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Pratt & Whitney
400 Main Street
East Hartford, Connecticut

Volume I
Documentation of Enviromental Indicator Determination Current Human Exposures Under Control

September 2004

Prepared For

United Technologies Corporation
One Financial Plaza
Hartford, Connecticut 06101

Prepared By

Loureiro Engineering Associates, Inc.
100 Northwest Drive
Plainville, Connecticut 06062
An Employee Owned Company
Comm. No. 88UT406

RDMS DocID 00101789

Loureiro Engineering Associates, Inc.

TRANSMITTAL

TO:	Environmental Protection Agency Region I, New England One Congress Street Suite 1100 (HBT) Boston, MA 02114-2023	DATE	September 15, 2004
		PROJECT	Pratt & Whitney, East Hartford Environmental Indicator Determination
		LOCATION: COMM. NO.:	Pratt & Whitney, East 88UT406
ATTN:	Mr. Juan Perez	PHONE #	617-918-1354

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Thank You

BY: Brian Cutler, P.E., LEP

Documentation of Environmental Indicator Determination (CA 725)
Pratt & Whitney
400 Main Street
East Hartford, Connecticut

Issued: September 2004

Volume I:

Documentation of Environmental Indicator Determination Report

Attachment 1 Figures and Drawings

Volume II:

Attachment 2 Tables & Data CD

Attachment 3 Relevant Sections of the Main Facility Area Conceptual Site Model and Airort/Klondike Area Conceptual Site Model

Attachment 4 July 2004 Indoor Air and Sub-Slab Vapor Analytical Laboratory Reports

Attachment 5 Calculated Risk Based Criteria Summary Report

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION (CA725) CURRENT HUMAN EXPOSURES UNDER CONTROL

Pratt & Whitney
400 Main Street
East Hartford, Connecticut

Prepared
September 2004

Prepared for

United Technologies Corporation
Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Prepared by

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An Employee Owned Company

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DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

PRATT & WHITNEY EAST HARTFORD MAIN FACILITY AND AIRPORT/KLONDIKE
SEPTEMBER 2004

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Attachment 2 Tables and CD

Attachment 3 Main Facility Area and Airport/Klondike Area Conceptual Site Model Reports

Attachment 4 July 2004 Indoor Air and Sub-Slab Vapor Analytical Laboratory Reports

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DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

PRATT & WHITNEY EAST HARTFORD MAIN FACILITY AND AIRPORT/KLONDIKE
SEPTEMBER 2004

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DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

PRATT & WHITNEY EAST HARTFORD MAIN FACILITY AND AIRPORT/KLONDIKE
SEPTEMBER 2004

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DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

PRATT & WHITNEY EAST HARTFORD MAIN FACILITY AND AIRPORT/KLONDIKE
SEPTEMBER 2004

ATTACHMENTS (continued)

ATTACHMENT 3

Relevant Sections of the Main Facility CSM Report
Airport/Klondike CSM Report

ATTACHMENT 4

July 2004 Indoor Air and Sub-Slab Vapor Analytical Laboratory Results

ATTACHMENT 5

Calculated Risk-Based Criteria Summary Report

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

Facility Name: **Pratt and Whitney East Hartford Main Facility and Airport/Klondike**
Facility Address: **400 Main Street, East Hartford, Connecticut**
Facility EPA ID #: **CTD990672081**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__X__ If yes - check here and continue with #2 below.
_____ If no - re-evaluate existing data, or
_____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., Site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

SITE OVERVIEW

On July 17, 1996, United Technologies Corporation/Pratt & Whitney Division and the United States Environmental Protection Agency, Region 1 (EPA-New England) signed a Memorandum of Understanding (MOU) that outlined the principle components of a Voluntary Corrective Action Program (VCAP) that UTC/ Pratt & Whitney Division agreed to undertake at six of its facilities in Connecticut. The July 17, 1996 MOU included the East Hartford Main Street facility, inclusive of the main factory complex and the Airport/Klondike Area. In November 1996, a VCAP Work Plan was developed by Pratt & Whitney and Loureiro Engineering Associates, Inc. (LEA), which addressed all six facilities. Appendix A of the VCAP Work Plan exclusively addresses the approximately 960-acre Pratt & Whitney facility (Site) located at 400 Main Street in Hartford, Connecticut (Figure 1 in Attachment 1). At the time the VCAP Work Plan was developed, only the western portion of the Site (the main factory complex and/or main facility) was included as the eastern portion (the Airport/Klondike Area) was being considered for sale or transfer. The western portion has been referred to as the main factory complex and/or main facility while the eastern portion is referred to as the Airport/Klondike Area. For purposes of clarity, the western portion of the Site will be hereinafter referred to as the Main Facility Area and the eastern portion of the Site will be hereinafter referred to as the Airport/Klondike Area. The result of handling the Site as two separate portions is that environmental investigations and remediation activities completed at the Main Facility Area and the Airport Klondike Area have been generally performed separately and are therefore documented separately herein. As such, the evaluation of all relevant/significant data for this documentation of environmental indicator determination (EID), which encompasses the entire Pratt & Whitney facility, will be performed independently for the Main Facility Area and the Airport/Klondike Area throughout the remainder of this document. The Main Facility Area and the Airport/Klondike Area, in their entirety, are depicted on four drawings, identified as Drawings 1 through 4, and provided in Attachment 1 of this EID. The following provides a summary overview for the Main Facility Area and the Airport/Klondike Area.

Main Facility Area

The Main Facility Area of the Site is bordered on the north by a residential neighborhood and Silver Lane, on the South by Brewer Street, on the west by Main Street and a mixed commercial and residential area, and on the east by the Airport/Klondike Area Willow Brook runs through the north end of the complex in an east to west direction towards the Connecticut River.

The Main Facility Area includes the main factory complex which incorporates over 6.5 million square feet of floor area for manufacturing, research, office space, and space for related activities and support services; engine development and test facilities, a power house, the Centralized Waste Storage and Transfer Facility, the Concentrated Waste Treatment Plant, several office buildings, and several other auxiliary buildings. In addition, the Main Facility Area incorporates 55 acres of grounds, and 112 acres of parking lots, roads, and walkways. The United Technologies Research Center (EPA ID # CTD095532131) (UTRC), located on the north central border of the Main Facility Area , does not constitute part of the Main Facility Area.

The Main Facility Area is involved in the manufacture, development, and testing of jet engines and jet engine components. The facility has been used for the manufacture of aircraft engines and aircraft engine components since December 1929. Operations at the facility include, or have included in the past, metal parts machining, vapor degreasing, chemical etching, cleaning, electroplating, painting, assembly and testing, and research operations. The future use of the Main Facility Area is expected to remain industrial.

Airport/Klondike Area

The 600-acre Airport/Klondike Area, abutting the Main Facility Area to the east, and is bordered on the north by a football stadium owned and operated by the State of Connecticut, on the south by Perimeter Road and Brewer Street, and on the east by undeveloped parcels. The Airport/Klondike Area consists of four areas that include the North and South Airport Areas and the North and South Klondike Areas. The North Airport Area consists of Rentschler Airport, former Army Barracks, and the former Silver Lane Pickle Company. Rentschler Airport consists of an inactive runway, vacant hangers and control tower. Army Barracks that were used as temporary quarters of military personnel were once located on the northwestern portion of the airfield. The former Army Barracks extended from the northern end of the north-south runway continued westward into the present UTRC Area. There were approximately thirty-three buildings (including barracks, mess, recreation, dispensary, supply and administration operations, warehouses, school, and radio) that were part of the Army Barracks complex.

The Silver Lane Pickle Company sold the property to United Aircraft (later United Technologies Corporation) in 1954 and 1963 with the former buildings being demolished in 1963 and 1964. Since 1964, the property has been undeveloped. The South Airport Area consists of Fire Training Area B, the South Airport Fill Area, the Tank Trailer Storage Area, the Contractor Storage Area, and the Former Storage Area. The North Klondike consists of undeveloped land along the north and east portions that extends almost to Silver Lane and Penny High School; the former test areas (X-401, X-407, X-415, X-430, X-194, X-410, and X-312/X-314); a former Explosives Storage Area, and the former Materials Engineering Research Laboratory (MERL) Area. The South Klondike Area consists of seven sub-areas identified as the following: former Tie-Down Area, former Fire Training Area A, former Firing Range Area, Former Linde Gas/Chemical Storage Building Area, former Cryogenics Area, former Virgin Products Storage Area, former X-307 test area, and the South Klondike Undeveloped Land Area.

The majority of the Airport/Klondike Area contains unpaved, infrequently mowed, grassy fields surrounding the inactive airport runways and former industrial buildings. The Airport/Klondike Area is no longer used for any production, testing or research operations.

Extensive environmental investigations and remediation activities have been performed at the Main Facility Area and the Airport/Klondike Area in which numerous documents have been prepared recording the results. The magnitude of these documents makes it infeasible to enclose them as separate, physical attachments. It should be noted that the vast majority of the documents referred to above have been submitted to EPA separately as component parts of regular progress reports documenting the status of investigation and remediation activities being conducted pursuant to the VCAP. With most, if not all, of these documents, analytical data in the form of laboratory reports and tables had been incorporated. The physical incorporation of analytical data into this EID would have been impractical due to the volume of data. As such, a CD in which all the relevant analytical data for the Site is included, has been prepared to accompany this EID. The CD is provided at the end of Attachment 2 and contains a complete summary of all relevant/significant data by environmental media. This documentation of environmental indicator determination is based on a review of all available relevant/significant data as it applies to these receptors for the identified exposure media and pathways.

PHYSICAL SETTING

Regional and Site-Specific Geology

The Pratt & Whitney facility (both Main Facility Area and the Airport/Klondike Area) lies in the Central Lowlands province of Connecticut, a north-south trending valley system that is approximately 20 miles wide in East Hartford. The lowland consists of a series of parallel valleys separated by linear north-south trending ridges. The Connecticut River flows southward, draining the northern part of the valley system. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system.

Post-glaciolacustrine fluvial deposits occur across the Site and generally range from 15 to 30 feet in thickness, generally increasing in thickness toward the southwest. These deposits generally consist of uniform brown fine or fine to medium sand. Other recent alluvial deposits are found scattered across the Site near existing and former streams (e.g., Willow Brook and Pewter Pot Brook) or wetland areas.

Glaciolacustrine lake bottom sediments occur over most of the local area and range up to 270 feet in thickness to the south of the facility. These deposits thicken towards the central part of the Pratt & Whitney facility (near the Main Facility Area and are generally absent near the eastern boundary of the Site. These deposits consist of laminated (varved) silts and clays with red fine sand partings. The color varies from gray near the surface to red at the base of the unit.

In the vicinity of the Main Facility Area, an intermediate layer of fine sand and silt that varies from approximately 5 to 20 feet thick occurs between these two deposits. A similar zone may occur at the base of the glaciolacustrine unit as well. On-site investigations have indicated that local sand or gravel lenses of glaciofluvial origin are present within the glaciolacustrine unit near its base. However, these lenses do not appear to be laterally extensive.

Bedrock beneath the Site consists of red sandstones and siltstones of the Portland Formation. Depth to bedrock within the general area is over 300 feet in the area of the main factory complex, and approximately 30 feet along the eastern property boundary near the airport. Near the Connecticut River, approximately 1 mile west of the Site, depth to bedrock is about 150 feet. A north-south trending buried bedrock valley underlies the main factory complex. This buried valley may have been a pre-glacial channel of the Connecticut River. Because of the presence of this bedrock valley, the local surface of the Portland Formation slopes to the southwest in the eastern side of the Site, in contrast to the regional dip of the Portland Formation which is generally to the east at between 10 degrees and 45 degrees; that is, the Portland Formation is revealed as a strike slope in the area beneath the Airport portion of the Airport/Klondike Area. Data on the elevation of the bedrock surface were taken from records of available well logs and test holes installed on the Main Facility Area and the Airport/Klondike Area and in the general East Hartford area.

The Site is located within the Upper Connecticut River Regional Drainage Basin. Regional groundwater flow in this part of the basin is expected to be toward the Connecticut River to the west, although local groundwater flow would be controlled by local geologic conditions and anthropogenic features, such as production or basement dewatering wells.

Regional and Site-Specific Hydrogeology

The Connecticut River basin consists of 508 square miles extending from the Massachusetts state line to the northern margin of the Mattabassett River basin at Middletown, Connecticut. The majority of the basin is within the southern part of the Triassic/Jurassic valley, a broad central lowland area flanked by ridges of crystalline rocks on the east and west. Ground elevations within the basin range from approximately mean sea level at the southern boundary to greater than 1,000 feet along the flanking ridges.

There are four distinct saturated hydrogeologic units in the shallow subsurface within the region (from uppermost to lowest) and, for purposes of this EID, are identified as follows:

Hydrogeologic Unit 1: Glaciolacustrine silt and sand deposits and post-glacial fluvial deposits. The aquifer zone of the greatest interest at the Site is the upper zone of the unconsolidated aquifer, which occurs within the stream terrace and glaciolacustrine silt and sand deposits. This is because of the shallow occurrence of economic quantities of groundwater for use, its proximity to potential sources of contamination, and its interconnection with surface water systems (Willow Brook within the Main Facility Area and Pewter Pot Brook within the Airport/Klondike Area). The uppermost zone of this unit is largely composed of well-sorted medium to fine sand, with a saturated thickness generally ranging from 10 to 20 feet. Saturated thicknesses are generally greater towards the center of the facility where the stream terrace deposits thicken, and less in the eastern portion of the Airport/Klondike Area where bedrock approaches the ground surface.

The post-glacial fluvial deposits in the lower zone comprise the majority of the upper aquifer and generally constitute the most important aquifer in the region, primarily due to the saturated thickness and extent. The unconfined aquifer is relatively coarse-grained and supplies much of the groundwater used for municipal and industrial purposes in the region.

Hydrogeologic Unit 2: Glaciolacustrine clay and silt deposits. The majority of the glaciolacustrine deposits are comprised of silt and clay. These sediments have low permeability and function as a confining layer. The glaciolacustrine unit also includes limited sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers, but are of limited areal extent. The glaciolacustrine deposits under the Airport/Klondike Area consist almost entirely of lake bottom silt and clay, and are considered to be a confining unit, or aquitard, inhibiting downward flow from the upper aquifer throughout most of the Airport/Klondike Area. This consideration is due to the fact that these sediments are composed of finely-laminated silt and clay which can be up to 270 feet thick, and are laterally extensive. A slug permeability test conducted in 1990 on a well screened within this unit indicated a horizontal hydraulic conductivity of 2.3×10^{-6} centimeters per second (cm/sec) (6.5×10^{-3} feet/day).

Hydrogeologic Unit 3: Till and ice-contact stratified sediments. Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Ice-contact stratified sediments beneath the silt and clay layer may be coarse-grained and capable of producing large amounts of water, but these deposits are not laterally extensive and are therefore only locally important.

Hydrogeologic Unit 4: Sedimentary bedrock (the Portland Formation). The Portland Formation consists of southeastward-dipping, well-cemented beds of sandstone and siltstone. Groundwater flow in the bedrock is primarily within fractured and faulted zones. The Portland Formation is an important source of water for domestic use, but yield is generally not sufficient for large-scale users.

Water-level measurements collected between 1996 and 2002 indicate that groundwater within the upper aquifer generally flows across the Site in a westerly-southwesterly direction, toward the Connecticut River. The depth to water in the upper zone of the unconsolidated aquifer ranges from approximately 1 to 13 feet below grade. Groundwater flow gradients in this aquifer are quite variable across the East Hartford facility, but are generally gentler in the central portion and steeper near the Airport/Klondike Area and adjacent to the Connecticut River. Local groundwater flow patterns are influenced by the interaction between local surface water bodies (Willow Brook and Pewter Pot Brook) and the groundwater system, and manmade features (e.g., ditches, ponds, utilities, dewatering wells, and drainage system beneath Rentschler Airport). In terms of surface water/groundwater interaction, local groundwater flow direction generally trends towards Willow Brook and Pewter Pot Brook as discharge points. As discussed in further detail in Question 2 below, there are a total of seven operating dewatering wells at Site, all within the Main Facility Area. The drawdown in the aquifer caused by the active dewatering wells has created a radial effect around the two major dewatering well clusters and as such, has affected local groundwater flow direction, as shown on Drawings 1 and 2 in Attachment 1.

CONCEPUTAL SITE MODELS

Two conceptual site model reports have been developed for the Site. A report entitled *Conceptual Site Models and Screening Levels for Pratt & Whitney's VCAP Connecticut Facilities* was prepared by Gradient Corporation (Main Facility CSM Report). This report was issued on December 19, 1997 and revised on September 18, 1998, and September 15, 1999. The second conceptual site model report, entitled *Conceptual Site Model for the Airport/Klondike Portions of the Pratt & Whitney Main Street Facility, East Hartford, CT* (Airport/Klondike CSM Report), prepared by Gradient Corporation on August 26, 2004, addresses the Airport/Klondike Area of the Site. Both of the reports provide area-specific (i.e., Main Facility Area and Airport/Klondike Area) conceptual site models, a description of area-specific exposure media and exposure pathways, a description of potential receptors, a rational and approach to screening analytical data generated for exposure media, and screening levels for exposure media.

Main Facility CSM Report

The Main Facility CSM Report defines the applicable receptors, exposure media, and pathways as follows:

On-Site Receptors:

Maintenance Workers

- Groundwater: Dermal Contact. The screening level only evaluates dermal contact with groundwater while repairing dewatering pumps.
- Indoor Air: Inhalation.

Groundskeepers

- Surface Soil: Ingestion and Dermal Contact.

Indoor Workers

- Indoor Air: Inhalation.

Samplers

- Indoor Air: Inhalation.
- Surface Soil: Ingestion and Dermal Contact.
- Surface Water: Ingestion and Dermal Contact.
- Sediment: Ingestion and Dermal Contact.
- Subsurface Soil: Ingestion and Dermal Contact. Controlled by DPR.

Trespassers

- Surface Soil: Ingestion and Dermal Contact.
- Surface Water: Ingestion and Dermal Contact.
- Sediment: Ingestion and Dermal Contact.

Off-Site Receptors:

Off-Site Utility Workers

- Groundwater: Dermal Contact.
- Wet Trench Air: Inhalation.

Off-Site Recreators

- Surface Water: Ingestion and Dermal Contact
- Sediment: Ingestion and Dermal Contact

Off-Site Residents

- Indoor Air: Inhalation

Copies of pertinent sections of the Main Facility CSM Report are provided in Attachment 3 of this EID.

Airport/Klondike CSM Report

For the Airport/Klondike Area, the Airport/Klondike CSM Report defines the applicable receptors, exposure media, and pathways as follows:

On-Site Receptors:

Maintenance Workers

- Surface Soil: Ingestion and Dermal Contact.
- Surface Water: Ingestion and Dermal Contact.
- Sediment: Ingestion and Dermal Contact.

Groundskeepers

- Surface Soil: Ingestion and Dermal Contact

Samplers

- Surface Soil: Ingestion and Dermal Contact
- Surface Water: Ingestion and Dermal Contact
- Sediment: Ingestion and Dermal Contact

Trespassers

- Surface Soil: Ingestion and Dermal Contact
- Surface Water: Ingestion and Dermal Contact
- Sediment: Ingestion and Dermal Contact

Off-Site Receptors:

Off-Site Utility Repair Workers:

- Wet Trench Air: Inhalation.

Off-Site Residents:

- Indoor Air: Inhalation.

As the CSM for the Airport/Klondike area has not been submitted previously, the entirety of the CSM has been provided in Attachment 3.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"** above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			MAIN FACILITY AREA: Groundwater samples have been collected from 517 individual sampling locations over the period from March 1982 to June 2004. Groundwater has exhibited concentrations of arsenic; cadmium; chromium; copper; iron; lead; manganese; mercury; nickel; silver; zinc; PCBs; cyanide; benzo(b)fluoranthene; benzo(a)pyrene; benzo(g,h,i)perylene; naphthalene, pentachlorophenol; bis(2-ethylhexyl)phthalate; acenaphthalene, 1,1-dichloroethanee; chloroethane; MTBE; 1,1-dichloroethylene; trans-1,2-dichlroroethylene; cis-1,2-dichloroethylene; tetrachloroethylene; bromomethane; dichlorodifluoromethane; trichlorotrifluoromethane; and methyl-isobutyl-ketone in excess of the Table 3-7 criteria and benzene, 1,2-dichloroethane, 1,1-dichloroethylene, vinyl chloride, and trichloroethylene in excess of the Table 3-5 criteria. AIRPORT/KLONDIKE AREA: Groundwater samples have been collected from over 450 individual sampling locations over the period from November 1991 to March 2001. Groundwater has exhibited concentrations of arsenic, barium, cadmium, total chromium, copper, lead, zinc, cis-1,2-dichloroethylene, tetrachloroethylene, and xylene concentrations that exceeded the Table 3-7 criteria.
Air (indoors) [2]	X			MAIN FACILITY AREA: Indoor air samples have been collected from facility buildings twice (1998 and 2004) to assess the presence of volatile compounds in indoor air space. Benzene was detected at a concentration above Table 3-4 criteria in a single sample collected in 1998. Benzene was detected at concentrations in excess of the Table 3-4 criteria in a duplicate sample pair of ambient outdoor air collected in 2004. The AIRPORT/KLONDIKE AREA does not have any active office or industrial buildings; thus, indoor air does not pose an exposure risk to human health.
Surface Soil (e.g., <2 ft)	X			MAIN FACILITY AREA. Arsenic, PCBs, and benzo(a)pyrene were detected in surface soil at concentrations in excess of the Table 3-10 criteria. AIRPORT/KLONDIKE AREA: No constituent concentrations in surface soil samples exceeded Table 3-10 screening criteria for the Trespasser, Groundskeeper and Sampler exposure scenarios.
Surface Water	X			MAIN FACILITY AREA. Arsenic, chromium, copper, manganese, silver, PCBs, benzene, chloroform, 1,1,1-trichlorethane, 1,1-dichloroethylene, cis-1,2-dihloroethylene, vinyl chloride, tetrachloroethylene, and trichloroethylene have been detected in surface water at concentrations in excess of the Table 3-6 criteria. AIRPORT/KLONDIKE AREA: Arsenic, barium, cadmium, total chromium, lead, mercury, selenium, zinc, chloroform, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene; cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, trichloroethylene, and methylene

chloride concentrations exceeded Table 3-6 screening criteria.

