a 6,000-gallon tank installed in 1983 and removed in 1992. No evidence of contamination was observed associated with the tank replaced in 1992.

TABLE 1-1 (Continued)

ID No.	PAFB Tank No.	Year Installed	Year Removed	Description
ABOVE GROUND STORAGE TANKS				
AST-2815-1	2815A	1964	No date of tank removal is available	Aircraft Support Equipment Storage 5,000-Gallon Diesel Fuel Above Ground Storage Tank. According to PAFB personnel, the tank may have been removed and replaced by a UST. However, there are no records for any UST at facility 2815. No evidence of surface contamination was observed associated with this tank.
AST-2815-2	2815B	1964	No date of tank removal is available	Aircraft Support Equipment Storage 5,000-Gallon Diesel Fuel Above Ground Storage Tank. According to PAFB personnel, the tank may have been removed and replaced by a UST. There are no records for any UST at facility 2815. No evidence of surface contamination was observed associated with this tank.

Note:

1) Tank information obtained from Basewide Environmental Baseline Survey, Plattsburgh Air Force Base (Tetra Tech, 1994).

2) NA = Not Applicable - Tank has not been removed.

2.0 TECHNICAL APPROACH OVERVIEW

SI field activities were conducted during October and November 1994 and consisted of:

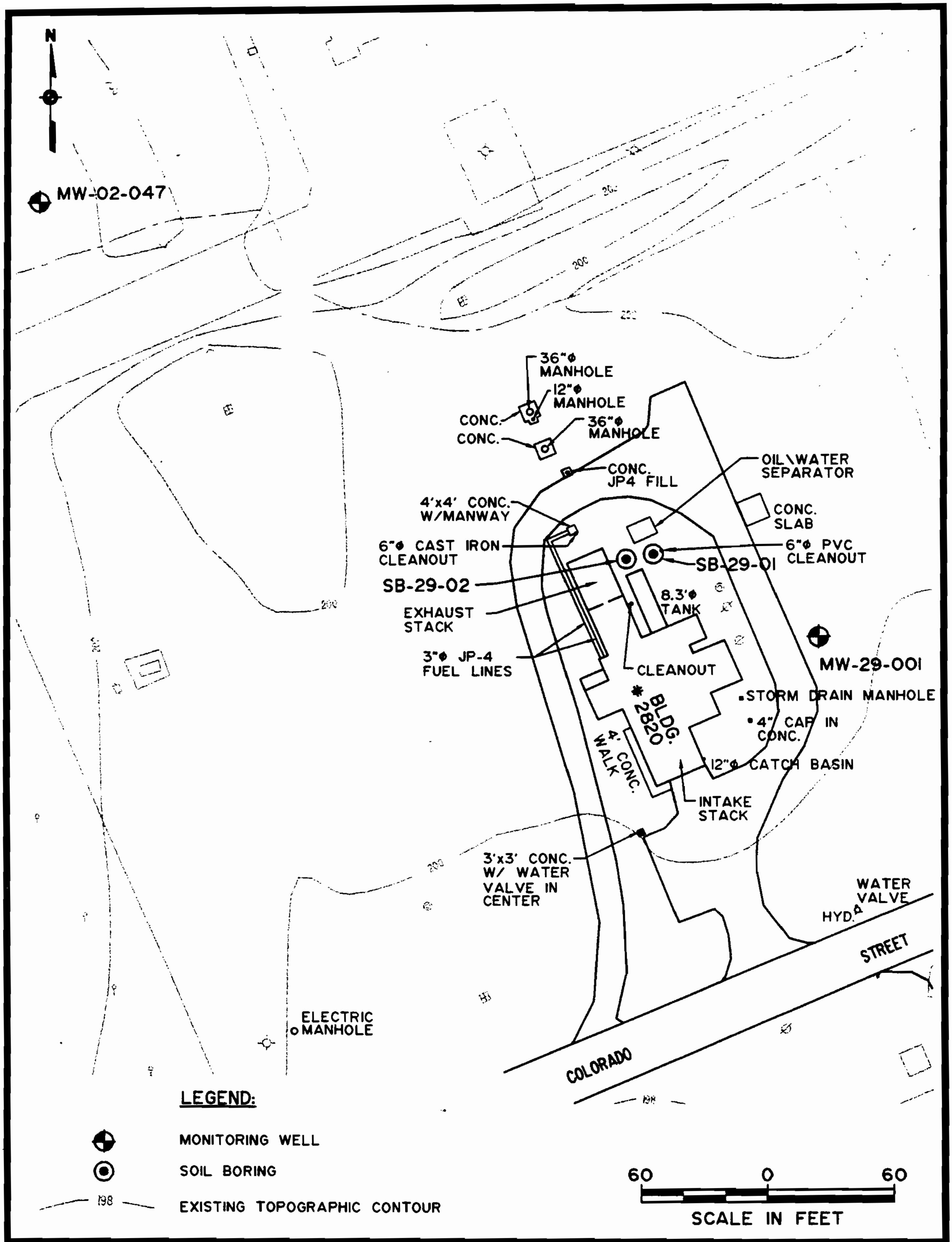
- Collection of 6 subsurface soil samples at three locations
- Installation of 1 downgradient SI groundwater monitoring well
- Sampling of the SI monitoring well and an existing upgradient monitoring well

The field and analytical programs were carried out in a manner generally consistent with the *Work Plan* (Malcolm Pirnie 1992b), *Final Chemical Data Acquisition Plan* (Malcolm Pirnie 1992c), *Site Safety and Health Plan* (Malcolm Pirnie 1992d), and the *Monitoring Well Installation Plan* (Malcolm Pirnie 1992e). However, following consultation with Plattsburgh AFB, NYSDEC, and USEPA, some modifications were made to the sampling and analytical program. These modifications included:

- All analytical data are USEPA Level IV with Level IV CLP deliverables. No analytical data are USEPA Level III.
- Hexane was eliminated as a rinse agent during the decontamination of sampling equipment--only a methanol rinse was used.
- The well was developed using a hydro-lift pump equipped with dedicated and disposable polyethylene tubing. Submersible pumps were not used.
- Pre-cleaned, factory sealed, disposable Teflon bailers were utilized for groundwater sampling. Rinse blanks were taken at a frequency of 1 per batch lot for this apparatus.
- Rinse blanks were taken from soil sampling apparatuses at the frequency of 1 per day per apparatus.
- Duplicates were taken at a minimum frequency of 1 per 20 samples for each medium.
- Matrix spike/matrix spike duplicate (MS/MSD) samples were taken at a frequency of 1 per 20 samples.
- Trip blanks were taken at a frequency of 1 per cooler for coolers in which a volatile groundwater aliquot was shipped.
- A 1-inch diameter slug was used to perform the rising head hydraulic conductivity test.

2.1 Boring and Soil Sampling Procedures

Three borings were advanced at the site at the locations shown on Figure 2-1. Drilling was performed with a CME-55 truck-mounted drill rig by Buffalo Drilling Company of Akron, New York, using hollow stem augers (HSA). The borings were continuously sampled for physical description of the subsurface materials using



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JET ENGINE TEST CELL (SS-029)
SAMPLE LOCATIONS

FIGURE 2-1

2-inch and 3-inch diameter split-barrel samplers according to ASTM D 1586-84 procedures. Soil samples were examined, classified, inspected for signs of contamination, and screened by the supervising field geologist with a photoionization detector (PID). All observations were recorded in the field notebook and summarized in the soil boring logs (Appendix D).

Two of the borings were advanced to the water table to obtain soil samples for chemical analysis. These borings were situated (1) immediately downgradient of the oil/water separator (SB-29-01) and (2) immediately downgradient of the sewer line connecting the building and the oil/water separator (SB-29-02). A downgradient monitoring well was installed in the third boring (WB-MW-29-001), which also was used to obtain soil samples for chemical analysis. Two discrete soil samples were taken at each boring location (6 samples) using 3-inch ID split-barrel samplers.

None of the soils encountered exhibited elevated PID readings, visual contamination, or unusual odors. Samples for chemical analysis, therefore, were collected from zones where potential contaminants might reasonably be expected to remain (i.e., just below the ground surface at a 0- to 2.0-foot depth and just above the water table at a 4.0- to 6.0-foot depth). All samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), and RCRA metals. Analytical results are provided in Appendix A and sample descriptions are provided in Appendix B.

2.2 Well Installation

One monitoring well (MW-29-001) was installed at a location downgradient from the oil/water separator (Figure 2-1) in boring WB-MW-29-001. The monitoring well was constructed with a 10-foot long, 2-inch ID, schedule 40 PVC screen (0.010-inch slot) set in a position straddling the water table surface. The screen was threaded to a length of 2-inch ID, schedule 40 PVC riser which extended to the ground surface. A flush mount road box was installed over the PVC riser. Monitoring well construction details may be found in Appendix E. The well was developed in a manner consistent with the *Monitoring Well Installation Plan* (Malcolm Pirnie 1992e). The well development log is provided in Appendix F.

2.3 Groundwater Sampling

The monitoring well installed during the SI (MW-29-001) and an existing upgradient monitoring well (MW-02-047) were sampled once on November 16, 1994. The wells were purged with an Isco peristaltic pump and dedicated HDPE tubing in accordance with the *Work Plan*. Well purging logs are provided in Appendix F. After purging, groundwater samples were collected using disposable, dedicated Teflon 1-5/8-inch OD bailers. Samples were analyzed for TCL VOCs and SVOCs, and total and dissolved RCRA metals. Analytical results are provided in Appendix A and sample descriptions are provided in Appendix B.

2.4 Laboratory Methods and Validation Procedures

Samples collected for chemical analysis were preserved, packaged, and shipped according to procedures specified in the *Work Plan* and *Chemical Data Acquisition Plan*. Samples were analyzed by Ecology and Environment, Inc., of Lancaster, New York. Validated results of analyses performed on respective samples are summarized in Appendix A. Methods of sample analysis used were: *USEPA Contract Laboratory Program*

(CLP) Statement of Work (SOW) for Organic Analysis - Document Number OLM01.8; and *USEPA CLP SOW for Inorganics* - Documents Number ILM03.0. Results are discussed in Section 5.0.

All analyses were independently validated for usability and completeness under the supervision of URS' Quality Assurance/Quality Control (QA/QC) Manager. Data validation was performed according to USEPA Region II data validation procedures. The results of the audit are documented in the *QC Summary Report* (URS Consultants 1995a). Raw (non-validated) data and associated blanks are compiled in the *Interim Raw Data Package* (URS 1995b). Appendix C contains data flagged with validation qualifiers and cross-referenced to method, trip, and field blank samples.

2.5 Geotechnical Testing

Two samples were collected and analyzed for geotechnical parameters. During drilling, split-barrel samplers were used to collect 2 samples from boring WB-MW-29-001, with 1 sample from the screened interval of the subsequently installed monitoring well. Geotechnical samples were analyzed for grain size (ASTM D 422), Atterberg limits (ASTM D 4318, for cohesive soils only), and moisture content (ASTM D 2216) by Huntingdon Analytical Services of Middleport, New York. Geotechnical testing results, presented in Appendix G, are discussed in Section 3.0.

2.6 Hydrogeologic Testing

In-situ slug tests were performed in the SI monitoring well to estimate the hydraulic conductivity of the water-bearing formation. Slug tests were conducted by lowering the water level within the monitoring well with a stainless-steel slug and monitoring the rate of return of the water to its previous level. Slug testing results, calculations, and supporting data are presented in Appendix H. Section 3.6 presents a discussion of the results.

2.7 Site Surveying

Following sampling and drilling activities, the monitoring well and soil sample points were surveyed for horizontal location and elevation. Horizontal coordinates are based on the New York State Plane Coordinate System, Transverse Mercator Projection, East Zone, North American Datum of 1983. Elevations are based on the North American Vertical Datum of 1988 (Mean Sea Level-MSL). Surveyed locations and elevations are provided in Table I-1 of Appendix I. Survey tie points for each boring also are provided in Appendix I. All surveying was conducted under the supervision of a New York State licensed Land Surveyor.

3.0 PHYSICAL SETTING

3.1 Surface Features

The Jet Engine Test Cell site is located within the central industrial corridor portion of Plattsburgh AFB, north of Colorado Street and adjacent to the flightline. Surface features of the site and adjacent areas are shown in Figure 3-1. The Pavement and Grounds Maintenance Facility, Building 2827, is located north of SS-029. The Fuel Systems Maintenance Dock Building 2818, is located south of SS-029. The Aerospace Ground Equipment Facility is located in Building 2815, due east of SS-029. This facility and the adjacent Weapons Systems Management and Maintenance Facility (Building 2801) comprise IRP site SS-006.

The prominent site surface features include: Building 2820, which houses equipment used to test jet engines; the oil/water separator housing; a partially buried concrete structure near the northeast corner of Building 2820; the cooling water tank adjacent to the east central side of Building 2820; the piping and access structures associated with JP-4 jet fuel UST 2820-1 north of Building 2820 (Figure 3-2 and Photos 1 through 6); and the paved parking area and access road that surrounds Building 2820.

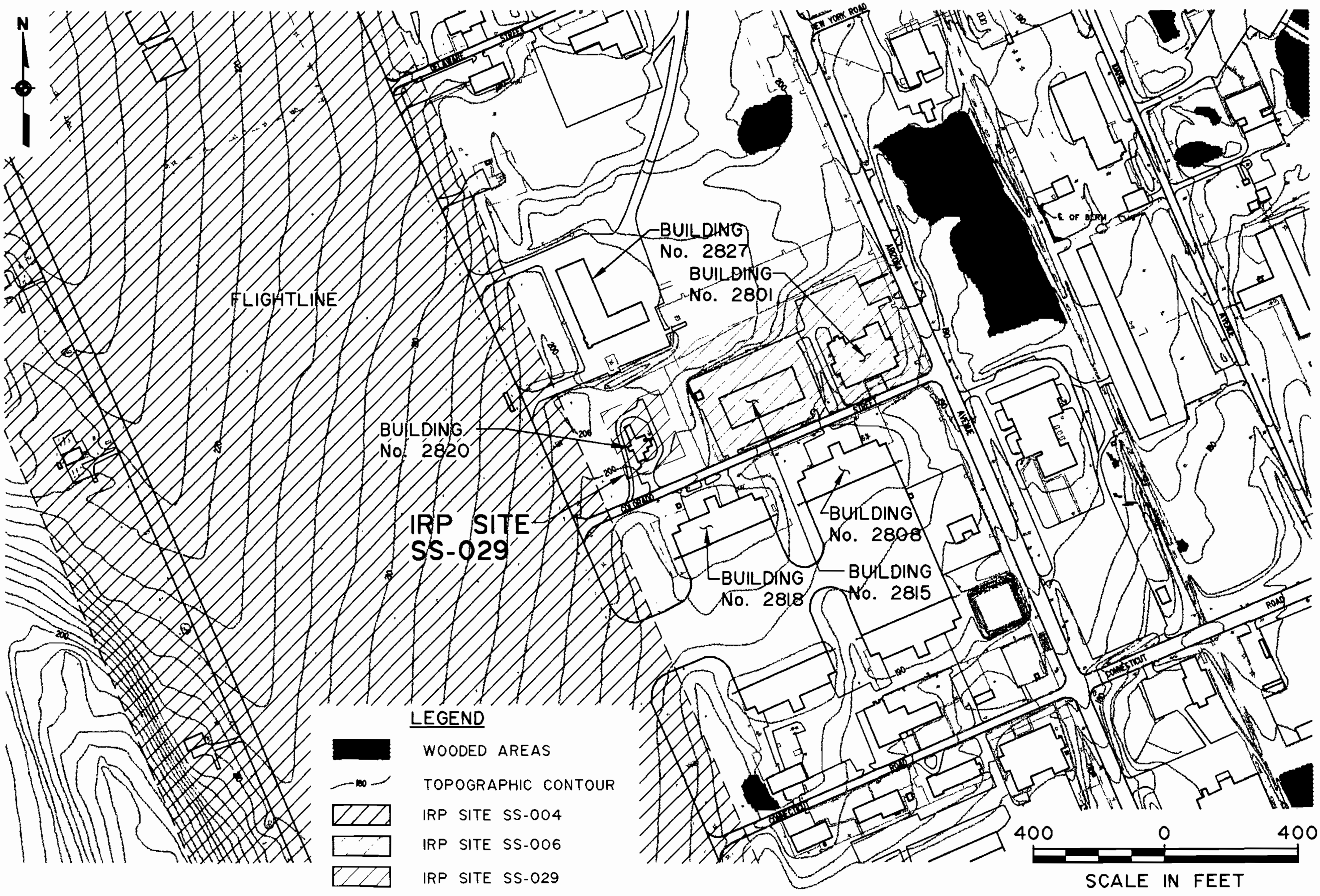
Although the central industrial corridor area generally slopes gently to the west-southwest, the site occupies a relatively flat area. Soils are highly permeable in the mowed lawn areas surrounding the site; but during heavy precipitation events, surface water flows toward the storm drain catch basin or manhole located near the southeast corner of Building 2820 and storm drain drop inlets in depressions in the lawn areas northwest and southwest of Building 2820 (Figure 3-2).

3.2 Demography and Land Use

According to the 1990 Census, Greater Plattsburgh has a population of 38,173. Between 1970 and 1990, the population of Clinton County has grown from 72,934 to 85,969, an average growth rate of approximately 0.9 percent per year. Assuming this growth rate remains constant, the projected population of Greater Plattsburgh will be approximately 41,751 by the year 2000; however, closure of the base may reduce this population by about 6,000.

Land uses near Plattsburgh AFB include residential, commercial, industrial, and recreational. A zoning map for Plattsburgh AFB and vicinity is presented on Figure 3-3. Subsequent to base closure, it is expected that zoning will be restructured based upon reuse and redevelopment recommendations from the PARC. The draft base reuse plan indicates a probable industrial or aviation support reuse for SS-029 (PARC 1995).

Plattsburgh AFB obtains its potable water from the City of Plattsburgh municipal water system. Municipal water supply sources are the Paterson and Mead reservoirs, and West Brook, located approximately 5 miles northwest of the City of Plattsburgh. Some residences adjacent to the base rely on private wells for drinking water. These residences include the homes along Kemp Lane (near the base's north gate), the residential development on old NY Route 22 (near the NY Route 22 and I-87 interchange); and residences along Route 9 just north of the Salmon River (Figure 3-4). These residences are approximately 1/2-mile north, 8/10-mile west, and 2-miles southeast of the site, respectively, and should not be influenced by groundwater flow from SS-029 (see Section 3.6).



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JET ENGINE TEST CELL (SS-029)
NEARBY IRP SITES

FIGURE 3-1

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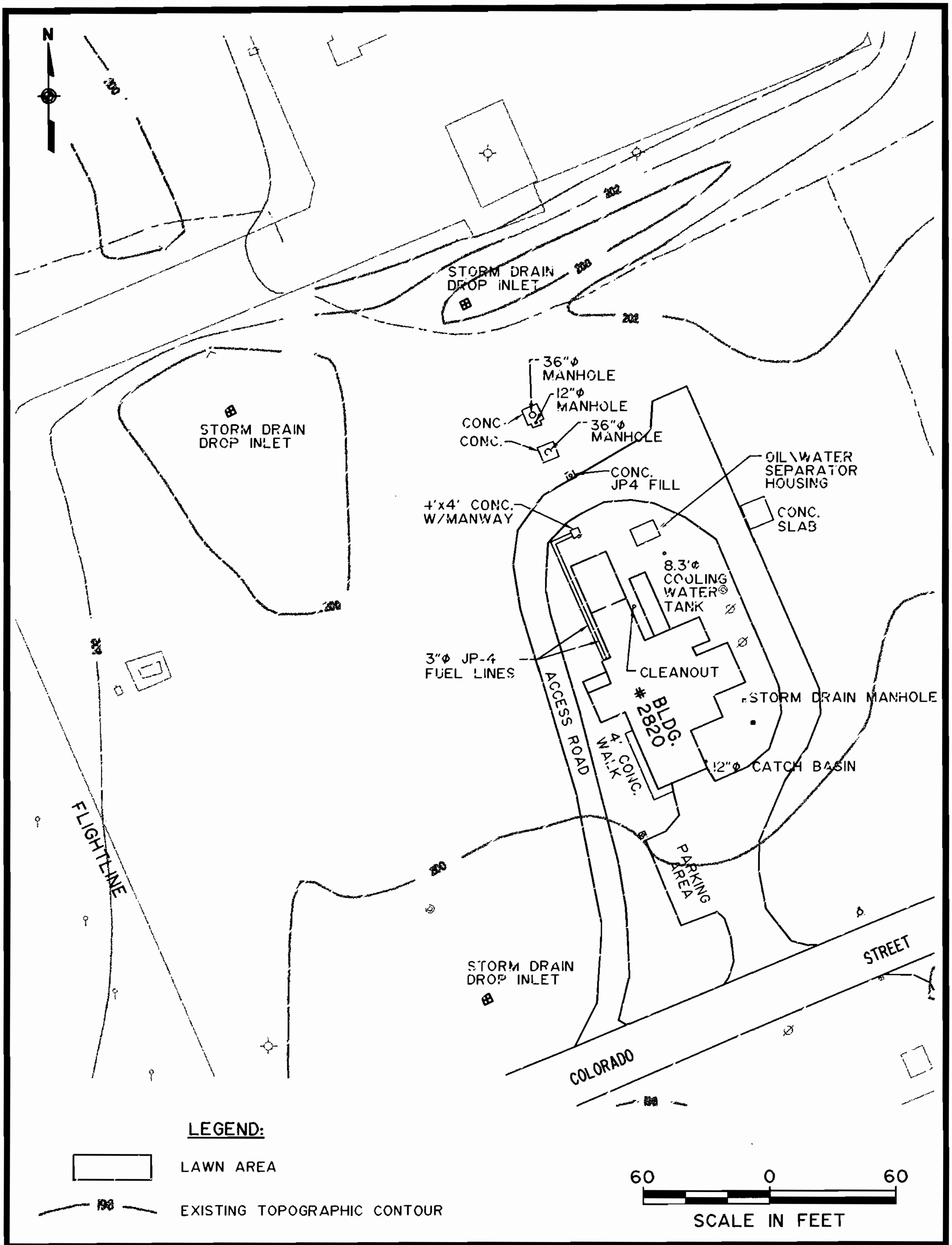

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JET ENGINE TEST CELL (SS-029)
SURFACE FEATURES

FIGURE 3-2

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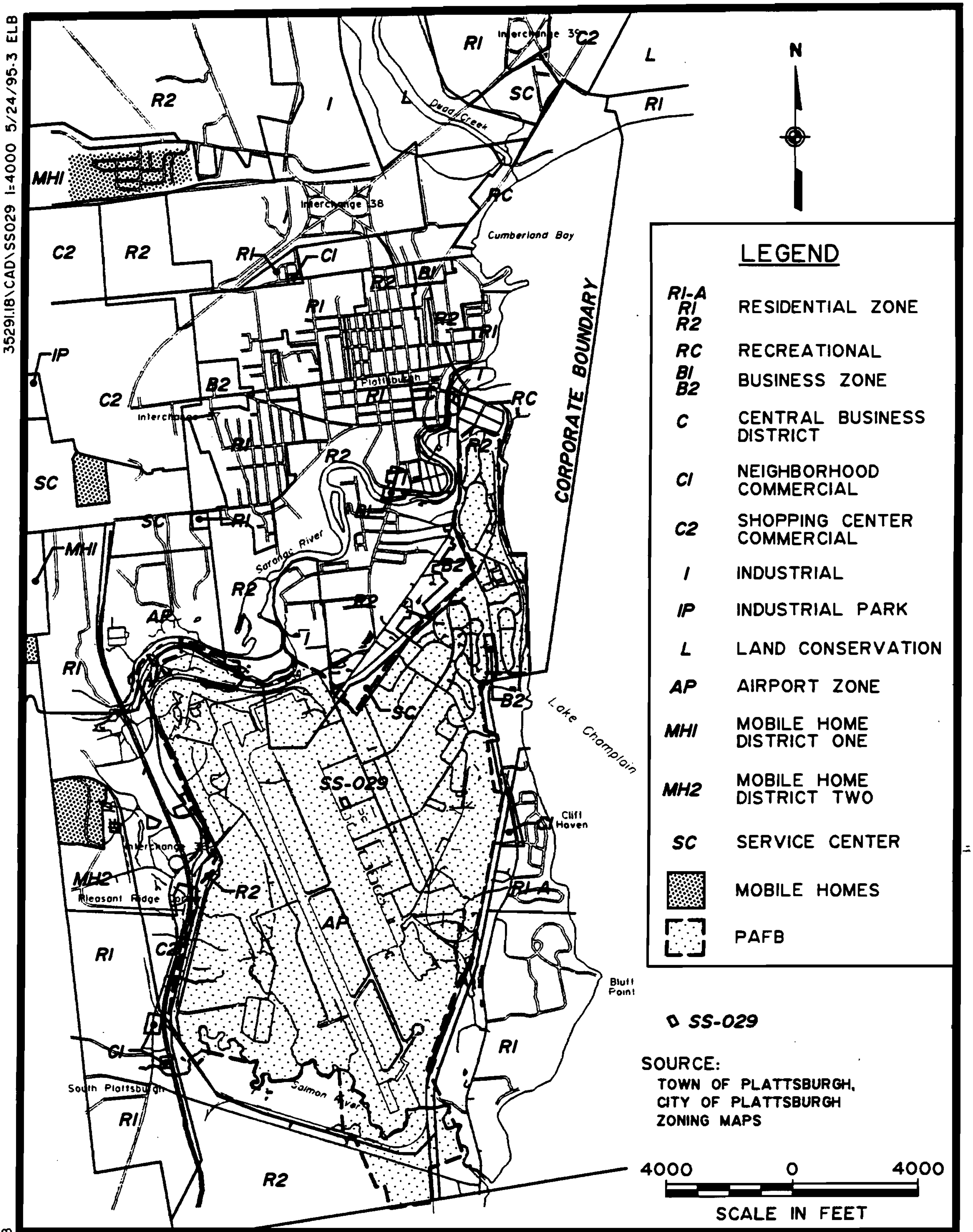

SOURCE:
TOWN OF PLATTSBURGH,
CITY OF PLATTSBURGH
ZONING MAPS

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PLATTSBURGH A.F.B. ZONING MAP

FIGURE 3-3

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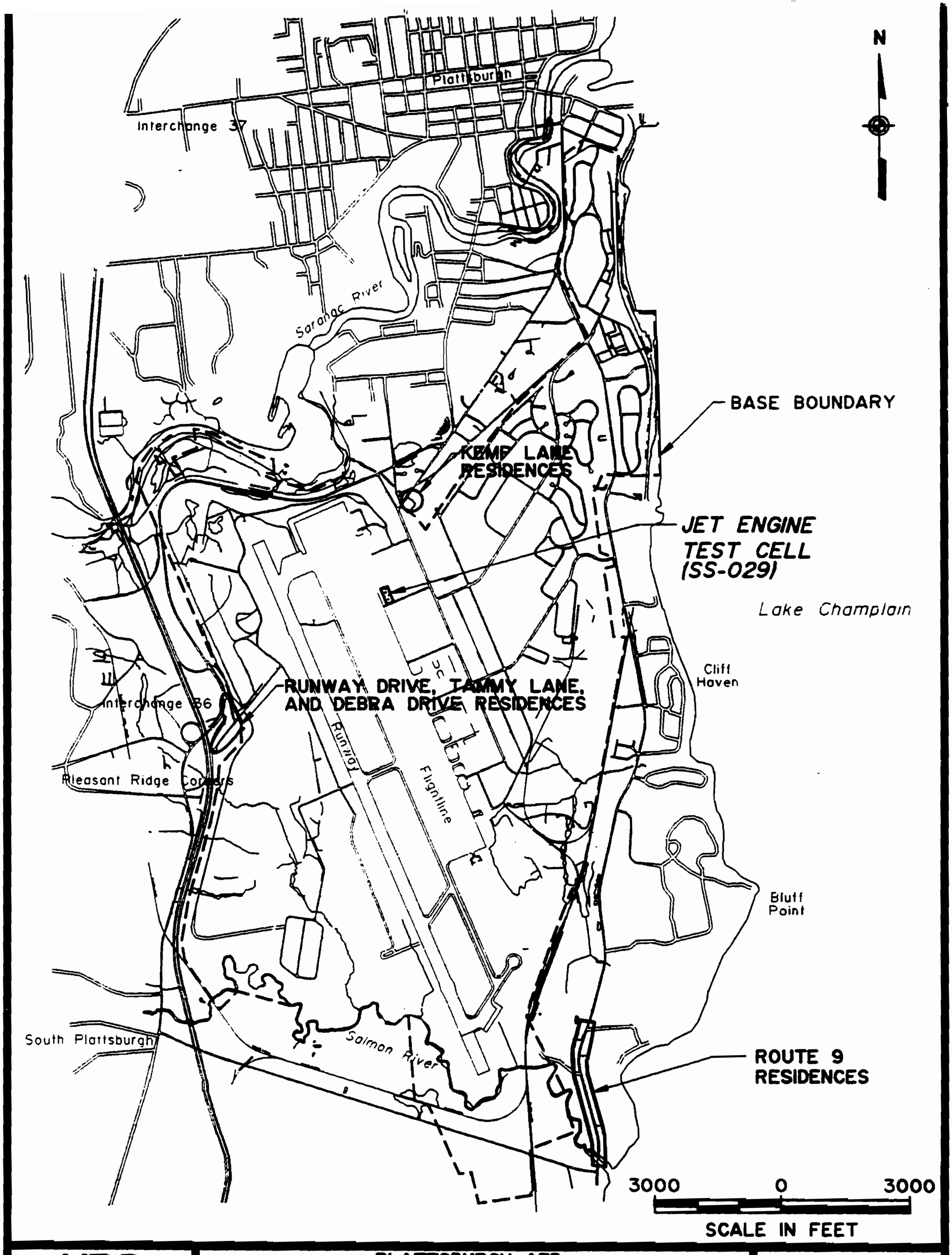

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PLATTSBURGH AFB
LOCATIONS OF OFF-BASE RESIDENCES UTILIZING
GROUNDWATER FOR POTABLE USE

FIGURE 3-4

3.3 Vegetative Covertypes

Vegetative covertypes, both aquatic and terrestrial, were mapped during the Step I Habitat Assessment (URS Consultants 1994a). Covertypes within 1,000 feet of the site are shown on Figure 3-5 and described below. [Plots of covertypes over the entire base at a scale of 1" = 200′ may be found in the Step I Habitat Assessment Report (URS 1994a).]

- **Terrestrial System - Non-Forested Covertypes (Highly Disturbed)**

(IS) - Unvegetated Impervious Surfaces - This covertype includes paved surfaces (e.g., roads, parking lots, runway, etc.) and building exteriors. These surfaces are impervious to precipitation and possess artificial drainage systems (i.e., gutters, storm sewers, etc.). Vascular plants are only minor, incidental components of this covertype, which is found throughout the base.

(ML) - Mowed Lawn - This covertype is mapped in areas of lawn grasses maintained by regular mowing. Trees and shrubs may be present, but make up less than 30 percent of the cover. This covertype can be found throughout the base. It includes most of site SS-029 and large areas to the east of the flightline.

(LT) - Mowed Lawn With Trees - This covertype is similar to Mowed Lawn (ML) but trees and shrubs make up more than 30 percent of the areal cover. An example of this covertype is a small area northeast of SS-029.

- **Terrestrial System - Forested Covertypes**

(PH) - Pine-Hardwoods - This covertype is the most xeric of the forested types and occurs on well-drained sandy soils. It is similar to the Appalachian oak-pine forest and pine-northern hardwoods forest of Reschke (1990). Pines make up more than 50 percent of the stand and some stands are plantations. This covertype occurs throughout the base. An example is a small area located northeast of SS-029. Dominant plant species include:

- Trees/Saplings
  - Pines (*Pinus strobus, P. rigida, P. resinosa*)
  - Oaks (*Quercus rubra, Q. alba, Q. velutina*)
  - Aspens (*Populus grandidentata, P. tremuloides*)
  - Paper Birch (*Betula papyrifera*)
  - Black Cherry (*Prunus serotina*)
- Shrubs
  - Blueberries (*Vaccinium angustifolium, V. pallidum*)
  - Black Huckleberry (*Gaylussacia baccata*)
  - Sheep Laurel (*Kalmia angustifolia*)
- Herbs
  - Bracken Fern (*Pteridium aquilinum*)
  - Sarsaparilla (*Aralia nudicaulis*)
  - Indian Cucumber-root (*Medeola virginiana*)

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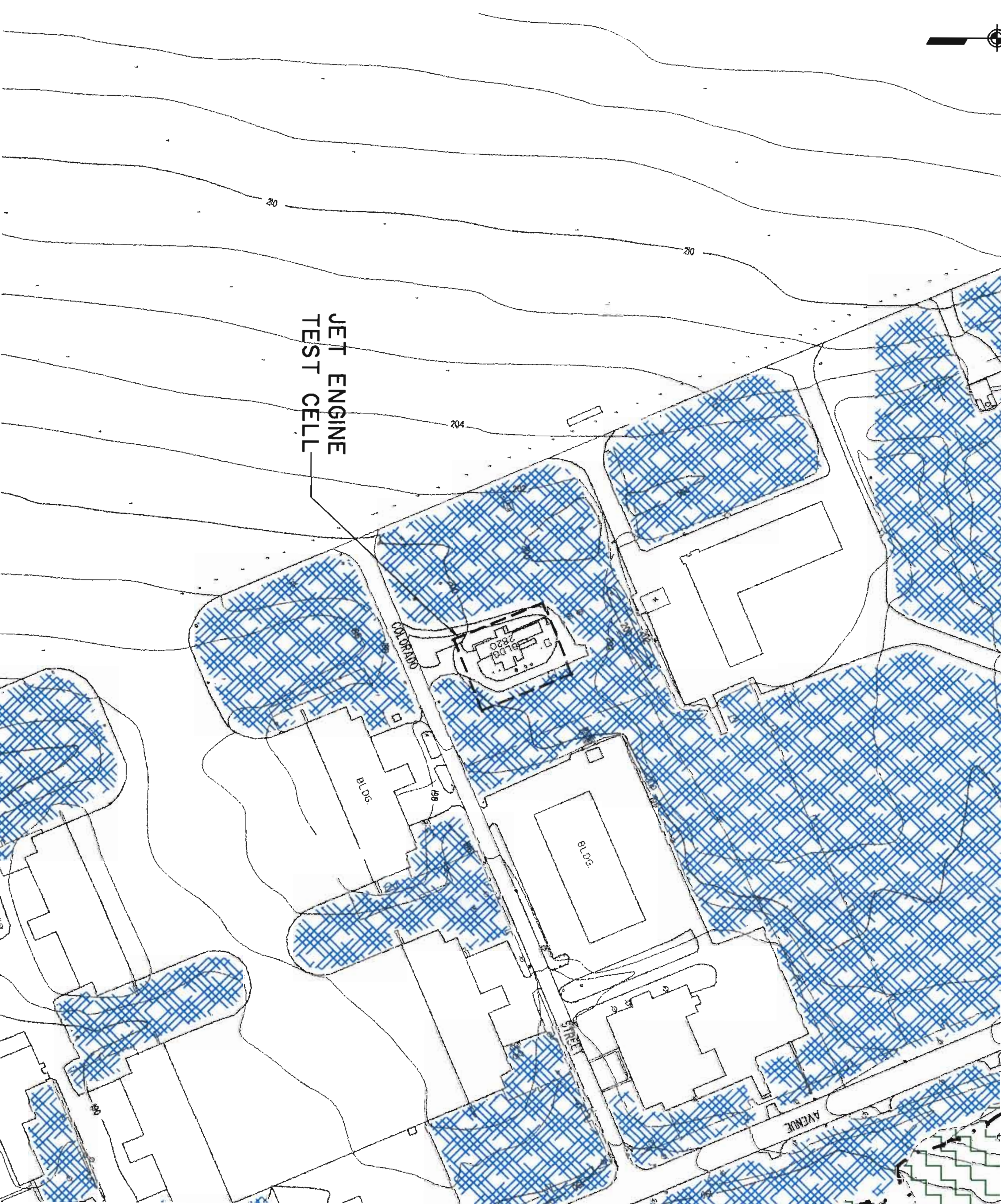

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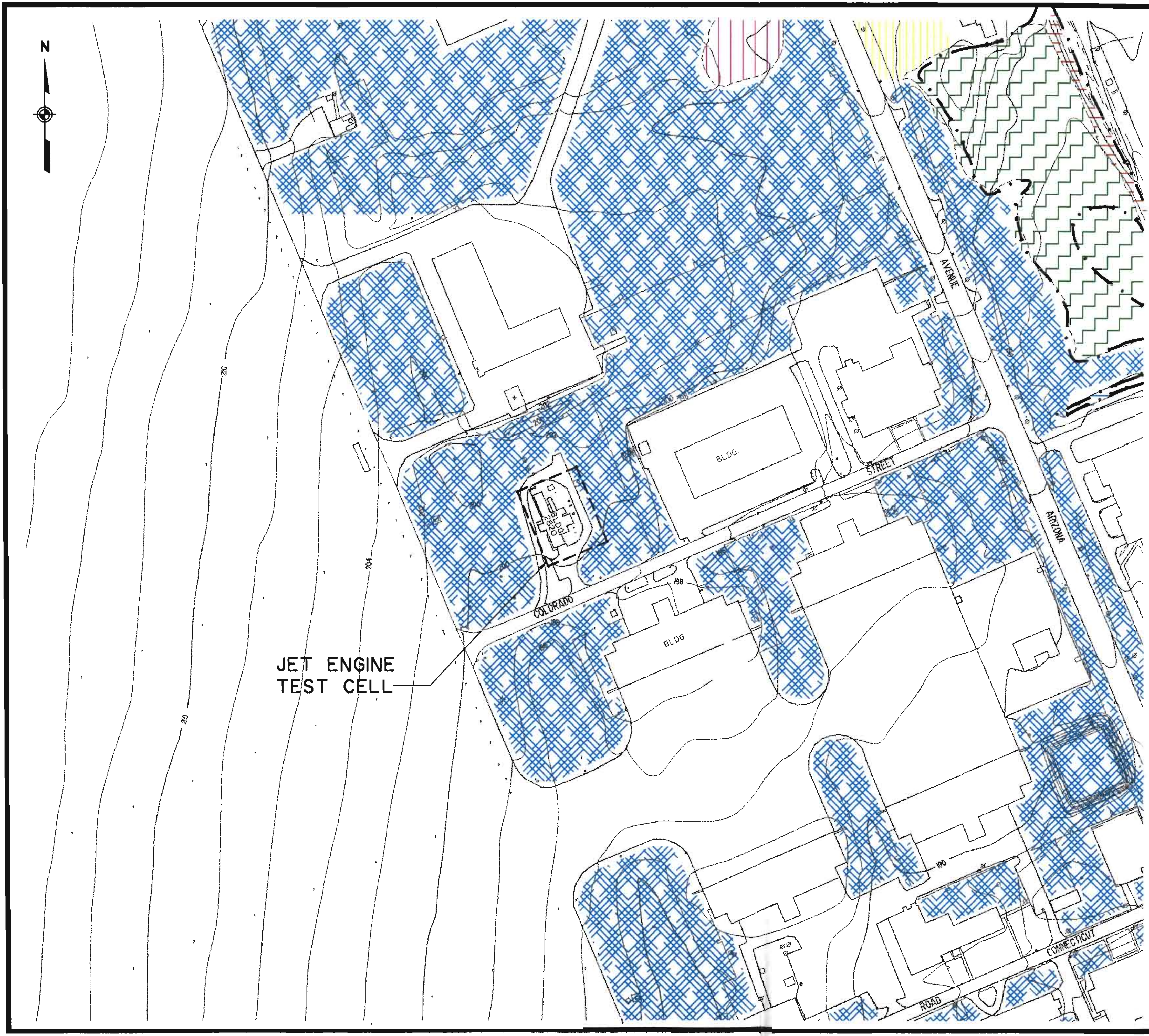

LEGEND

—198— EXISTING CONTOUR

– – – – APPROXIMATE SITE BOUNDARIES

— · — FEDERALLY REGULATED WETLANDS APPROXIMATE BOUNDARIES

TERRESTRIAL SYSTEM

FORESTED COVERTYPES

▨ (MH) MIXED HARDWOODS

▥ (PH) PINE-HARDWOODS

NON-FORESTED COVERTYPES

HIGHLY DISTURBED

▥ (LT) MOWED LAWN WITH TREES

▩ (ML) MOWED LAWN

☐ (IS) UNVEGETATED IMPERVIOUS SURFACES

RIVERINE SYSTEM

▤ (DS) DITCH/INTERMITTENT STREAM

NOTE:

1. FEDERALLY REGULATED WETLAND BOUNDARIES ARE BASED ON U.S. ARMY CORPS OF ENGINEERS, 1992 PLATTSBURGH AIR FORCE BASE WETLAND DELINEATION.

200 0 200
SCALE IN FEET

PLATTSBURGH A.F.B. - SS-029
HABITAT COVERTYPES

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FIGURE 3-5

(MH) - Mixed Hardwoods - This covertype occurs on mesic sites. It is most similar to successional northern hardwoods, but with elements of the beech-maple mesic forest of Reschke (1990). Some conifers may be present, e.g., white pine, hemlock, and northern white cedar, but these together make up less than 50 percent of the stand. This covertype is found throughout the base. An area with this covertype occurs northeast of SS-029. Dominant plant species include:

- Trees/Saplings
  - Red Maple (*Acer rubrum*)
  - Aspens (*Populus grandidentata, P. tremuloides*)
  - Paper Birch (*Betula papyrifera*)
  - Beech (*Fagus grandifolia*)
  - Sugar Maple (*Acer saccharum*)
  - White Ash (*Fraxinus americana*)
  - Oaks (*Quercus rubra, Q. alba, Q. macrocarpa*)
- Shrubs
  - Hop Hornbeam (*Ostrya virginiana*)
  - Ironwood (*Carpinus caroliniana*)
  - Spicebush (*Lindera benzoin*)
  - Herbs
  - Cinnamon Fern (*Osmunda cinnamomea*)
  - Sensitive Fern (*Onoclea sensibilis*)
  - Spinulose Wood Fern (*Dryopteris spinulosa*)
- Herbs
  - Cinnamon Fern (*Osmunda cinnamomea*)
  - Sensitive Fern (*Onoclea sensibilis*)
  - Spinulose Wood Fern (*Dryopteris spinulosa*)

- **Riverine System**

(DS) - Ditch/Intermittent Stream - This covertype occurs along small drainage ways, either channelized or natural. An example is a small area northeast of SS-029. These drainageways are often lined with plant species from the Wet Meadow or Shrub Swamp communities. Fish species that may be found in ditches include:

Bluntnose Minnow *(Pimephales notatus)*
Creek Chub (*Semotilus atromaculatus)*
Johnny Darter *(Etheostoma nigrum)*

The U.S. Army Corps of Engineers (USACE) identified a wetland area located approximately 1,100 feet northeast of SS-029 (Figure 3-5). This federally-regulated wetland is described as a forested swamp area (USACE 1992). The closest NYSDEC-regulated wetland is approximately 3,500 feet southwest of the site (PB-14). Other wetlands identified on the base and details of base wetland resources are described in the base-wide wetland delineation report (URS Consultants 1993).

3.4 Soil Characteristics

Soils in the vicinity of SS-029 have been classified by the Soil Conservation Service as Urban Land (USDA-SCS undated). These soils generally consist of nearly level areas where at least 80 percent of the surface is covered with asphalt, concrete, buildings, or other impervious materials.

3.5 Geologic Setting

Stratigraphy in the area of SS-029 can be generalized as consisting of three hydrogeologic units (four stratigraphic units): an upper unconsolidated sand aquifer, an underlying confining layer formed by a thin silt and clay unit and thicker glacial till unit, and a thinly bedded dolostone bedrock aquifer. Since the SS-029 SI soil borings only partially penetrated the upper sand aquifer, stratigraphic information from nearby deeper borings conducted for other investigations (MW-06-001 and MW-06-002) and from maps prepared by Malcolm Pirnie (Malcolm Pirnie 1994) was used to construct a cross-section in the vicinity of the site. This cross-section, located on Figure 3-6, is shown on Figure 3-7.

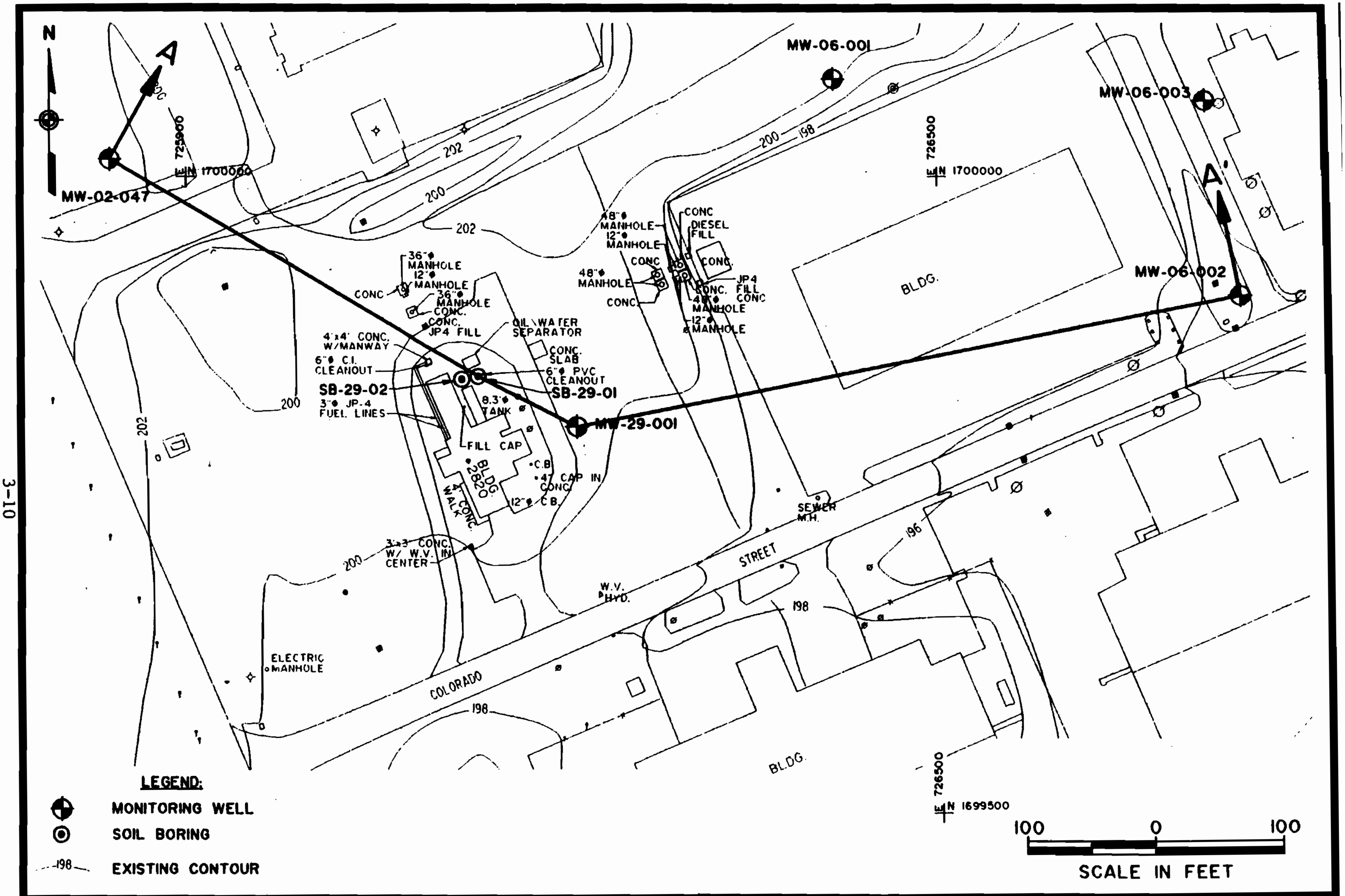
The sand (water table) aquifer generally consists of fine to medium sand with lesser, variable amounts of coarse sand, silt, and gravel. The sand is of glaciomarine and glaciolacustrine origin and is typically brown to gray in color. The thickness of the sand unit ranges from 32.0 to 39.0 feet in the vicinity of SS-029. The sand unit typically becomes finer grained with depth, grading texturally into the underlying silt and clay unit. Table 3-1 summarizes geotechnical information for samples collected during the SI from the sand unit. The complete geotechnical testing report is included as Appendix G.

A gray silt and clay unit, also of glaciomarine/glaciolacustrine origin, typically underlies the sand unit in the vicinity of the site. The silt and clay unit was encountered in well borings MW-06-001 and MW-06-002 at adjacent IRP site SS-006 at approximate depths of 39.0 feet and 32.0 feet, respectively (161 feet elevation above mean sea level [amsl]). The thickness of the silt and clay unit could not be determined from these borings.

Glacial till reportedly underlies the silt and clay unit and overlies bedrock. It is described as a poorly-sorted gray silt and clay matrix with frequent gravel, cobbles, and boulders (Malcolm Pirnie 1994). The till was reported to be 14.5 and 24 feet thick in piezometers PZ-2D and PZ-11D, respectively, which are the closest borings to the SS-029 site that encountered glacial till (Figure 3-8).

The silt and clay unit, in combination with the underlying glacial till, forms a confining layer between the upper sand aquifer and lower bedrock aquifer.

Bedrock at the site is described as thin, horizontally to sub-horizontally, bedded dolostone (Malcolm Pirnie 1994). Bedrock was encountered at depths of 54.0 and 73.5 feet (119.0 to 129.5 feet elevation amsl) in piezometers PZ-11D and PZ-2D, respectively, which are the closest explorations to the site that encountered bedrock. Geophysical survey data (Malcolm Pirnie 1994) indicate that bedrock beneath SS-029 is at a depth of approximately 64 feet (approximately 135 feet elevation amsl).



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JET ENGINE TEST CELL (SS-029)
CROSS-SECTION A-A' LOCATION

FIGURE 3-6

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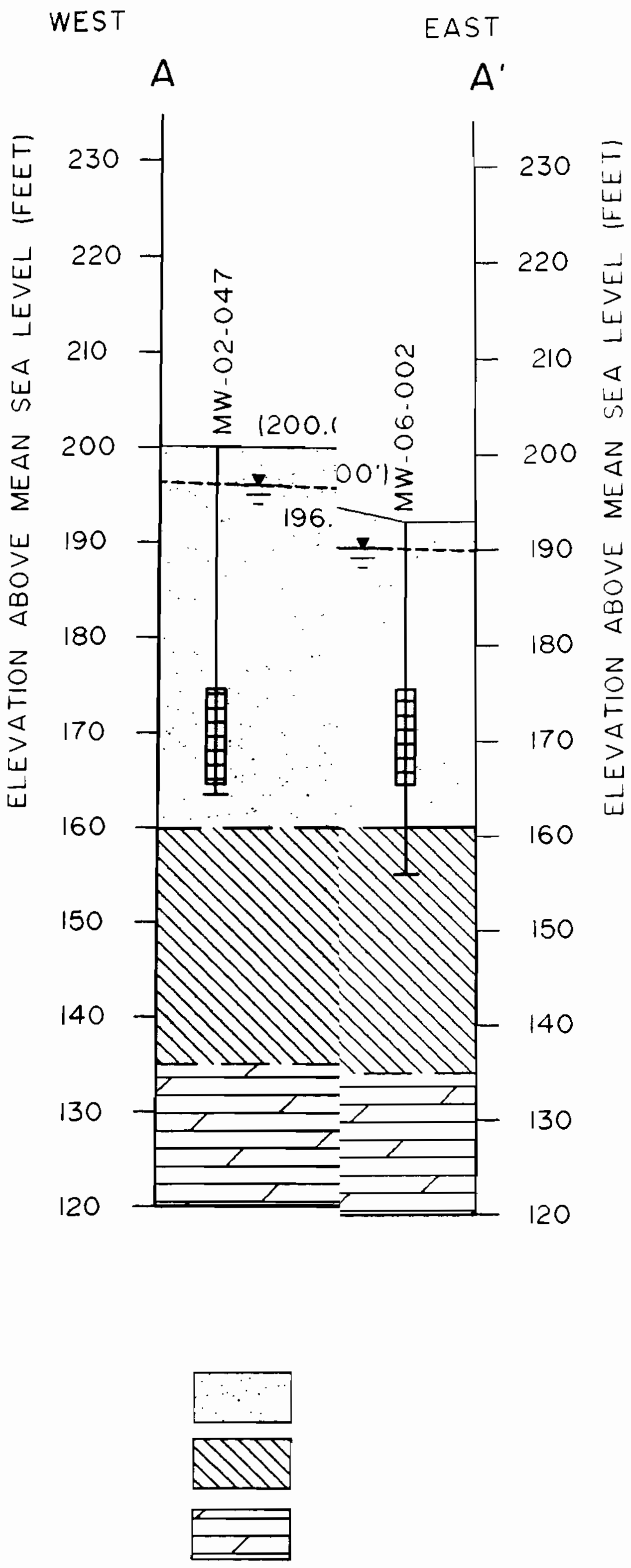

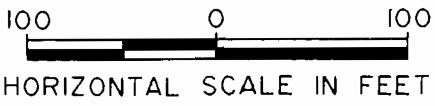

NOTES:

1. GEOLOGICAL CONDITIONS SHOWN ARE REPRESENTATIVE OF THE ENCOUNTERED AT EACH BORING LOCATION TO THE DEPTH DRILL EXTRAPOLATIONS BETWEEN BORINGS HAVE BEEN INTERPRETED STANDARDLY ACCEPTED GEOLOGIC PRACTICES AND PRINCIPLES. CONDITIONS MAY VARY BETWEEN BORINGS FROM THOSE SHOWN.
2. ELEVATIONS BASED ON TRANSVERSE MERCATOR PROJECTION, E NORTH AMERICAN DATUM 1983.
3. CONTACTS AT THE SAND AND CLAY/TILL INTERFACE AND AT T TILL AND BEDROCK INTERFACE ARE INFERRED. THE ELEVATION TOP OF THE CLAY/TILL UNIT WAS EXTRAPOLATED ACROSS THE FROM ITS ELEVATION AT MW-06-002. THE ELEVATION OF THE WAS EXTRAPOLATED ACROSS SITE USING AN APPROXIMATE 26 THICKNESS BELOW THE SAND AND CLAY/TILL CONTACTS AS OB AT MW-06-002.

JET ENGINE TEST CELL (SS-029)
CROSS SECTION A-A'

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FIGURE 3-7

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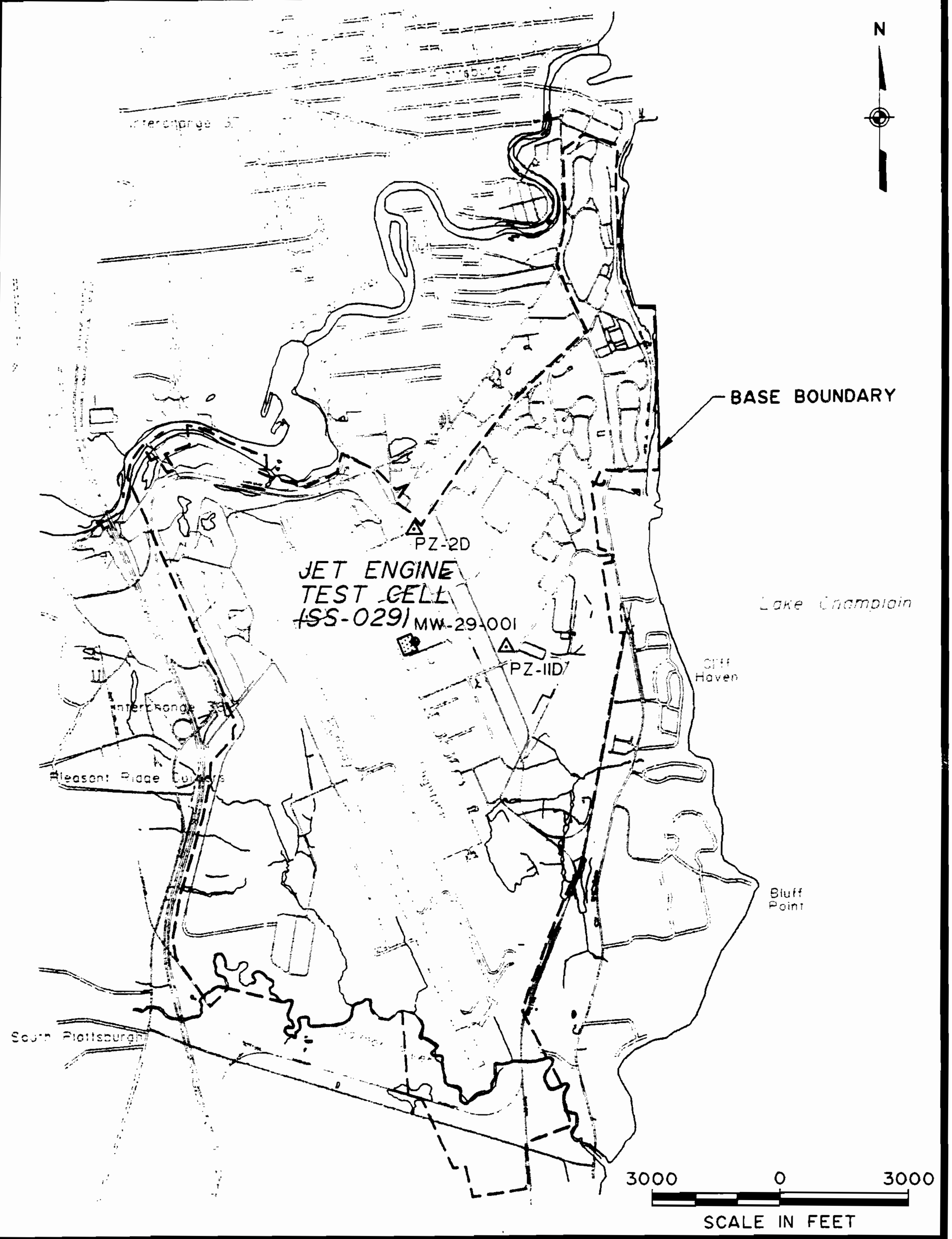

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PLATTSBURGH AFB - LOCATION
OF PZ-2D AND PZ-11D TO SITE SS-029

FIGURE 3-8

TABLE 3-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION GEOTECHNICAL ANALYSIS SUMMARY

	GRAIN SIZE DISTRIBUTION				USCS Class	Water Content (%)
Sample Location/Depth	% Gravel	% Sand	% Silt	%Clay		
WB-MW-29-001/2′-4′	0.2	85.2	13.0	1.6	SM	7.5
WB-MW-29-001/6′-8′	0.0	97.5	2.5		SP	21.8

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3.6 Hydrogeologic Setting

Groundwater in the Plattsburgh area generally occurs in both the overburden deposits and bedrock. The Adirondack Mountains to the west of Plattsburgh represent the major recharge area for the region and Lake Champlain represents the regional discharge area (Giese and Hobba 1970). Other locally significant discharge areas include the Saranac and Salmon Rivers. The Saranac River is located approximately 0.9-mile to the northwest of SS-029, while the Salmon River is located approximately 1.6 miles south of SS-029. Groundwater flow from SS-029 is to the southeast toward the Golf Course Drainage Area, located approximately 1.6 miles southeast of the site, and eventually to Lake Champlain.

Groundwater elevations were recorded in the SI monitoring wells and several nearby existing wells during this study (Table 3-2). These data were used to infer groundwater flow patterns across the site. Figure 3-9 depicts the potentiometric surface of the unconfined water table aquifer in the vicinity of SS-029 from water level data collected on December 11, 1994. Local groundwater flow is toward the southeast at a horizontal gradient of approximately 0.007 ft/ft. Since the data collected on January 12, 1995 indicates that water level elevations did not change significantly from December, there is negligible variation in the resultant groundwater direction and gradients. Regional groundwater flow, measured in May 1995 and depicted on Figure 3-10, is south-southeast in the general area of the site. Vertical hydraulic gradients were not calculated.

In-situ hydraulic conductivity tests were performed on the SI monitoring well, MW-29-001. Rising and falling head slug test data were analyzed using the method of Bouwer and Rice (Bouwer and Rice 1976; Bouwer 1989). Calculated hydraulic conductivity values for the sand aquifer in the site vicinity are summarized in Table 3-3. Hydraulic conductivity calculated for MW-29-001 averaged 1.17 x 10^{-2} cm/sec, which is within one order of magnitude of the values calculated for nearby wells screened slightly deeper in the sand aquifer (Table 3-3). Monitoring well MW-29-001 was screened through the upper, coarser textured portion of the sand aquifer and has slightly higher hydraulic conductivity than the wells screened in the finer textured, deeper portion of this aquifer. Hydraulic conductivity calculations are included as Appendix H.

