DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

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

Facility Name: Kaman Aerospace Corporation
Facility Address: 100 South Main Street, Moosup, CT 06354
Facility EPA ID #: CTD065529158

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

   ✓ If yes - check here and continue with #2 below.

   _____ If no - re-evaluate existing data, or

   _____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Current Human Exposures Under Control" EI

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			**VOC, SVOC, TPH, CTETPH and metal concentrations exceed risk-based levels**
Air (indoors)[2]		X		**Indoor air concentrations do not exceed risk-based levels**
Surface Soil (e.g., <2 ft)	X			**PCE, As, Cr, SVOC, TPH and CTETPH concentrations exceed risk-based levels**
Surface Water		X		**Isolated, one-time exceedance of risk-based level for Hg**
Sediment		X		**No appropriately protective risk-based "levels" to assess human exposure risk; cumulative ELCRs for adults exceed EPA threshold; however, risk is result of sediment PAH concentrations that are not a result of releases subject to RCRA Corrective Action at Kaman site, rather reflect background conditions**
Subsurf. Soil (e.g., >2 ft)	X			**PCE, Cr and TPH concentrations exceed risk-based levels**
Air (outdoors)		X		**Concentrations do not exceed risk-based levels**

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

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

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

Rationale and Reference(s):

Groundwater: Figure 1 shows the location of the Kaman Moosup facility, and Figure 2 is a plan of the Kaman site showing the historical field sampling locations. Table 1 lists VOCs above levels of concern and locations of exceedances for the most-recent site-wide groundwater sampling event, February 2004. VOC compounds detected at concentrations above levels of concern include cis-1,2-dichloroethene (cis-1,2-DCE), 1,1,-dichloroethene (1,1-DCE), chloroform, trichloroethene (TCE), tetrachloroethene (PCE), MTBE, vinyl chloride and hexachlorobutadiene. Table 2 lists the non-VOC parameters above levels of concern and locations of exceedances for the period from April 2001 to November 2004. Non-VOC compounds detected at concentrations above levels of concern include arsenic, barium, chromium, copper, lead, nickel, zinc, cyanide, petroleum hydrocarbons and PAHs. The extent of contaminated groundwater is defined by the presence of TCE, which is the compound that is found at the highest concentrations relative to its level of concern and is the compound that is most widely distributed in groundwater. VOCs that typically are detected in monitoring wells with TCE include cis-1,2-DCE and PCE, which are typically present at much lower concentrations.

In the shallow unconsolidated-deposit aquifer, the highest concentrations of TCE occur at MW-19 and MW-202. MW-19 is located adjacent to (west) of Building 6 (AOC-16), and MW-202 is located west of MW-19, just south of Building 20. In the deep unconsolidated-deposit aquifer, the highest concentrations of TCE occur at IW-2A, IW-3A and MW-6A. All three wells are located south of Building 20. In the shallow bedrock aquifer, the highest concentrations of TCE occur at IW-6A, MW-27BA and MW-28BA, located in the southwestern portion of the site. In the deep bedrock aquifer, the highest concentrations of TCE occur at IW-5A, MW-27BD and MW-28BD. IW-5A is located east of Building 15, and MW-27BD and MW-28BD are located in the southwestern portion of the site.

With respect to the distribution of TCE and other VOCs in groundwater, a VOC plume, extending vertically through the unconsolidated-deposit and bedrock aquifers, extends from the historical manufacturing areas in the south-central portion of the site generally west-southwestward toward the Moosup River. A separate, smaller VOC plume extends from the area of AOC-24 and, based on the results of a soil vapor survey performed in 1989 and the groundwater results for well MW-25S, likely extends southwestward toward the river. The areal extent of the VOC plumes is approximately 7 acres.

Migration of contaminated groundwater in the unconsolidated-deposit and bedrock aquifers is the dominant contaminant transport mechanism at the site. It has been demonstrated that groundwater in the unconsolidated-deposit aquifer flows generally west-southwestward toward the Moosup River and discharges to the river. Groundwater in the shallow bedrock aquifer likewise flows west-southwestward toward the river and discharges to the river. Therefore, the Moosup River is the receptor for the contaminant mass that is mobile and migrating with the site groundwater.