Sediment	___	X	___	MAIN FACILITY AREA: Remediation of Willow Brook and Willow Brook Pond completed in August 2002 resulted in the removal of all sediment within the exposure area. Certified clean soils and rock replaced the excavated sediment. As such, no contaminants above respective screening levels remain in this media. AIRPORT/KLONDIKE: No constituent concentrations in sediment samples exceeded Table 3-10 criteria.
Subsurf. Soil (e.g., >2 ft)	X	___	___	MAIN FACILITY AREA and AIRPORT/KLONDIKE AREA: Though subsurface soil at the Main Facility Area and the Airport/Klondike Area is reasonably expected to be contaminated, exposure to subsurface soil is controlled through the Design Process Review (DPR), an institutional control, to ensure analytical data for subsurface soils are reviewed or generated/evaluated prior to exposure.
Air (outdoors)	___	X	___	MAIN FACILITY AREA and AIRPORT/KLONDIKE AREA: Exposure to outdoor air (wet trench air) is considered applicable to off-site Excavating Laborers and Maintenance Workers. A comparison of analytical data from groundwater monitoring wells located along the perimeter of the Site did not indicate any exceedances of applicable screening levels. It should be also noted that as subsurface soil at portions of the Site is reasonably expected to be contaminated, it is similarly reasonably expected that onsite excavation laborers could be exposed to contaminated air during the performance of excavations. In addition, the exposure to trench air by excavation laborers is limited through the implementation of an institutional control, the Design Process Review, to ensure analytical data for subsurface soils and/or groundwater are reviewed or generated/evaluated prior to potential exposure.

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

RATIONALE:

The following discusses in detail the groundwater, indoor air, surface soil, surface water, sediments, subsurface soil, or outdoor (wet trench) air known or reasonably suspected to be above appropriately protective risk-based "levels" as defined in the Main Facility CSM Report and the Airport/Klondike CSM Report. The data is conveyed below by specific area (i.e., Main Facility Area and Airport/Klondike Area) followed by individual media.

MAIN FACILITY AREA

Groundwater

The following discussions and resulting conclusions are based on the review and evaluation of available groundwater data for the Main Facility Area portion of the Site. A map depicting all groundwater sampling locations is presented as Drawing 1 in Attachment 1. Groundwater data collected from 517 locations over the period from March 1982 to June 2004 were considered in this determination. The groundwater monitoring well network is determined adequate in number and spatial distribution to assess the quality of groundwater at the Main Facility Area. Drawing 1 in Attachment 1 illustrates the locations of all groundwater monitoring points assessed. The results of groundwater investigations completed at the Main Facility Area were assessed to determine if groundwater was contaminated above respective screening levels for each of the following exposure scenarios.

- Dermal contact to groundwater by Off-site Utility Repair Workers via a comparison of spatial arithmetic mean groundwater concentration in wells along the facility boundary to Table 3-8 criteria (Main Facility CSM Report).

- Dermal contact to groundwater by Maintenance Workers completing repairs on dewatering pumps via a comparison of the spatial arithmetic mean groundwater concentration in wells near dewatering pumps to Table 3-8 criteria (Main Facility CSM Report).

- Ingestion of, and dermal contact with surface water by Samplers, Trespassers, and Off-site Recreators via a comparison of groundwater analytical data to Table 3-7 criteria (Main Facility CSM Report).

- Volatilization of groundwater to indoor air at off-site residential properties via a comparison of groundwater analytical data from wells along facility boundary to Table 3-5 criteria (Main Facility CSM Report).

Dermal Contact to Groundwater by Off-site Utility Repair Workers

Groundwater flows across the Site in a generally westerly-southwesterly direction. The presence of volatile organic compounds (VOCs) and select inorganic constituents in groundwater collected from groundwater monitoring points located along the facility boundary has been documented. Off-site Utility Repair Workers are the receptor potentially exposed to groundwater during the performance of excavations to perform subsurface utility repairs. The spatial arithmetic mean concentration of each compound and constituent in groundwater from groundwater monitoring points along the facility boundary in the Main Facility Area was compared to the screening levels provided in Table 3-8 of the Main Facility CSM Report. The facility boundary groundwater sampling locations that were considered in this evaluation include the following:

EA-GW-51D	EG-GW-34D	PH-GW-42D	PH-MW-11I	WT-GW-32S	WT-GW-44D	WT-MW-46
EA-GW-51S	EG-GW-35D	PH-GW-42S	PH-MW-11S	WT-GW-33D	WT-GW-44S	WT-MW-47
EA-GW-52D	EG-GW-36D	PH-GW-43D	PH-MW-19S	WT-GW-33S	WT-GW-45D	WT-MW-49
EA-GW-52S	EG-GW-37D	PH-GW-43S	WT-GW-01D	WT-GW-34D	WT-GW-45S	WT-MW-50
EA-GW-53D	EG-MW-03	PH-GW-44D	WT-GW-01S	WT-GW-34S	WT-MW-26I	WT-PZ-08
EA-GW-53S	ET-GW-18S	PH-GW-44S	WT-GW-02S	WT-GW-35D	WT-MW-26S	WT-PZ-09
EA-GW-54D	ET-GW-19S	PH-GW-45D	WT-GW-02D	WT-GW-35S	WT-MW-29D	WT-PZ-10
EA-GW-54S	ET-GW-20S	PH-GW-45S	WT-GW-03S	WT-GW-36D	WT-MW-29S	WT-PZ-11
EA-GW-55D	ET-GW-21S	PH-GW-46D	WT-GW-03D	WT-GW-36S	WT-MW-30	WT-PZ-12
EA-GW-55S	ET-GW-22S	PH-GW-46S	WT-GW-04D	WT-GW-37D	WT-MW-31	
EA-MW-01I	ET-GW-23S	PH-GW-47D	WT-GW-04S	WT-GW-37S	WT-MW-34D	
EA-MW-02I	ET-GW-24S	PH-GW-47S	WT-GW-05D	WT-GW-38D	WT-MW-34S	
EA-MW-02S	ET-GW-25S	PH-GW-48D	WT-GW-05S	WT-GW-38S	WT-MW-35S	
EA-MW-09I	ET-GW-26S	PH-GW-48S	WT-GW-06D	WT-GW-39D	WT-MW-36D	
EA-MW-09S	PH-GW-38D	PH-GW-49D	WT-GW-06S	WT-GW-39S	WT-MW-37	
EA-MW-11I	PH-GW-38S	PH-GW-49S	WT-GW-07D	WT-GW-40D	WT-MW-38D	
EA-MW-11S	PH-GW-39D	PH-GW-50D	WT-GW-07S	WT-GW-40S	WT-MW-38S	
EA-MW-13I	PH-GW-39S	PH-MW-50S	WT-GW-08D	WT-GW-41D	WT-MW-39	
EA-MW-13S	PH-GW-40D	PH-MW-02	WT-GW-08S	WT-GW-41S	WT-MW-41	
EA-MW-17I	PH-GW-40S	PH-MW-08I	WT-GW-31D	WT-GW-42	WT-MW-42	
EA-MW-17S	PH-GW-41D	PH-MW-08S	WT-GW-31S	WT-GW-43D	WT-MW-43	
EG-GW-31	PH-GW-41S	PH-MW-09	WT-GW-32D	WT-GW-43S	WT-MW-44	

Table 3-8 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Dermal Contact, P&W VCAP, Connecticut Facilities*. Based on the above comparison, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and methyl-isobutyl-ketone were present in groundwater from groundwater monitoring well WT-MW-38D at concentrations in excess of Table 3-8 screening levels. It should be noted, the groundwater present in WT-MW-38D is not considered representative of groundwater that could be contacted by an off-site Utility Repair Worker. This well is screened 17.5 to 20.5 feet below the ground surface. The shallow well of this well couplet (WT-MW-38S) is screened at an interval of 8 to 17 feet below the ground surface. Groundwater collected from WT-MW-38S did not contain any constituents in excess of the Table 3-8 criteria. As the shallow interval of WT-MW-38S is most representative of groundwater in the vicinity of the WT-MW-38 wells that could be contacted by off-site Utility Repair Workers, it is concluded that exceedances of Table 3-8 criteria do not exist. A table of the sampling and analytical information for groundwater samples selected for the above comparison is provided as Table 1 in Attachment 2. A summary of all analytical data for groundwater samples included in the above comparison is on the CD provided in Attachment 2. A table documenting the evaluation of groundwater samples along the facility boundary containing concentrations in excess of the Table 3-8 criteria is presented as Table 2 in Attachment 2. The completeness of this exposure pathway will discussed further in Question 3. The significance of this exposure pathway is discussed in further detail in Question 4.

Dermal Contact to Groundwater by Maintenance Workers Repairing Dewatering Sumps

The Main Facility Area CSM requires the comparison of the spatial arithmetic mean groundwater concentration in wells near dewatering sumps to the Table 3-8 screening levels. Based on a review of the groundwater contour maps generated for the facility (Drawings 1 and 2 in Attachment 1), areas affected by dewatering can be best described as three discrete areas. These areas are described as the Central Area, the Southeast Area, and the South Central Area. The limit of the approximate area of influence for each of the areas is depicted on Drawing 2 in Attachment 1. The spatial arithmetic mean concentration of each compound and constituent in groundwater from wells within each area of influence, respectively, was compared to the screening levels provided in Table 3-8 of the Main Facility CSM Report. Table 3-8 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Dermal Contact, P&W VCAP, Connecticut Facilities*. A table of the sampling and analytical information for groundwater samples selected for the above comparison is provided as Tables 3, 3a, and 3b in Attachment 2. A summary of all analytical data for groundwater samples included in the above comparison is on the CD provided in Attachment 2.

Based on the above comparison, there were exceedances for only two compounds in only the Central Area. The spatial arithmetic mean concentration of naphthalene at 12 µg/l exceeded the Table 3-8 screening level of 10 µg/l. This is based on the presence of naphthalene in 1 sample of 19 samples collected at a concentration of 180 µg/l. In addition, the single sample containing a detectable concentration of naphthalene was collected on November 7, 1994. The spatial arithmetic mean concentration of tetrachloroethylene at 387 µg/l exceeded the Table 3-8 screening level of 179 µg/l. This is based on the presence of tetrachloroethylene in 114 of 184 samples collected.

In further evaluation of the presence of naphthalene and tetrachloroethylene in groundwater that could be potentially present in dewatering sumps, an evaluation of available analytical data for the sump discharges was performed. It was determined that a robust analytical dataset for sumps WS-01, WS-5 and WS-07 was available. These umps are located in the Central Area and are located such that the data are representative of groundwater from the entire area. The following is a description of the dataset for the above dewatering sumps.

As of 2004, there are a total of nine active dewatering sumps in the Main Facility Area, as shown on Drawing 2 provided in Attachment 1. The following table provides a summary overview of these dewatering sumps.

Pump Well ID	Location	Installation Date[1]
WS-01 [2,3]	Dewatering System "G-Building"	1975
WS-05 [2,3]	Dewatering System "H-Building"	1975
WS-07 [2,3]	Dewatering System "South Test Area"	1937
WS-14[4]	Dewatering System "C-Building"	1940
WS-17 [2,3]	Dewatering System "Power House"	1937
WS-18 [2,3]	Dewatering System "Chilled Water Building"	1959
WS-28 [2,3]	Dewatering System "South Test Area"	1975
WS-29 [2,3]	Dewatering System "H-building"	1970s
WS-81[3]	Dewatering System "South Test Area"	1940s

Notes:
[1] Data obtained from *Summary of Production Wells and Dewatering Systems That Are Or may Be Subject To The Connecticut Water Diversion Policy Act.*
[2] Pump status and flow rates field verified by Loureiro Engineering Associates Inc. (LEA) (2002-2003)
[3] Information obtained by LEA from Pratt & Whitney East Hartford Data Base, and interviews with John Wotus (EH&S) (2002-2003)
[4] Data obtained from conversations/data with Erin Sullivan from Pratt & Whiney based on 2002 pumping well survey for Diversion Permit

As noted above, groundwater sample data were available from dewatering sumps WS-01, WS-05, and WS-07. Each of these sumps are located in the Central Area noted above. The dataset for dewatering sumps was compared to

criteria presented in Table 3-8, entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Dermal Contact, P&W VCAP, Connecticut Facilities*, provided in the Main Facility CSM Report. Tetrachloroethylene was present in dewatering sump WS-07 in the August and December 1989 samples at concentrations greater than the Table 3-8 screening levels, but not in the 1991, 1992, 2000, and 2001 groundwater sampling events. 1,1-dichloroethylene and methyl–isobutyl-ketone concentrations exceeded the Table 3-8 screening levels in dewatering sump WS-07 once in the 1989 groundwater sampling event (1,1-dichloroethylene), and once in the 1991 groundwater sampling event (methyl–isobutyl-ketone). 1,1-dichloroethylene and methyl-isobutyl-ketone concentrations did not exceed the Table 3-8 screening levels in the subsequent groundwater sample data for the 1992 and 2000 collection events. It is recognized that groundwater conditions are transient and that to make an assessment representative of current conditions, an evaluation of the most recent groundwater analytical data available for the dewatering sumps must be performed. As such, groundwater analytical data from the most recent two years of sampling from the dewatering sumps were considered as most current. Based on these data, there are no exceedances of the Table 3-8 criteria.

The data for the dewatering sumps, coupled with the spatial arithmetic mean evaluation from groundwater monitoring wells within the areas influenced by dewatering sumps performed above is determined to be adequate to assess the potential risks to Maintenance Workers. Based on the above evaluation, there were no exceedances of the respective screening criteria in the most recent groundwater analytical dataset for the Southeast Area and the South Central Area (areas for which sump discharge information is not available) and in the most recent sampling from dewatering sumps representative of groundwater from the Central Area.

Groundwater Discharging to Surface Water

Groundwater flows across the Site in a westerly-southwesterly direction. In terms of surface water/groundwater interaction, local groundwater flow in the Main Facility Area generally trends towards Willow Brook as a discharge point. An initial evaluation of the groundwater analytical data obtained from all 517 groundwater monitoring points was completed to determine the presence or absence of constituents at concentrations in excess of the respective screening criteria. Drawing 1 in Attachment 1 depicts the groundwater monitoring locations assessed. Table 5 in Attachment 2 is a presentation of the sampling and analytical information for all groundwater samples evaluated in this comparison. The groundwater samples were initially compared to Table 3-7, entitled Generic *P&W Groundwater Screening Levels (SLs) Based on Surface Water Protection, P&W VCAP, Connecticut Facilities*, of the Main Facility CSM Report. As presented in Table 6, based on an initial comparison of all groundwater data, there are over 35 individual constituents or compounds detected in groundwater at concentrations in excess of the Table 3-7 criteria.

To more appropriately assess groundwater discharging to surface water, only groundwater samples from those groundwater sampling locations immediately upgradient from Willow Brook and Willow Brook Pond were evaluated against the Table 3-7 criteria. Specifically, the groundwater sample locations included in this assessment are presented on the following page.

ET-MW-18S	WT-GW-15D	WT-GW-26S	WT-GW-37D	WT-MW-15S	WT-MW-31	WT-MW-46
ET-MW-19S	WT-GW-15S	WT-GW-27D	WT-GW-37S	WT-MW-17I	WT-MW-32D	WT-MW-47
ET-MW-21S	WT-GW-16D	WT-GW-27S	WT-GW-38D	WT-MW-17S	WT-MW-32S	WT-MW-48
WT-GW-03D	WT-GW-16S	WT-GW-28D	WT-GW-38S	WT-MW-19I	WT-MW-33D	WT-MW-49
WT-GW-03S	WT-GW-19D	WT-GW-28S	WT-GW--39D	WT-MW-19S	WT-MW-33S	WT-MW-50
WT-GW-04D	WT-GW-19S	WT-GW-29D	WT-GW-40D	WT-MW-20I	WT-MW-34D	WT-PZ-05
WT-GW-04S	WT-GW-20D	WT-GW-29S	WT-GW-40S	WT-MW-20S	WT-MW-34S	WT-PZ-06
WT-GW-05D	WT-GW-20S	WT-GW-31D	WT-GW-41D	WT-MW-22I	WT-MW-35S	WT-PZ-07
WT-GW-05S	WT-GW-21D	WT-GW-31S	WT-GW-41S	WT-MW-23I	WT-MW-36D	WT-PZ-08
WT-GW-06D	WT-GW-21S	WT-GW-32D	WT-GW-42	WT-MW-23S	WT-MW-37	WT-PZ-09
WT-GW-07D	WT-GW-22D	WT-GW-32S	WT-GW-43S	WT-MW-24I	WT-MW-38D	WT-PZ-10
WT-GW-08D	WT-GW-22S	WT-GW-33D	WT-GW-44S	WT-MW-24S	WT-MW-38S	WT-PZ-11
WT-GW-08S	WT-GW-23D	WT-GW-33S	WT-GW-45S	WT-MW-25I	WT-MW-39	WT-PZ-12
WT-GW-12D	WT-GW-23S	WT-GW-34D	WT-MW-02	WT-MW-25S	WT-MW-40	
WT-GW-12S	WT-GW-24D	WT-GW-34S	WT-MW-06	WT-MW-26I	WT-MW-41	
WT-GW-13D	WT-GW-24S	WT-GW-35D	WT-MW-08	WT-MW-26S	WT-MW-42	
WT-GW-13S	WT-GW-25D	WT-GW-35S	WT-MW-09I	WT-MW-29D	WT-MW-43	
WT-GW-14D	WT-GW-25S	WT-GW-36D	WT-MW-09S	WT-MW-29S	WT-MW-44	
WT-GW-14S	WT-GW-26D	WT-GW-36S	WT-MW-15I	WT-MW-30	WT-MW-45	

A summary of the sampling and analytical information for all the groundwater monitoring locations considered as part of this comparison is presented as Table 7 in Attachment 2. A summary of the constituents detected in the groundwater samples noted in Table 7 in excess of the Table 3-7 criteria are presented in Table 8 in Attachment 2. As presented in Table 8, the following constituents were present in groundwater at the locations described at concentrations that exceeded Table 3-7 screening levels: arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, zinc, polychlorinated biphenyls (PCBs), cyanide, benzo(b)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, naphthalene, pentachlorophenol, bis(2-ethylhexyl)phthalate, acenaphthalene, 1,1-dichloroethane, chloroethane, methyl-tert-butyl-ether, 1,1-dichloroethylene, trans-1,2-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, bromomethane, dichlorodifluormethane, trichlorotrifluoromethane, and methyl-isobutyl-ketone have been detected in groundwater from one or more sampling locations at concentrations in excess of the Table 3-7 criteria. The completeness and significance of this exposure pathway will be discussed in Questions 3 and 4.

Future analysis of off site GW migration must be performed. JAP 2/2/05

Groundwater Migrating Toward Adjacent Off-Site Residential Properties

As noted above, the presence of VOCs in groundwater collected from groundwater sampling locations situated along the facility boundary has been documented. Off-site residents are a potential receptor that may be potentially exposed to the effects of volatile organic compounds in groundwater beneath their respective dwellings. Specifically, an evaluation must be performed to assess the potential for volatile organic compounds present in groundwater at facility boundaries to affect indoor air quality and pose a potential risk to inhabitants of residential structures. The concentration of each compound in groundwater from wells along the facility boundary in the Main Facility Area was compared to the screening levels provided in Table 3-5 of the Main Facility CSM Report. Table 3-5 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Residential Indoor Air Inhalation, P&W VCAP, Connecticut Facilities*. A table of the sampling and analytical information for groundwater samples selected for the above comparison is provided as Table1 in Attachment 2. A summary of all analytical data for groundwater samples included in the above comparison is on the CD provided in Attachment 2.

As presented in Table 9, benzene, 1,2-dichloroethane, 1,1-dichloroethylene, vinyl chloride, and trichloroethylene have been detected in groundwater collected from groundwater monitoring locations situated along the facility boundary at concentrations in excess of the Table 3-5 criteria. The completeness and significance of this pathway will be evaluated in Questions 3 and 4.

Indoor Air

The following discussions and resulting conclusions are based on the review and evaluation of available indoor air data for the Main Facility Area portion of the Site. A table of the sampling and analytical information for indoor air samples is provided as Table 10 in Attachment 2. A summary of all analytical data for indoor air samples is on the CD provided in Attachment 2. A map depicting all indoor air sampling locations is presented as Figure 2 in Attachment 1. The results of indoor air sampling events completed at the Main Facility Area were assessed to determine if indoor air was contaminated above respective screening levels for the following exposure scenario.

- Inhalation of indoor air by Maintenance Workers, Indoor Workers, and Samplers via a comparison of indoor air analytical information to Table 3-4 criteria (Main Facility Area CSM Report).

