

**RCRA Corrective Action  
Environmental Indicator (EI) RCRIS code (CA725)**

**Attachment No. 3**

***Summary of Groundwater Analytical Data and  
Constituents Detected in Groundwater,  
December 1999 Deep Soil Boring Report,  
Generalized Geologic Cross Sections, and  
Ranney Well Results  
Environmental Indicator Determination  
For  
Pratt & Whitney Rocky Hill Facility***

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**GROUNDWATER MONITORING  
IN SUPPORT OF  
VCAP RISK ASSESSMENT**

**Pratt & Whitney  
60 Belamose Avenue  
Rocky Hill, CT**

**February 2000**

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## **1. SUMMARY**

A round of groundwater monitoring was performed at the Pratt & Whitney, Rocky Hill facility in Rocky Hill, Connecticut in support of the Voluntary Corrective Action Program (VCAP) Risk Assessment. Groundwater samples were collected from twenty-one existing monitoring wells on site. The samples collected were analyzed for: volatile organic compounds (VOCs); semivolatile organic compounds (SVOCs); total petroleum hydrocarbons (TPH); and the following filtered and unfiltered metals: arsenic, barium, beryllium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc.

## **2. FACILITY INFORMATION**

The Rocky Hill facility is located at 60 Belamose Avenue, Rocky Hill, Connecticut. The facility lies at the eastern end of Belamose Avenue, north of Dividend Brook, and west of the Main Street facility and west of the Connecticut River. The facility consists of a main factory building, a separate power house, and several auxiliary buildings on 51.5 acres of land.

The site includes two hazardous waste storage buildings located on the east side of the main building; an NPDES-permitted wastewater treatment system located on the south side of the main building, and general flammable materials storage areas. The facilities are located on the northern portion of the site. The southern portion of the site is the location of a former landfill, and is not presently used.

Groundwater quality in the area of the site has been classified as GB. Class GB groundwaters are groundwaters within historically highly urbanized areas or areas of intense industrial activity and where public water supply service is available. Class GB groundwaters are presumed suitable for industrial uses, but are presumed to be unsuitable for direct human consumption due to waste discharges, spills or leaks of chemicals, or other land use impacts.

## **3. METHODOLOGY**

Groundwater samples were collected by LEA personnel on April 7 and 8, 1999, and May 17 and 18, 1999, from 21 existing monitoring wells. Prior to sampling the depth to water and total depth of each monitoring well were recorded. From this information the total volume of water contained in each monitoring well was calculated. The water was purged initially and parameters such as pH, temperature and conductivity were recorded. Once the initial volume of water was removed, the monitoring well was purged a minimum of three times the standing water volume. The turbidity of the groundwater was measured upon purging three well volumes.



In cases where the turbidity was greater than 20 Nephelometric Turbidity Units (NTU), up to 2 additional well volumes were purged while monitoring turbidity.

Samples for SVOCs, TPH, and metals were collected using a peristaltic pump equipped with dedicated polyethylene tubing. The filtered metals samples collected were filtered in the field using a dedicated 0.45-micron in-line filter assembly. Unfiltered samples for metals were collected as well.

Because of the small diameter (0.5 inch) of the majority of monitoring wells at the Rocky Hill facility, samples for VOCs were also collected using a peristaltic pump equipped with dedicated polyethylene tubing. Samples collected for VOCs from monitoring wells RH-MW-06D, RH-MW-11D, and RH-MW-17D were collected using disposable bailers.

All samples were collected directly into pre-labeled, laboratory-supplied glassware. The containers were sealed, placed in an iced cooler, and shipped to Lancaster Laboratories under chain-of-custody procedures for analysis for the selected analytical parameters

In addition, two equipment blanks, three trip blanks, two duplicate sample and one performance evaluation sample were collected for quality assurance/quality control (QA/QC) purposes.

The locations of all monitoring wells are shown on the Site Plan provided as Attachment No. 2 of the *Documentation of Environmental Indicator Determination for Current Human Exposures Under Control*.

#### **4. RESULTS**

A summary of the groundwater monitoring well information including the screened interval, reference elevation, and groundwater elevations for the monitoring wells sampled are provided in Table 1. A summary of the analytical results for the two above-described events is provided in Table 2. A summary of the constituents detected for the two above-described events is provided in Table 3. A summary of all analytical results for groundwater samples collected at the Rocky Hill facility during the two sampling events is presented in Table 4. The unfiltered samples are designated as total concentrations ('total') in the tables. The monitoring well locations are shown on the Site Plan provided as Attachment No. 2 of the *Documentation of Environmental Indicator Determination for Current Human Exposures Under Control*.

