DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL

Pratt & Whitney
60 Belamose Avenue
Rocky Hill, CT

February 2000

Prepared for

PRATT & WHITNEY
400 Main Street
East Hartford, CT 06108

Prepared by

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, CT 06062

LEA Comm. No. 68VE401

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

Migration of Contaminated Groundwater Under Control

Facility Name: **Pratt & Whitney, Rocky Hill Facility**
Facility Address: **60 Belamose Avenue, Rocky Hill, Hartford, Connecticut**
Facility EPA ID #: **CTD000844407**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, 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 #8 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

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).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

__x__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The Rocky Hill Facility is a jet engine component manufacture and assembly facility. The facility prepares and packages selected jet engine assembly components for shipment to other facilities. The facility consists of a main factory building, a separate power house, and several auxiliary buildings on 51.5 acres of land. Pratt & Whitney has occupied the facility since 1965. The site was reported to have been developed in 1927 as the Belamose Rayon plant, and operated as a rayon manufacturing facility until 1965. Samples of groundwater, indoor air, surface soil (i.e., those soils located at depths less than or equal to 6 inches below the ground surface), surface water, and sediment have been collected during the performance of investigation activities conducted at the site.

A report entitled *Conceptual Site Models and Screening Levels for Pratt & Whitney's VCAP Connecticut Facilities*, was prepared by Gradient Corporation (Gradient Report). This report was issued on December 19, 1997 and revised on September 18, 1998, and September 15, 1999. A copy of applicable portions of this report, those portions addressing the Rocky Hill Facility, has been included in Attachment No. 1. For the Rocky Hill Facility, the Gradient Report provides a facility-specific conceptual site model, a description of facility-specific exposure media and exposure pathways, a description of potential receptors, a rationale and approach to screening analytical data generated for exposure media, and screening levels for exposure media. For the Rocky Hill Facility, the Gradient Report identifies the applicable receptors, exposure media and pathways that require screening as follows:

1) grounds keepers, samplers, and trespassers, surface soil by ingestion and dermal contact (Table 3-10);
2) maintenance workers, indoor workers, and samplers, indoor air by inhalation (Table 3-4);
3) off-site recreators, samplers, and trespassers, surface water, ingestion and dermal contact (Tables 3-6 and 3-7);
4) off-site recreators, samplers, and trespassers, sediment, ingestion and dermal

contact; (Table 3-10) and,

5) maintenance workers and samplers, groundwater by dermal contact (Ranney well water quality data compared to Table 3-8 and MCLs, respectively).

This documentation of environmental indicator determination is based on a review of all available relevant/significant data as it applies to groundwater at the site.

Groundwater

Groundwater samples have been collected from groundwater monitoring wells installed at the Pratt & Whitney Rocky Hill Facility as part of the Voluntary Corrective Action program (VCAP) groundwater monitoring since September 1997. The initial groundwater monitoring well network was installed in March 1997 and consisted of eighteen groundwater monitoring wells (RH-MW-01S through RH-MW-18S). Each of these wells are constructed such that the screen section intersects the groundwater table. In February 1999, RH-MW-06D, RH-MW-11D, and RH-MW-17D were added to augment the existing well network with monitoring wells screened in deeper zones of the aquifer. Specifically, these three additional wells are constructed with screen sections immediately above the bedrock/unconsolidated material interface.

Groundwater samples have been collected from the site during four separate events during the period from September 1997 to December 1999. In September 1997, groundwater samples were collected from wells RH-MW-1S through RH-MW-18S. In the April 1999 and May 1999 sampling event, groundwater samples were collected from RH-MW-1S through RH-MW-18S and RH-MW-06D, RH-MW-11D, and RH-MW-17D. In the December 1999 sampling event, a single groundwater duplicate sample pair was collected from the soil boring RH-SB-35. A complete listing of constituents for which samples were analyzed during the September 1997, April 1999, May 1999, and December 1999 sampling events is provided in the tabular presentation of analytical data in Attachment No. 3.