Indoor air samples were collected from the buildings associated with the Main Facility Area in October 1998 and July 2004. As documented in the report entitled *Indoor Air Monitoring in Support of VCAP Risk Assessment*, prepared by LEA in March 1999, nine indoor air samples (EH-RSK-01 through EH-RSK-09) were collected on October 29, 1998 throughout the main facility building and the Waste Treatment Plant at locations representative of process operations, and from basements (Waste Treatment Plant) and ground floors (main facility building) immediately above areas where elevated volatile organic compound concentrations were observed in groundwater. Figure 2 in Attachment 1 depicts the locations of the indoor air samples. The samples were collected in multimedia thermal desorption tubes over an approximately eight hour period and analyzed in accordance with the modified EPA Method T01/T02 for an expanded list of VOCs. In addition, one duplicate sample and one trip blank were collected for quality assurance/quality control purposes.

The rationale for the indoor sample collection is outlined in the table below.

Sampling Location	Rationale/Location
EH-RSK-AS-01	Basement near location where groundwater VOC concentrations are elevated (11DCE=5,533 µg/l; VC=520 µg/l).
EH-RSK-AS-02	Basement near location where groundwater VOC concentrations are elevated (11DCE=204µg/l).
EH-RSK-AS-03	Truck well near location where groundwater VOC concentrations are elevated (VC=3,400 µg/l).
EH-RSK-AS-04	Occupied process area (Hollow fan blade).
EH-RSK-AS-05	Basement near locations where groundwater VOC concentrations are elevated (VC=1,900 µg/l)
EH-RSK-AS-06	Occupied process area (Foundry).
EH-RSK-AS-07	Occupied process area (Lathes).
EH-RSK-AS-08	Location where groundwater VOC concentrations are elevated (11DCE=817 µg/l; TCE=32,702 µg/l; VC=2,400 µg/l).
EH-RSK-AS-09	Waste Treatment Plant

The indoor air sample data were compared to the numeric criteria published in Table 3-4, entitled *Generic P&W Indoor Air Screening Levels (SLs) P&W VCAP, Connecticut Facilities* of the Main Facility CSM Report. The comparison indicated that the detected concentrations are several orders of magnitude below the corresponding screening levels, with the exception of benzene in EH-RSK-AS-03 at concentrations that exceeded the Table 3-4 screening levels. A summary of the constituents detected in indoor air samples at concentrations in excess of applicable screening criteria is presented as Table 11 in Attachment 2.

In July 2004, further indoor air sampling and associated sub-slab sampling was completed throughout the facility in to provide additional documentation in support of this EID. This sampling event included eight indoor air samples (EH-RSK-AS-10 through EH-RSK-AS-17), eight sub-slab samples (EH-RSK-VP-10 through EH-RSK-VP-17), one field duplicate, one trip blank and one background air [outside ambient air (EH-RSK-AS-AA)] sample (Table 10). Figure 2 in Attachment 1 depicts the locations of the indoor air and sub-slab vapor sample locations. The rationale for the collection of sub-slab samples in conjunction and at the same locations of the indoor air samples was to assess the potential that concentrations in indoor air result from elevated VOC concentrations in groundwater.

The following table correlates the indoor air and sub-slab sample identification and location.

Indoor Air Sample Location	Sub-Slab Sample Location	Rationale/Location
EH-RSK-AS-AA	N/A	Ambient air sample taken outside manufacturing facility
EH-RSK-AS-10	EH-RSK-VP-10	H Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-11	EH-RSK-VP-11	Waste Treatment Plant. Leadman Office and Basement. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-12	EH-RSK-VP-12	K Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-13	EH-RSK-VP-13	D Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-14	EH-RSK-VP-14	A Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-15	EH-RSK-VP-15	C Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-16	EH-RSK-VP-16	E Building. Elevated VOC Concentrations in Groundwater.
EH-RSK-AS-17	EH-RSK-VP-17	North Test Area.

Indoor air and sub-slab samples were collected using Summa® Canisters. The sub-slab samples incorporated the use of ¼-inch diameter steel probes advanced to a depth of 3 inches below the concrete. The indoor air composite

sample collection occurred over a period of 8 hours where as the sub-slab grab samples were collected for a duration of 30 minutes.

The indoor air and sub-slab samples were submitted for laboratory analysis via EPA Method T0-15. Analytical laboratory reports are provided in Attachment 4. As with the 1998 indoor air sampling event, the analytical laboratory results for the indoor air were compared to Table 3-4 screening levels tabulated in the Main Facility CSM Report.

Only benzene was detected in the outdoor ambient air sample (EH-RSK-AS-AA) at a concentration that exceeded Table 3-4 criteria of the Main Facility CSM Report. A summary of the constituents detected in indoor air samples at concentrations in excess of applicable screening criteria is presented as Table 11 in Attachment 2. The significance of this exceedance and the exceedance of benzene noted during the 1998 sampling event are discussed in greater detail in Questions 3 and 4 of this document.

Surface Soil

The following discussions and resulting conclusions are based on the review and evaluation of available surface soil data for the Main Facility Area portion of the Site. Table 12 in Attachment 2 provides a summary of sampling and analytical information for surface soil samples collected at the Main Facility Area. In an effort to obtain an adequate surface soil dataset for each exposure area at the Main Facility Area, UTC/Pratt & Whitney collected a total of 10 surface soil samples on March 18, 1998. Each of the surface soil samples were collected from a depth interval of 0 to 0.5 feet below the ground surface and, as such, represent the uppermost soil horizon present at the locations sampled. In addition to these sampling locations, during the course of subsurface investigation activities conducted at the Main Facility Area, a total of 18 additional soil samples have been collected within designated exposure areas from an interval beginning at the ground surface. In all but one case, the interval sampled was the 0 to 2-foot interval. Analytical data for all samples in which the sampling interval began at the 0-foot mark have been included in this evaluation. A map depicting all sampling locations is presented as Drawing 3 in Attachment 1. The results of the surface soil sampling completed at the Main Facility Area were assessed to determine if surface soil was contaminated above respective screening levels for the following exposure scenario.

- Groundskeepers, Samplers, and Trespassers ingestion and dermal contact with surface soils via a comparison of the surface soil analytical data to Table 3-10 criteria (Main Facility CSM Report).

The majority of surface soil samples were collected in the Sampler and Trespasser exposure areas at Willow Brook and Willow Pond. However, as discussed below in further detail, remediation activities at Willow Brook and Willow Pond resulted in the removal of the surface soils and the implementation of engineered and institutional controls. As a result, the only applicable exposure area for surface soil samples at the Main Facility Area is the Groundskeeper exposure area. For purposes of this EID, the surface soil sample analytical data in the Groundskeeper exposure area were assessed. Table 13 is a summary of the sampling and analytical information for all surface soil samples considered in this evaluation. Surface soil samples were compared to Table 3-10 of the Main Facility CSM Report. Table 3-10 is entitled *Generic P&W Soil Screening Levels (SSLs) Based on Soil Ingestion and Dermal Contact P&W VCAP, Connecticut Facilities* and provides values for seven receptors scenarios and identifies separate screening levels for each scenario. For this evaluation, the Groundskeeper scenario tabulated in Table 3-10 was used. Table 14in Attachment 2 summarizes the constituent concentrations present in surface soil samples that exceeded the Table 3-10 Groundskeeper scenario screening levels. Based on this comparison, arsenic, PCBs, and/or benzo(a)pyrene were detected in surface soil from eight locations in excess of the Table 3-10 criteria.

The completeness of the pathway and the significance of the presence of these constituents at concentrations in excess of the Table 3-10 criteria are discussed in Questions 3 and 4.

Surface Water

Surface water samples have been collected from Willow Brook and Willow Brook Pond between 1991 and 2002 for analysis of VOCs, Resource Conservation and Recovery Act (RCRA) 8 metals, total petroleum hydrocarbons (TPH), and PCBs. The surface water sample locations are depicted on Drawing 4 in Attachment 1 of this EID. The results of the surface water sampling completed at the Main Facility Area were assessed to determine if surface water was contaminated above respective screening levels the following exposure scenario.

- Ingestion of, and dermal contact with surface water by Samplers, Trespassers, and Off-site Recreators via a comparison of surface water analytical data to Table 3-6 criteria (Main Facility CSM Report).

Surface water sample analytical results were initially compared to the Generic Pratt & Whitney Surface Water Screening Levels tabulated in Table 3-6 of the Main Facility CSM Report. Table 3-6 is entitled *Generic P&W Surface Water Screening Levels P&W VCAP, Connecticut Facilities*. Table 15 in Attachment 2 summarizes the sampling and analytical information for surface water samples collected and that were considered as part of this evaluation. Table 16 in Attachment 2 is a tabular presentation of constituent concentrations in surface water samples that exceeded the screening levels provided in Table 3-6 of the Main Facility CSM Report. Constituent concentrations that exceeded the screening levels provided in Table 3-6 of the Main Facility CSM Report include arsenic, chromium, copper, manganese, silver, PCBs, benzene, chloroform, 1,1,1-trichlorethane, 1,1-dichloroethylene, cis-1,2-dihloroethylene, vinyl chloride, tetrachloroethylene, and trichloroethylene. The completeness of this pathway and the significance of the presence of the above constituents must be further evaluated in Questions 3 and 4.

Sediment

Within the Main Facility Area, sediment samples were only collected along and within Willow Brook and Willow Brook Pond. Willow Brook is a small stream transecting the Site from the northern portion of the Rentschler Airport (Airport/Klondike Area) through to the northwest portion of the Main Facility Area operations complex. Currently, Willow Brook flows in a southwesterly direction in an open channel from the Rentschler Airport, is then hard-piped underground to the inlet of Willow Brook Pond, and continues from the pond as an open channel to a culvert under Main Street. From Main Street, Willow Brook flows in an open channel for a distance of approximately 2,500 feet to the confluence with the Connecticut River. Willow Brook Pond is located in the northwestern portion of the Main Facility Area and is approximately 4 acres in size. The pond, a single body of water when first created, has been modified various times through the years. It is now comprised of two ponds (Upper Willow Brook Pond and Lower Willow Brook Pond) subdivided by a culvert.

During routine draining of Willow Brook Pond in September 1997, an oil sheen was noticed seeping through the sediment. Pratt & Whitney reported the sheen to the United States Coast Guard and the Connecticut Department of Environmental Protection (DEP) in accordance with discharge reporting requirements. Following the detection of PCBs in a sample, the DEP issued Pratt & Whitney a Notice of Violation (NOV), No. PCB 97-08, on November 7, 1997. In response to the NOV, UTC/Pratt & Whitney developed a sampling work plan and conducted three phases (initial, supplemental and final site characterization) of remedial investigation from December 1997 to April 1999. These investigations were underway during the preparation and finalization of the CSM for the Main Facility Area. The investigations not only identified the probable sources and provided the analytical data to sufficiently define the horizontal and vertical limits of contamination allowing development of a remediation plan, but also confirmed that

historic discharges originating from the UTC/Pratt & Whitney Site resulted in the deposition of oils containing PCBs within and immediately surrounding Willow Brook and Willow Brook Pond. The initial, supplemental, and final site characterization investigations are documented in further detail in the following reports: *Report on PCB Investigation for Willow Brook and Willow Brook Pond Sediment*, prepared by LEA, dated February 13, 1998; *Report on Supplemental PCB Investigation for Willow Brook and Willow Brook Pond*, prepared by LEA, and dated April 1998; and *Report on PCB Investigation for Willow Brook and Willow Brook Pond*, prepared by LEA, and dated April 1999.

The sediment samples collected during the initial, supplemental, and final site characterization investigations indicated the presence of VOCs, semi-volatile organic compounds (SVOCs), TPH, RCRA 8 metals (including nickel and zinc), and PCBs.

Remediation of contaminated soil and sediment was completed within and immediately surrounding Willow Brook and Willow Brook Pond in August 2002 to satisfy the requirements of the State of Connecticut Consent Order SRD-130. In addition to satisfying the requirements of SRD-130, the remediation and restoration activities were also implemented as a final remedy under the RCRA Corrective Action and Toxic Substance Control Act (TSCA) programs. The remediation activities are discussed in further detail in the report entitled *Remedial Action Report, Willow Brook and Willow Brook Pond, United Technologies Corporation, Pratt & Whitney East Hartford, Connecticut* (Remedial Action Report) prepared by LEA in November 2002.

The remediation activities and restoration activities performed within and immediately surrounding Willow Brook and Willow Brook Pond took place during the period from July 2, 2001 through August 31, 2002. The remediation activities consisted of the excavation and off-site disposal of soil and sediment from within and immediately surrounding Willow Brook and Willow Brook Pond that contained PCBs at concentrations greater than 25 milligrams per kilogram [mg/kg or parts per million (ppm)] with the following exceptions:

- The wetland downgradient of the dam where the excavation of soil and sediment at concentrations greater than the DEP Remediation Standard Regulations (RSRs) Residential Direct Exposure Criteria (RDEC) for PCBs was performed;

- The southern portion of the Lower Willow Brook Pond where the excavation of soil and sediment at concentrations greater than the RDEC for PCBs was performed; and

- The footprint of the Process Water Facility and the small embayment west of the Process Water Facility where soil was remediated to meet the RDEC for PCBs for soils within 4-feet of the final grade, the DEP RSRs Industrial/Commercial Direct Exposure Criteria (IDEC) for PCBs for soils located in inaccessible locations and the DEP RSRs GB Pollutant Mobility Criteria (GB PMC) for soils above the seasonal high water table.

The remediation activities also incorporated the implementation of two institutional controls to ensure the long-term protectiveness of the remedy. The institutional controls consist of 1) an Environmental Land Use Restriction (ELUR) to ensure the affected area will not be used for residential purposes and to prohibit excavation and 2) a fence around the entire project area to preclude access to Willow Brook and Willow Brook Pond. At the time of this EID, the perimeter fence is in place and a draft ELUR has been submitted to the Commissioner of DEP for approval.

Upon completion of the remediation activities, the entire area affected by construction was restored. The restoration involved the installation of three types of engineered controls over the remaining soil and sediments. The engineered controls were designed to accommodate the anticipated stream flow velocities and considered the

ultimate use of the areas. The Wetland north of Willow Brook was remediated to meet the RDEC. As such, there was no need for an engineered control within this area. The restoration activities performed were focused on restoring this area to a marsh with habitat value.

While the remedial action objective of 25 mg/kg exceeds the lowest applicable screening value of 11 mg/kg for samplers in Willow Brook Pond, confirmatory sediment sampling performed during the remediation activities indicated that no single sample exhibited total PCB concentrations in excess of 5 mg/kg. In addition, the remediation activities resulted in the removal of not less than three feet of bottom sediment from within and immediately surrounding Willow Brook and Willow Brook Pond and the restoration of the stream channel and ponds through the installation of a 36-inch thick engineered control consisting of soil, a synthetic filter fabric, and rock. The limit of the area affected by remediation activities is depicted on Drawing 4 in Attachment 1.

It should be noted that portions of Willow Brook and all of Willow Brook Pond were considered exposure areas for both samplers and trespassers at the time of the finalization of the CSM for the Main Facility Area in September 1999. The exposure areas designated in September 1999 are depicted on Drawing 4 in Attachment 1. Per the Main Facility CSM Report, the receptors associated with applicable exposure scenario are as follows:

- Ingestion of, and dermal contact with sediment by Samplers, Trespassers, and Off-site Recreators via a comparison of surface soil analytical data to Table 3-10 criteria (Main Facility CSM Report).

These exposure areas were applicable at the time of the finalization of the CSM as access to the portions of Willow Brook and Willow Brook Pond were not restricted by a fence. However, the remediation activities completed in August 2002 have resulted in the installation of a locked fence enclosure around the entire perimeter of the exposed length of Willow Brook and both the upper and lower sections of Willow Brook Pond. As a result, access to these areas is now restricted and only capable through or over the gated enclosure. As the engineered control is comprised of materials that have been documented to be free of PCBs (as well as other contaminants) and the sediments existing prior to remedial actions have been removed, it is concluded that sediments within Willow Brook and Willow Brook Pond do not exhibit the presence of contaminants in excess of the Table 3-10 criteria. A table of the sampling and analytical information for sediment samples is provided in Table 17 in Attachment 2. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Subsurface Soil

It is presumed that this media is contaminated above respective soil screening levels presented in the CSM. However, for reasons described above and again in response to Question 3, exposure to these media is controlled through the implementation of the Design Process Review, and institutional control. The Design Process Review control is described in greater detail in response to Question 3. However, for purposes of this EID, the following exposure scenario would be applied to subsurface soils:

- Dermal contact by Samplers via a comparison of subsurface sample analytical data to Table 3-10 criteria ((Main Facility CSM Report).

The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Wet Trench Air (Outdoor Air)

Air quality within a trench can be affected by sources of volatile organics in groundwater as the water table is relatively shallow at and in the immediate vicinity of the Site. Off-site Utility Repair Workers are the receptor potentially exposed to wet trench air. A table of the sampling and analytical information for groundwater samples selected for the above comparison is provided as Table 1 in Attachment 2. A summary of all analytical data for groundwater samples included in the above comparison is on the CD provided in Attachment 2. A table documenting the evaluation of groundwater samples along the facility boundary and the absence of constituents at concentrations in excess of the Table 3-3 criteria is presented as Table 18 in Attachment 2. The groundwater sampling locations that were considered in this evaluation are the same as those tabulated under the Dermal Contact to Groundwater by off-site Utility Repair Workers discussed above. These groundwater sampling locations that was used for all evaluations requiring an assessment of groundwater quality at the perimeter of the facility and assessed for the following exposure scenario:

- Inhalation of wet trench air by Off-site Utility Repair Workers via a comparison of spatial arithmetic mean groundwater concentrations to wells along the Main Facility Area boundary to Table 3-3 criteria (Main Facility CSM Report).

The spatial arithmetic mean concentration of each volatile organic compound in groundwater from wells along the facility boundary in the Main Facility Area was compared to the screening levels provided in Table 3-3 of the Main Facility CSM Report. Table 3-3 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Trench Air Inhalation, P&W VCAP, Connecticut Facilities*. There were no volatile organic compounds (VOCs) present in any of the groundwater samples assessed at concentrations that exceeded the Table 3-3 screening levels. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

AIRPORT/KLONDIKE AREA

Groundwater

The following discussions and resulting conclusions are based on the review and evaluation of available groundwater data for the Airport/Klondike Area portion of the Site. Groundwater data collected from over 450 locations over the period from November 1991 to March 2001 were considered in this determination. The groundwater monitoring well network is determined adequate in number and spatial distribution to assess the quality of groundwater at the Airport/Klondike Area. Drawing 1 in Attachment 1 illustrates the locations of all groundwater monitoring points assessed. Table 19 in Attachment 2 provides a summary of sampling and analytical information for all the groundwater sampling locations assessed in the Airport/Klondike Area. A summary of all analytical data for groundwater is provided in a CD included in Attachment 2. The results of groundwater investigations completed at the Airport/Klondike Area were assessed to determine if groundwater was contaminated above respective screening levels for each of the following exposure scenarios.

- Ingestion of, and dermal contact with surface water by Maintenance Workers, Samplers, and Trespassers via a comparison of groundwater analytical data to Table 3-7 criteria (Airport/Klondike CSM Report).

- Volatilization of groundwater to indoor air at off-site residential properties via a comparison of groundwater analytical data from wells along the facility boundary to Table 3-5 criteria (Airport/Klondike CSM Report).

Groundwater Discharging to Surface Water

Groundwater flows across the Site in a westerly-southwesterly direction. In terms of the surface water/groundwater interaction, local groundwater flow in the Airport/Klondike Area generally trends towards Pewter Pot Brook, including the Klondike Tributary and Suntan Tributary as discharge points. An initial evaluation of the groundwater analytical data obtained from over 450 groundwater monitoring points was completed to determine the presence or absence of constituents at concentrations in excess of the respective screening criteria. Drawing 1 in Attachment 1 depicts the groundwater monitoring locations assessed. The groundwater samples were initially compared to Table 3-7, entitled Generic *P&W Groundwater Screening Levels (SLs) Based on Surface Water Protection, P&W VCAP, Connecticut Facilities*, of the Airport/Klondike CSM Report. As presented in Table 20, based on an initial comparison of all groundwater data, there are over 23 individual constituents or compounds detected in groundwater at concentrations in excess of the Table 3-7 criteria.

To more appropriately assess groundwater discharging to surface water, only groundwater samples from those groundwater sampling locations immediately upgradient from Pewter Pot Brook and associated tributaries were evaluated against the Table 3-7 criteria. Specifically, a total of 44 groundwater monitoring sample locations were included in this assessment. A summary of the sampling and analytical information for all the groundwater locations considered as part of this comparison is presented as Table 21 in Attachment 2. A summary of the constituents detected in the groundwater samples noted in Table 21 in excess of the Table 3-7 criteria are presented in Table 22 in Attachment 2. As presented in Table 22, the following constituents were present in groundwater at the locations described at concentrations that exceeded Table 3-7 screening levels: arsenic, barium, cadmium, chromium, copper, lead, zinc, cis-1,2-dichloroethylene, tetrachloroethylene, and xylenes. The completeness and significance of this exposure pathway will be discussed in Questions 3 and 4.

Groundwater Migrating Toward Adjacent Off-Site Residential Properties

Future analysis of Off-Site GW migration must be performed.