Volatile organic compounds detected in groundwater samples collected during the April 1999 sampling event, and their maximum concentrations, included carbon disulfide (120,000 µg/l), chloroform (43 µg/l), dichlorobromomethane (2J µg/l), tetrachloroethylene (24 µg/l), and



trichloroethylene (1J µg/l). The “J” qualifier indicates that the concentrations were estimated. The highest concentration of VOCs occurred in monitoring well RH-MW-17S.

Semivolatile organic compounds detected in groundwater samples collected during the April 1999 groundwater sampling event, and their maximum concentrations, included acenaphthene (1J mg/l), and bis (2-ethylhexyl) phthalate (4J mg/l).

Total petroleum hydrocarbons were not detected in any of the groundwater samples collected during the April 1999 sampling event.

Metals detected in filtered groundwater samples collected during the April 1999 groundwater sampling event included arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc. The maximum observed concentrations of each of these metals was: arsenic 0.0101 mg/l; barium 0.207 mg/l; beryllium 0.0022 mg/l; cadmium 0.00038 mg/l; chromium 0.036 mg/l; copper 0.0085 B mg/l; lead 0.0030 J mg/l; mercury 0.000068 B mg/l; nickel 0.0412 B mg/l; selenium 0.0113 N mg/l; and zinc 2.29 mg/l. The “B” qualifier indicates that the reported concentration is greater than the instrumental detection limit (IDL) but below than the contract required detection limit (CRDL), and the “N” qualifier indicates that sample spike was not within control limits.

Metals detected in unfiltered groundwater samples collected during the May 1999 groundwater sampling event included arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. Metals collected from unfiltered groundwater samples are denoted as “(Total)” in the data tabulations. The maximum observed concentrations of each of these metals was: arsenic 0.0093 B mg/l; barium 0.222 mg/l; cadmium 0.00046 B mg/l; chromium 0.037 mg/l; copper 0.161 mg/l; lead 0.0854 mg/l; mercury 0.00066 mg/l; nickel 0.0417 B mg/l; silver 0.0079 B mg/l; and zinc 1.72 mg/l. The “B” qualifier indicates that the reported concentration is greater than the IDL but below than the CRDL.

With the exception of results from RH-MW-16S, a comparison of the metals concentrations of the filtered and unfiltered samples in most cases resulted in reasonable agreement. Metals concentrations are typically lower in the filtered samples, in some cases the concentrations are for all practical purposes equivalent. With regard to data from RH-MW-16S, the groundwater from this well exhibited turbidity in excess of 200 NTU. As a result, the filtered groundwater sample from this location contains significantly lower concentrations of metals in comparison to the unfiltered groundwater sample.

Groundwater data were compared to the numeric criteria published in Table 3-7 of the *Conceptual Site Models and Screening Levels for Pratt & Whitney's VCAP Connecticut*



*Facilities*, prepared by Gradient Corporation, issued on December 19, 1997, revised on September 18, 1998, and September 15, 1999. Table 3-7 is entitled *Generic P&W Groundwater Screening Levels (SLs) Based on Surface Water Protection P&W VCAP, Connecticut Facilities*. Exceedances of the screening levels in Table 3-7 were noted for arsenic, copper, lead, mercury, zinc, and carbon disulfide. Summaries of the exceedances of the applicable screening levels are provided in Tables 5 and 6 and are discussed in greater detail below.

The exceptions in comparison to the Table 3-7 screening criterion are: arsenic at concentrations of 0.0101 mg/l (RH-MW-11D), and 0.0119 mg/l (RH-MW-07S); copper at a concentration of 0.161 mg/l (RH-MW-16S); lead at a concentration of 0.0854 mg/l (RH-MW-16S); mercury at a concentration of 0.00066 mg/l (RH-MW-16S); zinc at concentrations of 1.72 mg/l (RH-MW-16S), 2.29 mg/l (RH-MW-17S), 0.153 mg/l (RH-MW-09S), and carbon disulfide at an average concentration of 104,000 µg/l in two replicate samples (RH-MW-17S).

The screening levels for groundwater discharging to surface water listed in the conceptual site model (CSM) were developed based on readily available published criteria. The readily available published criteria cited are protective of both human 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 in consideration of the effects of groundwater discharges to the surface water, comparison of the maximum contaminant level (MCL) multiplied by a dilution attenuation factor of 10 is considered an applicable screening criterion. The applicable screening criteria for evaluation of direct human exposures to surface in consideration of the effects of groundwater discharge to the surface water are as follows:

- Arsenic            0.05 mg/l x 10            =        0.5 mg/l
- Chromium        0.1 mg/l x 10             =        1 mg/l
- Copper            1.3 mg/l x 10             =        13 mg/l
- Lead              0.015 mg/l x 10         =        0.15 mg/l
- Mercury          0.002 mg/l x 10         =        0.02 mg/l
- Zinc               5 mg/l x 10                =        50 mg/l

Comparison with these criteria did not indicate any exceedances in groundwater. With regard to carbon disulfide detected in well RH-MW-17S, wells located downgradient of this location do not contain concentrations of carbon disulfide. As a result, the concentration of carbon disulfide detected in groundwater at location RH-MW-17S does not pose a risk to surface water.