With respect to the deep bedrock aquifer, water level data from the four bedrock well clusters along the Moosup River indicate that vertical gradients are strongly upward between the shallow and deep bedrock. The upward bedrock gradients along the river further reflects the presence of the groundwater discharge zone at the river.

The results of the September and October 2004 sampling of 68 domestic supply wells during the supplemental CA 725 off-site groundwater investigation indicated that, with the exception of the location that has regularly yielded TCE detections (DW-6), compounds from the Kaman facility are not impacting the domestic supply wells in the areas located potentially downgradient of the Kaman Moosup facility.

In summary, the domestic well sampling indicates that compounds associated with the Kaman facility occur in groundwater in a limited area on the Kaman facility and to the south of the Kaman facility in the vicinity of DW-6 that was previously defined. The TCE detected in groundwater to the south of the facility, and south of the river, is limited to a narrow zone within the fractured fault zone/Quinebaug gneiss unit where pumping of domestic wells can locally reverse groundwater flow directions in the bedrock. Our conceptual model of the deep bedrock groundwater flow from the Kaman facility is that:

- Groundwater flow in the bedrock in the vicinity of the Kaman facility, on both sides of the Moosup River, is toward the river. The river is the discharge area for the bedrock groundwater within the Moosup River basin, as evidenced by the upward flow potential between the deep and shallow bedrock.
- Pumping of domestic wells located within the fractured fault zone/Quinebaug intrusive gneiss unit locally reverses groundwater flow directions in the bedrock as the result of the large drawdowns created by pumping within this unit. The

permeability of this unit appears to be much greater in a direction oriented parallel to the thrust fault than in a direction perpendicular to the thrust fault, and as a result the drawdowns are preferentially propagated along the orientation of the fault zone.

- Bedrock groundwater discharging into the Moosup River that has flowed through the zone beneath the Kaman facility that contains elevated concentrations of VOCs transports VOCs to the river. The total mass of VOCs in the discharging groundwater is sufficiently small that only low (parts per billion) concentrations of VOCs are detected in the river. The VOCs discharging to the river volatilize into the atmosphere downstream of the Kaman facility.

Air (indoors): Indoor air concentrations in eight buildings overlying the VOC plume (Table 3) do not exceed the OSHA PEL eight-hour TWAs.

Surface Soil: The Kaman Moosup facility is largely fenced and covered by pavement or buildings. Small unpaved areas of historical Kaman employee use (i.e., lunch break/smoking areas), as well as unpaved areas outside the Kaman facility fence, were targeted for surface soil sampling for the CA 725 evaluation. Table 4 lists exceedances of the applicable Connecticut Direct Exposure Criteria (DEC). The applicable DEC is based upon location relative to the Kaman facility's perimeter fence. The Residential (Res) DEC applies to areas outside the fence, and the industrial/commercial (I/C) DEC applies to areas inside the fence. Exceptions to this relationship occur at areas of employee use within AOCs 20 and 30, where the applicable DEC is the Res DEC. It is important to note that the facility is not currently used for manufacturing, and on-site workers are limited to security personnel and remediation contractors. Constituents in surface soils exceeding the applicable DEC are petroleum hydrocarbons, arsenic, chromium, PCE and PAHs.

The surface soil samples analyzed for chromium were analyzed for total chromium. Although DEC values have been established for Cr^{+3} and Cr^{+6}, DEC values do not exist for total Cr. Therefore, the more stringent criteria for Cr^{+6} were used as appropriate risk-based levels. However, based on knowledge of the waste stream and sampling data, the presence of chromium in the hexavalent state is not anticipated. While the total chromium concentrations for some samples exceeded the DEC for Cr^{+6}, only one surface soil sample from outside the fence, 86B-05, contained total chromium at a concentration above the Res DEC for Cr^{+3}.