General groundwater flow in the upper portion of the unconsolidated aquifer at the site is toward the southeast. However, the direction of flow, especially in proximity to the Connecticut River, is influenced for periods of time and to varying degrees by the tidal influences of the river. The Connecticut River is tidally influenced from its mouth at Long Island Sound up to approximately the City of Hartford. The depth to the water table over most of the site is typically 15 to 25 feet below the ground surface. Water table elevations typically range from approximately 7 to 8.5 feet above mean sea level (MSL).

In the vicinity of monitoring well RH-MW-17S, a layer of dense silt was encountered which acts locally as an aquitard. A perched layer of groundwater in the immediate vicinity of RH-MW-17S is located approximately 10 feet above the water table in the

general area. The full extent of the perched zone has not been identified. However, with the exception of soil boring RH-SB-35, the dense silt was not encountered in any other soil borings or monitoring wells installed at the site. Based on the available geologic and hydrogeologic data, coupled with chemical data from locations downgradient of RH-MW-17S, it is concluded that a direct hydrologic connection between the contaminated zone of the perched layer of groundwater and the underlying aquifer does not exist. Provided in Attachment No. 3 is a map depicting generalized geologic cross sections for the area proximal to RH-MW-17S.

Provided in Attachment No. 2 is a Site Plan depicting the location of each of the groundwater monitoring points. The site plan also presents groundwater contours generated from data collected during the April 1999 groundwater sampling event. Provided in Attachment No. 3 is a copy of a report entitled *Groundwater Monitoring in Support of VCAP Risk Assessment, Pratt & Whitney, Rocky Hill, Connecticut.* Attachment No. 3 also includes a database listing of analytical data for groundwater samples collected during the period from September 1997 through December 1999 and a summary of constituents detected in groundwater samples collected from onsite monitoring wells for the same period.

The groundwater data provided in the attachments have been compared to the numeric screening levels published in the Gradient Report. Specifically, the groundwater data have been compared to the numeric criteria published in Table 3-7 of the above-referenced report. The table is titled *Generic P&W Groundwater Screening Levels (SLs) Based on Surface Water Protection, P&W VCAP, Connecticut Facilities.* The groundwater monitoring well network at the site is determined adequate in number and spatial distribution to assess the quality of groundwater that discharges to surface water bodies at the site. With the exception of those constituents noted below, constituents were not detected in groundwater at concentrations above the numeric criteria published in the above referenced table. The exceptions were noted for arsenic, chromium, copper, lead, mercury, zinc, and carbon disulfide at one or more of the following locations, RH-MW-07S, RH-MW-09S, RH-MW-11D, RH-MW-16S, RH-MW-17S, and RH-SB-35. A tabular presentation of the exceedances of groundwater screening criteria is presented in Attachment No. 3.

The zinc detected in groundwater at locations RH-MW-09S during the September 1997 sampling event, RH-MW-16S during the April 1999 and May 1999 sampling event, and RH-MW-17S in the May 1999 sampling event do not represent exceedances of applicable groundwater screening criteria. The criterion in Table 3-7 for zinc is derived directly from the DEP Surface Water Protection Criteria. The Surface Water Protection Criterion for zinc is calculated by multiplying the aquatic life criteria protective of chronic health effects by a dilution attenuation factor of 10. In 1997, the DEP revised the aquatic life criteria for surface waters. As a result, the current aquatic life criteria protective of

chronic health effects in surface water for zinc is 0.0582 mg/l, above the previous 0.0123 mg/l standard in existence at the time of the development of the generic screening levels. As a result, the screening criterion for zinc for the purposes of comparison of groundwater data is 0.582 mg/l (0.0582 x 10). Since the concentrations of zinc detected in location RH-MW-16S, RH-MW-17S and RH-MW-09S during the noted sampling events do not exceed this criterion, additional evaluation of these data from these locations for zinc is not necessary.

