UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

September 25, 2001

Richard E. Post
Senior Environmental Engineer
UTC Corp. - Sikorsky Aircraft
1 Financial Plaza
Hartford, CT 06101

Subject: Sikorsky Aircraft Corporation, Stratford, Connecticut. Technical Review of Environmental Indicators RCRIS Code CA750.

Dear Mr. Post:

EPA has conducted a technical review of Sikorsky Aircraft Corporation's (Sikorsky) Corrective Action Environmental Indicator (EI) RCRIS Code CA750 Report, Migration of Contaminated Groundwater Under Control (CA750), for its Stratford, Connecticut facility submitted on August 22, 2001. Our review of this document considered previous site assessment and hydrogeologic documents prepared in support of RCRA corrective action at this property. Our review of the CA750 and relevant characterization data indicate that the groundwater contaminant plumes at the Sikorsky Stratford facility appear stabilized at this time, and that "YE" is the appropriate CA750 RCRIS status code for this facility.

The CA750 was reviewed to determine whether migration of contaminated groundwater (i.e., groundwater with contaminant concentrations in excess of appropriate risk-based levels) is currently under control and whether monitoring will be conducted to confirm that migration of contaminated groundwater remains under control. For ease of review, the information in this letter follows the format of the information provided in Sikorsky's CA750.

In response to Question No. 2, Sikorsky indicates that groundwater is contaminated above appropriately protective risk-based levels. Specifically, Sikorsky identifies groundwater contamination above the Connecticut Department of Environmental Protection (CTDEP) Surface Water Protection Criteria (SWPC) and the CTDEP Industrial/Commercial Volatization Criteria (I/C VC). For those constituents for which no SWPC is available, Sikorsky calculated an alternative SWPC using an approach identical to that used by the CTDEP to develop the SWPC. A comparison of contaminant concentrations to drinking water standards was not conducted because groundwater beneath the facility is classified by the CTDEP as GB (not suitable for drinking water). The organic constituents identified as exceeding their respective SWPC include tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene (1,2-DCE), xylene, and phenanthrene. In addition, inorganic constituents identified as exceeding their respective SWPC include aluminum, arsenic, barium, chromium, iron manganese, tin, and zinc. Vinyl chloride was

the only constituent identified as exceeding the I/C VC. Sikorsky includes attached tables in the CA750 with appropriate listings of measured concentrations of these and other relevant contaminants. These tables also include the identification of maximum contaminant levels detected in groundwater at the site.

In response to Question No. 3, Sikorsky indicates that the migration of contaminated groundwater has stabilized. In support of this contention, Sikorsky explains that groundwater beneath the site discharges into both the Housatonic River and its tributary, the Far Mill River. Given groundwater travel times and likely release scenarios, Sikorsky concludes that the contaminant plumes from all release areas have reached either the Housatonic or Far Mill River. Based on these factors, the conclusion that all contaminant plumes at the Sikorsky facility have stabilized appears appropriate.

In response to Question No. 4, Sikorsky appropriately responds that contaminated groundwater discharges into a surface water body. As indicated above, contaminated groundwater from the site discharges into both the Housatonic and Far Mill Rivers.

In response to Question No. 5, Sikorsky correctly indicates that the discharge of contaminated groundwater to surface water is significant. Sikorsky explains that groundwater contamination at the Stratford facility includes both a southern and a northern plume. The southern plume discharges into the Housatonic River. The majority of the northern plume also discharges into the Housatonic River; however a limited portion of the plume, in the shallow portion of the aquifer, discharges into the Far Mill River.

Sikorsky indicates that in the southern plume, single groundwater measurements for aluminum and barium exceed screening criteria by more than a factor of ten. Specifically, these individual aluminum and barium measurements exceed their criteria by a factor of 13.9 and 11.4, respectively. However, it should be noted that no other measurements of aluminum or barium in groundwater in the southern portion of the plume exceed their criteria by more than a factor of 10. Sikorsky also states that a number of other constituents in upgradient portions of the southern plume exceed their criteria by a factor greater than 10. These constituents include PCE, TCE, and chromium (both total and hexavalent). Despite the elevated contaminant concentrations, Sikorsky demonstrates, using the extensive investigations and monitoring conducted to date, that the southern groundwater plume appears stable and concentrations of these constituents in groundwater at the point of discharge into the Housatonic River are not likely to increase in the near future.

In the northern plume, Sikorsky identifies seven constituents with measured maximum concentrations that exceed screening criteria by a factor of more than ten. These constituents are: arsenic (factor of 75.8), iron (factor of 34), manganese (factor of 20.1), tin (factor of 79.4), zinc (factor of 27.9), phenanthrene (factor of 64.9), and DCE (factor of 24.5). In addition, Sikorsky identifies one constituent (barium), that exceeds its criterion by more than a factor of 100. Sikorsky notes, however, that the criterion for barium was only exceeded by a factor of 100 at a

single location and sampling event. Otherwise, measurements of groundwater quality in the northern plume indicate that barium has exceeded its criterion by a factor of 10 only twice. Based on historical data and trend analyses, Sikorsky demonstrates that the concentrations of contaminants exceeding their criteria in the northern plume are not likely to increase significantly in the near future.

Based on the response to Question No. 5, Sikorsky indicates in response to Question No. 6, that the discharge of contaminated groundwater is currently acceptable. Sikorsky cites a number of factors supporting this position. Of particular note is the dilution that should occur to any contaminated groundwater discharging into the Housatonic River. Based on estimates of the mean annual flow of the Housatonic River, and conservative estimates of annual groundwater discharges, the flow of the Housatonic River should dilute groundwater discharging into the river by a factor of at least 50,000. In addition, the surface water in the Far Mill River and in the wetlands adjacent to both the Housatonic and Far Mill Rivers are subject to extensive flushing by daily tidal variations of as much as seven feet. Furthermore, both these rivers are brackish and are used primarily for recreational purposes, including boating and fishing. Due to their brackish nature, these rivers are not considered sources of drinking water.