The silt and clay unit and underlying glacial till form a confining layer that separates the unconfined sand aquifer from the confined bedrock aquifer. Deep boring stratigraphic information from nearby investigations indicates that the confining unit is probably continuous beneath SS-029. The vertical hydraulic conductivity of the silt and clay unit is estimated to be approximately 10^{-8} cm/sec and the hydraulic conductivity of the glacial till is estimated to be approximately 10^{-7} cm/sec (Malcolm Pirnie 1994).

Groundwater flow in the bedrock aquifer beneath Plattsburgh AFB has been only cursorily investigated. Eight bedrock wells/piezometers were installed as part of the base-wide hydrogeology investigation (Malcolm Pirnie 1994). Data from April 1994 indicated that groundwater flow in the shallow bedrock aquifer was to the east and southeast toward Lake Champlain and the Salmon River, at a horizontal gradient of approximately 0.007 ft/ft (Malcolm Pirnie 1994). Slug tests performed on the bedrock wells yielded hydraulic conductivities ranging from 10^{-6} to 10^{-2} cm/sec.

TABLE 3-2

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
GROUNDWATER ELEVATIONS

MONITORING WELL I.D.	MEASURING POINT (TOP OF RISER) ELEVATION*	MEASUREMENT DATE							
		10/30/94		12/10/94		12/11/94		1/12/95	
		GW Elevation*	Time	GW Elevation*	Time	GW Elevation*	Time	GW Elevation*	Time
MW-29-001	199.43	193.32	09:15	193.73	11:12	193.73	11:43	193.05	13:20
MW-02-047	199.58	195.93	09:25	196.18	11:16	196.16	11:51	195.57	13:30
MW-06-001	200.23			193.46	11:37	193.49	11:37	192.87	13:10
MW-06-002	192.79			190.17	11:31	190.17	11:28	189.58	13:00

* Above Mean Sea Level

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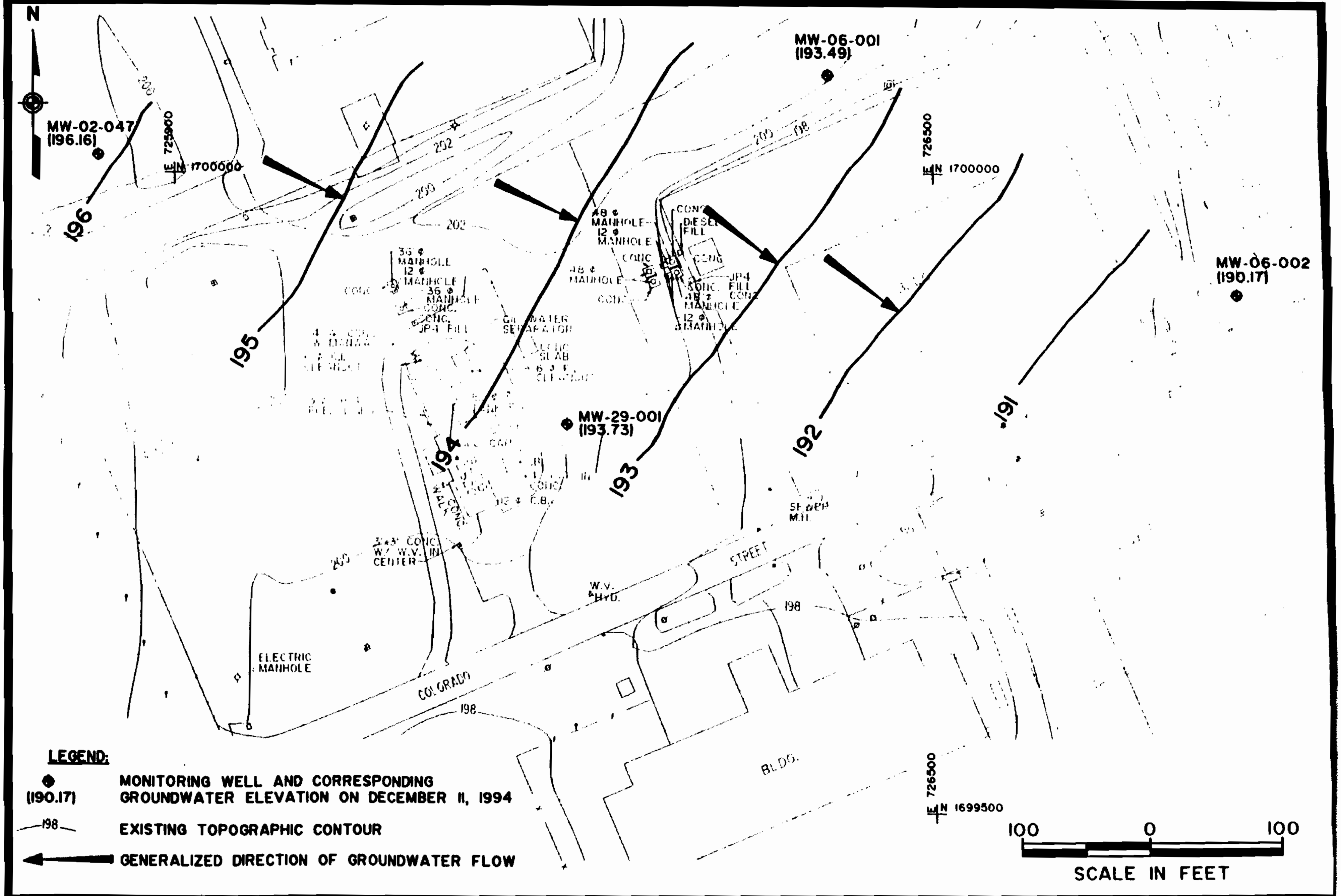

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JET ENGINE TEST CELL (SS-029)
GROUNDWATER CONTOUR MAP 12/11/94

FIGURE 3-9

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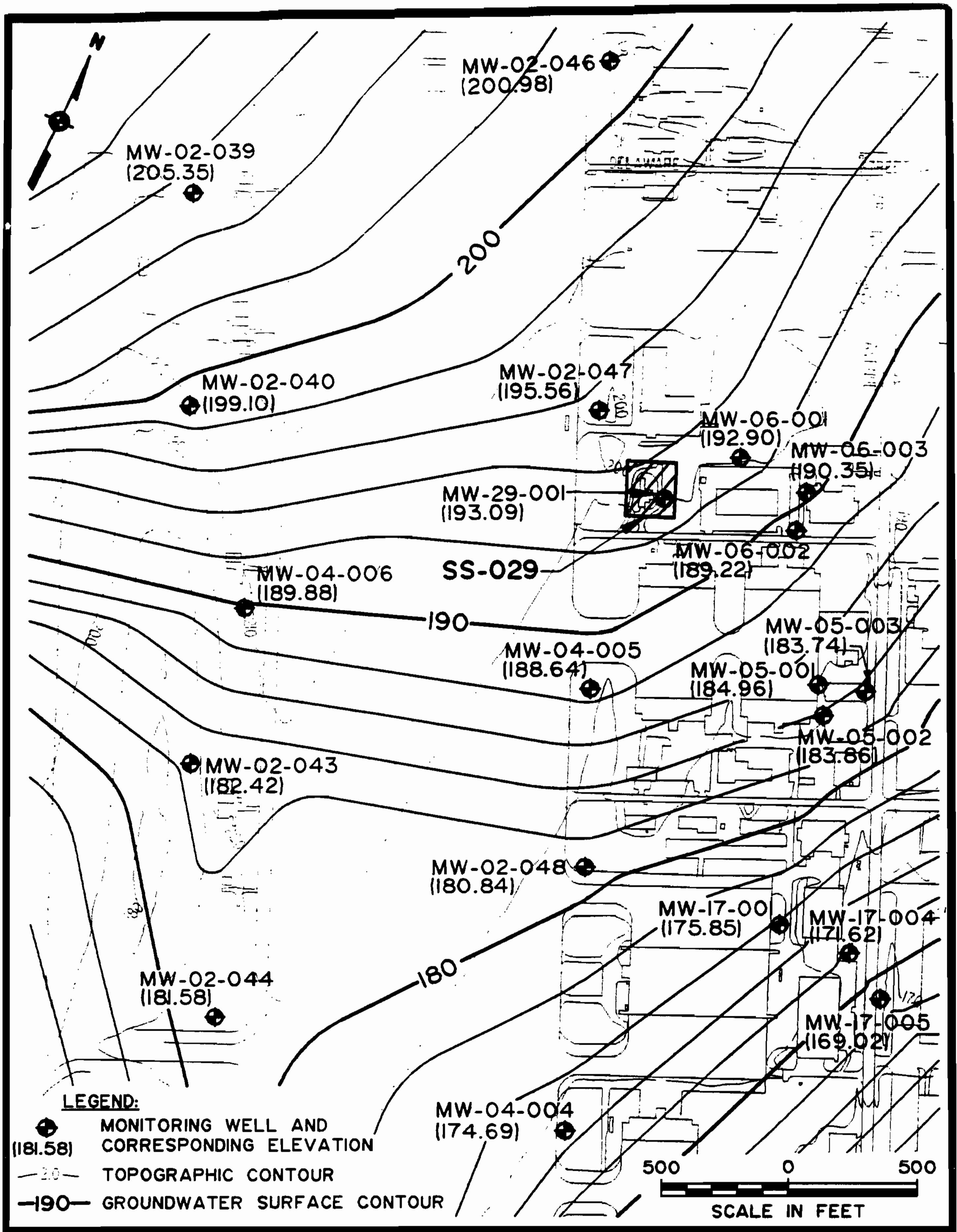

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JET ENGINE TEST CELL (SS-029)
REGIONAL WATER TABLE SURFACE
UNCONFINED AQUIFIER - MAY 1995

FIGURE 3-10

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TABLE 3-3

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION HYDRAULIC CONDUCTIVITY OF WATER TABLE AQUIFER DETERMINED FROM IN-SITU SLUG TESTS

WELL I.D.	SCREENED INTERVAL		UNIT SCREENED	HYDRAULIC CONDUCTIVITY					
				SLUG- IN TEST		SLUG- OUT TEST		AVERAGE	
	DEPTH(ft.)	ELEVATION(ft.)		(cm/sec)	(ft/day)	(cm/sec)	(ft/day)	(cm/sec)	(ft/day)
MW-29-001	5.5 - 15.5	193.93 - 183.93	Sand Aquifer (Shallow)	9.36×10^{-3}	26.5	1.47×10^{-2}	41.7	1.17×10^{-2}	33.2
MW-02-047*	25.5 - 35.5	174.6 - 164.5	Sand Aquifer (Deep)	6.3×10^{-3}	17.9	6.0×10^{-3}	17.0	6.15×10^{-3}	17.4
MW-06-002*	17.5 - 27.5	175.5 - 165.5	Sand Aquifer (Deep)			2.3×10^{-3}	6.6	2.3×10^{-3}	6.6

Notes:

1. *Slug Testing Performed in Previous Work
2. Average hydraulic conductivity is the geometric mean of the slug-in and slug-out tests.

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4.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The National Oil and Hazardous Substance Pollution Contingency Plan (40 CFR 300) requires that the selection of remedial actions at CERCLA sites meet applicable or relevant and appropriate requirements (ARARs) of federal and state environmental laws and regulations (USEPA 1990a). The process of identifying ARARs begins during the scoping of the investigation and can continue through the remedial design phase. ARARs identification is always site-specific.

4.1 Definition of ARARs and TBCs

A requirement of federal or state law may be either "applicable" or "relevant and appropriate."

Applicable requirements are those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance or contaminant, a remedial action, location, or other circumstances at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance or contaminant, a remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site.

In addition to promulgated standards and controls, other requirements are "to be considered (TBC)." TBCs are federal and state policies, advisories, and other non-promulgated health and environmental criteria, including numerical guidance values, that are not legally binding. TBCs are used for the protection of public health and the environment if no specific ARARs for a chemical or other site condition exist, or if ARARs are not deemed sufficiently protective.

ARARs are divided into the following three categories, although categories may overlap.

Location-specific requirements discussed in Section 4.2, pertain to existing natural or cultural features at the site that are specifically protected. These may affect contaminant levels or implementation of remedial actions.

Chemical-specific requirements are numerical values, or methodologies which result in the establishment of numerical values, for the acceptable amount of a chemical in the environment. Chemical-specific requirements are addressed in detail in Section 4.3 of this report.

Action-specific requirements pertain to the proposed site remedies and govern implementability of the selected site remedy. Action-specific ARARs generally set performance or design standards, controls, or restrictions on particular types of activities. These are generally addressed in a Feasibility Study.

4.2 Location-specific ARARs

The following location-specific ARARs were evaluated in relation to the SS-029 site.

4.2.1 Natural Features

National Environmental Policy Act of 1969 (NEPA)

The Department of the Air Force recently revised its regulations to update the Air Force process for compliance with NEPA. The final rule for the Environmental Impact Analysis Process (32 CFR Part 989) was published in the January 24, 1995 *Federal Register*. This revision provides policy and guidance for consideration of environmental matters in the Air Force decision-making process. It implements the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and 32 CFR Part 188 (Department of Defense Directive 6050.1, Environmental Effects in the United States of DOD Actions).

The Air Force's position on CERCLA-consistent response actions with respect to the requirements of NEPA is that the CERCLA response process can satisfy the requirements of NEPA by addressing potential impacts of remedial actions on human health and the environment (USAF 1992). Installations have the option to prepare separate NEPA- and CERCLA-consistent restoration documentation, but an attempt is made to:

- Integrate NEPA and CERCLA documentation whenever possible
- Use the community involvement element of the CERCLA process to address impacts of remedial actions
- Evaluate potential environmental impacts the response action may have on natural resources
- Reflect any potential impacts from anticipated CERCLA response actions in the disposal/reuse Environmental Impact Statement.

32 CFR Part 989 also sets forth policy for compliance with Executive Orders #11988 and #11990 on Floodplain Management and Wetlands Protection. These require that a remedial alternative located in a floodplain or in a wetland not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of floodplains (e.g., reduction and control of flood hazard, replenishment of groundwater, soil conservation, and conservation and long-term productivity of existing flora and fauna).

Section 404 of the Clean Water Act and related regulations (40 CFR 230) protect waters of the United States, including wetlands, and prohibit the deposition of dredged or excavated materials. Protection of aquatic and wetland habitats is a primary goal of this program. Remedial activities that affect these habitats may include capping, stream channelization, and dewatering of the site [See 33 CFR 320-330 for USACE permit regulations].

New York State Use and Protection of Waters (6 NYCRR 608) establishes a permit program to protect certain classes of New York State waterways. Stream disturbances must be avoided, or adverse impacts must be mitigated through terms and conditions of the joint permitting process between NYSDEC and USACE regulating waters of the United States. Protected streams included Class A, B, and C (T).

New York State Fish and Wildlife Regulations (6 NYCRR 182) and the federal Endangered Species Act (16 USC 1531) list and protect endangered or threatened species from actions that may threaten their existence or modify their habitats. Rare and endangered plant species also are protected in New York State by regulations in 6 NYCRR 193. The species data bases with location-specific information are kept by the U.S. Fish and Wildlife Service and the New York State Heritage Program, housed in NYSDEC.

Fish and Wildlife Coordination Act (16 USC 661). This federal law requires protection of fish and wildlife from actions which would affect or modify wildlife habitat.

New York State Water Quality Classifications (6 NYCRR 701-703). NYSDEC classifies groundwater, streams, and other water bodies according to this system. Classes A, B, C, and D fresh surface waters are pre-identified and their best uses, ranging from fishing to drinking, are protected with ambient water quality criteria. These criteria are discussed in Section 4.3.

New York State Floodplain Management Act and Regulations (ECL Article 36, and 6 NYCRR 500) regulates activities taking place in floodplains. Although Plattsburgh AFB was not classified on Federal Emergency Management Agency (FEMA) flood insurance maps, nearby mapping indicates SS-029 to be well above the 100-year floodplain boundary (FEMA 1979).

4.2.2 Cultural Features

National Historic Preservation Act (16 USC 470). The National Historic Preservation Act (NHPA) is a federal law that establishes the responsibilities of federal agencies with respect to "historic properties" which include objects from both history and prehistory and which cover the range from standing structures to discrete artifacts recovered from archaeological excavations. This federal law also protects properties listed on, or eligible for inclusion of the National Register of Historic Places (NRHP). Archaeological finds that are considered eligible for inclusion on the NRHP also are protected by this act. The New York State Historic Preservation Office lists all federal- and state-protected properties. This office has determined that investigation and general remedial activities at Plattsburgh AFB will not adversely affect existing historic properties.

An archaeological survey report for Plattsburgh AFB was completed in November 1994 by the United States Army Construction Engineering Research Laboratories/Technical Assistance Center (USACERL/TAC 1994). The purpose of the survey was to complete the inventory of prehistoric and historic archaeological sites on base, as required by the National Historic Preservation Act, Section 110. According to the survey, SS-029 is not located within 1,000 feet of an identified archaeological site (Figure 4-1).

Archaeological and Historic Preservation Act (16 USC Section 469). This act provides for the protection of archaeological data that might be lost as a result of a federal construction project. In contrast to the National Historic Preservation Act, this law allows for only the preservation of the data and not the site itself.

4.3 Chemical-specific ARARs

Numerical standards have been developed for each environmental medium at the SS-029 site through the evaluation of the ARARs and TBCs discussed below. Table 4-1 and tables in Appendix A present these numerical standards, which are compared to analytical data in Section 5.0

PLATTSBURGH AFB

Sites Identified During Archaeological Survey

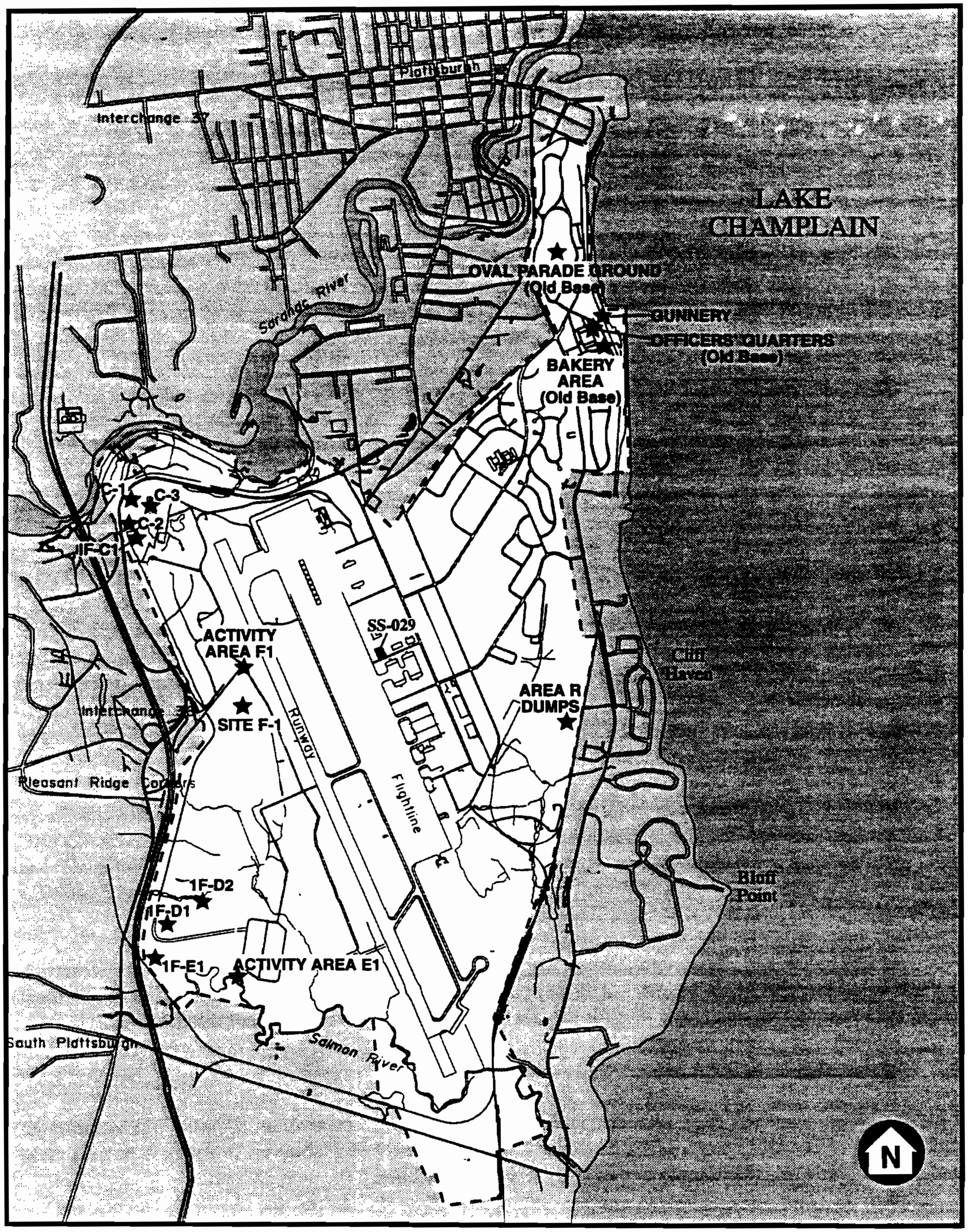

Figure 4-1

TABLE 4-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Groundwater		Soil	
		ARAR Value (µg/l)	Source	TBC Value (µg/kg)	Source
Chloromethane	VOC	5	A		
Bromomethane	VOC	5	A		
Vinyl Chloride	VOC	2	A	200	E
Chloroethane	VOC	5	A	1,900	E
Methylene Chloride	VOC	5	A	100	E
Acetone	VOC	50	A	200	E
Carbon Disulfide	VOC	50	C	2,700	E
1,1-Dichloroethene	VOC	5	A	400	E
1,1-Dichloroethane	VOC	5	A	200	E
1,2-Dichloroethene (total)	VOC	5	A(1)	300	E(1)
Chloroform	VOC	7	A	300	E
1,2-Dichloroethane	VOC	5	A	100	E
2-Butanone (or MEK)	VOC	50	A	300	E
1,1,1-Trichloroethane	VOC	5	A	800	E
Carbon Tetrachloride	VOC	5	A	600	E
Bromodichloromethane	VOC	50	A		
1,2-Dichloropropane	VOC	5	A		
cis-1,3-dichloropropene	VOC	5	A		
Trichloroethene	VOC	5	A	700	E
Dibromochloromethane	VOC	50	A		
1,1,2-Trichloroethane	VOC	5	A		
Benzene	VOC	0.7	A	60	E
trans-1,3-dichloropropene	VOC	5	A		
Bromoform	VOC	50	A		
4-Methyl-2-pentanone	VOC	50	C	1,000	E
2-Hexanone	VOC	50	A		
Tetrachloroethene	VOC	5	A	1,400	E
1,1,2,2-Tetrachloroethane	VOC	5	A	600	E
Toluene	VOC	5	A	1,500	E
Chlorobenzene	VOC	5	A	1,700	E
Ethylbenzene	VOC	5	A	5,500	E
Styrene	VOC	5	A		
Total Xylenes	VOC	5	A(1)	1,200	E

TABLE 4-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Groundwater		Soil	
		ARAR Value (µg/l)	Source	TBC Value (µg/kg)	Source
Phenol	SVOC	1	A(P)	30	E
bis(2-Chloroethyl)ether	SVOC	1	A		
2-Chlorophenol	SVOC	1	A(P)	800	E
1,3-Dichlorobenzene	SVOC	5	A	1,600	E
1,4-Dichlorobenzene	SVOC	4.7	A(2)	8,500	E
1,2-Dichlorobenzene	SVOC	4.7	A(2)	7,900	E
2-Methylphenol	SVOC	1	A(P)	100	E
Bis(2-chloroisopropyl)ether	SVOC	50	C		
4-Methylphenol	SVOC	1	A(P)	900	E
N-Nitroso-di-n-propylamine	SVOC	50	C		
Hexachloroethane	SVOC	5	B		
Nitrobenzene	SVOC	5	A	200	E
Isophorone	SVOC	50	A	4400	E
2-Nitrophenol	SVOC	1	A(P)	330	E
2,4-Dimethylphenol	SVOC	1	A(P)		
Bis(2-chloroethoxy)methane	SVOC	5	B		
2,4-Dichlorophenol	SVOC	1	A(P)	400	E
1,2,4-Trichlorobenzene	SVOC	5	A	3,400	E
Naphthalene	SVOC	10	A	13,000	E
4-Chloroaniline	SVOC	5	B	220	E
Hexachlorobutadiene	SVOC	5	A		
4-Chloro-3-methylphenol	SVOC	1	A(P)	240	E
2-Methylnaphthalene	SVOC	50	C	36,400	E
Hexachlorocyclopentadiene	SVOC	5	A		
2,4,6-Trichlorophenol	SVOC	1	A(P)		
2,4,5-Trichlorophenol	SVOC	1	A(P)	100	E
2-Chloronaphthalene	SVOC	10	A		
2-Nitroaniline	SVOC	5	B	430	E
Dimethylphthalate	SVOC	50	A	2,000	E
Acenaphthylene	SVOC	50	C	41,000	E
2,6-Dinitrotoluene	SVOC	5	A	1,000	E

TABLE 4-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Groundwater		Soil	
		ARAR Value (µg/l)	Source	TBC Value (µg/kg)	Source
3-Nitroaniline	SVOC	5	B	500	E
Acenaphthene	SVOC	20	A	50,000	E
2,4-Dinitrophenol	SVOC	1	A(P)	200	E
4-Nitrophenol	SVOC	1	A(P)	100	E
Dibenzofuran	SVOC	50	C	6,200	E
2,4-Dinitrotoluene	SVOC	5	B		
Diethylphthalate	SVOC	50	A	7,100	E
4-Chlorophenyl-phenylether	SVOC	50	C		
Fluorene	SVOC	50	A	50,000	E
4-Nitroaniline	SVOC	5	B		
4,6-Dinitro-2-methylphenol	SVOC	1	A(P)		
N-nitrosodiphenylamine	SVOC	50	A		
4-Bromophenylphenylether	SVOC	50	C		
Hexachlorobenzene	SVOC	0.35	A	410	E
Pentachlorophenol	SVOC	1	A(P)	1,000	E
Phenanthrene	SVOC	50	A	50,000	E
Anthracene	SVOC	50	A	50,000	E
Carbazole	SVOC	50	C		
Di-n-butylphthalate	SVOC	50	A	8,100	E
Fluoranthene	SVOC	50	A	50,000	E
Pyrene	SVOC	50	A	50,000	E
Butylbenzylphthalate	SVOC	50	A	50,000	E
3,3'-Dichlorobenzidine	SVOC	5	B		
Benzo(a)anthracene	SVOC	0.002	A	224	E
Chrysene	SVOC	0.002	A	400	E
bis(2-Ethylhexyl)phthalate	SVOC	50	A	50,000	E
Di-n-octylphthalate	SVOC	50	A	50,000	E
Benzo(b)fluoranthene	SVOC	0.002	A	1,100	E
Benzo(k)fluoranthene	SVOC	0.002	A	1,100	E
Benzo(a)pyrene	SVOC	ND	A	61	E
Indeno(1,2,3-cd)pyrene	SVOC	0.002	A	3,200	E
Dibenz(a,h)anthracene	SVOC	50	C	14	E
Benzo(g,h,i)perylene	SVOC	50	C	50,000	E

TABLE 4-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Groundwater		Soil	
		ARAR Value (µg/l)	Source	TBC Value (mg/kg)	Source
Arsenic	MET	25	A	7.5	E
Barium	MET	1,000	A	300	E
Cadmium	MET	5	D	1.3	SB
Chromium	MET	50	A	19.5	SB
Lead	MET	15	D	79.4	SB(3)
Mercury	MET	2	A	0.1	E
Selenium	MET	10	A,D	2	E
Silver	MET	50	A	ND	SB

TABLE 4-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICAL-SPECIFIC ARARs/TBCs

NOTES:

(1) Applies to each isomer individually.
(2) Applies to the sum of 1,4- and 1,2-dichlorobenzene.
(3) Background levels for lead vary widely. Average levels in undeveloped rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.
(P) Phenolic compound. Standard is for total phenols.

SOURCES:

A - New York State DEC water quality standards and guidance values, TOGS 1.1.1, October 1993. (Table 1)
B - TOGS 1.1.1 (Table 2).
C - Subpart 5-1, Public Water Systems, New York State Department of Health.
D - EPA Drinking Water Standards 40 CFR 141-143.
E - NYSDEC Soil Cleanup Objectives and Cleanup Levels, TAGM HWR-94-4046, January 1994.

ABBREVIATIONS:

VOC - Volatile Organic Compound.
SVOC - Semivolatile Organic Compound.
MET - Metals.
ND - Not detected.
SB - Site background.
ARAR- Applicable or Relevant and Appropriate Requirements.
TBCs - To Be Considered (criteria that are not legally binding).

4.3.1 Groundwater

New York State regulates groundwater quality through numerical standards and guidance values established by the NYSDEC and the New York State Department of Health. These values have been consolidated into a single NYSDEC guidance document, the Division of Water's *Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standard and Guidance Values* (NYSDEC 1993). In New York State, there is little practical difference between standards and guidance values since the procedure for determining these values is the same, and the state has the authority to enforce guidance values where there are no promulgated standards (6 NYCRR 701.15(d)). *TOGS* values are presented in Table 4-1 for use at Plattsburgh AFB.

The Safe Drinking Water Act (SDWA) authorizes the National Primary and Secondary Drinking Water Regulations (40 CFR 141 and 143). The potable groundwater standards established by these regulations are called Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). MCLs are legally enforceable federal drinking water standards and MCLGs are nonenforceable health goals established by USEPA. MCLs are commonly identified as ARARs for existing or potential future drinking water sources. MCLGs are used in cases in where multiple contaminants or exposure pathways present extraordinary risks to human health. In such cases, USEPA makes a site-specific determination of the more stringent standards (USEPA 1992a).

Groundwater currently is not used as a potable water source on base and, therefore, MCLGs are not considered applicable for Plattsburgh AFB. However, MCLs are relevant and appropriate because groundwater may be considered a future water supply source. Secondary Maximum Contaminant Levels (SMCLs) are federal nonenforceable regulations that control contaminants in drinking water that affect the aesthetic qualities relating to the public acceptance of drinking water.

ARAR values for groundwater at SS-029, which are primarily derived from *TOGS*, are presented in Table 4-1.

4.3.2 Soils

Federal and state laws and regulations have not promulgated standards for soil contaminants, other than for hazardous waste characterization. However, NYSDEC has established soil cleanup objectives in its document entitled *Determination of Soil Cleanup Objectives and Cleanup Levels* (NYSDEC 1994). The NYSDEC cleanup objectives for organic compounds are based on the soil to water partition theory model. They represent the maximum concentration of a particular organic compound that may be in soil and not produce groundwater contamination greater than groundwater standards. NYSDEC cleanup objectives for metals are based upon published average concentrations detected in eastern U.S. soils. NYSDEC permits the use of "site background" data for metals, if this data is available. A base-wide background surface soil and groundwater survey was performed in late 1994 primarily to establish background inorganic constituent concentrations in Plattsburgh AFB soils (URS 1995c). The 95% Upper Tolerance Limits calculated for each inorganic constituent detected in the background soil samples will be considered to be "site background" metals concentrations and appropriate for use as soil TBCs. RCRA hazardous waste toxicity characteristic limits established by 40 CFR 261 are considered soil ARARs.

The chemical-specific TBCs and ARARs developed for soil at SS-029 are presented on Table 4-1.

5.0 ANALYTICAL DATA SUMMARY

This section discussed the results of chemical analysis of soil and groundwater samples at site SS-029. Chemicals of potential concern at this site are those associated with JP-4 jet fuel spills, such as BTEX compounds and other petroleum hydrocarbons. Potential sources of contamination at this site include the oil/water separator and the piping leading into and out of the oil/water separator.

5.1 Soil

5.1.1 Previous Investigations

Except the site walkover for the PAs, no previous investigations of soil were conducted at SS-029.

5.1.2 Site Investigation

Six soil samples were obtained from three borings advanced during the SI at the locations shown in Figure 2-1. Two discrete soil samples were taken at each boring location from zones where potential contaminants might reasonably be expected to be encountered. All samples were analyzed for TCL VOCs, TCL SVOCs, and RCRA metals. Sixteen organic compounds and 4 of the 8 RCRA metals were detected in the soil samples. A summary of the soil sample analytical data is presented in Table 5-1 and complete analytical data tables are provided in Table A-1 of Appendix A.

Four VOCs were detected (methylene chloride, acetone, trichloroethene [TCE], and toluene) at concentrations ranging from 1 ppb to 7 ppb (Table 5-1). Methylene chloride, acetone, and toluene (in the absence of other BTEX compounds) are common laboratory solvents. The frequent, low-level detections of these compounds may be attributable to laboratory contamination, as suggested by the detection of methylene chloride, acetone, and other VOCs in trip blank TB-941115 (Table C-3, Appendix C). TCE, along with toluene and acetone, was detected in sample SB-29-01-0 DUP. This sample is a duplicate of sample SB-29-01-0, taken from the same location and depth interval. No VOCs were detected in SB-29-01-0. Because the VOCs detected may be attributed to laboratory contamination and TCE was not detected in a duplicate sample, the analytical results may not represent the presence of these VOCs in soil at these sample locations. VOC concentrations were below TBC values for all VOCs detected.

Twelve SVOCs were detected including three phthalate compounds and nine polycyclic aromatic hydrocarbon (PAHs) compounds (Table 5-1). The phthalate compounds were detected in three samples, SB-29-01-0 DUP, SB-29-02-4, and WB-MW-29-001-0, at concentrations ranging from 38 ppb to 2,200 ppb. Di-n-butylphthalate, detected in sample SB-29-01-0 DUP, was not detected in sample SB-29-01 taken from the same location and depth interval. Phthalate compounds are plasticizers which may be introduced into samples from sampling or laboratory equipment (i.e., latex gloves). The phthalate compounds detected were present at concentrations below TBC values.

PAHs were detected in four samples: SB-29-01-0, SB-29-02-0, SB-29-02-4, and WB-MW-29-001-0, at concentrations ranging from 22 ppb to 83 ppb. PAHs were detected most frequently in the near-surface soil samples obtained from depths of 0 to 2.0 feet. The presence of PAHs in surface soils may be attributed to air emissions/exhaust from the burning of petroleum hydrocarbon fuels near and at the site or to the higher organic carbon content normally found in near-surface soils. Soil borings SB-29-01 and SB-29-02 are located due east

TABLE 5-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION ANALYTES DETECTED IN SOIL SAMPLES

ANALYTE		CLASS	TBC VALUE	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	AVERAGE OF DETECTIONS	LOCATION OF MAXIMUM DETECTION
Methylene Chloride	(µg/kg)	VOC	100	4 / 6	2	2	2	(1)
Acetone	(µg/kg)	VOC	200	1 / 6	4	4	4	WB-MW-29-001-4
Trichloroethene	(µg/kg)	VOC	700	1 / 6	2	2	2	SB-29-01-0 DUP
Toluene	(µg/kg)	VOC	1,500	1 / 6	7	7	7	WB-MW-29-001-0
Diethylphthalate	(µg/kg)	SVOC	7100	1 / 6	2200	2200	2200	SB-29-02-4
Di-n-butylphthalate	(µg/kg)	SVOC	8100	1 / 6	38	38	38	SB-29-01-0 DUP
Fluoranthene	(µg/kg)	SVOC	50000	3 / 6	50	83	65	SB-29-02-4
Pyrene	(µg/kg)	SVOC	50000	3 / 6	53	67	62	SB-29-02-4
Benzo(a)anthracene	(µg/kg)	SVOC	224	1 / 6	48	48	48	SB-29-02-4
Chrysene	(µg/kg)	SVOC	400	1 / 6	50	50	50	SB-29-02-4
bis(2-Ethylhexyl)phthalate	(µg/kg)	SVOC	50000	1 / 6	56	56	56	WB-MW-29-001-0
Benzo(b)fluoranthene	(µg/kg)	SVOC	1100	4 / 6	44	77	59	SB-29-02-4
Benzo(k)fluoranthene	(µg/kg)	SVOC	1100	2 / 6	22	26	24	SB-29-01-0
Benzo(a)pyrene	(µg/kg)	SVOC	61	3 / 6	30	45	39	SB-29-02-4
Indeno(1,2,3-cd)pyrene	(µg/kg)	SVOC	3200	2 / 6	41	44	42.5	SB-29-01-0
Benzo(g,h,i)perylene	(µg/kg)	SVOC	50000	2 / 6	45	49	47	SB-29-01-0
Arsenic	(mg/kg)	METAL	7.5 **	3 / 6	0.73	1.1	0.9	WB-MW-29-001-0
Barium	(mg/kg)	METAL	300 **	6 / 6	10.7	38.3	17.0	SB-29-01-0
Chromium	(mg/kg)	METAL	19.5 (SB)	4 / 4	4.9	9.2	6.35	SB-29-01-0
Lead	(mg/kg)	METAL	79.4 (SB)	6 / 6	0.47	60.4	13.4	SB-29-02-0

Notes:

1. (1) - The maximum concentration of methylene chloride detected in the site investigation soil samples (2ug/kg) was the reported concentration for the following four samples: SB-29-01-4, SB-29-02-0, WB-MW-29-001-0, WB-MW-29-001-4.
2. TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.
3. SB - Site Background. (95% Upper Tolerance Limit Value from " Background Surface Soil & Groundwater Survey for Plattsburgh Air Force Base", URS 1995)
4. **- NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)
5. µg/kg= ppb; mg/kg = ppm.

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of the exhaust stack for the Jet Engine Test Cell facility. PAHs detected in sample SB-29-01-0 were not detected in the duplicate sample. All PAHs detected were present at concentrations below TBC values.

Four of the 8 RCRA metals (arsenic, barium, chromium, and lead) were detected at concentrations ranging from 0.73 to 60.4 ppm; cadmium, mercury, and silver were not detected.. All metals detected were present at concentrations below TBC values. Sample results for selenium and chromium in several samples were rejected due to quality control criteria deficiencies. The presence or absence of these compounds in these samples, therefore, could not be verified.

In summary, all analytes detected in the soil samples were present at concentrations below TBC values. Analytical results do not indicate the presence of BTEX compounds or other petroleum hydrocarbons which are attributable to past spills at SS-029.

5.2 Groundwater

5.2.1 Previous Investigations

No previous investigations of groundwater were conducted at SS-029; however, groundwater samples from nearby monitoring wells appear to be impacted by the dissolved contaminant plume associated with the Fire Training Area (IRP site FT-002) (URS 1993). The extent of TCE contamination associated with this plume in the vicinity of SS-029 is shown on Figure 5-1. This plume extends to the northeast and southwest of the site. Although there is currently no evidence that this plume has impacted groundwater quality at the SS-029, portions of the site possibly could be impacted as a consequence of seasonal fluctuations in groundwater flow patterns.

5.2.2 Site Investigation

Groundwater samples were collected from SI monitoring well MW-29-001 and existing upgradient monitoring well MW-02-047 (Figure 2-1). The groundwater samples were analyzed for TCL VOCs, TCL SVOCs, and total and dissolved RCRA metals. A summary of the analytes detected in the groundwater samples is presented in Table 5-2 and complete analytical data tables are provided in Table A-2 of Appendix A. No VOCs or SVOCs were detected in the groundwater samples.

Three of the 8 RCRA metals (arsenic, chromium, and selenium) were detected at concentrations ranging from 5.3 to 299 ppb. Arsenic was detected in the unfiltered (total) sample from the downgradient monitoring well (MW-29-001) at a concentration of 5.3 ppb, which is below the 25 ppb ARAR value. It was not detected in the filtered (dissolved) sample from MW-29-001. Chromium was detected in the unfiltered (total) sample from the upgradient well (MW-02-047) at a concentration of 299 ppb, which exceeds the 50 ppb ARAR value. It was not detected in the filtered (dissolved) sample from well MW-02-047 or from downgradient well MW-29-001. The detection of arsenic and chromium in only the unfiltered samples indicates their presence may be attributable to the presence of organic colloids in these samples. A better indicator of metals migration off site is the presence of dissolved metals in groundwater. Since there was no detection of dissolved metals in groundwater samples, it is assumed that migration does not occur at SS-029.

Selenium was detected at a concentration of 10.1 ppb in the unfiltered groundwater sample from downgradient well MW-29-001, which barely exceeds the 10 ppb ARAR value. However, the analytical results obtained for selenium in groundwater may be suspect for the following reasons:

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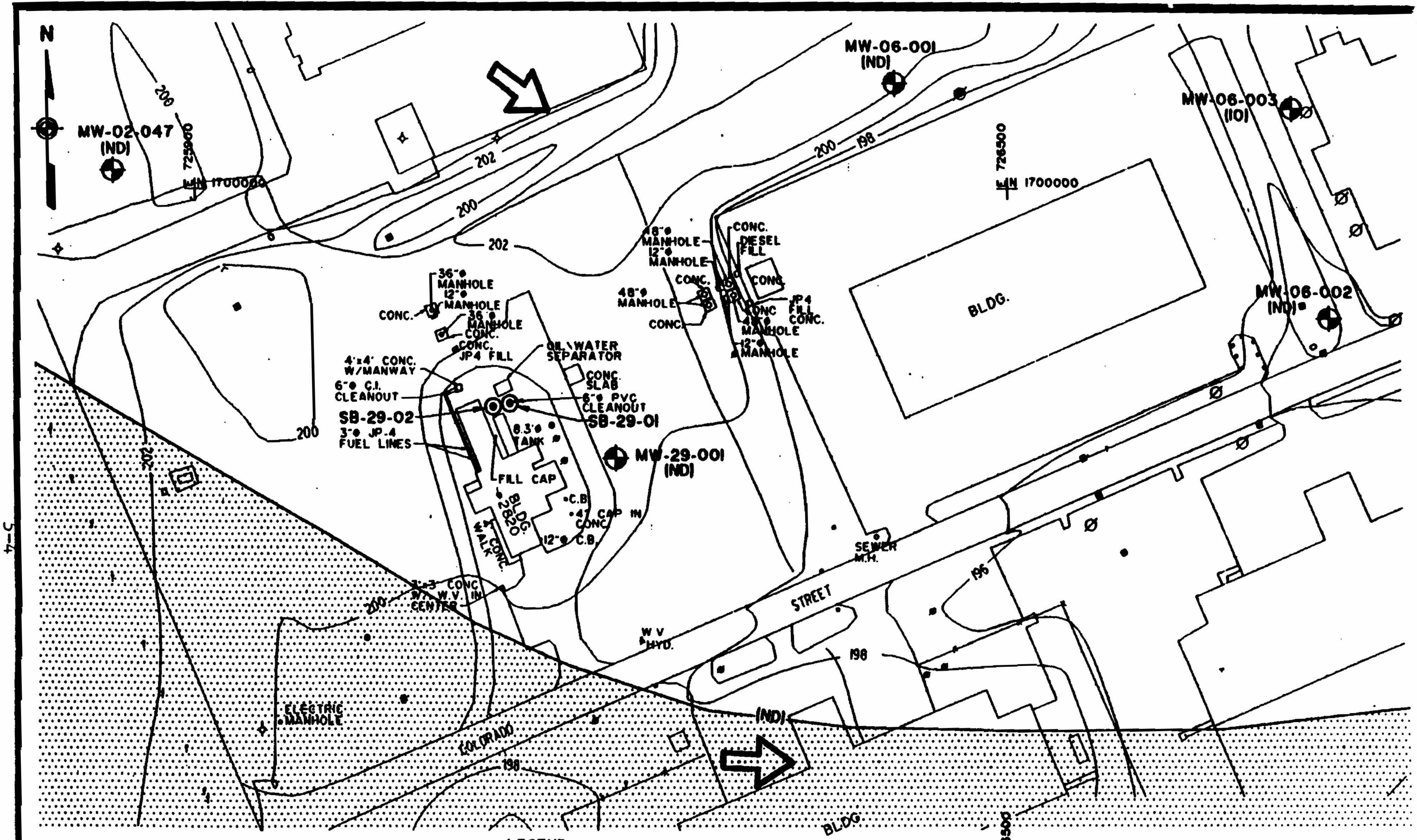


LEGEND:

⊕	MONITORING WELL
◎	SOIL BORING
—198—	EXISTING CONTOUR
⇨	GROUNDWATER FLOW DIRECTION UNCONFINED AQUIFER
▨	ND-99 ppb TCE
(85)	TCE CONCENTRATION IN ppb
(ND)	NOT DETECTED

100 0 100
SCALE IN FEET

URS
CONSULTANTS, INC.

JET ENGINE TEST CELL SS-029
EXTENT OF FT-002 TCE PLUME

FIGURE 5-1

TABLE 5-2

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION ANALYTES DETECTED IN GROUNDWATER SAMPLES

ANALYTE		CLASS	ARAR VALUE	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	AVERAGE OF DETECTIONS	LOCATION OF MAXIMUM DETECTION
Arsenic	(µg/l)	METAL	25	1 / 2	5.3	5.3	5.3	MW-29-001
Chromium	(µg/l)	METAL	50	1 / 2	299	299 [a]	299	MW-02-047
Selenium	(µg/l)	METAL	10	2 / 2	6.2	10.1 [a]	8.15	MW-29-001

Notes:

1. ARAR - "Applicable or Relevant and Appropriate Requirements" that are legally binding.
2. [a] - Exceeds ARAR.
3. (µg/l) =ppb

- Selenium concentrations were qualified as estimated in this sample due to various quality control outliers (URS 1995a).

- The filtered sample analytical results for selenium were rejected during the data validation due to serious deficiencies in quality control criteria.

- Selenium was detected (6.2 ppb) in the unfiltered groundwater sample from well MW-02-47 but was not detected in the duplicate sample.

- Selenium was detected in the rinse blank (FB-941115-W) associated with these groundwater samples (Table C-3); therefore, selenium concentrations in these samples may have been impacted by the sampling equipment or laboratory methodology.

Analytical results for barium and silver were rejected during the data validation due to deficiencies in quality control criteria. The presence or absence of barium and silver in groundwater could not be verified.

With the exception of selenium, metal concentrations in groundwater samples from the downgradient well do not exceed ARAR values and no organic compounds were detected in the samples from this well. Therefore, the groundwater analytical results show no evidence of contamination attributable to past petroleum spills at SS-029.

5.3 Tentatively Identified Compounds

Tentatively identified compounds (TICs) are non-target compounds that may be present in a sample. The mass spectrum of an unknown peak in a sample is compared to a computer library of mass spectral data in an effort to identify it. Compounds identified in this manner are referred to as TICs since an analytical standard has not been analyzed and, therefore, the identification is only tentative. Quantitations associated with TICs are considered gross estimates of concentrations present and easily could be in error by several orders of magnitude (IEA 1994).

No volatile organic TICs were noted during the soil and groundwater sample analyses.

Four to 21 semivolatile organic TICs were detected in each of the soil samples at estimated concentrations of up to 37,000 ppb. Most TIC detections were unidentifiable (e.g., unknown, unknown PAH, unknown carboxylic acid, unknown hydrocarbon, unknown diterpenoid). Aldol condensation product, a remnant of the soil extraction/sample preparation process, was identified in every sample at estimated concentrations of up to 37,000 ppb. Aldol condensation product usually had the highest TIC concentration in each sample. The other compounds that were more positively identified were: molecular sulfur (120 ppb in SB-29-01-4) and butane isomers (1,000 ppb in WB-MW-29-001-4 and 2,000 ppb in WB-MW-29-001-0).

Six to 13 semivolatile organic TICs were detected in each of the groundwater samples at estimated concentrations up to 36 ppb. Most TIC detections were unidentifiable (e.g., unknown and unknown carboxylic acid). Aldol condensation product was identified in every sample at estimated concentrations up to 10 ppb. The only other compound that was more positively identified was alkylated thiazole at an estimated concentration of 34 ppb in a duplicate groundwater sample from well MW-02-047.

It should be noted that up to 7 semivolatile organic TICs were detected in the soil and groundwater method blanks and rinse blanks, indicating that many TICs could be laboratory contaminants or introduced from sampling equipment. Based on the ambiguous and suspect nature of the TIC results, TICs do not warrant further consideration at SS-029.

6.0 HUMAN HEALTH RISK ASSESSMENT

6.1 Introduction

6.1.1 Objectives and Scope

This human health risk assessment (HRA) is an analysis of the potential adverse health effects caused by contaminants resulting from activities at SS-029 in the absence of remedial measures. As such, it may be classified as a no action, or "baseline" HRA. The HRA quantitatively assesses human health risk under current and potential future site conditions, and is considered an integral part of the SI for SS-029. It uses data and information collected during the SI to assess human health risk in the immediate and surrounding area. The HRA serves as one of the principal criteria for determining whether remedial action is required at the site.

The HRA for SS-029 follows the general format and procedures set forth in the USEPA's *Risk Assessment Guidance for Superfund (RAGS)* (USEPA 1989a) and consists of six components:

1. Data Evaluation
2. Hazard Identification
3. Exposure Assessment
4. Toxicity Assessment
5. Risk Characterization
6. Uncertainty Analysis

These components are presented sequentially in Sections 6.2 through 6.8 and summarized in Section 6.9.

6.1.2 Site Background

SS-029, approximately ½ acre in size, is located adjacent to the flightline apron within the central industrial corridor portion of the base (Figure 1-2). The site consists of Building 2820, an asphalt-paved parking area and access road, and grassy areas. Because Building 2820 was used to test jet aircraft engines, spills of JP-4 jet fuel and lubricating oils occasionally occurred at the site. An oil/water separator, which collected spills to the floor drains in the building, was found to be leaking in May 1989 and was replaced. No soil contamination was reported during the separator's replacement.

Several USTs and ASTs, reportedly containing JP-4 jet fuel, unleaded gasoline, No. 2 fuel oil, and diesel oil, were located at or near the site. All of the ASTs have been removed and all of the USTs (except UST-2820-3) have been replaced. No contamination was observed during the removal/replacement operations.

The water table aquifer generally consists of fine to medium sand varying from 32 to 39 feet in thickness. Local groundwater flow is to the southeast toward the Golf Course Drainage Area and Lake Champlain.

6.2 Data Evaluation

This HRA is based on the analytical results of the SI, as described in Section 5.0. The soil and groundwater samples collected as part of the SI were analyzed for the following chemical parameters: target compound list (TCL) volatiles, TCL semivolatiles, and eight RCRA metals (total and dissolved for groundwater). SI data were collected in accordance with the approved *Chemical Data Acquisition Plan (CDAP)* (Malcolm Pirnie 1992c). Minor deviations from this plan were made and are discussed in detail in Section 2.0.

Data validation was performed by environmental chemists under the supervision of the Project Chemical QA/QC Task Leader. The data were reviewed against the appropriate method according to procedures outlined in USEPA's *Contract Laboratory Program (CLP) Organic Data Review, SOP No. HW-6, Revision #8,* and *Evaluation of Metals Data for the Contract Laboratory Program* based on *SOW 3/90 HW-2, Revision XI.* All deliverables were in accordance with the approved *CDAP*. The validation summary tables and all definitions of data qualifiers are presented in Appendix C.

The data evaluation process followed the guidelines outlined in *RAGS* (USEPA 1989a) and *Guidance for Data Usability in Risk Assessment* (USEPA 1990b). Steps in determining the usability of data in the HRA include comparing site data with method blanks, and evaluating the data qualifiers and reported detection limits. The following subsections discuss the usability of the data collected during this investigation.

6.2.1 Analytical Methods and Quantitation Limits

The employed analytical methods and their corresponding quantitation limits were evaluated for suitability for the risk assessment. The analytical methods incorporate quality control measures to ensure confidence in target compound identification and quantitation. Before eliminating undetected chemicals, sample quantitation limits (SQLs) were reviewed against corresponding ARARs. Quantitation limits were assessed for proper adjustment due to dilutions or when use of a smaller sample aliquot was required due to limited sample volume.

6.2.2 Comparison with Concentrations in Blanks

Results of field and laboratory blank analyses were compared with sample analytical results to determine if contamination was introduced during sample collection, shipment, or analysis. In accordance with the USEPA validation guidelines previously referenced, chemicals detected in site samples were compared to concentrations in corresponding field, trip, or method blanks. Common laboratory contaminants including methylene chloride, acetone, toluene, 2-butanone, and phthalate esters were included in the HRA if their concentration in onsite samples was 10 or more times greater than their concentration detected in the corresponding blanks. Other chemicals were included in the HRA if their concentration in onsite samples was 5 or more times greater than their concentration detected in the corresponding blanks. Data tables in Appendix C reflect the results of the data validation, and indicate which chemicals were considered field and/or laboratory contaminants and, therefore, are not included in the HRA.

6.2.3 Evaluation of Qualified Data

Qualified data were evaluated to determine whether data were appropriate for use in the HRA. Analytical results qualified with a "U" indicate that a chemical was analyzed for, but not detected. Chemicals with U-qualified data were included in the HRA only when there was at least one detection of that chemical in a particular medium. U-qualified data then were used at a value of one-half the SQL for organics (one-half the contract required quantitation limit for inorganics) in the calculation of exposure point concentrations. Organics detected at concentrations below the quantitation limit were flagged by the laboratory with a "J," indicating that the reported concentration is an estimate, although the identity of the analyte is certain. Silver concentrations in groundwater were qualified as estimated during the data validation process for SS-029 because the spike recovery was between 30 and 74 percent (URS 1995b). J-qualified data are considered acceptable for use in the HRA. Analytical results qualified with an "R" (i.e., rejected) during the data validation process were excluded from the HRA. Selected barium, selenium, and chromium results for groundwater and soil at SS-029 were rejected on the basis of spike recovery deviations and field blank contamination. Due to these rejections, the percent completeness of the data is below the project goal of 95 percent. The soil data is 89.6 percent complete and the groundwater data is 94.4 percent complete (URS 1995b). Appendix C presents the results of the data validation and any qualified data.

6.2.4 Evaluation of Duplicate Analyses

Analytical results from field duplicate samples were validated as unique data and then were averaged (original and duplicate) for inclusion in the HRA. If a compound was detected in only one sample and not in the duplicate, the detected concentration was utilized in the HRA.

6.2.5 Evaluation of Tentatively Identified Compounds (TICs)

Tentatively Identified Compounds (TICs) were reviewed for input to the HRA. Until a standard is analyzed, however, positive identification of a TIC remains uncertain. Analytical standards are not analyzed for TICs, which leads to uncertainties in chemical identification and quantitation of a TIC. No TICs were reported for the soil or groundwater volatile results. Of the TICs reported for the soil semivolatile fraction, molecular sulfur was identified but was not confirmed. For the groundwater semivolatile fraction, several unknown TICs were reported but none were identified or confirmed. Because only one TIC (molecular sulfur) was identified and several uncertainties exist regarding its identify and concentration, it was not included in the HRA, as recommended in *RAGS* (USEPA 1989a).

6.3 Hazard Identification

6.3.1 Identification of Media of Concern

Surface and subsurface soil are included in the HRA as media of concern. Under current site conditions, onsite receptors may be exposed to surface soil via direct exposure. Since the site may be developed in the future, intrusive activities resulting from new construction are possible. Under this future use scenario, direct exposure to both surface and subsurface soil could occur during construction and after regrading of the site. A total of six soil samples were collected from three soil boring locations (i.e., SB-29-01, SB-29-02, and MW-29-001) as shown in Figure 2-1. This includes three surface soils at a depth range of 0 to 2 feet and three subsurface soils at a depth range of 4 to 6 feet.

Groundwater is also a medium of concern for this HRA. Although it is not utilized currently as a potable resource at or immediately downgradient of the site, groundwater may be used as a potable supply source in the future. Two groundwater samples were collected from monitoring well locations MW-29-001 and MW-02-047, as shown in Figure 2-1.

Surface water and sediment were not encountered on site and, therefore, were not considered media of concern for this HRA.

6.3.2 Identification of Chemicals of Potential Concern

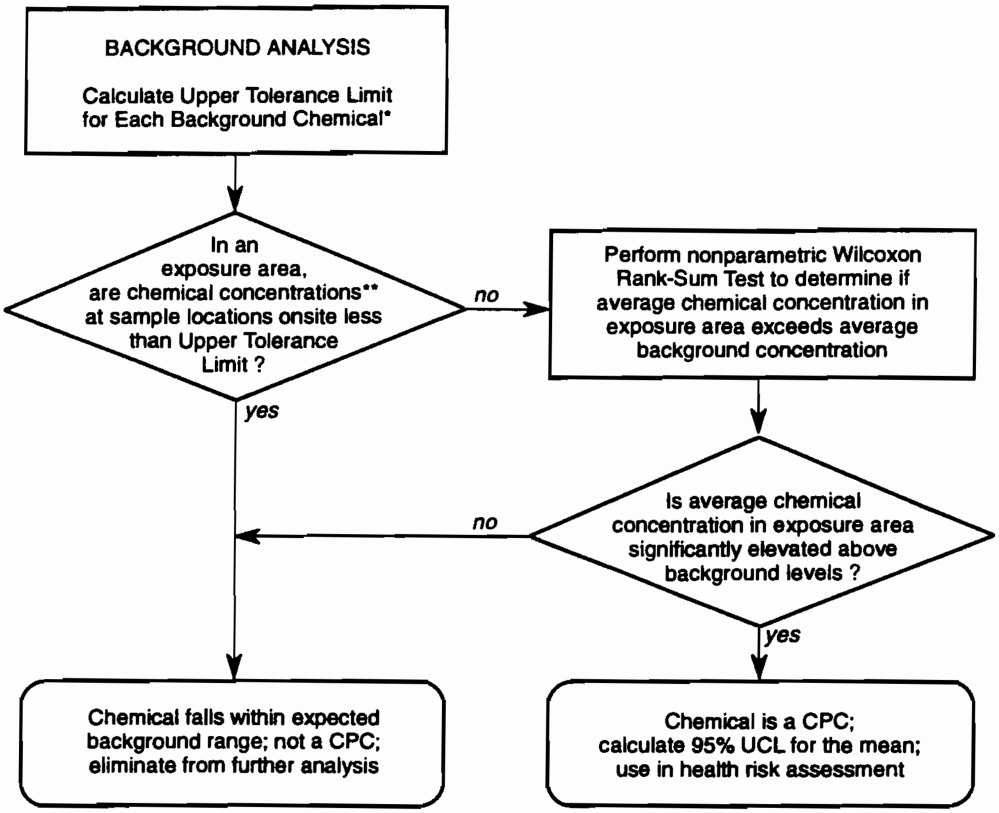
Data presented in the SI report were analyzed statistically to select chemicals of potential concern (CPCs) for inclusion in the HRA. All organic compounds detected in soil were considered CPCs. However, all inorganic chemicals in soil were eliminated from consideration as a result of a statistical screening procedure which indicated that onsite inorganic chemicals in soil were present at background levels. No organic compounds were detected in groundwater. All inorganics detected in groundwater were determined to be above background levels and were included in the HRA. A comparison of total versus dissolved metals data (Appendix C) indicate that the metals concentrations exceeding background levels may be attributable to high concentrations of suspended solids in the total (unfiltered) groundwater samples.

Two USEPA documents (USEPA 1989b; 1992b) were utilized to develop the CPC screening procedure used in the HRA. As shown in Figure 6-1, a two-step methodology was utilized for soil CPC screening. Only the first step was utilized for groundwater CPC screening because there were not enough background groundwater samples to perform the second step. In the first screening step, the concentration of each individual soil or groundwater sample constituent was compared to the corresponding upper tolerance limit for that constituent derived from base-wide background soil or groundwater data, respectively. Based on the USEPA guidance (USEPA 1989b), a one-sided upper tolerance limit with a coverage of 95 percent and a confidence coefficient of 95 percent was used for the first screening step. The upper tolerance limit, hereinafter referred to as the "95% UTL," is the statistically derived background concentration. If none of the onsite detections of a sample constituent exceed the 95% UTL, it can be safely concluded that the constituent is present at background levels and the constituent is not considered a CPC. Background data and derivation of 95% UTLs are presented in the base-wide background study (URS 1995c).