Groundwater analytical data from a sample collected from the Ranney Well on November 18, 1988, was compared to the numeric criteria published in Table 3-8 of the above-referenced report. The table is titled *Generic P&W Groundwater Screening Levels (SLs) Based on Dermal Contact, P&W VCAP, Connecticut Facilities.* The groundwater analytical data from the same sample was also compared to the USEPA Maximum Contaminant Levels (MCLs). Analytical data from the Ranney Well indicated the presence of the following compounds (listed as compound and detected concentration) copper (0.019 mg/l), iron (0.210 mg/l), manganese (0.061 mg/l), sodium (14 mg/l), zinc (0.009 mg/l), alkalinity and hardness as calcium carbonate (50 mg/l), chloride (30 mg/l), Nitrate (8 mg/l), total dissolved solids (100 mg/l), and chloroform (2 µg/l). The detected concentrations are below both the screening criteria and the MCL (for those constituents listed in Table 3-8 and that have established MCLs). A copy of the analytical data from the Ranney Well sampling is included in Attachment 3 to this document.

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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

__x__ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

At the time of this determination, the groundwater monitoring well network on the site consists of twenty one groundwater monitoring wells (RH-MW-01S through RH-MW-18S and RH-MW-06D, RH-MW-11D, and RH-MW-17D). The eighteen wells with S in the location identification designation are constructed such that the screen section intersects the groundwater table and were installed in March 1997. The remaining three wells, those with a D in the location identification designation, are constructed with screen sections immediately above the bedrock/unconsolidated material interface and were installed in February 1999. Groundwater samples were collected from monitoring wells RH-MW-01S through RH-MW-18S in September 1997. Groundwater samples were also collected from all twenty-one onsite wells in two separate events in April and May 1999. A single duplicate groundwater sample pair was also collected from soil boring RH-SB-35 in December 1999. A complete listing of constituents for which samples were analyzed during the September 1997, April 1999, May 1999, and December 1999 sampling events is provided in the tabular presentation of analytical data in Attachment No. 3.

As noted above, data from the April, May 1999 and December sampling events indicated exceedances of generic P&W screening levels in groundwater collected from locations RH-SB-35, RH-MW-07S, RH-MW-11D, RH-MW-16S, RH-MW-17S for one or more of the following constituents: arsenic, chromium, copper, lead, mercury, zinc, and carbon disulfide. A comparison of the data from wells sampled during the September 1997, April 1999 and May 1999 sampling events does not indicate that contaminated groundwater is migrating to unimpacted areas of the site.

With regard to carbon disulfide detected in groundwater monitoring well RH-MW-17S, it is concluded that the presence of this compound is coincident with an area of perched groundwater beneath an existing facility structure that is not in direct communication with the underlying aquifer. As the perched groundwater is not in direct communication with the underlying aquifer and geologic, hydrogeologic and groundwater analytical data are available to support that migration has not occurred over a significant period of time since the presumed date of release (i.e. between 1927 and 1965) it is concluded that carbon disulfide impacted groundwater will not migrate beyond the current area of contamination.

Furthermore, arsenic, chromium, copper, lead, mercury, zinc are not predominant constituents of concern for the site based on past and current operations. The sporadic detection of these constituents in groundwater at the site coupled with the fact than none are considered predominant constituents of concern supports the conclusion that presence of these constituents in groundwater is not associated with an area or areas of contamination. For these reasons, it is concluded that groundwater is expected to remain within the existing area of contaminated groundwater as defined by the monitoring locations currently present at the site.

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

__x__ If yes - continue after identifying potentially affected surface water bodies.

____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

With the exception of groundwater in the vicinity of RH-MW-17S, the potential exists that groundwater represented by other monitoring points at the site could discharge to surface water. With regard to RH-MW-17S, it has been concluded that this well is constructed in a localized area of perched groundwater beneath an existing facility structure. The perched area is not in direct communication with the underlying aquifer. As the perched groundwater is not in direct communication with the underlying aquifer and geologic, hydrogeologic and groundwater analytical data are available to support that migration has not occurred over a significant period of time since the presumed date of release, it is concluded that impacted groundwater in the vicinity of RH-MW-17S does not, and will not, discharge to surface water.

The remainder of groundwater at the site could potentially discharge to either the Connecticut River or Dividend Brook. For this reason, the significance of any potential impact this groundwater may have on these adjoining surface waters will be further evaluated.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

__x__ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

As noted above, a comparison of relevant/significant groundwater data to generic P&W screening levels indicated exceedances in groundwater collected from locations RH-SB-35, RH-MW-07S, RH-MW-11D, RH-MW-16S for one or more of the following constituents: arsenic, chromium, copper, lead, mercury, zinc, and carbon disulfide. As noted above, groundwater from RH-MW-17S is not considered to be representative of groundwater that discharges to surface water at the site.