Sikorsky also notes that there are many industrial and municipal outfalls to the river located upstream of the facility, and that concentrations of several contaminants in surface water upstream of the facility have been shown to exceed surface water criteria. Sikorsky cites surface water quality measurements made in the two rivers adjacent to the facility. While some of these measurements indicated exceedences over background surface water quality and surface water quality criteria, Sikorsky attributes many of these exceedences to excess turbidity in unfiltered samples. Sikorsky cites recent analytical measurements of filtered surface water samples collected from within the Far Mill River and a nearby tidal channel, which indicated exceedences over background and surface water criteria for only barium and zinc. Specifically, these measurements indicated that barium and zinc exceeded surface water quality standards by factors of 2 and 5, respectively.

Although the filtered samples indicate less significant impact to the Rivers, Sikorsky's surface water quality measurements do indicate a potential threat to ecological receptors. These potential impacts, however, are not viewed as acute but consider chronic, and are currently under study as part of Sikorsky's ongoing corrective action activities. Moreover, other transport mechanisms, most notably sediment transport during stormwater runoff, may be primarily responsible for the limited estuarine contamination observed adjacent to the Sikorsky facility. Furthermore, it appears that the current discharge of contaminants into the Far Mill River via shallow groundwater flow is limited and not likely a significant source of the contamination. Based on these considerations, Sikorsky's conclusion that the discharge of contaminated groundwater into the Housatonic and Far Mill Rivers is currently acceptable appears appropriate.

In response to Question No. 7, Sikorsky indicates that the ongoing long-term monitoring (LTM) program will be used to verify that contaminated groundwater has remained within the

existing area of contaminated groundwater and that no unacceptable impacts on surface water develop in response to discharges of groundwater. A summary of the LTM program is provided in the CA750. Review of the LTM program indicates that it is adequate for these purposes.

Finally, Sikorsky has responded "YE" to Question No. 8, indicating that the migration of groundwater is under control. Our review of the CA750 and relevant characterization data indicate that the groundwater contaminant plumes at the Sikorsky Stratford facility appear stabilized and that "YE" is the appropriate CA750 RCRIS status code for this facility. However, if conditions change at the site, the status code may need to be reevaluated.

If you have any questions, please feel free to contact me at (617) 918-1360.

Sincerely,

Robert A. O'Meara
RCRA Facility Manager

ENVIRONMENTAL INDICATOR FORM CA750

CORRECTIVE ACTION PROGRAM
STRATFORD FACILITY

Prepared for:

SIKORSKY AIRCRAFT CORPORATION
6900 MAIN STREET
STRATFORD, CT 06615

Prepared by:

HARDING ESE
A MACTEC Company
511 CONGRESS STREET
PORTLAND, MAINE 04101

AUGUST 2001

Harding ESE
A MACTEC COMPANY

Harding ESE, Inc.
511 Congress Street
P.O. Box 7050
Portland, ME 04112-7050
Telephone: 207/775-5401
Fax: 207/772-4762
Home Page: www.mactec.com

August 22, 2001

Mr. Robert O'Meara
USEPA, New England Region (HPR-CAN1)
John F. Kennedy Federal Building
Boston, MA 02203-2211

Subject: **Environmental Indicator Form CA 750 Revision**
Stratford RCRA Corrective Action Program (Docket No. RCRA-I-90-1011)

Dear Mr. O'Meara:

On behalf of United Technologies Corporation (UTC), Harding ESE, Inc. (Harding) submits the enclosed revised RCRA Environmental Indicator Form CA 750 pertaining to the Sikorsky Aircraft Corporation facility in Stratford, Connecticut. This form, submitted to you in November of last year, has been revised to reflect our current understanding of site hydrogeological conditions based on recently collected Phase II Remedial Facility Investigation (RFI) data and to address review comments provided by the USEPA in a letter dated June 14, 2001..

Please contact either Dick Post of UTC (860-728-6521) or me (207-828-3523) if you have any questions or require further information.

Sincerely,

HARDING ESE
A MACTEC Company

John L. Baron

John L. Baron, C.H.M.M.
Associate Project Manager

Cc w/enclos.: R. Post, UTC
W. Schew, ESI
G. Shteynberg, CTDEP
C. Crossley, BAH
R. Kuhlthau, ASE

Cc w/o enclos.: R. Araujo, SAC
M. DiNoia, CTDEP
C. Morrissey, SAC

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Sikorsky Aircraft Corporation
Facility Address: 6900 Main Street, Stratford, CT 06614
Facility EPA ID #: ~~RCRA-I-90-1011~~ CTD001449784 MRH 9/28/01

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.
Completion of this form drew upon information presented to the agency in interim deliverables of Public Health and Ecological Risk Evaluation (PHERE), RCRA Facility Investigation (RFI) Phases I and II (including the Revised Phase I Report dated December 1998) and the draft Phase II RFI Report dated August 2001), Technical Memoranda, monthly progress reports, and recent status meetings with USEPA (March and September 2000).

_____ If no - re-evaluate existing data, or

_____ if data are not available, skip to #8 and enter"IN" (more information needed) status code.

[Acronyms used in the responses on this form are described at the end of the form.]

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).

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

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 physiographic and cultural setting of the facility is presented in the following paragraphs as presented in the Revised Phase I RFI Report by Parsons Engineering Sciences and in the draft Phase II RFI (PIIRFI) Report by Harding ESE.