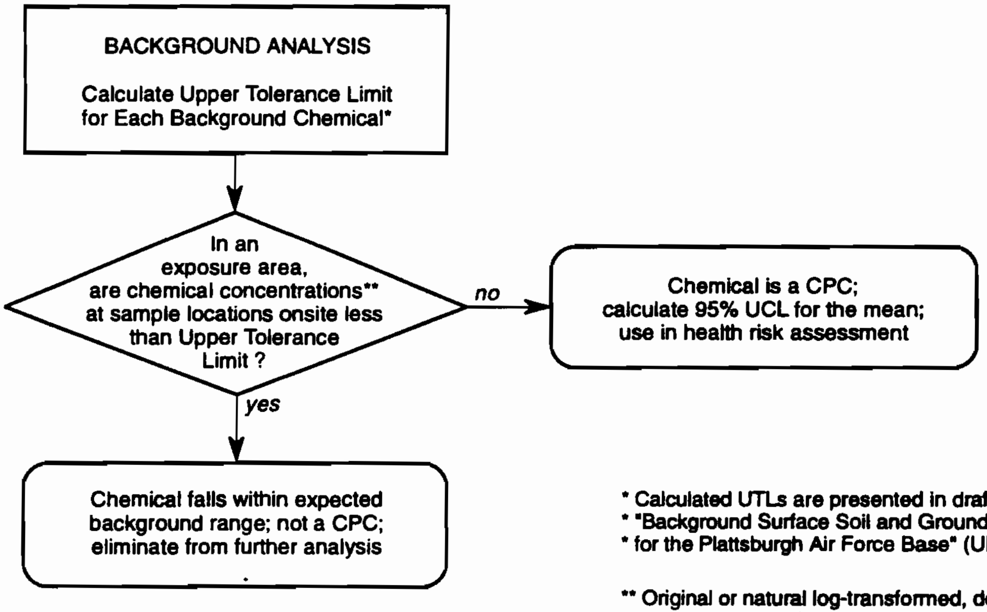
The nature of tolerance intervals is such that, even in the absence of contamination, a certain percentage of measurements can be expected to exceed the 95% UTLs by random chance. For example, approximately 5 percent (or 1 in 20) of onsite constituent concentrations would be expected to exceed the 95% UTL even if onsite constituent concentrations are at background levels. Because these occasional exceedances do not necessarily indicate the presence of contamination at a site, a second screening step is applied to soil inorganic constituents which exceed the 95% UTL in one or more onsite samples (Figure 6-1). In the second screening step, the onsite mean concentration is compared to the mean of the background samples using the non-parametric Wilcoxon Rank-Sum Test procedure. If the onsite mean concentration does not exceed the mean of the background samples, then the constituent is within the expected background range and is not considered a CPC. If the onsite mean concentration does exceed the mean background concentration, the constituent is considered a CPC and is included in the HRA. Because all of the soil inorganic constituents at SS-029 were eliminated after the first screening step, the Wilcoxon Rank-Sum Test procedure was not performed.

Constituents detected in onsite samples, but not in background samples, could not be statistically analyzed and are considered CPCs by default. Calcium, magnesium, sodium, iron, and potassium were not used in the HRA since, in accordance with *RAGS* (USEPA 1989a), " chemicals that are (1) essential human nutrients,

SOIL SCREENING



GROUNDWATER SCREENING



* Calculated UTLs are presented in draft report
* "Background Surface Soil and Groundwater Survey
* for the Plattsburgh Air Force Base" (URS 1995)

** Original or natural log-transformed, depending
** upon background distribution

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METHODS FOR SCREENING INORGANIC CPCs IN SOIL AND GROUNDWATER

FIGURE 6-1

(2) present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and (3) toxic only at very high doses (i.e., much higher than those that could be associated with contact at the site) need not be considered further in the quantitative risk assessment."

The identification of CPCs in surface soil, the combination of surface and subsurface soil, and groundwater are summarized in Tables 6-1, 6-2, and 6-3, respectively.

6.4 Exposure Assessment

The purpose of this exposure assessment is to estimate the type and magnitude of potential human exposure to chemicals present at SS-029. Ultimately, this estimate is achieved by determining an exposure dose for each pathway and each CPC. There are four steps in the exposure assessment: (1) identification of potentially exposed populations; (2) identification of potential pathways of exposure; (3) estimation of chemical concentrations at the potential point of exposure; and (4) estimation of an exposure dose (i.e., chemical intake) for each pathway.

6.4.1 Identification of Potentially Exposed Populations

Potentially exposed populations were identified for both current and potential future use conditions at SS-029 for the Draft SI Report in June 1995. At that time, the base was scheduled for closure (actual closure date was September 30, 1995). The current use exposure scenario assumed that adult and teenage (aged 13 to 18) trespassers may access the site. Future exposure to site contaminants was considered in two phases. In the first phase, construction workers would be exposed to contaminated soil during intrusive activities. In the second phase, industrial workers would be exposed to contaminated soil and groundwater after industrial development.

In the summer of 1996, Building 2820 was leased by PARC to the Wood Group, an aviation firm that will use the site to test jet engines. Changes have been made to the building to accommodate the company's needs. No intrusive activities were necessary. It is possible that intrusive site work may be necessary in the future at SS-029 or, that upon completion of the term of the lease, the site again may become vacant.

In this version of the SI, the same potentially exposed populations will be assessed in the HRA as were assessed in the Draft SI, including adult and teenage trespassers, construction workers performing intrusive activities, and industrial workers. Because of the changed site use, references to separate current and future use scenarios will be deleted. Rather, the exposed populations assessed in the HRA will represent a variety of populations that may be exposed given the changing use of the site and the base. The currently exposed population is best represented by the industrial worker without exposure to groundwater.

6.4.2 Identification of Potential Routes of Exposure

Exposure pathways for SS-029 have been developed for multiple land use scenarios. A pathway is considered complete if there is (1) a source or chemical release from a source; (2) an exposure point where contact can occur; and (3) an exposure route (e.g., ingestion) by which contact can occur. If the exposure point differs from the source, a transport/exposure medium also is necessary. Figures 6-2 and 6-3 present the potential exposure pathways under trespass and industrial scenarios, respectively.

TABLE 6-1

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL TRESPASS SCENARIO

CHEMICAL	MAXIMUM CONCENTRATION (mg/kg)	FREQUENCY OF DETECTION	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND SOIL		CHEMICAL OF POTENTIAL CONCERN
			95% UPPER TOLERANCE LIMIT (mg/kg)	PERFORM WILCOXON RANK-SUM TEST?	
Methylene Chloride	2.00E-03	2 / 3	—	—	YES
Acetone	6.00E-03	1 / 3	—	—	YES
Trichloroethene	2.00E-03	1 / 3	—	—	YES
Toluene	7.00E-03	2 / 3	—	—	YES
Di-n-butylphthalate	3.80E-02	1 / 3	—	—	YES
Fluoranthene	6.10E-02	2 / 3	—	—	YES
Pyrene	6.50E-02	2 / 3	—	—	YES
bis(2-Ethylhexyl)phthalate	5.60E-02	1 / 3	—	—	YES
Benzo(b)fluoranthene	6.50E-02	3 / 3	—	—	YES
Benzo(k)fluoranthene	2.60E-02	2 / 3	—	—	YES
Benzo(a)pyrene	4.20E-02	2 / 3	—	—	YES
Indeno(1,2,3-cd)pyrene	4.40E-02	2 / 3	—	—	YES
Benzo(g,h,i)perylene	4.90E-02	2 / 3	—	—	YES
Arsenic	1.10E+00	1 / 3	3.44E+00	NO	NO
Barium	2.45E+01	3 / 3	1.01E+02	NO	NO
Chromium	6.80E+00	2 / 2	1.95E+01	NO	NO
Lead	6.04E+01	3 / 3	7.94E+01	NO	NO

TABLE 6-2

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
CHEMICALS OF POTENTIAL CONCERN IN SOIL*
INDUSTRIAL SCENARIO

CHEMICAL	MAXIMUM CONCENTRATION (mg/kg)	FREQUENCY OF DETECTION	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND SOIL: 95% UPPER TOLERANCE LIMIT (mg/kg)	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND SOIL: PERFORM WILCOXON RANK-SUM TEST?	CHEMICAL OF POTENTIAL CONCERN
Methylene Chloride	2.00E-03	4 / 6	—	—	YES
Acetone	6.00E-03	2 / 6	—	—	YES
Trichloroethene	2.00E-03	1 / 6	—	—	YES
Toluene	7.00E-03	2 / 6	—	—	YES
Diethylphthalate	2.20E+00	1 / 6	—	—	YES
Di-n-butylphthalate	3.80E-02	1 / 6	—	—	YES
Fluoranthene	8.30E-02	3 / 6	—	—	YES
Pyrene	6.70E-02	3 / 6	—	—	YES
Benzo(a)anthracene	4.80E-02	1 / 6	—	—	YES
Chrysene	5.00E-02	1 / 6	—	—	YES
bis(2-Ethylhexyl)phthalate	5.60E-02	1 / 6	—	—	YES
Benzo(b)fluoranthene	7.70E-02	4 / 6	—	—	YES
Benzo(k)fluoranthene	2.60E-02	2 / 6	—	—	YES
Benzo(a)pyrene	4.50E-02	3 / 6	—	—	YES
Indeno(1,2,3-cd)pyrene	4.40E-02	2 / 6	—	—	YES
Benzo(g,h,i)perylene	4.90E-02	2 / 6	—	—	YES
Arsenic	1.10E+00	3 / 6	3.44E+00	NO	NO
Barium	2.45E+01	6 / 6	1.01E+02	NO	NO
Chromium	6.80E+00	4 / 4	1.95E+01	NO	NO
Lead	6.04E+01	6 / 6	7.94E+01	NO	NO

NOTES:

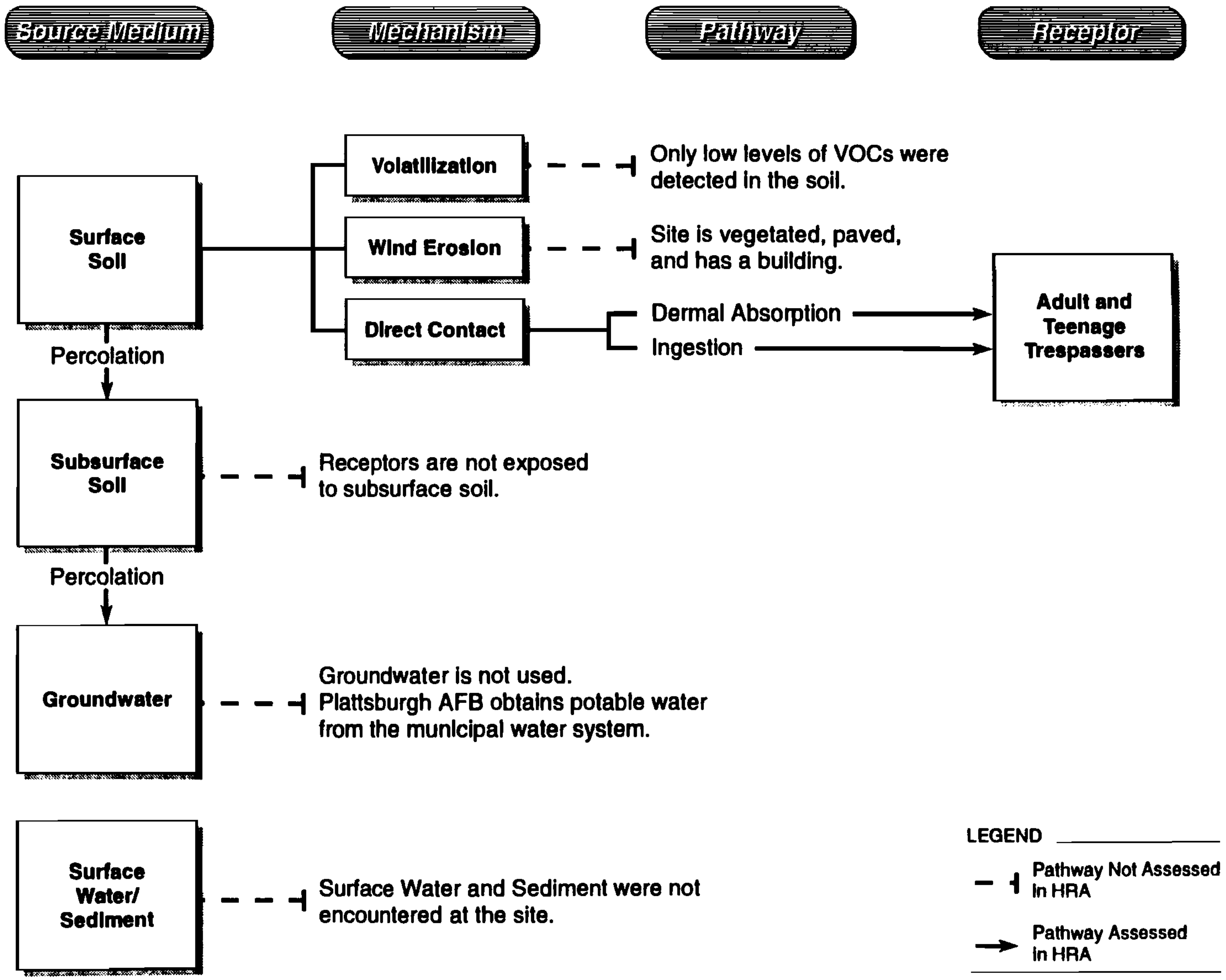
* - Soil consists of surface and subsurface soil.

TABLE 6-3

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER INDUSTRIAL SCENARIO

CHEMICAL	MAXIMUM CONCENTRATION (mg/l)	FREQUENCY OF DETECTION	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND GROUNDWATER	
			95% UPPER TOLERANCE LIMIT (mg/l)	CHEMICAL OF POTENTIAL CONCERN
Arsenic	5.30E-03	1 / 2	3.60E-03	YES
Chromium	2.46E-01	1 / 2	4.29E-02	YES
Selenium	1.01E-02	2 / 2	ND	YES

NOTES:
ND - Not Detected.



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PLATTSBURGH AFB - SS-029 SI
EXPOSURE PATHWAYS - TREPASS SCENARIO

FIGURE 6-2

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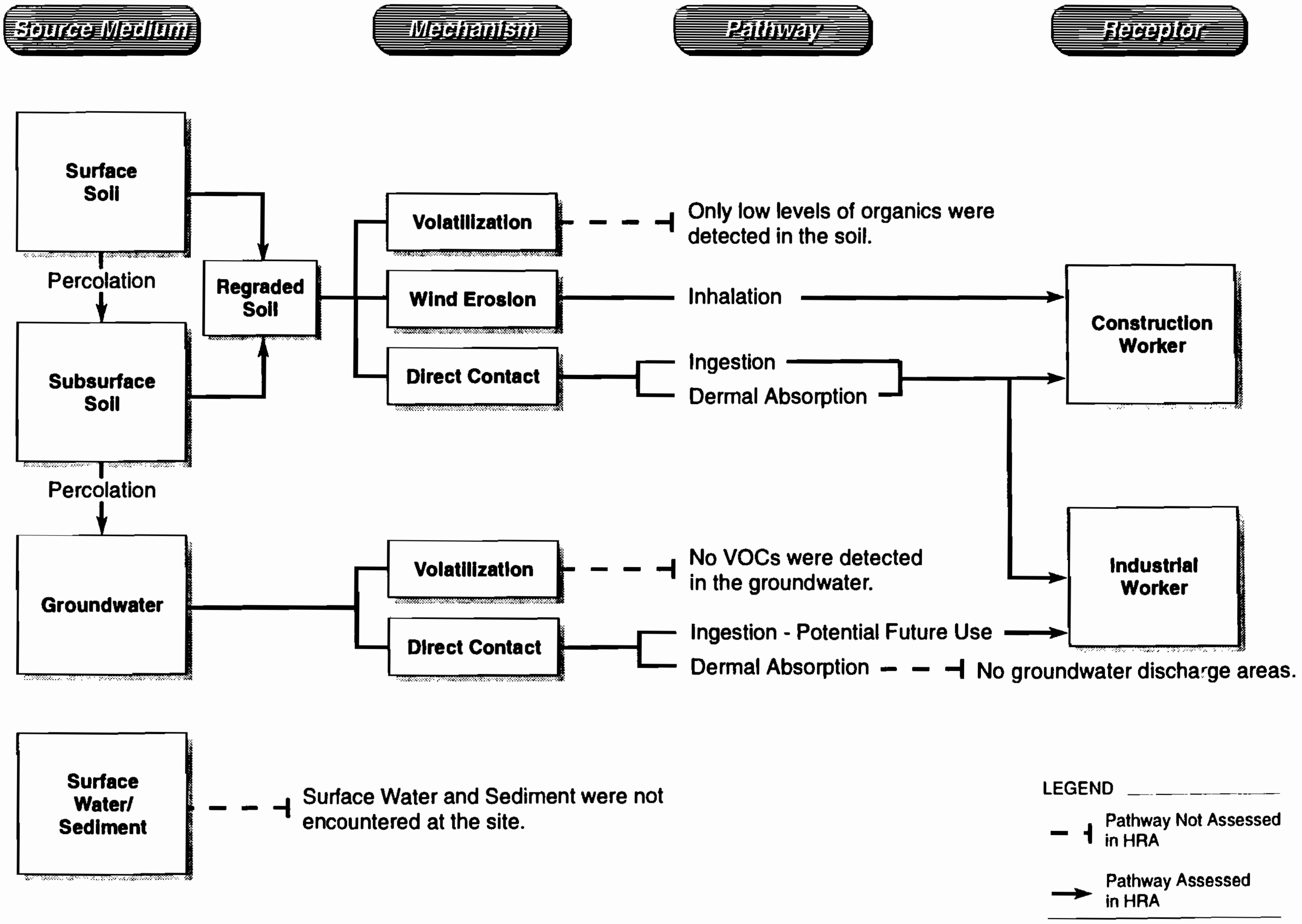

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PLATTSBURGH AFB - SS-029 SI
EXPOSURE PATHWAYS - INDUSTRIAL SCENARIO

FIGURE 6-3

For the trespass scenario, incidental ingestion of and dermal contact with site-related CPCs in surface soil are potential exposure pathways for adult and teenage trespassers. Inhalation of fugitive dust from wind erosion, however, is not an exposure pathway of concern since the site is almost completely vegetated as shown in Photos 1 through 6. Exposure of trespassers to surface water, sediment, and groundwater were not evaluated because surface water and sediment were not encountered on the site and groundwater currently is not used at SS-029 because Plattsburgh AFB obtains its potable water from the municipal water system.

Four VOCs (trichloroethene, toluene, acetone, and methylene chloride) were detected infrequently in the surface soil at concentrations ranging from 1 µg/kg to 7 µg/kg. Nine SVOCs were detected (Table 6-1) at concentrations ranging from 22 µg/kg (benzo(k)fluoranthene) to 65 µg/kg (pyrene). Based on this data, volatilization of organic chemicals from soil is not expected to represent a significant risk and was not evaluated in the HRA.

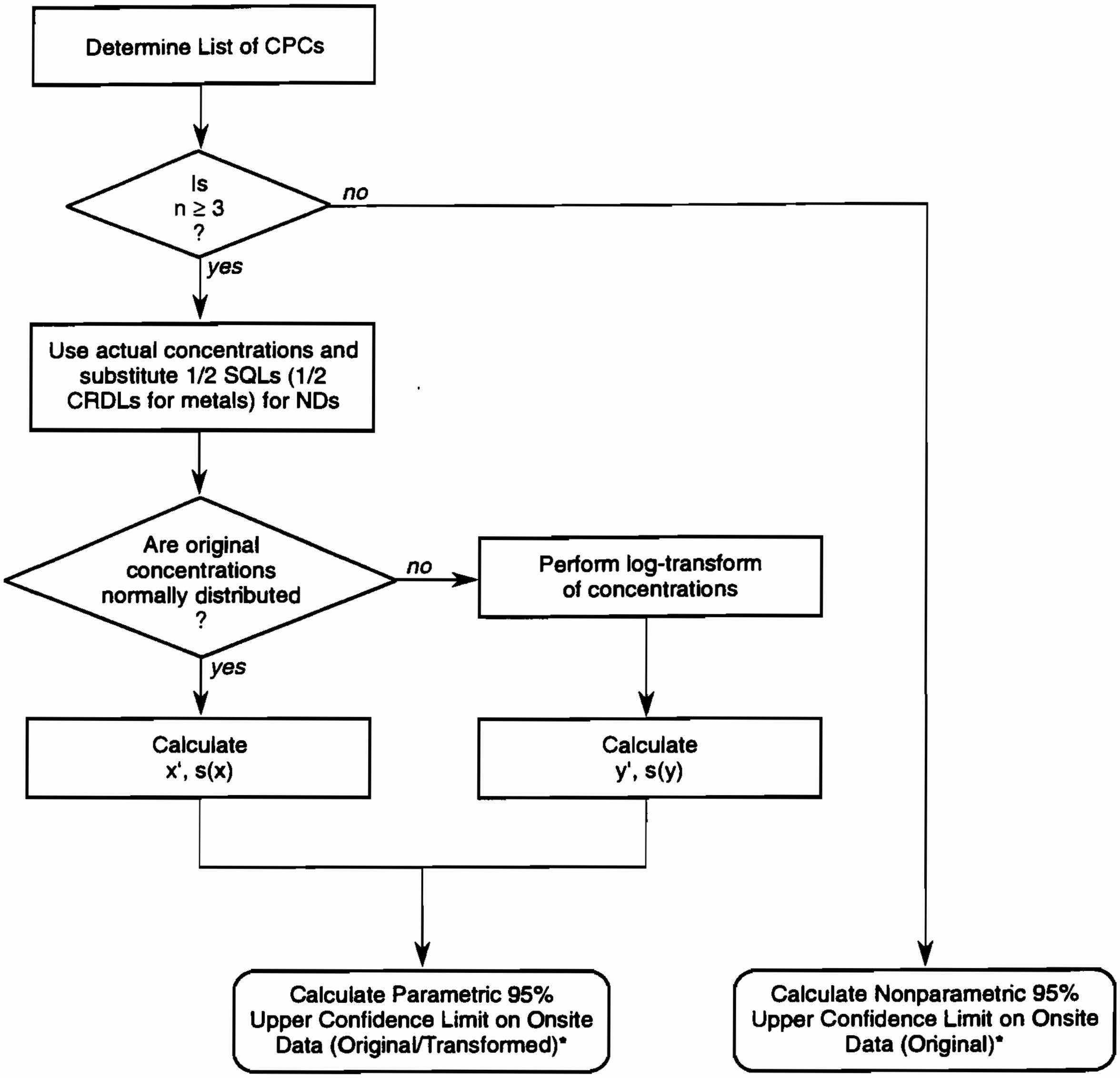
The potential exposure pathways for the industrial scenario include incidental ingestion of and dermal contact with surface and subsurface soil. In addition, construction workers could be exposed to fugitive dust during possible future intrusive activities and industrial workers could be exposed to groundwater through ingestion. After construction is completed, the future site will be repaved and covered with vegetation as part of an aviation support industrial setting. Since wind erosion is not possible under paved conditions, the inhalation of fugitive dust is an incomplete exposure pathway and was not evaluated for industrial workers.

Some other potential exposure pathways were not assessed. Risk associated with the volatilization of CPCs from soil was not considered significant due to the low concentrations of volatiles in the soil. Surface water and sediment were not assessed since neither was encountered at the site. Exposure to groundwater via inhalation of volatiles was not assessed because no volatiles or semivolatiles were detected in the groundwater. Ingestion of groundwater was not evaluated for construction workers since water may be obtained from the existing municipal system or bottled water may be used during the brief construction period. Dermal exposure to groundwater was not assessed because there are no groundwater discharge areas on the site.

6.4.3 Development of Exposure Concentrations

In order to quantify health effects, it is necessary to establish the concentration of each CPC at the point where it comes into contact with a human receptor; that is, along a completed exposure pathway. For pathways of direct exposure to contaminants in the media of concern (e.g., ingestion, dermal contact), exposure concentrations are developed directly from chemical data. For pathways of indirect exposure to contaminants (e.g., the inhalation of fugitive dust), modeling is required to develop exposure concentrations.

Because of the uncertainty associated with the estimation of exposure concentrations, statistical methods were employed to calculate them. The exposure concentrations used to assess health risks are based on the 95% upper confidence limit (UL_{95}) on the arithmetic mean for each CPC in each medium of concern. The method utilized to establish the UL_{95} from onsite data is summarized in Figure 6-4. The USEPA guidance (USEPA 1992c) prescribes two formulas for calculation of the UL_{95}. The appropriate formula depends on the distribution of the data (i.e., normal or log-normal distribution). In this HRA, a skewness coefficient was utilized to evaluate the data distribution. Since three data points are needed to calculate a skewness coefficient, data sets with less than three measurements (i.e., groundwater data) were assumed to be distributed normally. When the number of samples equaled or exceeded three, the skewness coefficient was calculated using the following formula:



* If the calculated 95% Upper Confidence Limit exceeds the maximum concentration detected in the background samples, then the maximum detection will become the 95% Upper Confidence Limit.

NOTES:

n = number of samples analyzed
x' = sample mean of original (untransformed) data
s(x) = sample standard deviation of original (untransformed) data
y' = sample mean of log-transformed data
s(y) = sample standard deviation of log-transformed data
SQL = sample quantitation limit
CRDL = contract required detection limit
ND = Non-detection

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METHOD FOR ESTABLISHING 95% UPPER CONFIDENCE LIMITS FOR ONSITE CONSTITUENTS

FIGURE 6-4

$$Skewness = \frac{n}{(n-1)(n-2)}\sum\left[\frac{x_1 - \bar{x}}{s}\right]^3$$

Where:

n = Number of measurements

x_1 = Detected concentration or one-half the SQL or CRDL

$\bar{x}$ = Arithmetic mean

s = Standard deviation

If the absolute value of the skewness coefficient was less than one (or the total number of samples was less than three) the data was assumed to be distributed normally. If the absolute value of the skewness coefficient was greater than or equal to one, the data was assumed to be log-normally distributed.

For small data sets, the large variability in the measured concentrations often yields a UL_{95} value greater than the maximum detected concentration. In these cases, the maximum detected concentration was used to represent the exposure concentration. For those samples where the CPC was not detected, the exposure concentration was calculated assuming one-half the SQL for organics or one-half the contract required quantitation limit (CRDL) for the RCRA metals.

Exposure concentrations for surface soil, the combination of surface and subsurface soil, and groundwater determined by this methodology are summarized in Tables 6-4, 6-5, and 6-6, respectively. Detailed calculations are presented in Appendix J (Tables J-1, J-2, and J-3).

Exposure concentrations for the inhalation of fugitive dust are based on soil concentrations presented in Table 6-5 and a factor determined from fugitive dust models created by NYSDEC and USEPA are presented in Table 6-7 (NYSDEC 1991; USEPA 1985). A more detailed description of the fugitive dust model and the determination of respirable concentrations for surface/subsurface soil is presented in Appendix K.

6.4.4 Estimation of Intake/Absorbed Dose and Exposure Parameters

The exposure dose, which is expressed either as an intake (i.e., administered dose) for ingestion and inhalation routes or as an absorbed dose for the dermal contact route, is defined as the mass of a substance in contact with an organism's exchange boundary (e.g., lungs, skin) per unit body weight per unit time. Units for intake or absorbed dose are typically milligrams per kilogram-day (mg/kg-day). The intake (administered dose) and absorbed dose are calculated using the chemical's exposure concentration in the environmental medium of concern, and a number of intake variables (or exposure parameters) expressing the frequency, duration, and magnitude of exposure. In addition, for calculating an absorbed dose via dermal contact, CPC-specific dermal absorption factors are also included as exposure parameters and are used to reflect the desorption of a CPC from the soil and the corresponding absorption of the CPC through the skin and into the blood stream. In this HRA, the CPCs identified in soil (surface and subsurface) lack published dermal absorption factors. In the absence of this data, the dermal contact with soil, under both trespass and industrial scenarios, could not be evaluated in this HRA, as shown on Table 6-12. The uncertainty associated with this data gap is presented in Table 6-13. The exposure parameters discussed below are selected conservatively so that, in combination, they produce an estimate of the reasonable maximum exposure for each particular exposure pathway.

TABLE 6-4

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION SUMMARY OF EXPOSURE CONCENTRATIONS FOR SURFACE SOIL TRESPASS SCENARIO

Chemical	Distribution	UL-95 Value (mg/kg)	Maximum Conc. (mg/kg)	Exposure Concentration (mg/kg)
Methylene Chloride	LOGNORMAL	4.11E-02	2.00E-03	2.00E-03
Acetone	LOGNORMAL	7.00E-03	6.00E-03	6.00E-03
Trichloroethene	LOGNORMAL	1.14E-01	2.00E-03	2.00E-03
Toluene	NORMAL	9.48E-03	7.00E-03	7.00E-03
Di-n-butylphthalate	LOGNORMAL	5.02E+02	3.80E-02	3.80E-02
Fluoranthene	LOGNORMAL	2.41E+01	6.10E-02	6.10E-02
Pyrene	LOGNORMAL	1.57E+01	6.50E-02	6.50E-02
bis(2-Ethylhexyl)phthalate	LOGNORMAL	8.10E+00	5.60E-02	5.60E-02
Benzo(b)fluoranthene	LOGNORMAL	8.48E-02	6.50E-02	6.50E-02
Benzo(k)fluoranthene	LOGNORMAL	1.86E+04	2.60E-02	2.60E-02
Benzo(a)pyrene	LOGNORMAL	1.46E+03	4.20E-02	4.20E-02
Indeno(1,2,3-cd)pyrene	LOGNORMAL	2.25E+02	4.40E-02	4.40E-02
Benzo(g,h,i)perylene	LOGNORMAL	2.00E+01	4.90E-02	4.90E-02

TABLE 6-5

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION SUMMARY OF EXPOSURE CONCENTRATIONS FOR SOIL* INDUSTRIAL SCENARIO

Chemical	Distribution	UL-95 Value (mg/kg)	Maximum Conc. (mg/kg)	Exposure Concentration (mg/kg)
Methylene Chloride	LOGNORMAL	5.71E-03	2.00E-03	2.00E-03
Acetone	LOGNORMAL	6.29E-03	6.00E-03	6.00E-03
Trichloroethene	LOGNORMAL	8.86E-03	2.00E-03	2.00E-03
Toluene	LOGNORMAL	1.79E-02	7.00E-03	7.00E-03
Diethylphthalate	LOGNORMAL	3.19E+00	2.20E+00	2.20E+00
Di-n-butylphthalate	LOGNORMAL	5.01E-01	3.80E-02	3.80E-02
Fluoranthene	NORMAL	2.04E-01	8.30E-02	8.30E-02
Pyrene	NORMAL	2.03E-01	6.70E-02	6.70E-02
Benzo(a)anthracene	LOGNORMAL	3.91E-01	4.80E-02	4.80E-02
Chrysene	LOGNORMAL	3.76E-01	5.00E-02	5.00E-02
bis(2-Ethylhexyl)phthalate	LOGNORMAL	3.31E-01	5.60E-02	5.60E-02
Benzo(b)fluoranthene	NORMAL	1.76E-01	7.70E-02	7.70E-02
Benzo(k)fluoranthene	NORMAL	2.13E-01	2.60E-02	2.60E-02
Benzo(a)pyrene	NORMAL	2.02E-01	4.50E-02	4.50E-02
Indeno(1,2,3-cd)pyrene	NORMAL	2.19E-01	4.40E-02	4.40E-02
Benzo(g,h,i)perylene	NORMAL	2.11E-01	4.90E-02	4.90E-02

NOTE:

* - Soil consists of suface and subsurface soil.

TABLE 6-6

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION SUMMARY OF EXPOSURE CONCENTRATIONS FOR GROUNDWATER INDUSTRIAL SCENARIO

Chemical	Distribution	UL-95 Value (mg/L)	Maximum Conc. (mg/L)	Exposure Concentration (mg/L)
Arsenic	NORMAL	6.10E-03	5.30E-03	5.30E-03
Chromium	NORMAL	8.85E-01	2.46E-01	2.46E-01
Selenium	NORMAL	2.05E-02	1.01E-02	1.01E-02

TABLE 6-7

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION MODELED RESPIRABLE FUGITIVE DUST CONCENTRATIONS FOR SOIL INDUSTRIAL SCENARIO

CHEMICAL	EXPOSURE CONCENTRATION (CS) (mg/kg)	FUTURE SCENARIO MODELING EXPOSURE FACTOR (MEF) (mg/m³)	FUTURE RESPIRABLE CONCENTRATION (CA) (mg/m³)
Methylene Chloride	2.00E-03	2.13E-01	4.26E-10
Acetone	6.00E-03	2.13E-01	1.28E-09
Trichloroethene	2.00E-03	2.13E-01	4.26E-10
Toluene	7.00E-03	2.13E-01	1.49E-09
Diethylphthalate	2.20E+00	2.13E-01	4.69E-07
Di-n-butylphthalate	3.80E-02	2.13E-01	8.09E-09
Fluoranthene	8.30E-02	2.13E-01	1.77E-08
Pyrene	6.70E-02	2.13E-01	1.43E-08
Benzo(a)anthracene	4.80E-02	2.13E-01	1.02E-08
Chrysene	5.00E-02	2.13E-01	1.07E-08
bis(2-Ethylhexyl)phthalate	5.60E-02	2.13E-01	1.19E-08
Benzo(b)fluoranthene	7.70E-02	2.13E-01	1.64E-08
Benzo(k)fluoranthene	2.60E-02	2.13E-01	5.54E-09
Benzo(a)pyrene	4.50E-02	2.13E-01	9.59E-09
Indeno(1,2,3-cd)pyrene	4.40E-02	2.13E-01	9.37E-09
Benzo(g,h,i)perylene	4.90E-02	2.13E-01	1.04E-08

EQUATION:

CA = CS × 0.000001 × MEF

The intake equations for each exposure pathway, derived from *RAGS* (USEPA 1989a), are presented in Tables 6-8 and 6-9. The exposure parameters used to calculate intake were taken from *RAGS* (USEPA 1989a), the USEPA supplemental guidance memorandum entitled *Standard Default Exposure Factors* (USEPA 1991), and the *Exposure Factors Handbook* (USEPA 1990a). The exposure parameters used in the HRA also are presented in Tables 6-8 and 6-9. Exposure parameters that differ from the default values presented in these documents are discussed below.

Frequency and Duration of Exposure to Soil

A total exposure duration (construction period) of three months was used to evaluate risks associated with exposure to soil contamination for construction workers. The exposure frequency was assumed to be five days per week during this three-month (13-week) period.

An exposure frequency of 130 days per year (5 days per week for 26 weeks/year) was used to evaluate risks associated with exposure to soil contamination for industrial workers. This exposure frequency is used because it is expected that these receptors would be exposed only 6 months per year (May to October). Cold weather and snow (ground cover) would reduce or prevent exposure during winter months.

In the absence of a USEPA-recommended exposure frequency for trespassers, an exposure frequency of 3 days per week for 26 weeks (78 days) was used for the trespass scenario. As is the case for industrial workers, this exposure frequency is based on the potential exposure to surface soil during the warmer months (May to October). Three days per week is considered a reasonable estimate, since trespassers would most likely access the site in their free time (i.e., weekends and one day during the work/school week).

Ingestion of Soil

The value 1.0 was used to account for the fraction of soil or dust contacted that is presumed to be contaminated (USEPA 1989a). This is a conservative assumption, but is general practice in HRAs. In the absence of a USEPA-recommended ingestion rate for adult and teenage trespassers, an ingestion rate of 100 mg/day, which is the default value for adult residents given in *RAGS* (USEPA 1989a), was used for the trespass scenario.

Inhalation of Fugitive Dust

The value used for the inhalation rate was developed from inhalation rate data reported in *Exposure Factors Handbook* (USEPA 1990a). For a reasonable construction scenario, it was assumed that an individual would spend 50 percent of time working at a heavy activity level and 50 percent of the time working at a moderate activity level. The value calculated for the construction worker is 3.0 m^3/hr.

6.5 Toxicity Assessment

The CPCs identified from media collected at SS-029 may be categorized by their relative health risks. Risks are evaluated for carcinogenic and noncarcinogenic (chronic and subchronic) effects. USEPA has published toxicity values for both types of effects that are to be used in evaluating these risks.

Toxicity data used in this HRA were collected following the protocol recommended by USEPA. First, *Integrated Risk Information System (IRIS)* (USEPA 1996) was consulted through an on-line computer linkage. When the information sought was not available on *IRIS*, the *Health Effects Assessment Summary Tables*

TABLE 6-8

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
SUMMARY OF EXPOSURE PARAMETERS
TRESPASS SCENARIO

PARAMETER	TRESPASSER			
	ADULT		TEENAGER	
	SURFACE SOIL INGESTION		SURFACE SOIL INGESTION	
CS	mg/kg		mg/kg	
IR	100 mg/day	(4)	100 mg/day	(4)
CF	1E-06 kg/mg	(1)	1E-06 kg/mg	(1)
FI	1.0 (unitless)	(1)	1.0 (unitless)	(1)
EF	78 days/year	(4)	78 days/year	(4)
ED	30 years	(2)	6 years	(2)
BW	70 kg	(2)	56 kg	(3)
AT (carcinogens)	25,550 days	(1)	25,550 days	(1)
AT (noncarcinogens)	10,950 days	(1)	2,190 days	(1)

ABBREVIATIONS:
CS - Chemical concentration in surface soil
IR - Ingestion rate or inhalation rate
CF - Conversion factor
FI - Fraction ingested
EF - Exposure frequency
ED - Exposure duration
ET - Exposure time
BW - Body weight
AT - Averaging time

EQUATION:

Soil Ingestion: Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

SOURCES:
(1) USEPA. 1989a. Risk Assessment Guidance for Superfund.
(2) USEPA. 1991. Standard Default Exposure Factors (Supplemental Guidance Memorandum).
(3) USEPA. 1990a. Exposure Factors Handbook.
(4) Professional judgement - See text.

TABLE 6-9

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
SUMMARY OF EXPOSURE PARAMETERS
INDUSTRIAL SCENARIO

PARAMETER	CONSTRUCTION WORKER		INDUSTRIAL WORKER	
			SOIL*	GROUNDWATER
	INGESTION	INHALATION FROM FUGITIVE DUST	INGESTION	INGESTION
CS	mg/kg	—	mg/kg	—
CA	—	mg/m^3	—	—
CW	—	—	—	mg/l
IR	480 mg/day (2)	3 m^3/hr (3)	50 mg/day (2)	1 L/day (2)
CF	1E-06 kg/mg (1)	—	1E-06 kg/mg (1)	—
FI	1.0 (unitless) (4)	—	1.0 (unitless) (4)	—
EF	5 days/week (4)	5 days/week (4)	130 days/year (4)	250 events/year (2)
ED	13 weeks (4)	13 weeks (4)	25 years (2)	25 years (2)
ET	—	8 hrs/day (4)	—	—
BW	70 kg (2)	70 kg (2)	70 kg (2)	70 kg (2)
AT (car.)	25,550 days (1)	25,550 days (1)	25,550 days (1)	25,550 days (1)
AT (noncar.)	91 days (1)	91 days (1)	9,125 days (1)	9,125 days (1)

ABBREVIATIONS:

CS - Chemical concentration in soil*
CA - Chemical concentration in air
CW - Chemical concentration in groundwater
IR - Ingestion rate or inhalation rate
CF - Conversion factor
FI - Fraction ingested
EF - Exposure frequency
ED - Exposure duration
ET - Exposure Time
BW - Body weight
AT - Averaging time

SOURCES:

(1) USEPA. 1989a. Risk Assessment Guidance for Superfund.
(2) USEPA. 1991. Standard Default Exposure Factors (Supplemental Guidance Memorandum).
(3) USEPA. 1990a. Exposure Factors Handbook.
(4) Professional judgement - See text.

NOTE:

* - Soil consists of surface and subsurface soil

EQUATIONS:

Inhalation: Intake = (CA × IR × ET × EF × ED) / (BW × AT)
Soil Ingestion: Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

(HEAST) (USEPA 1995) were consulted. Lastly, the USEPA Environmental Criteria & Assessment Office (USEPA ECAO 1995) was contacted for toxicity data not available from *IRIS* and *HEAST*.

For the evaluation of carcinogenic risk from exposure to contaminants, the USEPA has established slope factors (SFs). An SF is a measure of toxicity that quantitatively defines the correlation between dose and response. It is used in the risk assessment to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a known or potential carcinogen. SFs have been developed for oral intake and for inhalation routes of exposure.

For evaluating noncarcinogenic effects from exposure to contaminants, oral reference doses (RfDs) are used when the exposure route is via ingestion while reference concentrations (RfCs) are used when the pathway is via inhalation. Values have been developed for chronic (long-term) and subchronic (short-term) effects.

Chronic RfDs are derived from the No-Observed-Adverse-Effect-Level (NOAEL) for the critical toxic effect. They are modified by application of uncertainty factors reflecting the type of study on which the values are based. Chronic RfCs are derived in a similar fashion but are based upon studies of inhalation exposure. For this reason, calculation of RfCs is more complex and, therefore, RfCs are available for fewer chemicals.

Subchronic values for RfDs and RfCs are derived in the same fashion as the chronic values when suitable less-than-lifetime studies are available. Subchronic RfDs and RfCs are used to evaluate noncarcinogenic effects over an exposure period of two weeks to seven years.

Since toxicity information is limited for many chemicals discussed in the HRA, uncertainty factors are published for noncarcinogenic toxicity values to indicate the relative strength of evidence supporting the toxicity value. These uncertainty factors generally range between 10 and 1,000. A high uncertainty factor indicates low strength of evidence for the toxicity value and further indicates that the toxicity value might change if additional data become available. A low uncertainty factor indicates that there is a high degree of confidence in the value and that a change is less likely should more data become available. The impact of uncertainty factors on the HRA is discussed further in Section 6.8.

6.5.1 Carcinogenic Effects

Table 6-10 summarizes toxicity information for known or potential carcinogens that were identified as CPCs in the environmental media at SS-029. For each of these CPCs, the following information is provided:

a. Slope Factor, representing a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. Slope factors are expressed as inverse units of dose, (i.e., $[\text{mg/kg-day}]^{-1}$). The slope factor allows the calculation of incremental lifetime cancer risk associated with exposure to the chemical at a known or estimated dosage. Table 6-10 provides separate slope factors, where applicable and available, for oral and inhalation routes of exposure.

When assessing potential cancer risk posed by exposure to carcinogenic PAHs other than benzo(a)pyrene, the slope factor for benzo(a)pyrene was used; however, the cancer risk for these other carcinogenic PAHs was adjusted by applying an "estimated order of potential potency," in accordance with *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons* (USEPA 1993). These relative potency factors are presented in Tables J-4 and J-6 of Appendix J.

TABLE 6-10

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
TOXICITY VALUES: POTENTIAL CARCINOGENIC EFFECTS

Chemical	Slope Factor		Weight-of-Evidence Classification	Tumor Site(s)		Reference - Date	
	Inhalation (mg/kg-day)^-1	Oral (mg/kg-day)^-1		Inhalation	Oral	Inhalation	Oral
Benzo(a)anthracene	ND	ND*	B2	—	—	—	—
Benzo(a)pyrene	ND	7.30E+00	B2	—	Forestomach, larynx	—	IRIS-10/96
Benzo(b)fluoranthene	ND	ND*	B2	—	—	—	—
Benzo(k)fluoranthene	ND	ND*	B2	—	—	—	—
Chrysene	ND	ND*	B2	—	—	—	—
Indeno(1,2,3-c,d)pyrene	ND	ND*	B2	—	—	—	—
Methylene Chloride	1.65E-03	7.50E-03	B2	Inc. hepatocellular neoplasms	Inc. hepatocellular neoplasms	IRIS-10/96	IRIS-10/96
Trichloroethene	ND	ND	—	—	—	—	—
bis(2-Ethylhexyl)phthalate	1.40E-02	1.40E-02	B2	Liver, lung	Liver	ECAO-3/95	IRIS-10/96
Arsenic	1.50E+01	1.50E+00	A	Respiratory system, lung cancer	Lung and skin cancer	IRIS-10/96	IRIS-10/96
Chromium (VI)	4.20E+01	ND	A	Lung cancer	—	IRIS-10/96	—

ECAO - Environmental Criteria and Assessment Office. Date indicates date of correspondence.

HEAST - Health Effects Assessment Summary Tables. Date indicates the fiscal year they were published.

IRIS - Integrated Risk Information System. Date indicates access to IRIS.

ND - Not Determined.

* - Relative potency factors were applied to the slope factor for benzo(a)pyrene to evaluate cancer risks attributable to these PAHs (see text).

For the inhalation route of exposure, the toxicity values for carcinogenic effects are expressed in terms of risk per unit concentration, (i.e., $[\mu g/m^3]^{-1}$). The following equation, as recommended in *RAGS* (USEPA 1989a), was utilized to convert the risk per unit concentration values to inhalation slope factors (i.e., $[mg/kg\text{-}day]^{-1}$):

$$Slope\ Factor = \frac{Unit\ Risk(\mu g/m^3)^{-1}\ x\ 70\ kg}{20\ m^3/day\ x\ 0.001\ mg/\mu g}$$

Where:

70 kg = body weight default value
20 m^3/day = inhalation rate default value
0.001 mg/μg = conversion factor

b. Weight-of-Evidence for carcinogenicity, expressing the degree of confidence in the likelihood that exposure to a given chemical causes cancer in humans. This weight-of-evidence is based upon the following USEPA classification system:

Group A--Human Carcinogen - Indicates that there is sufficient evidence from epidemiological studies to support a causal association between an agent and cancer in humans.

Group B--Probable Human Carcinogen - Indicates that there is at least limited evidence from epidemiological studies of carcinogenicity to humans (Group B1) or that, in the absence of positive data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).

Group C--Possible Human Carcinogen - Indicates that there is limited evidence of carcinogenicity in animals and inadequate or lacking human data.

Group D--Not Classified - Indicates that there were no data to evaluate or that the evidence for carcinogenicity in humans and in animals is inadequate.

Group E--No Evidence of Carcinogenicity to Humans - Indicates that there is no evidence of carcinogenicity in at least two adequate animal tests in different species or in both epidemiological and animal studies.

c. Tumor site, i.e., physiological location of cancer upon which the slope factor and weight-of-evidence are based.

d. References, including source(s) and date(s), are provided to indicate the basis for identified slope factors.

6.5.2 Noncarcinogenic Effects

Unlike carcinogenic effects, noncarcinogenic effects are thought to have a threshold daily dosage level below which adverse effects are not expected. This section provides information concerning these threshold levels. Table 6-11 summarizes noncarcinogenic toxicity information for the CPCs identified at SS-029. For each CPC, the following information is provided:

TABLE 6-11

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION
TOXICITY VALUES: POTENTIAL NONCARCINOGENIC EFFECTS

Chemical	Reference Dose(mg/kg-day)				Critical Effect(s)				Reference - Date			
	Subchronic		Chronic		Subchronic		Chronic		Subchronic		Chronic	
	Inhalation RfD	Oral RfD	Inhalation RfD	Oral RfD	Inhalation		Inhalation	Oral	Inhalation	Oral	Inhalation	Oral
Acetone	ND	1.00E+00	ND	1.00E-01	—	Inc liver & kidney wt. nephrotoxicity	—	Inc liver & kidney wt. nephrotoxicity	—	HEAST-FY95	—	IRIS-10/96
Benzo(a)anthracene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Benzo(a)pyrene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Benzo(b)fluoranthene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Benzo(k)fluoranthene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Benzo(g,h,i)perylene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Chrysene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Di-n-butylphthalate	ND	1.00E+00	ND	1.00E-01	—	Inc. mortality	—	Inc mortality	—	HEAST-FY95	—	IRIS-10/96
Diethylphthalate	ND	8.00E+00	ND	8.00E-01	—	Dec. growth and organ wt.	—	Dec. growth rate, alter. organ wt.	—	HEAST-FY95	—	IRIS-10/96
Fluoranthene	ND	4.00E-01	ND	4.00E-02	—	Kidney nephropathy, liver wt. changes, hematological alterations	—	Nephropathy, inc. liver wt. hematological alterations	—	HEAST-FY95	—	IRIS-10/96
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	—	—	—	—	—	—	—	—
Methylene Chloride	8.57E-01	6.00E-02	8.57E-01	6.00E-02	Liver Toxicity	Liver Toxicity	Liver toxicity	Liver toxicity	HEAST-FY95	HEAST-FY95	HEAST-FY95	IRIS-10/96
Pyrene	ND	3.00E-01	ND	3.00E-02	—	Kidney effects	—	Kidney effects	—	HEAST-FY95	—	IRIS-10/96
bis(2-Ethylhexyl)phthalate	5.71E-02	2.00E-02 **	ND	2.00E-02	—	Inc. liver wt.	—	Inc. liver wt.	ECAO-3/95	IRIS-10/96	—	IRIS-10/96
Toluene	2.86E-01	2.00E+00	1.14E-01	2.00E-01	Neurological effects	Liver/kidney altered wt.	Neurological effects	Liver/kidney altered wt.	ECAO-3/95	HEAST-FY95	IRIS-10/96	IRIS-10/96
Trichloroethene	ND	6.00E-03 **	ND	6.00E-03	—	Inc. liver wt.	—	Inc. liver wt.	—	ECAO-5/95	—	ECAO-5/95
Arsenic	ND	3.00E-04	ND	3.00E-04	—	Hyperpigmentation, keratosis	—	Hyperpigmentation, keratosis, vascular complications	—	HEAST-FY95	—	IRIS-10/96
Chromium(III)	ND	1.00E+00	ND	1.00E+00	—	No effects observed	—	No effects observed	—	HEAST-FY95	—	HEAST-FY95
Chromium(VI)	ND	2.00E-02	ND	5.00E-03	—	No effects observed	—	No effects observed	—	HEAST-FY95	—	IRIS-10/96
Selenium	ND	5.00E-03	ND	5.00E-03	—	Clinical selenosis	—	Clinical selenosis	—	HEAST-FY95	—	IRIS-10/96

ECAO - Environmental Criteria and Assessment Office. Date indicates date of correspondence.

HEAST - Health Effects Assessment Summary Tables. Date indicates the fiscal year they were published.

IRIS - Integrated Risk Information System. Date indicates access to IRIS.

ND - No Data

** - In the absence of established subchronic RfD values, chronic values are utilized.

a. Reference Doses, expressed in mg/kg-day, generally identify the threshold dosage level below which adverse health effects are not expected.

The published chronic and subchronic inhalation toxicity values are reported as RfCs in units of mg/m^3. The published RfCs were converted to RfDs, expressed in units of mg/kg-day, using the following equation as given in *RAGS* (USEPA 1989a):

$$\textit{Reference Dose (RfD)} = \frac{RfC\ (mg/m^3) \times 20\ m^3/day}{70\ kg}$$

Where:

70 kg = body weight default value
20 m^3/day = inhalation rate default value

In accordance with *RAGS* (USEPA 1989a), the chronic RfD was used as the subchronic RfD if subchronic values were not available. Table 6-11 identifies when chronic RfDs were used as subchronic RfDs.

b. Critical Effects expressing the most sensitive toxic end point of adverse response (e.g., liver damage) associated with exposure to the CPC(s).

c. Source(s) and date(s) of dose-response data.

6.5.3 Chemicals for Which No Values Are Available

Toxicity information is not available for all CPCs detected in environmental samples at SS-029. For example, benzo(g,h,i)perylene, a PAH compound with noncarcinogenic effects, was not included in the HRA because of the lack of reference doses. CPCs were included in pathway-specific risk calculations only when relevant toxicity information was available for that pathway. Generally, there are many more chemicals included in risk calculations for pathways involving exposure via ingestion than exposure via inhalation. For instance, 12 of the 19 CPCs have been assigned chronic oral RfD values, but only 2 have been assigned chronic inhalation RfDs.

Chromium was analyzed as total chromium, as opposed to trivalent or hexavalent chromium. In the absence of speciation data, USEPA Region II guidance states that a 6:1 trivalent-to-hexavalent ratio be assumed. This factor was applied to the chromium exposure concentrations in Appendix J Tables J-10 and J-11.

A toxicological profile for each CPC, has been prepared that summarizes physical, chemical, and toxicity information. These profiles are presented in Appendix L.

6.6 Risk Characterization

Health risk is a function of both human exposure and chemical toxicity. The risk characterization for SS-029 is the process by which the toxicity assessment (Section 6.5) is integrated with the exposure assessment (Section 6.4) to estimate present and potential threats to human health attributable to contamination at the site.

6.6.1 Carcinogenic Risk

Carcinogenic risk is expressed as the incremental lifetime cancer risk to an individual or population exposed to contaminants at a site. This incremental lifetime cancer risk corresponds to the 95th percent upper confidence limit of the probability (when based on animal data), or to the maximum likely estimate (when based on human data), of developing cancer over a 70-year lifetime from exposure to hazardous substances present at a hazardous waste site. It is computed by the following equation:

$$\text{Cancer Risk} = \text{Exposure Intake (mg/kg-day)} \times \text{Slope Factor (mg/kg-day)}^{-1}$$

As indicated by the above equation, incremental lifetime cancer risk is dimensionless. A risk of 1.0×10^{-6} for example, indicates that an individual would incur an additional risk of 0.000001 (or 1 in 1 million) due to his/her exposure to contaminants at a given site. Alternately, out of a population of one million persons so exposed, this level of risk would indicate that one person, on average, would contract cancer due to such exposure.

6.6.2 Noncarcinogenic Risk

Evaluation of noncarcinogenic risk is based on a threshold response theory. The process involves a comparison of an exposure intake to the estimated threshold response level. The term used to make this comparison is the "hazard quotient," which is defined as:

$$\text{Hazard Quotient} = \frac{\text{Exposure Intake (mg/kg-day)}}{\text{Reference Dose (mg/kg-day)}}$$

CPCs may have different adverse noncarcinogenic responses, or end points. Therefore, the sum of the hazard quotients calculated for all CPCs within a pathway, called the hazard index, should be interpreted with caution.

Noncarcinogenic effects have been evaluated separately for chronic (lifetime) and subchronic (short-term) exposure. Chronic risk evaluation assumes 25 or 30 years of exposure to SS-029 site CPCs that might be experienced by industrial workers or adult trespassers, whereas subchronic evaluation assumes a shorter exposure (less than seven years) that might be experienced by construction workers or teenage trespassers.

6.6.3 Combination of Risks Across Pathways

As shown in Figure 6-2, two exposure pathways were considered under the trespass scenario. Of the completed pathways, only the ingestion route was evaluated, since dermal absorption factors were lacking, as previously discussed in the exposure assessment. Risk calculations are based on the equation given in Table 6-8 and are presented in Appendix J, Tables J-4 and J-5. Total risk was determined solely on the ingestion of soil. Table 6-12 summarizes risks to trespassers.

Three basic exposure pathways were considered under the industrial use scenario, which approximates what may be occurring currently onsite. However, potential risks were calculated for the ingestion and inhalation routes of exposure only. Risk calculations under the industrial use scenario are presented in Appendix J, Tables J-6 through J-11. Calculations of the combined total risk for industrial use receptors are summarized in Table 6-12.

TABLE 6-12

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION CANCER RISKS AND HAZARD INDICES FOR MULTIPLE PATHWAYS

EXPOSURE PATHWAY	TRESPASSER				CONSTRUCTION WORKER		INDUSTRIAL WORKER	
	ADULT		TEENAGE					
	CANCER RISK	HAZARD INDEX CHRONIC	CANCER RISK	HAZARD INDEX SUBCHRONIC	CANCER RISK	HAZARD INDEX SUBCHRONIC	CANCER RISK	HAZARD INDEX CHRONIC
Dermal Contact with Soil*	NV	NV	NV	NV	NV	NV	NV	NV
Ingestion of Soil*	5E-08	2E-06	1E-08	1E-06	8E-09	2E-05	4E-08	3E-06
Inhalation of Fugitive Dust	NA	NA	NA	NA	1E-13	5E-08	NA	NA
Ingestion of Groundwater	NA	NA	NA	NA	NA	NA	3E-05	3E-01
TOTAL EXPOSURE CANCER RISK	**5E-08**		**1E-08**		**8E-09**		**3E-05**	
TOTAL EXPOSURE HAZARD INDEX		**2E-06**		**1E-06**		**2E-05**		**3E-01**

NOTE:

* - Soil consists of surface soil for the current use scenario and surface and subsurface soil for the future use scenario.

ABBREVIATIONS:

NV - No value could be calculated, since CPCs lack dermal absorption factors(see text).

NA - Not Applicable

6.7 Results and Discussion

This discussion focuses on the comparison of risks presented in Table 6-12 to acceptable risk levels established by the USEPA through the National Contingency Plan (USEPA 1990c). The acceptable levels are as follows:

> **Noncarcinogenic effects**: The hazard index should not exceed unity (1.0) for noncarcinogenic effects. If the calculated hazard index is below this value, adverse effects are unlikely, even for sensitive populations.
>
> **Carcinogenic effects**: For carcinogenic effects, acceptable exposure levels are those which represent an incremental lifetime cancer risk to an individual of between 10^{-6} and 10^{-4}, with the lower value in this range (1×10^{-6}) representing a "point of departure" or target risk level.

Given the current site conditions, industrial workers may be exposed to soil via ingestion. The total hazard index (3×10^{-6}) and the cancer risk (4×10^{-8}) for ingestion of soil are both below the acceptable USEPA value/risk range. In the future, industrial workers may also be exposed to groundwater. Risks for future industrial workers are discussed below.

In the trespass scenario, the hazard indices for adult and teenage trespassers are 2×10^{-6} and 1×10^{-6}, respectively, indicating that noncarcinogenic risk is not a concern under current conditions. The calculated hazard indices are based solely on the ingestion of surface soil, primarily bis(2-ethylhexyl)phthalate (Table J-5). The total cancer risk for adult and teenage trespassers are 5×10^{-8} and 1×10^{-8}, respectively, which are also below the acceptable risk range. Ingestion of benzo(a)pyrene in surface soil is the major contributor to these risks (Table J-4).

The total subchronic hazard index for construction workers is 2×10^{-5}. This hazard index is below the acceptable value of 1, indicating that exposure to site contaminants does not pose a noncarcinogenic risk to construction workers. The major contributor to this hazard index is the ingestion of bis(2-ethylhexyl)phthalate in soil (Table J-7). The total cancer risk for construction workers is 8×10^{-9}, which also is below the acceptable risk range. Ingestion of benzo(a)pyrene in soil (Table J-6) is the primary contributor to this risk.

The total hazard index for future industrial workers is 3×10^{-1}, which is below the acceptable value. Ingestion of arsenic in groundwater is the major contributor to the hazard index (Table J-11). The cancer risk for industrial workers, 3×10^{-5}, is within the USEPA's acceptable risk range. The calculated risk is primarily driven by ingestion of arsenic in groundwater (Table J-10).

6.8 Uncertainty Analysis

The estimates of cancer risk and noncarcinogenic hazard indices (chronic/subchronic) in this HRA are based upon numerous assumptions and, therefore, involve a considerable degree of uncertainty. Some of this uncertainty is inherent in the risk assessment process itself and in the current limits of scientific knowledge regarding human health risk factors. For example, the necessary extrapolation of animal study data to humans introduces a large uncertainty factor into the process, as does extrapolation from the high doses used in animal studies to the low doses associated with sites such as SS-029. Likewise, estimating human exposure and human intake is largely judgmental, involving the extrapolation of human behavioral patterns (often unknown even at present) into the relatively distant future. The exposure assessment for this study is based upon reasonable maximum exposure defined as the highest exposure that may be reasonably expected at the site. The intent of reasonable maximum exposure is to provide a conservative exposure scenario that is still within the range of possible exposure.

Due to these types of uncertainties, the results of the HRA for SS-029 should not be taken as a characterization of absolute risk, or as a fully probable estimate of this risk. Rather, they are intended to identify the types and relative levels of risk associated with various potential exposure routes at SS-029, so that remedial efforts can focus upon aspects of the site which are of greatest concern from a human health standpoint. Table 6-13 summarizes the uncertainties for this HRA.

6.9 Conclusions

Given the current and a variety of reasonably expected future uses of the site, the results of the quantitative risk evaluation indicate that all carcinogenic and noncarcinogenic human health risk associated with human exposure to site chemicals at SS-029 lies within or below the range of acceptability established by the National Contingency Plan. Although risk may be underestimated somewhat because risk from dermal contact with contaminated media could not be quantified, conservative assumptions (particularly for exposure frequency and duration) used for ingestion are believed to compensate for unknowns regarding dermal contact. The potential cancer risk calculated for future industrial workers, 3 x 10^{-5}, is the only risk above the target risk level of 10^{-6}. This is attributable to ingestion of arsenic in groundwater. Although this risk is not insignificant, it does not appear to warrant groundwater remediation because:

- Arsenic was detected in only 1 groundwater sample.
- The concentration of arsenic detected (5.3 ppb) is only slightly higher than the base-wide background concentration (3.6 ppb). It is possible that this detection is representative of arsenic concentrations naturally present in the groundwater in this area.
- The concentration of arsenic is one-fifth the New York State groundwater standard (25 ppb) established as a drinking water standard protective of public health.
- The concentration of arsenic is one-tenth the USEPA's maximum contaminant level for arsenic in drinking water (50 ppb).