Under the Connecticut Remediation Standard Regulations (RSRs, Regulations of Connecticut State Agencies (RCSA) Section 22a-133k-2(e)(1)(A)), compliance with the DEC for a particular substance is achieved when the 95% UCL of the arithmetic mean of all the sample results of laboratory analyses of soil from the subject release area for such substance is equal to or less than the applicable DEC, provided that no single sample result exceeds two times the DEC.

All of these conditions apply to the total chromium surface soil sample results in the AOC-01 release area, outside of the facility fence. The 95% UCL of the arithmetic mean of the 21 surface soil sample total chromium results for the AOC-01 release area outside of the fence is lower than the Cr^{+3} Res DEC, and no single result exceeds two times the Cr^{+3} Res DEC. The 95% UCL calculation is provided in Appendix A.

At one accessible location in AOC-01 the TPH concentration (by EPA method 418.1) exceeded the AOC-01-specific stabilization criterion for TPH, defined as 30 times the applicable DEC (the Connecticut significant environmental hazard threshold). Subsequent resampling and analysis of surface soil samples using the Connecticut ETPH method in 2000 indicated compliance with the DEC.

Surface soils containing PAHs at concentrations greater the DEC were either paved over (AOC-20) or contained with a perimeter fence (AOC-30) in October 2002 to remove the pathway for human exposure to surface-soil contamination. Surface soils containing arsenic concentrations greater than the DEC are under a building slab and thus are not accessible for human exposure and surface soils containing PCE at concentrations greater than the DEC are beneath a paved area.

PCBs were only analyzed in soil samples from the transformer area in the northern portion of the site (AOC-30) as PCBs were not used at the facility. The PCB concentrations in three oil-stained surface soil samples from the area surrounding the former transformer pad at AOC-30 were less than 100 ug/kg.

Surface Water: None of the surface water concentrations reported in samples collected between January 2002 and November 2004 (Table 5) exceeded the Connecticut Water Quality Criteria (WQC) for Human Health, Consumption of Organisms Only, with the one-time exception of mercury at location SW-105 in August 2004. The prior SW-105 surface water samples collected in February and May 2004, as well as the subsequent SW-105 sample in November 2004, did not contain mercury above the laboratory reporting limit.

Sediment: Sediment analytical results are presented in Table 6. Res DEC exceedances occurred for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, arsenic and chromium (Cr^{+6}). Similar to surface soil, the sediment samples were analyzed for total chromium. The Res DEC for Cr^{+6} was exceeded. The Res DEC for Cr^{+3} was not exceeded. As was indicated for surface soil, it is very likely that the total chromium concentration reported is comprised of Cr^{+3}, not Cr^{+6}. Sediment samples were not analyzed for PCBs as they are not a site-related chemical of concern.

Risk to human health from potential exposure to contaminated sediment was assessed for adults and children to determine if exposure to sediment represents an unacceptable health risk. Three exposure pathways were evaluated: consumption of fish, ingestion of sediment, and dermal absorption. Cumulative risk for each exposure point was determined by adding the risks calculated for each pathway.

Three exposure points were established:

- SED-14 data were used to assess risk attributed to sediment contamination upgradient of the Kaman facility and outside the Kaman property boundaries (Upgradient, Off-Site)
- SED-15 data were used to assess risk attributed to sediment contamination upgradient of the Kaman facility but within the Kaman property boundaries (Upgradient, On-Site)
- Remaining sediment data were used to assess risk attributed to sediment contamination downgradient of the Kaman facility (Downgradient)

Table 7 lists the sediment concentrations used for the three exposure points. With respect to the concentrations used for the downgradient exposure point, the lesser of the 95% upper confidence limit (UCL) and the maximum concentration was used as the exposure point concentration for each contaminant. For calculating the 95% UCL, one-half the detection limit was used for those analytes that were non-detect. If the majority of the samples were reported as non-detect with only one or two detects, the maximum of the detected results was used.

The software package RISK*ASSISTANT™ (Hampshire Research Institute, 1995) was used to calculate risk. This software incorporates the use of bioaccumulation factors. The toxicity values employed included reference dose factors and carcinogenic slope factors from the EPA Region III Risk-Based Concentration Table, the EPA Region 9 PRG Table, Massachusetts Department of Environmental Protection (MADEP) Background Documentation for the Development of the MCP Numerical Standards, the Connecticut Department of Environmental Protection (CTDEP) (lead), and the National Institute of Health (magnesium). The RISK*ASSISTANT output is presented in Appendix B.