- The Sikorsky Aircraft Corporation Stratford, CT facility is located (see draft PIIRFI Report Figures 2.1-1 and 4.2-1 in Appendix A) at the confluence of the Far Mill River (flow rate of 3.2×10^7 gallons per day (gpd) average) and the Housatonic River (2.2×10^9 gpd average, 1.9×10^8 gpd 7-day annual minimum flow with a 10-year recurrence interval – 7Q10). The rivers adjacent to the facility are classified by the CT Department of Environmental Protection (CTDEP) as Coastal Marine Surface Water SC/SB, not suitable as a drinking water supply (Housatonic River) and B (Far Mill River). Both rivers are brackish and subject to tidal variation as great as 7 feet (ft). These rivers drain urban and industrial areas upgradient of the facility and the presence of hazardous constituents in upgradient water of these rivers can be expected.

- To the west, and upgradient for groundwater that flows under the facility, there is a shopping center and two gasoline stations, one of which has been documented to have released gasoline to the groundwater and the Sikorsky facility. Sikorsky's own groundwater data confirms the presence of petroleum-based hazardous constituents in groundwater entering the facility from the west.

- Manufacturing operations, begun in the mid-fifties, resulted in the release of chlorinated solvents at several ACs. These solvents included tetrachloroethene (perchloroethene or PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (TCA). These solvents degrade in the environment yielding less chlorinated compounds. For example, PCE degrades to TCE, 1,2-dichloroethene (DCE), vinyl chloride, and ethene and TCA degrades to 1,1-dichloroethane and ethane. In the southern portion of the facility, hexavalent chromium was also accidentally released to the subsurface. Chromium precipitates from solution under reducing conditions created by biotic degradation of organic material such as the released solvents.

******continued next page******

Footnote:

[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).

- Groundwater under the facility and downgradient to the two rivers is classified by the CTDEP as GB, not suitable for drinking water supplies. There are no domestic or municipal water supply wells located on the Sikorsky facility or between the facility and the Housatonic River or the Far Mill River. There are no chemical-specific groundwater protection criteria for CT GB groundwater, but under the Connecticut Remediation Standard Regulations (RSRs) program there are criteria for volatilization (e.g., Industrial/Commercial Volatilization Criteria – I/C VC) and discharge to surface water (Surface Water Protection Criteria - SWPC) for constituents in groundwater, including groundwater classified as GB.

- An estimated 4.5×10^4 gpd discharges to the rivers based on 3400 ft long river bank, 70 ft average aquifer thickness, hydraulic conductivity of 25 feet per day (ft/d) and a maximum hydraulic gradient of 1×10^{-3} feet per foot (ft/ft). This groundwater discharge from the facility is 0.002 percent of the average Housatonic River flow and 0.024 percent of the 7Q10 flow.

- Evaluation of stabilization is based on extensive site characterization data presented in the Revised Phase I RFI Report (Parsons Engineering Sciences, Inc., Dec 1998) and recently completed direct-push and monitoring well installation, field screening, and off-site laboratory analyses, long-term monitoring event observations (including laboratory analysis of groundwater and surface water), as well as information presented in monthly progress reports since August 1998. This work is summarized in the recently completed draft Phase II RCRA Facility Investigation (PIIRFI) Report (August 2001).

- Investigations identified hazardous constituents in groundwater underlying five (5) areas of concern (ACs) in the southern portion of the facility (ACs 6, 7, 8, 9, and 10) and underlying seven (7) ACs in the northern portion of the facility (ACs 1, 2, 3, 4, 5, 11, and 12). These ACs are depicted in draft PIIRFI Report Figure 4.2-1 presented in Appendix A of this form.

- Maps showing groundwater and surface water sample locations are included in Appendix A of this form.

Subsurface geologic conditions were interpreted from these investigations. Draft PIIRFI Report Figures 4.2-4, 5, and 14 presented in Appendix A depict these interpreted geologic conditions. Based on the investigations, perched/shallow groundwater in the northern portion of the facility (e.g., ACs 1, 2, 3, 4, 5, 11, and 12) is interpreted to discharge in a northerly direction into the Far Mill River and its adjacent wetlands. Deeper groundwater in this northern portion is interpreted to discharge to the northeast toward the Housatonic River. In the southern portion of the facility (e.g., ACs-6, 7, 8, and 9), all groundwater is interpreted to flow easterly into the Housatonic River. This interpreted flow regime of the groundwater is supported by and is consistent with hydrogeologic conditions (e.g., geologic media and water level measurements). Draft PIIRFI Report Figures 4.2-17, 18, and 19 depict the interpreted groundwater flow regime and are included as Appendix A. The geological setting and topography of the east bank of the Housatonic River valley (i.e., bedrock outcrops on steep slopes of the east bank) is interpreted to present a hydraulic barrier to migration of constituents in groundwater from the facility eastward of the river. Profiles of geologic media comprising the aquifer are also provided in Appendix A. The bulk of groundwater flowing under the Stratford facility and discharging to the Housatonic and Far Mill Rivers is interpreted to be flowing through the fine to coarse sand stratum.

Screening criteria were developed for constituents detected in groundwater. CT RSRs were used only for screening purposes for the preparation of this Environmental Indicator (EI) Form CA750, while a comprehensive human and ecological risk assessment is underway. The criteria used to screen conditions were developed as follows.

- RSR criteria that are comparable to conditions at the facility are the I/C VC and SWPC developed for groundwater prior to discharge to surface water. To develop the SWPC, CTDEP identified surface water quality criteria and multiplied the criteria by a factor of ten (10) to be compared directly to

groundwater quality. Since SWPCs are not available for all the constituents detected in facility groundwater, supplemental criteria were sought and adjusted accordingly by the factor of ten to conduct a comprehensive screening of facility groundwater.