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 at those locations representative of groundwater with the potential to discharge to surface water (RH-SB-35, RH-MW-07S, RH-MW-11D, RH-MW-16S). Therefore, the discharge of groundwater containing arsenic, chromium, copper, lead, mercury, and zinc at the detected concentrations to surface water is determined to be insignificant with respect to direct human exposure.

Of the compounds detected in groundwater at concentrations above the generic P&W screening levels, arsenic and mercury are considered potentially bioaccumulative compounds. Arsenic has been detected in 17 of 62 (27 percent) groundwater samples collected at the site. P&W generic groundwater screening levels for arsenic were exceeded in 10 of 62 (16 percent) groundwater samples collected at the site. Mercury has been detected in 5 of 72 (7 percent) groundwater samples collected at the site. P&W generic groundwater screening levels for mercury were exceeded in 1 of 72 (1 percent) groundwater samples collected from the site. Due to the infrequent detection of these compounds in groundwater at the site, potential bioaccumulative affects are not considered relevant in the evaluation of the data.

Furthermore, although arsenic can potentially bioaccumulate in fish tissue, a screening criteria of 10 times the arsenic MCL of 50 µg/L (using a default DAF of 10) was used to evaluate potential risks *via* groundwater discharge to surface water. This approach is appropriate because the bioaccumulative potential for arsenic is limited compared to other compounds, such as PCBs. The bioaccumulation factor (BCF), which relates aqueous concentrations with fish tissue concentrations, for arsenic is on the order of 1

L/kg (Stephan, 1993; U.S. EPA, 1998)[1,2] compared to BCFs for PCBs (Aroclor 1016, 1248, 1254, and 1260) ranging from 26,000 to 660,000 L/kg in aquatic specifies (fish, shrimp, oysters) (ATSDR, 1998).[3] Given the low bioaccumulative potential for arsenic, human health risks as a result of exposure to arsenic *via* the fish ingestion is not expected to be significant and 10 times the MCL is expected to be protective of human health for all pathways, including fish ingestion.

Additionally, Dividend Brook is a small stream that is not likely to contain fish that would be attractive (i.e., of adequate size and appropriate specie) to humans for ingestion. Furthermore, general fish advisories are in-place in Connecticut restricting ingestion of fish in fresh water bodies due to the presence of elevated levels of "background" mercury. This further reduces the likelihood of fish ingestion. For these reasons, the low concentrations of arsenic and mercury present in groundwater, coupled with the infrequent detection of these compounds in groundwater at the site support the determination that exposure to these compounds at the detected concentrations is insignificant with respect to potential human health risks associated with ingestion of fish obtained from Dividend Brook.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

---

1 U.S. Environmental Protection Agency (USEPA). 1998. Region 6 Interim Strategy: Arsenic Freshwater Human Health Criterion for Fish Consumption. Last Update on 02/04/98.

2 Stephan, C.E. 1993. Draft: Derivation of Proposed Human Health and Wildlife Bioaccumulation Factors for the Great Lakes Initiative. Duluth, MN. U.S Environmental Protection Agency, Office of Research and Development.

3 Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological Profile for Polychlorinated Biphenyls. Draft. U.S. Department of Human & Health Services.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_____ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

__x__ If no - enter "NO"* status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Exceedances of P&W generic screening criteria were noted in groundwater collected from locations RH-SB-35, RH-MW-07S, RH-MW-11D, RH-MW-16S, RH-MW-17S for one or more of the following constituents: arsenic, chromium, copper, lead, mercury, zinc, and carbon disulfide. However, as noted in Question 5 above, the generic P&W screening criteria were based on readily available published criteria that are protective of both ecological and human receptors. The evaluation presented in Question 5 above is appropriate in assessing the significance of human exposure to a surface water in consideration of the effects of groundwater discharges to the surface water. A comparison of the maximum concentration of arsenic, chromium, copper, lead, mercury and zinc detected in any groundwater sample collected from the site indicates these concentrations to be well below the MCLs multiplied by a dilution attenuation factor of 10. Based on this comparison, it is determined that the concentrations of arsenic, chromium, copper, lead, mercury, and zinc observed in groundwater from any location at the site represent an insignificant risk with respect to human exposure via surface water ingestion.