TABLE 6-13

JET ENGINE TEST CELL (SS-029) - SITE INVESTIGATION POTENTIAL SOURCES OF UNCERTAINTY

Potential Source	Direction of Effect	Reason for Uncertainty
Likelihood of exposure pathways	Unknown, over-or underestimate risk	Pathways may not actually occur (e.g., future-use construction scenario may never occur), or exposure pathways may not have been included.
Degradation of chemicals	Overestimate risk	Risk estimates are based on recent chemical concentrations. Concentrations may decrease with time as a result of the degradation processes.
Lack of consideration of chemical transformation	Unknown	Chemical may transform to more or less toxic forms in the environment
Exposure assumptions (frequency, duration, and intensity)	Overestimate risk	Parameters selected are conservative estimates of exposure.
Dermal contact pathway not evaluated	Underestimate risk	Dermal absorption factors not available for any CPCs detected.
Extrapolation of animal toxicity data to humans.	Unknown, probably overestimate risk	Animals and humans differ with respect to absorption, metabolism, distribution, and excretion of chemicals. The magnitude and direction of the difference will vary with each chemical. Animal studies typically involve high-dose exposures, whereas humans are exposed to low doses in the environment.

TABLE 6-13 (Con't)

Potential Source	Direction of Effect	Reason for Uncertainty
Analytes with no toxicity values	Underestimate Risk	There are some analytes for which dose-response data are undetermined or inadequate. The risk associated with these chemicals cannot be quantified.
Use of linearized, multi-stage model to derive cancer slope factors	Overestimate risk	Model assumes a non-threshold, linear at low dose relationship for carcinogens. Many compounds induce cancer by non-genotoxic mechanisms. Model results in a 95% upper confidence limit of the cancer risk. The true risk is unlikely to be higher and may be as low as zero.
Summation of effects (cancer risks and hazard indices) from multiple substances	Unknown	The assumption that effects are additive ignores potential synergistic and/or antagonistic effects. Assumes similarity in mechanism of action, which is not the case for many substances. Compounds may induce tumors or other toxic effects in different organs or systems.
Use of uncertainty factors in the derivation of reference dose	Unknown	Ten-fold uncertainty factors are incorporated to account for various sources of uncertainty (animal to human extrapolation, protection of sensitive human populations, extrapolation from subchronic to chronic data, and use of LOAELS rather than NOAELs). Although some data seem to support the ten-fold factor, its selection is somewhat arbitrary.

7.0 RECOMMENDATIONS

Chemical contamination from JP-4 jet fuel or other petroleum hydrocarbon spills is not evident at SS-029 based upon physical observations and the results of chemical analyses performed on soil and groundwater samples collected at the site. None of the SS-029 site soils encountered exhibited elevated PID readings, visual contamination, or unusual odors. The 16 organic compounds and 4 metals detected in site soil samples were present at concentrations below TBCs.

No organic compounds were detected in the groundwater samples. Three metals were detected in groundwater sampled during the SI including arsenic, chromium, and selenium. Chromium was detected in the upgradient well above the ARARs, but was not present in the downgradient well. Arsenic was detected at a concentration below the ARAR value. The highest concentration of selenium occurred in the unfiltered groundwater sample obtained from the downgradient well (10.1 ppb). This detection barely exceeded the 10 ppb ARAR value and does not appear to represent selenium contamination attributable to the site.

The results of the quantitative human health risk assessment, based on chemical concentrations in onsite media, indicate that no excess carcinogenic or noncarcinogenic human health risk is associated with site chemicals at SS-029 given the current and variety of possible future uses of the site.

Based upon the absence of significant contamination in soil or groundwater at SS-029, no remedial action is warranted to reduce or contain site contaminants. The data base obtained during the SI appears to be sufficient to support an Air Force Decision Document specifying "no further action" for the site for both investigated media. Therefore, no further investigation is necessary.

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APPENDIX A
ANALYTICAL RESULTS

TABLE A-1 - ANALYTICAL RESULTS FROM SOIL SAMPLES

TABLE A-2 - ANALYTICAL RESULTS FROM GROUNDWATER SAMPLES

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (VOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Parameter	TBC				
Chloromethane	—				
Bromomethane	—				
Vinyl Chloride	200				
Chloroethane	1,900				
Methylene Chloride	100			2	2
Acetone	200		6		
Carbon Disulfide	2,700				
1,1-Dichloroethene	400				
1,1-Dichloroethane	200				
1,2-Dichloroethene (total)	300				
Chloroform	300				
1,2-Dichloroethane	100				
2-Butanone	300				
1,1,1-Trichloroethane	800				
Carbon Tetrachloride	600				
Bromodichloromethane	—				
1,2-Dichloropropane	—				
cis-1,3-Dichloropropene	—				
Trichloroethene	700		2		
Dibromochloromethane	—				
1,1,2-Trichloroethane	—				
Benzene	60				
trans-1,3-Dichloropropene	—				
Bromoform	—				
4-Methyl-2-Pentanone	1,000				
2-Hexanone	—				
Tetrachloroethene	1,400				
1,1,2,2-Tetrachloroethane	600				
Toluene	1,500		1		
Chlorobenzene	1,700				
Ethylbenzene	5,500				
Styrene	—				
Xylene (total)	1,200				

Only detected results reported.

TBC - "To Be Considered" criteria
that are not legally binding.

— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (VOLATILES)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Units		UG/KG	UG/KG	UG/KG
Parameter	TBC			
Chloromethane	—			
Bromomethane	—			
Vinyl Chloride	200			
Chloroethane	1,900			
Methylene Chloride	100		2	2
Acetone	200			4
Carbon Disulfide	2,700			
1,1-Dichloroethene	400			
1,1-Dichloroethane	200			
1,2-Dichloroethene (total)	300			
Chloroform	300			
1,2-Dichloroethane	100			
2-Butanone	300			
1,1,1-Trichloroethane	800			
Carbon Tetrachloride	600			
Bromodichloromethane	—			
1,2-Dichloropropane	—			
cis-1,3-Dichloropropene	—			
Trichloroethene	700			
Dibromochloromethane	—			
1,1,2-Trichloroethane	—			
Benzene	60			
trans-1,3-Dichloropropene	—			
Bromoform	—			
4-Methyl-2-Pentanone	1,000			
2-Hexanone	—			
Tetrachloroethene	1,400			
1,1,2,2-Tetrachloroethane	600			
Toluene	1,500		7	
Chlorobenzene	1,700			
Ethylbenzene	5,500			
Styrene	—			
Xylene (total)	1,200			

Only detected results reported.

TBC - "To Be Considered" criteria
that are not legally binding.

— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Parameter	TBC				
Phenol	30				
bis(2-Chloroethyl)ether	—				
2-Chlorophenol	800				
1,3-Dichlorobenzene	1,600				
1,4-Dichlorobenzene	8,500				
1,2-Dichlorobenzene	7,900				
2-Methylphenol	100				
2,2'-oxybis(1-Chloropropane)	—				
4-Methylphenol	900				
N-Nitroso-di-n-propylamine	—				
Hexachloroethane	—				
Nitrobenzene	200				
Isophorone	4,400				
2-Nitrophenol	330				
2,4-Dimethylphenol	—				
bis(2-Chloroethoxy)methane	—				
2,4-Dichlorophenol	400				
1,2,4-Trichlorobenzene	3,400				
Naphthalene	13,000				
4-Chloroaniline	220				
Hexachlorobutadiene	—				
4-Chloro-3-methylphenol	240				
2-Methylnaphthalene	36,400				
Hexachlorocyclopentadiene	—				
2,4,6-Trichlorophenol	—				
2,4,5-Trichlorophenol	100				
2-Chloronaphthalene	—				
2-Nitroaniline	430				
Dimethylphthalate	2,000				
Acenaphthylene	41,000				
2,6-Dinitrotoluene	1,000				
3-Nitroaniline	500				

Only detected results reported.
TBC - "To Be Considered" criteria
that are not legally binding.
— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Parameter	TBC				
Acenaphthene	50,000				
2,4-Dinitrophenol	200				
4-Nitrophenol	100				
Dibenzofuran	6,200				
2,4-Dinitrotoluene	—				
Diethylphthalate	7,100				
4-Chlorophenyl-phenylether	—				
Fluorene	50,000				
4-Nitroaniline	—				
4,6-Dinitro-2-methylphenol	—				
N-Nitrosodiphenylamine	—				
4-Bromophenyl-phenylether	—				
Hexachlorobenzene	410				
Pentachlorophenol	1,000				
Phenanthrene	50,000				
Anthracene	50,000				
Carbazole	—				
Di-n-butylphthalate	8,100		38		
Fluoranthene	50,000	61			50
Pyrene	50,000	65			53
Butylbenzylphthalate	50,000				
3,3'-Dichlorobenzidine	—				
Benzo(a)anthracene	224				
Chrysene	400				
bis(2-Ethylhexyl)phthalate	50,000				
Di-n-octylphthalate	50,000				
Benzo(b)fluoranthene	1,100	65			50
Benzo(k)fluoranthene	1,100	26			
Benzo(a)pyrene	61	42			30
Indeno(1,2,3-cd)pyrene	3,200	44			41
Dibenz(a,h)anthracene	14				
Benzo(g,h,i)perylene	50,000	49			

Only detected results reported.

TBC - "To Be Considered" criteria
that are not legally binding.

— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Units		UG/KG	UG/KG	UG/KG
Parameter	TBC			
Phenol	30			
bis(2-Chloroethyl)ether	—			
2-Chlorophenol	800			
1,3-Dichlorobenzene	1,600			
1,4-Dichlorobenzene	8,500			
1,2-Dichlorobenzene	7,900			
2-Methylphenol	100			
2,2'-oxybis(1-Chloropropane)	—			
4-Methylphenol	900			
N-Nitroso-di-n-propylamine	—			
Hexachloroethane	—			
Nitrobenzene	200			
Isophorone	4,400			
2-Nitrophenol	330			
2,4-Dimethylphenol	—			
bis(2-Chloroethoxy)methane	—			
2,4-Dichlorophenol	400			
1,2,4-Trichlorobenzene	3,400			
Naphthalene	13,000			
4-Chloroaniline	220			
Hexachlorobutadiene	—			
4-Chloro-3-methylphenol	240			
2-Methylnaphthalene	36,400			
Hexachlorocyclopentadiene	—			
2,4,6-Trichlorophenol	—			
2,4,5-Trichlorophenol	100			
2-Chloronaphthalene	—			
2-Nitroaniline	430			
Dimethylphthalate	2,000			
Acenaphthylene	41,000			
2,6-Dinitrotoluene	1,000			
3-Nitroaniline	500			

Only detected results reported.

TBC - "To Be Considered" criteria
that are not legally binding.

— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Units		UG/KG	UG/KG	UG/KG
Parameter	TBC			
Acenaphthene	50,000			
2,4-Dinitrophenol	200			
4-Nitrophenol	100			
Dibenzofuran	6,200			
2,4-Dinitrotoluene	—			
Diethylphthalate	7,100	2200		
4-Chlorophenyl-phenylether	—			
Fluorene	50,000			
4-Nitroaniline	—			
4,6-Dinitro-2-methylphenol	—			
N-Nitrosodiphenylamine	—			
4-Bromophenyl-phenylether	—			
Hexachlorobenzene	410			
Pentachlorophenol	1,000			
Phenanthrene	50,000			
Anthracene	50,000			
Carbazole	—			
Di-n-butylphthalate	8,100			
Fluoranthene	50,000	83		
Pyrene	50,000	67		
Butylbenzylphthalate	50,000			
3,3'-Dichlorobenzidine	—			
Benzo(a)anthracene	224	48		
Chrysene	400	50		
bis(2-Ethylhexyl)phthalate	50,000		56	
Di-n-octylphthalate	50,000			
Benzo(b)fluoranthene	1,100	77	44	
Benzo(k)fluoranthene	1,100		22	
Benzo(a)pyrene	61	45		
Indeno(1,2,3-cd)pyrene	3,200			
Dibenz(a,h)anthracene	14			
Benzo(g,h,i)perylene	50,000		45	

Only detected results reported.

TBC - "To Be Considered" criteria
that are not legally binding.

— - No TBC available.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (METALS)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Parameter	TBC				
Arsenic	7.5 **			0.87	
Barium	300 **	38.3	10.7	11.6	11.3
Cadmium	1.3 (SB)				
Chromium	19.5 (SB)	9.2	4.4	5.8	5.5
Lead	79.4 (SB)	6.7	5.1	1.1	60.4
Mercury	0.1 **				
Selenium	2 **	R	R	R	R
Silver	ND (SB)				

Only detected results reported.

TBC - "To Be Considered" criteria that are not legally binding. Determined as per NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

* - Exceeds TBC.

SB - Site Background. (95% Upper Tolerance Limit Value from Background Surface Soil & Groundwater Survey: URS 1995)

** - NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

R - The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (METALS)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Parameter	TBC			
Arsenic	7.5 **	0.73	1.1	
Barium	300 **	12.3	18	10.7
Cadmium	1.3 (SB)			
Chromium	19.5 (SB)	4.9	R	R
Lead	79.4 (SB)	4.5	7.1	0.47
Mercury	0.1 **			
Selenium	2 **	R	R	R
Silver	ND (SB)			

Only detected results reported.

TBC - "To Be Considered" criteria that are not legally binding. Determined as per NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

* - Exceeds TBC.

SB - Site Background. (95% Upper Tolerance Limit Value from Background Surface Soil & Groundwater Survey: URS 1995)

** - NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

R - The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE A-2

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (VOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Units		UG/L	UG/L	UG/L
Parameter	ARAR			
Chloromethane	5			
Bromomethane	5			
Vinyl Chloride	2			
Chloroethane	5			
Methylene Chloride	5			
Acetone	50			
Carbon Disulfide	50			
1,1-Dichloroethene	5			
1,1-Dichloroethane	5			
1,2-Dichloroethene (total)	5			
Chloroform	7			
1,2-Dichloroethane	5			
2-Butanone	50			
1,1,1-Trichloroethane	5			
Carbon Tetrachloride	5			
Bromodichloromethane	50			
1,2-Dichloropropane	5			
cis-1,3-Dichloropropene	5			
Trichloroethene	5			
Dibromochloromethane	50			
1,1,2-Trichloroethane	5			
Benzene	0.7			
trans-1,3-Dichloropropene	5			
Bromoform	50			
4-Methyl-2-Pentanone	50			
2-Hexanone	50			
Tetrachloroethene	5			
1,1,2,2-Tetrachloroethane	5			
Toluene	5			
Chlorobenzene	5			
Ethylbenzene	5			
Styrene	5			
Xylene (total)	5			

Only detected results reported.

ARAR - "Applicable or Relevant and Appropriate Requirements" that are legally binding.

TABLE A-2

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (SEMIVOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Units		UG/L	UG/L	UG/L
Parameter	ARAR			
Phenol	1			
bis(2-Chloroethyl)ether	1			
2-Chlorophenol	1			
1,3-Dichlorobenzene	5			
1,4-Dichlorobenzene	4.7			
1,2-Dichlorobenzene	4.7			
2-Methylphenol	1			
2,2'-oxybis(1-Chloropropane)	50			
4-Methylphenol	1			
N-Nitroso-di-n-propylamine	50			
Hexachloroethane	5			
Nitrobenzene	5			
Isophorone	50			
2-Nitrophenol	1			
2,4-Dimethylphenol	1			
bis(2-Chloroethoxy)methane	5			
2,4-Dichlorophenol	1			
1,2,4-Trichlorobenzene	5			
Naphthalene	10			
4-Chloroaniline	5			
Hexachlorobutadiene	5			
4-Chloro-3-methylphenol	1			
2-Methylnaphthalene	50			
Hexachlorocyclopentadiene	5			
2,4,6-Trichlorophenol	1			
2,4,5-Trichlorophenol	1			
2-Chloronaphthalene	10			
2-Nitroaniline	5			
Dimethylphthalate	50			
Acenaphthylene	50			
2,6-Dinitrotoluene	5			
3-Nitroaniline	5			

Only detected results reported.

ARAR - "Applicable or Relevant and Appropriate
. Requirements" that are legally binding.

TABLE A-2

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (SEMIVOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Units		UG/L	UG/L	UG/L
Parameter	ARAR			
Acenaphthene	20			
2,4-Dinitrophenol	1			
4-Nitrophenol	1			
Dibenzofuran	50			
2,4-Dinitrotoluene	5			
Diethylphthalate	50			
4-Chlorophenyl-phenylether	50			
Fluorene	50			
4-Nitroaniline	5			
4,6-Dinitro-2-methylphenol	1			
N-Nitrosodiphenylamine	50			
4-Bromophenyl-phenylether	50			
Hexachlorobenzene	0.35			
Pentachlorophenol	1			
Phenanthrene	50			
Anthracene	50			
Carbazole	50			
Di-n-butylphthalate	50			
Fluoranthene	50			
Pyrene	50			
Butylbenzylphthalate	50			
3,3'-Dichlorobenzidine	5			
Benzo(a)anthracene	0.002			
Chrysene	0.002			
bis(2-Ethylhexyl)phthalate	50			
Di-n-octylphthalate	50			
Benzo(b)fluoranthene	0.002			
Benzo(k)fluoranthene	0.002			
Benzo(a)pyrene	ND			
Indeno(1,2,3-cd)pyrene	0.002			
Dibenz(a,h)anthracene	50			
Benzo(g,h,i)perylene	50			

Only detected results reported.

ARAR - "Applicable or Relevant and Appropriate
Requirements" that are legally binding.

APPENDIX B
SAMPLE DATA SUMMARY

TABLE B-1

PLATTSBURGH AIR FORCE BASE SS-029
SAMPLE DATA SUMMARY

Sample ID	Depth	Sample Matrix	Date Sampled					Organic Screening HNU (ppm)	Description
			TCL VOC	TCL SVOC	RCRA Metals	RCRA Metals			
						Filtered	Unfiltered		
SB-29-01-0	0.0 — 2.0	Surface Soil	13-OCT-94	13-OCT-94	13-OCT-94	--	--	0.2	Gray/brown fine to medium sand.
SB-29-02-0	0.0 — 2.0	Surface Soil/Fill	13-OCT-94	13-OCT-94	13-OCT-94	--	--	0.2	Brown silty fine sand.
WB-MW-29-001-0	0.0 — 2.0	Surface Soil	14-OCT-94	14-OCT-94	14-OCT-94	--	--	0.2	Tan fine to mod. sand.
SB-29-01-4	4.0 — 6.0	Subsurface Soil	13-OCT-94	13-OCT-94	13-OCT-94	--	--	0.3	Tan fine sand.
SB-29-02-4	4.0 — 6.0	Subsurface Soil	13-OCT-94	13-OCT-94	13-OCT-94	--	--	0.2	Brown fine to medium sand.
WB-MW-29-001-4	4.0 — 6.0	Subsurface Soil	14-OCT-94	14-OCT-94	14-OCT-94	--	--	0.2	Tan fine sand.
MW-29-001	0.0 — 0.0	Groundwater	15-NOV-94	15-NOV-94	--	15-NOV-94	15-NOV-94		Clear, became turbid orange/brown.
MW-02-047	0.0 — 0.0	Groundwater	16-NOV-94	16-NOV-94	--	16-NOV-94	16-NOV-94		Clear.

APPENDIX C
VALIDATION SUMMARY TABLES
AND
TENTATIVELY IDENTIFIED
COMPOUNDS (TICs) DATA SHEETS

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (VOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Date Analyzed		19-Oct-94	19-Oct-94	19-Oct-94	22-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		5	4	19	5
Parameter	Class				
Chloromethane	VOC	10 U	10 U	12 U	10 U
Bromomethane	VOC	10 U	10 U	12 U	10 U
Vinyl Chloride	VOC	10 U	10 U	12 U	10 U
Chloroethane	VOC	10 U	10 U	12 U	10 U
Methylene Chloride	VOC	10 U	10 U	2 J	2 J
Acetone	VOC	10 U	6 J	12 U	10 U
Carbon Disulfide	VOC	10 U	10 U	12 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	12 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	12 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	12 U	10 U
Chloroform	VOC	10 U	10 U	12 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	12 U	10 U
2-Butanone	VOC	10 U	10 U	12 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	12 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	12 U	10 U
Bromodichloromethane	VOC	10 U	10 U	12 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	12 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	12 U	10 U
Trichloroethene	VOC	10 U	2 J	12 U	10 U
Dibromochloromethane	VOC	10 U	10 U	12 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	12 U	10 U
Benzene	VOC	10 U	10 U	12 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	12 U	10 U
Bromoform	VOC	10 U	10 U	12 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	12 U	10 U
2-Hexanone	VOC	10 U	10 U	12 U	10 U
Tetrachloroethene	VOC	10 U	10 U	12 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	12 U	10 U
Toluene	VOC	10 U	1 J	12 U	10 U
Chlorobenzene	VOC	10 U	10 U	12 U	10 U
Ethylbenzene	VOC	10 U	10 U	12 U	10 U
Styrene	VOC	10 U	10 U	12 U	10 U
Xylene (total)	VOC	10 U	10 U	12 U	10 U
Associated Method Blank		VBLKS1	VBLKS1	VBLKS1	VBLKS3
Associated Trip Blank		NA	NA	NA	NA
Associated Rinse Blank		FB29-941013-S	FB29-941013-S	FB29-941013-S	FB29-941013-S

MADE BY__JSM_____DATE__03/02/95_
CHKD BY__________DATE__3/4/95_

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (VOLATILES)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Date Analyzed		20-Oct-94	19-Oct-94	19-Oct-94
Units		UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1
% Moisture		12	20	26
Parameter	Class			
Chloromethane	VOC	11 U	12 U	13 U
Bromomethane	VOC	11 U	12 U	13 U
Vinyl Chloride	VOC	11 U	12 U	13 U
Chloroethane	VOC	11 U	12 U	13 U
Methylene Chloride	VOC	11 U	2 J	2 J
Acetone	VOC	11 U	12 U	4 J
Carbon Disulfide	VOC	11 U	12 U	13 U
1,1-Dichloroethene	VOC	11 U	12 U	13 U
1,1-Dichloroethane	VOC	11 U	12 U	13 U
1,2-Dichloroethene (total)	VOC	11 U	12 U	13 U
Chloroform	VOC	11 U	12 U	13 U
1,2-Dichloroethane	VOC	11 U	12 U	13 U
2-Butanone	VOC	11 U	12 U	13 U
1,1,1-Trichloroethane	VOC	11 U	12 U	13 U
Carbon Tetrachloride	VOC	11 U	12 U	13 U
Bromodichloromethane	VOC	11 U	12 U	13 U
1,2-Dichloropropane	VOC	11 U	12 U	13 U
cis-1,3-Dichloropropene	VOC	11 U	12 U	13 U
Trichloroethene	VOC	11 U	12 U	13 U
Dibromochloromethane	VOC	11 U	12 U	13 U
1,1,2-Trichloroethane	VOC	11 U	12 U	13 U
Benzene	VOC	11 U	12 U	13 U
trans-1,3-Dichloropropene	VOC	11 U	12 U	13 U
Bromoform	VOC	11 U	12 U	13 U
4-Methyl-2-Pentanone	VOC	11 U	12 U	13 U
2-Hexanone	VOC	11 U	12 U	13 U
Tetrachloroethene	VOC	11 U	12 U	13 U
1,1,2,2-Tetrachloroethane	VOC	11 U	12 U	13 U
Toluene	VOC	11 U	7 J	13 U
Chlorobenzene	VOC	11 U	12 U	13 U
Ethylbenzene	VOC	11 U	12 U	13 U
Styrene	VOC	11 U	12 U	13 U
Xylene (total)	VOC	11 U	12 U	13 U
Associated Method Blank		VBLKS2	VBLKS1	VBLKS1
Associated Trip Blank		NA	NA	NA
Associated Rinse Blank		FB29-941013-S	FB29-941014-S	FB29-941014-S

MADE BY__JSM_____DATE__03/02/95
CHKD BY__________DATE__3/12/95

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Date Extracted		18-Oct-94	18-Oct-94	18-Oct-94	18-Oct-94
Date Analyzed		31-Oct-94	31-Oct-94	02-Nov-94	31-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		5	4	18	5
Parameter	Class				
Phenol	SVOC	350 U	340 U	400 U	350 U
bis(2-Chloroethyl)ether	SVOC	350 U	340 U	400 U	350 U
2-Chlorophenol	SVOC	350 U	340 U	400 U	350 U
1,3-Dichlorobenzene	SVOC	350 U	340 U	400 U	350 U
1,4-Dichlorobenzene	SVOC	350 U	340 U	400 U	350 U
1,2-Dichlorobenzene	SVOC	350 U	340 U	400 U	350 U
2-Methylphenol	SVOC	350 U	340 U	400 U	350 U
2,2'-oxybis(1-Chloropropane)	SVOC	350 U	340 U	400 U	350 U
4-Methylphenol	SVOC	350 U	340 U	400 U	350 U
N-Nitroso-di-n-propylamine	SVOC	350 U	340 U	400 U	350 U
Hexachloroethane	SVOC	350 U	340 U	400 U	350 U
Nitrobenzene	SVOC	350 U	340 U	400 U	350 U
Isophorone	SVOC	350 U	340 U	400 U	350 U
2-Nitrophenol	SVOC	350 U	340 U	400 U	350 U
2,4-Dimethylphenol	SVOC	350 U	340 U	400 U	350 U
bis(2-Chloroethoxy)methane	SVOC	350 U	340 U	400 U	350 U
2,4-Dichlorophenol	SVOC	350 U	340 U	400 U	350 U
1,2,4-Trichlorobenzene	SVOC	350 U	340 U	400 U	350 U
Naphthalene	SVOC	350 U	340 U	400 U	350 U
4-Chloroaniline	SVOC	350 U	340 U	400 U	350 U
Hexachlorobutadiene	SVOC	350 U	340 U	400 U	350 U
4-Chloro-3-methylphenol	SVOC	350 U	340 U	400 U	350 U
2-Methylnaphthalene	SVOC	350 U	340 U	400 U	350 U
Hexachlorocyclopentadiene	SVOC	350 U	340 U	400 U	350 U
2,4,6-Trichlorophenol	SVOC	350 U	340 U	400 U	350 U
2,4,5-Trichlorophenol	SVOC	840 U	830 U	980 U	840 U
2-Chloronaphthalene	SVOC	350 U	340 U	400 U	350 U
2-Nitroaniline	SVOC	840 U	830 U	980 U	840 U
Dimethylphthalate	SVOC	350 U	340 U	400 U	350 U
Acenaphthylene	SVOC	350 U	340 U	400 U	350 U
2,6-Dinitrotoluene	SVOC	350 U	340 U	400 U	350 U
3-Nitroaniline	SVOC	840 U	830 U	980 U	840 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1
Associated Rinse Blank		FB29-941013-S	FB29-941013-S	FB29-941013-S	FB29-941013-S

MADE BY__JSM____DATE__03/02/95
CHKD BY__GTM__DATE__3/6/95

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-01-0	SB-29-01-0 DUP	SB-29-01-4	SB-29-02-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		13-Oct-94	13-Oct-94	13-Oct-94	13-Oct-94
Date Extracted		18-Oct-94	18-Oct-94	18-Oct-94	18-Oct-94
Date Analyzed		31-Oct-94	31-Oct-94	02-Nov-94	31-Oct-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		5	4	18	5
Parameter	Class				
Acenaphthene	SVOC	350 U	340 U	400 U	350 U
2,4-Dinitrophenol	SVOC	840 U	830 U	980 U	840 U
4-Nitrophenol	SVOC	840 U	830 U	980 U	840 U
Dibenzofuran	SVOC	350 U	340 U	400 U	350 U
2,4-Dinitrotoluene	SVOC	350 U	340 U	400 U	350 U
Diethylphthalate	SVOC	350 U	340 U	400 U	350 U
4-Chlorophenyl-phenylether	SVOC	350 U	340 U	400 U	350 U
Fluorene	SVOC	350 U	340 U	400 U	350 U
4-Nitroaniline	SVOC	840 U	830 U	980 U	840 U
4,6-Dinitro-2-methylphenol	SVOC	840 U	830 U	980 U	840 U
N-Nitrosodiphenylamine	SVOC	350 U	340 U	400 U	350 U
4-Bromophenyl-phenylether	SVOC	350 U	340 U	400 U	350 U
Hexachlorobenzene	SVOC	350 U	340 U	400 U	350 U
Pentachlorophenol	SVOC	840 U	830 U	980 U	840 U
Phenanthrene	SVOC	350 U	340 U	400 U	350 U
Anthracene	SVOC	350 U	340 U	400 U	350 U
Carbazole	SVOC	350 U	340 U	400 U	350 U
Di-n-butylphthalate	SVOC	350 U	38 J	400 U	350 U
Fluoranthene	SVOC	61 J	340 U	400 U	50 J
Pyrene	SVOC	65 J	340 U	400 U	53 J
Butylbenzylphthalate	SVOC	350 U	340 U	400 U	350 U
3,3'-Dichlorobenzidine	SVOC	350 U	340 U	400 U	350 U
Benzo(a)anthracene	SVOC	350 U	340 U	400 U	350 U
Chrysene	SVOC	350 U	340 U	400 U	350 U
bis(2-Ethylhexyl)phthalate	SVOC	350 U	340 U	400 U	350 U
Di-n-octylphthalate	SVOC	350 U	340 U	400 U	350 U
Benzo(b)fluoranthene	SVOC	65 J	340 U	400 U	50 J
Benzo(k)fluoranthene	SVOC	26 J	340 U	400 U	350 U
Benzo(a)pyrene	SVOC	42 J	340 U	400 U	30 J
Indeno(1,2,3-cd)pyrene	SVOC	44 J	340 U	400 U	41 J
Dibenz(a,h)anthracene	SVOC	350 U	340 U	400 U	350 U
Benzo(g,h,i)perylene	SVOC	49 J	340 U	400 U	350 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1
Associated Rinse Blank		FB29-941013-S	FB29-941013-S	FB29-941013-S	FB29-941013-S

MADE BY__JSM____DATE__03/02/95
CHKD BY____DATE__3/4/95

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (SEMIVOLATILES)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
Date Extracted		18-Oct-94	18-Oct-94	18-Oct-94
Date Analyzed		31-Oct-94	31-Oct-94	31-Oct-94
Units		UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1
% Moisture		12	20	26
Parameter	Class			
Phenol	SVOC	370 U	410 U	450 U
bis(2-Chloroethyl)ether	SVOC	370 U	410 U	450 U
2-Chlorophenol	SVOC	370 U	410 U	450 U
1,3-Dichlorobenzene	SVOC	370 U	410 U	450 U
1,4-Dichlorobenzene	SVOC	370 U	410 U	450 U
1,2-Dichlorobenzene	SVOC	370 U	410 U	450 U
2-Methylphenol	SVOC	370 U	410 U	450 U
2,2'-oxybis(1-Chloropropane)	SVOC	370 U	410 U	450 U
4-Methylphenol	SVOC	370 U	410 U	450 U
N-Nitroso-di-n-propylamine	SVOC	370 U	410 U	450 U
Hexachloroethane	SVOC	370 U	410 U	450 U
Nitrobenzene	SVOC	370 U	410 U	450 U
Isophorone	SVOC	370 U	410 U	450 U
2-Nitrophenol	SVOC	370 U	410 U	450 U
2,4-Dimethylphenol	SVOC	370 U	410 U	450 U
bis(2-Chloroethoxy)methane	SVOC	370 U	410 U	450 U
2,4-Dichlorophenol	SVOC	370 U	410 U	450 U
1,2,4-Trichlorobenzene	SVOC	370 U	410 U	450 U
Naphthalene	SVOC	370 U	410 U	450 U
4-Chloroaniline	SVOC	370 U	410 U	450 U
Hexachlorobutadiene	SVOC	370 U	410 U	450 U
4-Chloro-3-methylphenol	SVOC	370 U	410 U	450 U
2-Methylnaphthalene	SVOC	370 U	410 U	450 U
Hexachlorocyclopentadiene	SVOC	370 U	410 U	450 U
2,4,6-Trichlorophenol	SVOC	370 U	410 U	450 U
2,4,5-Trichlorophenol	SVOC	910 U	1000 U	1100 U
2-Chloronaphthalene	SVOC	370 U	410 U	450 U
2-Nitroaniline	SVOC	910 U	1000 U	1100 U
Dimethylphthalate	SVOC	370 U	410 U	450 U
Acenaphthylene	SVOC	370 U	410 U	450 U
2,6-Dinitrotoluene	SVOC	370 U	410 U	450 U
3-Nitroaniline	SVOC	910 U	1000 U	1100 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1
Associated Rinse Blank		FB29-941013-S	FB29-941014-S	FB29-941014-S

MADE BY__JSM____DATE__03/02/95
CHKD BY__KSC__DATE__[illegible]

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TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
SOIL (METALS)

Sample I.D.		SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Beginning Depth (ft.)		4	0	4
Ending Depth (ft.)		6	2	6
Date Sampled		13-Oct-94	14-Oct-94	14-Oct-94
% Moisture		12	20	26
Units		MG/KG	MG/KG	MG/KG
Parameter	Class			
Arsenic	METAL	0.73 ▯	1.1 ▯	0.73 U
Barium	METAL	12.3 ▯	18 ▯	10.7 ▯
Cadmium	METAL	0.82 U	0.91 U	0.98 U
Chromium	METAL	4.9	6.8 R	4.5 R
Lead	METAL	4.5	7.1 J	0.47 ▯
Mercury	METAL	0.11 U	0.13 U	0.14 U
Selenium	METAL	0.41 R	0.45 R	0.49 R
Silver	METAL	0.66 U	0.73 U	0.79 U
Associated Rinse Blank		FB29-941013-S	FB29-941014-S	FB29-941014-S

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (VOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Date Analyzed		19-Nov-94	18-Nov-94	18-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Chloromethane	VOC	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U
Acetone	VOC	10 U	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	10 U
2-Butanone	VOC	10 U	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	10 U
2-Hexanone	VOC	10 U	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U
Associated Method Blank		VBLKW2	VBLKW1	VBLKW1
Associated Trip Blank		TB-941115-W	TB-941116-W	TB-941116-W
Associated Rinse Blank		FB-941115-W	FB-941115-W	FB-941115-W

MADE BY__JSM____DATE__03/02/95
CHKD BY________DATE__3/6/95

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (SEMIVOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Date Extracted		17-Nov-94	20-Nov-94	20-Nov-94
Date Analyzed		29-Nov-94	29-Nov-94	29-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Phenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethyl)ether	SVOC	10 U	10 U	10 U
2-Chlorophenol	SVOC	10 U	10 U	10 U
1,3-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,4-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,2-Dichlorobenzene	SVOC	10 U	10 U	10 U
2-Methylphenol	SVOC	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	SVOC	10 U	10 U	10 U
4-Methylphenol	SVOC	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	SVOC	10 U	10 U	10 U
Hexachloroethane	SVOC	10 U	10 U	10 U
Nitrobenzene	SVOC	10 U	10 U	10 U
Isophorone	SVOC	10 U	10 U	10 U
2-Nitrophenol	SVOC	10 U	10 U	10 U
2,4-Dimethylphenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	SVOC	10 U	10 U	10 U
2,4-Dichlorophenol	SVOC	10 U	10 U	10 U
1,2,4-Trichlorobenzene	SVOC	10 U	10 U	10 U
Naphthalene	SVOC	10 U	10 U	10 U
4-Chloroaniline	SVOC	10 U	10 U	10 U
Hexachlorobutadiene	SVOC	10 U	10 U	10 U
4-Chloro-3-methylphenol	SVOC	10 U	10 U	10 U
2-Methylnaphthalene	SVOC	10 U	10 U	10 U
Hexachlorocyclopentadiene	SVOC	10 U	10 U	10 U
2,4,6-Trichlorophenol	SVOC	10 U	10 U	10 U
2,4,5-Trichlorophenol	SVOC	25 U	25 U	25 U
2-Chloronaphthalene	SVOC	10 U	10 U	10 U
2-Nitroaniline	SVOC	25 U	25 U	25 U
Dimethylphthalate	SVOC	10 U	10 U	10 U
Acenaphthylene	SVOC	10 U	10 U	10 U
2,6-Dinitrotoluene	SVOC	10 U	10 U	10 U
3-Nitroaniline	SVOC	25 U	25 U	25 U
Associated Method Blank		SBLKW1A	SBLKW2	SBLKW2
Associated Rinse Blank		FB-941115-W	FB-941115-W	FB-941115-W

MADE BY JSM DATE 03/02/95
CHKD BY DATE 3/6/95

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (SEMIVOLATILES)

Sample I.D.		MW-29-001	MW-02-047	MW-02-047 DUP
Well I.D.		MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94
Date Extracted		17-Nov-94	20-Nov-94	20-Nov-94
Date Analyzed		29-Nov-94	29-Nov-94	29-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Acenaphthene	SVOC	10 U	10 U	10 U
2,4-Dinitrophenol	SVOC	25 U	25 U	25 U
4-Nitrophenol	SVOC	25 U	25 U	25 U
Dibenzofuran	SVOC	10 U	10 U	10 U
2,4-Dinitrotoluene	SVOC	10 U	10 U	10 U
Diethylphthalate	SVOC	10 U	10 U	10 U
4-Chlorophenyl-phenylether	SVOC	10 U	10 U	10 U
Fluorene	SVOC	10 U	10 U	10 U
4-Nitroaniline	SVOC	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	SVOC	25 U	25 U	25 U
N-Nitrosodiphenylamine	SVOC	10 U	10 U	10 U
4-Bromophenyl-phenylether	SVOC	10 U	10 U	10 U
Hexachlorobenzene	SVOC	10 U	10 U	10 U
Pentachlorophenol	SVOC	25 U	25 U	25 U
Phenanthrene	SVOC	10 U	10 U	10 U
Anthracene	SVOC	10 U	10 U	10 U
Carbazole	SVOC	10 U	10 U	10 U
Di-n-butylphthalate	SVOC	10 U	10 U	10 U
Fluoranthene	SVOC	10 U	10 U	10 U
Pyrene	SVOC	10 U	10 U	10 U
Butylbenzylphthalate	SVOC	10 U	10 U	10 U
3,3'-Dichlorobenzidine	SVOC	10 U	10 U	10 U
Benzo(a)anthracene	SVOC	10 U	10 U	10 U
Chrysene	SVOC	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	SVOC	10 U	10 U	10 U
Di-n-octylphthalate	SVOC	10 U	10 U	10 U
Benzo(b)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(k)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(a)pyrene	SVOC	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	SVOC	10 U	10 U	10 U
Dibenz(a,h)anthracene	SVOC	10 U	10 U	10 U
Benzo(g,h,i)perylene	SVOC	10 U	10 U	10 U
Associated Method Blank		SBLKW1A	SBLKW2	SBLKW2
Associated Rinse Blank		FB-941115-W	FB-941115-W	FB-941115-W

MADE BY JSM DATE 03/02/95
CHKD BY [illegible] DATE 3/4/95

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (METALS)

Sample I.D.		MW-29-001	MW-29-001	MW-02-047	MW-02-047
Well I.D.		MW-29-001	MW-29-001	MW-02-047	MW-02-047
Date Sampled		15-Nov-94	15-Nov-94	16-Nov-94	16-Nov-94
Matrix		WG	WG	WG	WG
Units		UG/L	UG/L	UG/L	UG/L
Parameter	Class	TOTAL	DISSOLVED	TOTAL	DISSOLVED
Arsenic	METAL	5.3 []	3.6 U	3.6 U	3.6 U
Barium	METAL	47.8 R	77.3 R	9.7 R	9.2 R
Cadmium	METAL	2.5 U	2.5 U	2.5 U	2.5 U
Chromium	METAL	4.8 U	4.8 U	299	4.8 U
Lead	METAL	2.2 U	2.2 U	2.2 U	2.2 U
Mercury	METAL	0.2 U	0.2 U	0.2 U	0.2 U
Selenium	METAL	10.1 J	11.7 R	6.2	4.4 U
Silver	METAL	3 UJ	3 UJ	3 UJ	3 UJ
Associated Rinse Blank		FB-941115-W	FB-941115-W	FB-941115-W	FB-941115-W

MADE BY JSM DATE 03/13/95
CHKD BY mcb DATE 3/14/95

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
GROUNDWATER (METALS)

Sample I.D.		MW-02-047 DUP	MW-02-047 DUP
Well I.D.		MW-02-047	MW-02-047
Date Sampled		16-Nov-94	16-Nov-94
Matrix		WG	WG
Units		UG/L	UG/L
Parameter	Class	TOTAL	DISSOLVED
Arsenic	METAL	3.6 U	3.6 U
Barium	METAL	10.3 R	10.3 R
Cadmium	METAL	2.5 U	2.5 U
Chromium	METAL	192	4.8 U
Lead	METAL	2.2 U	2.2 U
Mercury	METAL	0.2 U	0.2 U
Selenium	METAL	4.4 U	4.4 U
Silver	METAL	3 UJ	3 UJ
Associated Rinse Blank		FB-941115-W	FB-941115-W

MADE BY JSM DATE 03/13/95
CHKD BY MKB DATE 3/14/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
TRIP BLANK DATA (VOLATILES)

Sample I.D.		TB-941115-W	TB-941116-W
Date Sampled		15-Nov-94	16-Nov-94
Matrix		WQ	WQ
Date Analyzed		18-Nov-94	18-Nov-94
Units		UG/L	UG/L
Dilution Factor		1	1
Parameter	Class		
Chloromethane	VOC	59	29
Bromomethane	VOC	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U
Chloroethane	VOC	2 J	10 U
Methylene Chloride	VOC	1 J	1 J
Acetone	VOC	7 J	10 U
Carbon Disulfide	VOC	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U
Chloroform	VOC	10 U	10 U
1,2-Dichloroethane	VOC	8 J	10 U
2-Butanone	VOC	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U
Trichloroethene	VOC	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U
Benzene	VOC	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U
Bromoform	VOC	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U
2-Hexanone	VOC	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U
Toluene	VOC	10 U	10 U
Chlorobenzene	VOC	10 U	10 U
Ethylbenzene	VOC	10 U	10 U
Styrene	VOC	10 U	10 U
Xylene (total)	VOC	10 U	10 U
Associated Method Blank		VBLKW1	VBLKW3
Associated Trip Blank		NA	NA
Associated Rinse Blank		NA	NA

MADE BY JSM DATE 03/02/95
CHKD BY DATE 3/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
RINSE BLANK DATA (VOLATILES)

Sample I.D.		FB29-941013-S	FB29-941014-S	FB-941115-W
Date Sampled		13-Oct-94	14-Oct-94	15-Nov-94
Matrix		WQ	WQ	WQ
Sample Type		RB1	RB1	RB1
Date Analyzed		19-Oct-94	19-Oct-94	18-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Chloromethane	VOC	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U
Acetone	VOC	10 U	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	10 U
2-Butanone	VOC	10 U	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	10 U
2-Hexanone	VOC	10 U	10 U	10 U
Tetrachloroethene	VOC	1 J	1 J	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U
Associated Method Blank		VBLKW1A	VBLKW1A	VBLKW1
Associated Trip Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

MADE BY__JSM____DATE__03/02/95__
CHKD BY__________DATE__3/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
RINSE BLANK DATA (SEMIVOLATILES)

Sample I.D.		FB29-941013-S	FB29-941014-S	FB-941115-W
Matrix		WQ	WQ	WQ
Date Sampled		13-Oct-94	14-Oct-94	15-Nov-94
Date Extracted		18-Oct-94	18-Oct-94	17-Nov-94
Date Analyzed		25-Oct-94	26-Oct-94	30-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Phenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethyl)ether	SVOC	10 U	10 U	10 U
2-Chlorophenol	SVOC	10 U	10 U	10 U
1,3-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,4-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,2-Dichlorobenzene	SVOC	10 U	10 U	10 U
2-Methylphenol	SVOC	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	SVOC	10 U	10 U	10 U
4-Methylphenol	SVOC	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	SVOC	10 U	10 U	10 U
Hexachloroethane	SVOC	10 U	10 U	10 U
Nitrobenzene	SVOC	10 U	10 U	10 U
Isophorone	SVOC	10 U	10 U	10 U
2-Nitrophenol	SVOC	10 U	10 U	10 U
2,4-Dimethylphenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	SVOC	10 U	10 U	10 U
2,4-Dichlorophenol	SVOC	10 U	10 U	10 U
1,2,4-Trichlorobenzene	SVOC	10 U	10 U	10 U
Naphthalene	SVOC	10 U	10 U	10 U
4-Chloroaniline	SVOC	10 U	10 U	10 U
Hexachlorobutadiene	SVOC	10 U	10 U	10 U
4-Chloro-3-methylphenol	SVOC	10 U	10 U	10 U
2-Methylnaphthalene	SVOC	10 U	10 U	10 U
Hexachlorocyclopentadiene	SVOC	10 U	10 U	10 U
2,4,6-Trichlorophenol	SVOC	10 U	10 U	10 U
2,4,5-Trichlorophenol	SVOC	25 U	25 U	25 U
2-Chloronaphthalene	SVOC	10 U	10 U	10 U
2-Nitroaniline	SVOC	25 U	25 U	25 U
Dimethylphthalate	SVOC	10 U	10 U	10 U
Acenaphthylene	SVOC	10 U	10 U	10 U
2,6-Dinitrotoluene	SVOC	10 U	10 U	10 U
3-Nitroaniline	SVOC	25 U	25 U	25 U
Associated Method Blank		SBLKW1	SBLKW1	SBLKWIA
Associated Rinse Blank		NA	NA	NA

MADE BY__JSM____DATE__03/02/95
CHKD BY__SDL__DATE__3/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
RINSE BLANK DATA (SEMIVOLATILES)

Sample I.D.		FB29-941013-S	FB29-941014-S	FB-941115-W
Matrix		WQ	WQ	WQ
Date Sampled		13-Oct-94	14-Oct-94	15-Nov-94
Date Extracted		18-Oct-94	18-Oct-94	17-Nov-94
Date Analyzed		25-Oct-94	26-Oct-94	30-Nov-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Acenaphthene	SVOC	10 U	10 U	10 U
2,4-Dinitrophenol	SVOC	25 U	25 U	25 U
4-Nitrophenol	SVOC	25 U	25 U	25 U
Dibenzofuran	SVOC	10 U	10 U	10 U
2,4-Dinitrotoluene	SVOC	10 U	10 U	10 U
Diethylphthalate	SVOC	10 U	10 U	10 U
4-Chlorophenyl-phenylether	SVOC	10 U	10 U	10 U
Fluorene	SVOC	10 U	10 U	10 U
4-Nitroaniline	SVOC	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	SVOC	25 U	25 U	25 U
N-Nitrosodiphenylamine	SVOC	10 U	10 U	10 U
4-Bromophenyl-phenylether	SVOC	10 U	10 U	10 U
Hexachlorobenzene	SVOC	10 U	10 U	10 U
Pentachlorophenol	SVOC	25 U	25 U	25 U
Phenanthrene	SVOC	10 U	10 U	10 U
Anthracene	SVOC	10 U	10 U	10 U
Carbazole	SVOC	10 U	10 U	10 U
Di-n-butylphthalate	SVOC	10 U	10 U	10 U
Fluoranthene	SVOC	10 U	10 U	10 U
Pyrene	SVOC	10 U	10 U	10 U
Butylbenzylphthalate	SVOC	10 U	10 U	10 U
3,3'-Dichlorobenzidine	SVOC	10 U	10 U	10 U
Benzo(a)anthracene	SVOC	10 U	10 U	10 U
Chrysene	SVOC	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	SVOC	10 U	10 U	10 U
Di-n-octylphthalate	SVOC	10 U	10 U	10 U
Benzo(b)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(k)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(a)pyrene	SVOC	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	SVOC	10 U	10 U	10 U
Dibenz(a,h)anthracene	SVOC	10 U	10 U	10 U
Benzo(g,h,i)perylene	SVOC	10 U	10 U	10 U
Associated Method Blank		SBLKW1	SBLKW1	SBLKWIA
Associated Rinse Blank		NA	NA	NA

MADE BY__JSM_____DATE__03/02/95
CHKD BY__GM____DATE__3/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
RINSE BLANK DATA (METALS)

Sample I.D.		FB29-941013-S	FB29-941014-S	FB-941115-W
Date Sampled		13-Oct-94	14-Oct-94	15-Nov-94
Matrix		WQ	WQ	WQ
Units		UG/L	UG/L	UG/L
Parameter	Class			
Arsenic	METAL	2.7 U	3.3 U	3.6 UJ
Barium	METAL	7.6 U	7.6 U	5.1 UJ
Cadmium	METAL	3.6 U	3.6 U	2.5 U
Chromium	METAL	2.2 U	19.4	4.8 U
Lead	METAL	1.1 U	1.1 U	2.2 UJ
Mercury	METAL	0.20 U	0.20 U	0.20 U
Selenium	METAL	2.0 U	11.2	5.0 J
Silver	METAL	2.9 U	2.9 U	3.0 UJ

MADE BY JSM DATE 03/13/95
CHKD BY MCB DATE 3/19/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
METHOD BLANK DATA (VOLATILES)

Sample I.D.		VBLKW1A	VBLKS1	VBLKS2
Matrix		WQ	SQ	SQ
Date Analyzed		18-Oct-94	19-Oct-94	20-Oct-94
Units		UG/L	UG/KG	UG/KG
Dilution Factor		1	1	1
Parameter	Class			
Chloromethane	VOC	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U
Acetone	VOC	10 U	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	10 U
2-Butanone	VOC	10 U	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	10 U
2-Hexanone	VOC	10 U	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U
Associated Method Blank		NA	NA	NA
Associated Trip Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

MADE BY__JSM____DATE__03/02/95
CHKD BY________DATE__3/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
METHOD BLANK DATA (VOLATILES)

Sample I.D.		VBLKS3	VBLKW3	VBLKW1	VBLKW2
Matrix		SQ	WQ	WQ	WQ
Date Analyzed		22-Oct-94	18-Nov-94	19-Nov-94	19-Nov-94
Units		UG/KG	UG/L	UG/L	UG/L
Dilution Factor		1	1	1	1
Parameter	Class				
Chloromethane	VOC	10 U	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U	10 U
Acetone	VOC	10 U	10 U	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	1 J	1 J
1,2-Dichloroethane	VOC	10 U	10 U	10 U	10 U
2-Butanone	VOC	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	1 J	1 J
2-Hexanone	VOC	10 U	10 U	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U	10 U
Associated Method Blank		NA	NA	NA	NA
Associated Trip Blank		NA	NA	NA	NA
Associated Rinse Blank		NA	NA	NA	NA

MADE BY__JSM____DATE__03/02/95
CHKD BY________DATE 3/10/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
METHOD BLANK DATA (SEMIVOLATILES)

Sample I.D.		SBLKS1	SBLKW1	SBLKW1A	SBLKW2
Matrix		SQ	WQ	WQ	WQ
Date Extracted		18-Oct-94	18-Oct-94	17-Nov-94	20-Nov-94
Date Analyzed		29-Oct-94	25-Oct-94	29-Nov-94	30-Nov-94
Units		UG/KG	UG/L	UG/L	UG/L
Parameter	Class				
Phenol	SVOC	330 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	SVOC	330 U	10 U	10 U	10 U
2-Chlorophenol	SVOC	330 U	10 U	10 U	10 U
1,3-Dichlorobenzene	SVOC	330 U	10 U	10 U	10 U
1,4-Dichlorobenzene	SVOC	330 U	10 U	10 U	10 U
1,2-Dichlorobenzene	SVOC	330 U	10 U	10 U	10 U
2-Methylphenol	SVOC	330 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	SVOC	330 U	10 U	10 U	10 U
4-Methylphenol	SVOC	330 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	SVOC	330 U	10 U	10 U	10 U
Hexachloroethane	SVOC	330 U	10 U	10 U	10 U
Nitrobenzene	SVOC	330 U	10 U	10 U	10 U
Isophorone	SVOC	330 U	10 U	10 U	10 U
2-Nitrophenol	SVOC	330 U	10 U	10 U	10 U
2,4-Dimethylphenol	SVOC	330 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	SVOC	330 U	10 U	10 U	10 U
2,4-Dichlorophenol	SVOC	330 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	SVOC	330 U	10 U	10 U	10 U
Naphthalene	SVOC	330 U	10 U	10 U	10 U
4-Chloroaniline	SVOC	330 U	10 U	10 U	10 U
Hexachlorobutadiene	SVOC	330 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	SVOC	330 U	10 U	10 U	10 U
2-Methylnaphthalene	SVOC	330 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	SVOC	330 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	SVOC	330 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	SVOC	800 U	25 U	25 U	25 U
2-Chloronaphthalene	SVOC	330 U	10 U	10 U	10 U
2-Nitroaniline	SVOC	800 U	25 U	25 U	25 U
Dimethylphthalate	SVOC	330 U	10 U	10 U	10 U
Acenaphthylene	SVOC	330 U	10 U	10 U	10 U
2,6-Dinitrotoluene	SVOC	330 U	10 U	10 U	10 U
3-Nitroaniline	SVOC	800 U	25 U	25 U	25 UJ
Associated Method Blank		NA	NA	NA	NA
Associated Rinse Blank		NA	NA	NA	NA

MADE BY__JSM____DATE__03/02/95
CHKD BY________DATE__7/6/95

TABLE C-3

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-029
METHOD BLANK DATA (SEMIVOLATILES)

Sample I.D.		SBLKS1	SBLKW1	SBLKW1A	SBLKW2
Matrix		SQ	WQ	WQ	WQ
Date Extracted		18-Oct-94	18-Oct-94	17-Nov-94	20-Nov-94
Date Analyzed		29-Oct-94	25-Oct-94	29-Nov-94	30-Nov-94
Units		UG/KG	UG/L	UG/L	UG/L
Parameter	Class				
Acenaphthene	SVOC	330 U	10 U	10 U	10 U
2,4-Dinitrophenol	SVOC	800 U	25 U	25 U	25 U
4-Nitrophenol	SVOC	800 U	25 U	25 U	25 U
Dibenzofuran	SVOC	330 U	10 U	10 U	10 U
2,4-Dinitrotoluene	SVOC	330 U	10 U	10 U	10 U
Diethylphthalate	SVOC	330 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	SVOC	330 U	10 U	10 U	10 U
Fluorene	SVOC	330 U	10 U	10 U	10 U
4-Nitroaniline	SVOC	800 U	25 U	25 U	25 UJ
4,6-Dinitro-2-methylphenol	SVOC	800 U	25 U	25 U	25 U
N-Nitrosodiphenylamine	SVOC	330 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	SVOC	330 U	10 U	10 U	10 U
Hexachlorobenzene	SVOC	330 U	10 U	10 U	10 U
Pentachlorophenol	SVOC	800 U	25 U	25 U	25 U
Phenanthrene	SVOC	330 U	10 U	10 U	10 U
Anthracene	SVOC	330 U	10 U	10 U	10 U
Carbazole	SVOC	330 U	10 U	10 U	10 UJ
Di-n-butylphthalate	SVOC	330 U	10 U	10 U	10 U
Fluoranthene	SVOC	330 U	10 U	10 U	10 U
Pyrene	SVOC	330 U	10 U	10 U	10 UJ
Butylbenzylphthalate	SVOC	330 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	SVOC	330 U	10 U	10 U	10 UJ
Benzo(a)anthracene	SVOC	330 U	10 U	10 U	10 U
Chrysene	SVOC	330 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	SVOC	330 U	10 U	10 U	10 UJ
Di-n-octylphthalate	SVOC	330 U	10 U	10 U	10 UJ
Benzo(b)fluoranthene	SVOC	330 U	10 U	10 U	10 U
Benzo(k)fluoranthene	SVOC	330 U	10 U	10 U	10 U
Benzo(a)pyrene	SVOC	330 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	SVOC	330 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	SVOC	330 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	SVOC	330 U	10 U	10 U	10 U
Associated Method Blank		NA	NA	NA	NA
Associated Rinse Blank		NA	NA	NA	NA

MADE BY__JSM____DATE__03/02/95
CHKD BY__CA___DATE___3/6/95

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17719

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) WATER Lab Sample ID: 17719

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: F9167

Level: (low/med) LOW Date Received: 11/16/94

% Moisture: not dec. Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-0

Lab Name: E & E INC.   Contract:

Lab Code: EANDE   Case No.: 260   SAS No.:   SDG No.: 14635

Matrix: (soil/water) SOIL   Lab Sample ID: 14641

Sample wt/vol: 5.1 (g/mL) G   Lab File ID: C9043

Level: (low/med) LOW   Date Received: 10/14/94

% Moisture: not dec. 5   Date Analyzed: 10/19/94

GC Column: VOCOL   ID: 0.530 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-0D

Lab Name: E & E INC.   Contract:

Lab Code: EANDE   Case No.: 260   SAS No.:   SDG No.: 14635

Matrix: (soil/water) SOIL   Lab Sample ID: 14637

Sample wt/vol: 5.2 (g/mL) G   Lab File ID: C9040

Level: (low/med) LOW   Date Received: 10/14/94

% Moisture: not dec. 4   Date Analyzed: 10/19/94

GC Column: VOCOL   ID: 0.530 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Number TICs found: 0   CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-4

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14638

Sample wt/vol: 5.2 (g/mL) G Lab File ID: C9041

Level: (low/med) LOW Date Received: 10/14/94

% Moisture: not dec. 19 Date Analyzed: 10/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

02-0

Lab Name: E & E INC.   Contract:

Lab Code: EANDE   Case No.: 260   SAS No.:   SDG No.: 14635

Matrix: (soil/water) SOIL   Lab Sample ID: 14640

Sample wt/vol: 5.2 (g/mL) G   Lab File ID: C9140

Level: (low/med) LOW   Date Received: 10/14/94

% Moisture: not dec. 5   Date Analyzed: 10/22/94

GC Column: VOCOL   ID: 0.530 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
Number TICs found: 0   (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

290010

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14686

Sample wt/vol: 5.1 (g/mL) G Lab File ID: C9044

Level: (low/med) LOW Date Received: 10/15/94

% Moisture: not dec. 20 Date Analyzed: 10/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

290014

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14687

Sample wt/vol: 5.2 (g/mL) G Lab File ID: C9045

Level: (low/med) LOW Date Received: 10/15/94

% Moisture: not dec. 26 Date Analyzed: 10/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17805

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) WATER Lab Sample ID: 17805

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: F9142

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. Date Analyzed: 11/18/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17806

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) WATER Lab Sample ID: 17806

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: F9143

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. Date Analyzed: 11/18/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.
17719

Lab Name: E & E INC.　Contract:

Lab Code: EANDE　Case No.: 583　SAS No.:　SDG No.: 17717

Matrix: (soil/water) WATER　Lab Sample ID: 17719

Sample wt/vol: 1000 (g/mL) ML　Lab File ID: B4497

Level: (low/med) LOW　Date Received: 11/16/94

% Moisture: decanted: (Y/N)　Date Extracted: 11/17/94

Concentrated Extract Volume: 1000 (uL)　Date Analyzed: 11/29/94

Injection Volume: 2.0(uL)　Dilution Factor: 1.0

GPC Cleanup: (Y/N) N　pH: 7.0

CONCENTRATION UNITS:
Number TICs found: 6　(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 12-34-22	Aldol Condensation Product	5.89	2	ABJN
2.	UNKNOWN	6.20	2	BJ
3.	UNKNOWN	15.60	16	J
4.	UNKNOWN	20.41	32	J
5.	UNKNOWN	21.00	4	J
6.	UNKNOWN	29.07	3	J

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-0

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14641

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4086

Level: (low/med) LOW Date Received: 10/14/94

% Moisture: 5 decanted: (Y/N) N Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 10/31/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 20

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	1.47	800	J
2. 12-34-22	Aldol Condensation Product	1.83	22000	ABJN
3.	UNKNOWN	2.97	250	BJ
4.	UNKNOWN	4.07	590	BJ
5.	UNKNOWN HYDROCARBON	12.19	82	J
6.	UNKNOWN HYDROCARBON	13.90	87	J
7.	UNKNOWN	21.68	100	J
8.	UNKNOWN DITERPENOID	25.16	160	J
9.	UNKNOWN DITERPENOID	25.47	110	J
10.	UNKNOWN HYDROCARBON	25.75	110	J
11.	UNKNOWN	30.02	140	J
12.	UNKNOWN	30.95	150	J
13.	UNKNOWN	31.20	640	J
14.	UNKNOWN	31.61	1100	J
15.	UNKNOWN	31.84	210	J
16.	UNKNOWN	32.68	81	J
17.	UNKNOWN	33.23	87	J
18.	UNKNOWN	34.33	110	J
19.	UNKNOWN	34.66	160	J
20.	UNKNOWN	35.31	140	J