- The draft PIIRFI Report (August, 2001) identified surface water criteria to screen conditions documented in facility surface water and groundwater. These surface water criteria were identified by Environmental Standards, Inc. (ESI) as part of its PHERE for the Stratford facility. These criteria were used in this CA750 Form to supplement the RSR SWPC criteria to screen potential effects to surface water receptors. Due to the tidal, brackish condition of both the Far Mill River and the Housatonic River, supplemental criteria were selected to protect ecological receptors or human health based on the ingestion of aquatic organisms. A comprehensive list of criteria used to screen groundwater is presented in Table 1.

- Screening groundwater using the RSR I/C VC identified one constituent that was present in groundwater up to 15 feet of the below ground surface at concentrations that exceeded the criterion (Table 2). I/C VC are not applicable to groundwater greater than 15 feet below ground surface. Vinyl chloride was the only constituent detected above I/C VC at the Stratford facility. Locations that exceeded criteria included: GW0046 and GW0048 (both located more than 350 ft east of the Main Manufacturing Building and beyond the paved surfaces); and MW0060S, MW0065S, and MW0066S (each located in unpaved areas of AC-1). These locations are not beneath buildings or other structures.

- Screening groundwater from all sampling locations at the Sikorsky facility using the RSR SWPC and supplemental criteria identified on Table 1 indicated several constituents exceeded the criteria. A complete listing of the most recent sample results from all locations that exceeded these screening criteria are provided in Appendix B of this form. A listing of those results that exceed the criteria by a factor of 10 or more is provided in Table 3 along with the location, sample date, and depth below ground surface. These constituents included Al, As, Ba, Cr, Cr^{+6}, Fe, Mn, Sn, Zn, phenanthrene, 1,2-dichloroethene,total (DCE), PCE, TCE, and total xylene. To accurately assess whether surface waters are threatened, the criteria are applied to groundwater immediately prior to discharge to the receiving surface, in this case the Far Mill River and the Housatonic River.

- When southern plume groundwater from sampling locations closest to the Housatonic River is compared to the screening criteria (Table 4), the following constituents are noted to exceed the criteria by a factor of 10 or more: Al (maximum 13.9 times criterion) and Ba (maximum 11.4 times criterion).

- When northern plume groundwater from sampling locations closest to the Far Mill River is compared to the screening criteria (Table 5), the following constituents are noted to exceed the criteria by a factor of 10 or more: As (maximum 75.8 times criterion), Ba (maximum 365.8 times criterion), Fe (maximum 34 times criterion), Mn (maximum 20.1 times criterion), Sn (maximum 79.4 times criterion), Zn (maximum 27.9 times criterion), phenanthrene (maximum 64.9 times criterion), and DCE (maximum 24.5 times criterion). Other constituents that exceed the screening criteria by less than a factor of 10 include Al, PCE and total xylenes.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

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 groundwater flow rates of 0.08 to 0.3 ft/d, it takes an estimated 2 to 8 years to travel 1200 ft between the plant and the Housatonic River from AC-6, which is located near the center of the southern portion of the Main Manufacturing Building. Other ACs are located closer to the river, requiring less time to discharge to surface water. Plant operations began in 1955, about 45 years ago. CAP investigation and monitoring activities have been underway for about 10 years. Based on this historical operations information and groundwater flow conditions and rates, the plumes of constituents in groundwater (a northern plume associated with ACs-1,2,3,4,5,11, and 12 and a southern plume associated with ACs-6,7,8,9, and 10) are discharging to the two rivers, have stabilized in areal extent, and are not expected to get larger.

- Contaminated groundwater in the southern plume encompasses part of the general area from the Main Manufacturing Building eastward 1200 feet to the Housatonic River and from the flight field south 1700 feet along the river to the Route 15 bridge. Long-term monitoring wells MW0102B,D,M,S and MW0086D,S monitor the plume to the south and MW0091D,M,S and MW0047B,D,M,S monitor the plume on the north. PCE trend plots in MW0102M,S are shown on Figure 1 and in MW0047B,D,M on Figure 2. Review of Figure 1 indicates PCE fluctuates between 0.008 and 0.038 milligrams per liter (mg/L) in the shallow (S) well screen and between 0.002 and 0.034 mg/L in the mid-depth (M) well screen. The latest measurement posted (April 2000) suggests a sharp increase in concentration. However, review of measurements from November 2000 and March 2001 that have not yet been checked for adequacy of data transcription and quality control indicates the PCE dropped to 0.005 mg/L in November 2000 and rose to 0.017 mg/L in March 2001. These more recent results, pending completion of quality control checking, indicate the results continue to fluctuate, but they not dramatically increase.

Footnote:

[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.

The MW0047 well cluster monitors the northern portion of the southern plume. The PCE measurements for the MW0047D and M well screens are relatively stable. The concentrations depicted for the MW0047B well fluctuate between 0.006 and 0.11mg/L with the April result suggesting a possible concentration increase. Measurements from November 2000 (0.004 mg/L) and March 2001 (0.008 mg/L) that still need to be quality checked indicate the April 2000 result did not signal an increasing trend. In general, review of these plots indicates that the concentrations are relatively stable (i.e., the plume is not expanding vertically or areally). A direct-push investigation of subsurface conditions near the Housatonic River was completed in 2000 and was presented in the draft PIIRFI Report (August, 2001). Based on this investigation, the distribution of PCE in the southern plume as it discharges to the river is presented in plan view in draft PIIRFI Report Figure 6.6-5 (Appendix A).

The spatial distribution of PCE is typical of other important constituents in groundwater, though other constituents may not be as widely distributed as PCE. For example, the distribution of hexavalent chromium is focused more toward the southern portion of the plume. The vertical distribution of PCE is depicted in draft PIIRFI Report Figure 6.6-15 (Appendix A). This profile shows that PCE preferentially migrates through the sand stratum of the overburden aquifer and tends not to be found in the lower hydraulically conductive peat/organic silt layer. Vertical hydraulic gradients in the conductive strata are influenced by tidal variations, but over the long-term have not caused significant changes in vertical distribution of PCE. This areal and vertical stability of the plume is visually demonstrated in Figures 1 and 2 depicting long-term PCE trends at MW0102 and MW0047 clusters, respectively.