As noted above, the presence of volatile organic compounds in groundwater collected from wells located along the facility boundary has been documented. Off-site residents are a receptor potentially exposed to the effects of VOCs in groundwater beneath their respective dwellings. Specifically, an evaluation must be performed to assess the potential for volatile organic compounds present in groundwater at facility boundaries to result in the presence of such compounds in indoor air at concentrations that pose a potential risk to inhabitants. The facility boundary groundwater sampling locations that were considered in this evaluation include the following:

NA-SB-09	NA-SB-110	NA-SB-111	NA-SB-113	NA-SB-12	NA-SB-15	NA-SB-29
NA-SB-30	NA-SB-32	NA-SB-36	NA-SB-38	NA-SB-43	SA-MW-04	SA-SB-169
SA-SB-170	SA-SB-35	SA-SB-66	SK-MW-01	SK-MW-04	SK-SB-130	SK-SB-131
SK-SB-280	SK-SB-283	SK-SB-284				

The concentration of each compound in groundwater from wells along the facility boundary in the Airport/Klondike Area was compared to the screening levels provided in Table 3-5 of the Airport/Klondike CSM Report. Table 3-5 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Residential Indoor Air Inhalation, P&W VCAP, Connecticut Facilities*. A table of the sampling and analytical information for groundwater samples selected for the above comparison is provided as Table 23 in Attachment 2. No constituent concentrations in groundwater samples analyzed exceeded the Table 3-5 criteria. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Indoor Air

The Airport/Klondike Area does not have any active office or industrial buildings; thus, indoor air exposures do not need to be evaluated

Surface Soil

The following discussions and resulting conclusions are based on the review and evaluation of available surface soil data for the Airport/Klondike Area portion of the Site. In an effort to obtain an adequate surface soil data set for each Groundskeeper, Trespasser and Sampler exposure areas in the Airport/Klondike Area, a total of 1,086 surface soils samples over the period from February 1990 to April 2001 were considered in this determination. Each of the surface soil samples were collected from a depth interval of 0 to 0.5 feet below the ground surface and as such, represent the uppermost soil horizon present at the locations sampled. In addition to these sampling locations, during the course of subsurface investigations completed at the Airport/Klondike Area, a total of 1,034 soil samples have been collected from interval beginning at the ground surface. In most cases, the samples were collected from the 0 to 2-foot interval. Analytical data for all samples in which the sampling interval began at the 0-foot mark have been included in this evaluation. A map depicting all surface soil sampling locations is presented as Drawing 3 of Attachment 1. A summary of all analytical data for surface soil, including select comparison discussed in the sections below, is provided in a CD included in Attachment 2. The results of surface soil investigations completed at the Airport/Klondike Area were assessed to determine if surface soil was contaminated above respective screening levels for the following exposure scenarios.

- Groundskeepers, Trespassers and Sampler ingestion and dermal contact with surface soils via a comparison of the surface soil analytical data to Table 3-10 criteria (Airport/Klondike CSM Report).

Surface soil samples were compared to Table 3-10 of the Airport/Klondike CSM Report. Table 3-10 is entitled *Generic P&W Soil Screening Levels (SSLs) Based on Soil Ingestion and Dermal Contact P&W VCAP, Connecticut Facilities* and provides values for seven receptor scenarios and identifies separate screening levels for each scenario. For this evaluation, the Groundskeeper, Trespasser, and Sampler scenarios tabulated in Table 3-10 were used.

A total of 756 surface soil sample data were compared to the Trespasser exposure scenario in Table 3-10. Table 24 in Attachment 2 is a presentation of the sampling and analytical information for all surface soil samples evaluated in this comparison. The results of the comparison indicate that no constituent concentrations in the surface soil samples exceed the Table 3-10 Trespasser Exposure scenario screening levels.

220 surface soil sample data were compared to the Groundskeeper exposure scenario in Table 3-10. Table 25 in Attachment 2 summarizes the sampling and analytical information for all surface soil samples used in this comparison. No constituent concentrations exceeded the Table 3-10 Groundskeeper Exposure scenario screening levels.

The Sampler Exposure scenario in Table 3-10 was used to compare six surface soil samples for this exposure scenario. A summary of the sampling and analytical information for the surface soil samples used in this comparison is provided in Table 26 in Attachment 2. There were no exceedances of constituent concentrations in surface soil samples to the Table 3-10 Sampler exposure scenario screening criteria. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Sediment

The following discussions and resulting conclusions are based on the review and evaluation of available sediment data for the Airport/Klondike Area portion of the Site. A map depicting all sediment sampling locations is presenting Drawing 4 of Attachment 1. A summary of all analytical data for sediment, including select comparison discussed in the sections below, is provided in a CD included in Attachment 2. Sediment data colleted from 40 locations over the period from November 1991 to July 1997 were considered in this determination.

The results of sediment investigations completed at the Airport/Klondike Area were assessed to determine if sediment was contaminated above respective screening levels for the following exposure scenarios.

- Ingestion of, and dermal contact with sediment by Maintenance Workers, Samplers, and Trespassers via comparison to Table 3-10 criteria (Airport/Klondike CSM Report).

A total of 67 sediment samples were collected from Pewter Pot Brook and its tributaries between 1991 and 1997 and assessed against risk-based screening levels calculated for Maintenance Workers, Samplers, and Trespasser exposure areas and tabulated in Table 3-10 of the Airport/Klondike CSM Report. Table 3-10 is entitled *Generic P&W Soil Screening Levels (SSLs) Based on Soil Ingestion and Dermal Contact P&W VCAP, Connecticut Facilities.* Table 27 in Attachment 2 summarizes the sampling and analytical information for sediment samples used in this comparison.

Although there is a low frequency of grounds-keeping activities in the Airport/Klondike Area, the use of Table 3-10 criteria was proposed as a conservative measure. Furthermore, contact with sediment is not considered an exposure pathway for Samplers. However, the use of Table 3-10 criteria was proposed in the Airport/Klondike CSM by stipulating that sampling-related exposures will be evaluated as a proxy for the Maintenance Worker exposures to sediment. In addition, trespasser-related activities are considered minimal in the Airport/Klondike Area. Therefore, the screening levels tabulated in Table 3-10 are proposed to be used as conservative criteria to evaluate both adult and adolescent trespasser exposures. As mentioned above, Table 3-10 provides values for seven receptor scenarios and identifies separate screening levels for each scenario.

A comparison of constituent concentrations in the sediment samples to the applicable (Maintenance Workers, Samplers, and Trespasser) scenarios in Table 3-10 indicates that there are no concentrations exceeding the Table 3-10 screening criteria. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Subsurface Soil

It is presumed that this media is contaminated in some areas above respective soil screening levels presented in the CSM. However, for reasons described above and again in response to Question 3, exposure to these media is controlled through the implementation of the Design Process Review, and institutional control. The Design Process Review control is described in greater detail in response to Question 3. However, for purposes of this EID, the following exposure scenario would be applied to subsurface soils:

- Dermal contact by Samplers via a comparison of subsurface sample analytical data to Table 3-10 criteria (Airport/Klondike CSM Report).

The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Surface Water

The following discussions and resulting conclusions are based on the review and evaluation of available surface water data for the Airport/Klondike Area portion of the Site. A map depicting all surface water sampling locations is presenting Drawing 4 of Attachment 1. A summary of all analytical data for surface water, including select comparisons discussed in the sections below, is provided in a CD included in Attachment 2. Surface water data colleted from 35 locations over the period from November 1991 to July 1997 were considered in this determination. The results of surface water investigations completed at the Airport/Klondike Area were assessed to determine if surface water was contaminated above respective screening levels for the following exposure scenario.

- Ingestion of, and dermal contact with, surface water by Maintenance Workers, Samplers, and Trespassers via comparison to Table 3-6 criteria (Airport/Klondike CSM Report).

Surface water bodies in the Airport/Klondike Area are Pewter Pot Brook and its tributaries, which drain the majority of the eastern and southern portions of the property. The first tributary, designated the Klondike Tributary, flows within an excavated ditch, which runs north-south, adjacent to the airport perimeter road, parallel to the easternmost runway. The second major tributary to Pewter Pot Brook, designated the Suntan Tributary, runs northeast-southwest and crosses the South Airport Area in a buried culvert. This tributary emerges from the culvert at a small pond.

The primary maintenance activities performed are the removal of beaver dams in surface water, and as such, the potential for exposure to surface water is viable. A conservative approach was utilized in the CSM in which surface water screening levels used in the Airport/Klondike CSM were based on the consideration of surface water as potable water. Although contact with surface water is not considered an exposure pathway for Samplers, the use of Table 3-6 criteria was proposed in the Airport/Klondike CSM by stipulating that sampling-related exposures will be evaluated as a proxy for the Maintenance Worker exposures to surface water.

Surface water was collected between 1991 and 1997 for one or more of the following analytical parameters: VOCs, SVOCs, PCBs, metals, and TPH. The sample locations are identified as NA-SW-01 through NA-SW-02; NK-SW-01 to NK-SW-06; SA-SW-01 through SA-SW-10; and SK-SW-01 through SK-SW-17, along Pewter Pot Brook and its tributaries. Constituent concentrations detected in the surface water samples were compared to screening levels documented in Table 3-6, entitled *Generic P&W Surface Water Screening Levels (SLs), P&W VCAP, Connecticut Facilities*, of the Airport/Klondike CSM Report. Table 28 in Attachment 2 is a presentation of the sampling and analytical information for all surface water samples evaluated. A summary of constituents in surface water samples exceeding Table 3-6 criteria are presented in Table 29 of Attachment 2.

Arsenic, barium, cadmium, total chromium, lead, mercury, selenium, zinc, chloroform, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, trichloroethylene, and methylene chloride concentrations exceeded the Table 3-6 screening levels in 35 samples. The completeness of this exposure pathway and significance of the constituent concentrations will be discussed further in Questions 3 and 4.

Wet Trench Air (Outdoor Air)

Air quality within a trench can be affected by sources of volatile organics in groundwater, as the water table is relatively shallow at and in the immediate vicinity of the Site. Off-site Utility Repair Workers are the receptor potentially exposed to wet trench air. The follow discussion and resulting conclusion is based on the review and evaluation of available in groundwater data for wells along the facility boundary in the Airport/Klondike Area. A map depicting all groundwater sampling locations is presented as Drawing 2 of Attachment 1. Groundwater

sampling data from a total of 24 groundwater sampling locations along the Airport/Klondike Area over a period from November 1991 to March 2001 were considered in this determination. A summary of all analytical data for groundwater is provided in a CD included in Attachment 2. Applicable groundwater data was assessed for the following exposure scenario:

- Inhalation of wet trench air by Off-site Utility Repair Workers via a comparison of spatial arithmetic mean groundwater concentrations to wells along the Airport/Klondike Area boundary to Table 3-3 criteria (Airport/Klondike CSM Report).

The spatial arithmetic mean concentration of each volatile organic compound in groundwater from wells along the facility boundary in the Airport/Klondike Area was compared to the screening levels provided in Table 3-3 of the Airport/Klondike CSM Report. Table 3-3 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Trench Air Inhalation, P&W VCAP, Connecticut Facilities.* There are no VOCs present in any of the groundwater samples assessed at concentrations exceeding the Table 3-3 screening levels.

The sampling and analytical information for groundwater samples selected for the above comparison is provided in Table 23 in Attachment 2. The evaluation of the spatial arithmetic mean concentrations for constituents in groundwater samples along the facility boundary as presented in Table 30 in Attachment 2. The completeness and significance of all exposure pathways for the above discussed media are discussed in Questions 3 and 4.

Footnotes:

1 "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

2 Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	Residents	On-Site Workers	Off-Site Workers	Trespassers	Recreation	Food[3]
~~Groundwater~~						
Air (indoors)	YES	YES	NO	NO	NO	NO
Surface Water	NO	YES	NO	YES	YES	NO
~~Sediment~~						
Soil (surface)	NO	YES	NO	YES	NO	NO
~~Soil (subsurface e.g., >2 ft)~~						
Air (outdoors)	NO	NO	YES	NO	NO	NO

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.
2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

RATIONALE:

The following discusses **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions. The data are conveyed below by specific area (i.e., Main Facility Area and Airport/Klondike Area) followed by individual media.

MAIN FACILITY AREA

The above assessment of complete pathways is based on a combination of individual assessments for both the Main Facility Area. For clarity, the above table has been reproduced below and represents the results of the exposure pathway assessment for only the Main Facility Area. A similar approach has been performed for the Airport/Klondike Area to provide the reader an understanding of the rationale and approach for the derivation of the presentation of complete pathways for the entire Site.

Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	Residents	On-Site Workers	Off-Site Workers	Trespassers	Recreation	Food[1]
~~Groundwater~~						
Air (indoors)	YES	YES	NO	NO	NO	NO
Surface Water	NO	YES	NO	YES	YES	NO
~~Sediment~~						
Soil (surface)	NO	YES	NO	YES	NO	NO
~~Soil (subsurface e.g., >2 ft)~~						
Air (outdoors)	NO	NO	YES	NO	NO	NO

Groundwater

As noted above, groundwater is considered a complete pathway for on-site workers (dermal contact) and offsite workers (dermal contact). In addition, other environmental media (indoor air and surface water) can be affected as a result of the presence of contaminants in groundwater. Further evaluation of the direct exposure pathways to groundwater is not necessary as contaminants are not present in groundwater at concentrations above respective screening levels (Question 2). However, as noted in Question 2, contaminants are present in groundwater at concentrations that exceed respective screening criteria applicable to the evaluation of the potential impacts to indoor air at adjoining residential properties and surface water bodies. The following is a discussion of the completeness of each of these pathways.

Ingestion and Dermal Contact to Surface Water – Groundwater Impacts to Surface Water

As presented in Question 2, the following constituents were present in groundwater at the locations described at concentrations that exceeded Table 3-7 screening levels: arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, zinc, PCBs, cyanide, benzo(b)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, naphthalene, pentachlorophenol, bis(2-ethylhexyl)phthalate, acenaphthalene, 1,1-dichloroethane, chloroethane, methyl-tert-butyl-ether, 1,1-dichloroethylene, trans-1,2-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, bromomethane, dichlorodifluormethane, trichlorotrifluoromethane, and methyl-isobutyl-ketone. This evaluation was performed to assess the potential for surface water quality within Willow Brook and Willow Brook Pond to be affected as a result of groundwater discharging to the surface water body. As described within the discussion of sediment quality under the heading of Main Facility Area in Question 2, it was noted that portions of Willow Brook and all of Willow Brook Pond were considered exposure areas for both samplers and trespassers at the time of the finalization of the CSM for the Main Facility Area in September 1999. The exposure areas designated in September 1999 are depicted on Drawing 4 in Attachment 1. These exposure areas were applicable at the time of the finalization of the CSM as access to the portions of Willow Brook and Willow Brook Pond were not restricted by a fence. However, the remediation activities completed in August

2002 resulted in the installation of a locked fence enclosure around the entire perimeter of the exposed length of Willow Brook and both the upper and lower sections of Willow Brook Pond. As a result, access to these areas is now restricted and only capable through or over the gated enclosure. While access is restricted, the significance of the presence of the above constituents in groundwater will be further assessed in Question 4.

Inhalation of Indoor Air – Groundwater Impacts to Indoor Air

As noted in Question 2, benzene, 1,2-dichloroethane, 1,1-dichloroethylene, vinyl chloride, and trichloroethylene have been detected in groundwater from wells collected along the facility boundary at concentrations in excess of the Table 3-5 criteria. These data are representative of groundwater discharging from the Site that could potentially flow beneath adjoining residential structures and potentially affect indoor air quality. This is a complete pathway due to the potential for indoor air inhalation from volatile organic constituents of concern in groundwater migrating off-site to adjacent residential properties. The significance of the presence of the above contaminants in groundwater must be further evaluated in Question 4.

The off-site workers (trench air and dermal contact) and the on-site maintenance worker pathways (dermal contact) will not be further evaluated as screening of groundwater data in Question 2 did not indicate the presence of contaminants at concentrations above respective screening levels. Specifically, the exposure pathways for off-site workers and maintenance workers to groundwater migrating off-site are not considered complete.

Inhalation of Air (Indoor)

This pathway is considered complete for onsite workers and, as noted immediately above, for offsite residences. As discussed in further detail in Question 2, an indoor air and sub-slab vapor evaluation was completed at the Main Facility Area to determine the potential for exposure of contaminated subsurface conditions to indoor workers (receptors). The significance of the presence of benzene in indoor air detected during both the 1998 and 2004 sampling events is discussed in greater detail in the response to Question 4.

Ingestion and Dermal Contact With Surface Soil

As noted above, this pathway is complete for onsite workers (groundskeepers and samplers) as well as for trespassers as each may come into contact with the media during the course of activities at the Main Facility Area. As noted in Question 2, concentrations of arsenic, PCBs, and/or benzo(a)pyrene were detected in surface soil from eight locations. As the exposure pathway to groundskeepers, samplers and trespassers is considered complete, the significance of the presence of these constituents in surface soil in excess of the Table 3-10 criteria must be evaluated in Question 4.

Ingestion and Dermal Contact With Sediment and Surface Water

Sediment is not being considered further as the remediation activities completed in August 2002 resulted in the elimination of bottom sediments from within and immediately surrounding the exposed portions of Willow Brook and Willow Brook Pond and no sediment exhibiting concentrations in excess of the respective screening criteria has been identified.

Surface water ingestion and dermal contact by samplers and trespassers is considered a complete pathway within Willow Brook and Willow Brook Pond even though access to this portion of the Main Facility Area is severely limited by the presence of a locked fence enclosure. As noted in Question 2, arsenic, chromium, copper, manganese, silver, PCBs, benzene, chloroform, 1,1,1-trichlorethane, 1,1-dichloroethylene, cis-1,2-dihloroethylene,

vinyl chloride, tetrachloroethylene, and trichloroethylene were detected in surface water samples considered in the evaluation at concentrations that exceeded the screening levels provided in Table 3-6 of the Main Facility CSM Report. While, it is recognized that however limited the exposure potential is, the potential for exposure still remains. As such the significance of the presence of the above constituents in surface water will be discussed in Question 4.

Ingestion and Dermal Contact with Subsurface Soil

The implementation of the DPR, as it applies to VCAP, controls exposures to contaminants in subsurface soil and trench air for Maintenance Workers. The implementation of the DPR process controls worker exposure to contaminants in subsurface soil and trench air (outdoor air encountered in a trench during performance of an excavation). A DPR is completed prior to any activity that results in the excavation of soil (the potential source of exposure to constituents in groundwater, subsurface soil and air, due to soil movement). The DPR includes an assessment of available analytical data for soil and groundwater in the area where the proposed activity will occur. If no data are available, or if existing data are incomplete, samples are collected. The data for the area are compared to the DPR thresholds, as listed in Table 3-11 of the Main Facility CSM Report, titled *Development of DPR Threshold Soil Concentrations, P&W VCAP, Connecticut Facilities*. If there are exceedances of applicable screening levels, all subsurface work in the area is conducted by personnel who have received appropriate health and safety training.

The purpose of the DPR process, as it relates to VCAP, is to provide the basis for a consistent approach to ensure that potential worker exposures to various environmental media resulting from facility modifications are evaluated prior to the implementation of a modification. The DPR process is primarily focused on the evaluation of potential human exposure to environmental contaminants in soil and groundwater. Any facility modification that could result in a human exposure to soil or outdoor air (trench air) is subject to the DPR process. Typical facility modifications addressed by the DPR process include, but are not limited to:

- Equipment pad construction.
- Underground utility repair.
- Dewatering pump replacement or repair.
- Landscaping projects requiring contact with soil (not normal grounds keeping).

Due to the implementation of the DPR, the exposure pathway to subsurface soil is considered incomplete and no further evaluation will be completed.

Inhalation of Wet Trench Air (Outdoor Air)

Exposure of offsite workers to wet trench air via inhalation is considered a complete pathway. However, as presented in Question 2, air quality within a trench can be affected by sources of volatile organics in groundwater, as the water table is relatively shallow at the Site. VOCs were not detected in shallow groundwater at concentrations that exceeded Table 3-3 criteria.

AIRPORT/KLONDIKE AREA

As with the discussion above for the Main Facility Area, the potential human receptor table has been reproduced below and represents the results of the exposure pathway assessment for only the Airport/Klondike Area. This approach is performed to provide the reader an understanding of the rationale and approach for the derivation of the presentation of complete pathways for the entire Site.

Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	Residents	On-Site Workers	Off-Site Workers	Trespassers	Recreation	Food[1]
~~Groundwater~~						
~~Air (indoors)~~						
Surface Water	NO	YES	NO	YES	YES	NO
~~Sediment~~						
~~Soil (surface)~~						
~~Soil (subsurface e.g., >2 ft)~~						
~~Air (outdoors)~~						

Groundwater

As noted above, groundwater is not considered a complete pathway for receptors. However, other environmental media (indoor air and surface water) can be affected as a result of the presence of contaminants in groundwater. As noted in Question 2, contaminants are present in groundwater at concentrations that exceed respective screening criteria applicable to the evaluation of the potential impacts to surface water bodies. The following is a discussion of the completeness of this pathway.

As presented in Question 2, constituents were present in groundwater at the locations described at concentrations that exceeded Table 3-7 screening levels: arsenic, barium, cadmium, total chromium, copper, lead, zinc, cis-1,2-dichloroethylene, tetrachloroethylene, and xylenes. This evaluation was performed to assess the potential for surface water quality within Pewter Pot Brook and associated tributaries be affected as a result of groundwater discharging to the surface water body. As there is currently access to surface water, groundwater discharging to surface water is considered a complete exposure pathway. The significance of the presence of the above constituents in groundwater will be further assessed.

Future analysis of off-site GW migration must be performed.
2/22/05

Inhalation of Air (Indoor)

As indicated in Question 2, the Airport/Klondike Area does not have any active office or industrial buildings; thus, there are no human receptors. There is an incomplete pathway between potentially contaminated indoor air and human receptors.

Ingestion and Dermal Contact With Surface Water

Surface water ingestion and dermal contact by onsite maintenance workers, samplers, and trespassers are each considered complete exposure pathways. As presented in Question 2, constituents were present in groundwater at the locations described at concentrations that exceeded Table 3-6 screening levels were identified as arsenic, barium, cadmium, total chromium, lead, mercury, selenium, zinc, chloroform, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, cis 1-2, dichloroethylene, vinyl chloride, tetrachloroethylene, trichloroethylene, and methylene chloride. The significance of the presence of the above constituents in groundwater will be further assessed.