With regard to carbon disulfide detected in groundwater monitoring well RH-MW-17S, it is concluded that the presence of this compound is coincident with an area of perched groundwater beneath an existing facility structure that is not in direct communication with the underlying aquifer. As the perched groundwater does not impact the underlying aquifer and geologic, hydrogeologic and groundwater analytical data are available to support this conclusion, the groundwater is not representative of groundwater which has the potential to impact surface water.

*The performance of groundwater monitoring at the P&W Rocky Hill facility is not warranted, as even the maximum concentrations of contaminants detected in groundwater at the site do not represent a risk to surface water. Consequently, even if the highest levels of groundwater contamination detected at the site were to migrate to surface water, no adverse impacts would result. It is concluded that migration of contaminated groundwater is under control and Question 8 has been answered accordingly to document this conclusion.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__x__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Pratt & Whitney Rocky Hill Facility, EPA ID #CTD000844407, located at 60 Belamose Avenue, Rocky Hill, Connecticut. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

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

Completed by (signature) E W Date 9-11-2000
(print) Ernest Waterman
(title) Geologist

Supervisor (signature) [signature] Date 9/11/00
(print) Matthew R. Hagglund
(title) Section Chief
(EPA Region or State) EPA-NE

Locations where References may be found:

_____
_____
_____

Contact telephone and e-mail numbers

(name) _____
(phone #) _____
(e-mail) _____

LIST OF ATTACHMENTS

Attachment No. 1 Copies of Applicable Sections, *Conceptual Site Models and Screening Levels For Pratt & Whitney's VCAP Connecticut Facilities*, Gradient Corporation, December 19, 1997, revised September 18, 1998, and September 15, 1999

Attachment No. 2 Site Plan

Attachment No. 3 Summary of Groundwater Analytical Data and Constituents Detected in Groundwater, December 1999 Deep Soil Boring Installation Report, Generalized Geologic Cross Sections, and Ranney Well Results

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Attachment No. 1

Copies of Applicable Sections
Conceptual Site Models and Screening Levels
For
Pratt & Whitney's VCAP Connecticut Facilities
Gradient Corporation, December 19, 1997,
revised September 18, 1998, and September 15, 1999

8 Rocky Hill Belamose Avenue Facility

A facility-specific CSM for the Rocky Hill Belamose Avenue Facility is developed in this chapter based on the activities undertaken at the facility. The generic P&W screening levels developed in Chapter 3 are evaluated for their applicability to facility-specific exposure conditions.

8.1 Introduction

The Rocky Hill Belamose Avenue Facility consists of a main factory building, a separate power house, a wastewater treatment system, and several additional structures (*e.g.*, flammable material and hazardous waste storage areas) on 51.5 acres of land (Pratt & Whitney/LEA, 1996). These structures are all in the northern portion of the facility which is completely enclosed by a dike (Figure 8-1). The southern portion of the facility is a wooded area that abuts the Connecticut River and contains the former American Enka landfill. Except for a well tower near the river, there are no current uses of the wooded portion of the facility. The northern portion of the facility is used for manufacturing jet engine components. The future use of the Rocky Hill property is expected to remain industrial.

The Rocky Hill facility is situated between Belamose Avenue to the west and the Connecticut River to the east (Figure 8-1). Surrounding land use is industrial and includes the Crown Petroleum Corporation Tank Farm to the north.

On August 29, 1997, Gradient conducted a facility visit and interviewed Pratt & Whitney employees to understand land use and activities at the Rocky Hill facility. We spoke with the Facilities Engineer and the Plant Manager. The visit and interviews revealed that the Rocky Hill facility is similar to other Pratt & Whitney manufacturing plants described by the generic CSM.