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-0D

Lab Name: E & E.INC.　　Contract:

Lab Code: EANDE　　Case No.: 260　　SAS No.:　　SDG No.: 14635

Matrix: (soil/water) SOIL　　Lab Sample ID: 14637

Sample wt/vol: 30.0 (g/mL) G　　Lab File ID: B4083

Level: (low/med) LOW　　Date Received: 10/14/94

% Moisture: 4　decanted: (Y/N) N　　Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL)　　Date Analyzed: 10/31/94

Injection Volume: 2.0(uL)　　Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y　　pH: 8.3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 21

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	1.53	690	J
2. 12-34-22	Aldol Condensation Product	1.71	11000	ABJN
3.	UNKNOWN	3.05	980	BJ
4.	UNKNOWN	4.15	1200	BJ
5.	UNKNOWN	7.09	210	J
6.	UNKNOWN	10.04	110	J
7.	UNKNOWN HYDROCARBON	10.33	200	J
8.	UNKNOWN	11.67	160	J
9.	UNKNOWN HYDROCARBON	12.18	240	J
10.	UNKNOWN HYDROCARBON	13.46	140	J
11.	UNKNOWN HYDROCARBON	13.89	250	J
12.	UNKNOWN HYDROCARBON	15.49	120	J
13.	UNKNOWN HYDROCARBON	18.46	110	J
14.	UNKNOWN	19.86	100	J
15.	UNKNOWN	31.20	1600	J
16.	UNKNOWN	31.61	2300	J
17.	UNKNOWN	32.01	180	J
18.	UNKNOWN	32.79	190	J
19.	UNKNOWN	33.57	200	J
20.	UNKNOWN	34.28	150	J
21.	UNKNOWN	34.63	110	J

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

01-4

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14638

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4133

Level: (low/med) LOW Date Received: 10/14/94

% Moisture: 18 decanted: (Y/N) N Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 11/02/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7

Number TICs found: 7

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	1.43	100	J
2.	UNKNOWN	1.55	150	J
3. 12-34-22	Aldol Condensation Product	1.73	5900	ABJN
4.	UNKNOWN	3.06	400	BJ
5.	UNKNOWN	4.05	300	BJ
6.	UNKNOWN	7.14	130	J
7. 10-54-4500	Molecular Sulfur	22.02	120	JN

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

02-0

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14640

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4085

Level: (low/med) LOW Date Received: 10/14/94

% Moisture: 5 decanted: (Y/N) N Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 10/31/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7

Number TICs found: 16

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	1.54	1600	J
2. 12-34-22	Aldol Condensation Product	1.89	26000	ABJN
3.	UNKNOWN	3.00	380	BJ
4.	UNKNOWN	4.08	540	BJ
5.	UNKNOWN	21.68	81	J
6.	UNKNOWN DITERPENOID	25.16	110	J
7.	UNKNOWN DITERPENOID	25.44	80	J
8.	UNKNOWN HYDROCARBON	29.73	79	J
9.	UNKNOWN HYDROCARBON	30.00	190	J
10.	UNKNOWN HYDROCARBON	30.94	200	J
11.	UNKNOWN HYDROCARBON	31.53	130	J
12.	UNKNOWN HYDROCARBON	31.81	330	J
13.	UNKNOWN	32.69	110	J
14.	UNKNOWN	34.18	90	J
15.	UNKNOWN	34.62	310	J
16.	UNKNOWN	35.30	170	J

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

02-4

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14636

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4080

Level: (low/med) LOW Date Received: 10/14/94

% Moisture: 12 decanted: (Y/N) N Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 10/31/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.2

Number TICs found: 18

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	1.57	200	J
2. 12-34-22	Aldol Condensation Product	1.80	5200	ABJN
3.	UNKNOWN	1.98	8300	J
4.	UNKNOWN	2.08	3100	J
5.	UNKNOWN	3.12	340	BJ
6.	UNKNOWN	4.17	180	BJ
7.	UNKNOWN	7.16	160	J
8.	UNKNOWN HYDROCARBON	29.76	94	J
9.	UNKNOWN HYDROCARBON	31.57	110	J
10.	UNKNOWN	31.65	94	J
11.	UNKNOWN	31.85	170	J
12.	UNKNOWN HYDROCARBON	33.25	140	J
13.	UNKNOWN PAH	33.53	96	J
14.	UNKNOWN	34.68	360	J
15.	UNKNOWN	34.83	91	J
16.	UNKNOWN	35.34	110	J
17.	UNKNOWN	35.64	110	J
18.	UNKNOWN	35.86	210	J

FORM I SV-TIC 3/90

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

290010

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) SOIL Lab Sample ID: 14686

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4087

Level: (low/med) LOW Date Received: 10/15/94

% Moisture: 20 decanted: (Y/N) N Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 10/31/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.9

Number TICs found: 19

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BUTANE ISOMER	1.56	2000	J
2. 12-34-22	Aldol Condensation Product	1.87	32000	ABJN
3.	UNKNOWN	2.99	530	BJ
4.	UNKNOWN	4.50	350	BJ
5.	UNKNOWN	7.12	260	J
6.	UNKNOWN	9.98	170	J
7.	UNKNOWN CARBOXYLIC ACID	21.89	130	J
8.	UNKNOWN	27.52	240	J
9.	UNKNOWN	29.09	110	J
10.	UNKNOWN	29.93	1100	J
11.	UNKNOWN HYDROCARBON	31.54	550	J
12.	UNKNOWN	31.69	2700	J
13.	UNKNOWN	32.57	170	J
14.	UNKNOWN HYDROCARBON	33.21	750	J
15.	UNKNOWN	33.85	110	J
16.	UNKNOWN	34.64	430	J
17.	UNKNOWN	34.79	350	J
18.	UNKNOWN	35.19	600	J
19.	UNKNOWN	35.83	200	J

FORM I SV-TIC 3/90

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

290014

Lab Name: E & E INC.   Contract:

Lab Code: EANDE   Case No.: 260   SAS No.:   SDG No.: 14635

Matrix: (soil/water) SOIL   Lab Sample ID: 14687

Sample wt/vol: 30.0 (g/mL) G   Lab File ID: B4088

Level: (low/med) LOW   Date Received: 10/15/94

% Moisture: 26   decanted: (Y/N) N   Date Extracted: 10/18/94

Concentrated Extract Volume: 500.0 (uL)   Date Analyzed: 10/31/94

Injection Volume: 2.0(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y   pH: 7.1

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BUTANE ISOMER	1.54	1000	J
2. 12-34-22	Aldol Condensation Product	1.89	37000	ABJN
3.	UNKNOWN	3.03	760	BJ
4.	UNKNOWN	4.05	340	BJ

FORM I SV-TIC   3/90

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17805

Lab Name: E & E INC.   Contract:

Lab Code: EANDE   Case No.: 583   SAS No.:   SDG No.: 17717

Matrix: (soil/water) WATER   Lab Sample ID: 17805

Sample wt/vol: 1000 (g/mL) ML   Lab File ID: B4510

Level: (low/med) LOW   Date Received: 11/17/94

% Moisture: decanted: (Y/N)   Date Extracted: 11/20/94

Concentrated Extract Volume: 1000 (uL)   Date Analyzed: 11/29/94

Injection Volume: 2.0(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) N   pH: 7.6

Number TICs found: 10   CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 12-34-22	Aldol Condensation Product	5.85	5	ABJN
2.	UNKNOWN	6.18	5	BJ
3.	UNKNOWN	14.74	2	J
4.	UNKNOWN	15.23	9	J
5.	UNKNOWN	15.43	2	J
6.	UNKNOWN	18.19	10	J
7.	UNKNOWN	18.85	3	J
8.	UNKNOWN	31.48	2	J
9.	UNKNOWN	38.61	14	J
10.	UNKNOWN	40.63	11	J

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17806

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) WATER Lab Sample ID: 17806

Sample wt/vol: 1000 (g/mL) ML Lab File ID: B4511

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: decanted: (Y/N) Date Extracted: 11/20/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/29/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Number TICs found: 13

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 12-34-22	Aldol Condensation Product	5.86	10	ABJN
2.	UNKNOWN	6.18	9	BJ
3.	UNKNOWN	12.93	2	J
4.	UNKNOWN	13.27	3	BJ
5.	UNKNOWN	15.23	10	J
6.	UNKNOWN	15.48	4	J
7.	UNKNOWN	18.18	5	J
8.	UNKNOWN CARBOXYLIC ACID	26.47	5	J
9.	UNKNOWN CARBOXYLIC ACID	28.94	5	J
10.	UNKNOWN	31.47	5	J
11.	UNKNOWN	38.60	36	J
12.	UNKNOWN ALKYLATED THIAZOLE	40.65	34	J
13.	UNKNOWN	43.40	9	J

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

941017

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 260 SAS No.: SDG No.: 14635

Matrix: (soil/water) WATER Lab Sample ID: 14982

Sample wt/vol: 1000 (g/mL) ML Lab File ID: E9911

Level: (low/med) LOW Date Received: 10/18/94

% Moisture: decanted: (Y/N) Date Extracted: 10/20/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 10/25/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 6.6

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 12-34-22	Aldol Condensation Product	2.08	8	ABJN
2.	TRICHLOROPROPENE ISOMER	4.70	4	BJ
3.	UNKNOWN	9.58	7	BJ
4.	UNKNOWN	14.24	3	J

APPENDIX D
SOIL BORING LOGS

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. WB-MW-29-001
SHEET NO. 1 **OF** 1
JOB NO.: 0535291.18
BORING LOCATION: N-1699803.457 E-726211.904
GROUND ELEVATION: 199.54'
DATE STARTED: 10-14-94 (0920)
DATE FINISHED: 10-14-94 (1125)
DRILLER: Larry Schroeder
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE LENHARDT

PROJECT: SS-029 Jet Engine Test Cell
CLIENT: Plattsburgh Air Force Base
BORING CONTRACTOR: Buffalo Drilling

GROUND WATER:

DATE	TIME	LEV	TYPE
10/14	1042	7.0'	BGS in 4¼"
	1110	5.9'	HSA advanced
			to 14' depth

	CAS.	SAMP	CORE	TUBE
TYPE	HSA	SS		
DIA.	4¼"	2" & 3"		
WT.		140*		
FALL		30"		

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE / HEADSPACE (PPM)	REMARKS
1	S/S/	*1	3" SS	4 15	7 18	75	DARK BROWN	MEDIUM DENSE	SANDY LOAM (topsoil)	SM	0.2 / NT	[illegible]
2	°°°						LIGHT GRAYISH BROWN	DENSE	GRAVELLY FINE & MED. SAND	SW		
		+2	3" SS	8 9	11 12	60		MEDIUM DENSE	FINE SAND, trace to some silt, trace med. sand (few orange mottles)	SP/SM	0.1 / 0.2	Moist
5 6		*3	3" SS	9 12	13 13	75					0.2 / NT	WET @5.5'
		+4	3" SS	9 12	12 12	65	GREENISH BROWN		(gradual textural change from 6' to 8')		0.1 / 0.2	
10		5	2" SS	3 4	3 5	60		LOOSE	FINE & MEDIUM SAND (few black fine sand laminae up to 4mm)	SW	0.1 / NT	
		6	2" SS	3 7	3 8	75		MEDIUM DENSE			0.2 / NT	
		7	2" SS	4 8	5 8	80					0.1 / 0.2	
15 16		8	2" SS	6 9	6 10	85					0.1 / NT	
20									BORING COMPLETED AT 16' depth (augers advanced to 15.5' depth to install well, sampled to 16')			NT = Not Taken
25									* ENVIRONMENTAL SAMPLES collected from 0-2' and 4'-6'	SS.		
									+ GEOTECHNICAL SAMPLES collected from 2'-4' and 6'-8'	SS.		
30												
35												

COMMENTS BOREHOLE ADVANCED WITH A CME 55 RIG ON A 2WD TRUCK CHASSIS USING 4¼" HSA. 4¼" HSA WERE PULLED AND 6¼" HSA WERE USED TO INSTALL WELL MW-29-001 IN THE SAME HOLE.

PROJECT NO. 0535291.18
BORING NO WB-MW-29-001

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-29-02
SHEET NO. 1 **OF** 1
JOB NO.: 0535291.18
BORING LOCATION: N-1699840.975 E-726120.697
GROUND ELEVATION: 199.34'
DATE STARTED: 10-13-94 (1530)
DATE FINISHED: 10-13-94 (1630)
DRILLER: Larry Schroeder
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE LENHARDT

PROJECT: SS-029 Jet Engine Test Cell
CLIENT: Plattsburgh Air Force Base
BORING CONTRACTOR: Buffalo Drilling

GROUND WATER:

DATE	TIME	LEV	TYPE
10/13	1628	5.1'	BGS in SS hole (4¼" HSA advanced to 4' depth)

	CAS.	SAMP	CORE	TUBE
TYPE	HSA	SS		
DIA.	4¼"	3"		
WT.		140*		
FALL		30"		

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
		*1	SS	3	2	40	GRAYISH BROWN	VERY LOOSE	FILL- silty fine sand, trace clay (some black ashy blebs)	SM	0.2 / NT	Dry to slightly moist
1.8				2	1				SILTY F-C SAND, trace cla.			
2.5		2	SS	3	5	60	DK. BROWN BROWN	TO LOOSE	FINE AND MEDIUM SAND, trace silt and gravel	SW	0.2 / NT	
				5	3							
5		*3	SS	2	2	40					0.2 / NT	Moist Wet@5.5'
6				1	2							
								BORING 6' depth to 4',	COMPLETED AT (augers advanced sampled to 6')			NT= Not Taken
								* ENVI	RONMENTAL SAMPLES collected from 0-2' and 4-6'	SS.		
10												
15												
20												
25												
30												
35												

A-3205

COMMENTS BOREHOLE ADVANCED WITH A CME 55 RIG ON A 2WD TRUCK CHASSIS USIN 4¼" HSA. BOREHOLE TREMIE BACKFILLED WITH CEMENT-BENTONITE GROUT.

PROJECT NO. 0535291.18
BORING NO. SB-29-02

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-29-01
SHEET NO. 1 OF 1
JOB NO. : 0535291.18
BORING LOCATION: N-1699840.975 E-726120.697
GROUND ELEVATION: 199.39'
DATE STARTED: 10-13-94 (1655)
DATE FINISHED: 10-13-94 (1730)
DRILLER: Larry Schroeder
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE [illegible]

PROJECT: SS-029 Jet Engine Test Cell
CLIENT: Plattsburgh Air Force Base
BORING CONTRACTOR: Buffalo Drilling

GROUND WATER:

DATE	TIME	LEV	TYPE
10/13	1721	5.4'	BGS in SS hole

	CAS.	SAMP	CORE	TUBE
TYPE		SS		
DIA.		3"		
WT.		140"		
FALL		30"		

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
1	[illegible]	*1	SS	6 4	3 5	80	DARK BROWN	LOOSE TO VERY LOOSE	SILTY FINE AND MEDIUM SAND, trace clay	SM	0.2 / 0.2	Dry to slightly moist
							GRAYISH BROWN TO BROWN		FINE AND MEDIUM SAND, trace silt and gravel (many orange mottles)	SW		
		2	SS	4 3	4 4	75	LIGHT GRAYISH BROWN				0.3 / 0.1	
5		*3	SS	4 3	4 3	70					0.3 / 0.0	Moist Wet @5.5'
6							GRAY					
10												
15												
20												
25												
30												
35												

BORING COMPLETED AT 6' depth (continuous split-spoon samples without HSA)

* ENVIRONMENTAL SAMPLES collected from 0-2' and 4'-6' SS.

COMMENTS BOREHOLE ADVANCED WITH A CME 55 RIG ON A 2WD TRUCK CHASSIS. BOREHOLE TREMIE BACKFILLED WITH CEMENT-BENTONITE GROUT.

PROJECT NO. 0535291.18
BORING NO SB-29-01

APPENDIX E
MONITORING WELL CONSTRUCTION DIAGRAMS

DRILLING SUMMARY

Geologist: Steven Moeller

Drilling Company: Buffalo Drilling Company

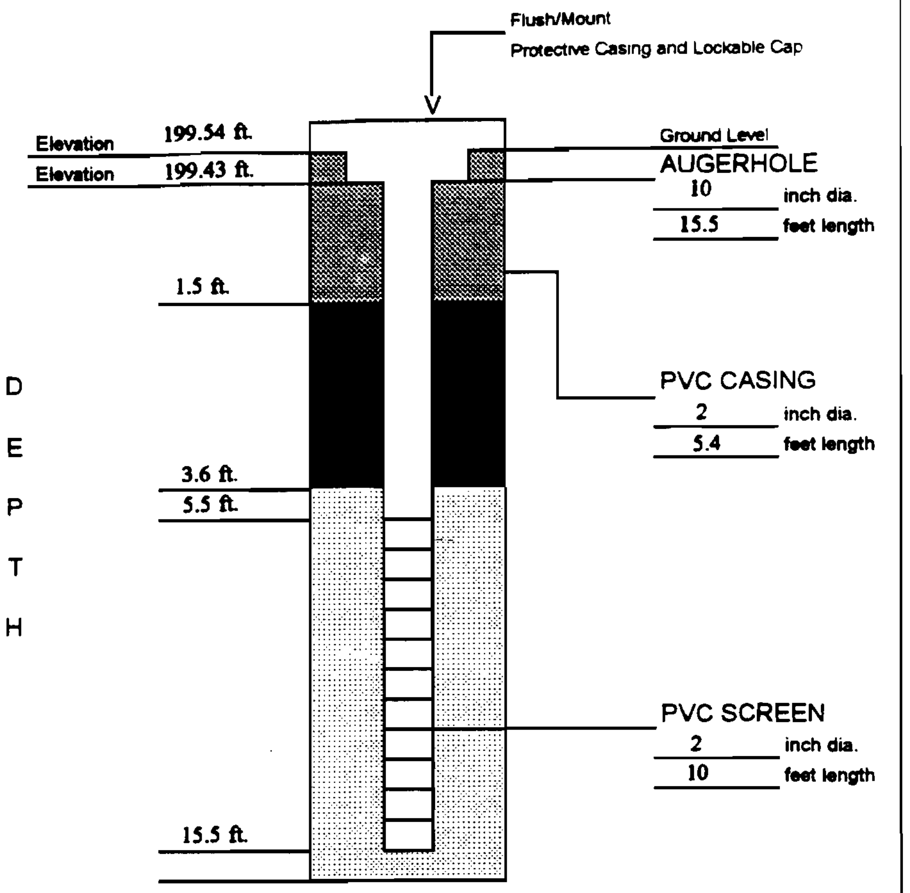
Driller: Larry Schroeder

Rig Make/Model: CME-55

Date: 10/14/94

GEOLOGIC LOG

depth(ft.)	lithology
0' - 1'	Sandy Loam (top soil)
1' - 2'	Gravely fine and medium sand
2' - 8'	Fine sand, trace medium sand
8' - 16'	Fine & Medium sand



WELL DESIGN

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: Steel	Type: PVC	Type: #2 Sand Setting: 3.6' - 15.5'
Monitor: PVC	Slot Size: 0.010-inch	*SEAL MATERIAL* Type: Bentonite Setting: 1.5' - 3.6'

COMMENTS:

Plattsburgh Air Force Base
Jet Engine Test Cell SS-029
Plattsburgh, New York

LEGEND

▨	Cement/Bentonite Grout
■	Bentonite Seal
░	Silica Sandpack

	Location: PAFB SS-029	**Project No.:** 0535291.18
URS **Consultants, Inc.**	**SHALLOW MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:** MW-29-001

TABLE E - 1
SUMMARY OF BASE - WIDE WELL COMPLETION INFORMATION

WELL NO.	GROUND ELEV. (ft)	TOP CASING ELEV. (ft)	TOP RISER ELEV. (ft)	DEPTH TO TOP OF SCREEN (ft)	DEPTH TO BOTTOM OF SCREEN (ft)	TOP SCREEN ELEV. (ft)	BOTTOM SCREEN ELEV. (ft)	DEPTH TO TOP OF SANDPACK (ft)	TOP OF SANDPACK ELEV. (ft)	DEPTH TO TOP OF SEAL (ft)	TOP OF SEAL ELEV. (ft)	TOTAL BORING DEPTH (TD)(ft)	TD ELEV. (ft)	DEPTH TO TOP OF SILTY SAND (ft)	TOP OF SILTY SAND ELEV. (ft)	DEPTH TO TOP OF CLAY (ft)	TOP OF CLAY ELEV. (ft)	DEPTH TO TOP OF TILL (ft)	TOP OF TILL ELEV. (ft)	DEPTH TO TOP OF BEDROCK (ft)	TOP OF BEDROCK ELEV. (ft)
MW-02-001	252.30	252.30	252.16	33.0	43.0	219.3	209.3	30.0	222.3	27.0	225.3	46.0	206.3	23.0	229.30	NA	NA	NA	NA	NA	NA
MW-02-002	250.80	250.79	250.63	30.0	40.0	220.8	210.8	28.0	222.8	25.0	225.8	42.0	208.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-003	251.00	251.04	250.91	30.0	40.0	221.0	211.0	27.0	224.0	25.0	226.0	42.0	209.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-004	254.20	257.18	256.93	34.8	44.8	219.4	209.4	32.8	221.4	30.8	223.4	48.0	206.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-005	249.10	251.08	250.92	32.5	42.5	216.6	206.6	30.0	219.1	28.0	221.1	44.0	205.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-006	245.80	248.78	NA	27.0	27.0	218.8	218.8	25.0	220.8	23.0	222.8	44.0	201.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-007	245.80	248.63	248.68	64.0	74.0	181.8	171.8	64.0	181.8	55.0	190.8	124.0	121.8	74.0	171.80	81.0	164.8	87.5	158.3	124.0	121.8
MW-02-008	257.40	260.44	260.25	25.0	35.0	232.4	222.4	32.0	225.4	30.0	227.4	48.0	209.4	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-009	254.20	257.22	256.98	34.0	44.0	220.2	210.2	32.0	222.2	30.0	224.2	45.0	209.2	40.0	214.20	NA	NA	NA	NA	NA	NA
MW-02-010	260.90	263.93	263.74	41.0	51.0	219.9	209.9	36.0	224.9	36.0	224.9	52.0	208.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-011	258.32	260.48	258.32	39.0	54.0	219.3	204.3	36.7	221.6	34.7	223.6	55.0	203.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-012	252.58	252.58	NA	32.5	47.5	220.1	205.1	14.5	238.1	11.5	241.1	51.0	201.6	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-013	256.18	256.16	NA	33.5	48.5	222.7	207.7	30.5	225.7	29.5	226.7	51.0	205.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-014	254.01	254.01	NA	29.0	45.0	225.0	209.0	27.0	227.0	25.0	229.0	51.0	203.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-015	253.77	256.72	256.25	31.0	47.0	222.8	206.8	29.0	224.8	27.0	226.8	51.0	202.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-016	265.19	267.35	267.33	41.0	56.0	224.2	209.2	38.5	226.7	36.5	228.7	57.0	208.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-017	248.02	250.52	250.44	27.0	42.0	221.0	206.0	24.5	223.5	22.5	225.5	43.0	205.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-018	243.05	245.79	245.76	24.0	39.0	219.1	204.1	24.0	219.1	22.0	221.1	42.0	201.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-019	228.20	228.20	227.93	9.0	24.0	219.2	204.2	7.0	221.2	5.0	223.2	26.0	202.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-020	227.58	230.28	230.16	30.0	40.0	197.6	187.6	27.0	200.6	20.0	207.6	64.0	163.6	NA	NA	62.0	165.58	NA	NA	NA	NA
MW-02-021	191.59	191.59	193.65	7.0	17.0	184.6	174.6	5.0	186.6	3.0	188.6	35.0	156.6	33.0	158.59	NA	NA	NA	NA	NA	NA
MW-02-022	189.49	191.83	191.75	20.0	30.0	169.5	159.5	17.0	172.5	11.0	178.5	32.0	157.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-023	206.97	206.97	206.62	43.0	53.0	164.0	154.0	38.0	169.0	33.0	174.0	56.0	151.0	54.0	152.97	55.0	151.97	NA	NA	NA	NA
MW-02-024	254.35	257.38	257.22	78.0	88.0	176.4	166.4	72.0	182.4	68.0	186.4	91.0	163.4	NA	NA	39.0	215.35	NA	NA	NA	NA
MW-02-025	257.09	257.09	NA	33.0	49.0	224.1	208.1	31.0	226.1	29.0	228.1	50.0	207.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-026	271.60	274.10	274.06	47.0	62.0	224.6	209.6	45.0	226.6	42.9	228.7	63.0	208.6	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-027	271.77	274.30	274.22	87.5	92.5	184.3	179.3	79.0	192.8	73.0	198.8	96.0	175.8	NA	NA	93.0	178.77	NA	NA	NA	NA
MW-02-028	257.09	260.09	259.64	35.0	50.3	222.1	206.8	33.0	224.1	31.0	226.1	51.0	206.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-029	257.63	260.35	260.23	77.0	87.0	180.6	170.6	74.0	183.6	68.0	189.6	91.0	166.6	NA	NA	88.0	169.63	NA	NA	NA	NA
MW-02-030	226.99	229.77	229.56	45.0	55.0	182.0	172.0	40.3	186.7	33.0	194.0	56.0	171.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-031	251.06	251.06	250.81	29.0	44.0	222.1	207.1	26.5	224.6	24.5	226.6	46.0	205.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-032	257.53	259.53	NA	35.0	60.0	222.5	197.5	32.0	225.5	29.0	228.5	63.0	194.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-033	258.12	260.02	259.96	81.0	91.0	177.1	167.1	78.0	180.1	0.0	258.1	96.0	162.1	NA	NA	90.5	167.62	NA	NA	NA	NA
MW-02-034	249.09	251.77	251.70	71.5	81.5	177.6	167.6	68.5	180.6	0.0	249.1	88.5	160.6	NA	NA	81.0	168.09	NA	NA	NA	NA
MW-02-035	250.06	250.06	249.36	74.0	84.0	176.1	166.1	70.5	179.6	0.0	250.1	85.5	164.6	NA	NA	82.0	168.06	NA	NA	NA	NA
MW-02-036	250.11	250.11	249.41	27.7	42.6	222.4	207.5	25.2	224.9	0.0	250.1	46.0	204.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-037	227.92	227.88	NA	25.0	35.0	202.9	192.9	22.0	205.9	6.0	221.9	37.0	190.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-038	227.83	227.97	227.97	45.0	55.0	182.8	172.8	42.0	185.8	6.0	221.8	57.0	170.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-039	226.78	227.00	226.25	40.0	50.0	186.8	176.8	37.0	189.8	5.0	221.8	57.5	169.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-040	209.42	209.58	209.02	20.0	30.0	189.4	179.4	16.4	193.0	5.0	204.4	31.0	178.4	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-041	210.11	210.24	209.05	35.0	45.0	175.1	165.1	31.5	178.6	5.0	205.1	46.0	164.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-042	209.31	209.33	208.78	52.0	62.0	157.3	147.3	49.0	160.3	4.0	205.3	63.0	146.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-043	185.90	185.98	185.47	15.0	25.0	170.9	160.9	11.5	174.4	4.0	181.9	40.0	145.9	NA	NA	34.0	151.9	NA	NA	NA	NA
MW-02-044	190.79	191.13	190.24	19.0	29.0	171.8	161.8	15.5	175.3	5.0	185.8	37.5	153.3	NA	NA	33.0	157.79	NA	NA	NA	NA
MW-02-045	182.11	182.13	181.85	13.4	23.4	168.7	158.7	10.0	172.1	4.0	178.1	24.0	158.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-046	211.83	211.79	NA	35.5	45.5	176.3	166.3	32.0	179.8	5.0	206.8	46.5	165.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-047	200.07	200.13	199.59	25.5	35.5	174.6	164.6	22.5	177.6	4.0	196.1	36.6	163.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-02-048	185.51	185.72	185.09	5.5	20.5	180.0	165.0	4.0	181.5	2.5	183.0	26.5	159.0	NA	NA	24.0	161.51	NA	NA	NA	NA
MW-02-049	190.03	190.01	NA	25.5	35.5	164.5	154.5	22.2	167.8	4.0	186.0	36.5	153.5	NA	NA	NA	NA	NA	NA	NA	NA

TABLE E - 1
SUMMARY OF BASE - WIDE WELL COMPLETION INFORMATION

WELL NO.	GROUND ELEV. (ft)	TOP CASING ELEV. (ft)	TOP RISER ELEV. (ft)	DEPTH TO TOP OF SCREEN (ft)	DEPTH TO BOTTOM OF SCREEN (ft)	TOP SCREEN ELEV. (ft)	BOTTOM SCREEN ELEV. (ft)	DEPTH TO TOP OF SANDPACK (ft)	TOP OF SANDPACK ELEV. (ft)	DEPTH TO TOP OF SEAL (ft)	TOP OF SEAL ELEV. (ft)	TOTAL BORING DEPTH (TD)(ft)	TD ELEV. (ft)	DEPTH TO TOP OF SILTY SAND (ft)	TOP OF SILTY SAND ELEV. (ft)	DEPTH TO TOP OF CLAY (ft)	TOP OF CLAY ELEV. (ft)	DEPTH TO TOP OF TILL (ft)	TOP OF TILL ELEV. (ft)	DEPTH TO TOP OF BEDROCK (ft)	TOP OF BEDROCK ELEV. (ft)
MW-04-001	180.81	180.91	180.71	8.0	11.0	174.9	169.9	8.0	174.8	1.5	179.4	12.0	168.9	NA	NA	11.5	169.41	NA	NA	NA	NA
MW-04-002	165.21	165.21	NA	3.5	6.5	161.7	158.7	2.0	163.2	1.0	164.2	10.0	155.2	NA	NA	8.0	157.21	NA	NA	NA	NA
MW-04-003	167.12	167.12	NA	5.0	10.0	162.1	157.1	3.0	164.1	0.0	167.1	12.0	155.1	5.0	162.12	11.0	156.12	NA	NA	NA	NA
MW-04-004	177.12	177.12	NA	5.0	15.0	172.1	162.1	3.7	173.4	2.0	175.1	17.0	160.1	NA	NA	16.0	161.12	NA	NA	NA	NA
MW-04-005	190.94	190.94	NA	7.0	17.0	183.9	173.9	5.0	185.9	2.0	188.9	22.0	168.9	20.0	170.94	NA	NA	NA	NA	NA	NA
MW-04-006	207.40	207.40	NA	16.0	26.0	191.4	181.4	6.0	201.4	4.0	203.4	27.0	180.4	20.0	187.40	NA	NA	NA	NA	NA	NA
MW-05-001	187.00	NA	190.00	4.0	11.0	183.0	176.0	3.0	184.0	1.0	186.0	32.5	154.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-05-002	191.00	NA	190.13	4.0	11.0	187.0	180.0	2.0	189.0	1.0	190.0	36.0	155.0	NA	NA	35.0	156	NA	NA	NA	NA
MW-05-003	187.00	NA	186.98	4.0	14.0	183.0	173.0	3.0	184.0	1.0	186.0	32.5	154.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-06-001	200.00	NA	200.23	6.5	13.5	193.5	186.5	4.5	195.5	2.3	197.7	42.0	158.0	36.0	164.00	39.0	161	NA	NA	NA	NA
MW-06-002	193.00	NA	192.79	17.5	27.5	175.5	165.5	15.5	177.5	11.4	181.6	37.0	156.0	26.5	166.50	32.0	161	NA	NA	NA	NA
MW-06-003	195.00	NA	194.72	3.2	10.1	191.8	184.9	2.6	192.4	1.3	193.7	33.0	162.0	27.5	167.50	NA	NA	NA	NA	NA	NA
MW-07-001	154.68	154.68	154.68	2.8	7.6	151.9	147.1	2.0	152.7	0.6	154.1	7.8	146.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-07-002	154.32	154.32	154.32	3.9	7.5	150.4	146.8	2.1	152.2	0.7	153.6	8.0	146.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-07-003	150.97	150.97	150.97	0.5	3.5	150.5	147.5	NA	151.0	NA	NA	3.5	147.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-07-004	156.01	156.01	156.01	2.7	7.3	153.3	148.7	2.0	154.0	0.8	155.2	7.8	148.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-07-005	150.58	150.58	150.28	2.5	5.0	148.1	145.6	2.0	148.6	1.0	149.6	5.5	145.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-10-001	187.64	189.78	189.56	5.0	15.0	182.6	172.6	4.2	183.4	3.0	184.6	36.0	151.6	25.0	162.64	33.0	154.64	NA	NA	NA	NA
MW-10-002	187.49	187.49	187.21	5.0	15.0	182.5	172.5	4.2	183.3	3.0	184.5	36.0	151.5	19.0	168.49	32.0	155.49	NA	NA	NA	NA
MW-10-003	186.53	186.53	186.19	5.0	15.0	181.5	171.5	4.0	182.5	3.0	183.5	37.0	149.5	30.0	156.53	35.0	151.53	NA	NA	NA	NA
MW-11-001	159.82	NA	162.82	7.5	17.5	152.3	142.3	5.5	154.3	3.6	156.3	19.0	140.8	NA	NA	18.0	141.82	NA	NA	NA	NA
MW-11-002	152.58	NA	155.58	7.0	17.0	145.6	135.6	5.0	147.6	3.0	149.6	22.0	130.6	NA	NA	15.0	137.58	NA	NA	NA	NA
MW-11-003	153.53	NA	156.53	9.0	14.0	144.5	139.5	7.0	146.5	5.0	148.5	19.0	134.5	8.5	145.03	13.5	140.03	NA	NA	NA	NA
MW-11-004	152.54	NA	154.63	5.0	15.0	147.5	137.5	3.9	148.6	2.2	150.3	15.6	136.9	5.0	147.54	9.0	143.54	NA	NA	NA	NA
MW-11-005	163.46	NA	166.11	7.8	17.8	155.7	145.7	5.5	158.0	3.5	160.0	21.0	142.5	NA	NA	18.0	145.46	NA	NA	NA	NA
MW-11-006	170.13	NA	173.13	4.9	14.9	165.2	155.2	2.6	167.5	2.0	168.1	26.0	144.1	NA	NA	23.0	147.13	NA	NA	NA	NA
MW-11-007	172.47	NA	175.22	4.0	14.0	168.5	158.5	3.0	169.5	2.0	170.5	16.0	156.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-11-008	171.06	NA	173.96	4.0	14.0	167.1	157.1	3.0	168.1	15.0	156.1	16.0	155.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-11-009	160.76	NA	163.86	24.0	29.0	136.8	131.8	21.0	139.8	15.0	145.8	54.5	106.3	NA	NA	29.5	131.26	37	123.78	54.0	106.8
MW-11-010	168.41	NA	171.56	17.0	22.0	151.4	146.4	14.5	153.9	11.5	156.9	54.5	113.9	NA	NA	22.5	145.91	42.5	125.91	54.5	113.9
MW-11-011	150.30	NA	150.30	6.0	11.0	144.3	139.3	4.5	145.8	2.5	147.8	12.0	138.3	NA	NA	8.5	141.8	NA	NA	NA	NA
MW-13-001	175.47	NA	178.47	5.0	15.0	170.5	160.5	3.0	172.5	1.0	174.5	17.0	158.5	18.0	157.47	27.0	148.47	57.5	117.97	NA	NA
MW-13-002	174.90	NA	177.93	15.0	25.0	159.9	149.9	12.5	162.4	8.0	166.9	62.5	112.4	16.0	158.90	27.0	147.9	57.5	117.4	NA	NA
MW-13-003	180.30	NA	183.27	9.3	19.3	171.0	161.0	7.0	173.3	4.7	175.6	22.5	157.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-13-004	151.30	NA	154.32	5.0	11.0	146.3	140.3	4.0	147.3	2.0	149.3	17.0	134.3	NA	NA	12.5	138.8	NA	NA	NA	NA
MW-13-005	152.70	NA	155.71	4.3	9.3	148.4	143.4	3.4	149.3	2.0	150.7	12.0	140.7	NA	NA	7.5	145.2	NA	NA	NA	NA
MW-13-006	174.75	176.68	176.26	8.0	18.0	166.8	156.8	7.0	167.8	4.8	170.0	47.0	127.8	31.5	143.25	45.0	129.75	NA	NA	NA	NA
MW-13-007	160.23	163.00	162.81	5.0	15.0	155.2	145.2	4.5	155.7	3.5	156.7	26.0	134.2	5.0	155.23	14.0	146.23	NA	NA	NA	NA
MW-13-008	160.63	160.63	160.34	6.0	16.0	154.6	144.6	5.5	155.1	4.0	156.6	22.0	138.6	8.5	152.13	20.0	140.63	NA	NA	NA	NA
MW-16-001	212.90	NA	212.91	10.0	20.0	202.9	192.9	8.0	204.9	6.0	206.9	22.0	190.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-16-002	209.90	NA	212.85	7.0	17.0	202.9	192.9	5.0	204.9	3.0	206.9	18.2	191.7	NA	NA	NA	NA	NA	NA	NA	NA
MW-16-003	210.60	NA	213.57	32.5	42.5	178.1	168.1	26.5	184.1	12.0	198.6	51.0	159.6	45.5	165.10	NA	NA	NA	NA	NA	NA
MW-16-004	211.88	213.82	213.37	8.0	18.0	203.9	193.9	7.0	204.9	5.0	206.9	61.0	150.9	43.0	168.88	59.0	152.88	NA	NA	NA	NA
MW-16-005	213.88	213.88	213.83	11.5	26.5	202.4	187.4	9.0	204.9	5.5	208.4	63.0	150.9	42.0	171.88	59.0	154.88	NA	NA	NA	NA
MW-16-006	210.61	212.67	212.51	19.5	29.5	191.1	181.1	17.8	192.8	14.5	196.1	62.0	148.6	43.0	167.61	58.0	152.61	NA	NA	NA	NA
MW-16-007	208.96	210.51	210.25	28.0	38.0	181.0	171.0	26.2	182.8	24.0	185.0	57.0	152.0	35.0	173.96	55.0	153.96	NA	NA	NA	NA
MW-17-001	177.50	NA	180.51	7.0	17.0	170.5	160.5	5.0	172.5	3.0	174.5	19.5	158.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-17-002	177.80	NA	180.64	7.0	17.0	170.8	160.8	5.0	172.8	3.0	174.8	19.4	158.4	NA	NA	NA	NA	NA	NA	NA	NA
MW-17-003	177.90	NA	180.86	17.5	27.5	160.4	150.4	14.5	163.4	12.5	165.4	29.0	148.9	23.5	154.40	NA	NA	NA	NA	NA	NA
MW-17-004	178.00	NA	177.02	4.0	9.0	174.0	169.0	3.0	175.0	1.8	176.2	30.0	148.0	27.0	151.00	28.5	149.5	NA	NA	NA	NA
MW-17-005	173.00	NA	172.89	4.0	14.0	169.0	159.0	3.0	170.0	1.0	172.0	28.0	145.0	NA	NA	24.8	148.25	NA	NA	NA	NA
MW-18-001	156.00	NA	155.61	18.0	28.0	138.0	128.0	16.0	140.0	14.0	142.0	36.0	120.0	25.0	131.00	34.0	122	NA	NA	NA	NA
MW-18-002	155.00	NA	155.23	18.0	28.0	137.0	127.0	16.0	139.0	14.0	141.0	36.0	119.0	30.0	125.00	34.0	121	NA	NA	NA	NA
MW-18-003	154.00	NA	153.99	18.0	28.0	136.0	126.0	17.1	136.9	15.1	138.9	34.0	120.0	30.0	124.00	32.0	122	NA	NA	NA	NA

TABLE E - 1
SUMMARY OF BASE - WIDE WELL COMPLETION INFORMATION

WELL NO.	GROUND ELEV. (ft)	TOP CASING ELEV. (ft)	TOP RISER ELEV. (ft)	DEPTH TO TOP OF SCREEN (ft)	DEPTH TO BOTTOM OF SCREEN (ft)	TOP SCREEN ELEV. (ft)	BOTTOM SCREEN ELEV. (ft)	DEPTH TO TOP OF SANDPACK (ft)	TOP OF SANDPACK ELEV. (ft)	DEPTH TO TOP OF SEAL (ft)	TOP OF SEAL ELEV. (ft)	TOTAL BORING DEPTH (TD)(ft)	TD ELEV. (ft)	DEPTH TO TOP OF SILTY SAND (ft)	TOP OF SILTY SAND ELEV. (ft)	DEPTH TO TOP OF CLAY (ft)	TOP OF CLAY ELEV. (ft)	DEPTH TO TOP OF TILL (ft)	TOP OF TILL ELEV. (ft)	DEPTH TO TOP OF BEDROCK (ft)	TOP OF BEDROCK ELEV. (ft)
MW-19-001	156.73	156.73	156.73	11.2	21.2	145.5	135.5	9.2	147.5	7.2	149.5	22.0	134.7	NA	NA	NA	NA	NA	NA	NA	NA
MW-21-001	219.41	NA	222.35	12.0	22.0	207.4	197.4	9.0	210.4	7.0	212.4	24.0	195.4	NA	NA	NA	NA	8.5	210.91	NA	NA
MW-21-002	198.61	NA	201.79	4.0	14.0	194.6	184.6	3.0	195.6	2.0	196.6	16.0	182.6	NA	NA	NA	NA	0	198.61	NA	NA
MW-21-003	196.92	NA	200.23	5.0	15.0	191.9	181.9	3.0	193.9	2.0	194.9	16.0	180.9	NA	NA	NA	NA	0	196.92	NA	NA
MW-21-004	199.62	201.98	201.57	7.0	17.0	192.6	182.6	6.0	193.6	4.0	195.6	41.5	158.1	NA	NA	NA	NA	NA	NA	40.0	159.6
MW-21-005	202.66	204.83	204.65	6.6	11.6	196.1	191.1	6.2	196.7	4.2	198.7	12.0	190.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-21-006	197.83	200.56	200.25	5.5	15.5	192.3	182.3	5.0	192.8	3.5	194.3	15.5	182.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-21-007	234.67	236.93	236.47	7.5	17.5	227.2	217.2	6.5	228.2	4.0	230.7	36.0	198.7	NA	NA	NA	NA	NA	NA	NA	NA
MW-21-008	219.97	221.13	220.59	19.0	29.0	201.0	191.0	17.0	203.0	14.0	206.0	30.0	190.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-001	229.10	NA	232.10	8.0	18.0	221.1	211.1	6.0	223.1	4.0	225.1	20.0	209.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-002	252.09	NA	255.09	32.0	42.0	220.1	210.1	29.0	223.1	26.8	225.3	44.0	208.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-003	277.16	NA	280.03	40.0	55.0	237.2	222.2	38.0	239.2	36.0	241.2	56.0	221.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-004	276.87	NA	NA	52.5	62.5	224.4	214.4	79.0	197.9	73.0	203.8	70.0	206.9	NA	NA	64.8	212.07	69	207.87	NA	NA
MW-22-005	229.51	NA	232.66	5.0	20.0	224.5	209.5	4.0	225.5	2.0	227.5	21.0	208.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-006	229.43	NA	NA	23.0	33.0	206.4	196.4	20.0	209.4	13.0	216.4	38.5	190.9	NA	NA	35.0	194.43	NA	NA	NA	NA
MW-22-007	263.54	NA	266.37	39.0	54.0	224.5	209.5	37.0	226.5	35.0	228.5	54.0	209.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-22-008	263.67	NA	266.70	82.5	92.5	181.2	171.2	79.0	184.7	73.0	190.7	96.0	167.7	NA	NA	93.0	170.67	NA	NA	NA	NA
MW-22-009	228.62	NA	231.58	35.0	45.0	193.6	183.6	32.5	196.1	6.0	222.6	81.6	147.0	45.0	183.62	50.0	178.62	NA	NA	NA	NA
MW-22-010	252.17	NA	255.07	60.0	70.0	192.2	182.2	55.5	196.7	49.5	202.7	81.0	171.2	69.0	183.17	78.0	174.17	NA	NA	NA	NA
MW-23-001	232.85	NA	235.85	15.5	25.5	217.4	207.4	13.0	219.8	11.0	221.8	27.0	205.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-002	251.90	NA	254.90	34.0	44.0	217.8	207.8	32.0	219.9	30.0	221.8	47.0	204.9	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-003	231.16	NA	234.16	17.0	27.0	214.2	204.2	15.1	216.1	13.0	218.2	30.0	201.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-004	271.40	NA	NA	80.0	90.0	191.4	181.4	77.0	194.4	67.0	204.4	103.0	168.4	55.0	216.40	102.0	169.4	NA	NA	NA	NA
MW-23-005	251.20	NA	253.92	67.0	77.0	184.2	174.2	63.0	188.2	53.0	198.2	87.0	164.2	76.0	175.20	86.0	165.2	NA	NA	NA	NA
MW-23-006	245.60	NA	247.22	28.0	43.0	217.6	202.6	26.0	219.6	24.0	221.6	45.0	200.6	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-007	245.80	NA	247.94	62.0	72.0	183.8	173.8	55.0	190.8	45.0	200.8	80.0	165.8	71.0	174.80	NA	NA	NA	NA	NA	NA
MW-23-008	233.80	NA	235.30	18.0	33.0	215.8	200.8	15.0	218.8	12.0	221.8	35.0	198.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-009	233.60	NA	235.92	32.0	42.0	201.6	191.6	28.0	205.6	18.0	215.6	44.0	189.6	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-010	233.70	NA	235.10	48.0	58.0	185.7	175.7	44.0	189.7	34.0	199.7	72.0	161.7	65.0	168.70	NA	NA	NA	NA	NA	NA
MW-23-011	231.53	NA	233.80	16.0	31.0	215.5	200.5	14.2	217.3	12.0	219.5	32.5	199.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-23-012	231.26	NA	233.66	54.5	64.5	176.8	166.8	50.3	181.0	43.0	188.3	74.0	157.3	NA	NA	66.0	165.26	NA	NA	NA	NA
MW-23-013	233.64	NA	235.77	55.5	65.5	178.1	168.1	52.1	181.5	45.0	188.6	74.0	159.6	NA	NA	60.0	173.64	NA	NA	NA	NA
MW-24-001	185.75	FLUSH	185.75	5.5	14.5	180.3	185.8	4.0	181.8	2.0	183.8	15.4	170.4	NA	NA	NA	NA	NA	NA	NA	NA
MW-24-002	157.45	159.45	157.45	0.2	3.2	157.3	154.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-24-003	158.42	160.42	158.42	0.5	3.5	157.9	154.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-24-004	164.61	166.61	164.61	0.7	3.7	163.9	160.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-26-001	185.72	189.01	188.61	5.0	15.0	180.7	170.7	3.0	182.7	1.0	184.7	15.0	170.7	9.0	176.72	NA	NA	NA	NA	NA	NA
MW-26-002	181.76	185.76	185.63	0.2	3.2	181.6	178.6	4.0	177.8	1.5	180.3	16.0	165.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-26-003	180.26	183.59	183.44	6.0	16.0	174.3	164.3	4.0	176.3	1.5	178.8	16.0	164.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-26-004	183.16	186.11	185.95	7.0	17.0	176.2	166.2	5.0	178.2	2.3	180.9	17.5	165.7	NA	NA	NA	NA	NA	NA	NA	NA
MW-27-001	212.17	214.59	214.59	5.0	15.0	207.2	197.2	4.0	208.2	2.0	210.2	15.0	197.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-28-001	159.12	159.12	158.84	9.5	19.5	149.6	139.6	6.5	152.6	3.5	155.6	20.0	139.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-28-002	155.28	155.29	155.01	17.0	27.0	138.3	128.3	15.0	140.3	12.0	143.3	27.5	127.8	NA	NA	NA	NA	NA	NA	NA	NA
MW-29-001	199.54	199.54	199.43	16.0	26.0	183.5	173.5	3.6	195.9	1.5	198.0	15.5	184.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-30-001	174.50	177.56	NA	5.0	15.0	169.5	159.5	3.5	171.0	1.8	172.8	17.0	157.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-30-002	167.50	170.02	NA	2.9	12.9	164.6	154.6	1.5	166.0	1.0	166.5	14.9	152.6	NA	NA	NA	NA	NA	NA	NA	NA
MW-30-003	163.50	FLUSH	NA	2.0	12.0	161.5	151.5	1.3	162.2	0.5	163.0	14.0	149.5	NA	NA	NA	NA	NA	NA	NA	NA
MW-30-002	162.50	165.38	NA	2.0	12.0	160.5	150.5	1.0	161.5	0.3	162.3	14.1	148.4	NA	NA	NA	NA	NA	NA	NA	NA
MW-31-001	196.50	199.05	NA	2.5	12.5	194.0	184.0	1.3	195.2	0.5	196.0	14.5	182.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-31-002	191.50	194.51	NA	2.5	12.5	189.0	179.0	1.5	190.0	0.8	190.8	14.5	177.0	NA	NA	NA	NA	NA	NA	NA	NA
MW-31-003	193.00	195.50	NA	2.9	12.9	190.1	180.1	1.5	191.5	0.9	192.1	14.9	178.1	NA	NA	NA	NA	NA	NA	NA	NA
MW-31-004	191.00	FLUSH	NA	2.8	12.8	188.3	178.3	1.8	189.3	1.0	190.0	14.8	176.3	NA	NA	NA	NA	NA	NA	NA	NA
MW-33-001	229.20	232.35	232.35	7.0	17.0	222.2	212.2	5.0	224.2	2.0	227.2	17.0	212.2	NA	NA	NA	NA	NA	NA	NA	NA
MW-33-002	226.92	230.07	230.07	6.0	16.0	220.9	210.9	4.0	222.9	2.0	224.9	16.0	210.9	NA	NA	NA	NA	NA	NA	NA	NA
PZ-1-S	146.50	NA	146.19	3.0	10.0	143.5	136.5	2.0	144.5	1.0	145.5	16.0	130.5	9.0	137.50	10.0	136.5	14	132.5	NA	NA
PZ-1-D	146.30	NA	146.12	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	27.5	118.8	9.0	137.30	10.0	136.3	14	132.3	17.5	128.8
PZ-2-S	203.00	NA	202.56	4.0	9.0	199.0	194.0	3.0	200.0	1.2	201.8	10.0	193.0	NA	NA	NA	NA	NA	NA	NA	NA
PZ-2-I	203.00	NA	202.65	28.0	33.0	175.0	170.0	26.0	177.0	24.0	179.0	46.0	157.0	33.0	170.00	44.0	159	NA	NA	NA	NA

TABLE E - 1

SUMMARY OF BASE - WIDE WELL COMPLETION INFORMATION

WELL NO.	GROUND ELEV. (ft)	TOP CASING ELEV. (ft)	TOP RISER ELEV. (ft)	DEPTH TO TOP OF SCREEN (ft)	DEPTH TO BOTTOM OF SCREEN (ft)	TOP SCREEN ELEV. (ft)	BOTTOM SCREEN ELEV. (ft)	DEPTH TO TOP OF SANDPACK (ft)	TOP OF SANDPACK ELEV. (ft)	DEPTH TO TOP OF SEAL (ft)	TOP OF SEAL ELEV. (ft)	TOTAL BORING DEPTH (TD)(ft)	TD ELEV. (ft)	DEPTH TO TOP OF SILTY SAND (ft)	TOP OF SILTY SAND ELEV. (ft)	DEPTH TO TOP OF CLAY (ft)	TOP OF CLAY ELEV. (ft)	DEPTH TO TOP OF TILL (ft)	TOP OF TILL ELEV. (ft)	DEPTH TO TOP OF BEDROCK (ft)	TOP OF BEDROCK ELEV. (ft)
PZ-2-D	203.00	NA	203.56	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	83.5	119.5	NA	NA	44.0	159	59	144	73.5	129.5
PZ-3-S	268.00	NA	267.83	32.0	39.0	236.0	229.0	30.0	238.0	28.0	240.0	40.0	228.0	NA	NA	NA	NA	NA	NA	NA	NA
PZ-3-I	268.00	NA	268.24	43.0	48.0	225.0	220.0	41.0	227.0	39.0	229.0	50.0	218.0	NA	NA	NA	NA	NA	NA	NA	NA
PZ-3-D	268.00	NA	267.72	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	134.0	134.0	NA	NA	48.7	219.3	48.5	219.5	115.0	153.0
PZ-4-S	181.00	NA	181.27	3.0	8.0	178.0	173.0	2.9	178.1	1.0	180.0	8.5	172.5	NA	NA	NA	NA	NA	NA	NA	NA
PZ-4-D	181.00	NA	180.19	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	65.0	116.0	10.5	170.50	18.0	165	33	148	40.0	141.0
PZ-5-S	154.00	NA	153.76	9.0	14.0	145.0	140.0	7.0	147.0	1.5	152.5	24.0	130.0	NA	NA	21.5	132.5	NA	NA	NA	NA
PZ-6-S	173.00	NA	175.03	7.5	14.5	165.5	158.5	5.5	167.5	3.5	169.5	16.5	156.5	NA	NA	NA	NA	NA	NA	NA	NA
PZ-6-I	173.00	NA	175.40	25.0	27.0	148.0	146.0	23.0	150.0	21.0	152.0	34.0	139.0	NA	NA	28.5	144.5	NA	NA	NA	NA
PZ-6-D	173.00	NA	174.85	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	83.5	89.5	14.0	159.00	28.5	144.5	55	118	73.0	100.0
PZ-7-S	183.00	NA	183.11	10.0	15.0	173.0	168.0	8.0	175.0	6.0	177.0	20.0	163.0	NA	NA	16.5	166.5	NA	NA	NA	NA
PZ-8-S	155.00	NA	155.16	3.0	9.0	152.0	146.0	2.0	153.0	1.0	154.0	12.0	143.0	6.0	149.00	8.8	146.25	NA	NA	NA	NA
PZ-8-D	155.00	NA	154.63	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	146.7	8.3	6.0	149.00	8.8	146.25	25	130	136.7	18.3
PZ-10-S	144.00	NA	143.76	3.0	5.0	141.0	139.0	2.0	142.0	1.0	143.0	8.0	136.0	NA	NA	5.0	139	NA	NA	NA	NA
PZ-11-S	173.00	NA	173.66	3.5	10.5	169.5	162.5	2.5	170.5	1.0	172.0	12.5	160.5	NA	NA	NA	NA	NA	NA	NA	NA
PZ-11-I	173.00	NA	173.21	19.0	24.0	154.0	149.0	17.0	156.0	15.0	158.0	28.0	145.0	NA	NA	24.0	149	NA	NA	NA	NA
PZ-11-D	173.00	NA	172.97	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	119.0	54.0	NA	NA	23.0	150	30	143	54.0	119.0
PZ-12-S	174.00	NA	173.15	4.0	9.0	170.0	165.0	3.0	171.0	1.5	172.5	9.5	164.5	NA	NA	NA	NA	NA	NA	NA	NA
PZ-12-I	174.00	NA	172.90	26.0	28.0	148.0	146.0	24.0	150.0	22.0	152.0	32.0	142.0	NA	NA	29.0	145	NA	NA	NA	NA
PZ-13-S	161.00	NA	160.91	3.0	8.0	158.0	153.0	2.5	158.5	1.2	159.8	14.0	147.0	NA	NA	11.0	150	NA	NA	NA	NA

APPENDIX F
WELL DEVELOPMENT/PURGING LOGS

WELL DEVELOPMENT LOG

URS
CONSULTANTS, INC.

PROJECT TITLE: PLATTSBURGH AFB
PROJECT NO.: 35291-18 Engine Test Cell
STAFF: Kevin S. Kearney
DATE: 10/30/94

WELL NO.: MW-29-001

1. TOTAL CASING AND SCREEN LENGTH (FT.): 15.43'
2. CASING INTERNAL DIAMETER (IN.): 2"
3. WATER LEVEL BELOW TOP OF CASING (FT.): 6.06'
4. VOLUME OF WATER IN CASING (GAL.): 1.59

4.77 GAL. (3 CASINGS)

WELL ID.	VOL. (GAL./FT.)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	5	10	15	20	30	40	50	100	150	180
pH	6.91	6.78	6.74	6.70	6.74	6.69	6.81	6.76	6.86	6.93	6.94
SPEC. COND. (µmho)	730	664	669	665	660	670	655	652	665	672	667
TURBIDITY (NTU)	>1000	377	241	104	59.8	34.4	26.1	20.7	9.97	8.72	8.03
TEMPERATURE (°C)	14.9	12.6	12.5	12.5	12.6	12.9	12.3	12.4	13.0	13.0	13.3
DISSOLVED OXYGEN (mg/L)	1.2	1.3	1.0	1.3	1.2	1.6	1.2	1.1	1.5	1.5	1.1

COMMENTS: WELL MW-29-001 WAS DEVELOPED USING ⅝" HDPE TUBING AND CHECK VALVE (DEDICATED) WITH A WATERRA HYDROLIFT PUMP.

WELL PURGING LOG

URS
CONSULTANTS, INC.

PROJECT TITLE: PLATTSBURGH AFB
PROJECT NO.: 35291 - 18 Jet Engine Test Cell
STAFF: Kevin S. Kearney
DATE: 11/15/94

WELL NO.: MW - 29 - 001

1. TOTAL CASING AND SCREEN LENGTH (FT.): 15.45'
2. CASING INTERNAL DIAMETER (IN.): 2"
3. WATER LEVEL BELOW TOP OF CASING (FT.): 5.85'
4. VOLUME OF WATER IN CASING (GAL.): 1.63

4.89 GAL. (3 CASINGS)

WELL ID.	VOL. (GAL./FT.)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	5		Sample							
pH	7.60	7.49		755							
SPEC. COND. (µmho)	508	500		495							
TURBIDITY (NTU)	39.3	21.7		43.3							
TEMPERATURE (°C)	10.5	10.3		9.5							
DISSOLVED OXYGEN (mg/L)	1.2	1.4		1.4							

COMMENTS: start purge 1530
End purge 1537
Sample time 1550

WELL PURGING LOG

URS
CONSULTANTS, INC.