Ingestion and Dermal Contact With Surface Soil

As presented in Question 2, there were no constituents in shallow soil samples that exceeded the Table 3-10 Trespasser, Groundskeeper and Sampler exposure scenario screening levels. Though the exposure pathway for each is considered complete, the absence of contaminants in excess of the screening criteria negates the need for further evaluation.

Ingestion and Dermal Contact With Sediment

As discussed in Question 2, a comparison of constituent concentrations in the sediment samples to the applicable (Maintenance Workers, Samplers, and Trespasser) scenarios in Table 3-10 indicated that there are no concentrations exceeding the Table 3-10 screening criteria. Though the exposure pathway for each is considered complete, the absence of contaminants in excess of the screening criteria negates the need for further evaluation.

Ingestion and Dermal Contact With Subsurface Soil

The implementation of the Design Process Review (DPR), as it applies to VCAP, controls exposures to contaminants in subsurface soil and trench air for Maintenance Workers. The implementation of the DPR process controls worker exposure to contaminants in subsurface soil and trench air (outdoor air encountered in a trench during performance of an excavation). A DPR is completed prior to any activity that results in the excavation of soil (the potential source of exposure to constituents in groundwater, subsurface soil and air, due to soil movement). The DPR includes an assessment of available analytical data for soil and groundwater in the area where the proposed activity will occur. If no data are available, or if existing data are incomplete, samples are collected. The data for the area are compared to the DPR thresholds, as listed in Table 3-11 of the Main Facility CSM Report, titled *Development of DPR Threshold Soil Concentrations, P&W VCAP, Connecticut Facilities*. If there are exceedances of applicable screening levels, all subsurface work in the area is conducted by personnel who have received appropriate health and safety training.

The purpose of the DPR process, as it relates to VCAP, is to provide the basis for a consistent approach to ensure that potential worker exposures to various environmental media resulting from facility modifications are evaluated prior to the implementation of a modification. The DPR process is primarily focused on the evaluation of potential human exposure to environmental contaminants in soil and groundwater. Any facility modification that could result

in a human exposure to soil or outdoor air (trench air) is subject to the DPR process. Typical facility modifications addressed by the DPR process include, but are not limited to:

- Equipment pad construction.
- Underground utility repair.
- Dewatering pump replacement or repair.
- Landscaping projects requiring contact with soil (not normal grounds keeping).

Inhalation of Wet Trench Air (Outdoor Air)

As presented in Question 2, air quality within a trench can be affected by sources of volatile organics in groundwater, as the water table is relatively shallow at the Site. VOCs were not detected in wet trench air at concentrations that exceeded Table 3-3 criteria. Though the exposure pathway is considered complete, the absence of contaminants in excess of the screening criteria negates the need for further evaluation.

Footnote:

3 Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

__X__ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

As discussed in Question 3 above, there are complete exposure pathways between certain media and human receptors in both the Main Facility Area and the Airport/Klondike Area. These complete exposure pathways are defined by the presence of constituents/compounds at concentrations exceeding the applicable screening levels documented in the Main Facility CSM Report and the Airport/Klondike CSM Report.

For groundwater discharging to surface water and surface water, it was determined that risk-based criteria would be developed for comparison to those constituents/compounds with exceedances to the screening levels. The risk-based criteria apply to both the Main Facility Area and the Airport/Klondike Area. Attachment 5 of this EID provides a summary report entitled, *Development of Risk-Based Criteria, Pratt & Whitney, Main Street Facility, East Hartford, CT*, (RBC Report) prepared by Gradient Corporation. The RBC Report provides detailed calculations and rationale for the development of the risk-based criteria, and tables summarizing the calculated risk-based criteria for VOCs, metals, SVOCs, and PCBs.

The following discusses in detail the potential for **exposures** from any of the complete pathways be reasonably expected to be **"significant".**

MAIN FACILITY AREA

Groundwater

Groundwater Discharging to Surface Water

As presented in Question 2 and 3, constituents were present in groundwater at the locations representative of groundwater that discharges to Willow Brook Pond at concentrations that exceeded Table 3-7 screening levels. Specifically, the constituents that have been detected in groundwater at concentrations in excess of Table 3-7 criteria are: arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, zinc, PCBs, cyanide, benzo(b)fluoranthene, benzo(a) pyrene, benzo(g,h,i)perylene, naphthalene, pentachlorophenol, bis(2-

ethylhexyl)phthalate, acenaphthalene, 1,1-dichloroethane, chloroethane, methyl-tert-butyl-ether, 1,1-dichloroethylene, trans-1,2-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, bromomethane, dichlorodifluormethane, trichlorotriflouromethane, and methyl-isobutyl-ketone. In review of the analytical data set for the Site, it was determined that significant groundwater monitoring events were conducted at the Main Facility Area in 2001 and 2003. As a result, groundwater analytical data from those wells representative of groundwater discharging to the surface water during the period from January 2001 through December 2003 were considered. These data are representative of the most current data over the entirety of the area in which groundwater discharges to surface water.

The analytical data set for wells located immediately upgradient of onsite surface water bodies for the period from January 2001 through December 2003 were compared to the Table 3-7 screening levels. The results of that comparison are presented in Table 31. Based on that evaluation, the compounds arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, cyanide, benzo(b)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, naphthalene pentachlorophenol, acenaphthalene, 1,1-dichloroethylene and cis-1,2-dichloroethylene are present in groundwater at concentrations in excess of the Table 3-7 criteria.

The readily published criteria cited in the Main Facility CSM are protective of both human health and ecological exposure. However, other applicable screening criteria with respect to evaluation of human exposures exist. Specifically, in evaluating the significance of direct human exposures to a surface water that is potentially affected by the discharge of groundwater, a comparison of the United States Environmental Protection Agency Maximum Contaminant Levels (MCLs) and Secondary MCLs multiplied by a dilution attenuation factor (DAF) of 10 as identified in the Connecticut Remediation Standard Regulations (RSRs) is considered an applicable screening criterion. A comparison of the relevant dataset from wells representative of groundwater discharging to surface water for the period from January 2001 to December 2003 to the above criteria indicates that nickel, benzo(a) anthracene, benzo(b)fluoranthene, benzo(a) pyrene, benzo(k)fluoranthene, chrysene, pentachlorophenol, 1,1-dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, and trichloroethylene are present in groundwater at concentrations above the applicable MCLs times a DAF of 10. A tabular presentation of the above data is presented as Table 32. As documented in the RBC Report provided in Attachment 5, all the above constituents with the exception of benzo(a)pyrene and vinyl chloride had concentrations below the calculated risk-based criteria. A such, it is determined the presence of nickel, benzo(a) anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, pentachlorophenol, 1,1-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, and trichloroethylene in groundwater that discharges to surface water is not significant.

As noted below, benzo(a)pyrene has not been detected in surface water. As a result it is determined that the presence of benzo(a)pyrene in groundwater discharging to surface water is not significant as it has not resulted in event detectable levels of benzo(a)pyrene in surface water. With regard to vinyl chloride, this compound has been detected in surface water. The significance of the detection of vinyl chloride is discussed further in the response to this question below.

Groundwater Migrating to Adjacent Off-Site Residential Properties

As noted in Question 2, benzene, 1,2-dichloroethane, 1,1-dichloroethylene, vinyl chloride, and trichloroethylene have been detected in groundwater collected from wells along the facility boundary at concentrations in excess of the Table 3-5 criteria. These data are representative of groundwater discharging from the Site that could potentially flow beneath adjoining residential structures and potentially affect indoor air quality. As noted in Question 3, this is a complete pathway and the significance of the presence of the above contaminants in groundwater must be further evaluated.

Future analysis of off-site GW migration must be performed. 2/22/05

Further analysis of Off Site GW migration must be performed. 2/4/05

As noted previously, the evaluation presented in Question 2 was based on a comparison of all available groundwater sampling performed at the Site. As noted in Question 2, groundwater data collected from 517 locations over the period from March 1982 to June 2004 have been considered in this evaluation. However, it is recognized that groundwater conditions are transient and that to make an assessment representative of current conditions, an evaluation of the most recent groundwater analytical data must be performed. In review of the analytical data set for the Site, it was determined that significant groundwater monitoring events were conducted at the Main Facility Area in 2001 and 2003. As a result, groundwater analytical data from those wells representative of groundwater discharging from the Site during the period from January 2001 through December 2003 were considered. These data are representative of the most current data over the entirety of the area representative of groundwater which discharges from the Site and potentially affects nearby residential structures.

The analytical data set for wells located along the boundary of the Site for the period from January 2001 through December 2003 were compared to the Table 3-5 screening levels. The results of that comparison are presented in Table 33 in Attachment 2. Based on that evaluation, 1,1-dichloroethylene, vinyl chloride, and trichloroethylene have been identified in boundary wells at concentrations in excess of the Table 3-5 criteria. Specifically, exceedances of the screening criteria were noted in wells WT-MW-34D, WT-MW-34S, and WT-MW-50. These data were also evaluated against both the current and proposed DEP groundwater volatilization criteria for a residential setting. The outcome of the comparison resulted in the identification of the same constituents as the above evaluation.

In the further evaluation, it should be noted that well WT-MW-50 is located along the southern bank of Willow Brook opposite a large wetland. This well is not considered to be truly representative of groundwater that has the potential to affect off-site residential structures. However, wells WT-MW-34S and WT-MW-34D are located on the extreme western Site boundary along Main Street. In this are of the Site, groundwater flows to the north and west in the direction of Willow Brook. Based on a review of Site geology and hydrogeology, it is concluded that groundwater from well WT-MW-34S is representative of groundwater that discharges to Willow Brook and the potential exists for groundwater present in WT-MW-34D to flow beneath Willow Brook. While it is unlikely that groundwater would flow a significant distance beyond Willow Brook to adjoining residential properties, the potential exists. The only residential properties located downgradient of WT-MW-34D that could be potentially affected by groundwater flowing past WT-MW-34D are a residential trailer park located on the west site of Main Street. An evaluation was performed and it was determined that the residential structures are constructed such that an open air space exists between the ground surface and the floor of the trailers. As a result of this open air space, it is determined that the potential effects of volatilization are negated by the presence of a gap between the underlying ground surface and the floor of the trailers. Further evaluation of the significance of the presence of 1,1-dichloroethylene and trichloroethylene in groundwater in well WT-MW-34D is not necessary.

Indoor Air

As noted in the response to Question 2, benzene was detected in a single sampling location during the 1998 indoor air sampling event and in a duplicate sample pair of ambient air from outside the facility buildings during the 2004 sampling event at concentrations in excess of the Table 3-4 criteria. To evaluate the significance of these data, the analytical data were compared to the Occupational Health and Safety Administration (OSHA) Permissible Exposure Levels (PELs). The results of the comparison indicate that the maximum concentration of benzene detected (33.5 $\mu g/m^3$) is three orders of magnitude below the published PEL of 3.25 mg/m^3. As such, it is determined that the presence of benzene at concentrations significantly below the PEL are not significant.

Surface Soil

As noted in Question 2, concentrations of arsenic, PCBs, and/or benzo(a)pyrene were detected in surface soil from 8 locations. As noted in Question 3, the exposure pathway to groundskeepers, samplers and trespassers are considered complete. As such, the significance of the presence of these constituents in surface soil in excess of the Table 3-10 criteria must be evaluated.

The evaluation performed in response to Question 2 was based on a point by point comparison of analytical data to the criteria in Table 3-10. In terms of evaluating the potential significance of exposures to shallow soils in this area, it is more appropriate to consider the average concentration of constituents present. The calculated arithmetic average concentration for the above constituents within the exposure area was performed and the results compared to the Table 3-10 criteria. Based on this evaluation, the average concentration of arsenic, PCBs, and/or benzo(a)pyrene within the exposure area are below the respective Table 3-10 criteria. As a result, it is determined that the presence of these contaminants at the concentrations detected is not significant. For purposes of this evaluation arithmetical averaging was adequate; however, further assessments of data (as part of risk assessments, CMS, RFI, and other analysis) must include and require a more rigorous statistical approach. JAP 2/22/05

Surface Water

As noted in Question 2 and 3 above, arsenic, chromium, copper, manganese, silver, PCBs, benzene, chloroform, 1,1,1-trichlorethane, 1,1-dichloroethylene, cis-1,2-dihloroethylene, vinyl chloride, tetrachloroethylene, and trichloroethylene were detected in surface water samples considered in the evaluation at concentrations that exceeded the screening levels provided in Table 3-6 of the Main Facility CSM Report.

The readily published criteria cited in Table 3-6 of the Main Facility CSM are protective of both human health and ecological exposure. However, other applicable screening criteria with respect to evaluation of human exposures exist. Specifically, in evaluating the significance of direct human exposures to a surface water, a comparison of the United States Environmental Protection Agency Maximum Contaminant Levels (MCLs) and Secondary MCLs is considered an applicable screening criterion. An evaluation of surface water data for the Main Facility Area against the above criteria indicated that manganese, PCBs, 1,1-dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, and/or trichloroethylene have been identified as being present in surface water at concentrations in excess of the Federal MCLs. A tabular presentation of the results of this evaluation is presented as Table 34 in Attachment 2. However, a comparison of these constituent concentrations to the risk-based criteria documented in the RBC Report indicate that 1,1-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, and vinyl chloride concentrations are below the calculated risk-based criteria.

With regard to the presence of PCBs, a single sample collected from a location identified as WT-SW-007 on September 11, 2001 was the only sample containing detectable levels of PCBs. The concentration of 0.54 µg/l was above the calculated risk-based criteria of 0.4 µg/l for a sampler. However, this sample was collected during the remediation of Willow Brook and Willow Brook Pond for the purposes of assessing potential for downstream impacts associated with the draining of the pond in preparation of remediation efforts. Specifically, the sample was collected in response to the discovery of a slight sheen on the surface water prior to the point of discharge from the site via the culverts beneath Main Street. As such, this sample is not representative of surface water conditions currently at the site and subsequent groundwater sampling performed during the post remediation groundwater monitoring program associated with the remediation of Willow Brook Pond have not indicated the presence of PCBs at concentrations that could negatively affect surface water quality. As a result, it is concluded that the presence of PCBs in a single surface water sample is not significant.

With respect to the presence of manganese, this constituent was detected in a single sample of surface water from location WT-SW-01 in 1992. Subsequent surface water sampling has not resulted in the detection of manganese.

As a result, it is concluded that the presence of manganese in a single sample collected in 1992 is neither representative of current conditions, nor is it significant.

AIRPORT/KLONDIKE AREA

Groundwater

Groundwater Discharging to Surface Water

As discussed in Questions 2 and 3, arsenic, barium, cadmium, total chromium, copper, lead, zinc, cis-1,2-dichloroethylene, tetrachloroethylene, and xylenes have been detected in groundwater from one or more sampling locations at concentrations in excess of the Table 3-7 criteria. A comparison of these constituents was made to the risk-based criteria provided in Table 3 of the RBC Report (Attachment 5) to further assess the significance of this exposure pathway to Maintenance Workers, Samplers, and Trespassers. The results of this comparative analysis indicates that arsenic, barium, cadmium, total chromium, copper, lead, zinc, cis-1,2-dichloroethylene, tetrachloroethylene, and xylenes concentrations in groundwater discharging to surface water are below the calculated risk-based criteria. As such, the presence of these constituents in groundwater that is representative of groundwater discharging to a surface water is not considered significant.

Surface Water

As noted in Question 2 and 3 above, arsenic, barium, cadmium, total chromium, lead, mercury, selenium, zinc, chloroform, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, trichloroethylene, and methylene chloride concentrations exceeded the Table 3-6 screening levels. A summary of constituents in surface water samples exceeding Table 3-6 criteria are presented in Table 28 of Attachment 2. A conservative approach was utilized in the CSM in which surface water screening levels used in the Airport/Klondike CSM were based on the consideration of surface water as potable water. Although contact with surface water is not considered an exposure pathway for Samplers, the use of Table 3-6 criteria was proposed in the Airport/Klondike CSM by stipulating that sampling-related exposures will be evaluated as a proxy for the Maintenance Worker exposures to surface water. A comparison of thee concentrations of the above constituents was made to the risk-based criteria provided in Tables 1 and 2 of the RBC Report (Attachment 5) to further assess the significance of these concentrations with regards to ingestion of, and dermal contact with, surface water by Maintenance Workers, Samplers, and Trespassers. The results of this comparison indicates that arsenic, barium, cadmium, total chromium, lead, mercury, selenium, zinc, chloroform, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, tetrachloroethylene, trichloroethylene, and methylene chloride concentrations in surface water are below the calculated risk-based criteria. As such, the presence of these constituents in surface water is not considered significant.

4 If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a Site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the United Technologies Corporation/Pratt & Whitney Division facility, EPA ID # **CTD990672081**, located at 400 Main Street , East Hartford, Connecticut under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by (signature) _____ Date 10/6/2004
(print) JUAN A. PEREZ
(title) Environmental Scientist

Supervisor (signature) _____ Date 2/22/2005
(print) Juan A. Perez
(title) Acting Section Chief
(EPA Region or State) EPA New England - Region I

Locations where References may be found:

_____
_____
_____
_____
_____

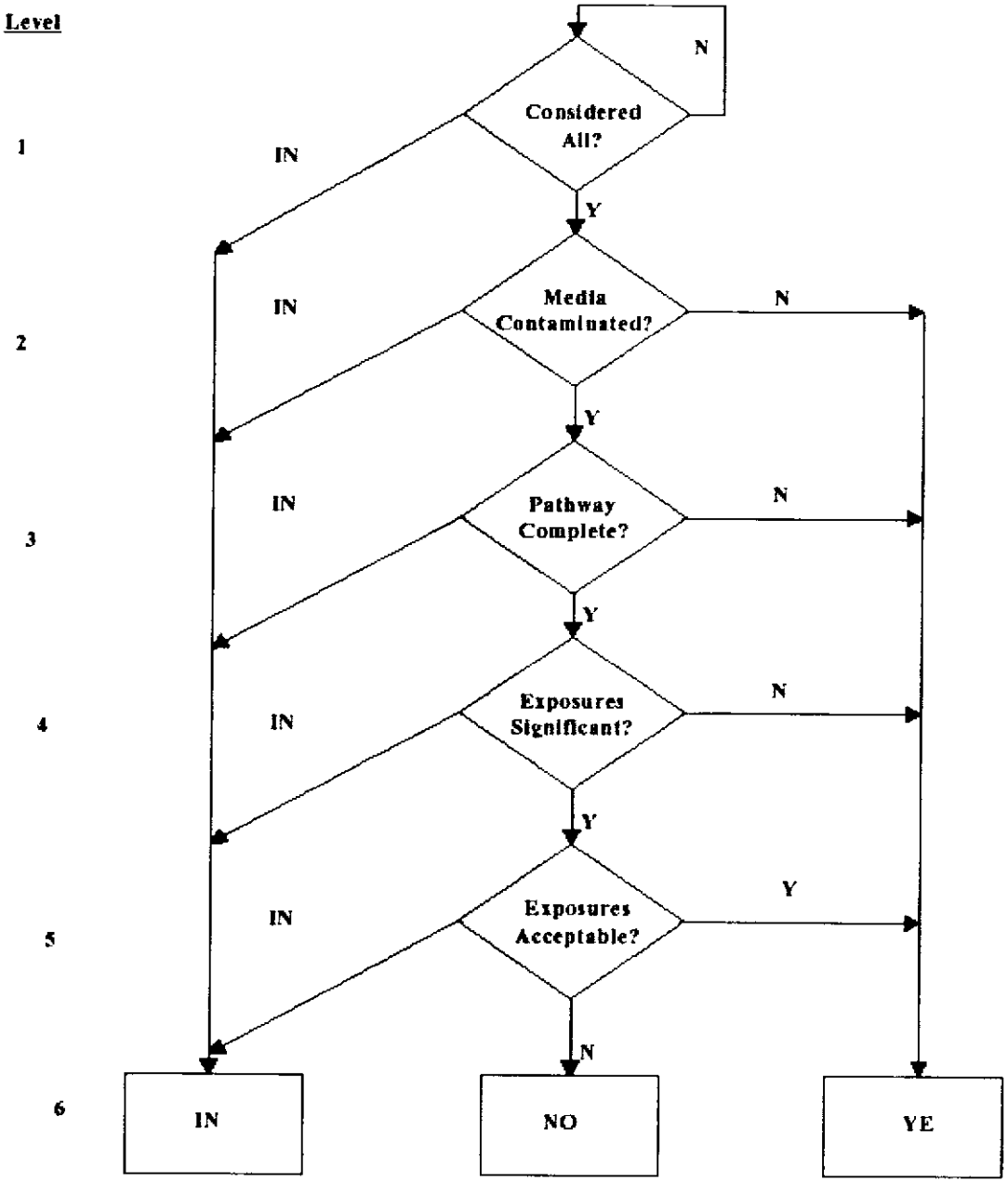
Contact telephone and e-mail numbers

(name) Ms. Lauren Levine
(phone #) 860-728-6520
(e-mail) levinel@corphq.utc.com

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE COPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Facility Name: _____
EPA ID#: _____
City/State: _____

CURRENT HUMAN EXPOSURES UNDER CONTROL (CA 725)