The unique characteristics of the Rocky Hill facility are:

- Dividend Brook discharges into the Connecticut River at the southeast corner of the property (Figure 8-1). Surface water and runoff from on-site paved areas most likely flow toward Dividend Brook.
- Groundwater at the facility flows to the south-southeast toward the confluence of the Connecticut River and Dividend Brook.
- Non-contact cooling water, in a closed loop system, comes from a Ranney-type collector well, near the Connecticut River.
- The only basement area is a locked tunnel near the former electrochemical machining area that was taken out of service in 1990. There are no groundwater seeps or standing water in the tunnel.
- Landscape maintenance is done less frequently at Rocky Hill than at other P&W facilities.
- There are no recreational activities at Rocky Hill. Many employees eat lunch off-site because the cafeteria has been closed. There are a few picnic tables on paved areas between buildings which may be used for lunch and other breaks.

8.2 Facility-Specific CSM and Screening Levels

The generic P&W CSM is modified, as appropriate, to: 1) delete any exposure scenarios or exposure pathways considered not to be "complete" at the Rocky Hill Belamose Avenue facility, and 2) add exposure scenarios (*i.e.*, receptors, pathways, and media) not included in the generic P&W CSM, if needed. Exposure conditions at the Rocky Hill Belamose Avenue facility are also evaluated against exposure conditions used in the development of generic P&W screening levels to determine if any modifications to these screening levels are required to reflect unique facility-specific conditions.

Overall, potential exposure scenarios and exposure conditions at the Rocky Hill Belamose Avenue facility are similar to exposure scenarios and conditions presented in the generic P&W CSM and the generic P&W screening levels. Since the non-contact cooling water obtained using the Ranney well could potentially be affected by groundwater leaving the site, exposures to this water are included in the facility-specific CSM.

Figure 8-2 presents the potential receptors at the Rocky Hill facility and the complete exposure pathways for these receptors. Potential on-site receptors include:

- Excavating Laborers -- Excavation is done at most once or twice per year to relocate machinery, and the typical duration for this work is 2 days; therefore, this exposure pathway is not significant at this facility. Furthermore, since DPR is used to control exposures during subsurface excavations, no screening is required (see Section 3.0).

- Maintenance Workers -- Exposure scenario same as in generic P&W CSM, although, subsurface maintenance activities are undertaken infrequently at this facility. DPR is used to control all exposures, except dermal contact with groundwater while repairing cooling water lines and indoor air exposure. Screening levels proposed in Section 3.0 will be used to address these exposures.

- Groundskeepers -- Unpaved areas are not maintained. P&W personnel mow grassy areas once during the summer. However, in order to be conservative, no modifications to the generic P&W screening levels are proposed.

- Indoor Workers -- Exposure scenario same as in generic P&W CSM. No modifications to generic P&W screening levels proposed. Since the Ranney well water is only used for non-contact cooling, Indoor Workers do not come in dermal contact with this water and indoor air quality is also not likely to be affected by this water.

- Samplers -- Exposure scenario same as in generic P&W CSM. No modifications to generic P&W screening levels proposed. Since the Ranney well water is used as a source of process water at the facility, water quality data for this source will be screened against MCLs to evaluate whether surface water/sediment-related risks need to be further assessed at outfalls that only convey process water.

- Trespassers -- Exposure scenario same as in generic P&W CSM. No modifications to generic P&W screening levels proposed.

- On-Site Recreators -- Not applicable. Employees do not recreate at the facility.

Off-site receptors and screening levels considered for the Rocky Hill facility are:

- Off-Site Utility Repair Workers -- Not applicable because the direction of groundwater flow is toward the Connecticut River, which abuts the facility boundary. Therefore, there are no off-site areas between the facility and the river.

- Off-Site Recreators -- Exposure scenario same as in generic P&W CSM. No modifications to generic P&W screening levels proposed.

- Off-Site Residents -- Not applicable because groundwater flow is toward the Connecticut River, which abuts the facility boundary. In addition, land use around the facility is not residential and is zoned for "manufacturing" or "office industry."

Table 8-1 summarizes the facility-specific CSM and compares the potential facility-specific receptors to the generic CSM receptors. Primary consideration is given to whether the exposure conditions described by the generic CSM are significantly different from facility-specific exposure conditions. Exposure Areas (EAs) for each of the facility receptors are also identified (Figure 8-3).