PROJECT TITLE: PLATTSBURGH AFB
PROJECT NO.: 35291 - 18 Jet Engine Test Cell
STAFF: Kevin Kearney
DATE: 11/16/94

WELL NO.: MW-02-047

1. TOTAL CASING AND SCREEN LENGTH (FT.): 35.05'
2. CASING INTERNAL DIAMETER (IN.): 2"
3. WATER LEVEL BELOW TOP OF CASING (FT.): 3.52'
4. VOLUME OF WATER IN CASING (GAL.): 5.36

16.08 GAL. (3 CASINGS)

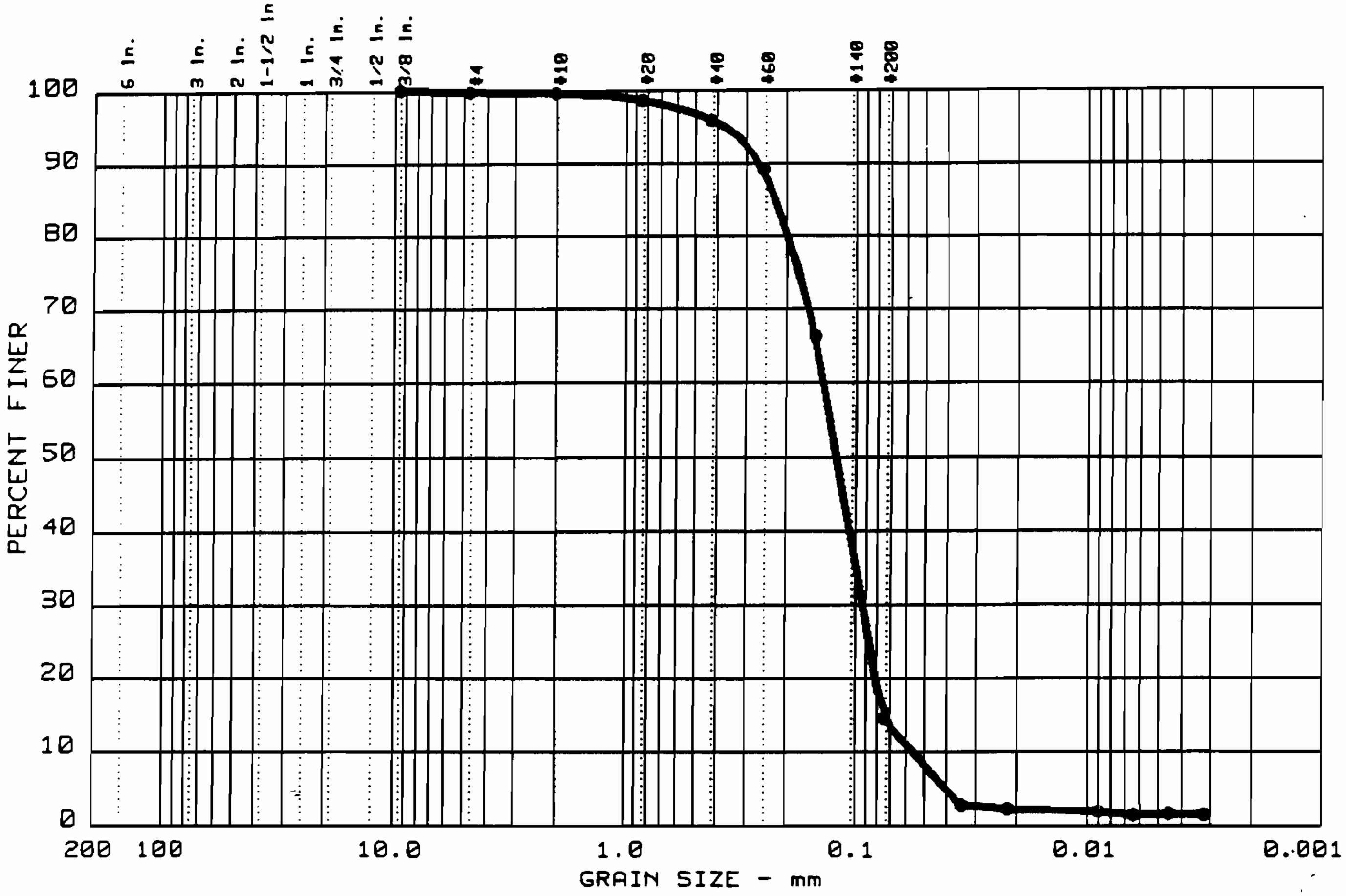
WELL ID.	VOL. (GAL./FT.)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	0	17		sample							
pH	6.65	7.09		7.79							
SPEC. COND. (µmho)	505	590		598							
TURBIDITY (NTU)	30.3	0.57		5.25							
TEMPERATURE (°C)	6.7	8.3		8.9							
DISSOLVED OXYGEN (mg/L)	5.9	3.0		3.0							

COMMENTS: Start time: 0936
End time: 0953
Sample time: 1005

APPENDIX G
GEOTECHNICAL TESTING RESULTS

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	12	0.0	0.2	85.2	13.0	1.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.22	0.14	0.12	0.092	0.0750	0.0550	1.12	2.5

MATERIAL DESCRIPTION	USCS	AASHTO
● TAN SAND, Little Silt, trace clay & gravel	SM	

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-29-001 / 2'- 4'

Date: DECEMBER 5, 1994

Remarks:

CLIENT: URS CONSULTANTS

WATER CONTENT: 7.5%

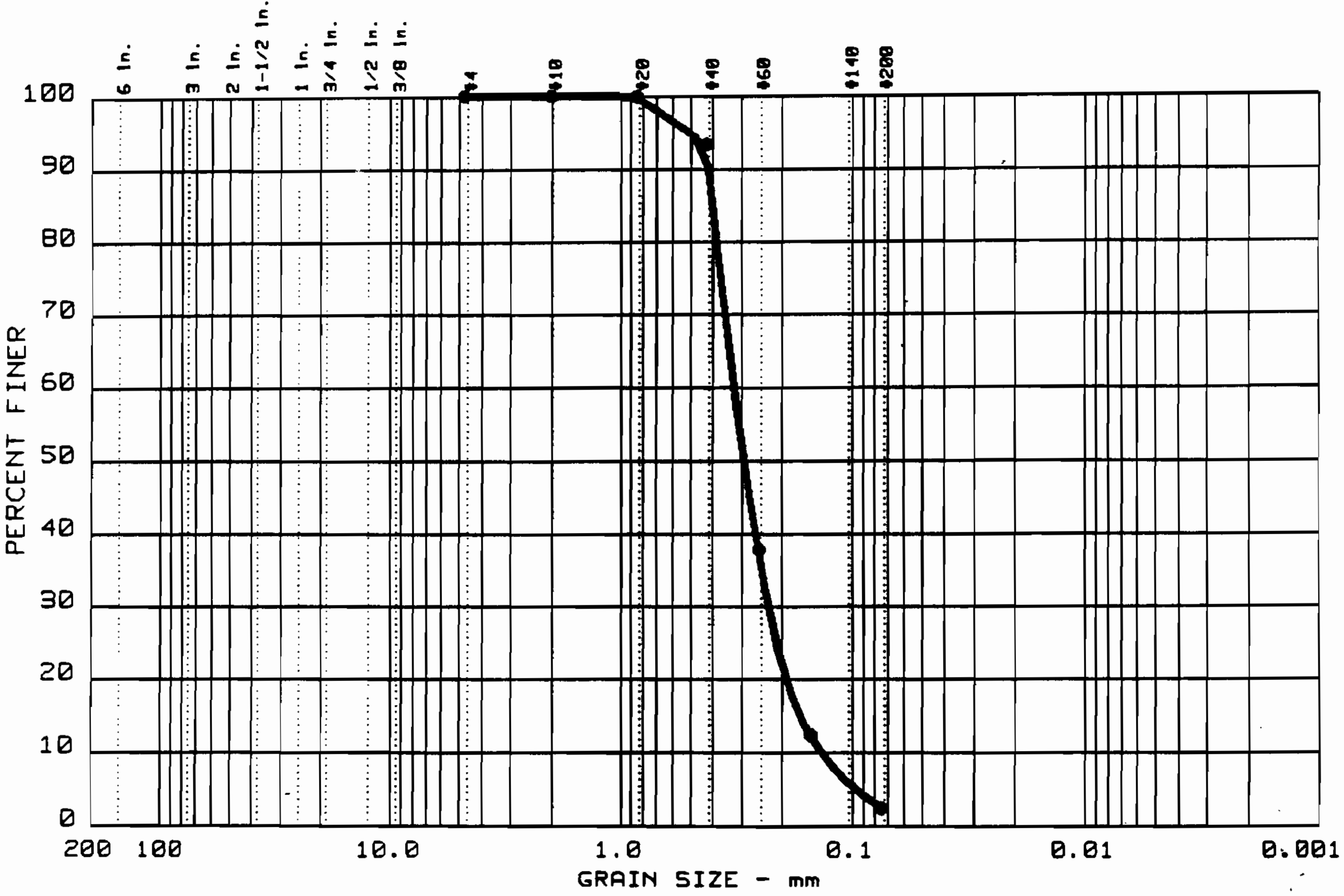
LAB NO. 2168.012

GRAIN SIZE DISTRIBUTION TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	13	0.0	0.0	97.5	2.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.40	0.32	0.29	0.227	0.1642	0.1335	1.20	2.4

MATERIAL DESCRIPTION	USCS	AASHTO
● TAN SAND, trace fines	SP	

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-29-001 / 6'- 8'

Date: DECEMBER 5, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Remarks:

CLIENT: URS CONSULTANTS

WATER CONTENT: 21.8%

LAB NO. 2168.013

Figure No. 1

APPENDIX H
SLUG TESTING RESULTS

BOUWER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS FOR UNCONFINED AND LEAKY CONFINED AQUIFERS
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "*".
PROGRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

#	*TIME mi (X)	*WATER LEVEL Ft	DRAWDO (Y)	TIME sec (X')	LN (Y)
1	0.000	1.33	0.100	0.0	-2.3026
2	0.01	1.01	0.420	0.6	-0.8675
3	0.02	0.85	0.580	1.2	-0.5447
4	0.03	0.88	0.550	1.8	-0.5978
5	0.05	1.01	0.420	3.0	-0.8675
6	0.06	1.11	0.320	3.6	-1.1394
7	0.08	1.17	0.260	4.8	-1.3471
8	0.10	1.27	0.160	6.0	-1.8326
9	0.11	1.25	0.180	6.6	-1.7148
10	0.13	1.27	0.160	7.8	-1.8326
11	0.15	1.28	0.150	9.0	-1.8971
12	0.16	1.29	0.140	9.6	-1.9661
13	0.18	1.30	0.130	10.8	-2.0402
14	0.20	1.31	0.120	12.0	-2.1203
15	0.25	1.32	0.110	15.0	-2.2073
16	0.33	1.32	0.110	19.8	-2.2073
17	0.50	1.32	0.110	30.0	-2.2073
18	0.75	1.32	0.110	45.0	-2.2073
19	1.25	1.32	0.110	75.0	-2.2073
20	1.75	1.32	0.110	105.0	-2.2073
21	2.50	1.33	0.100	150.0	-2.3026
22	4.00	1.33	0.100	240.0	-2.3026
23	6.00	1.33	0.100	360.0	-2.3026
24	9.00	1.33	0.100	540.0	-2.3026
25	12.00	1.33	0.100	720.0	-2.3026
26	16.00	1.33	0.100	960.0	-2.3026

* PROJECT NAME : Plattsburgh AFB: EOD Range
* PROJECT NO : 35291.19
* WELL NO : MW-29-001 IN
* ANALYST : KEARNEY/BYRNE
* DATE COLLECTED : 12/10/94
* RISER PIPE (ID): (2 r sub c) = 2.0 in = 0.0833 (radius in ft)
* EFFECTIVE SCREEN DIAMETER (D) = 10.0 in = 0.4167 (radius in ft)
* EFFECTIVE SCREEN LENGTH: (L) = 9.70 Ft.
* MAX DRAWDOWN (IN SUBSET): (H-Ho)= 1.00 Ft.
* STATIC WATER LEVEL PRESSURE = 1.43 Ft
* DEPTH FROM SWL TO EFF. SCREEN BOTTOM: 9.70 Ft.
* EST AQUIFER DEPTH (SWL TO AQUIFER BOTTOM) (D) = 32.75 Ft
* INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)? 1
* SANDPACK'S SPECIFIC YIELD (Sy) = 0.15

BOUWER AND RICE CURVE COEFFICIENTS
RATIO OF L/(r sub w) = 23.28
---LOG OF L/(r sub w) = 1.3670
FOR PARTIALLY PENETRATING WELLS--
A = 2.21
B = 0.31
FOR FULLY PENETRATING WELLS--
C = 1.62

---EVALUATION OF LN(Re/(r sub w)):
CONST.1 = 0.3495
CONST.2 = 4.0131 =(MAX OF 6.0)= 4.0131
LN(Re/(r sub w) = 2.01

EFFECTIVE r sub c (for sandpack dewatering) = 0.1787
(1/T)(LN(Yo/Yt)) (SLOPE) = -9.28E-02 sec^(-1)

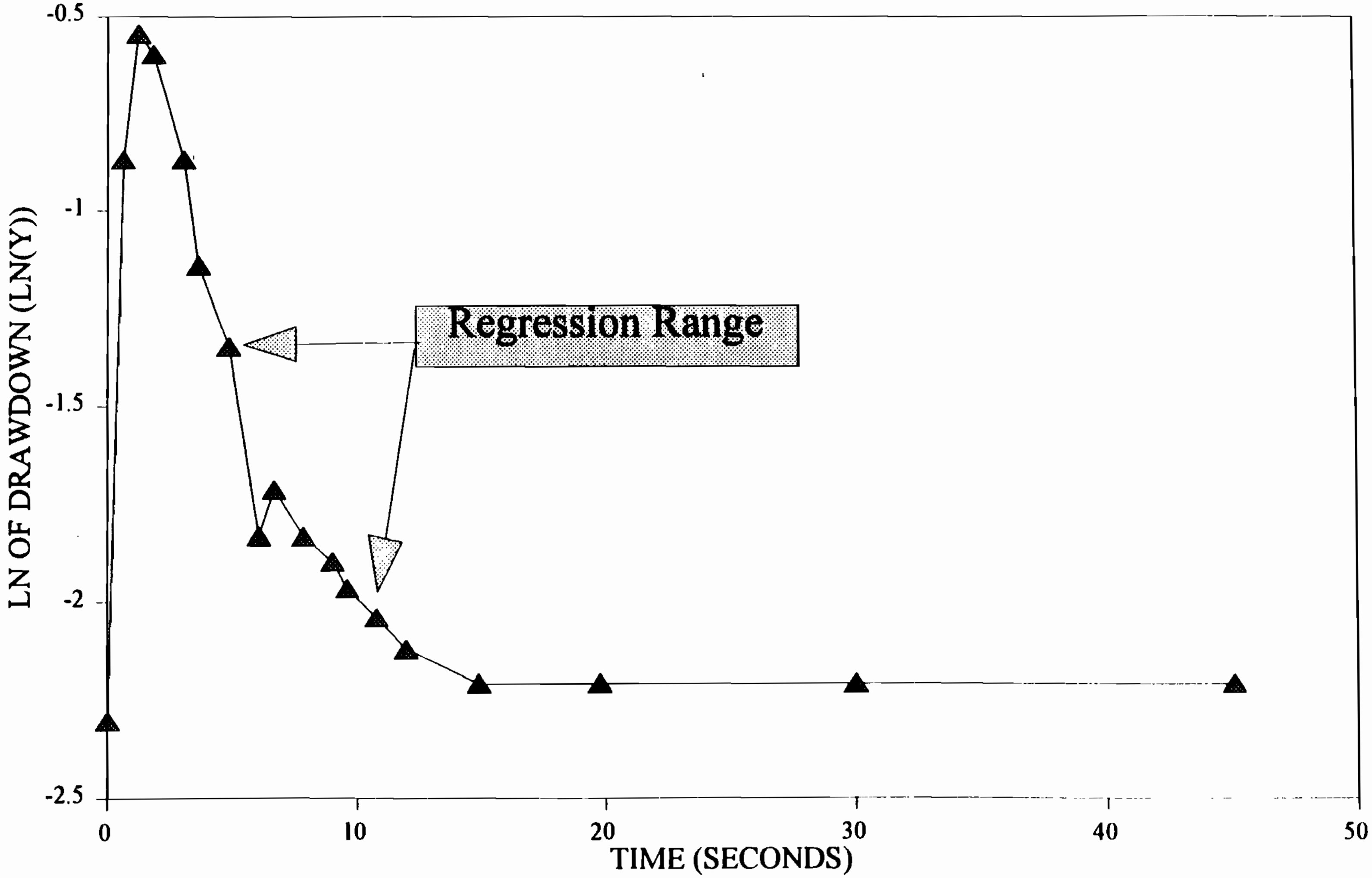
HYDRAULIC CONDUCTIVITY (K) = 3.07E-04 ft/sec <==================
9.36E-03 cm/sec <==================

Regression Output

Constant	-1.08
Std Err of Y Est	1.21E-01
R Squared	0.7620
No. of Observations	7.0000
Degrees of Freedom	5
X Coefficient(s)	-9.28E-02
Std Err of Coef	2.32E-02
Regression Range	t=4.8 - 10.8

RATE OF RECOVERY TEST

MW-29-001 (SLUG IN)



BOUWER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS FOR UNCONFINED AND LEAKY CONFINED AQUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "*".
PROGRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

#	*TIME mi (X)	*WATER LEVEL Ft	DRAWDO (Y)	TIME sec (X')	LN (Y)
1	0.000	1.33	0.100	0.0	-2.3026
2	0.01	1.68	0.450	0.6	-0.7985
3	0.02	2.26	1.030	1.2	0.0296
4	0.03	1.96	0.730	1.8	-0.3147
5	0.05	1.79	0.560	3.0	-0.5798
6	0.06	1.56	0.330	3.6	-1.1087
7	0.08	1.49	0.260	4.8	-1.3471
8	0.10	1.46	0.230	6.0	-1.4697
9	0.11	1.44	0.210	6.6	-1.5606
10	0.13	1.43	0.200	7.8	-1.6094
11	0.15	1.42	0.190	9.0	-1.6607
12	0.16	1.39	0.160	9.6	-1.8326
13	0.18	1.39	0.160	10.8	-1.8326
14	0.20	1.39	0.160	12.0	-1.8326
15	0.25	1.38	0.150	15.0	-1.8971
16	0.33	1.36	0.130	19.8	-2.0402
17	0.50	1.35	0.120	30.0	-2.1203
18	0.75	1.35	0.120	45.0	-2.1203
19	1.25	1.35	0.120	75.0	-2.1203
20	1.75	1.35	0.120	105.0	-2.1203
21	2.50	1.35	0.120	150.0	-2.1203
22	4.00	1.35	0.120	240.0	-2.1203
23	6.00	1.35	0.120	360.0	-2.1203
24	9.00	1.35	0.120	540.0	-2.1203
25	12.00	1.35	0.120	720.0	-2.1203
26	16.00	1.35	0.120	960.0	-2.1203

* PROJECT NAME : Plattsburgh AFB: EOD Range
* PROJECT NO : 35291.19
* WELL NO : **MW-29-001 OUT**
* ANALYST : KEARNEY/BYRNE
* DATE COLLECTED : 12/10/94
* RISER PIPE (ID): (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
* EFFECTIVE SCREEN DIAMETER: (D) = 10.0 in. = 0.4167 (radius in ft.)
* EFFECTIVE SCREEN LENGTH: (L) = 9.70 Ft.
* MAX DRAWDOWN (IN SUBSET): (H-Ho)= 1.00 Ft.
* STATIC WATER LEVEL PRESSURE = 1.23 Ft.
* DEPTH FROM SWL TO EFF. SCREEN BOTTOM: 9.70 Ft
* EST. AQUIFER DEPTH (SWL TO AQUIFER BOTTOM): (D) = 32.75 Ft
* INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)? 1
* SANDPACK'S SPECIFIC YIELD (Sy) = 0.15

BOUWER AND RICE CURVE COEFFICIENTS:
RATIO OF L/(r sub w) = 23.28
---LOG OF L/(r sub w) = 1.3670
FOR PARTIALLY PENETRATING WELLS--
A = 2.21
B = 0.31
FOR FULLY PENETRATING WELLS--
C = 1.62

---EVALUATION OF LN(Re/(r sub w)):
CONST.1 = 0.3495
CONST.2 = 4.0131 =(MAX. OF 6.0)= 4.0131
LN(Re/(r sub w) = 2.01

EFFECTIVE r sub c (for sandpack dewatering) = 0.1787
(1/T)(LN(Yo/Yt)) (SLOPE) = -1.46E-01 sec^(-1)

HYDRAULIC CONDUCTIVITY (K) = 4.82E-04 ft/sec <==================
1.47E-02 cm/sec <==================

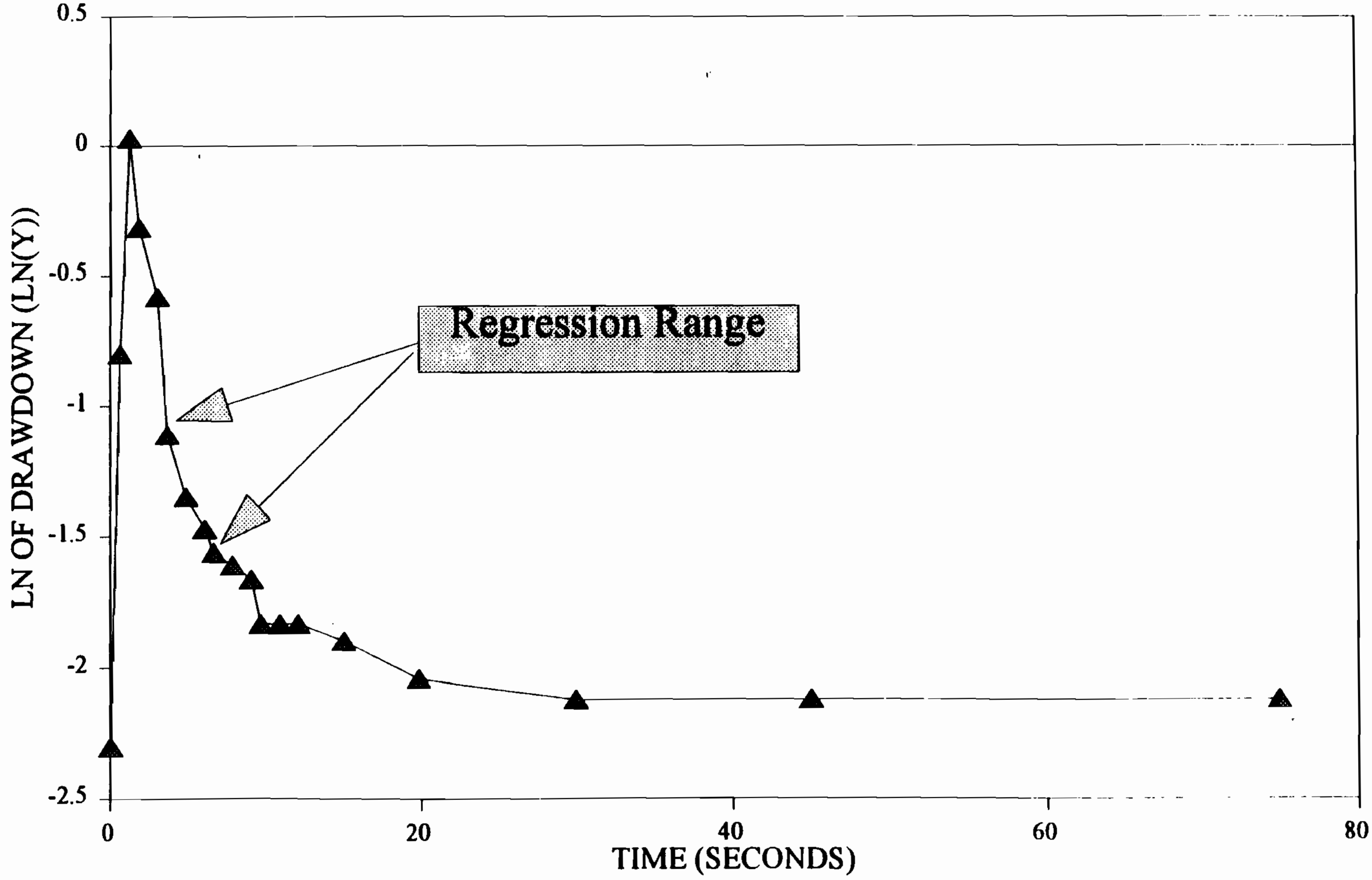
Regression Output

Constant	-0.61
Std Err of Y Est	3.45E-02
R Squared	0.9794
No. of Observations	4.0000
Degrees of Freedom	2
X Coefficient(s)	-1.46E-01
Std Err of Coef.	1.50E-02

Regression Range t=3.6 - 6.6

RATE OF RECOVERY TEST

MW-29-001 (SLUG OUT)



APPENDIX I
SURVEY TIE SHEETS

TABLE I-1
COORDINATE AND ELEVATION LIST

PLATTSBURGH AIR FORCE BASE

Sampling Locations	Northing	Easting	Elevation
MW-29-001	1699803.457	726211.904	Ground - 199.54 Riser - 199.43 Rim - 199.65
MW-02-047	1700013.855	725839.413	Ground - 200.03 Riser - 199.58 Rim - 200.02
SB-29-01	1699843.302	726133.580	Ground - 199.39
SB-29-02	1699840.975	726120.697	Ground - 199.34

TABLE I-1
COORDINATE AND ELEVATION LIST

PLATTSBURGH AIR FORCE BASE

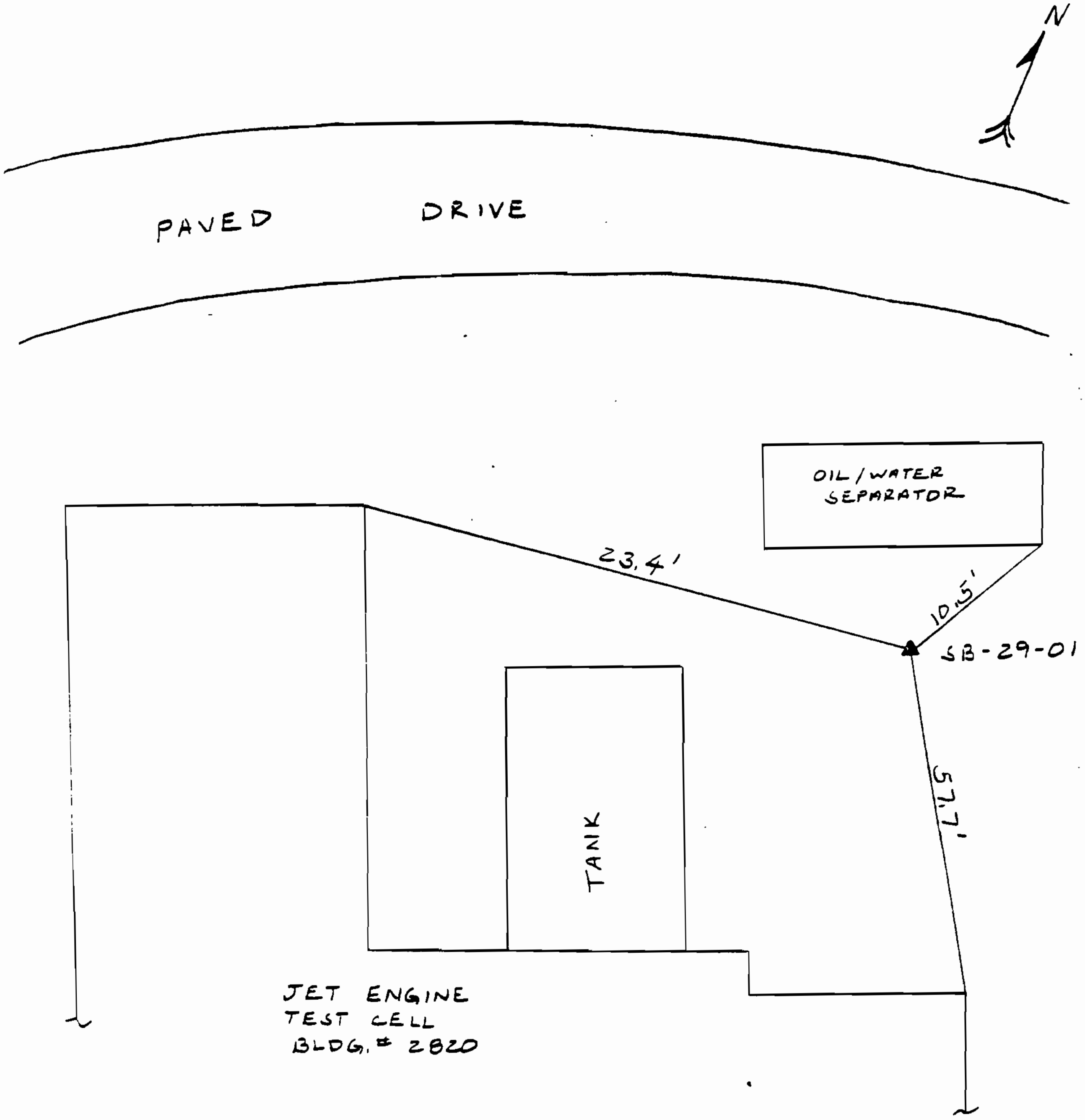
Sampling Locations	Northing	Easting	Elevation
MW-29-001	1699803.457	726211.904	Ground - 199.54 Riser - 199.43 Rim - 199.65
MW-02-047	1700013.855	725839.413	Ground - 200.03 Riser - 199.58 Rim - 200.02
SB-29-01	1699843.302	726133.580	Ground - 199.39
SB-29-02	1699840.975	726120.697	Ground - 199.34

URS
CONSULTANTS, INC.
MAKING
TECHNOLOGY
WORK™

SUBSURFACE BORING LOCATION SHEET

NORTHING : 1699843,302
EASTING : 726133,580
GROUND ELEVATION : 199.39
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-29-01
SITE I.D. SS-029



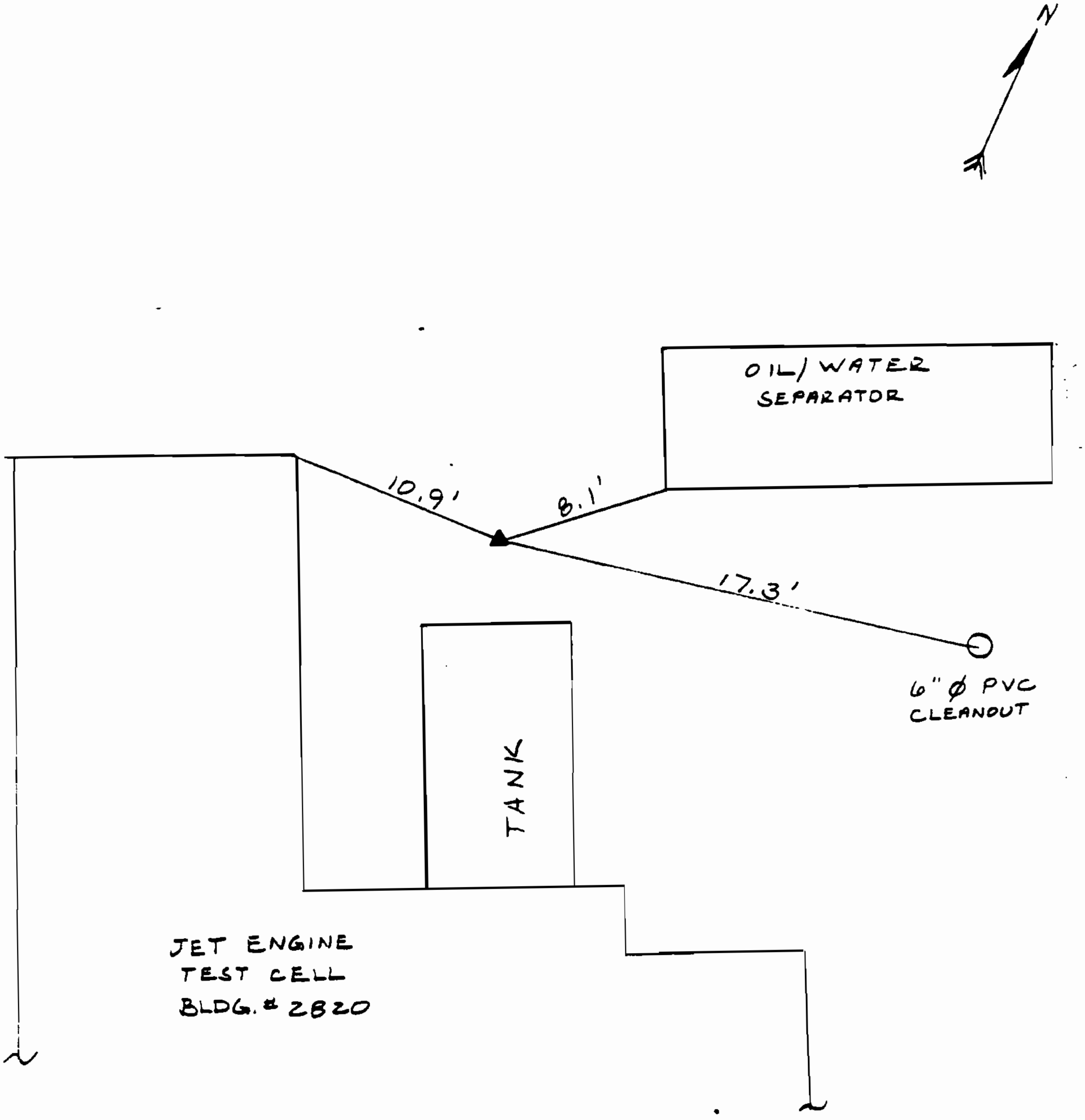
POSITION RELATIVE TO EXISTING FEATURES

URS
CONSULTANTS, INC.
MAKING
TECHNOLOGY
WORK™

SUBSURFACE BORING LOCATION SHEET

NORTHING : 1699840.975
EASTING : 726120.697
GROUND ELEVATION : 199.34
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SE-29-02
SITE I.D. SS-029.



POSITION RELATIVE TO EXISTING FEATURES

APPENDIX J
HUMAN HEALTH RISK ASSESSMENT TABLES

TABLE J-1

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SURFACE SOIL (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET
TRESPASS SCENARIO

Sample I.D. Chemical	SB-29-01-0* (mg/kg)	SB-29-02-0 (mg/kg)	WB-MW-29-001-0 (mg/kg)	Skewness	Normally distributed?**	Arithmetic Mean[1]	Number of samples (n)	(n-1)	t(0.95)	Standard Deviation[1]	UL-95[1] Value	Maximum Conc.	Exposure Conc.
Methylene Chloride	5.00E-03	2.00E-03 ¥ ¤	2.00E-03 ¥ ¤	1.73	NO	—	—	—	—	—	—	2.00E-03	—
Acetone	6.00E-03 ¥ ¤	5.00E-03	6.00E-03	-1.73	NO	—	—	—	—	—	—	6.00E-03	—
Trichloroethene	2.00E-03 ¥ ¤	5.00E-03	6.00E-03	-1.29	NO	—	—	—	—	—	—	2.00E-03	—
Toluene	1.00E-03 ¥	5.00E-03	7.00E-03 ¥ ¤	-0.94	YES	4.33E-03	3	2	2.920	3.06E-03	9.48E-03	7.00E-03	7.00E-03
Di-n-butylphthalate	3.80E-02 ¥ ¤	1.75E-01	2.05E-01	-1.51	NO	—	—	—		—	—	3.80E-02	—
Fluoranthene	6.10E-02 ¥ ¤	5.00E-02 ¥	2.05E-01	1.70	NO	—	—	—	—	—	—	6.10E-02	—
Pyrene	6.50E-02 ¥ ¤	5.30E-02 ¥	2.05E-01	1.69	NO	—	—	—	—	—	—	6.50E-02	—
bis(2-Ethylhexyl)phthalate	1.75E-01	1.75E-01	5.60E-02 ¥ ¤	-1.73	NO	—	—	—	—	—	—	5.60E-02	—
Benzo(b)fluoranthene	6.50E-02 ¥ ¤	5.00E-02 ¥	4.40E-02 ¥	1.15	NO	—	—	—	—	—	—	6.50E-02	—
Benzo(k)fluoranthene	2.60E-02 ¥ ¤	1.75E-01	2.20E-02 ¥	1.73	NO	—	—	—	—	—	—	2.60E-02	—
Benzo(a)pyrene	4.20E-02 ¥ ¤	3.00E-02 ¥	2.05E-01	1.70	NO	—	—	—	—	—	—	4.20E-02	—
Indeno(1,2,3-cd)pyrene	4.40E-02 ¥ ¤	4.10E-02 ¥	2.05E-01	1.73	NO	—	—	—	—	—	—	4.40E-02	—
Benzo(g,h,i)perylene	4.90E-02 ¥ ¤	1.75E-01	4.50E-02 ¥	1.73	NO	—	—	—	—	—	—	4.90E-02	—

NOTES:

* - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

** - Skewness values between 1 and -1 indicate a normal distribution. If skewness values are not in this range, log (LN) transform original data and assume it is log-normally distributed.

[1] - Untransformed concentration

TABLE J-1

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SURFACE SOIL (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET
TRESPASS SCENARIO

Sample I.D. Chemical	SB-29-01-0* (mg/kg)	SB-29-02-0 (mg/kg)	WB-MW-29-001-0 (mg/kg)	Arithmetic Mean[2]	Number of samples (n)	(n-1)	Standard Deviation[2]	H(0.95)	UL-95[2] Value	Maximum Conc.	Exposure Conc.
Methylene Chloride	-5.30E+00	-6.21E+00	-6.21E+00	-5.91E+00	3	2	5.29E-01	6.889	4.11E-02	2.00E-03	2.00E-03
Acetone	-5.12E+00	-5.30E+00	-5.12E+00	-5.18E+00	3	2	1.05E-01	2.805	7.00E-03	6.00E-03	6.00E-03
Trichloroethene	-6.21E+00	-5.30E+00	-5.12E+00	-5.54E+00	3	2	5.89E-01	7.676	1.14E-01	2.00E-03	2.00E-03
Toluene	—	—	—	—	—	—	—	—	—	7.00E-03	—
Di-n-butylphthalate	-3.27E+00	-1.74E+00	-1.58E+00	-2.20E+00	3	2	9.31E-01	12.133	5.02E+02	3.80E-02	3.80E-02
Fluoranthene	-2.80E+00	-3.00E+00	-1.58E+00	-2.46E+00	3	2	7.64E-01	9.906	2.41E+01	6.10E-02	6.10E-02
Pyrene	-2.73E+00	-2.94E+00	-1.58E+00	-2.42E+00	3	2	7.29E-01	9.513	1.57E+01	6.50E-02	6.50E-02
bis(2-Ethylhexyl)phthalate	-1.74E+00	-1.74E+00	-2.88E+00	-2.12E+00	3	2	6.58E-01	8.595	8.10E+00	5.60E-02	5.60E-02
Benzo(b)fluoranthene	-2.73E+00	-3.00E+00	-3.12E+00	-2.95E+00	3	2	1.99E-01	3.295	8.48E-02	6.50E-02	6.50E-02
Benzo(k)fluoranthene	-3.65E+00	-1.74E+00	-3.82E+00	-3.07E+00	3	2	1.15E+00	15.018	1.86E+04	2.60E-02	2.60E-02
Benzo(a)pyrene	-3.17E+00	-3.51E+00	-1.58E+00	-2.75E+00	3	2	1.03E+00	13.111	1.46E+03	4.20E-02	4.20E-02
Indeno(1,2,3-cd)pyrene	-3.12E+00	-3.19E+00	-1.58E+00	-2.63E+00	3	2	9.10E-01	11.871	2.25E+02	4.40E-02	4.40E-02
Benzo(g,h,i)perylene	-3.02E+00	-1.74E+00	-3.10E+00	-2.62E+00	3	2	7.61E-01	9.906	2.00E+01	4.90E-02	4.90E-02

NOTES:

* - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

[2] - Log-transformed concentration

TABLE J-2

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SOIL* (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET
INDUSTRIAL SCENARIO

Sample I.D.	SB-29-01-0**	SB-29-01-4	SB-29-02-0	SB-29-02-4	WB-MW-29-001-0	WB-MW-29-001-4
Chemical	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Methylene Chloride	5.00E-03	2.00E-03 ¥ ¤	2.00E-03 ¥ ¤	5.50E-03	2.00E-03 ¥ ¤	2.00E-03 ¥ ¤
Acetone	6.00E-03 ¥ ¤	6.00E-03	5.00E-03	5.50E-03	6.00E-03	4.00E-03 ¥
Trichloroethene	2.00E-03 ¥ ¤	6.00E-03	5.00E-03	5.50E-03	6.00E-03	6.50E-03
Toluene	1.00E-03 ¥	6.00E-03	5.00E-03	5.50E-03	7.00E-03 ¥ ¤	6.50E-03
Diethylphthalate	1.75E-01	2.00E-01	1.75E-01	2.20E+00 ¥ ¤	2.05E-01	2.25E-01
Di-n-butylphthalate	3.80E-02 ¥ ¤	2.00E-01	1.75E-01	1.85E-01	2.05E-01	2.25E-01
Fluoranthene	6.10E-02 ¥	2.00E-01	5.00E-02 ¥	8.30E-02 ¥ ¤	2.05E-01	2.25E-01
Pyrene	6.50E-02 ¥	2.00E-01	5.30E-02 ¥	6.70E-02 ¥ ¤	2.05E-01	2.25E-01
Benzo(a)anthracene	1.75E-01	2.00E-01	1.75E-01	4.80E-02 ¥ ¤	2.05E-01	2.25E-01
Chrysene	1.75E-01	2.00E-01	1.75E-01	5.00E-02 ¥ ¤	2.05E-01	2.25E-01
bis(2-Ethylhexyl)phthalate	1.75E-01	2.00E-01	1.75E-01	1.85E-01	5.60E-02 ¥ ¤	2.25E-01
Benzo(b)fluoranthene	6.50E-02 ¥	2.00E-01	5.00E-02 ¥	7.70E-02 ¥ ¤	4.40E-02 ¥	2.25E-01
Benzo(k)fluoranthene	2.60E-02 ¥ ¤	2.00E-01	1.75E-01	1.85E-01	2.20E-02 ¥	2.25E-01
Benzo(a)pyrene	4.20E-02 ¥	2.00E-01	3.00E-02 ¥	4.50E-02 ¥ ¤	2.05E-01	2.25E-01
Indeno(1,2,3-cd)pyrene	4.40E-02 ¥ ¤	2.00E-01	4.10E-02 ¥	1.85E-01	2.05E-01	2.25E-01
Benzo(g,h,i)perylene	4.90E-02 ¥ ¤	2.00E-01	1.75E-01	1.85E-01	4.50E-02 ¥	2.25E-01

NOTES:

* - Soil consists of surface and subsurface soil.

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

TABLE J-2

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SOIL* (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET
INDUSTRIAL SCENARIO

Sample I.D. Chemical	Skewness	Normally distributed?*	Arithmetic Mean¹	Number of samples (n)	(n-1)	t(0.95)	Standard Deviation¹	UL-95¹ Value	Maximum Conc.	**Exposure Conc.**
Methylene Chloride	1.01	NO	—	—	—	—	—	—	2.00E-03	—
Acetone	-1.35	NO	—	—	—	—	—	—	6.00E-03	—
Trichloroethene	-1.94	NO	—	—	—	—	—	—	2.00E-03	—
Toluene	-1.88	NO	—	—	—	—	—	—	7.00E-03	—
Diethylphthalate	2.45	NO	—	—	—	—	—	—	2.20E+00	—
Di-n-butylphthalate	-2.09	NO	—	—	—	—	—	—	3.80E-02	—
Fluoranthene	-0.02	YES	1.37E-01	6	5	2.015	8.07E-02	2.04E-01	8.30E-02	8.30E-02
Pyrene	0.03	YES	1.36E-01	6	5	2.015	8.18E-02	2.03E-01	6.70E-02	6.70E-02
Benzo(a)anthracene	-1.96	NO	—	—	—	—	—	—	4.80E-02	—
Chrysene	-1.95	NO	—	—	—	—	—	—	5.00E-02	—
bis(2-Ethylhexyl)phthalate	-1.86	NO	—	—	—	—	—	—	5.60E-02	—
Benzo(b)fluoranthene	0.92	YES	1.10E-01	6	5	2.015	8.05E-02	1.76E-01	7.70E-02	7.70E-02
Benzo(k)fluoranthene	-0.82	YES	1.39E-01	6	5	2.015	9.05E-02	2.13E-01	2.60E-02	2.60E-02
Benzo(a)pyrene	0.02	YES	1.25E-01	6	5	2.015	9.42E-02	2.02E-01	4.50E-02	4.50E-02
Indeno(1,2,3-cd)pyrene	-0.87	YES	1.50E-01	6	5	2.015	8.43E-02	2.19E-01	4.40E-02	4.40E-02
Benzo(g,h,i)perylene	-0.77	YES	1.47E-01	6	5	2.015	7.89E-02	2.11E-01	4.90E-02	4.90E-02

NOTES:

* - Soil consists of surface and subsurface soil.

** - Skewness values between 1 and -1 indicate a normal distribution. If skewness values are not in this range, log (LN) transform original data and assume it is log-normally distributed.

¹ - Untransformed concentration

TABLE J-2

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SOIL* (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET
INDUSTRIAL SCENARIO

Sample I.D. Chemical	SB-29-01-0** (mg/kg)	SB-29-01-4 (mg/kg)	SB-29-02-0 (mg/kg)	SB-29-02-4 (mg/kg)	WB-MW-29-001-0 (mg/kg)	WB-MW-29-001-4 (mg/kg)
Methylene Chloride	-5.30E+00	-6.21E+00	-6.21E+00	-5.20E+00	-6.21E+00	-6.21E+00
Acetone	-5.12E+00	-5.12E+00	-5.30E+00	-5.20E+00	-5.12E+00	-5.52E+00
Trichloroethene	-6.21E+00	-5.12E+00	-5.30E+00	-5.20E+00	-5.12E+00	-5.04E+00
Toluene	-6.91E+00	-5.12E+00	-5.30E+00	-5.20E+00	-4.96E+00	-5.04E+00
Diethylphthalate	-1.74E+00	-1.61E+00	-1.74E+00	7.88E-01	-1.58E+00	-1.49E+00
Di-n-butylphthalate	-3.27E+00	-1.61E+00	-1.74E+00	-1.69E+00	-1.58E+00	-1.49E+00
Fluoranthene	—	—	—	—	—	—
Pyrene	—	—	—	—	—	—
Benzo(a)anthracene	-1.74E+00	-1.61E+00	-1.74E+00	-3.04E+00	-1.58E+00	-1.49E+00
Chrysene	-1.74E+00	-1.61E+00	-1.74E+00	-3.00E+00	-1.58E+00	-1.49E+00
bis(2-Ethylhexyl)phthalate	-1.74E+00	-1.61E+00	-1.74E+00	-1.69E+00	-2.88E+00	-1.49E+00
Benzo(b)fluoranthene	—	—	—	—	—	—
Benzo(k)fluoranthene	—	—	—	—	—	—
Benzo(a)pyrene	—	—	—	—	—	—
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	—
Benzo(g,h,i)perylene	—	—	—	—	—	—

NOTES:

* - Soil consists of surface and subsurface soil.

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

TABLE J-2

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR SOIL* (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET
INDUSTRIAL SCENARIO

Sample I.D. Chemical	Arithmetic Mean²	Number of samples (n)	(n-1)	Standard Deviation²	H(0.95)	UL-95² Value	Maximum Conc.	Exposure Conc.
Methylene Chloride	-5.89E+00	6	5	4.99E-01	2.706	5.71E-03	2.00E-03	2.00E-03
Acetone	-5.23E+00	6	5	1.61E-01	2.041	6.29E-03	6.00E-03	6.00E-03
Trichloroethene	-5.33E+00	6	5	4.42E-01	2.563	8.86E-03	2.00E-03	2.00E-03
Toluene	-5.42E+00	6	5	7.38E-01	3.413	1.79E-02	7.00E-03	7.00E-03
Diethylphthalate	-1.23E+00	6	5	9.94E-01	4.267	3.19E+00	2.20E+00	2.20E+00
Di-n-butylphthalate	-1.90E+00	6	5	6.78E-01	3.222	5.01E-01	3.80E-02	3.80E-02
Fluoranthene	—	—	—	—	—	—	8.30E-02	—
Pyrene	—	—	—	—	—	—	6.70E-02	—
Benzo(a)anthracene	-1.87E+00	6	5	5.81E-01	2.925	3.91E-01	4.80E-02	4.80E-02
Chrysene	-1.86E+00	6	5	5.64E-01	2.870	3.76E-01	5.00E-02	5.00E-02
bis(2-Ethylhexyl)phthalate	-1.86E+00	6	5	5.10E-01	2.733	3.31E-01	5.60E-02	5.60E-02
Benzo(b)fluoranthene	—	—	—	—	—	—	7.70E-02	—
Benzo(k)fluoranthene	—	—	—	—	—	—	2.60E-02	—
Benzo(a)pyrene	—	—	—	—	—	—	4.50E-02	—
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	—	4.40E-02	—
Benzo(g,h,i)perylene	—	—	—	—	—	—	4.90E-02	—

NOTES:

* - Soil consists of surface and subsurface soil.

² - Log-transformed concentration

TABLE J-3

PLATTSBURGH AIR FORCE BASE SS-029
EXPOSURE CONCENTRATIONS FOR GROUNDWATER
INDUSTRIAL SCENARIO

Sample I.D. Chemical	MW-29-001 (mg/L)	MW-02-047* (mg/L)	Arithmetic Mean	Number of samples (n)	(n-1)	t(0.95)	Standard Deviation	UL-95 Value	Maximum Conc.	Exposure Conc.
Arsenic	5.30E-03 ¥ ¤	5.00E-03	5.15E-03	2	1	6.314	2.12E-04	6.10E-03	5.30E-03	5.30E-03
Chromium	5.00E-03	2.46E-01 ¥ ¤	1.25E-01	2	1	6.314	1.70E-01	8.85E-01	2.46E-01	2.46E-01
Selenium	1.01E-02 ¥ ¤	6.20E-03 ¥	8.15E-03	2	1	6.314	2.76E-03	2.05E-02	1.01E-02	1.01E-02

NOTES:

* - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

TABLE J-4

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CARCINOGENIC CHEMICALS IN SURFACE SOIL - CANCER RISK
TRESPASS SCENARIO

CHEMICAL	POTENTIAL POTENCY FACTOR (unitless)	CHEMICAL CONCENTRATION IN SOIL (CS) (mg/kg)	INTAKE (mg/kg-day)		SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK (unitless)	
			TRESPASSER			TRESPASSER	
			ADULT	TEENAGER	ORAL	ADULT	TEENAGER
Methylene Chloride	—	2.00E-03	2.62E-10	6.54E-11	7.50E-03	1.96E-12	4.91E-13
Trichloroethene	—	2.00E-03	2.62E-10	6.54E-11	NV	NV	NV
bis(2-Ethylhexyl)phthalate	—	5.60E-02	7.33E-09	1.83E-09	1.40E-02	1.03E-10	2.56E-11
Benzo(b)fluoranthene	0.1	6.50E-02	8.50E-09	2.13E-09	7.30E+00	6.21E-09	1.55E-09
Benzo(k)fluoranthene	0.01	2.60E-02	3.40E-09	8.50E-10	7.30E+00	2.48E-10	6.21E-11
Benzo(a)pyrene	1	4.20E-02	5.50E-09	1.37E-09	7.30E+00	4.01E-08	1.00E-08
Indeno(1,2,3-cd)pyrene	0.1	4.40E-02	5.76E-09	1.44E-09	7.30E+00	4.20E-09	1.05E-09

TOTAL CANCER RISK	5E-08	1E-08

PARAMETER	SYMBOL	UNITS	TRESPASSER	
			ADULT	TEENAGER
Ingestion rate	IR	mg/day	100	100
Conversion factor	CF	kg/mg	1.00E-06	1.00E-06
Fraction ingested from contaminated source	FI	unitless	1.0	1.0
Exposure frequency	EF	days/year	78	78
Exposure duration	ED	years	30	6
Body weight	BW	kg	70	56
Averaging time	AT	days	25550	25550

ABBREVIATION:

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Cancer Risk = (Intake) × (Slope Factor × Potential Potency Factor)

TABLE J-5

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CHEMICALS IN SURFACE SOIL - HAZARD INDEX
TRESPASS SCENARIO

CHEMICAL	CHEMICAL CONCENTRATION IN SOIL (CS) (mg/kg)	INTAKE (mg/kg-day) TRESPASSER		TOXICITY VALUE ORAL RfD (mg/kg-day)		HAZARD QUOTIENT (unitless) TRESPASSER	
		ADULT	TEENAGER	CHRONIC	SUBCHRONIC	ADULT	TEENAGER
Methylene Chloride	2.00E-03	6.11E-10	7.63E-10	6.00E-02	6.00E-02	1.02E-08	1.27E-08
Acetone	6.00E-03	1.83E-09	2.29E-09	1.00E-01	1.00E+00	1.83E-08	2.29E-09
Trichloroethene	2.00E-03	6.11E-10	7.63E-10	6.00E-03	6.00E-03	1.02E-07	1.27E-07
Toluene	7.00E-03	2.14E-09	2.67E-09	2.00E-01	2.00E+00	1.07E-08	1.34E-09
Di-n-butylphthalate	3.80E-02	1.16E-08	1.45E-08	1.00E-01	1.00E+00	1.16E-07	1.45E-08
Fluoranthene	6.10E-02	1.86E-08	2.33E-08	4.00E-02	4.00E-01	4.66E-07	5.82E-08
Pyrene	6.50E-02	1.98E-08	2.48E-08	3.00E-02	3.00E-01	6.61E-07	8.27E-08
bis(2-Ethylhexyl)phthalate	5.60E-02	1.71E-08	2.14E-08	2.00E-02	2.00E-02	8.55E-07	1.07E-06
Benzo(b)fluoranthene	6.50E-02	1.98E-08	2.48E-08	NV	NV	NV	NV
Benzo(k)fluoranthene	2.60E-02	7.94E-09	9.92E-09	NV	NV	NV	NV
Benzo(a)pyrene	4.20E-02	1.28E-08	1.60E-08	NV	NV	NV	NV
Indeno(1,2,3-cd)pyrene	4.40E-02	1.34E-08	1.68E-08	NV	NV	NV	NV
Benzo(g,h,i)perylene	4.90E-02	1.50E-08	1.87E-08	NV	NV	NV	NV

TOTAL HAZARD INDEX	2E-06	1E-06

PARAMETER	SYMBOL	UNITS	TRESPASSER	
			ADULT	TEENAGER
Ingestion rate	IR	mg/day	100	100
Conversion factor	CF	kg/mg	1.00E-06	1.00E-06
Fraction ingested from contaminated source	FI	unitless	1	1
Exposure frequency	EF	days/year	78	78
Exposure duration	ED	years	30	6
Body weight	BW	kg	70	56
Averaging time	AT	days	10950	2190

ABBREVIATIONS:

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

TABLE J-6

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CARCINOGENIC CHEMICALS IN SOIL* - CANCER RISK
INDUSTRIAL SCENARIO

CHEMICAL	POTENTIAL POTENCY FACTOR (unitless)	CHEMICAL CONCENTRATION IN SOIL* (CS) (mg/kg)	INTAKE (mg/kg-day)		SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK (unitless)	
			CONSTRUCTION WORKER	INDUSTRIAL WORKER	ORAL	CONSTRUCTION WORKER	INDUSTRIAL WORKER
Methylene Chloride	—	2.00E-03	3.49E-11	1.82E-10	7.50E-03	2.62E-13	1.36E-12
Trichloroethene	—	2.00E-03	3.49E-11	1.82E-10	NV	NV	NV
Benzo(a)anthracene	0.1	4.80E-02	8.37E-10	4.36E-09	7.30E+00	6.11E-10	3.18E-09
Chrysene	0.001	5.00E-02	8.72E-10	4.54E-09	7.30E+00	6.37E-12	3.32E-11
bis(2-Ethylhexyl)phthalate	—	5.60E-02	9.77E-10	5.09E-09	1.40E-02	1.37E-11	7.12E-11
Benzo(b)fluoranthene	0.1	7.70E-02	1.34E-09	7.00E-09	7.30E+00	9.81E-10	5.11E-09
Benzo(k)fluoranthene	0.01	2.60E-02	4.54E-10	2.36E-09	7.30E+00	3.31E-11	1.72E-10
Benzo(a)pyrene	1	4.50E-02	7.85E-10	4.09E-09	7.30E+00	5.73E-09	2.98E-08
Indeno(1,2,3-cd)pyrene	0.1	4.40E-02	7.68E-10	4.00E-09	7.30E+00	5.60E-10	2.92E-09

TOTAL CANCER RISK	8E-09	4E-08

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER	INDUSTRIAL WORKER
Ingestion rate	IR	mg/day	480	50
Conversion factor	CF	kg/mg	1E-06	1E-06
Fraction ingested from contaminated source	FI	unitless	1	1
Exposure frequency	EF	days/year**	5	130
Exposure duration	ED	years**	13	25
Body weight	BW	kg	70	70
Averaging time	AT	days	25550	25550

NOTES AND ABBREVIATIONS:

* - Soil consists of surface and subsurface soil.

** - Units for construction worker are days/week for EF and weeks for ED.

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Cancer Risk = (Intake) × (Slope Factor × Potential Potency Factor)

TABLE J-7

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CHEMICALS IN SOIL* - HAZARD INDEX
INDUSTRIAL SCENARIO

CHEMICAL	CHEMICAL CONCENTRATION IN SOIL* (CS) (mg/kg)	INTAKE (mg/kg-day)		TOXICITY VALUE ORAL RfD (mg/kg-day)		HAZARD QUOTIENT (unitless)	
		CONSTRUCTION WORKER	INDUSTRIAL WORKER	SUBCHRONIC	CHRONIC	CONSTRUCTION WORKER	INDUSTRIAL WORKER
Methylene Chloride	2.00E-03	9.80E-09	5.09E-10	6.00E-02	6.00E-02	1.63E-07	8.48E-09
Acetone	6.00E-03	2.94E-08	1.53E-09	1.00E+00	1.00E-01	2.94E-08	1.53E-08
Trichloroethene	2.00E-03	9.80E-09	5.09E-10	6.00E-03	6.00E-03	1.63E-06	8.48E-08
Toluene	7.00E-03	3.43E-08	1.78E-09	2.00E+00	2.00E-01	1.71E-08	8.90E-09
Diethylphthalate	2.20E+00	1.08E-05	5.60E-07	8.00E+00	8.00E-01	1.35E-06	7.00E-07
Di-n-butylphthalate	3.80E-02	1.86E-07	9.67E-09	1.00E+00	1.00E-01	1.86E-07	9.67E-08
Fluoranthene	8.30E-02	4.07E-07	2.11E-08	4.00E-01	4.00E-02	1.02E-06	5.28E-07
Pyrene	6.70E-02	3.28E-07	1.70E-08	3.00E-01	3.00E-02	1.09E-06	5.68E-07
Benzo(a)anthracene	4.80E-02	2.35E-07	1.22E-08	NV	NV	NV	NV
Chrysene	5.00E-02	2.45E-07	1.27E-08	NV	NV	NV	NV
bis(2-Ethylhexyl)phthalate	5.60E-02	2.74E-07	1.42E-08	2.00E-02	2.00E-02	1.37E-05	7.12E-07
Benzo(b)fluoranthene	7.70E-02	3.77E-07	1.96E-08	NV	NV	NV	NV
Benzo(k)fluoranthene	2.60E-02	1.27E-07	6.61E-09	NV	NV	NV	NV
Benzo(a)pyrene	4.50E-02	2.20E-07	1.14E-08	NV	NV	NV	NV
Indeno(1,2,3-cd)pyrene	4.40E-02	2.16E-07	1.12E-08	NV	NV	NV	NV
Benzo(g,h,i)perylene	4.90E-02	2.40E-07	1.25E-08	NV	NV	NV	NV
		TOTAL HAZARD INDEX				2E-05	3E-06

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER	INDUSTRIAL WORKER
Ingestion rate	IR	mg/day	480	50
Conversion factor	CF	kg/mg	1E-06	1E-06
Fraction ingested from contaminated source	FI	unitless	1	1
Exposure frequency	EF	days/year**	5	130
Exposure duration	ED	years**	13	25
Body weight	BW	kg	70	70
Averaging time	AT	days	91	9125

NOTES AND ABBREVIATIONS:

* - Soil consists of surface and subsurface soil.

** - Units for construction worker are days/week for EF and weeks for ED.

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

TABLE J-8

PLATTSBURGH AIR FORCE BASE SS-029
INHALATION OF CARCINOGENIC CHEMICALS FROM FUGITIVE DUST* - CANCER RISK
INDUSTRIAL SCENARIO

CHEMICAL	RESPIRABLE CONCENTRATION (CA) (mg/m^3)	INTAKE (mg/kg-day)	SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK (unitless)
		CONSTRUCTION WORKER	INHALATION	CONSTRUCTION WORKER
Methylene Chloride	4.26E-10	3.72E-13	1.65E-03	6.13E-16
Trichloroethene	4.26E-10	3.72E-13	NV	NV
Benzo(a)anthracene	1.02E-08	8.92E-12	NV	NV
Chrysene	1.07E-08	9.29E-12	NV	NV
bis(2-Ethylhexyl)phthalate	1.19E-08	1.04E-11	1.40E-02	1.46E-13
Benzo(b)fluoranthene	1.64E-08	1.43E-11	NV	NV
Benzo(k)fluoranthene	5.54E-09	4.83E-12	NV	NV
Benzo(a)pyrene	9.59E-09	8.36E-12	NV	NV
Indeno(1,2,3-cd)pyrene	9.37E-09	8.17E-12	NV	NV

TOTAL CANCER RISK	**1E-13**

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER
Inhalation rate	IR	m^3/hr	3
Exposure time	ET	hours/day	8
Exposure frequency	EF	days/week	5
Exposure duration	ED	weeks	13
Body weight	BW	kg	70
Averaging time	AT	days	25550

NOTES AND ABBREVIATIONS:

* - Soil consists of surface and subsurface soil.