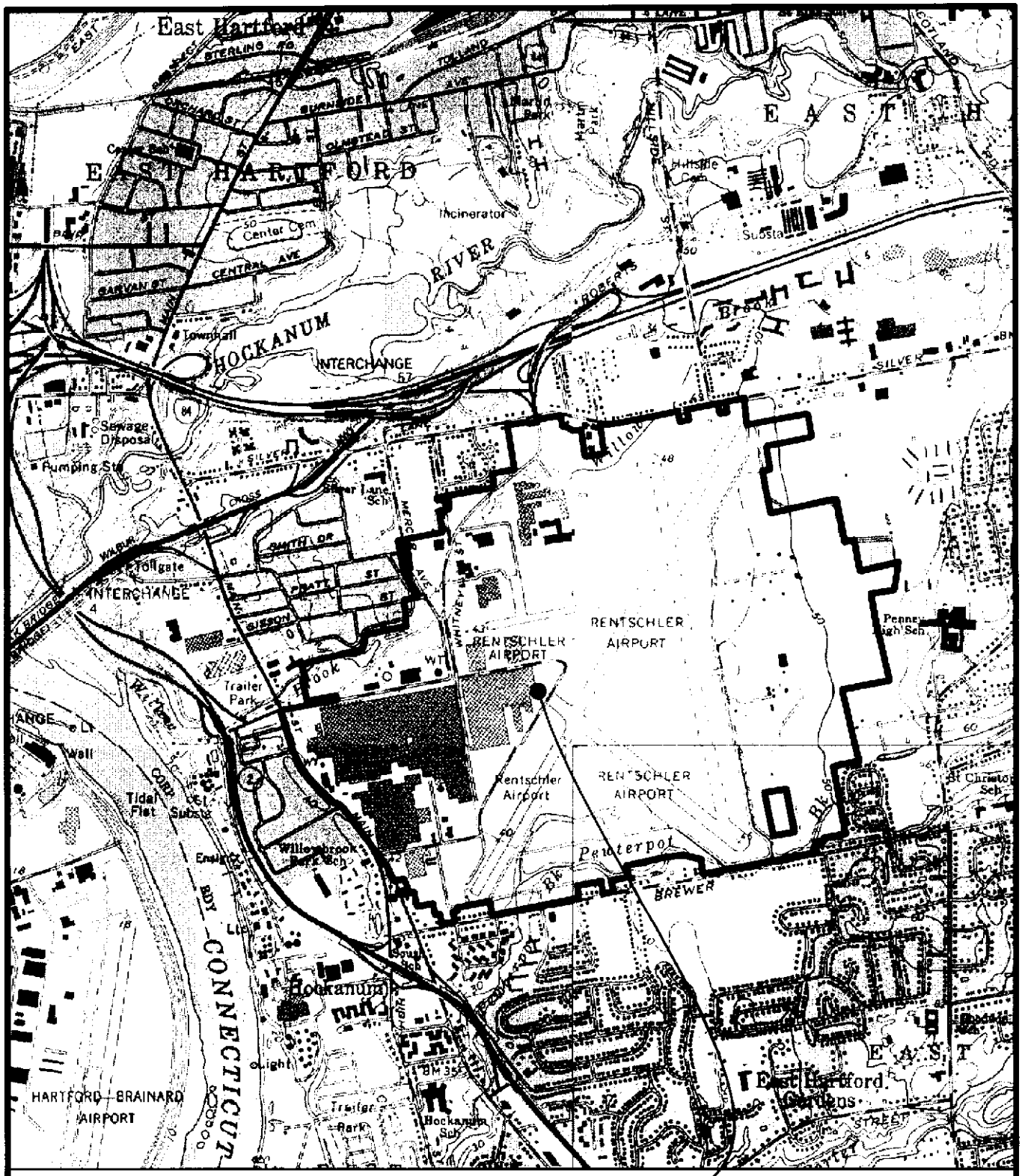


Attachment 1

Pratt and Whitney East Hartford Main Facility and Airport/Klondike
400 Main Street, East Hartford, Connecticut
Facility EPA ID #CTD990672081

Facility
Figures 1 through 2
And
Drawings 1 through 4

FIGURES



SITE LOCATION

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR HARTFORD NORTH, HARTFORD SOUTH,
GLASTONBURY, AND MANCHESTER CONN.,
DATED 1964 & 1963 AND PHOTOREVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

N

Environmental Indicator CA725
United Technologies, Pratt & Whitney, East Hartford, CT

SITE LOCATION MAP

Comm.No.	FIGURE 1	TTA
88UT406		

88UT406-USGS.dwg

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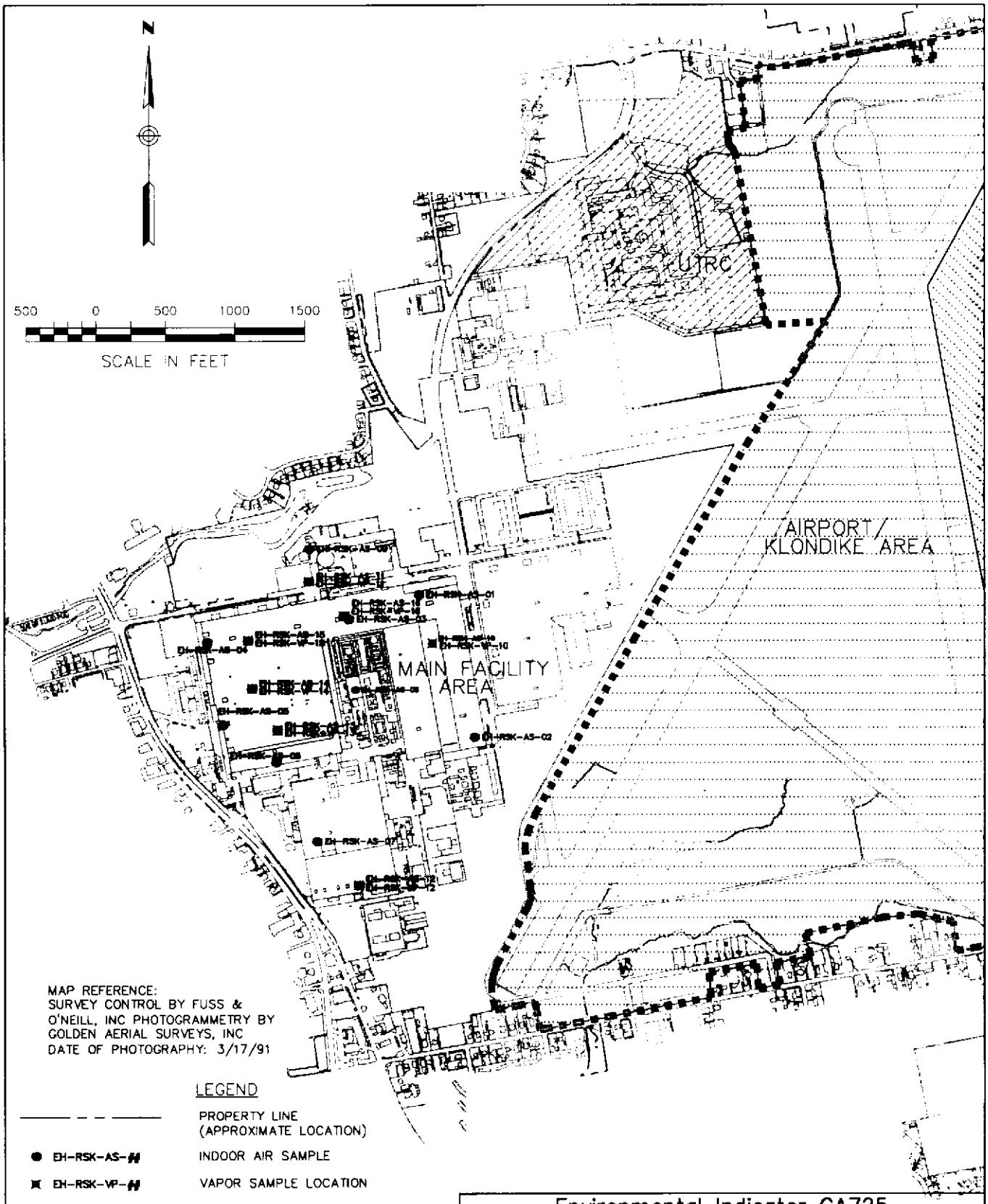


Environmental Indicator CA725

United Technologies, Pratt & Whitney, East Hartford, CT

MAIN FACILITY AREA INDOOR AIR AND SUB-SLAB VAPOR SAMPLE LOCATIONS

Comm.No.	FIGURE 2	LEA
88UT406		

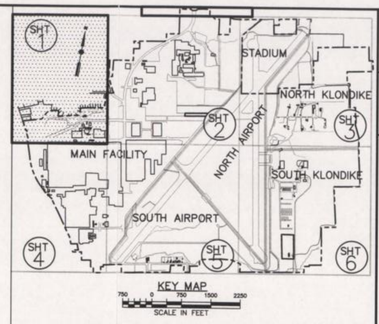
BUSINESS/PRIVATE RESIDENCES

ROBERTS ST.

SILVER LANE

BUS

MATCH TO SHEET 2



KEY MAP

750 0 750 1500 2250

SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT. DATE OF PHOTOGRAPHY 3/17/91, COMBINED WITH SITE DRAWINGS AS PROVIDED BY THE CLIENT AND UPDATED AREAS BY FIELD VISITS AND MAPPING. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

LEGEND

- AREA NOT SUBJECT TO ENVIRONMENTAL INDICATOR DETERMINATON
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- TRESPASSER EXPOSURE AREA WITHIN AIRPORT/KLONDIKE AREA
- GROUNDSKEEPER EXPOSURE AREA (SITEWIDE)
- MAINTENANCE WORKER EXPOSURE AREA (SITEWIDE)
- MAINTENANCE/CONTRACTOR LOT AREA (SITEWIDE)
- ENGINEERED CONTROL AREA (WILLOW BROOK/WILLOW POND)
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- STATE OF CONNECTICUT APPROX. PROPERTY BOUNDARY LINE
- CULVERT (WILLOW BROOK)
- FENCE LINE
- GUIDE/GUARD RAIL LINE
- MONITORING WELL SAMPLE LOCATION
- PIEZOMETER SAMPLE LOCATION
- PRODUCTION WELL SAMPLE LOCATION
- SCREENPOINT SAMPLE LOCATION
- SOIL BORING SAMPLE LOCATION
- GROUNDWATER CONTOUR
- GROUNDWATER CONTOUR (INFERRED)
- GROUNDWATER FLOW DIRECTION

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PRIVATE RESIDENCES

WILLOW BROOK/
WILLOW BROOK POND
PCB REMEDIATION AREA

FENCE PRECLUDING ACCESS

TRAILER PARK

MUFFLER SHOP

MAIN STREET

WILLOW STREET EXT.

WILLOW STREET

WILLOW STREET A.K.A. HOBBS ROAD

MAIN FACILITY AREA

50 0 50 100 150

SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE	COMA. NO.	DRAWN BY	DATE	APP. BY	DATE
1" = 100'	88UT406	A.C.L./G.F.B.	09/09/04	B.A.C.	09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Groundwater Sample Locations

An Employee Owned Company

DRAWING 1

SHEET NO. 1 NO. OF SHEETS 6

88UT406-Groundwater-MP.dwg

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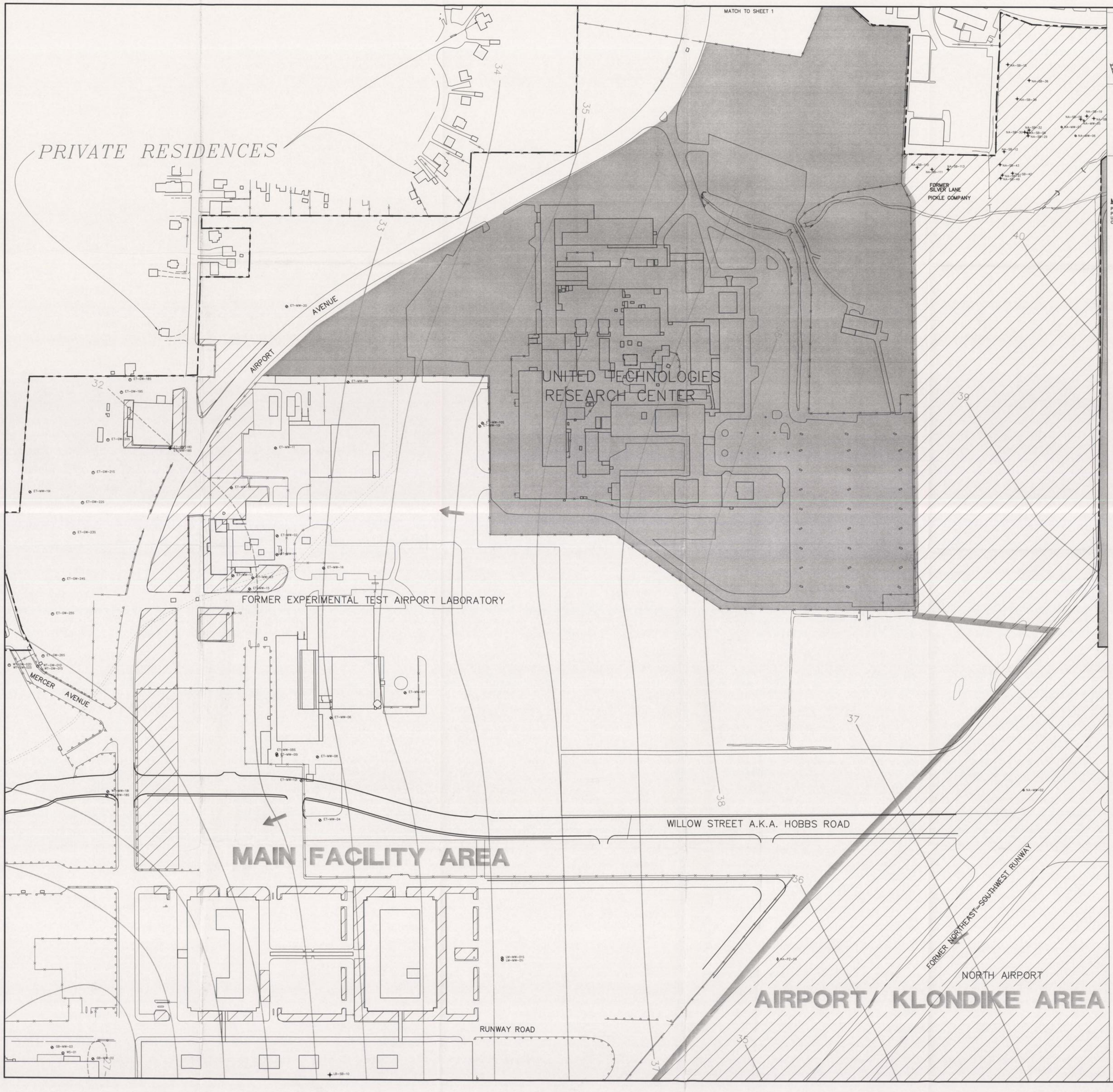

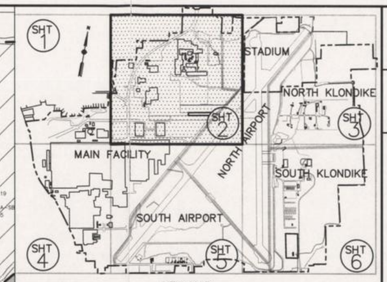

KEY MAP

750 0 750 1500 2250

SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT, DATE OF PHOTOGRAPHY 3/17/91, COMBINED WITH SITE DRAWINGS AS PROVIDED BY THE CLIENT AND UPDATED AREAS BY FIELD VISITS AND MAPPING. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

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REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE 1" = 100'
COMM. NO. 88UT406
DRAWN BY A.C.L./G.F.B. DATE 09/09/04
APP. BY B.A.C. DATE 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Groundwater Sample Locations

An Employee Owned Company

DRAWING 1

SHEET NO. 2 NO. OF SHEETS 6

88UT406-Groundwater-MP.dwg

SILVER LANE

PRIVATE RESIDENCES

UNDEVELOPED LAND

N/F U.T.C. NORTH AIRPORT

N/F STATE OF CONNECTICUT

RUNWAY REMOVED

N/F STATE OF CONNECTICUT

PERIMETER ROAD

UCONN HUSKIES

SUPPLEMENTAL STADIUM PARCEL

LIMITS OF STADIUM PARCEL

UNDEVELOPED LAND AREA

NORTH KLONDIKE

FORMER NORTH-SOUTH RUNWAY

FORMER X-401

FORMER X-407

FORMER X-415

FORMER X-430

FORMER X-410

FORMER M.E.R.L.

FORMER EXPLOSIVES STORAGE AREA

FORMER X-194

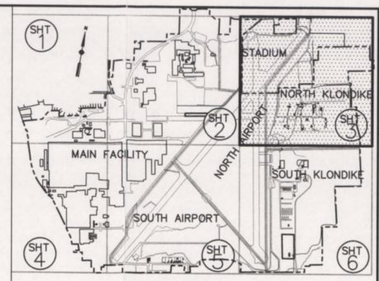
FORMER X-312/X-314

PEWTER POT BROOK

AIRPORT/ KLONDIKE AREA

UNDEVELOPED LAND

45 46 47 48 50 51



KEY MAP

750 0 750 1500 2250

SCALE IN FEET

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50 0 50 100 150

SCALE IN FEET

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Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE	COMM. NO.	DATE	APPR. BY	DATE
1" = 100'	88UT406	09/09/04	B.A.C.	09/13/04

DRAWN BY: A.C.L./G.F.B.

Environmental Indicator Determination UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas

Groundwater Sample Locations

LEA An Employee Owned Company

DRAWING 1

SHEET NO. 3 NO. OF SHEETS 6

88UT406-Groundwater-MP.dwg

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MAIN FACILITY AREA

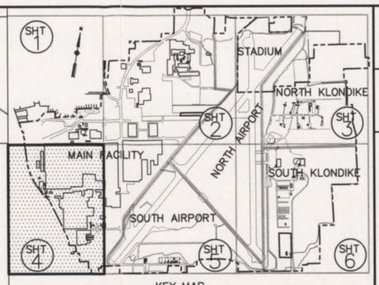
COLT STREET

MAIN STREET

HIGH STREET

BREWER STREET

BUSINESS/PRIVATE RESIDENCES



KEY MAP

750 0 750 1500 2250

SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT, DATE OF PHOTOGRAPHY 3/17/91, COMBINED WITH SITE DRAWINGS AS PROVIDED BY THE CLIENT AND UPDATED AREAS BY FIELD VISITS AND MAPPING. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

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50 0 50 100 150

SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney

A United Technologies Company

SCALE: 1" = 100'

COMM. NO.: 88UT406

DRAWN BY: A.C.L./G.F.B. DATE: 09/09/04

APP. BY: B.A.C. DATE: 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas

Groundwater Sample Locations

An Employee Owned Company

DRAWING 1

SHEET NO. 4 NO. OF SHEETS 6

88UT406-Groundwater-MP.dwg

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MAIN FACILITY AREA

AIRPORT/ KLONDIKE AREA

SOUTH TEST

NORTH AIRPORT

SOUTH AIRPORT

RUNWAY ROAD

FORMER NORTHEAST-SOUTHWEST RUNWAY

NORTHWEST-SOUTHEST RUNWAY

MEAD ROAD

ENGINEERING

PEWTER POT BROOK

FORMER FIRE TRAINING AREA "B"

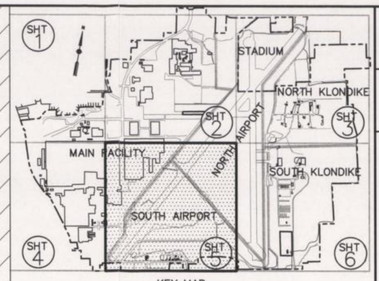
PERIMETER ROAD

SAMPLING AREA NEAR DSN 005

CONTRACTORS ROAD

CONTRACTOR STORAGE AREA

BREWER STREET



KEY MAP

750 0 750 1500 2250

SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT, DATE OF PHOTOGRAPHY 3/17/91, COMBINED WITH SITE DRAWINGS AS PROVIDED BY THE CLIENT AND UPDATED AREAS BY FIELD VISITS AND MAPPING. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

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50 0 50 100 150

SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney

A United Technologies Company

SCALE	COMM. NO.	DATE
1" = 100'	88U1406	09/09/04
DRAWN BY: A.C.L./G.F.B.	APPR BY: B.A.C.	DATE 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Groundwater Sample Locations

An Employee Owned Company

DRAWING 1

SHEET NO. 5 NO. OF SHEETS 6

88U1406-Groundwater-MP.dwg

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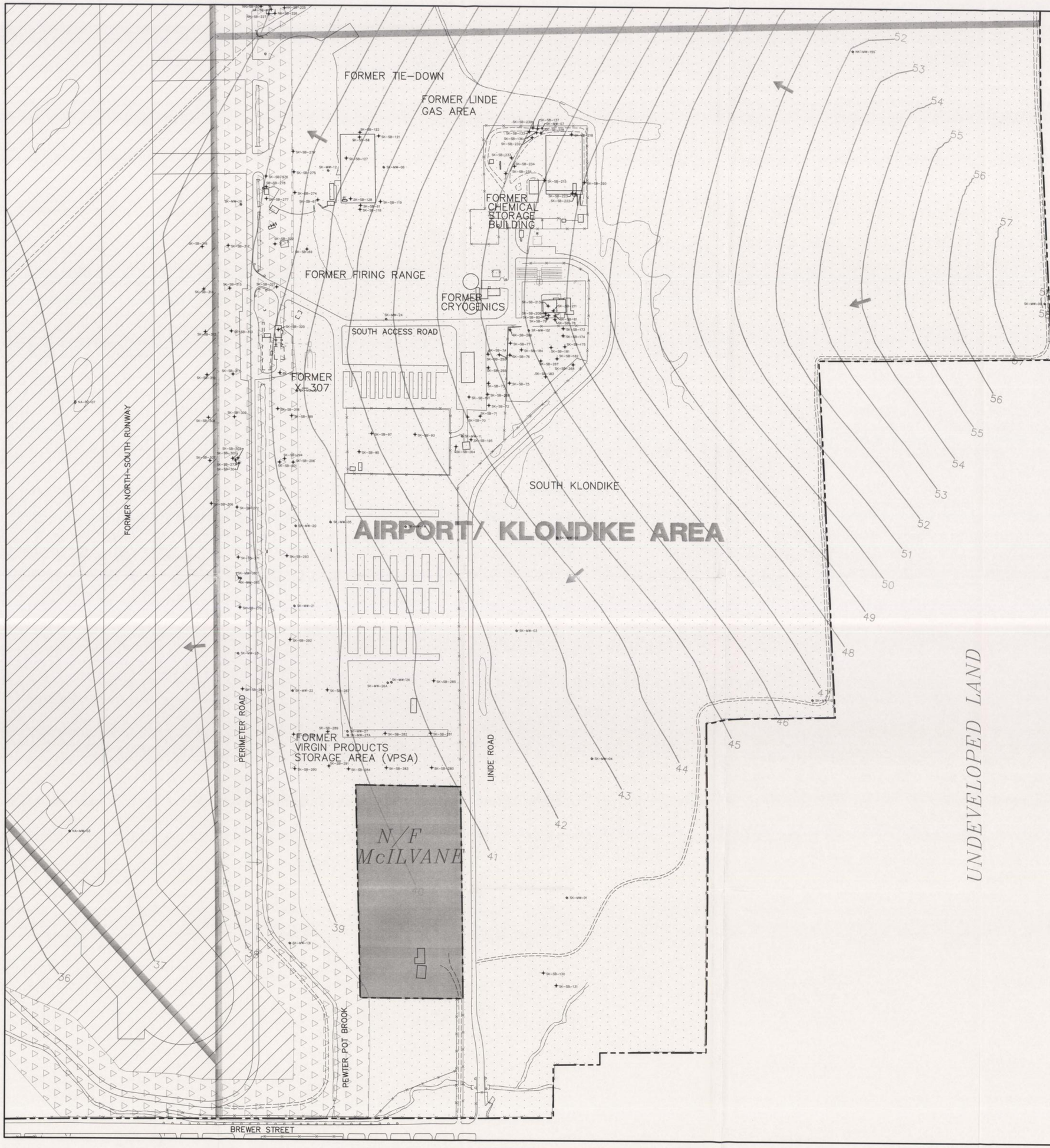

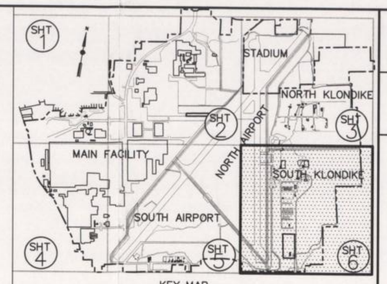

KEY MAP

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SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT, DATE OF PHOTOGRAPHY 3/17/91, COMBINED WITH SITE DRAWINGS AS PROVIDED BY THE CLIENT AND UPDATED AREAS BY FIELD VISITS AND MAPPING. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

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50 0 50 100 150
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REV.	DESCRIPTION OF REVISION	DATE	APPR.