- The northern plume exists in the general area from AC-12 in the north 1000 feet south to AC-4 and northeastward toward the Far Mill River (for shallow/perched groundwater) and eastward under the flight field 2500 feet to the Housatonic River (for the deeper overburden flow regimes). Interpreted areal distribution of the northern TCE plume is depicted on draft PIIRFI Report Figure 6.1-18 (Appendix A). Long-term monitoring wells MW0061, MW0065, and MW0066 on the plume perimeter monitor the eastern and southern limit of the plume area. The vertical distribution of TCE, a constituent relatively widely distributed in the northern plume, is depicted in draft PIIRFI Report Figure 6.1-29 (Appendix A). This profile (A-A') shows the preference for constituent transport through the sand stratum of the overburden aquifer. Trend plots of TCE at MW0063 and MW0065 clusters (Figures 3 and 4, respectively) demonstrate the vertical and areal stability of the plume.

- Background wells MW0083S; MW0074B,S; MW0069B,D,S; MW0051B,S; MW0085B,S; and MW0044B monitor groundwater quality entering the facility property from the west upgradient of the northern plume. Samples from these wells typically do not contain the volatile constituents detected within the northern or southern plumes.

- No new recent sources of contamination have been identified at the facility to cause the observed constituent distribution to increase in the future.

- Current operational practices at the facility described in spill release contingency plans are designed to prevent the uncontrolled release of contaminants to the groundwater.

- There is an ongoing corrective measure program at AC-4 to remediate jet fuel contaminants in soil and groundwater (more than 8870 gallons of jet fuel have been recovered to date) from releases that occurred prior to 1987.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

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):

- Based on the hydrogeologic setting of the facility described above in response to Question 3, contaminated groundwater flowing under the facility discharges to the Housatonic River and perched groundwater at AC-1 discharges into the Far Mill River.

- The perched plumes from the northern portion of the facility (e.g., ACs-1, 2, 3, and 4) are interpreted to discharge into the tidal Far Mill River (and associated drainage channels) which in turn discharges to the tidal Housatonic River.

- The deeper plumes in the north and all of the southern portion plumes (e.g., emanating from AC-6 and from AC-7, 8, and 9) are interpreted to discharge directly to the Housatonic River, passing beneath a tidal wetland that lies between the river and the facility structures.

- This interpretation of the facility groundwater flow regime is supported by the observed geological conditions and water level measurements as depicted on draft PIIRFI Report figures of groundwater piezometric conditions (draft PIIRFI Report Figures 4.2-17, 18, and 19 in Appendix A).

- Representative depictions in Appendix A of the southern (draft PIIRFI Report Figure 6.6-5) and northern (draft PIIRFI Report Figure 6.1-18) plumes indicate constituents are detected next to and are interpreted to be discharging to the two rivers.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

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)?

_____ 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 judgement/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.

__X__ 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):

Screening of groundwater with the comprehensive set of criteria (see response to Question 2), done separately for the northern and southern portions of the facility, was performed to identify whether the groundwater is contaminated based on the maximum concentration of constituents at each of the screening locations.

Investigations of facility subsurface conditions have resulted in a series of monitoring wells and direct-push groundwater samples close to the two rivers. These locations were used to compare the concentrations to appropriate criteria to screen whether groundwater at the facility exceeds these criteria. The criteria for groundwater prior to discharge to surface water were identified in response to Question 2.

1. Contaminants above 10 times criteria.

- Screening of the most recent groundwater analysis results are presented in Table 4 for the southern plume and in Table 5 for the northern plume.

Footnote:

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

- In the southern plume discharge area (Table 4), there are only two constituents with maximum groundwater measurements that exceed screening criteria by a factor more than 10: Al (factor of 13.9) and Ba (factor of 11.4). Neither of these inorganic constituents are characteristic of the wastes released at the facility. These may be derived from geochemical changes in the aquifer caused by biotic degradation of wastes released at the facility. The maximum result for Al in upgradient AC-8 groundwater (see Table 3) is less than the screening criterion. Therefore, the current Al concentration (12.1 mg/L) in excess of the criterion (0.87 mg/L) can be expected to decrease in the future.

  The maximum concentration of Ba (0.433 mg/L) in groundwater discharging into the Housatonic River was observed downgradient of AC-7. Upgradient from the river, the maximum concentration of Ba in the vicinity of AC-7 was detected at 0.5 mg/L in MW0003S. This is 15 percent higher than detected at the Housatonic River. This difference is within typical analytical precision and is not interpreted to represent a potential for significant increased concentrations of Ba discharging to the river in the future.

  PCE concentrations in groundwater currently discharging to the river are considered not to be a significant threat to receptors (less than 10 times the screening criterion of 0.088 mg/L). The maximum concentration (0.53 mg/L) along the river was detected downgradient of AC-6 at MW0109M1. Upgradient of this location, PCE is found at concentrations ranging up to 40.288 mg/L at GW0034 in close proximity to the interpreted release area at the Anodize Room in AC-6. This concentration is indicative of the presence of DNAPL under the Anodize Room. As seen on draft PIIRFI Report Figure 6.6-5 (Appendix A), higher concentrations are found at several locations upgradient of MW0109M1. There has been more than ample time for the higher concentrations to migrate to the river (an estimated transport time of 8 years) since release of the solvent. Concentrations within the plume have remained relatively stable for several years as represented by PCE trend plots for MW0089 and MW0101 (see Figures 5 and 6, respectively). The distribution of concentrations shown on draft PIIRFI Report Figure 6.6-5 is evidence of the effectiveness of natural attenuative processes to moderate the migration of PCE to the river. These processes include biotic activity, along with hydrodynamic (e.g., tidal) dilution. Evidence of biotic activity includes measured concentrations of PCE degradation products, including DCE and ethene and indicators of anoxic conditions (elevated concentrations of Fe and Mn as shown in Table 4 and absence of dissolved oxygen and negative oxidation reduction conditions as provided in the draft PIIRFI Report August 2001).