NV - No Value

EQUATIONS:

Intake = (CA × IR × ET × EF × ED) / (BW × AT)

Cancer Risk = (Intake) × (Slope Factor)

TABLE J-9

PLATTSBURGH AIR FORCE BASE SS-029
INHALATION OF CHEMICALS FROM FUGITIVE DUST* - HAZARD INDEX
INDUSTRIAL SCENARIO

CHEMICAL	RESPIRABLE CONCENTRATION (CA) (mg/m³)	INTAKE (mg/kg-day)	TOXICITY VALUE INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT (unitless)
		CONSTRUCTION WORKER	SUBCHRONIC	CONSTRUCTION WORKER
Methylene Chloride	4.26E-10	1.04E-10	8.57E-01	1.22E-10
Acetone	1.28E-09	3.13E-10	NV	NV
Trichloroethene	4.26E-10	1.04E-10	NV	NV
Toluene	1.49E-09	3.65E-10	2.86E-01	1.28E-09
Diethylphthalate	4.69E-07	1.15E-07	NV	NV
Di-n-butylphthalate	8.09E-09	1.98E-09	NV	NV
Fluoranthene	1.77E-08	4.33E-09	NV	NV
Pyrene	1.43E-08	3.49E-09	NV	NV
Benzo(a)anthracene	1.02E-08	2.50E-09	NV	NV
Chrysene	1.07E-08	2.61E-09	NV	NV
bis(2-Ethylhexyl)phthalate	1.19E-08	2.92E-09	5.71E-02	5.12E-08
Benzo(b)fluoranthene	1.64E-08	4.02E-09	NV	NV
Benzo(k)fluoranthene	5.54E-09	1.36E-09	NV	NV
Benzo(a)pyrene	9.59E-09	2.35E-09	NV	NV
Indeno(1,2,3-cd)pyrene	9.37E-09	2.30E-09	NV	NV
Benzo(g,h,i)perylene	1.04E-08	2.56E-09	NV	NV

TOTAL HAZARD INDEX **5E-08**

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER
Inhalation rate	IR	m³/hr	3
Exposure time	ET	hours/day	8
Exposure frequency	EF	days/week	5
Exposure duration	ED	weeks	13
Body weight	BW	kg	70
Averaging time	AT	days	91

NOTES AND ABBREVIATIONS:

* - Soil consists of surface and subsurface soil.

NV - No Value

EQUATIONS:

Intake = (CA × IR × ET × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

TABLE J-10

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CARCINOGENIC CHEMICALS IN GROUNDWATER - CANCER RISK
INDUSTRIAL SCENARIO

CHEMICAL	EXPOSURE CONCENTRATION IN GROUNDWATER (CW) (mg/l)	INTAKE (mg/kg-day)	SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK (unitless)
		INDUSTRIAL WORKER	ORAL	INDUSTRIAL WORKER
Arsenic	5.30E-03	1.85E-05	1.50E+00	2.78E-05
Chromium (VI)	3.51E-02	1.23E-04	NV	NV

TOTAL CANCER RISK	3E-05

PARAMETER	SYMBOL	UNITS	INDUSTRIAL WORKER
Ingestion Rate	IR	liters/day	1
Exposure Frequency	EF	days/year	250
Exposure Duration	ED	years	25
Body Weight	BW	kg	70
Averaging Time	AT	days	25550

ABBREVIATIONS:

NV - No Value

EQUATIONS:

Intake = (CW × IR × EF × ED) / (BW × AT)

Cancer Risk = (Intake) × (Slope Factor)

TABLE J-11

PLATTSBURGH AIR FORCE BASE SS-029
INGESTION OF CHEMICALS IN GROUNDWATER - HAZARD INDEX
INDUSTRIAL SCENARIO

CHEMICAL	EXPOSURE CONCENTRATION IN GROUNDWATER (CW) (mg/l)	INTAKE (mg/kg-day)	TOXICITY VALUE ORAL RfD (mg/kg-day)	HAZARD QUOTIENT (unitless)
		INDUSTRIAL WORKER	CHRONIC	INDUSTRIAL WORKER
Arsenic	5.30E-03	5.19E-05	3.00E-04	1.73E-01
Chromium (III)	2.10E-01	2.06E-03	1.00E+00	2.06E-03
Chromium (VI)	3.51E-02	3.43E-04	5.00E-03	6.86E-02
Selenium	1.01E-02	9.88E-05	5.00E-03	1.98E-02

TOTAL HAZARD INDEX	3E-01

PARAMETER	SYMBOL	UNITS	INDUSTRIAL WORKER
Ingestion Rate	IR	liters/day	1
Exposure Frequency	EF	days/year	250
Exposure Duration	ED	years	25
Body Weight	BW	kg	70
Averaging Time	AT	days	9125

ABBREVIATIONS:

NV - No Value

EQUATIONS:

Intake = (CW × IR × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

APPENDIX K
FUGITIVE DUST MODEL

PLATTSBURGH AIR FORCE BASE
FUGITIVE DUST MODEL - FUTURE CONSTRUCTION SCENARIO
JET ENGINE TEST CELL SS-029

SUMMARY

The USEPA documents *Rapid Assessment of Exposure to Particulate Emission from Surface Contamination Sites* (EPA/600/8-85/002 Feb 1985) and *AP-42* Section 13, July 1994, are used to estimate the rate of fugitive dust emission from Plattsburgh AFB SS-029. The *New York State Air Guide*-1 Draft (NYSDEC 1991) is used to estimate the Maximum Actual Annual Impact Concentration for an onsite receptor during future construction activities.

The Maximum Actual Annual Concentration (C_a) for an onsite receptor at SS-029 is estimated to be:

$$C_a = (5.9 \times 10^{-2}\ \alpha_{surf} + 15.4 \times 10^{-2}\ \alpha_{sub})\ \mathrm{mg/m^3}$$

"α_{surf}" is the dimensionless concentration of the chemical in the surface soil at the site. "α_{sub}" is the dimensionless concentration of the chemicals in the subsurface soils at the site. "α_{surf}," "α_{sub}," and "C_a" are all contaminant-specific.

1. Purpose

The purpose of this calculation is to estimate the ambient air concentration of contaminants from particulate emissions on the SS-029 site during future construction activities.

2. Methodology

The emission rate of fugitive dust is estimated using the methodologies described in two USEPA documents, *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites* (EPA/600/8-85/002 February 1985) and *AP-42* Sections 13.2.1, 13.2.2, and 13.2.3 (July 1994). The ambient air concentration model in these documents (hereafter referred to as the "manual") is applicable only to sites measuring 300 ft. x 300 ft. or smaller and to receptors located at some distance from the source. The methodology described in the *New York State Air Guide-1 Draft* is used to calculate the ambient air concentration for site SS-029 using the emission rate determined by the method in the manual.

3. Summary of Assumptions

a) The site was approximated as a square region.

b) Large non-erodible particles were not present so u_{*t} did not need to be corrected.

c) The area where the construction will take place is paved and on two sides there are two buildings. The roughness height is $z_o = 1.5$ cm.

d) Total area of the site (23,100 ft^2) is assumed for future construction. After the pavement and existing jet/engine test cells are removed, the entire construction site will be without any vegetation (Figure 1, page 10 of this calculation). Thus, $V = 0$.

e) Earth-moving activities were assumed to be batch drop operations. Corresponding assumptions were:

   i) Backhoe loads are dropped from a height of 10 ft above ground surface

   ii) The capacity of the backhoe bucket is 1.5 cubic yards

   iii) The backhoe operates at 30 sec/load

   iv) Each load weighs 1.5 tons/cubic yards

   v) One backhoe is used on the site

f) Construction vehicles were assumed to travel 10 km/hr, weigh 10 tons (9 Mg) and have 5 wheels on average. Approximately 4 round trips/day were assumed for 2 vehicles making a 0.25 km round trip on site.

g) Surface soil and subsurface soils had different contaminant concentrations ($\alpha_{surf} \neq \alpha_{sub}$).

h) No other sources contributed to the SS-029 site contamination.

4. Calculation - Construction Activities

a) Likelihood of Wind Erosion

Visual inspection of the present site indicates that the existing site is covered with pavement, the jet/engine test cell, and grass therefore, wind erosion of soils does not occur. However, this calculation models emissions from future construction activities which would involve the excavation and removal of soil, producing exposed areas indicated in Figure 1, page 10.

b) Type of Emission Model

From the grain size analysis of subsoil (pages 11-13 of this calculation),
Mode = 0.22 mm

i) From Figure 3-4, the threshold friction velocity is

u_{*t} = 34 cm/sec (see page 16 of this calculation)

ii) It is assumed that large non-erodible particles are not present at the site, thus u_{*t} does not need to be corrected.

iii) Because > 34 cm/sec < 75 cm/s, the "unlimited reservoir model" will be utilized. (The cut off friction velocity of 75 cm/sec corresponds to an ambient wind speed of about 10 m/sec (22 mph), measured at a height of about 7 m from the surface).

c) Wind Erosion from Surfaces with Unlimited Erosion

i) Find E_{10} (annual average emission rate) using Equation 4-4 in the manual (page 24 of this calculation):

$$E_{10} = 0.036\ (1 - V) \left(\frac{[u]}{u_t}\right)^3 F(x)$$

where

E_{10} = annual average emission rate (g/m^2 hr)
V = fraction of vegetated surface
[u] = mean annual wind speed (from Table 4-1, pages 18-19)
x = $0.886\ u_t/[u]$
F(x) = function of x (plotted in Fig. 4-3, page 20 of this calculation)

- Rearrange Eqn 4-3 to find u_t (Equation 4-3 in the manual, page 23)

$$u(z) = \left(\frac{u_{*t}}{0.4}\right) \ln\left(\frac{z}{z_0}\right)$$

where

$u(z)$ = wind speed at height "z" (m/s)
u_{*t} = friction velocity (m/s)
z = height above surface
z_0 = roughness height (cm)

- u_{*t} = 34 cm/sec = 0.34 m/sec
- z = 7 m = 700 cm (typical weather station sensor height)
- z_0 = 1.5 cm from Figure 3-6 (assume roughness in between grassland and plowed field - see page 17 of this calculation)

$$u(z = 7\ m) = \left(\frac{0.34\ m/s}{0.4}\right) \ln\left(\frac{700\ cm}{1.5\ cm}\right) = 5.22\ m/s$$

- [u] = 3.9 m/sec (from Table 4-1 for Burlington, VT, pages 18-19 of this calculation)
- To find F(x)

$$x = 0.886\ \frac{u_t}{[u]} = \frac{(0.886\ x\ 5.22\ m/s)}{3.9\ m/s} = 1.19$$

F (x = 1.19) = 1.35 (from Figure 4.3, page 20 of this calculation)

- V = 0. During future construction approximately 23,100 ft^2 area will be excavated at one time. (see Figure 1, page 10 of this calculation). Entire area will be the work area.

$$E_{10} = 0.036\ (1 - 0) \left(\frac{3.9\ m/s}{5.22\ m/s}\right)^3 (1.35) = 0.02\ g/m^2hr = 2.0\ x\ 10^{-2}\ g/m^2hr$$

ii) Total mass emission rate for wind erosion can be calculated from Equation 2-1 in the manual (page 22 of this calculation):

$$R_w = \alpha_{surf}\ E_w\ A$$

where

R_w = emission rate of contaminant (g/hr)
α_{sub} = mass fraction of surface soil contaminants (unitless)
A = source area extent (m^2)
E_w = annual average emission rate (g/m^2 hr)

- α_{sub} = contaminant specific
- $E_w = 2.0 \times 10^{-2}$ g/m^2 hr
- $A = 23{,}100\ ft^2\ (1\ m/3.2808\ ft)^2 = 2{,}146\ m^2$

$R_w = \alpha_{sub}\ (2.0 \times 10^{-2}\ g/m^2\ hr)\ (2{,}146\ m^2)$
$= 43.0\ \alpha_{sub}$ g/hr

d) Emissions Due to Traffic

The emissions from the bare soil produced during future construction will be accounted for in the construction assessment of emissions modeled in Section e.

e) Emissions Due to Construction Activities

i) The earth-moving operations on site are assumed to be batch drop operations. According to *AP-42* Section 13.2.3, heavy construction operation Table 13.2.3 suggests to use formulae given in Section 13.2.2 Aggregate Handling and Storage Pile to calculate the predictive emission factor (pages 28-31 of this calculation).

$$E = k\ (0.0032)\ \frac{\left[\frac{U}{5}\right]^{1.3}}{\left[\frac{M}{2}\right]^{1.4}}\ (lb/ton)$$

where

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (mph)
M = material moisture content (%)

- Mode = 0.22 mm = 220 μm (page 11 of this calculation)
  k = 0.74

- U = mean wind speed = 8.72 mph (from Table 4-1 for Burlington VT, pages 18-19 of this calculation)

- M = material moisture content = 14.65% (page 11 of this calculation)

$$E = 0.74\ (0.0032)\ \frac{\left[\dfrac{8.72}{5}\right]^{1.3}}{\left[\dfrac{14.65}{2}\right]^{1.4}}\ (lb/ton) = 3.0\ x\ 10^{-4}\ lb/ton$$

- Assuming a cycle of 30 sec/load in one hour the backhoe can process

  (3,600 sec/hr)/(30 sec/load) = 120 load/hr

- Assuming 1.5 tons/yd^3, the mass of soil moved in one hour is

  (120 load/hr) (1.5 yd^3/load) (1.5 tons/yd^3) = 270 tons/hr

- Given the construction area to be 23,100 ft^2 (see page 10), the emission rate is:

  E_{emo} = 3.0 x 10^{-4} lb/ton (270 ton/hr)/23,100 ft^2
  = 3.5 x 10^{-6} lb/ft^2 hr

- Assuming 1 backhoe will be used on the construction area

  E_{emo} = 1 x (3.5 x 10^{-6} lb/ft^2 hr) (3.2808 ft/m)^2 (1 g/0.0022 lb)
  = 1.71 x 10^{-2} g/m^2 hr

ii) Total mass emission rate for earth-moving operations can be calculated from Equation 2-1 in the manual:

$R_{emo} = \alpha_{sub}\ E_{emo}\ A$

where

α_{sub} = mass fraction of subsurface contaminants (unitless)
A = area of region (m^2)
E_{emo} = emission factor (g/m^2 hr)

- α_{sub} = contaminant-specific
- A = 23,100 ft^2
- E_{emo} = 1.71 x 10^{-2} g/m^2 hr

R_{emo} = α_{sub} (1.71 x 10^{-2}) 23,100 ft^2 (1 m/3.2808 ft)^2 = 36.70 α_{sub} g/hr

f) Construction Activities Emissions Due to Traffic

i) Emissions from the unpaved parking area will be calculated using Equation 1, *AP-42* Chapter 13.2.1-1, for unpaved roads (pages 25-27 of this calculation). The following empirical expression is used to estimate the quantity of size specific particulate emissions from an unpaved road.

$$E_{10} = k\ (1.7) \left[\frac{s}{12}\right] \left[\frac{S}{48}\right] \left[\frac{W}{2.7}\right]^{0.7} \left[\frac{w}{4}\right]^{0.5} \left[\frac{365-p}{365}\right] \frac{kg}{VKT}$$

where

E_{10} = emission factor (kg/VKT)
k = particle size multiplier (dimensionless)
s = silt content of road surface material (%)
S = mean vehicle speed (km/hr)
W = mean vehicle weight (Mg)
w = mean number of wheels
p = number of days with at least 0.254 mm of precipitation per year (number of wet days per year)

- Mode = 0.22 mm = 220 μm (page 11 of this calculation)
  k = particle size multiplier = 1

- s = silt content of surface material = 7.75% (see page 11 of this calculation)

- S = mean vehicle speed for the construction area = 10 km/hr (≈ 6 mph) Table 4-2 of the manual and page 13.2.1-2 of *AP-42*

- W = mean vehicle weight for construction and security vehicles = 9 Mg

- w = mean number of wheels = 5 (page 2 of this calculation)

- p = number of days with at least 0.254 mm of precipitation (from Figure 4-4, page 21 of this calculation)

  Plattsburgh AFB, p = 140 days

$$E_{10} = 1\ (1.7) \left[\frac{7.75}{12}\right] \left[\frac{10}{48}\right] \left[\frac{9}{2.7}\right]^{0.7} \left[\frac{5}{4}\right]^{0.5} \left[\frac{365-140}{365}\right] \frac{kg}{VKT} = 0.366\ kg/VKT$$

ii) Total mass emission rate for vehicular traffic

$R_{traffic} = \alpha_{surf} E_{10} A$ [Eqn 2-1 of the Manual]

where

$R_{traffic}$ = emission rate of contaminant (g/hr)
α_{surf} = mass fraction of surface contaminants (unitless)
E_{10} = emission factor (kg/VKT)
A = source extent = #VKT/yr

- α_{surf} = contaminant-specific

- Assuming an average of 2 vehicles make 4 round trips per day, approximately 0.25 km/trip:

  A = (365 days/yr) (4 trips/day) (0.25 km/trip) (2 vehicles)
  = 730 VKT/yr

- E_{10}= 0.366 kg/VKT

R_{traff} = α_{surf} (0.366 kg/VKT) (730 VKT/yr)
= α_{surf} (267 kg/yr)
= α_{surf} (267 kg/yr) (1000g/kg) (1 yr/365 days) (1 day/24 hours)
= 30.48 α_{surf} g/hr

g) <u>Maximum Actual Annual Impact (C_a)</u>

i) To determine the area source emission rate, the alternate area source method from *NYS Air Guide-1* was used because it addresses area up to 3,300 ft. x 3,300 ft. The present site is approximately 152 ft. x 152 ft. The entire area will be subjected to fugitive dust. Using the following equation from page B-11 of *NYS Air Guide-1* (pages 32-33 of this calculation):

$$Q_A = \frac{Q_a}{A}$$

where

Q_A = area source emission rate (lb/hr-ft^2)
Q_a = emission rate (lb/hr)
A = area (ft^2)

- A = 23,100 ft^2 (page 10 of this calculation)
- Q_a= $R_w + R_{emo} + R_{traffic}$
  = 43.0 α_{sub} g/hr + 36.70 α_{sub} g/hr + 30.48 α_{surf} g/hr
  = (30.48 α_{surf} + 79.70 α_{sub}) g/hr
  = (30.48 α_{surf} + 79.70 α_{sub}) g/hr x (0.0022 lb/g)

$$= (0.067\ \alpha_{surf} + 0.175\ \alpha_{sub})\ \text{lb/hr}$$

$$Q_A = \frac{(0.067\ \alpha_{surf} + 0.175\ \alpha_{subs})\ lb/hr}{23{,}100\ ft^2} = (2.9 \times 10^{-6}\ \alpha_{surf} + 7.58 \times 10^{-6}\ \alpha_{subs})\ lb/hr\ ft^2$$

ii) To determine the Maximum Actual Annual Impact (C_a), the following equation from page B-11 of the *NYS Air Guide-1* was used (page 33 of this calculation):

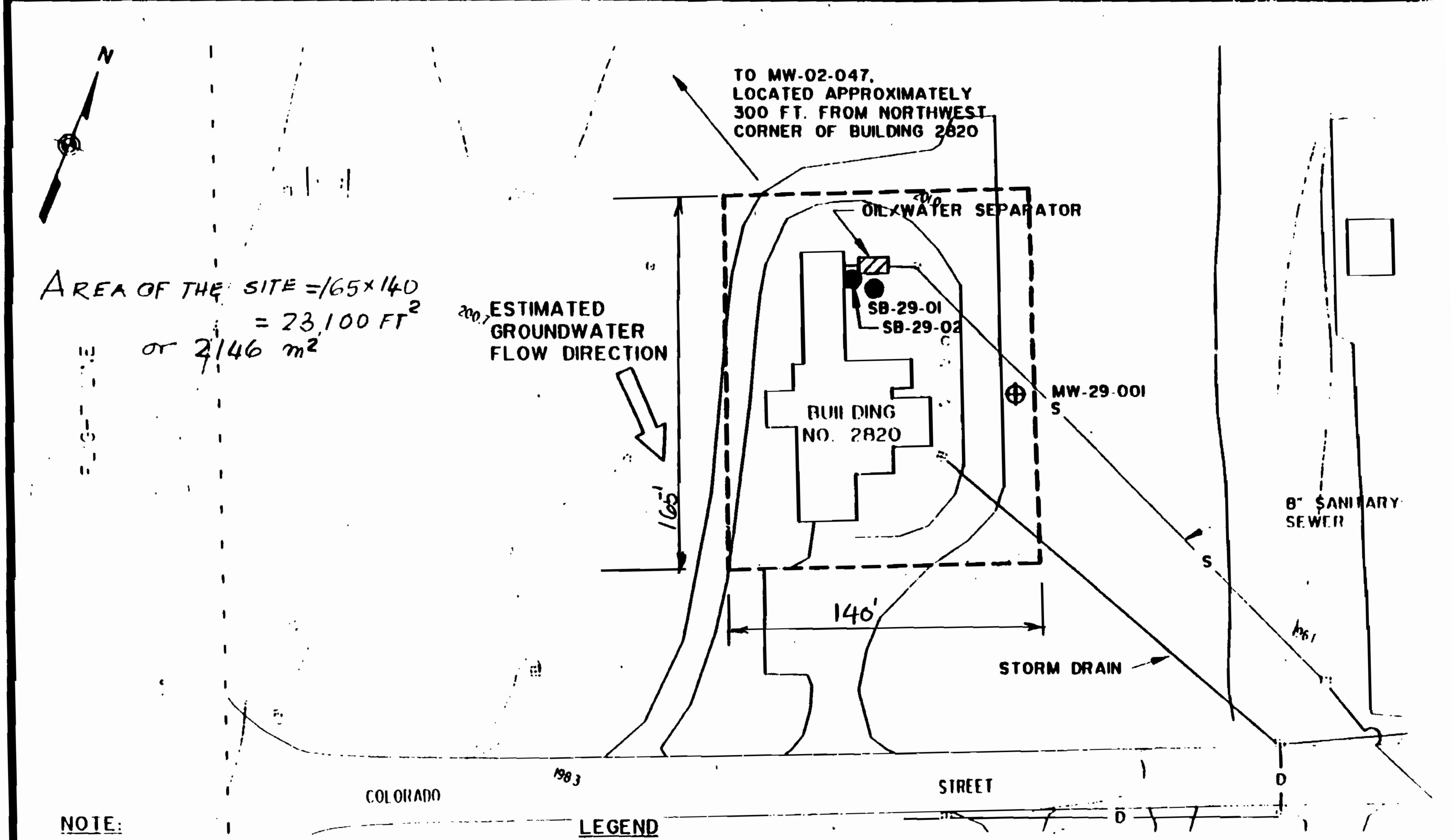
$$C_a\ (\text{ug/m}^3) = KQ_A\ C_m$$

where

K = 15 for $330 \leq S \leq 3{,}300$
= 30 for $S > 3{,}300$
S = length of a side of the area source (ft)
C_m = conversion factor from lb/hr ft^2 to μg/m^{2}s
Q_A = area source emission rate

- $S = 152$ ft, so $K = 15$
- $C_m = 1.355 \times 10^6$
- $Q_A = (2.9 \times 10^{-6}\ \alpha_{surf} + 7.58 \times 10^{-6}\ \alpha_{sub})$ lb/hr ft^2

$$\begin{aligned} C_a &= 15 \times (2.9 \times 10^{-6}\ \alpha_{surf} + 7.58 \times 10^{-6}\ \alpha_{sub}) \times (1.355 \times 10^6) \\ &= (59\ \alpha_{surf} + 154\ \alpha_{sub})\ \mu g/m^3 \\ &= (0.059\ \alpha_{surf} + 0.154\ \alpha_{sub})\ mg/m^3 \\ &= \underline{(5.9 \times 10^{-2}\ \alpha_{surf} + 15.4 \times 10^{-2}\ \alpha_{sub})\ mg/m^3} \end{aligned}$$



AREA OF THE SITE = 165 × 140
= 23,100 FT^2
or 2146 m^2

NOTE:

THE LOCATION OF ANY UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ALL UTILITIES MAY NOT BE SHOWN. UTILITIES WILL BE ACCURATELY LOCATED PRIOR TO DRILLING

LEGEND

- - - - APPROXIMATE SITE BOUNDARIES
● PROPOSED BORING LOCATION
⊕ PROPOSED MONITORING WELL LOCATION
(POSITION OF UNDERGROUND LINES IS ESTIMATED)

60 0 60
SCALE IN FEET

URS
CONSULTANTS, INC.

SS-029 - JET ENGINE TEST CELL
SITE INVESTIGATION - PROPOSED SAMPLING LOCATIONS

FIGURE 1

Calculation of Soil Mode

Future Activity - site will be developed for industrial use

a) WB-MW-29-001 2´ - 4´

$$Soil\ Mode = \frac{0.16 + 0.07}{2} = .115\ mm$$

b) WB-MW-29-001 6´ - 8´

$$Soil\ Mode = \frac{0.4 + 0.25}{2} = 0.325\ mm$$

c) $$Mode = \frac{(0.115 + 0.325)}{2} = 0.22\ mm$$

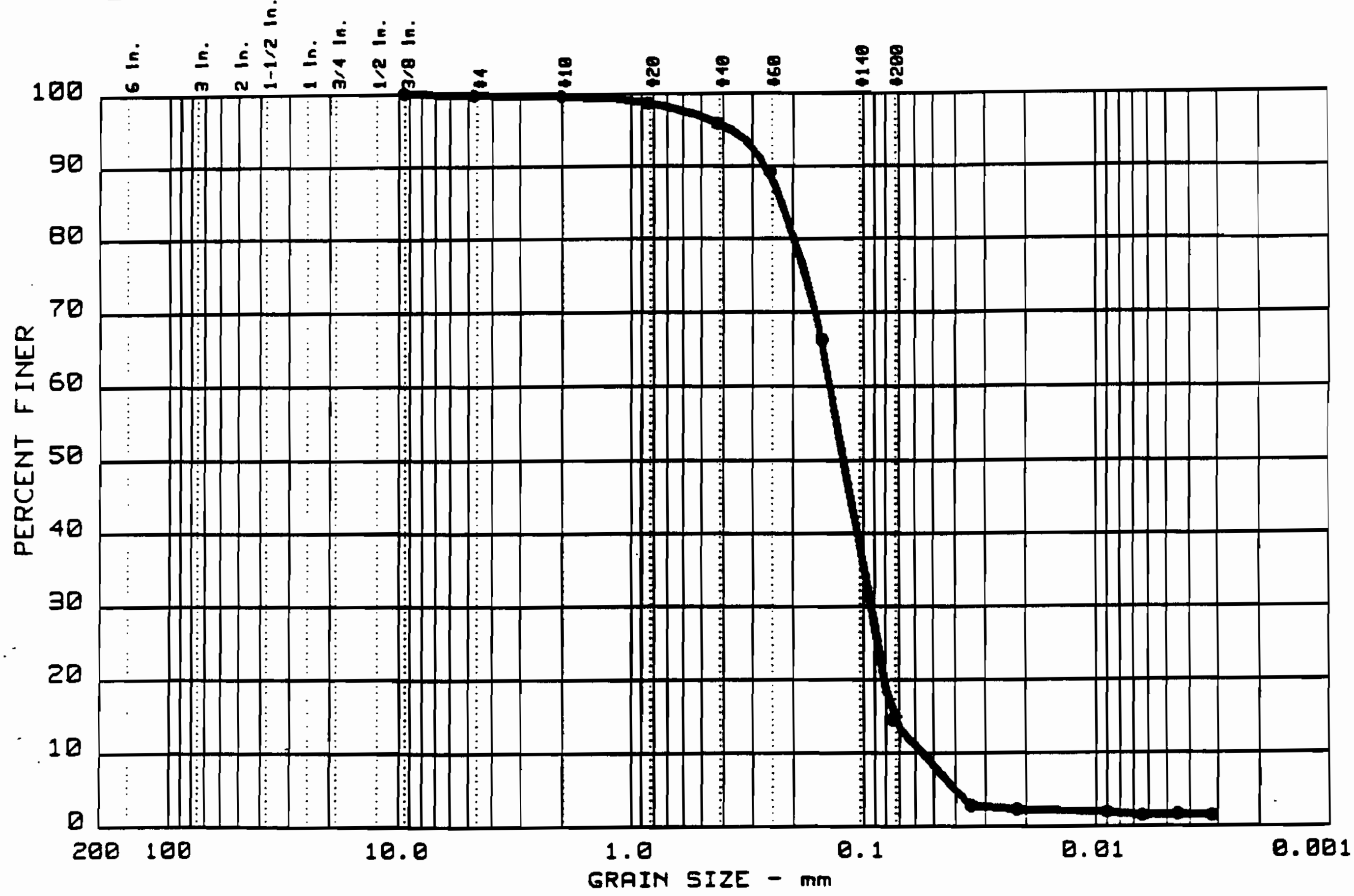
Moisture Content

$$M = \frac{(7.5\% + 21.8\%)}{2} = 14.65\%$$

Silt Content

$$s = \frac{(13\% + 2.5\%)}{2} = 7.75\%$$

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	12	0.0	0.2	85.2	13.0	1.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.22	0.14	0.12	0.092	0.0750	0.0550	1.12	2.5

MATERIAL DESCRIPTION	USCS	AASHTO
● TAN SAND, Little Silt, trace clay & gravel		

Project No.: G008.018

Project: PLATTSBURGH AIR FORCE BASE

● Location: WB-MW-29-001 / 2'- 4'

Date: DECEMBER 5, 1994

Remarks:

CLIENT: URS CONSULTANTS

WATER CONTENT: 7.5%

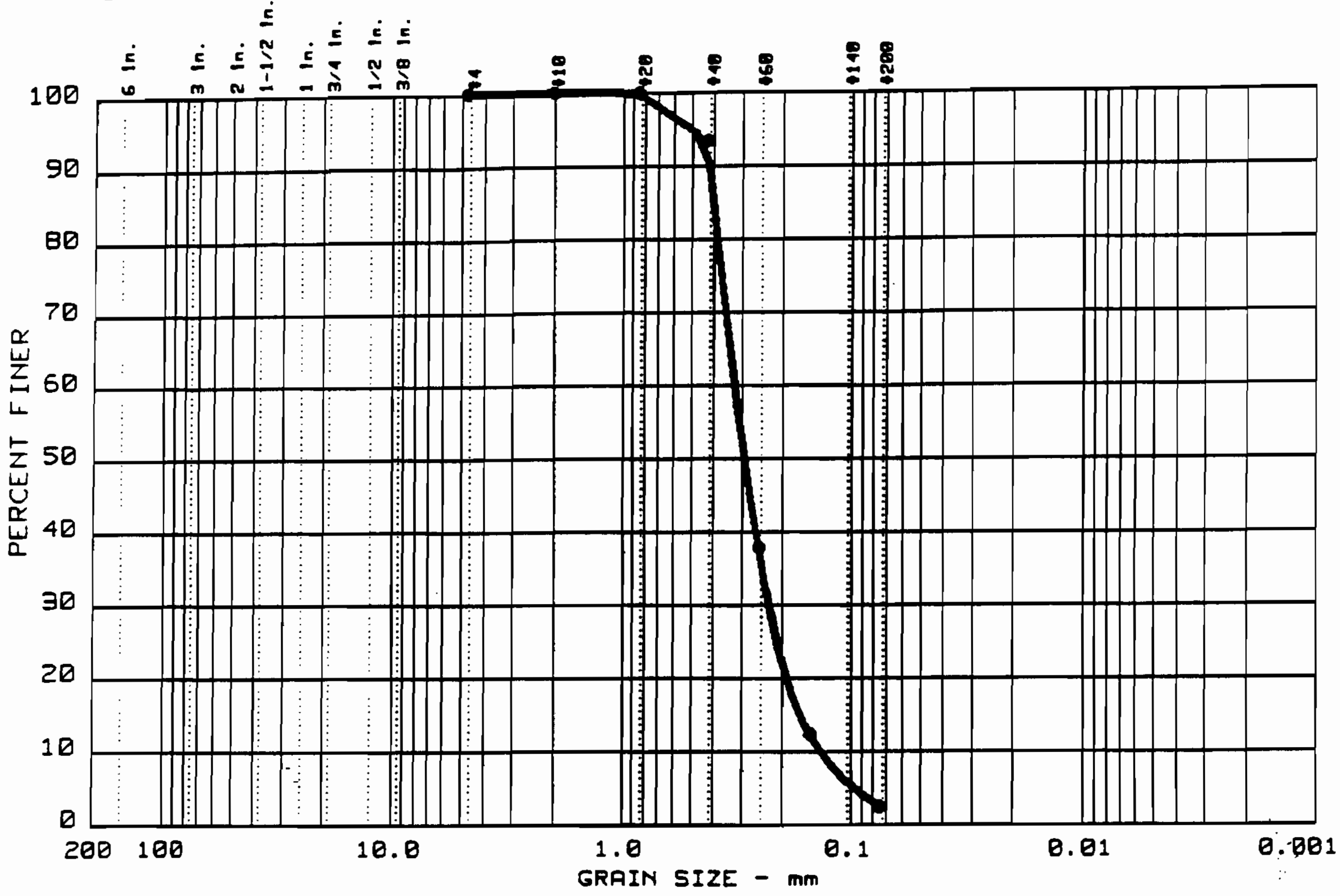
LAB NO. 2168.012

GRAIN SIZE DISTRIBUTION TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	13	0.0	0.0	97.5	2.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.40	0.32	0.29	0.227	0.1642	0.1335	1.20	2.4

MATERIAL DESCRIPTION	USCS	AASHTO
● TAN SAND, trace fines		

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-29-001 / 6'- 8'

Date: DECEMBER 5, 1994

Remarks:
CLIENT: URS CONSULTANTS
WATER CONTENT: 21.8%

LAB NO. 2168.013

GRAIN SIZE DISTRIBUTION TEST REPORT
HUNTINGDON ENGINEERING & ENVIRONMENTAL

Figure No. 1

SITE: SS-029
GEOTECHNICAL ANALYSIS SUMMARY

Sample Location/Depth	GRAIN SIZE DISTRIBUTION				USCS Class*	Water Content	Permeability (Vertical/cm/s)
	% Gravel	% Sand	% Silt	% Clay			
WB-MW-29-001/2'-4'	0.2	85.2	13.0	1.6	SM	7.5%	
WB-MW-29-001/6'-8'	0.0	97.5	2.5		SP	21.8%	
SB-16-004/45'-47'	0.0	29.9	63.8	6.3	ML	23.5%	---
SB-16-004/55'-57'	0.0	5.1	60.0	34.9	CL	28.1%	---
SB-16-005/25'-27'	0.4	97.0	2.6	0.0	SP	19.2%	---
SB-16-005/60'-62'	0.0	4.8	26.0	69.2	CL	31.6%	---
MW-16-004/15'-17'	0.0	97.7	1.9	0.4	SP	19.0%	---
MW-16-004/59'-61'	0.0	10.2	50.0	39.8	CL	28.7%	---
MW-16-005/15'-17'	1.5	83.8	11.8	2.9	SP	5.3%	---
MW-16-005/59'-61'	0.0	7.6	75.0	17.4	ML	20.7%	---
SB-16-005/62'-64'	0.0	4.1	18.8	77.1	CH	42.4%	$3.78X10^{8}$
MW-16-006/24'-26'	0.9	89.2	8.9	1.0	SP	18.1%	---
MW-16-006/60'-61'	1.0	3.4	18.2	77.4	CH	46.0%	---
MW-16-007/30'-32'	0.0	75.4	22.1	2.5	SM	19.1%	---

United States
Environmental Protection
Agency

Office of Health and
Environmental Assessment
Washington DC 20460

EPA [illegible]
February 1985

PB85-192219

Research and Development

EPA

Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites

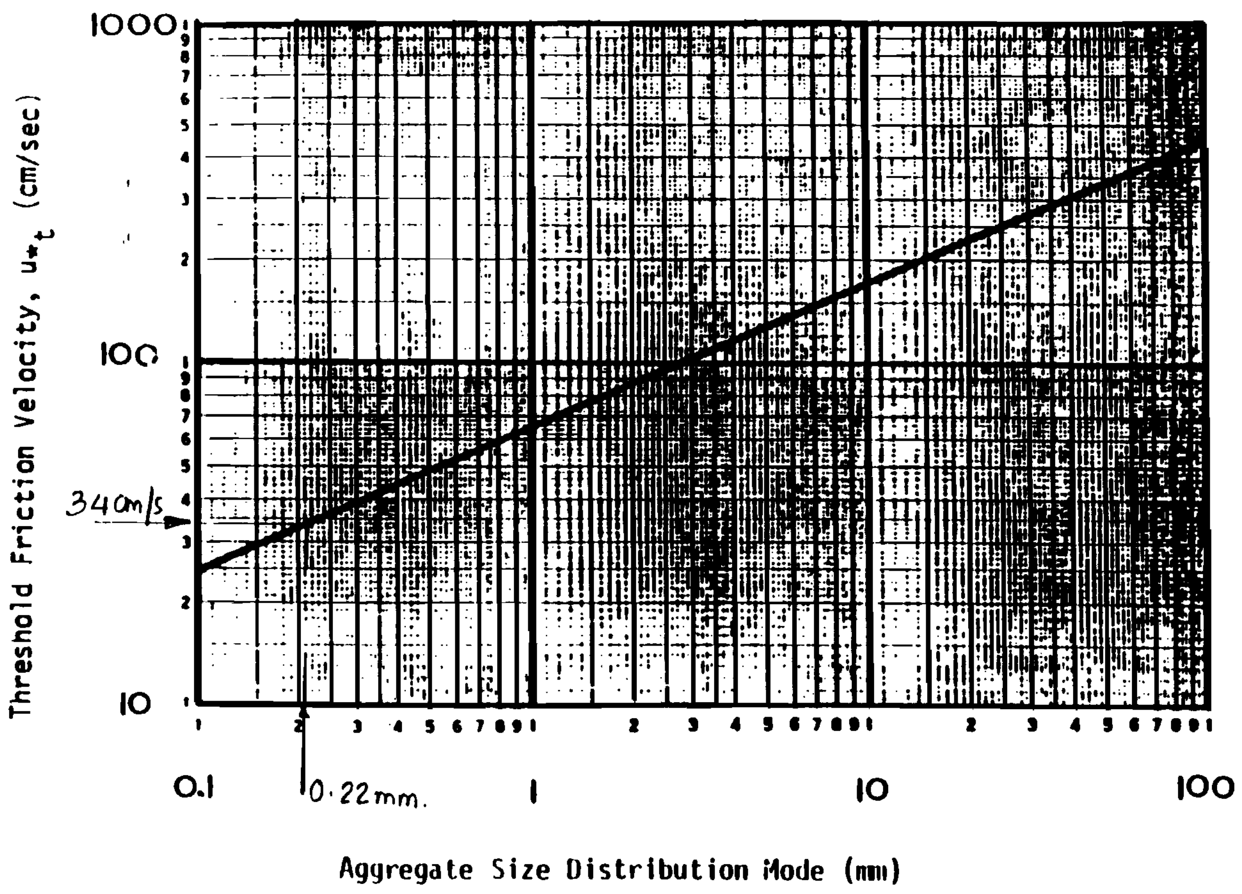


Figure 3-4. Relationship of Threshold Friction Velocity to Size Distribution Mode

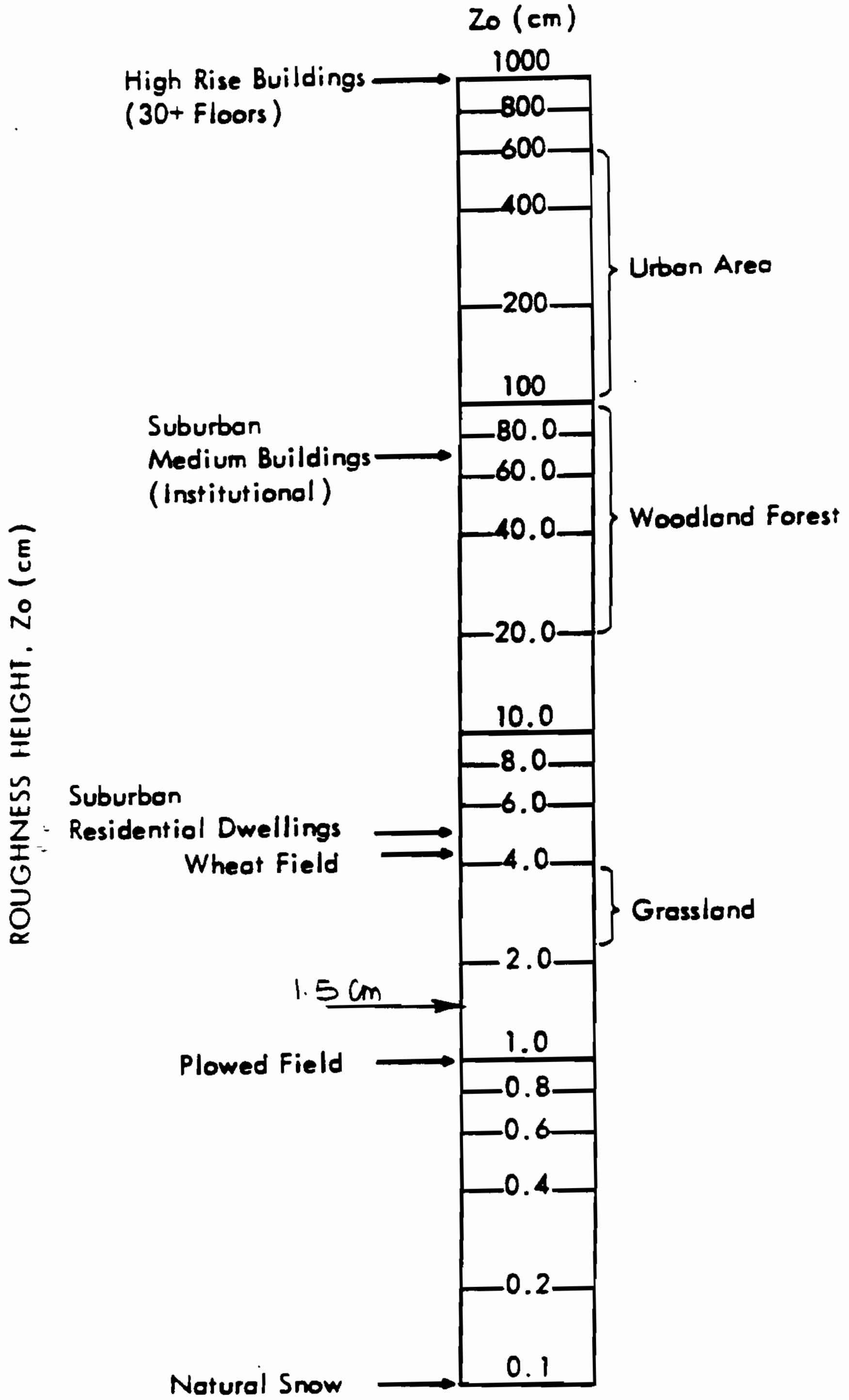


Figure 3-6. Roughness Heights for Various Surfaces (Cowherd and Guenther, 1976)

TABLE 4-1. FASTEST MILE[a] [u^+] AND MEAN WIND SPEED[b] [u] FOR SELECTED UNITED STATES STATIONS

Station	State	[u^+] (m/s)	[u] (m/s)	Station	State	[u^+] (m/s)	[u] (m/s)
Birmingham	AL	20.8	3.3	Detroit	MI	21.8	4.6
Montgomery	AL	20.2	3.0	Grand Rapids	MI	21.6	4.5
Tucson	AZ	23.0	3.7	Lansing	MI	23.7	4.6
Yuma	AZ	21.8	3.5	Sault St. Marie	MI	21.6	4.3
Fort Smith	AR	20.8	3.4	Duluth	MN	22.8	5.1
Little Rock	AR	20.9	3.6	Minneapolis	MN	22.0	4.7
Fresno	CA	15.4	2.8	Jackson	MS	20.5	3.4
Red Bluff	CA	23.3	3.9	Columbia	MO	22.4	4.4
Sacramento	CA	20.6	3.7	Kansas City	MO	22.6	4.6
San Diego	CA	15.4	3.0	St. Louis	MO	21.2	4.2
Denver	CO	22.0	4.1	Springfield	MO	22.4	5.0
Grand Junction	CO	23.6	3.6	Billings	MT	26.6	5.1
Pueblo	CO	28.1	3.9	Great Falls	MT	26.4	5.9
Hartford	CT	20.2	4.0	Havre	MT	25.9	4.5
Washington	DC	21.6	3.4	Helena	MT	24.7	3.5
Jacksonville	FL	21.7	3.8	Missoula	MT	21.6	2.7
Tampa	FL	22.2	3.9	North Platte	NE	27.7	4.6
Atlanta	GA	21.2	4.1	Omaha	NE	24.6	4.8
Macon	GA	20.1	3.5	Valentine	NE	27.1	4.8
Savannah	GA	21.3	3.6	Ely	NV	23.6	4.7
Boise	ID	21.4	4.0	Las Vegas	NV	24.4	4.0
Pocatello	ID	23.8	4.6	Reno	NV	25.2	2.9
Chicago	IL	21.0	4.6	Winnemucca	NV	22.4	3.5
Moline	IL	24.5	4.4	Concord	NH	19.2	3.0
Peoria	IL	23.2	4.6	Albuquerque	NM	25.6	4.0
Springfield	IL	24.2	5.1	Roswell	NM	26.0	4.1
Evansville	IN	20.9	3.7	Albany	NY	21.4	4.0
Fort Wayne	IN	23.7	4.6	Binghampton	NY	22.0	4.6
Indianapolis	IN	24.8	4.3	Buffalo	NY	24.1	5.5
Burlington	IA	25.0	4.6	New York	NY	22.5	5.5
Des Moines	IA	25.8	5.0	Rochester	NY	23.9	4.3
Sioux City	IA	25.9	4.9	Syracuse	NY	22.5	4.4
Concordia	KS	25.7	5.4	Cape Hatteros	NC	25.9	5.1
Dodge City	KS	27.1	6.3	Charlotte	NC	20.0	3.4
Topeka	KS	24.4	4.6	Greensboro	NC	18.9	3.4
Wichita	KS	26.0	5.6	Wilmington	NC	22.3	4.0
Louisville	KY	22.0	3.8	Bismarck	ND	26.1	4.7
Shreveport	LA	19.9	3.9	Fargo	ND	26.6	5.7
Portland	ME	21.7	3.9	Cleveland	OH	23.6	4.8
Baltimore	MD	25.0	4.2	Columbus	OH	22.1	3.9
Boston	MA	25.2	5.6	Dayton	OH	24.0	4.6

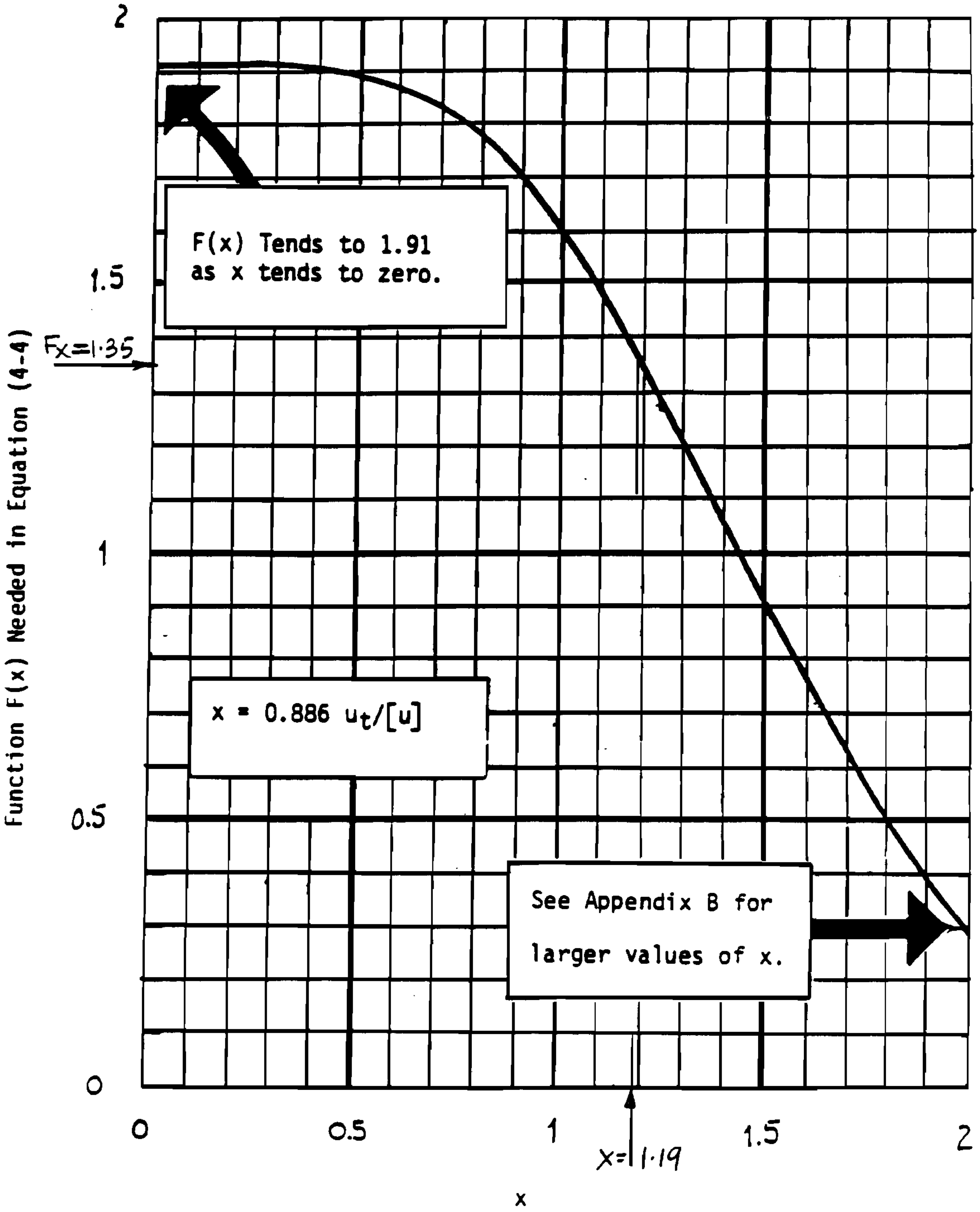
TABLE 4-1 (concluded)

Station	State	$[u^+]$ (m/s)	$[u]$ (m/s)	Station	State	$[u^+]$ (m/s)	$[u]$ (m/s)
Toledo	OH	22.7	4.2	Dallas	TX	21.9	4.9
Oklahoma City	OK	24.1	5.7	El Paso	TX	24.8	4.2
Tulsa	OK	21.4	4.7	Port Arthur	TX	23.7	4.5
Portland	OR	23.5	3.5	San Antonio	TX	21.0	4.2
Harrisburg	PA	20.4	3.4	Salt Lake City	UT	22.6	3.9
Philadelphia	PA	22.1	4.3	Burlington	VT	20.4	3.9
Pittsburgh	PA	21.6	4.2	Lynchburg	VA	18.3	3.5
Scranton	PA	19.9	3.8	Norfolk	VA	21.8	4.7
Huron	SD	27.4	5.3	Richmond	VA	18.9	3.4
Rapid City	SD	27.3	5.0	Quillayute	WA	16.3	3.0
Chattanooga	TN	21.4	2.8	Seattle	WA	18.7	4.1
Knoxville	TN	21.8	3.3	Spokane	WA	21.4	3.9
Memphis	TN	20.3	4.1	Green Bay	WI	25.3	4.6
Nashville	TN	20.9	3.6	Madison	WI	24.9	4.4
Abilene	TX	24.4	5.4	Milwaukee	WI	24.0	5.3
Amarillo	TX	27.3	6.1	Cheyenne	WY	27.0	5.9
Austin	TX	20.2	4.2	Lander	WY	27.4	3.1
Brownsville	TX	19.5	5.3	Sheridan	WY	27.5	3.6
Corpus Christi	TX	24.4	5.4	Elkins	WV	22.8	2.8

---

[a] Data taken from Extreme Wind Speeds at 129 Stations in the Contiguous United States. Simiu, E., Filliben, J. J., and M. J. Changery. NBS Building Science Series 118. U.S. Department of Commerce, National Bureau of Standards, 1979.

[b] Data taken from Local Climatological Data - Annual Summaries for 1977. U.S. Department of Commerce, National Oceanic and Atmospheric Administration/Environmental Data Service/National Climatic Data Center.



F(x) Tends to 1.91 as x tends to zero.

$x = 0.886\, u_t/[u]$

See Appendix B for larger values of x.

Figure 4-3. Graph of Function F(X) Needed to Estimate Unlimited Erosion

MEAN NUMBER OF DAYS WITH 0.01 INCH OR MORE OF PRECIPITATION, ANNUAL

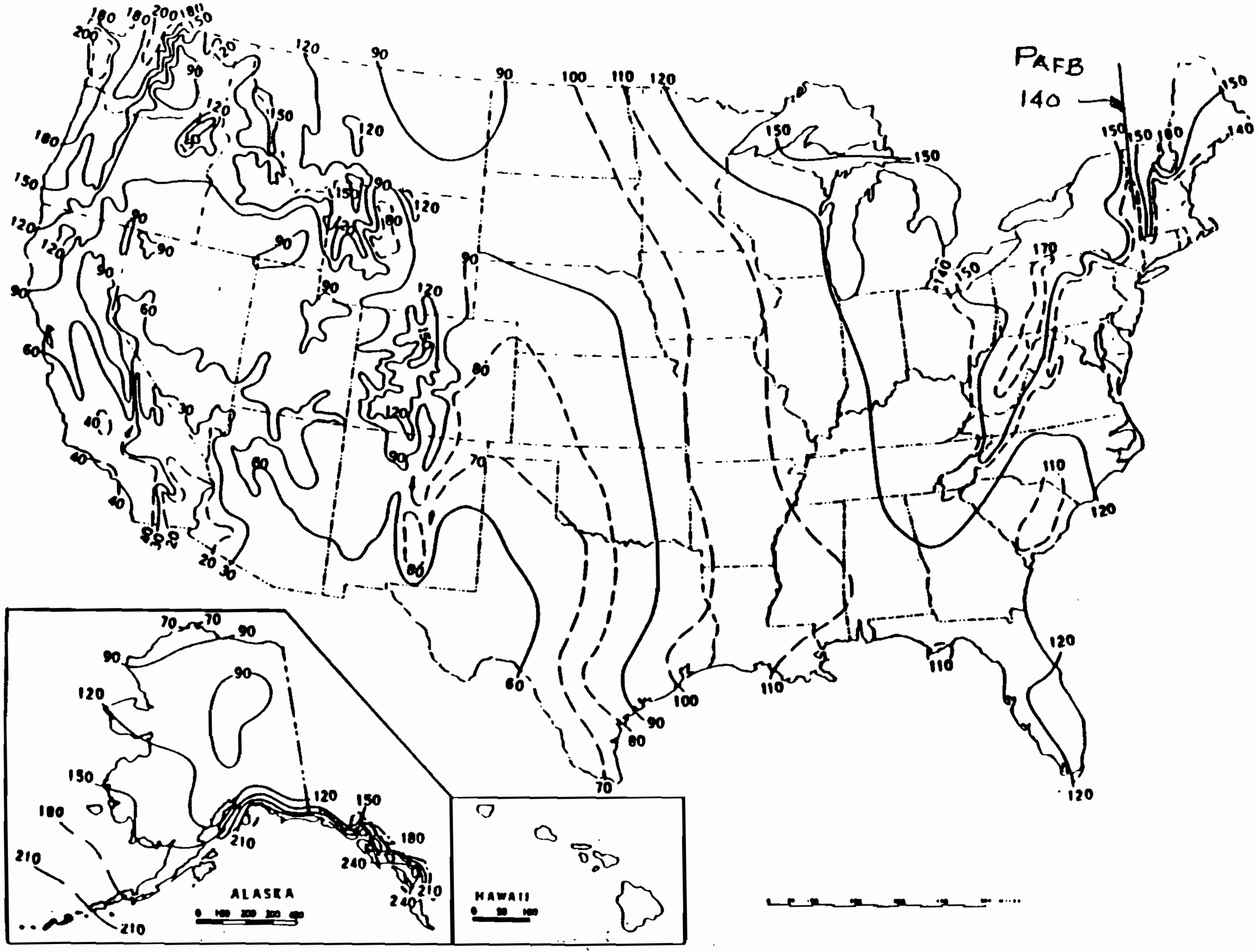


Figure 4-4. Map of Precipitation Frequency

Step 1 - Estimation of Emissions

The technical approach for estimating respirable (PM_{10}) emissions from surface contamination sites is consistent with the technique used in air pollution assessments. It is based on the following equation:

$$R_{10} = \alpha E_{10} A \tag{2-1}$$

where R_{10} = emission rate of contaminant as PM_{10} (mass/time)

α = fraction of contaminant in PM_{10} emissions (mass/mass)

E_{10} = PM_{10} emission factor (mass/source extent)

A = source extent (source-dependent units)

The emission factor is simply the ratio of uncontrolled emissions per unit of source extent. For wind erosion, the source extent is the area of erodible surface. In the case of emissions generated by mechanical disturbance, source extent is also the area (or volume) of the material from which the emissions emanate. Normally, the "uncontrolled" emission factor incorporates the effects of natural mitigation (e.g., rainfall). If anthropogenic control measures (e.g., treating the surface with a chemical binder which forms an artificial crust) are applied to the source, the uncontrolled emission factor must be reduced to reflect the resulting fractional control.

The first step in the estimation of atmospheric particulate emissions from a surface contamination site is to decide whether potential emissions are limited to those generated by wind erosion. If traffic over the site occurs, it is likely that the traffic emissions (or emissions from other forms of mechanical disturbance) substantially exceed emissions from wind erosion. This is because, for most parts of the country, vehicle traffic is an intensive entrainment mechanism in comparison with wind erosion.

For estimation of emissions from traffic on unpaved surfaces, a predictive emission factor equation is recommended in Section 4. This equation, developed from regression analysis of field test data, explains much of the observed variance in road dust emission factor values on the basis of variances in specific road surface and traffic parameters. Thus it provides more reliable estimates of source emissions on a site specific basis than does a single-valued average emission factor. The appropriate measure of source extent for this emission factor is obtained by converting traffic counts and road segment lengths into the total vehicle-distance traveled; in effect this represents the cumulative road surface area from which the emissions are released.

For estimating emissions from wind erosion, either of two emission factor equations are recommended in Section 4 depending on the erodibility of the surface material. In both cases, the appropriate measure of source

u^+ = observed (or probable) fastest mile of wind for the period between disturbances (m/s)

$P(u^+)$ = erosion potential, i.e., quantity of erodible particles present on the surface prior to the onset of wind erosion (g/m²)

V = fraction of contaminated surface area covered by continuous vegetative cover (equals 0 for bare soil)

PE = Thornthwaite's Precipitation Evaporation Index used as a measure of average soil moisture content

Although Equation 4-1 is based primarily on field tests of nonsoil surfaces (e.g., coal with a top size of 3 cm and a silt content exceeding 4%), subsoil and other crustal materials showed similar behavior. The erosion potential (in g/m²) depends on the fastest mile (in m/s) as follows:

$$P(u^+) = \begin{cases} 6.7\,(u^+ - u_t), & u^+ \geq u_t \\ 0 \qquad\qquad\quad , & u^+ < u_t \end{cases} \qquad (4\text{-}2)$$

where u_t is the erosion threshold wind speed (in m/s), measured at a typical weather station sensor height of 7 m.

The threshold friction velocity determined from the site survey is converted to the equivalent wind speed at a height of 7 m using Figure 4-1. This figure assumes a logarithmic velocity profile near the earth's surface:

$$\frac{u(z)}{u_*} = \frac{1}{0.4} \ln (z/zo) \qquad (4\text{-}3)$$

where:
u = wind speed at height z (m/s)
z = height above surface (cm)
u_* = friction velocity (m/sec)
z_o = roughness height (cm)

Mean annual fastest mile (u^+) values are presented in Table 4-1. The value for the weather station closest to the surface contamination site should be used.

Emissions generated by wind erosion of "limited reservoir" surfaces are also dependent on the frequency of disturbance (f) of the erodible surface, because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action which results in the exposure of fresh surface material. This would occur whenever aggregate material is either added to or removed from the old surface. A disturbance of an exposed area may also result from the turning of surface material to a depth exceeding the size of the largest pieces of material present.

Although vehicular traffic alters the surface by pulverizing surface material, several vehicle passes may be required to restore the full erosion potential, except for surfaces that crust before substantial wind erosion occurs. In that case, breaking of the crust over the area of the tire/surface contact once again exposes the erodible material beneath.

Thornthwaites' P-E (PE) Index is a useful indicator of average surface soil moisture conditions. In the present context, the P-E Index is applied as a correction parameter for wind generated emissions in the limited reservoir case. Figure 4-2 provides a basis for selecting an appropriate P-E value.

The worst-case emission rate is calculated by assuming that a disturbance occurs just prior to the annual fastest mile event, both within the 24-h period of interest. For this calculation, use Equation (4-1) with $f = 30\ \text{mo}^{-1}$.