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Pratt & Whitney
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SCALE	1" = 100'
COMM. NO.	88UT406
DRAWN BY	A.C.L./G.F.B.
DATE	09/09/04
APP. BY	B.A.C.
DATE	09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas

Groundwater Sample Locations

An Employee Owned Company

DRAWING 1

SHEET NO. 6 NO. OF SHEETS 6

88UT406-Groundwater-MP.dwg

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UNITED TECHNOLOGIES RESEARCH CENTER

EXPERIMENTAL TEST AIRPORT LABORATORY

PRIVATE RESIDENCES

WILLOW BROOK/
WILLOW BROOK POND
PCB REMEDIATION AREA

MERCER AVENUE

PAVED ACCESS ROAD

FENCE PRECLUDING ACCESS

PAVED ACCESS ROAD

TRAILER PARK

MUFFLER SHOP

MAIN STREET

WILLOW STREET EXT.

WILLOW STREET A.K.A. HOBBS ROAD

COLT STREET

MAIN STREET

RUNWAY ROAD

AIRPORT

CENTRAL AREA

MAIN FACILITY AREA

MAIN FACILITY AREA

SOUTH TEST

SOUTH CENTRAL AREA

SOUTHEAST AREA

RUNWAY ROAD

FORMER NORTHEAST–SOUTHWEST RUNWAY

FORMER NORTHEAST–SOUTHWEST RUNWAY

AIRPORT/ KLONDIKE AREA

SOUTH AIRPORT

MEAD ROAD

ENGINEERING

PEWTER POT BROOK

FORMER FIRE TRAINING AREA "B"

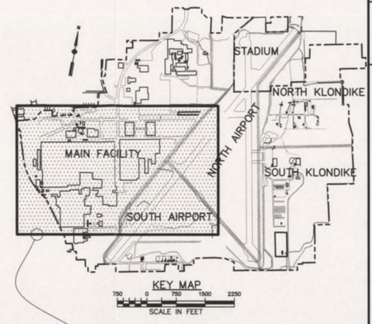
PERIMETER ROAD

SAMPLING AREA NEAR DSN 005

PEWTER POT BROOK

BUSINESS/PRIVATE RESIDENCES

HIGH STREET



APPROX. AREA SHOWN

MAP REFERENCE:

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- GROUNDWATER CONTOUR (INFERRED)
- GROUNDWATER FLOW DIRECTION

THE GROUNDWATER CONTOURS SHOWN ARE BASED ON MEASUREMENTS OBTAINED ON APRIL 17, 2001

- CENTRAL AREA DEWATERING RADIAL INFLUENCE
- SOUTHEAST AREA DEWATERING RADIAL INFLUENCE
- SOUTH CENTRAL AREA DEWATERING RADIAL INFLUENCE

75 0 75 150 225
SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE	COMM. NO.	DATE	DATE
1" = 150'	88UT406	09/09/04	09/13/04
DRAWN BY: A.C.L./G.F.B.		APP'D. BY: B.A.C.	

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility Area

Dewatering Well Locations

An Employee Owned Company

DRAWING 2

SHEET NO. 1 NO. OF SHEETS 1

88UT406-DewateringWells.dwg

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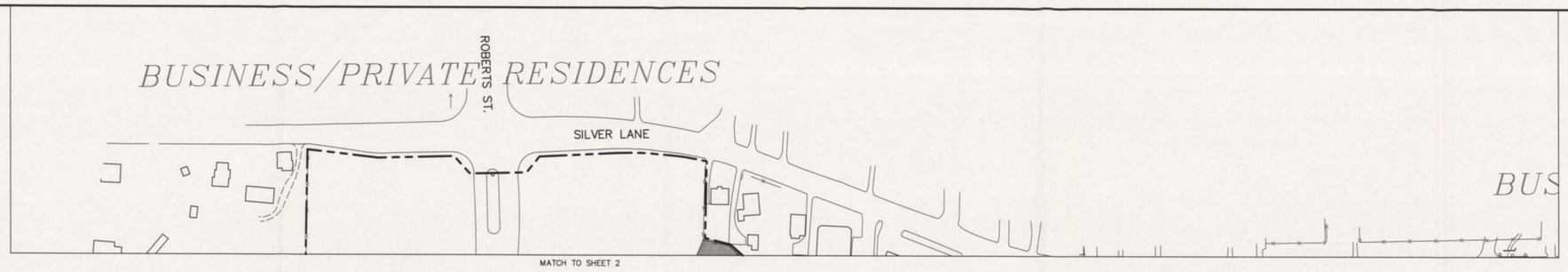

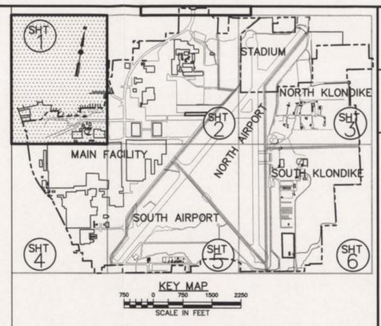

MAP REFERENCE:

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LEGEND

- AREA NOT SUBJECT TO ENVIRONMENTAL INDICATOR DETERMINATON
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- TRESPASSER EXPOSURE AREA WITHIN AIRPORT/KLONDIKE AREA
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- MAINTENANCE WORKER EXPOSURE AREA (SITEWIDE)
- MAINTENANCE/CONTRACTOR LOT AREA (SITEWIDE)
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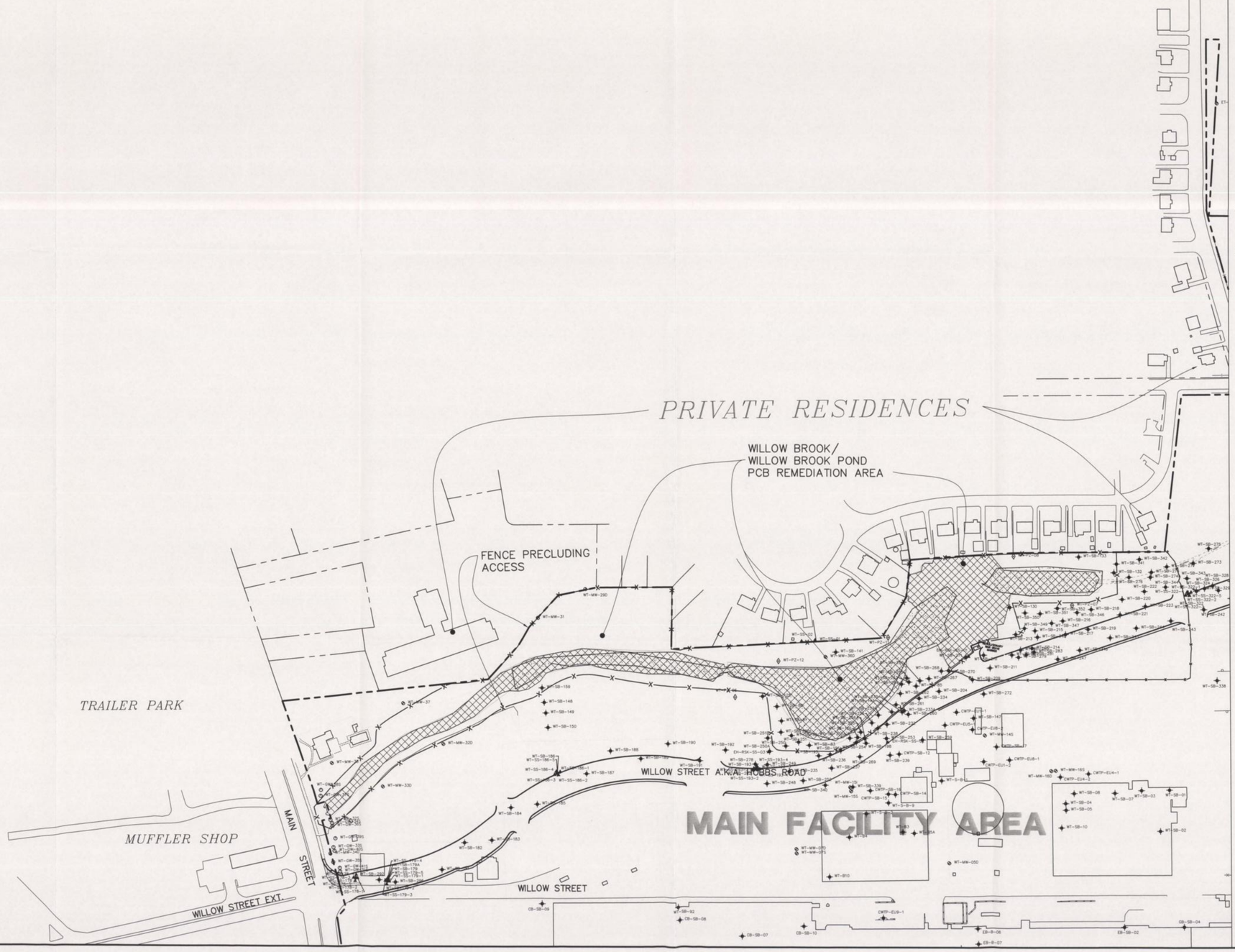
- STATE OF CONNECTICUT APPROX. PROPERTY BOUNDARY LINE
- CULVERT (WILLOW BROOK)
- FENCE LINE
- GUIDE/GUARD RAIL LINE
- MONITORING WELL SAMPLE LOCATION
- PIEZOMETER SAMPLE LOCATION
- SCREEN POINT SAMPLE LOCATION
- XX-SD-## SEDIMENT SAMPLE LOCATION
- SOIL BORING SAMPLE LOCATION
- SURFACE SOIL SAMPLE LOCATION
- XX-SW-## SURFACE WATER SAMPLE LOCATION
- TEST PIT SAMPLE LOCATION
- VAPOR EXTRACTION WELL SAMPLE LOCATION



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Pratt & Whitney
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DRAWN BY		APP. BY	
A.C.L./G.F.B.		B.A.C.	

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

An Employee Owned Company

DRAWING 3

SHEET NO. 1 NO. OF SHEETS 6

88UT406-SurfaceSoil.dwg

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MATCH TO SHEET 1

PRIVATE RESIDENCES

AIRPORT AVENUE

UNITED TECHNOLOGIES RESEARCH CENTER

FORMER SILVER LANE PICKLE COMPANY

FORMER EXPERIMENTAL TEST AIRPORT LABORATORY

MERCER AVENUE

WILLOW STREET A.K.A. HOBBS ROAD

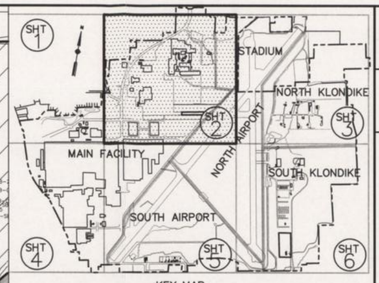
MAIN FACILITY AREA

RUNWAY ROAD

FORMER NORTHEAST-SOUTHWEST RUNWAY

NORTH AIRPORT

AIRPORT/ KLONDIKE AREA



KEY MAP

750 0 750 1500 2250

SCALE IN FEET

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50 0 50 100 150

SCALE IN FEET

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100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE:	COMM. NO.	DATE	DATE
1" = 100'	88UT406	09/09/04	09/13/04
DRAWN BY		APP'D BY	
A.C.L./G.F.B.		B.A.C.	

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

LEA An Employee Owned Company

DRAWING 3

SHEET NO. 2 NO. OF SHEETS 6

88UT406-SurfaceSoil.dwg

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SILVER LANE

PRIVATE RESIDENCES

N/F
U.T.C.
NORTH AIRPORT

UNDEVELOPED LAND

N/F
STATE OF
CONNECTICUT

N/F
STATE OF
CONNECTICUT

RUNWAY REMOVED

PERIMETER ROAD

SUPPLEMENTAL STADIUM PARCEL

LIMITS OF STADIUM PARCEL

UNDEVELOPED LAND AREA

NORTH KLONDIKE

FORMER NORTH-SOUTH RUNWAY

FORMER X-401

FORMER X-407

FORMER X-415

FORMER X-430

FORMER X-410

FORMER M.E.R.L.

FORMER X-312/X-314

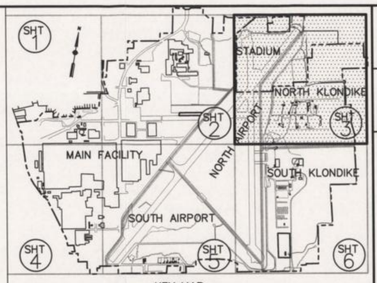
FORMER EXPLOSIVES STORAGE AREA

FORMER X-194

PEWTER POT BROOK

AIRPORT/ KLONDIKE AREA

UNDEVELOPED LAND



KEY MAP

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SCALE IN FEET

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50 0 50 100 150
SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

SCALE	COMM. NO.	DATE
1" = 100'	88UT406	09/09/04
DRAWN BY: A.C.L./G.F.B.	APP. BY: B.A.C.	DATE 09/13/04

An Employee Owned Company

DRAWING 3

SHEET NO. 3 NO. OF SHEETS 6

88UT406-SurfaceSoil.dwg

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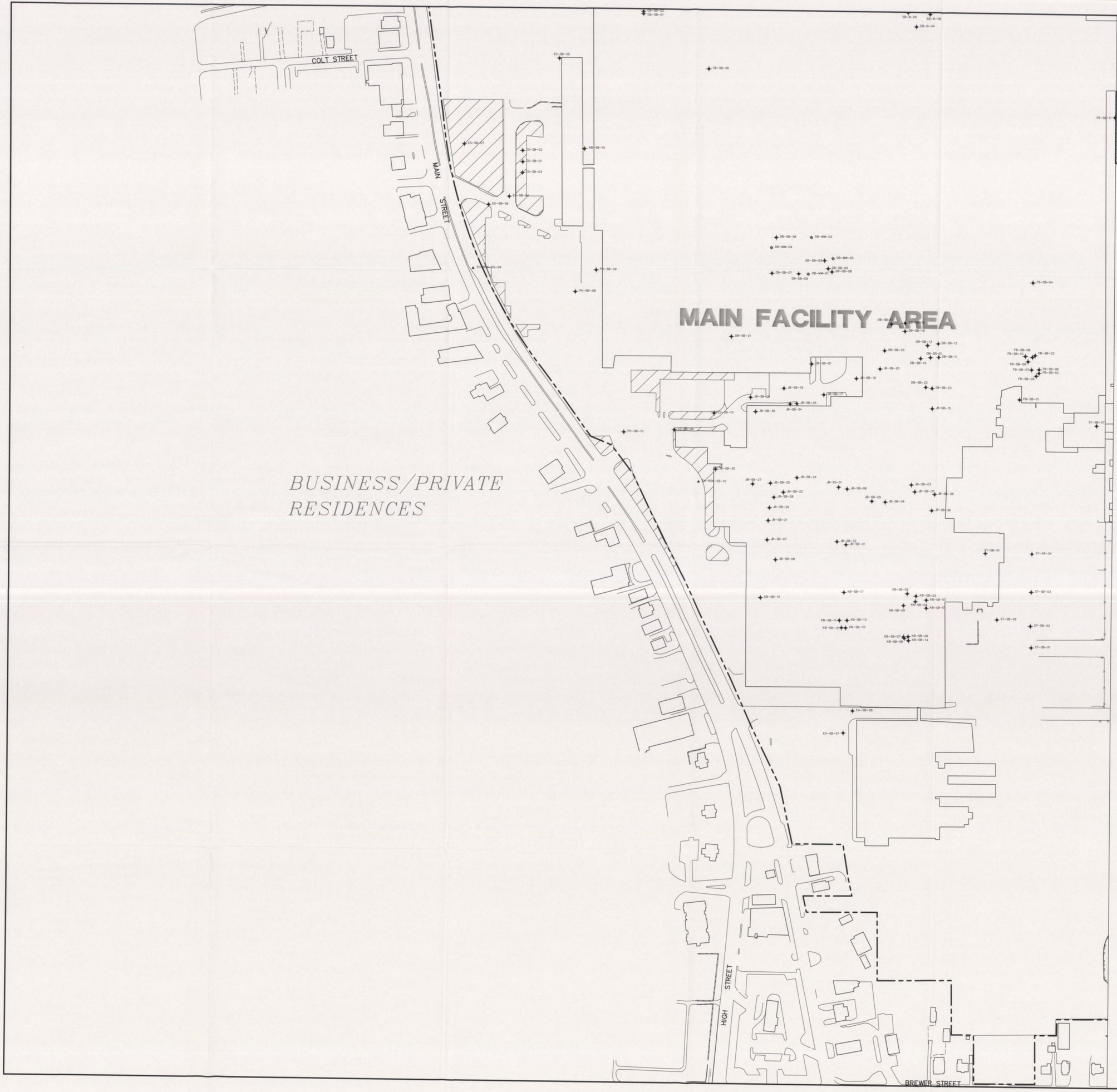

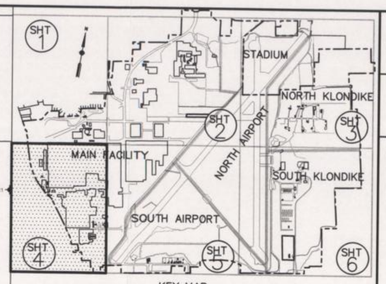

KEY MAP

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SCALE IN FEET

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REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE 1" = 100'
COMM. NO. 88UT406
DRAWN BY A.C.L./G.F.B. DATE 09/09/04
APP. BY B.A.C. DATE 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

An Employee Owned Company

DRAWING 3

SHEET NO. 4 NO. OF SHEETS 6

88UT406-SurfaceSoil.dwg

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MAIN FACILITY AREA

AIRPORT/ KLONDIKE AREA

SOUTH TEST

NORTH AIRPORT

SOUTH AIRPORT

RUNWAY ROAD

FORMER NORTHEAST-SOUTHWEST RUNWAY

NORTHWEST-SOUTHEST RUNWAY

MEAD ROAD

ENGINEERING

PEWTER POT BROOK

FORMER FIRE TRAINING AREA "B"

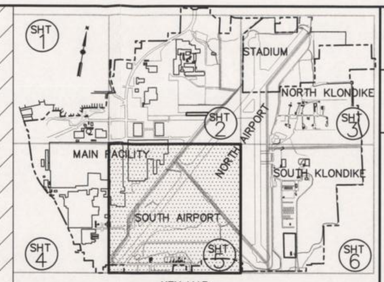
PERIMETER ROAD

SAMPLING AREA NEAR DSN 005

CONTRACTORS ROAD

CONTRACTOR STORAGE AREA

BREWER STREET



KEY MAP

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SCALE IN FEET

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50 0 50 100 150

SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney

A United Technologies Company

SCALE 1" = 100'