A performance evaluation sample for metals, TPH, SVOCs, and VOCs was also submitted for analysis during the April 1999 sampling event. The concentration for arsenic was reported to be



0.182 mg/l, which lies between the vendor-certified acceptance values (0.150-0.236 mg/l). The concentration for lead was reported to be 0.467 mg/l, which lies between the vendor-certified acceptance criteria (0.410-0.590 mg/l). These results were obtained for quality assurance/quality control (QA/QC) purposes. The concentration of TPH was reported to be 0.58 mg/l, which lies outside the vendor-certified acceptance criteria (0.720-1.05 mg/l). All of the VOCs certified by the vendor to be present (tetrachloroethylene, 1,1,2-trichloroethane, and vinyl chloride) were reported as not detected by Lancaster. In response to these results, Lancaster conducted an investigation. The results of that investigation were not available as of the time of this report.



**Table 1**  
**Summary of On-Site Monitoring Wells**

<b>Location Identifier</b>	<b>Top of Casing Elevation</b>	<b>Top of Cover Elevation</b>	<b>Top of Riser Elevation</b>	<b>Depth of Well</b>	<b>Depth of Boring</b>	<b>Screened Interval (Feet BGS)</b>
RH-MW-1S		28.56	28.33	27.0	27.0	18.0 - 27.0
RH-MW-2S	38.16		37.83	38.0	38.0	26.0 - 38.0
RH-MW-3S		27.46	27.08	28.0	28.0	19.0 - 28.0
RH-MW-4S	19.76		19.58	18.5	20.0	8.5 - 18.5
RH-MW-5S	24.83		24.50	19.0	20.0	10.0 - 19.0
RH-MW-6S	29.33		29.07	25.0	26.0	16.0 - 25.0
RH-MW-6D			28.08	120.0	132.0	114.0 - 119.0
RH-MW-7S	26.17		26.10	24.0	24.0	12.0 - 24.0
RH-MW-8S	25.53		25.24	21.0	21.0	12.0 - 21.0
RH-MW-9S	29.26		29.08	24.0	24.0	15.0 - 24.0
RH-MW-10S		23.93	23.62	23.0	23.0	14.0 - 23.0
RH-MW-11S		22.90	22.49	22.5	22.5	13.5 - 22.5
RH-MW-11D			22.56	145.5	146.0	140.0 - 145.0
RH-MW-12S		23.90	23.75	24.0	24.0	15.0 - 24.0
RH-MW-13S	31.00		30.65	26.0	26.0	17.0 - 26.0
RH-MW-14S		28.51	28.19	27.0	27.0	18.0 - 27.0
RH-MW-15S	30.69		30.16	24.0	24.0	15.0 - 24.0
RH-MW-16S			32.03	27.0	27.0	18.0 - 27.0
RH-MW-17S			28.74	15.0	15.0	6.0 - 15.0
RH-MW-17D			28.80	134.5	152.0	128.0 - 133.0
RH-MW-18S			28.57	30.0	30.0	21.0 - 33.0