Table 8-2 presents a summary of the exposure media and pathways for each receptor and points the reader to other tables which contain the screening levels for these media and pathways.

Table 8-1
Summary of Facility-Specific Receptors and Comparison to Generic P&W Receptors
Pratt & Whitney, Rocky Hill Belamose Avenue Facility, CT

Potential Receptors	Exposure assumptions significantly different from generic CSM?	Facility-Specific Receptor Characteristics	Exposure Area
Excavating Laborers	No screening proposed since exposures are controlled by DPR.		
Maintenance Workers	Yes. DPR controls all exposures, except groundwater exposure during cooling water line repair and indoor air exposure. Screening proposed to address these exposures.	None	Not defined*
Groundskeepers	Yes	infrequent, EF = 5 days/year**	Figure 8-3
Indoor Workers	No	None	Figure 8-3
Samplers	No	None	Figure 8-3
Trespassers	No	None	Figure 8-3
On-Site Recreators	Yes, no exposure	Not applicable	Not applicable
Off-Site Utility Repair Workers	Yes, no exposure	Not applicable	Not applicable
Off-Site Recreators	No	None	Not defined*
Off-Site Residents	Yes, no exposure	Not applicable	Not applicable

Notes:

NSP: No Screening Proposed

** Exposure areas are not defined, however screening is proposed as indicated in Table 8-2.*

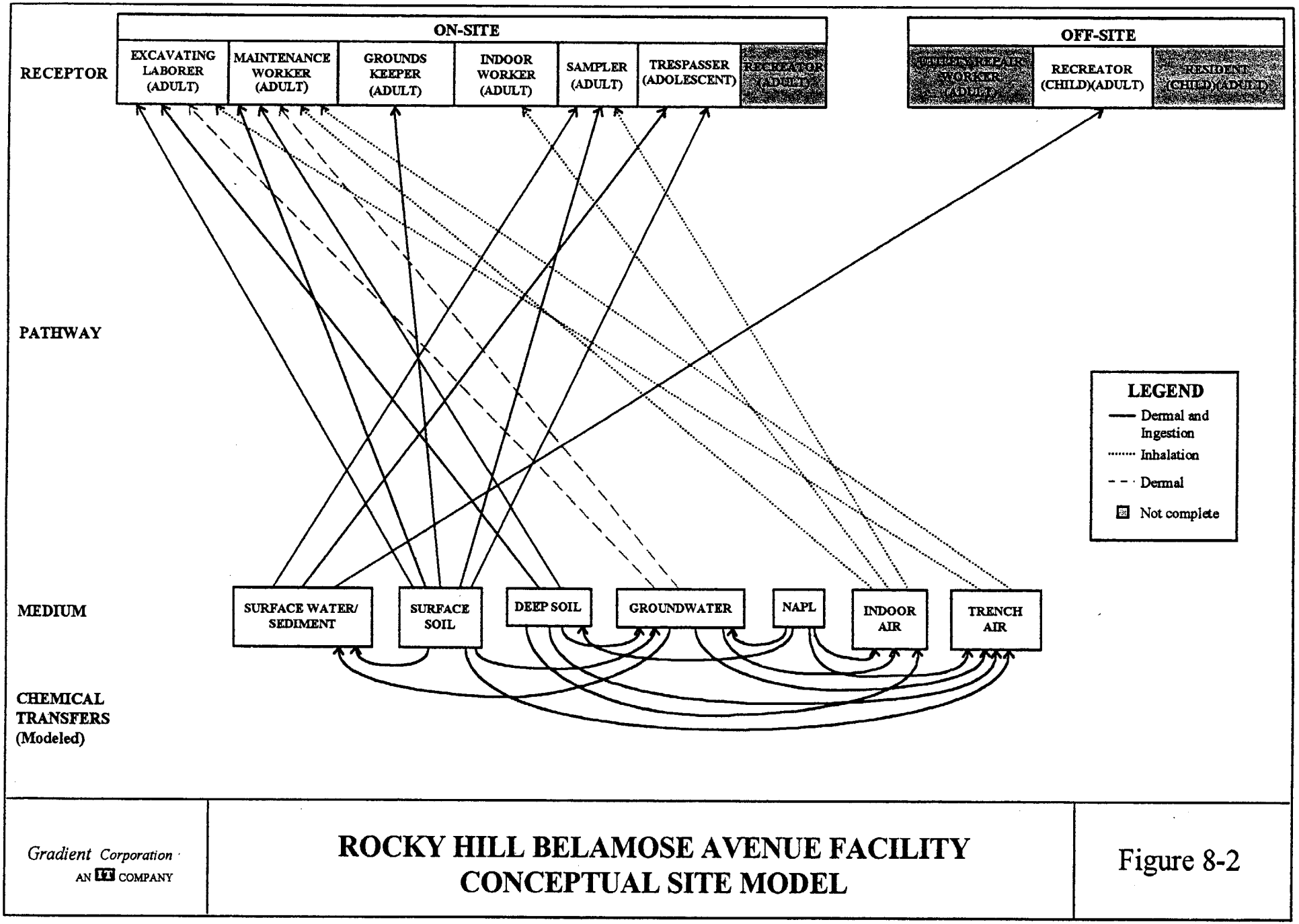
***Although the exposure frequency (EF) is less than the EF used in deriving the generic screening levels, the generic screening levels will be used in the Qualitative Risk Assessment to provide a conservative screening.*