COMM. NO. 88UT406

DRAWN BY: A.C.L./G.F.B. DATE: 09/09/04

APP. BY: B.A.C. DATE: 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

LEA An Employee Owned Company

DRAWING 3

SHEET NO. 5 NO. OF SHEETS 6

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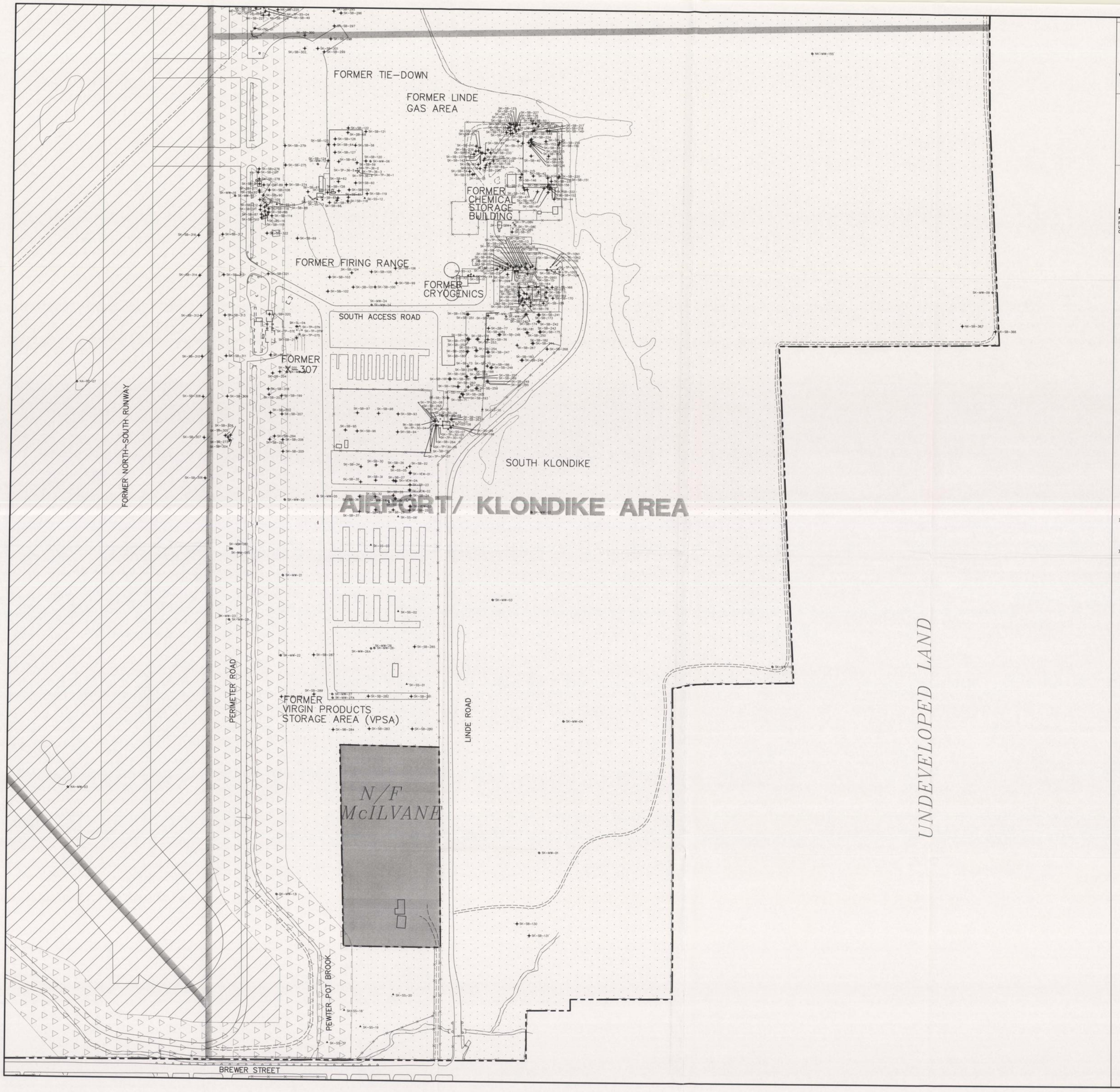

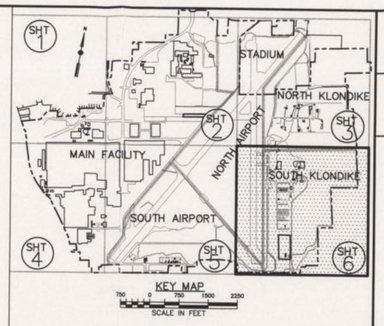

KEY MAP

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SCALE IN FEET

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- TEST PIT SAMPLE LOCATION
- VAPOR EXTRACTION WELL SAMPLE LOCATION

N

50 0 50 100 150
SCALE IN FEET

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Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

SCALE 1" = 100'
COMM. NO. 88UT406
DRAWN BY A.C.L./G.F.B. DATE 09/09/04
APP. BY B.A.C. DATE 09/13/04

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas
Surface Soil
Sample Locations

An Employee Owned Company

DRAWING 3

SHEET NO. 6 NO. OF SHEETS 6

88UT406-SurfaceSoil.dwg

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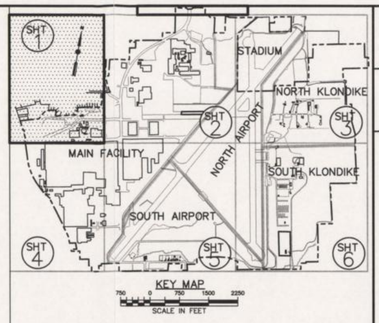

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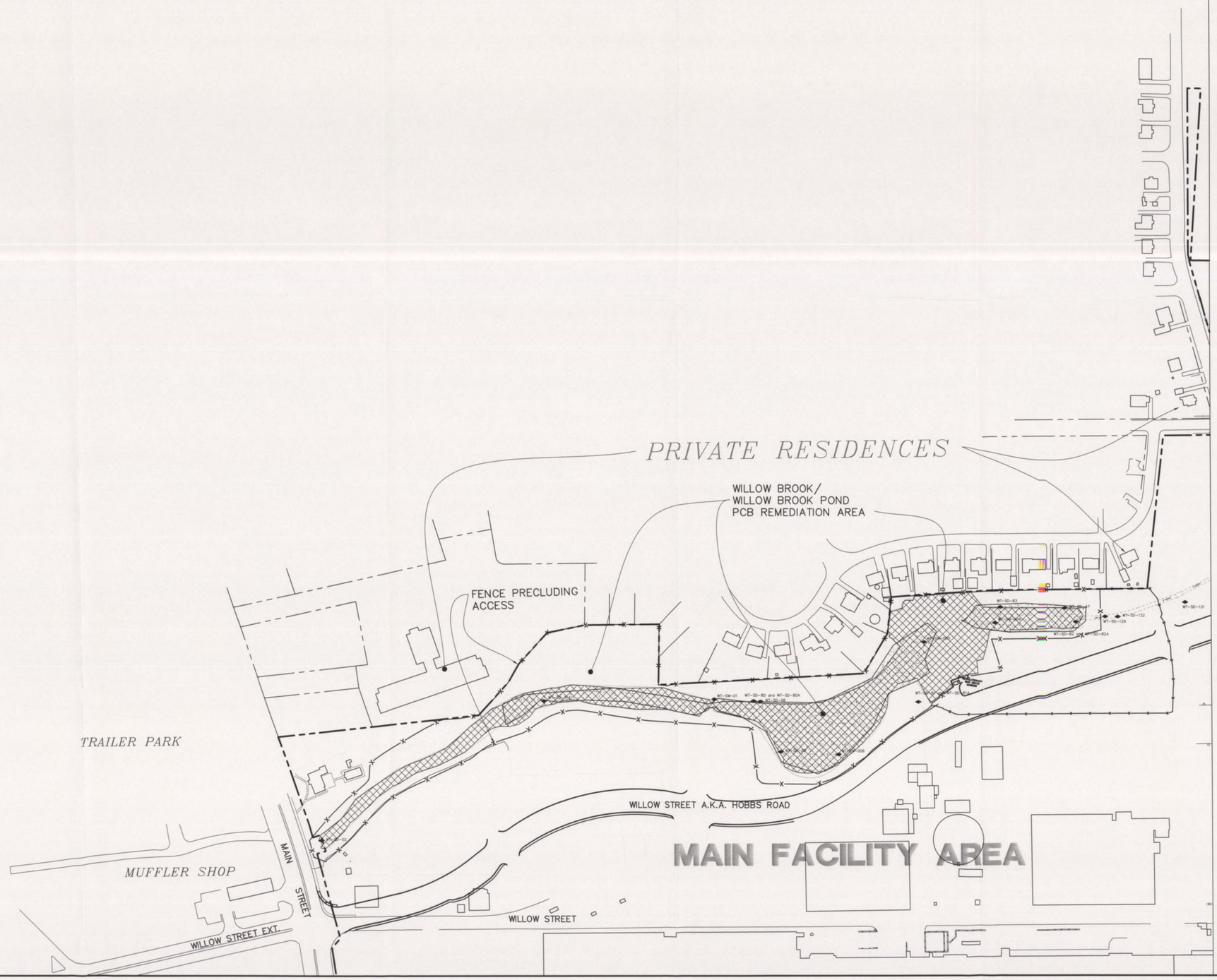
- XX-SD-## SEDIMENT SAMPLE LOCATION



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Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Alrport/Klondike Areas
Sediment & Surface Water
Sample Locations

An Employee Owned Company

DRAWING 4

SHEET NO. 1 NO. OF SHEETS 6

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MATCH TO SHEET 1

PRIVATE RESIDENCES

AIRPORT AVENUE

UNITED TECHNOLOGIES RESEARCH CENTER

FORMER SILVER LANE PICKLE COMPANY

FORMER EXPERIMENTAL TEST AIRPORT LABORATORY

MERCER AVENUE

WT-SD-130
WT-SD-128
WT-SD-133

WILLOW STREET A.K.A. HOBBS ROAD

MAIN FACILITY AREA

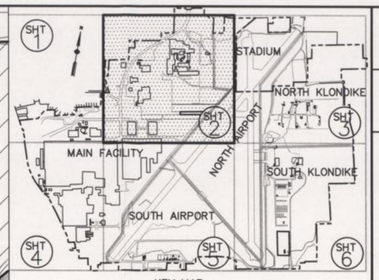
RUNWAY ROAD

FORMER NORTHEAST-SOUTHWEST RUNWAY

NORTH AIRPORT

AIRPORT/ KLONDIKE AREA

SCALE IN FEET
50 0 50 100 150



KEY MAP

750 0 750 1500 2250
SCALE IN FEET

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Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT
Main Facility & Airport/Klondike Areas
Sediment & Surface Water
Sample Locations

An Employee Owned Company

DRAWING 4

SHEET NO. 2 NO. OF SHEETS 6

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SILVER LANE

PRIVATE RESIDENCES

UNDEVELOPED LAND

N/F
U.T.C.
NORTH AIRPORT

N/F
STATE OF
CONNECTICUT

RUNWAY REMOVED

N/F
STATE OF
CONNECTICUT

UCONN HUSKIES

PERIMETER ROAD

LIMITS OF STADIUM PARCEL

SUPPLEMENTAL STADIUM PARCEL

UNDEVELOPED LAND AREA

UNDEVELOPED LAND

FORMER NORTH-SOUTH RUNWAY

NORTH KLONDIKE

NK-SW-01

NK-SW-02

NK-SW-03

NK-SW-04

NK-SW-05

NK-SW-07

FORMER X-401

FORMER X-407

FORMER X-415

FORMER X-430

FORMER X-410

FORMER M.E.R.L.

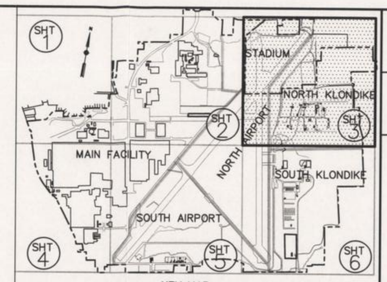
FORMER EXPLOSIVES STORAGE AREA

FORMER X-194

FORMER X-312/X-314

PEWTER POT BROOK

AIRPORT/ KLONDIKE AREA



KEY MAP

750 0 750 1500 2250
SCALE IN FEET

MAP REFERENCE:

PHOTOGRAMMETRY BY: GOLDEN AERIAL SURVEY, INC., NEWTOWN, CONNECTICUT,
DATE OF PHOTOGRAPHY 3/17/91.

LEGEND

- AREA NOT SUBJECT TO ENVIRONMENTAL INDICATOR DETERMINATON
- SAMPLER & TRESPASSER EXPOSURE AREA WITHIN MAIN FACILITY AREA
- TRESPASSER EXPOSURE AREA WITHIN AIRPORT/KLONDIKE AREA
- GROUNDSKEEPER EXPOSURE AREA (SITEWIDE)
- MAINTENANCE WORKER EXPOSURE AREA (SITEWIDE)
- MAINTENANCE/CONTRACTOR LOT AREA (SITEWIDE)
- ENGINEERED CONTROL AREA (WILLOW BROOK/WILLOW POND)
- UNITED TECHNOLOGIES CORPORATION APPROX. PROPERTY BOUNDARY LINE
- STATE OF CONNECTICUT APPROX. PROPERTY BOUNDARY LINE
- CULVERT (WILLOW BROOK)
- FENCE LINE
- GUIDE/GUARD RAIL LINE
- XX-SW-## SURFACE WATER SAMPLE LOCATION
- XX-SD-## SEDIMENT SAMPLE LOCATION

50 0 50 100 150
SCALE IN FEET

REV.	DESCRIPTION OF REVISION	DATE	APPR.

Loureiro Engineering Associates, Inc.
100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney
A United Technologies Company

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas
Sediment & Surface Water
Sample Locations

SCALE	COMM. NO.	DATE	DRAWN BY	DATE	APPR. BY	DATE
1" = 100'	88U1406		A.C.L./G.F.B.	09/09/04	B.A.C.	09/13/04

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DRAWING
4

SHEET NO. 3 NO. OF SHEETS 6

88U1406-Surf-Sed.dwg

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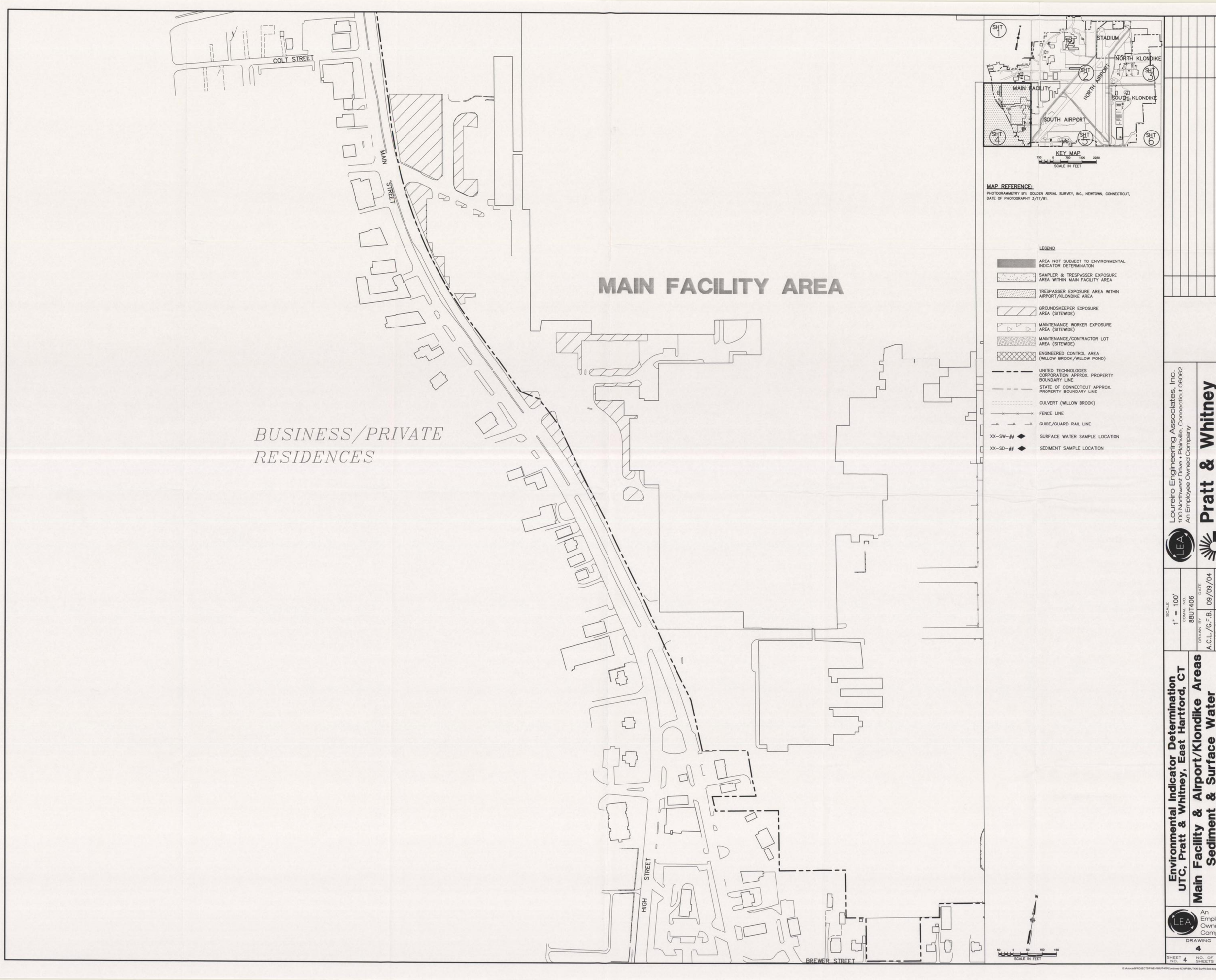

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SCALE	COMM. NO.	DATE	APP. BY	DATE
1" = 100'	88UT406	09/09/04	B.A.C.	09/13/04

DRAWN BY: A.C.L./G.F.B.

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DRAWING 4

SHEET NO. 4 NO. OF SHEETS 6

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MAIN FACILITY AREA

SOUTH TEST

RUNWAY ROAD

FORMER NORTHEAST–SOUTHWEST RUNWAY

NORTH AIRPORT

NORTHWEST–SOUTHEAST RUNWAY

AIRPORT/ KLONDIKE AREA

SOUTH AIRPORT

MEAD ROAD

ENGINEERING

PEWTER POT BROOK

FORMER FIRE TRAINING AREA "B"

PERIMETER ROAD

SAMPLING AREA NEAR DSN 005

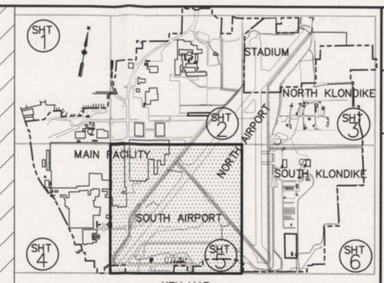
PEWTER POT BROOK

CONTRACTORS ROAD

CONTRACTOR STORAGE AREA

BREWER STREET

SA–SW–01
SA–SW–02
SA–SW–03
SA–SW–04
SA–SW–05
SA–SW–06
SA–SW–07
SA–SW–08
SA–SW–10



KEY MAP

750 0 750 1500 2250
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50 0 50 100 150
SCALE IN FEET

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100 Northwest Drive • Plainville, Connecticut 06062
An Employee Owned Company

Pratt & Whitney

A United Technologies Company

SCALE	COMM. NO.	DATE	
1" = 100'	88UT406	09/09/04	
DRAWN BY		DATE	
A.C.L./G.F.B.		09/09/04	
APP. BY		DATE	
B.A.C.		09/13/04	

Environmental Indicator Determination
UTC, Pratt & Whitney, East Hartford, CT

Main Facility & Airport/Klondike Areas
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Sample Locations

An Employee Owned Company

DRAWING	
4	
SHEET NO. 5	NO. OF SHEETS 6

88UT406-SurfW-Sed.dwg

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FORMER TIE-DOWN

FORMER LINDE GAS AREA

FORMER CHEMICAL STORAGE BUILDING

FORMER FIRING RANGE

FORMER CRYOGENICS

SOUTH ACCESS ROAD

FORMER X-307

SOUTH KLONDIKE

AIRPORT/ KLONDIKE AREA

FORMER NORTH-SOUTH RUNWAY

PERIMETER ROAD

FORMER VIRGIN PRODUCTS STORAGE AREA (VPSA)

LINDE ROAD

N/F McILVANE

UNDEVELOPED LAND

PEWTER POT BROOK

BREWER STREET

SK-SW-01 SK-SW-02 SK-SW-03 SK-SW-04 SK-SW-05 SK-SW-06 SK-SW-07 SK-SW-08 SK-SW-09 SK-SW-10 SK-SW-11 SK-SW-12 SK-SW-13 SK-SW-14 SK-SW-15 SK-SW-16

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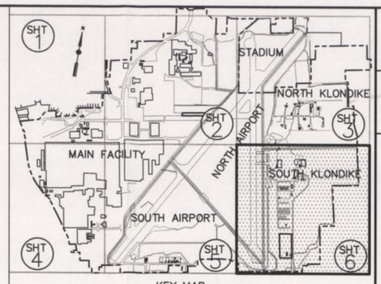

KEY MAP

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An Employee Owned Company

DRAWING 4

SHEET NO. 6 NO. OF SHEETS 6

88UT406-SurfW-Sed5.dwg

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