**Table 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**  
**Pratt & Whitney, Rocky Hill, Connecticut**

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
RH-MW-10S	1642985	9/18/97	14.0	23.0	GW		x					x		
RH-MW-10S	1837029	4/7/99	14.0	23.0	GW		x					X		
RH-MW-10S	1839134	5/14/99	14.0	23.0	GW							X		x
RH-MW-11D	1837050	4/9/99	140.0	145.0	GW		X	X				X		
RH-MW-11D	1839139	5/17/99	140.0	145.0	GW							X		x
RH-MW-11D	1839140	5/17/99	140.0	145.0	GW							X		x
RH-MW-11S	1642989	9/19/97	13.5	22.5	GW		X					x		
RH-MW-11S	1837030	4/7/99	13.5	22.5	GW		X					X		
RH-MW-11S	1839141	5/17/99	13.5	22.5	GW							X		x
RH-MW-12S	1642990	9/19/97	15.0	24.0	GW		x					x		
RH-MW-12S	1837036	4/8/99	15.0	24.0	GW		X					X		
RH-MW-13S	1642991	9/19/97	17.0	26.0	GW		x					X		
RH-MW-13S	1837037	4/8/99	17.0	26.0	GW		x					X		
RH-MW-13S	1839135	5/14/99	17.0	26.0	GW							X		x
RH-MW-14S	1642992	9/19/97	18.0	27.0	GW		x					X		
RH-MW-14S	1837038	4/8/99	18.0	27.0	GW		x					X		
RH-MW-14S	1839136	5/14/99	18.0	27.0	GW							X		x
RH-MW-15S	1837039	4/8/99	15.0	24.0	GW		x					X		
RH-MW-16S	1642976	9/18/97	18.0	27.0	GW		x	x				X		X
RH-MW-16S	1837028	4/7/99	18.0	27.0	GW		x	x				X		X
RH-MW-16S	1839150	5/18/99	18.0	27.0	GW							X		x
RH-MW-17D	1837052	4/9/99	0.0		GW		X	X				X		
RH-MW-17D	1839146	5/17/99	0.0		GW							X		x
RH-MW-17S	1642988	9/19/97	6.0	15.0	GW		X	x				X		X
RH-MW-17S	1837044	4/8/99	6.0	15.0	GW		X	x				X		x
RH-MW-17S	1837045	4/8/99	6.0	15.0	GW		X	x				X		x
RH-MW-17S	1839147	5/17/99	6.0	15.0	GW							X		x
RH-MW-18S	1642732	10/9/97	21.0	30.0	GW		x	x				X		x
RH-MW-1S	1642987a	9/19/97	18.0	27.0	GW		X					x		
RH-MW-1S	1837025	4/7/99	18.0	27.0	GW		x					X		
RH-MW-1S	1839149	5/18/99	18.0	27.0	GW							X		x

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit  
2. Printed on 02/17/00



**Table 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**  
**Pratt & Whitney, Rocky Hill, Connecticut**

Sample Information						Analysis Information									
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous	
RH-MW-2S	1642983	9/18/97	26.0	38.0	GW		x					x			
RH-MW-2S	1837041	4/ 8/99	26.0	38.0	GW		x					X			
RH-MW-2S	1839154	5/18/99	26.0	38.0	GW							X		x	
RH-MW-3S	1642982	9/18/97	19.00	28.00	GW		x					x			
RH-MW-3S	1837040	4/ 8/99	19.0	28.0	GW		x	x				X		x	
RH-MW-3S	1839153	5/18/99	19.0	28.0	GW							X		x	
RH-MW-4S	1642981	9/18/97	8.5	18.5	GW		x					X			
RH-MW-4S	1837042	4/ 8/99	8.5	18.5	GW		x					X			
RH-MW-4S	1837043	4/ 8/99	8.5	18.5	GW		x	x				X		x	
RH-MW-4S	1839152	5/18/99	8.5	18.5	GW							X		x	
RH-MW-5S	1642980	9/18/97	10.0	19.0	GW		x					x			
RH-MW-5S	1837034	4/ 7/99	10.0	19.0	GW		x					X			
RH-MW-5S	1839145	5/17/99	10.0	19.0	GW							X		x	
RH-MW-6D	1837048	4/ 9/99	114.0	119.0	GW		X	x				X			
RH-MW-6D	1839142	5/17/99	114.0	119.0	GW							X		x	
RH-MW-6S	1642977	9/18/97	16.0	25.0	GW		x	x				X		x	
RH-MW-6S	1837032	4/ 7/99	16.0	25.0	GW		x	x				X		X	
RH-MW-6S	1839143	5/17/99	16.0	25.0	GW							X		x	
RH-MW-7S	1642978	9/18/97	12.0	24.0	GW		x	x				X		x	
RH-MW-7S	1642979	9/18/97	12.0	24.0	GW		x	x				X		x	
RH-MW-7S	1837031	4/ 7/99	12.0	24.0	GW		X	x				X		X	
RH-MW-7S	1839144	5/17/99	12.0	24.0	GW							X		x	
RH-MW-8S	1642975	9/18/97	12.0	21.0	GW		x					X		X	
RH-MW-8S	1837026	4/ 7/99	12.0	21.0	GW		x					X		X	
RH-MW-8S	1839132	5/14/99	12.0	21.0	GW							X		x	
RH-MW-9S	1642984	9/18/97	15.0	24.0	GW		x					X			
RH-MW-9S	1837027	4/ 7/99	15.0	24.0	GW		x					X			
RH-MW-9S	1839133	5/14/99	15.0	24.0	GW							X		x	
RH-SB-35	1949030	12/20/99	24	28	GW	x	x					X		X	
RH-SB-35	1949035	12/23/99	83	87	GW		x					X		x	

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit, x - Analysed, no analytes in group over the detection limit  
2. Printed on 02/17/00