  Chromium was a constituent released in the southern plume and detected below and downgradient of the Main Manufacturing Building at concentrations greater than the groundwater screening criterion of 0.11 mg/L. As shown on draft PIIRFI Report Figure 6.6-8 (Appendix A), Cr concentrations in groundwater prior to discharge to the Housatonic River are below the screening criterion. As a result of the reducing conditions within the southern plume (as illustrated by the high levels of Fe and Mn – Table 4), Cr concentrations decrease as groundwater flows from the release area towards the river. Concentrations have been relatively stable in the plume close to the release area (see trend plot of Cr depicted in Figures 5 and 6 for MW0089M and MW0101M2, respectively). There is no evidence that Cr will increase in the future to higher concentrations than are now observed in groundwater prior to its discharge to the Housatonic River.

  In summary, Al and Ba are the only constituents that exceed the screening criteria by a factor of more than 10 (factors of 13.9 and 11.4, respectively). There are no known releases of these constituents at the facility. Their presence in groundwater at the facility is attributed to geochemical reactions within the aquifer in response to conditions imposed by other releases (e.g., solvents and other degrading organic matter). A constituent known to have been released at the facility, chromium, was present in discharging groundwater, but at concentrations considered insignificant (i.e., less than 10 times the screening criteria). Based on upgradient historic measurements and trend analyses, these constituents are not expected to increase in the future as the groundwater discharges to the Housatonic River.

- In the northern plume discharging to the Far Mill River (Table 5), there are seven constituents with a maximum concentration more than 10 times the criteria: As (factor of 75.8), Fe (factor of 34), Mn (factor of 20.1), Sn (factor of 79.4), Zn (factor of 27.9), phenanthrene (factor of 64.9), and DCE (factor

of 24.5). In addition, Ba exceeds the criterion by more than a factor of 100. All of the maximums are in groundwater discharging downgradient of AC-1, except for the As maximum at MW0071S which is downgradient of AC-3. There are no higher As concentrations upgradient of the MW0071S (see Table 3). Similarly, there are no higher upgradient Sn concentrations than observed in the discharging groundwater at MW0051S in AC-1. Consequently, As and Sn are not expected to increase in the future. Phenanthrene (0.005J mg/L) and Zn (3.43 mg/L) are found at higher concentrations upgradient in AC-1. At GW0102, Zn was detected at 7.5 mg/L; this concentration would be less than 100 times the screening criterion even if it was not attenuated as it migrated to the river. Other Zn concentrations are nearly the same or less than the screening criterion of 0.123 mg/L.

Phenanthrene, one of the more mobile semivolatile constituents, is found above screening criteria at several AC-1 sampling locations. The maximum phenanthrene concentration in groundwater under AC-1 is found at MW0063S. Based on the trend plot (Figure 7) for phenanthrene at MW0066S, the concentrations seem to fluctuate between 0.015 and 0.025 mg/L since April 1997. The detected concentration of DCE at MW0063M represents a maximum for groundwater under AC-1. The trend for DCE at MW0063M, depicted on Figure 8 suggests increased concentrations would not be expected in the future. Fe and Mn are interpreted to be present in the discharging groundwater as a result of the reducing (anoxic) conditions resulting from degradation of chlorinated solvents within the northern plume (e.g., PCE, TCE, and DCE). Significantly higher concentrations of Fe or Mn are not present upgradient of the discharging groundwater in AC-1 and therefore are not expected to increase in the future.

In summary, As, Fe, Mn, Sn, Zn, phenanthrene, and DCE exceed the screening criteria by a factor of 10 or more. One constituent, Ba, exceeds the screening criterion by more than a factor of 100 at one location. Based on historical measurements and trend analyses at upgradient locations, all of these constituents are not expected to increase in the future as groundwater discharges to the Far Mill River.

2. **Constituents more than 100 times the appropriate criteria:**

- No constituents were detected more than 100 times the screening criteria in the southern plume and only Ba at MW0063S in AC-1 exceeded 100 times the criterion in the northern plume. All other Ba concentrations in the discharging groundwater were no more than 16 times the criterion of 0.038 mg/L. Similarly, groundwater upgradient of discharging groundwater contains similar (less than 16 times criterion) concentrations. Barium at MW0063S (see Figure 9) fluctuates between 0.949 and 15.2 mg/L. Review of the unchecked measurements from November 2000 (5.62 mg/L) and March 2001 (10.8 mg/L) indicates Ba concentrations have decreased from the April 2000 result of 13.9 mg/L. Therefore, Ba concentrations are not expected to increase in the future. More recent measurements (though not yet quality checked) of Ba at MW0063S in November 2000 (5.62 mg/L) and March 2001 (10.8 mg/L) are somewhat lower than the April 2000 result. Nearby (within 50 to 100 ft of the shallow groundwater flow line from MW0063S) are explorations GW0104 and GW0117 (see draft PIIRFI Report Figure 6.1-18). As shown in Table 5, Ba at these locations were less than 10 times the groundwater screening criteria (3.2 and 5.1 times the criterion of 0.038 mg/L, respectively). These explorations are also 120 ft closer to the Far Mill River and are interpreted to provide a better estimate of the discharging groundwater concentrations and are more representative of these conditions than MW0063S.