4.1.2 Wind Erosion from Surfaces with Unlimited Erosion Potential

For estimating respirable particulate emissions from wind erosion of surfaces with an "unlimited reservoir" of erodible particles, a predictive emission factor equation developed from Gillette's (1981) field measurements of highly erodible soils is recommended. In relating the annual average rate of respirable particulate emissions (per unit area) to field and climatic factors, the equation takes the following form:

$$E_{10} = 0.036\ (1-V) \left(\frac{[u]}{u_t}\right)^3 F(x) \qquad (4\text{-}4)$$

where:

E_{10} = PM_{10} emission factor, i.e., annual average PM_{10} emission rate per unit area of contaminated surface (g/m^2-hr)

V = fraction of contaminated surface vegetative cover (equals 0 for bare soil)

$[u]$ = mean annual wind speed (m/s), taken from Table 4-1

$x = 0.886\ u_t/[u]$ = dimensionless ratio

$F(x)$ = function plotted in Figure 4-3

u_t = threshold value of wind speed at 7 m (m/s)

This follows from the empirical relationship that the vertical flux of particles smaller than 10 µm diameter is proportional to the cube of wind speed. Because highly erodible soils do not readily retain moisture, no moisture-related parameter is included in the equation.

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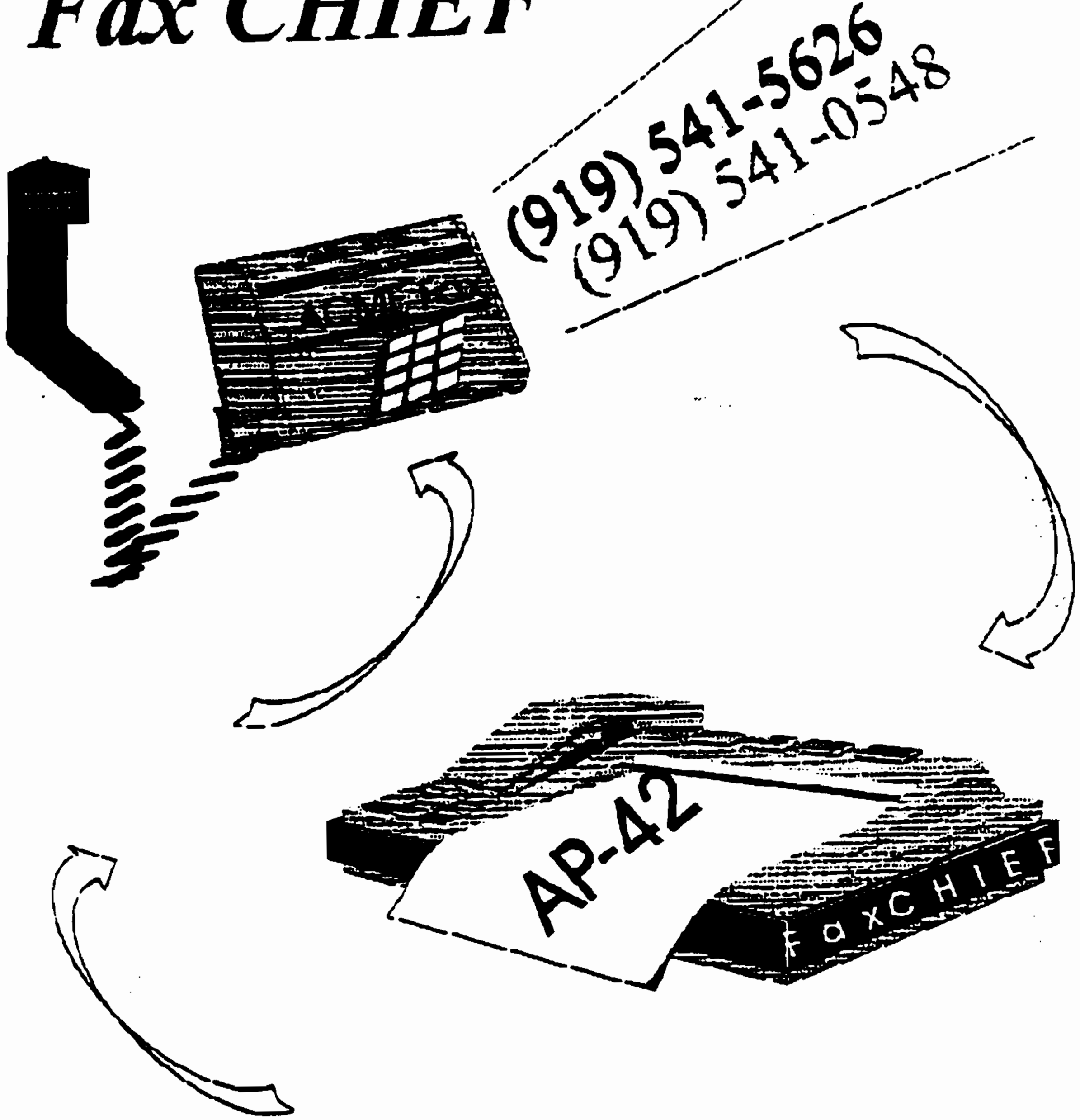

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Index (Document #001) updated on February 22, 1995

13.2.1 UNPAVED ROADS

13.2.1.1 General

Dust plumes trailing behind vehicles traveling on unpaved roads are a familiar sight in rural areas of the United States. When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

13.2.1.2 Emissions Calculation And Correction Parameters

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on correction parameters (average vehicle speed, average vehicle weight, average number of wheels per vehicle, road surface texture and road surface moisture) that characterize the condition of a particular road and the associated vehicle traffic.[1-4]

Dust emissions from unpaved roads have been found to vary in direct proportion to the fraction of silt (particles smaller than 75 micrometers in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. Table 13.2.1-1 summarizes measured silt values for industrial and rural unpaved roads.

Since the silt content of a rural dirt road will vary with location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall. The temporary reduction in emissions caused by precipitation may be accounted for by not considering emissions on "wet" days (more than 0.254 millimeters [0.01 inches] of precipitation).

The following empirical expression may be used to estimate the quantity of size specific particulate emissions from an unpaved road, per vehicle kilometer traveled (VKT) or vehicle mile traveled (VMT):

$$E = k(1.7)\ \overset{s}{\left(\frac{s}{12}\right)}\overset{S}{\left(\frac{S}{48}\right)}\overset{W}{\left(\frac{W}{2.7}\right)}^{0.7}\ \overset{w}{\left(\frac{w}{4}\right)}^{0.5}\ \left(\frac{365-p}{365}\right)\ (\mathrm{kg/VKT})$$

(1)

$$E = k(5.9)\ \left(\frac{s}{12}\right)\left(\frac{S}{30}\right)\left(\frac{W}{3}\right)^{0.7}\ \left(\frac{w}{4}\right)^{0.5}\ \left(\frac{365-p}{365}\right)\ (\mathrm{lb/VMT})$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
s = silt content of road surface material (%)
S = mean vehicle speed, km/hr (mph)
W = mean vehicle weight, Mg (ton)
w = mean number of wheels
p = number of days with at least 0.254 mm (0.01 in.) of precipitation per year (see discussion below about the effect of precipitation.)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range as follows:

Aerodynamic Particle Size Multiplier For Equation					
≤30 μm[a]	≤30 μm	≤15 μm	≤10 μm	≤5 μm	≤2.5 μm
1.0	0.80	0.50	0.36	0.20	0.095

[a] Stokes diameter.

The number of wet days per year, p, for the geographical area of interest should be determined from local climatic data. Figure 13.2.1-1 gives the geographical distribution of the mean annual number of wet days per year in the United States.[17] The equation is rated "A" for dry conditions (p = 0) and "B" for annual or seasonal conditions (p > 0). The lower rating is applied because extrapolation to seasonal or annual conditions assumes that emissions occur at the estimated rate on days without measurable precipitation and, conversely, are absent on days with measurable precipitation. Clearly, natural mitigation depends not only on how much precipitation falls, but also on other factors affecting the evaporation rate, such as ambient air temperature, wind speed, and humidity. Persons in dry, arid portions of the country may wish to base p (the number of wet days) on a greater amount of precipitation than 0.254 millimeters (0.01 inch). In addition, Reference 18 contains procedures to estimate the emission reduction achieved by the application of water to an unpaved road surface.

The equation retains the assigned quality rating, if applied within the ranges of source conditions that were tested in developing the equation, as follows:

Ranges Of Source Conditions for Equation					
Road Silt Content (wt %)	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels
	Mg	ton	km/hr	mph	
4.3 - 20	2.7 - 142	3 - 157	21 - 64	13 - 40	4 - 13

Moreover, to retain the quality rating of the equation when addressing a specific unpaved road, it is necessary that reliable correction parameter values be determined for the road in question. The field

13.2.2 AGGREGATE HANDLING AND STORAGE PILES

13.2.2.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, such as material loading onto the pile, disturbances by strong wind currents, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

13.2.2.2 Emissions And Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Emissions also depend on three parameters of the condition of a particular storage pile: age of the pile, moisture content, and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, the potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents, either from aggregate transfer itself or from high winds. As the aggregate pile weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and then the drying process is very slow.

Silt (particles equal to or less than 75 microns in diameter) content is determined by measuring the portion of dry aggregate material that passes through a 200-mesh screen, using ASTM-C-136 method.[1] Table 13.2.2-1 summarizes measured silt and moisture values for industrial aggregate materials.

13.2.2.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

Table 13.2.2-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. of Samples	Range	Mean	No. of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	-	17
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	-	15	1	-	6.6
		Sinter	1	-	0.7	0	-	-
		Limestone	3	0.4 - 2.3	1.0	2	NA	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	NA	11	1	-	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	-	-
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	-	2.6	1	-	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	-	9.2	1	-	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	-	12	1	-	11

[a] References 1 - 10. NA = Not Available.

The quantity of particulate emissions generated by either type of drop operation, per kg (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

$$E = k(0.0016)\ \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ \text{(kg/Mg)}$$

$$E = k(0.0032)\ \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ \text{(lb/ton)}$$

where:
E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, m/s (mph)
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) for Equation

< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
0.74	0.48	0.35	0.20	0.11

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the two was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced one quality rating level, if the silt content used in a particular application falls outside the range given:

Ranges Of Source Conditions For Equation

Silt Content (%)	Moisture Content (%)	Wind Speed	
		(m/s)	(mph)
0.44 - 19	0.25 - 4.8	0.6 - 6.7	1.3 - 15

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site specific values for

Construction Phase	Dust-Generating Activities	Recommended Emission Factor	Comments	Rating Adjustment[a]
	5. Loading of excavated material into trucks	Material handling factor in Section 13.2.2		$-0/-1^b$
	6. Truck dumping of fill material, road base, or other materials	Material handling factor in Section 13.2.2	May occur off-site	$-0/-1^b$
	7. Compacting	Dozer equation in Table 11.24-1, -2	Emission factor downgraded because of differences in operating equipment	$-1/-2^b$
	8. Motor grading	Grading equation in Table 11.24-1, -2		$-1/-2^b$
III. General Construction	1. Vehicular traffic	Unpaved road emission factor in Section 13.2.1, or Paved road emission factor in Section 13.2.4		$-0/-1^b$ $-0/-1^b$
	2. Portable plants			
	2a. Crushing	Factors for similar material/operations in Section 11 of this document		$-1/-2^b$
	2b. Screening	Factors for similar material/operations in Section 11 of this document		$-1/-2^b$
	2c. Material transfers	Material handling factor in Section 13.2.2		$-0/-1^b$
	3 Other operations	Factors for similar material/operations in Section 11 of this document		—

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III.B.5. Calculate the maximum Short-Term Impact, C_{ST}, from the area source using the equation below:

$$C_{ST}\ (ug/m3) = C_p\ \ 100.$$

where C_p is the maximum Potential Annual Impact as defined above.

III.C. ALTERNATE AREA SOURCE METHOD

The following alternate area source method was developed specifically for remediation projects and urban scale emissions. It has the flexibility to permit the calculation of the maximum annual concentration within an area source. Annual impacts may be estimated both within and downwind from an area source. However, the method has not been modified to estimate short-term impacts. The method will perform better the closer the source characteristics and assumptions approximate those specified in Section IV.G. The contribution from nearby area sources can be calculated by the procedures outlined below. Only sources located within a distance of 3S (S is the length of a side of the area source) from the source being analyzed need be considered. The method can calculate impacts at receptor distances from the source boundary to a distance of 2.5S from the area source. This range encompasses practically all cases of interest in these types of applications.

The following procedures are valid for ground level area sources, effectively less than 10 feet in height, with side lengths greater than 330 feet:

III.C.1. Determine the area source emission rate (Q_A) in units of $lb/(hr\text{-}ft^2)$ by dividing the total annual emission rate, Q_a (lb/hr), by the area, A (ft^2), of the source.

$$Q_A \frac{(\ lb\ )}{(hr\text{-}ft^2)} = \frac{(\text{emission rate})}{(\text{area})} = \frac{Q_a}{A}$$

III.C.2. Calculate the maximum Actual Annual Impact, C_a, within the area source as defined below:

$$C_a(ug/m^3) = K \quad Q_A \quad C_m$$

Where:
K = 15 for 330 ft $\leq$ S< 3300 ft
K = 30 for S $\geq$ 3300 ft
C_m = 1.355 x 10^6, a conversion factor from $lb/(hr\text{-}ft^2)$ to $ug/m^2\text{-}sec$).

APPENDIX L
TOXICOLOGICAL PROFILES

JET ENGINE TEST CELL (SS-029)
SITE INVESTIGATION
TOXICOLOGICAL PROFILES

ACETONE

Acetone is a volatile ketone commonly used as a solvent for waxes, oils, resins, rubber, plastic, lacquers, varnishes, and rubber cement. It is also used in the production of lubricating oils, pharmaceuticals, and pesticides. Acetone is a colorless liquid with a sweetish odor. Limited information on the transport and fate of acetone was found in the literature reviewed. However, ketones in general are probably not very persistent. Acetone has a high vapor pressure and, therefore, would be expected to volatilize readily; however, because of its high water solubility, volatilization is probably limited. Once in the atmosphere, it is apparently oxidized. Acetone has a low K_{ow} and, therefore, is probably not readily adsorbed to soil. Biodegradation is probably important in determining the fate of acetone in the environment because of its aliphatic nature.

Acetone is considered to have rather low toxicity. Acute and chronic inhalation of acetone concentrations exceeding 500 ppm can cause eye and upper respiratory tract irritation and headaches. Nausea and other gastrointestinal (GI) effects also have been reported. No serious chronic health hazards have been associated with long-term, low-level exposure to it. Short-term inhalation of acetone vapors causes no detectable effects at acetone concentrations below 500 ppm. Ten unacclimatized volunteers exposed to a single 5-minute dose of 500 ppm reported ocular and nasal irritation, but experienced little effect at lower concentrations (Nelson et al. 1943).

Inhalation of small quantities of acetone over long periods of time can cause irritation of the respiratory tract, coughing, and headache. Workers exposed to 700 to 1,000 ppm of acetone for 3 hours/day over many years complained of respiratory tract irritation, GI disturbances, dizziness, and loss of strength (Vigliani and Zurlo 1955). Workers exposed 8 hours/day to time-weighted average (TWA) acetone concentrations of about 1,000 ppm, with transient exposures to 6,500 ppm, frequently reported eye irritation. Other effects (e.g., headache, light-headedness, and nose and throat irritation) occurred intermittently and may have been due to exposures in excess of 1,000 ppm.

ARSENIC

Arsenic is present as an impurity in many metal ores and is produced as a by-product in the smelting of these ores, particularly copper. It is labeled as a poison and is used in a variety of industries: agricultural, insecticides, herbicides, pharmaceuticals, pigment production, and manufacturing of glass. This substance has been listed as a carcinogen. The USEPA's weight-of-evidence classification as to human carcinogenicity is listed as Group A based on observation of increased lung cancer mortality in populations exposed primarily through inhalation and an increased skin cancer incidence in several populations consuming drinking water with high arsenic concentrations.

Arsenic can be ingested or inhaled through dust and fumes. Acute toxic effects generally are seen following ingestion of the compound. Symptoms may develop within one-half to four hours following ingestion and are characterized by constriction of the throat followed by dysphagia, epigastric pain, vomiting, and water diarrhea. Exfoliative dermatitis and peripheral neuritis also may develop. If large amounts of arsenic are ingested, shock may result due to severe fluid loss, and death may ensue within 24 hours. Chronic arsenic poisoning due to ingestion is rare. Although acute cases due to inhalation are rare, it can result in symptoms of weight loss, nausea, eruption of the skin, loss of hair, and peripheral neuritis. Horizontal white lines (striations) on the fingernails and toenails are commonly seen in chronic arsenic poisoning. Liver damage from chronic poisoning is still debated.

BENZO(a)ANTHRACENE

Benzo(a)anthracene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke or soot. Benzo(a)anthracene is found in coal tar pitch used by industry as an adhesive. This chemical combines with dust particles in the air and is carried into water and soil and onto crops.

Benzo(a)anthracene produced tumors in mice exposed by gavage, intraperitoneal, subcutaneous, or intramuscular injection and topical application. Benzo(a)anthracene produced mutations in bacteria and in mammalian cells, and transformed mammalian cells in culture. Although there are no human data that specifically link exposure to benzo-anthracene to human cancers, benzo(a)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke.

BENZO(a)PYRENE

Benzo(a)pyrene is a polycyclic aromatic hydrocarbon (PAH) compound. It is formed when any organic material burns and is usually found in smoke and soot as a combustion by-product. Benzo(a)pyrene is found in coal tar pitch used by industry, as an adhesive and in creosote. People may be exposed to benzo(a)pyrene from environmental sources such as air, water, and soil, and from tobacco smoke and overcooked food. Typical exposure is not usually to benzo(a)pyrene alone, but to a mixture of similar chemicals.

Short-term and intermediate oral exposure to very high levels of benzo(a)pyrene resulted in death in experimental animals. The induction of cancer is the key endpoint of toxicity in animals following chronic exposures to lower doses of benzo(a)pyrene in the diet. Lethal effects from high doses of benzo(a)pyrene were caused by bone marrow depression. There is no information available for the potential human carcinogenicity following oral benzo(a)pyrene exposure. Studies with experimental animals have produced leukemia and tumors of the forestomach and lung following intermediate exposure in mice.

No short-term or intermediate inhalation exposure effects are available for benzo(a)pyrene. The induction of cancer is the key long-term effect. Benzo(a)pyrene is a moderately potent experimental carcinogen in many species by many routes of exposure. There are no reports directly correlating human benzo(a)pyrene exposure and tumor development, although humans are likely to be exposed by all routes.

BENZO(b)FLUORANTHENE

Benzo(b)fluoranthene is a polycyclic aromatic hydrocarbon (PAH) that is formed during combustion of fossil fuels and organic material. In its pure form, is a colorless crystalline solid.

There are no data available to assess significant exposure levels of benzo(b)fluoranthene alone for humans. Reports of adverse health effects such as carcinogenicity by the inhalation and dermal routes of exposure exist for mixtures that include benzo(b)fluoranthene, thus providing some information to qualitatively assess its role as a human carcinogen. It is a carcinogen via various routes; a poison to rats via subcutaneous route; a contaminant in food, water, and smoke; and an experimental teratogen, neoplastic agent, and mutagen.

BENZO(k)FLUORANTHENE

Benzo(k)fluoranthene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Benzo(k)fluoranthene is found in coal tar pitch used by industry as an adhesive.

Typical exposure occurs in mixtures of PAHs rather than to benzo(k)fluoranthene alone. The most common way it enters the body is through the lungs when a person breathes in air or smoke containing it. It also enters the body through the digestive system when substances containing it are swallowed. Although benzo(k)fluoranthene does not normally enter the body through the skin, small amounts could enter if contact occurs with soil that contains high levels of the compound.

No information has been found about specific levels of benzo(k)fluoranthene that have caused harmful effects in people after breathing, swallowing, or touching the substance. Skin cancer has developed in mice that had benzo(k)fluoranthene on their skin throughout their lives. Tumors were produced after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Equivocal results have been found in a lung adenoma assay in mice. Benzo(k)fluoranthene is mutagenic in bacteria. It is not known if similar levels could cause cancer in people. No information has been found about harmful effects of benzo(k)fluoranthene in animals that breathed in or ate the chemical. Although no human data specifically link exposure to benzo(k)fluoranthene to human cancers, benzo(k)fluoranthene is component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke.

BENZO(g,h,i)PERYLENE

Benzo(g,h,i)perylene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Benzo(g,h,i)perylene is found in coal tar pitch used by industry as an adhesive. People may be exposed to benzo(g,h,i)perylene from environmental sources such as air, water, and soil, and from cigarette smoke and overcooked food. Typical exposure are not usually to benzo(g,h,i)perylene alone, but to a mixture of similar chemicals.

Benzo(g,h,i)perylene appeared to increase lung epidermoid tumors when administered with trioctanonin in a lung implant study. In a lifetime implant study, 3-month-old female Osborne-Mendel rats received a lung implant of benzo(g,h,i)perylene. Epidermoid carcinomas in the lung and thorax were observed. The apparent increased incidence of tumors was not statistically significant and no distant tumors were seen. It is not known if similar levels could cause cancer in people. No information has been found about harmful effects of benzo(g,h,i)perylene in animals that breathed in or ate the chemical.

Although no human data specifically links exposure to benzo(g,h,i)perylene to human cancers, it is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke.

BIS(2-ETHYLHEXYL)PHTHALATE

Bis(2-ethylhexyl)phthalate (BEHP) is widely used in plastic products; as a result, it is almost ubiquitously distributed in the environment. As plasticizers, phthalic acid esters are added to synthetic plastic resins to impart flexibility to the finished product, improve workability during fabrication, and extend or modify properties not present in the original resins. BEHP in particular is often used as an insect repellent and orchard acaricide (ATSDR 1987) and in the manufacture of organic pump fluids. BEHP in water accumulates in sediments, on suspended solids, and in lipid tissues of biota. In the soil, BEHP is strongly adsorbed to soils and organics and not readily leached.

Humans are primarily exposed through foods that come into contact with packaging materials containing BEHP. Once BEHP gets into the gastrointestinal tract, it is quickly absorbed and gets into the blood and is rapidly metabolized. Humans may also received higher exposures during blood transfusions and kidney dialysis because of the movement of BEHP into blood from plastic bags and tubing. It is also possible for children to ingest BEHP by accidentally eating contaminated soil, or for BEHP to leach into water sources, but this would have to continue at very high levels for months or years before any effect might occur.

There are essentially no studies on the health effects of BEHP in humans. However, the U.S. Department of Health and Human Services has determined that BEHP may reasonably be anticipated to be a carcinogen since it causes cancer in rats and mice. It is also known to produce liver damage and male reproductive system damage, affect reproduction, and produce birth defects in laboratory animals. Because none of these effects have been documented in humans, it is difficult to estimate the kinds of health effects and exposure levels that may actually affect humans. However, it is prudent to regard the animal data is indicating some degree of concern for harmful human effects and until more research can be done.

CHROMIUM

Chromium is used in plating for corrosion resistance and decorative purposes (appliances, tools, automobiles, etc.), in the manufacture of alloys (including stainless-steel and heat resistant alloys), and in printing, dyeing, photography, tanning, and numerous other industrial applications. It is assumed that most of the chromium in ambient air occurs in the trivalent state. Hexavalent chromium (CR VI) is more toxic than trivalent chromium (CR III).

In humans, the respiratory tract is the primary system of concern for chromium toxicity. Renal damage has also been observed (Klaassen 1986). It causes ulceration of nasal mucosa and carcinoma of the lung following long-term occupational exposure. Cases of acute poisoning in humans have been reported from the medical use of chromic acid. Chronic exposures of workers in chromium-related industries have been observed to result in skin and nasopharyngeal irritations (Cohen 1973; 1974). The epidemiologic studies of respiratory cancer in chromate production workers provide the bulk of the evidence for chromium carcinogenicity. Studies of chromate production facilities in the United States, Great Britain, and Japan have all found an association between occupational exposure to chromium and lung cancer (USEPA 1984). Workers were exposed to both Cr(VI) and Cr(III), and it is unclear whether Cr(VI) alone is the etiologic agent or whether Cr(III) is implicated as well. The association between chromate production and lung cancer is strong, as demonstrated by the high lung cancer mortality ratios found in various studies, the consistency of results found by different researchers in different countries, the dose-response found in several studies, and the specificity of the tumor site. Respiratory cancer mortality rates as high as 29 were reported. Three studies of the chrome pigment industry have found a similar association; in this industry, the predominant exposure is to Cr(VI). Studies of the chrome-plating industry and the ferro-chromium industry have been generally inconclusive.

CHRYSENE

Chrysene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Chrysene is found in coal tar pitch used by industry as an adhesive. People may be exposed to chrysene from environmental sources such as air, water, and soil, and from tobacco smoke and overcooked food. Typical exposure usually is not to chrysene alone, but to a mixture of similar compounds.

Chrysene produced carcinomas and malignant lymphoma in mice after intraperitoneal injection and skin carcinomas in mice following dermal exposure. In mouse skin painting assays, chrysene tested positive in both initiation and complete carcinogen studies. Chrysene produced chromosomal abnormalities in hamsters and mouse germ cells after gavage exposure, positive responses in bacterial gene mutation assays, and transformed mammalian cells exposed in culture. It was shown to be a complete carcinogen. Chrysene has produced positive results for initiating activity in several mouse strains when applied in combination with various promoting agents producing skin papillomas and carcinomas. Although no human data specifically link exposure to chrysene to human cancers, chrysene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions, and cigarette smoke.

DIETHYLPHTHALATE

Diethylphthalate is a clear, colorless liquid used as a solvent for cellulose esters, as a vehicle in pesticidal sprays, as a fixative and solvent in perfumery, as an alcohol denaturant, and as a plasticizer in solid rocket propellants. Likely routes of exposure would be inhalation and ingestion. Diethylphthalate can be poisonous by intravenous route. It is also known to be an experimental teratogen and may be moderately toxic if ingested. Diethylphthalate causes narcosis at high concentrations. It has few chronic toxic properties and seems to be devoid of any major irritating or sensitizing effects on the skin. Exposure to heated vapors may produce transient irritation of the nose and throat. Conjunctivitis, corneal necrosis, respiratory tract irritation, dizziness, nausea, and eczema are acute symptoms of exposure.

DI-N-BUTYLPHTHALATE

Di-n-butyl-phthalate is a man-made odorless and colorless oily liquid that is used to make soft plastics, carpet backing, paints, blue, insect repellents, hairspray, nail polish, and rocket fuel. Its many uses in modern society is evidenced by its presence in the environment. Di-n-butyl-phthalate does not evaporate easily, but small amounts do enter into the air as a gas. Di-n-butyl-phthalate also gets into air by attaching to dust particles. In air, di-n-butyl-phthalate usually breaks down within a few days. Di-n-butyl-phthalate does not dissolve easily in water, but can get into water by attached to dirt particles. In water and soil, it biodegrades in a day to a month depending on the kind of bacteria present and the temperature. Most people are exposed to low levels in air, water, and food. The largest source of exposure is from food that is stored or packaged in plastic, or taken up directly by the food (e.g., fish or shellfish).

Once inside the body, di-n-butyl-phthalate is quickly metabolized into other chemicals, most of which are removed in the urine within 24 hours. The balance removed is feces and within 48 hours virtually all is gone.

Adverse effects on humans from exposure to di-n-butyl-phthalate have not been reported. In animals, eating large amounts of di-n-butyl-phthalate can affect their ability to reproduce and can cause death of unborn animals. In male animals, sperm production can decrease after eating large amounts of di-n-butyl-phthalate; however, when exposure to di-n-butyl-phthalate stops, sperm production seems to return to near normal levels. Exposure to high levels of di-n-butyl-phthalate might cause similar effects in humans as in animals, but this is not known. The levels of di-n-butyl-phthalate which cause toxic effects in animals are about 10,000 times higher than the levels of di-n-butyl-phthalate found in air, food, or water. Large amounts of di-n-butyl-phthalate repeatedly applied to the skin for a long time may also cause mild irritation. There is no evidence that di-n-butyl-phthalate causes cancer, but this has not been thoroughly studied.

FLUORANTHENE

Fluoranthene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Fluoranthene is found in coal tar pitch used by industry as an adhesive. People may be exposed to fluoranthene from environmental sources such as air, water, and soil, and from tobacco smoke and overcooked food. Typical exposures are not usually to fluoranthene alone, but to a mixture of similar compounds. Fluoranthene enters the body generally through ingestion/inhalation routes.

No information has been found about specific levels of fluoranthene that have caused harmful effects in people after breathing, swallowing, or touching the substance. Although fluoranthene has not exhibited the properties of a mutagen or primary carcinogen, there is concern about its toxicity. This concern is based on the fact that is it widespread in the environment and that it belongs to the PAH group which includes a numerous potent of carcinogens. In a 13-week mouse oral subchronic toxicity study where mice were gavaged with a range of doses of fluoranthene, all treated mice exhibited nephropathy, increased salivation, increased liver enzyme levels and increased liver weights in a dose-dependent manner. Microscopic liver lesions (indicated by pigmentation) were observed in 65 percent and 87.5 percent of the mid- and high-dose mice, respectively.

INDENO (1,2,3-cd)PYRENE

Indeno(1,2,3-cd) pyrene is a polycyclic aromatic hydrocarbon (PAH) compound. Because it is formed when fossil fuels, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and onto soil and crops. Indeno(1,2,3-cd) pyrene is found in coal tar pitch used by the industry as an adhesive.

There are animal data that specifically link exposure to indeno (1,2,3-cd) pyrene with human cancers. It produced tumors in mice following lung implants, subcutaneous injection and dermal exposure. Indeno(1,2,3-cd) pyrene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions, overcooked food and tobacco smoke.

METHYLENE CHLORIDE

Methylene chloride (also known as dichloromethane) is widely used in a variety of industrial and commercial applications including metal degreasing, paint stripping, and solvent extraction in the food processing industry. It replaced trichloroethylene as the caffeine extractant in the production of decaffeinated coffee. It is also used to extract spice oleoresins and the beer flavoring in hops. It has additional uses as an aerosol propellent, an insecticidal fumigant and as a solvent in the manufacture of photographic film and synthetic fiber (Arthur D. Little, Inc. 1985).

Methylene chloride is classified as a probable human carcinogen with evidence from studies on two different animal species. There is inadequate evidence regarding methylene chloride's carcinogenicity to humans.

As with many low molecular weight halogenated hydrocarbons, methylene chloride is an anesthetic and may cause loss of awareness, mental confusion, lightheadedness, nausea, vomiting, irritation of the eyes and respiratory tract, and headache. Continual exposure to levels exceeding 500 ppm may lead to unconsciousness and death. Both human and animal studies of acute or prolonged exposure have shown impairment or loss of function of the liver, kidney, and cardiovascular system.

Exposure to methylene chloride can be fatal in humans following inhalation and ingestion. One case of accidental death resulted from acute methylene chloride exposure during paint stripping operations (Bonventre et al. 1977). Methylene chloride concentrations were not reported; however, it was detected in various tissues, including the liver (14.4 mg/100 g of tissue), blood (510 mg/L), and brain (24.8 mg/100 g of tissue). Another death occurred following acute exposure to methylene chloride being used as a paint remover (Stewart and Hake 1976).

A primary adverse health effect associated with short-term exposure to methylene chloride is impairment of CNS functions. Inhalation of methylene chloride for up to 5 hours decreased visual and auditory functions and various psychomotor functions (Fodor and Winneke 1971; Winneke, 1987). Longer-term exposure also produced CNS effects. Neurotoxicity was the most prominent symptom complex reported in over 100 cases involving occupational exposure to methylene chloride. Welch (1987) reported that workers from several industries, including auto parts production and plastic manufacturing had a variety of CNS complaints, including headaches, dizziness, nausea, memory loss, paresthesia, tingling in hands and feet, and loss of consciousness. Methylene chloride levels measured were up to 100 ppm, and duration of exposure was 6 months to 2 years. Hepatic effects were noted in humans exposed to methylene chloride and other solvents, however, there is no conclusive evidence showing that methylene chloride was responsible (Welch 1987) .

PYRENE

Pyrene, a polycyclic aromatic hydrocarbon (PAH), is a colorless solid which is derived from coal tar. It is a condensed ring hydrocarbon and is used for biochemical research. The USEPA weight-of-evidence classification for pyrene is D, not classifiable as to human carcinogenicity on the basis of no human data and inadequate data from animal bioassays.

Pyrene is absorbed by the skin and is a skin irritant. Workers exposed to 3 to 5 mg/m^3 of pyrene exhibited some teratogenic effects. The acute toxicity of pure PAHs appears low when administered orally or dermally to rats or mice. Human exposure to PAHs is almost exclusively via the gastrointestinal and respiratory tracts, and approximately 99 percent is ingested in the diet. Despite the high concentrations of pyrene to which humans may be exposed through food, there currently is little information available to implicate diet-derived PAHs as the cause of serious health effects.

SELENIUM

Selenium is a non-metallic element that occurs naturally in rock and soils, but is unevenly distributed. Selenium is an essential element to life and is found as any one of a number of compounds. It is used in electronics, xerographic plates, photocells, magnetic computer cores, solar batteries, rubber accelerators, catalysts, and as a trace element in animal feeds. Heat decomposition emits toxic fumes of selenium. It can react violently with many active compounds.

Selenium is an experimental tumorigenic agent and is a poison via inhalation. The dust and fumes irritate the respiratory tract, inorganic compounds causes dermatitis, garlic odor of breath; common symptoms are pallor, nervousness, depression and gastrointestinal disturbances. It is implicated in causing amyotrophic lateral sclerosis in humans. The oxychloride form is a vesicant.

TOLUENE

Toluene, also known as methylbenzene, is a colorless liquid, with a sweet, pungent, benzenelike odor. It is derived from coal tar and is used in the manufacture of benzene, as a chemical feed, as a solvent for paints and coatings, and as a fuel component.

Toluene is an experimental mutagen and skin and eye irritant. It causes moderate human central nervous system psychotrophic effects via the inhalation and subcutaneous route. Repeated exposure to small doses can cause headache, nausea, eye irritation, loss of appetite, bad taste, lassitude, impairment of coordination and reaction time. Toluene affects the central nervous system, kidney, and liver. Fatal exposure can cause the subject to go from intoxication to coma. It is a dangerous fire and explosion hazard, it is also a powerful oxidizer.

TRICHLOROETHYLENE (Trichloroethene)

Trichloroethylene (TCE) is widely used as an industrial solvent, particularly in metal degreasing, which consumes about 90 percent of TCE produced annually in the United States. TCE is also used for dry-cleaning, as a low-temperature heat exchange fluid, as a fumigant, as a diluent in paints and adhesives, in aerospace operations, and in textile processing. Previously, TCE was used as an extractant in food-processing. These uses were discontinued in 1975 due to evidence of possible carcinogenic activity. Its earlier use in anesthetics was also discontinued (Arthur D. Little, Inc. 1985).

TCE is assumed to be responsible for the deaths of four men employed at degreasing operations using TCE as the solvent (Kleinfeld and Tabershaw 1954). Toxicological analysis revealed TCE in varying concentrations in various tissues. Kleinfeld and Tabershaw (1954) reported that, despite treatment, a man died 11 days after he accidentally drank an unknown quantity of TCE.

TCE has been shown to affect the central nervous system. Short-term exposure to high concentrations of TCE caused dizziness, headache, nausea, confusion, facial numbness, blurred vision, and, at very high levels, unconsciousness. Longer exposures cause ataxia, decreased appetite, sleep disturbances, and trigeminal neuropathy (USEPA 1985).

Information regarding hepatotoxicity in humans is limited and derived from acute overexposure. USEPA (1985) has concluded that it is unlikely that chronic exposure to trichloroethylene at concentrations found or expected in ambient air would result in liver damage.

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USEPA COMMENTS ON THE DRAFT SITE INVESTIGATION REPORT FOR SITE SS-029

(JET ENGINE TEST CELL)

COMMENT	RESPONSE
General Comment Soil analytical data are compared to site background surface soil concentrations determined in the Background Surface Soil & Groundwater Survey for the Plattsburgh Air Force Base, Draft Report (URS, April 1995). Comparison of site specific background data to analytical results for soil samples collected from the subsurface (greater than 2 feet below grade) should be made with caution, since the background soils survey was limited to surficial sampling.	Comment is acknowledged. Conclusions drawn from analytical soil results will be considered carefully.
Page Specific Comments	
Page E-1, Paragraph 6: The text specifies that four metals were detected in soil samples, but at concentrations below regulatory limits. However, site background concentrations are To Be Considered (TBC) criteria for metals in soil.	Table 4 of Appendix A in the New York State TAGM "Determination of Soil Cleanup Objectives and Clean Up Levels" dated January 24, 1994 indicates that either specified levels or site background levels are TRC criteria for metals in soil.
Page E-1, Paragraph 6: The text specifies that four metals were detected in soil samples, but makes no mention of selenium, for which all soil data points were rejected. The reader should not be left with the impression that selenium analytical data were usable and that this metal was not detected in all site samples.	Quality control deficiencies for selenium and chromium analyses are clearly stated in the first full paragraph of page 5-3. The Executive Summary only summarizes the conclusions which can be drawn from the unqualified analytical data.
Page 1,1, Section 1.2, Paragraph 2: Is the waste oil tank which receives the discharge form the oil/water separator located in the same partially-buried housing as the oil/water separator? If not, please locate the oil tank on Figure 1-3, and indicate whether it is an underground storage tank (UST) or an aboveground storage tank (AST).	The oil/water separator's waste oil tank is an underground storage tank located beneath the same housing as the separator.
Page 1-1, Section 1.2, Paragraph 3: Was the previous oil/water separator, installed in 1971, located in the same place as the current oil/water separator? If not, please locate the former oil/water separator on Figure 1-3. A soil sample should be collected from the location of the former oil/water separator if it was in a location not in proximity to the location of the current oil/water separator.	The leaking oil/water separator was replaced in kind by the current unit at the same location.

COMMENT	RESPONSE
Page 1-4, Figure 1-3: The boundaries of site SS-029 should be marked on the figure. Based on the figure and additional information presented in Section 1, it is not clear where the limits of the site lie.	Figure 1-3 has been modified to indicate the approximate site boundaries.
Page 1-4, Figure 1-3: Several miscellaneous artifacts (i.e., 36" and 12" manholes north of tank 2820-1, 4' cap in concrete adjacent to the southeast corner of Building 2820, etc) are depicted on the figure. Has the history and physical features of such artifacts been investigated in order to determine whether they could indicate the presence of potential source areas?	Potential contaminant migration implications of these structures were considered during formulation of project scope. However, as pointed out in the second paragraph of page 1-8, the identified area of concern was the oil/water separator and its attendant piping.
Page 1-9, Table 1-1: The table states that tank UST-2820-2 was located north of Building 2820, across the road. Figure 1-3 indicates that this tank was located on the same side of the road as Building 2820. Please resolve this discrepancy.	The table is only partially right and it will be corrected. The figure correctly shows that the tank was located on the same side of the road as Building 2820.
Page 2-3, Section 2.3, Paragraph 1: The text states that MW-29-001 and MW-01-047 were sampled on 15 November 1994, however, Appendices A, B, C, and F indicate that the upgradient monitoring well was sampled on 16 November 1994 and is labeled MW-02-047. Please resolve this discrepancy.	The misidentification of MW-02-047 on page 2-3 is a typographical error. Its designation should conform with that shown in Appendices A, B, C, and F. The sampling date should also be changed to November 16. The text will be changed accordingly.
Page 3-9, Section 3.5, Paragraphs 4 and 6: The text indicates that the stratigraphic information presented for the confining unit and deeper (bedrock) aquifer underlying SS-029 are inferred from deep borings conducted for other investigations (i.e., PZ-2D and PZ-11D). It is recommended that the report present a figure which locates the borings utilized to construct the cross-section for clarity. The deeper borings' proximity to SS-029 was not made clear to the reader. Modifying Figure 3-6 to include the locations of PZ-2D and PZ-11D would be appropriate.	We agree that a figure should be included in the report which identifies the location of the additional borings used to prepare the cross section. The proximity of the deeper borings to MW-29-001 will be shown on additional map Figure 3-7.
Page 3-11, Figure 3-7: The identifier assigned to the monitoring well located on the extreme right of the cross-section is in error. The well should be identified as MW-06-002, not as MW-29-002.	We agree and Figure 3-7, now Figure 3-8, will be corrected accordingly.
Page 3-11, Figure 3-7: Since none of the borings/wells included on the geologic cross section were advanced to either the clay/till unit or the bedrock (with the exception of MW-06-002 to the clay/till unit), the figure should include a note describing how the elevations of the tops of these geologic units were determined.	We agree and a note of explanation will be added to this figure.

COMMENT	RESPONSE
Page 3-13, Section 3.6, Paragraph 2: Please provide a rationale for presenting the groundwater level/flow direction for 11 December 1994 in preference to the data for 12 January 1995 (the other date for which groundwater level data are available for the four wells included in the calculation). At a minimum, please indicate whether data collected on 12 January 1995 indicate similar groundwater flow direction and horizontal hydraulic gradient as those identified using the December 1994 data.	The selection of December 11, 1994 groundwater level elevation data for flow direction presentation was arbitrary. As requested, additional comment will be provided to indicate that data collected on January 12, 1995 indicate similar flow directions and gradients as those identified using the December 1994 data.
Page 3-13, Section 3.6, Paragraph 3; and Table 3-3, Page 3-17: Based on the data presented in Appendix H, the hydraulic conductivities were miscalculated. See comment for Appendix H.	See response to comment for Appendix A. The response indicates that a dewatering correction in the analysis was properly applied. The resulting hydraulic conductivities were not miscalculated.
Section 3.6, Figure 3-8: Please indicate which contouring package was used to determine groundwater elevation contours. Manual krigging resulted in a slightly different flow pattern.	The groundwater elevation contours shown on Figure 3-8 (now 3-9) were initially determined by the DCA Softdesk V-12 contouring package and subsequently modified manually to conform with the regional flow system directions.
Page 4-1, Section 4.1, Paragraph 8: The text states that action specific ARARs are generally addressed in a Feasibility Study. EPA's Guidance Document for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, October 1988) suggest that ARARs be discussed in the Remedial Investigation Report.	On page 3-28 of EPA's Guidance Document for Conducting RI/FS Under CERCLA, the last sentence in Section 3.7.1 requires that only location- and chemical-specific ARARs be identified in the Draft RI Report, which URS has complied with. Action-specific ARARs are not identified as required for the RI Report. Action-specific ARARs are discussed in Chapter 4 of the above-referenced document, which is the first chapter concerning the Feasibility Study.
Page 4-8, Table 4-1: Site background soils data should be used with caution for comparison to subsurface soil analytical data since base-specific background criteria were only determined for surface soils.	As noted in our response to the General Comment, we agree with this comment.
Page 5-7, Section 5.3, Paragraph 1: Were comparisons of retention times made between the semivolatile TICs observed in the method and rinse blanks associated with the environmental samples? If the TICs detected in the soil and groundwater samples were indicative of laboratory and/or sampling equipment contamination, there should be some correlation between the retention times (and hence molecular weights) of the TICs detected in the environmental and quality assurance samples.	Comment noted; TICs were evaluated following the guidelines established in USEPA's Contract Laboratory Program (CLP) Organic Data Review, SOP No. HW-6, Revision #8. A comparison of TICs found in samples and associated blanks was completed.

COMMENT	RESPONSE
Page 6-2, Section 6.2: It would be helpful to indicate whether a full or partial chemical analysis was performed for each medium (e.g., not all metals were analyzed in groundwater).	Section 6-2 has been revised to indicate the analyses performed for each medium collected. All groundwater and soil were analyzed for Target Compound List (TCL) volatiles, TCL semivolatiles and RCRA metals (total and dissolved for groundwater).
Page 6-2, Section 6.2.2, Sentence 2: The wording is confusing to the reader. The sentence suggests that the detected concentrations for each chemical were compared with both the maximum blank concentrations of the common laboratory contaminants and the maximum blank concentrations of other analytes. Please clarify.	This sentence has been clarified.
Page 6-3, Section 6.3.1: Additional information should be included regarding the soil and groundwater samples. The depths of the samples considered to be surface and subsurface samples, and the number of groundwater sampling rounds should be indicated. A figure showing the sampling locations, or a reference to a figure showing the sampling locations should be provided.	Section 6.3.1 has been revised to include additional information requested for the soil and groundwater samples.
Page 6-3, Section 6.2.5, Paragraph 1: The discussion seems limited to TICs detected in soil samples. The text should be revised to include a discussion on the evaluation of TICs detected in the groundwater samples.	The text has been revised to include information on the evaluation of TICs in the groundwater samples.
Page 6-4, Section 6.3.2, Paragraph 1, Last Sentence: It is unusual for all metals to be above background. This may be due to a high concentration of suspended particulates in the sample(s). If this is the case, it would be appropriate to include a comment to that effect in the text.	A sentence has been included in this paragraph to comment on the effects of high suspended particulates in the sample(s). Comparison of total versus dissolved metals results indicate that high concentrations of metals in the total metals results may be attributable to suspended particulates.
Page 6-11, Figure 6-3: The box showing adult and child residents as receptors should be changed to indicate an industrial worker. A residential scenario was not evaluated.	Figure 6-3 has been changed to indicate an industrial worker.
Page 6-12, Section 6.4.2.2, Paragraph 2: An explanation should be provided as to why the fugitive dust (wind erosion) pathway was not evaluated for the future industrial worker. The wind erosion pathway needs to be added for the industrial worker in Figure 6-3.	An explanation has been provided as to why fugitive dust is considered an incomplete exposure pathway for industrial workers. This pathway was not added to Figure 6-3 since it is incomplete.

COMMENT	RESPONSE
Page 6-12, Section 6.4.3, Paragraph 2, Sentence 4: Please check the USEPA 1992a reference. A previous URS risk assessment indicated a different USEPA 1992a reference (i.e., Calculating the Concentration Term) as the source of the formulas. The previously cited reference appears to be correct.	Comment noted; previously cited reference is correct and text has been revised to reflect the correct reference.
Page 6-14, Section 6.4.3, Paragraph 2, Last Sentence: Delete the phrase "For chemicals that were detected infrequently..." One-half the SQL should have been used for nondetects regardless of the frequency of detection.	This sentence has been revised.
Page 6-14, Section 6.4.4: This subsection should be rewritten to discuss and distinguish between the two types of exposure doses calculated in the exposure assessment: administered doses, which are calculated for the ingestion and inhalation exposure routes, and absorbed doses, which are calculated for the dermal exposure route. Paragraph 1, sentence 1 applies only to administered doses.	This subsection has been revised to discuss and distinguish between administered and absorbed doses.
Page 6-14, Section 6.4.4, Paragraph 1, Sentence 4: Delete the phrase "the relative absorption factor of the chemical." Relative absorption factors were not used to calculate doses.	The phrase has been deleted from the sentence.
Page 6-18, Table 6-7: Please define "CSD" or delete the column. The inclusion of the CSD values seems to be unnecessary. The equation given below the table includes only CA, CS, and MEF.	The "CSD" column has been deleted from Table 6-7.
Page 6-19, Table 6-8 and Page 6-20, Table 6-9, Footnote (a): The reference for the absorption factors is USEPA 1992b. Because neither cadmium nor PCBs were chemicals of potential concern, it would be more appropriate if the footnote were rewritten to indicate that absorption factors were not available for any of the CPCs.	Tables 6-8 and 6-9 have been revised. All information regarding dermal contact has been deleted from these tables since the absence of dermal absorption factors leads to no calculated values as noted on Table 6-12.
Page 6-20, Table 6-9: It should be indicated in the table or in the text that the inhalation rate for the worker is based on heavy activity.	The inhalation rate reported in Table 6-9 and explained in the text have been revised to indicate the inhalation rate for the construction worker. The inhalation rate reflects the construction workers will spend 50% of their time doing moderate activity and 50% doing heavy activity.

COMMENT	RESPONSE
Page 6-21, Section 6.4.4, Frequency and Duration of Exposure to Soil: Some explanation should be given as to how the exposure frequency and duration for the trespassers were arrived at; are they reasonable based on the site size, location, suitability for recreation, etc? Since most adults are at work 5 days/week for most of their adult lives, and teenagers should be at school for most of the day during most of the year, the assumptions may be overly conservative.	The exposure frequency and duration to soil for onsite trespassers have been reviewed and explained in Section 6.4.4 based on the comment suggestions. Although 78 days/year is conservative, we feel that it is reasonable given that the conclusions indicated that, at this frequency, no health risks are posed to trespassers.
Page 6-21, Ingestion of Soil: The bases for the soil ingestion rates assumed for the trespassers need to be explained. Table 6-8 indicates that they are EPA default exposure assumptions; however, there are no EPA-recommended soil ingestion rates for trespasser scenario.	The soil ingestion rate assumed for the trespassers has been explained in the revised subsection entitled Ingestion of Soil. The 100 mg/day is given as the default value for an adult resident in RAGS (USEPA 1989).
Page 6-21, Skin Surface Area: It is illogical to use a larger body surface area for the teenage trespasser than for the adult trespasser, if the same parts of the body are assumed to be exposed. A single value should be selected and used for both.	Comment noted; since the CPCs identified at SS-029 lack dermal absorption factors, the dermal contact pathway could not be evaluated. This section has been deleted since it is not necessary to discuss exposure parameters for dermal contact. Tables J-4, J-5, J-8, and J-9 have been deleted and replaced in the revised Appendix J since these tables presented dermal contact calculations which resulted in no risk values.
Page 6-21, Subsection 6.5, Paragraph 2 Sentences 2 and 3: The references for IRIS and HEAST should be USEPA 1994 and 1995 (not 1994a and 1995a), respectively. The references also should be corrected in the reference section (page R-3).	The references in the text and reference section (page R-3) have been corrected and reflect updated toxicity data as of Fall 1996.
Page 6-22, (Subsection 6.5), Equations: These are not equations for converting RfCs to RfDs; they are equations for interconverting cancer unit risk factors with inhalation and oral cancer slope factors. These equations should be used in the correct context, if they are applicable to the risk assessment; otherwise, the equations should be deleted. Also, if applicable, the correct equation for calculating an inhalation RfD from an RfC should be added to the text, and the calculation of RfDs from RfCs should be checked, using the correct equation. The sentence following the equations is incorrect and should be deleted; there are no carcinogenic RfCs.	Subsection 6.5 has been revised. The equations have been deleted from Section 6.5. Where applicable, any equations used in obtaining slope factors or reference doses have been incorporated into Sections 6.5.1 and 6.5.2, respectively.
Page 6-22, Section 6.5, Paragraph Following the Equations, Sentence 2: Insert the word "dermal" after "Because."	This paragraph has been deleted from this section since it applies to dermal contact which was not evaluated in this HRA.

COMMENT	RESPONSE
Page 6-23, Table 6-10: a) The weight-of-evidence for each of the PAHs should be included in the table. b) It would be helpful if a footnote were provided indicating that a toxicity equivalency factor approach based on toxicity relative to benzo(a)pyrene was used to evaluate the cancer risk posed by the other carcinogenic PAHs. c) Gentoxicity, listed as the tumor site for benzo(a)pyrene, is not a tumor site. The correct tumor site(s) should be indicated.	Table 6-10 has been revised. The weight-of-evidence for each chemical, where available, has been added to Table 6-10. A discussion regarding relative potency factors for PAHs is presented in Section 6.5.1.
Page 6-24, Section 6.5.1, Item a, Last Sentence: This statement is not applicable and should be deleted.	This sentence has been deleted since it applies to dermal contact risk assessment.
Page 6-24, Subsection 6.5.2, Paragraph 1, Sentence 1: The phrase "Unlike carcinogens, noncarcinogenic compounds..." should be changed to "Unlike carcinogenic effects, noncarcinogenic effects..."	This sentence has been revised.
Page 6-24, Section 6.5.2, Paragraph 2, Sentence 1: Change the phrase "...summarizes toxicity information for the noncarcinogenic chemicals..." to "summarizes noncarcinogenic toxicity information for the chemicals..."	Sentence 1 has been revised.
Page 6-24, Section 6.5.2, Item a., Sentence 1 (definition): Delete the phrase "... for noncarcinogenic chemicals..."	Phrase has been deleted.
Page 6-24, Section 6.5.2, Item a, Last Sentence: This sentence is not applicable and should be deleted.	Sentence has been deleted.
Page 6-26, Section 6.5.2, Item b: The wording should be changed to read "...expressing the most sensitive end point of adverse response (e.g., liver damage) associated with exposure to the chemical."	Item b has been revised.
Page 6-26, Section 6.5.3, Paragraph 1, Last Sentence: The phrase ... 13 of the 20 detected noncarcinogenic chemicals..." should be changed to "...12 of the 19 CPCs..." Some of the chemicals referred to are carcinogens. Of the CPCs, chromium should be counted only once.	Comment noted; sentence has been revised.
Page 6-27, Section 6.6.2, Next to Last Paragraph, Sentence 1: The sentence should be changed to read "Different chemicals may have different adverse noncarcinogenic responses or end points."	Comment noted; sentence has been revised.

COMMENT	RESPONSE
Page 6-27, Section 6.6.2, Next to Last Paragraph, Sentence 2: Delete the word "noncarcinogenic."	Comment noted; sentence has been revised.
Page 6-27, Section 6.6.2, Last Paragraph, Sentence 2: Change the phrase "25 to 30 years" to "25 or 30 years." To be consistent, the sentence also should indicate that the 25 to 30 years refer to industrial workers and adult trespassers.	Comment noted; sentence has been revised.
Page 6-27, Section 6.7, definition of "Noncarcinogenic effects," Sentence 2: Change the phrase "If noncarcinogenic risk..." to "If the hazard index..."	Comment noted; sentence has been revised.
Page 6-29, Section 6.7, Paragraph 1, Sentence 2: Change "The calculated risk ..." to "The calculated hazard index..."	Comment noted; sentence has been revised.
page 6-29, Section 6.7, Paragraph 3, Sentence 1: Delete "risk"	Comment noted; sentence has been revised.
Page 6-29, Section 6.7, Paragraph 3, Sentence 2: Change "...to this risk" to "... to the hazard index..."	Comment noted; sentence has been revised.
Page 6-30, Table 6-13, Item 5: This item is not applicable and should be deleted. The dermal exposure route was not evaluated quantitatively. Therefore, dermal absorption factors did not affect any risk calculations.	Table 6-13, Item 5, has been deleted since dermal contact was not evaluated in this HRA.
Page 6-30, Table 6-13, Item 6, Potential Source and Reason for Uncertainty: Change the word "most" to "any."	Table 6-13 has been revised since dermal contact was not evaluated in this HRA.
Page 6-32, Item 2: According to the Draft New York State Air Guide-1 (Appendix K), the air model calculates concentrations within the source area. It is unclear why it is stated that the model doesn't calculate concentrations less than 200 meters from the source. Please clarify.	The Draft New York State Air Guide-1 (AG-1) alternate area source method was used for the fugitive air model. According to Mr. Leon Sedefian of NYSDEC (518-457-7688), the developer of the model, the model's estimated values are very conservative, and the model should adequately predict estimated maximum annual concentrations of pollutants at distances less than 200 meters. The algorithm has only been checked against actual air sampling data for distances greater than 200 meters from the center of the source area.
Page 6-33, Bullet 3: Suggest changing "is five times less" to "is one-fifth."	Suggestion noted; bullet revised.
Page 6-33, Bullet 4: Suggest changing "is ten times less" to "is one-tenth."	Suggestion noted; bullet revised.

COMMENT	RESPONSE
Appendix C: TICs should be presented on the validation summary tables.	TICs have been submitted in addition to the validation summary tables in Appendix C. The TICs data cannot be presented directly on the tables due to the format of the data tables.
Appendix C: Table C-1 indicates that all selenium data were rejected, as well as the chromium data for samples WP-MW-29-001-0 and WP-MW-29-001-4. A discussion regarding the reasons for the data rejection should be provided in the report. This discussion should include why the data points were invalidated, what field or laboratory conditions (if any) could have caused the problems, and what corrective actions will be implemented to prevent similar occurrences from occurring throughout the remainder of the field program being conducted at Plattsburgh Air Force Base. Based on the groundwater data for this well, however, resampling the soils for the rejected analytes does not appear warranted.	A discussion on the data rejection was included in Section 6.2.3 (page 6-3) of the report. These data points were rejected based on matrix spike recovery outliers or field blank contamination in the case of selenium.
Appendix C: Associated method blank samples are not provided for the metals analysis. CLP Method ILM03.0 provides for method blank analysis as part of the Quality Assurance (QA) process. The associated method blanks should be provided in Tables C-1 and C-2.	These blanks (for metals analysis) were not included in Tables C-1 and C-2 due to great number. Method blank analysis was done according to Metered ILM030 and USEPA Region II Validation Protocols. Method blanks are currently archived at the AFBCA offices in Plattsburgh.
Appendix D: The soil description presented in Table B-1 (Appendix B) for the soil sample collected from 0.0 - 2.0 feet from boring SB-29-02 does not agree with the material description presented on the test boring log in Appendix D. Please review both for accuracy.	Comment noted; Table B-1 has been revised.
Appendix E: The well construction data seems to be in error. The well construction log indicates that the well screen and riser are 10 feet in length each, that the well is set at 15.5 feet below grade, and that the well is finished at the ground surface with a flush-mount road box. Based on the arithmetic, the reported dimensions for the screen length, casing length, the depth of well, or any combination thereof, are incorrect. The authors should review the construction log for accuracy.	Comment noted; well construction log corrected.

COMMENT	RESPONSE
Appendix H: The water level and well construction data indicate that the well screen and sand pack were fully submerged during the entirety of the rising and falling head slug tests. As a result, sandpack dewatering should not have to be taken into account during calculation of the hydraulic conductivities. The input data presented in Appendix H indicates that sandpack dewatering was factored into the Bouwer and Rice method calculations, which would provide faulty hydraulic conductivity values. Please rerun the program with the correct input values.	The static water level pressures presented in the slug IN and OUT of 1.43 feet and 1.23 feet respectively reflect pressures related to an arbitrary transducer setting. The depth from SWL to eff. screen bottom of 9.70 feet indicates screen submergence. When subtracting the screen submergence from the depth of the bottom of the screen as shown in Appendix E-1 a water level depth of 5.8 feet indicates that the screen and sand pack were partially dewatered during testing.
Appendix I: Subsurface Boring Location Sheets were not provided for WB-MW-29-001 and WB-MW-02-047.	Subsurface boring location sheets are not required for borings where infrastructure (i.e., a well) is left for future investigators to physically locate the boring.
Appendix J, Tables J-5, J-7, J-9, J-11, J-13, and J-15: The word "noncarcinogenic" should be deleted from the title of each of the tables. The tables include both carcinogenic and noncarcinogenic chemicals.	Tables have been revised. Tables J-13 and J-15 have been deleted since the dermal pathway was not assessed in this HRA.
Appendix L, Toxicity Profiles: In general, the information presented in the toxicity profiles could be better organized and written. The information, as presented, is likely to be confusing to the average reader. To eliminate repetition of text, rather than present a toxicity profile for each of the PAHs, it might be preferable to present one detailed toxicity profile for all PAHs. The PAH profile could include a discussion of the relative carcinogenic potencies of the individual PAHs.	Appendix L, Toxicological Profiles, has been revised based on reviewer comments.
Appendix L, page L-1, Acetone, paragraph 1, sentence 5: The sentence should clarify what it is that acetone is not readily adsorbed to.	The profile on acetone has been revised.
Appendix L, Page L-1, Acetone: Contradictory information is presented in paragraphs 2 and 3 regarding gastrointestinal effects. In paragraph 2, sentence 3, it is stated that "GI effects have not been reported." In paragraph 3, sentence 2, "GI disturbances" are listed as an effect.	Comment noted; the profile on acetone has been revised.
Appendix L, page L-1, Arsenic, paragraph 2, sentence 1: The sentence should be rewritten to read "This substance has been listed as a carcinogen." In sentence 2, the phrase "is listed in Group A" should be changed to "is listed as Group A."	The profile on arsenic has been revised.

COMMENT	RESPONSE
Appendix L, page L-2, Benzo(a)pyrene, paragraph 2, sentence 2: Insert the phrase "in animals" after the phrase "key endpoint of toxicity."	The profile on benzo(a)pyrene has been revised.
Appendix L, page L-5, Diethylphthalate: The toxicity information should be clarified to indicate which toxic effects were observed in animal studies, and which were observed in humans. Sentence 4: Please clarify what is meant by a "systemic irritant." Sentence 5: The sentence should probably read "Diethylphthalate causes narcosis at high concentrations."	The profile on diethylphthalate has been revised/clarified.
Appendix L, page L-6, (Fluoranthene), paragraph 2, sentence 3: Change "gauged" to "gavaged."	The profile on fluoranthene has been revised/clarified.
Appendix L, page L-6, Methylene Chloride, paragraph 2, last sentence: Change "toxicity" to "carcinogenicity."	The profile on methylene chloride has been revised/clarified.