Table 8-2
Summary of Screening Levels and Proposed Screening Approach
Pratt & Whitney, Rocky Hill Belamose Avenue Facility, CT

Exposure Media	Soil	Trench Air	Indoor Air	Surface Water	Sediment	Groundwater
Exposure Pathways	**Ingestion and Dermal**	**Inhalation**	**Inhalation**	**Ingestion and Dermal**	**Ingestion and Dermal**	**Dermal**
Maintenance Workers	DPR	DPR	Table 3-4	N/A	N/A	Table 3-8*
Groundskeepers	Table 3-10	N/A	N/A	N/A	N/A	N/A
Indoor Workers	N/A	N/A	Table 3-4	N/A	N/A	N/A
Samplers	Table 3-10	N/A	Table 3-4	Tables 3-6, 3-7, MCLs**	Table 3-10**	MCLs**
Trespassers	Table 3-10	NA	N/A	Table 3-6, 3-7	Table 3-10	N/A
Off-Site Recreators	N/A	N/A	N/A	Table 3-6, 3-7	Table 3-10	N/A
Proposed Screening Approach	Compare max by EA to P&W soil screening level	NSP	Compare measured indoor air concentrations to on-site indoor air screening levels.	Compare surface water, groundwater concentrations to CT criteria	Compare max by EA to P&W soil screening level	Compare cooling water concentrations to P&W groundwater screening levels

Notes:

N/A: Indicates that receptor is not exposed to medium/pathway.
NSP: No Screening Proposed.
**: Screening will evaluate dermal contact with groundwater while repairing cooling water lines.*
***: Ranney well water quality will be screened against MCLs to evaluate whether surface water/sediment-related risks need to be further evaluated at process water outfalls.*



Gradient Corporation
AN EA COMPANY

ROCKY HILL BELAMOSE AVENUE FACILITY
CONCEPTUAL SITE MODEL

Figure 8-2

772604
FO0697K.ppt

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Attachment No. 2

Site Plan
Environmental Indicator Determination
For
Pratt & Whitney Rocky Hill Facility

US EPA New England
RCRA Document Management System (RDMS)
Image Target Sheet

RDMS Document ID# 710

Facility Name: Pratt & Whitney (Rocky Hill)

Phase Classification: R-13

Document Title: Environmental Indicator (EI) Determination, Migration of Contaminated Groundwater Under Control (CA 750 YE) - Pratt & Whitney Rocky Hill

Date of Document: 09-11-2000

Document Type: EI Determination

Purpose of Target Sheet:

[x] Oversized **[ ] Privileged**

[ ] Page(s) Missing **[ ] Other (Please Provide Purpose Below)**

_____
_____
_____
_____

Comments:
Determination of Environmental Indicators - Migration of Contaminated Groundwater Under Control

*** Please Contact the EPA New England RCRA Records Center to View This Document ***