3. **Comparison of Surface Water to Screening Criteria:**

- Historical surface water results in the Housatonic River (Table 6) and the Far Mill River (Table 7) were screened using one-tenth the groundwater screening criteria listed in Table 1. This screening was done for those constituents that exceeded 10 times the groundwater screening criteria in nearby discharging groundwater to evaluate the potential effect on these surface waters. Only those results that exceed the screening criteria are listed in Tables 6 and 7. Also shown on these tables are the respective background (upstream of the facility) conditions as presented in the draft PIIRFI Report.

- Review of historical Housatonic River surface water results screening (Table 6) indicates Al and Ba, were found to exceed background and screening criteria by a factor of 10 or more at least once. Aluminum was found to exceed ten times the criterion twice. These limited number of greater than 10 times the criteria exceedances are infrequent and not widely distributed, being found at SW0067 (Al in January 2000) and SW0020D (Al in October 1995). SW0067 is at the southern plume discharge into the Housatonic River, approximately 250 ft upstream of the US 15 bridge. SW0020D is located near the southeastern corner of the flight field. Since filtered samples were not collected and analyzed at SW0067 during the January event, it is not possible to evaluate how much of the Al detected was associated with solids that may have been collected with the surface water sample. Based on current measurements (April 2000), Al and Ba exceed (by less than a factor of 4) the screening criteria at SW0020 (Ba) and SW0069 (Al and Ba).

  It is noted that no solvents or their degradation products (e.g., PCE, TCE, DCE, TCA) present in groundwater at the facility were observed to exceed the criteria in the Housatonic River.

  In summary, groundwater discharging to the Housatonic River contains several constituents that exceed groundwater screening criteria. Of these constituents (under April 2000 conditions), the Housatonic River contains Al and Ba concentrations that are less than four times greater than respective screening criteria at two locations (SW0020 and SW0069). Therefore, these conditions are not considered significant (i.e., less than 10 times the screening criteria). No organic constituents released at the facility and migrating with groundwater that discharges to the Housatonic River have been found to exceed the screening criteria.

- Review of Far Mill River surface water screening (Table 7) indicates As, Ba, Fe, Mn, Sn, and Zn exceed background and screening criteria. As indicated in Table 7 by comparing total and filtered results, suspended solids are a major contributor of the detected constituent in the sample from SW0042 collected August 1996. The high solids content at SW0042 is interpreted to be responsible for the one time detection of phenanthrene above the screening criterion. More recent (April 2000) measurements at SW0042 indicate phenanthrene no longer exceeds the screening criterion. In general, current (April 2000) measurements indicate Ba (SW0001, SW0003, SW0006, SW0010, SW0016, and SW0097) and Zn (SW0006 and SW0010) exceed criteria by less than a factor of 10 and Sn exceeded 10 times the screening criterion, but not background, at SW0003.

  PCE was detected above the screening criteria twice (October 1995 and May 1997) at SW0010 located in a drainage swale near to AC-3, a former solvent storage area that released PCE into the shallow groundwater. This swale eventually discharges to the Far Mill River. More recent measurements (April 2000) for PCE at SW0010 no longer exceed the screening criteria.

  In summary, under current conditions (April 2000), the Far Mill River is observed to have elevated (less than a factor of ten above surface water screening criteria or background) concentrations of Ba and Zn. The Zn exceedances (less than a factor of 2) are found in the tidal channel that drains from the vicinity of AC-3 and AC-5 northward to the Far Mill River. The Ba exceedances (less than a factor of 5) are found in the same tidal channel as the Zn and in the Far Mill River from its confluence with the Housatonic River upstream to within 650 feet of the CT 110 bridge that crosses the Far Mill River. Organic constituents associated with the facility are not currently (April 2000) found above the screening criteria. Suspended solids are significant contributors to the detected concentrations. Constituents associated with suspended solids are not as biologically available to receptors as the dissolved fraction and therefore the limited number and magnitude of exceedances are not considered significant.

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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])?

__X__ 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):

- A final remedy has not been developed for the northern or southern portion of the facility.
- A screening level ecological risk assessment (SERA) was completed (draft) October 2000.

Footnotes:

[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.

- A detailed ecological investigation of the benthic community conditions and fish tissue assays will be undertaken in September 2001 as part of the PHERE.

- As reported in Subsection 4.6 of the revised Phase I RFI (December 1998), no substantial differences between composition of ecological reference area populations and facility study area populations were found during a 1997 ecological survey. The aquatic community in the study area was typical of many estuaries along the coast of the Northeastern United States.

- Surface water bodies adjacent to the facility include the Far Mill River and the Housatonic River, both brackish and subject to 7-ft tidal variation at the facility. The rivers are used primarily for recreational purposes including boating, fishing, hunting, and bathing. There is no known commercial or subsistence fishing in the rivers adjacent to the facility. The rivers and adjacent wetlands offer habitat for a variety of small mammals, reptiles, birds, and fish. The SERA identified several representative ecological receptors including: white-tailed deer, raccoon, great blue heron, deer mouse, American woodcock, striped bass, mummichog, green crab, and green frog. The SERA also identified nine plants classified by the state as biologically critical species known to occur or that may potentially occur at the facility.

- Although several groundwater seeps have been identified along the Far Mill River, inspection by professional ecologists (including Dr. William A. Schew, ESI and Patti Tyler of the US Environmental Protection Agency - USEPA) indicated that no significant ecological impacts are evident other than some staining of sediment (probably iron-based)

- A conservative estimate of groundwater daily discharge from the facility to the Housatonic River is 45,000 gallons per day. This estimate is based on 3400 ft long river bank, 70 ft deep transmissive zone, with water flowing under a 0.001 ft/ft hydraulic gradient (highest observed) through soils with a hydraulic conductivity of 25 ft/day (high end of observed/measured values). It is most likely that the discharge is less than this.

- The Housatonic River watershed is quite large, extending more than 100 miles north into Massachusetts. The watershed includes several urban areas, some of which include industrial activity in addition to typical commercial activity. There are many industrial and municipal outfalls to the river upstream of the facility. The mean annual flow is 2.2 billion gallons per day and the 7Q10 flow is 0.19 billion gallons per day. The mean annual flow dilutes discharging groundwater by a factor of at least 50,000. The river was classified by the CTDEP as Coastal Marine Surface Water SC/SB, not suitable as a drinking water supply. As described in Question 2, groundwater discharge from the facility is very small compared to the river. The magnitude of dilution is so large that significant impacts are not expected. This is illustrated by comparing Tables 4 and 5 that present comparable Housatonic River water quality at the facility and at upstream (background) locations. The Far Mill River watershed is much smaller than the Housatonic watershed, but also includes several urban areas. The mean annual flow is 32 million gallons per day. The river adjacent to the facility was classified by the CTDEP as B, not suitable as a drinking water supply.

- Background surface water detections of selected constituents were summarized as the 95 UCL in Table 6 (Housatonic River) and Table 7 (Far Mill River). Comparison with criteria in Tables 4 (Housatonic River) and Table 5 (Far Mill River) indicate several constituents in background (upgradient locations are higher than the screening criteria.

- Additional ecological risk assessment activity, including fish tissue sampling and bio-availability studies are planned as part of the Phase II PHERE.

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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?"

__X___ 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."

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

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

Rationale and Reference(s):

- A long-term monitoring program was developed and presented in the Phase II RFI Work Plan submitted to USEPA August 1999. This program identifies monitoring wells and surface water and sediment locations that are to be sampled (see Long-Term Monitoring Program Figure 3.10-1 revised August 20, 2001 in Appendix A). One of the objectives of the program was to monitor the expansion of the plume area and the concentrations within the plume. The sampling program includes multiple well depths to evaluate vertical as well as areal expansion. The program also describes the analyses conducted for each sample. Volatile organic constituents are analyzed at monitoring locations in both the southern and northern plumes. Selected metals (i.e., total and hexavalent chromium, iron, and manganese) are monitored in the southern plume and the complete Target Analyte List (TAL) metals are analyzed in the northern plume. In addition, surface water and sediment sampling locations are monitored in the Far Mill River and Housatonic Rivers and selected tidal channel tributaries to these rivers.

- Corrective measures, including monitored natural attenuation (undertaken and planned at the site and operated until site specific risk-based standards are developed), will require a prescribed monitoring program to establish groundwater conditions and evaluate the effectiveness of the corrective measure. The frequency of monitoring activities will depend on the corrective measure and the rate at which improvements can be expected.

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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).

MRH 7/28/01

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 **Sikorsky Aircraft Corporation** facility , EPA ID# **RCRA-I-90-1011**, located at **6900 Main Street, Stratford, CT 06614**. 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.

(Review of Facility Submission)

Completed by (signature) [signature] Date 9/25/01
(print) _____
(title) _____

Supervisor (signature) [signature] Date 9/28/01
(print) Matthew R. Haagland
(title) Section Chief
(EPA Region or State) EPA - Reg I.

Locations where References may be found:

_____

_____

_____

Contact telephone and e-mail numbers

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

LIST OF ACRONYMS

AC	area of concern
Al	aluminum
AOC	area of concern
As	arsenic
AWQC	Ambient Water Quality Criteria
Ba	barium
Cd	cadmium
Co	cobalt
CN	cyanide
Cr	chromium
Cr^{+6}	hexavalent chromium
CT	State of Connecticut
CTDEP	Connecticut Department of Environmental Protection
Cu	copper
D	data quality flag indicating sample was diluted
DCE	1,2-dichloroethene, total
DNAPL	dense non-aqueous phase liquid
EI	Environmental Indicator Form CA750
EPAORG	USEPA AWQC established to protect human receptors exposed by ingestion of aquatic organisms
ESI	Environmental Standards, Inc., PHERE consultant
Fe	iron
ft	feet
ft/d	feet per day
ft/ft	feet per foot
GB	classification of groundwater by CTDEP for non-potable uses
gpd	gallons per day
GPRA	Government Performance and Results Act
GW	direct-push groundwater exploration
Hg	mercury
J	data quality flag indicating estimated value, outside the linear range of quantitation
kg/yr	kilograms per year
mg/L	milligrams per liter
Mn	manganese
MW	monitoring well
MWXXXXB	monitoring well screened in bedrock
MWXXXXD	monitoring well screened on top of till in silty sand aquifer material
MWXXXXM	monitoring well screened at mid-depth of silty sand aquifer material
MWXXXXS	monitoring well screened near top of silty sand aquifer material
NAPL	non-aqueous phase liquid

ORG	CTDEP SWQC established to protect human receptors exposed by ingestion of aquatic organisms
Pb	lead
PCE	tetrachloroethene
PES	Parsons Engineering Science, Inc.
PHERE	Public Health and Ecological Risk Evaluation
PIIRFI	Phase II RCRA Facility Investigation
Q	data quality flag indicating result was qualified by the laboratory
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RFI	RCRA Facility Investigation
RSR	CTDEP Remediation Standard Regulations
RU	regulated unit
SERA	Screening Level Ecological Risk Assessment
SPROT	same as SWPC
SWC	same as SWQC
SWQC	surface water quality criteria developed by CTDEP for surface water
SWMU	solid waste management unit
SWPC	surface water protection criteria developed under the CTDEP RSR program for groundwater
TAL	Target Analyte List of metals developed by USEPA
TCA	1,1,1-trichloroethane
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
Zn	zinc
7Q10	7-day annual minimum flow with a 10-year recurrence interval
95 UCL	estimate of mean (average) at 95 percent upper confidence limit

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APPENDIX B FACILITY-WIDE GROUNDWATER EXCEEDING SCREENING CRITERIA