Human Exposure Through Consumption of Fish: For evaluating the risk of unacceptable human exposures to contaminated sediment via the consumption of fish from the river, a screening-level food-chain risk evaluation was performed to determine the human health risk due to eating the fish that consume benthic organisms.

Exposure scenarios included a 70 kg adult catching fish from the Moosup River and eating 0.149 kg (0.33 lb) of fish ten times per year for 24 years. Risk was also calculated for a 15 kg child eating 0.054 kg (0.12 lb) of fish from the site ten times per year for six years. The edible tissue of the fish was assumed to be uniformly contaminated.

Human Exposure Through Consumption of Sediment: The risk of unacceptable human exposures to contaminated sediment via the consumption of the sediment was evaluated for all detected analytes assuming incidental consumption of sediment.

The assessment addressed the exposure of child and adult trespassers to river sediments on-site. Risk was calculated for a 15 kg child twice per week during the fishing season (April to October, 60 times per year) and ingests 100 mg of sediment per visit for six years. Risk was also calculated for a 70 kg adult at the same frequency and consumes 50 mg of sediment for 24 years.

Human Exposure Through Dermal Absorption:

Exposure scenarios for evaluating risks from dermal absorption of contaminants in sediment were developed based upon guidance provided by the USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), July 2004 (EPA/540/R/99/005). The soil-skin adherence factors selected for this assessment were "reed collector" for adults and "children playing in mud" for children. These adherence factors used EPA's default assumptions for skin surface area exposed. Risk was calculated for a 15 kg child, 2,800 cm^2 of exposed skin area, for three hours of exposure, ten times per year for six years. Risk was also calculated for a 70 kg adult, 5,700 cm^2 of exposed skin area, for three hours of exposure, ten times per year for 24 years.

Uncertainty: This risk assessment is site-specific and assumes that sediment data utilized are representative of the site. Risk calculations are based only on the exact concentrations, exposure pathways, media, and receptors described in this evaluation. A risk assessment that considers a different set of parameters or variations will produce different risk estimates.

Most human health risk assessment reports present risks that are unique to a specific chemical and route of exposure. When risks are combined across chemicals or across routes of exposure, risk may be overestimated because one cannot speculate that a specific chemical will produce the identical toxic effects by all paths of exposure and that

dissimilar chemicals produce diverse ranges of toxic effects. This approach is used in this risk assessment, providing a conservative estimate of carcinogenic risk. A detailed discussion of the uncertainty involved in the sediment exposure risk assessment, and the conservative assumptions included in the exposure risk calculations to account for this uncertainty, is provided in Appendix B.

Summary of Cumulative Risk:

Tables 8a through 8f summarize the cancer and non-cancer risks attributable to sediment exposure via sediment ingestion, fish ingestion and dermal absorption for adults and children. Non-cancer risk is assessed in terms of Hazard Index (HI). An HI greater than 1 is generally indicative of a significant non-cancer risk due to exposure. None of the cumulative HIs calculated exceed 1.

Cancer risk is assessed by calculating the estimated lifetime cancer risk (ELCR). The EPA generally considers an ELCR range of 1 in 1,000,000 (1e-006) to 1 in 10,000 (1e-004) to be an acceptable risk. Cumulative ELCRs calculated range from 2.9e-005 to 5.8e-005 for children, indicating that there is no significant cancer risk to children due to exposure to contaminated sediments at the site. For adults, the cumulative ELCRs calculated ranged from 8.2e-005 to 1.3e-004, with the risk at the off-site upgradient and downgradient locations slightly exceeding the 1e-004 threshold.

As detailed in Tables 8a through 8f, the cumulative ELCR values are driven chiefly by the fish-consumption ELCRs. The sediment-consumption and dermal-absorption ELCR values are all at least one order of magnitude below the 1e-004 threshold, and approximately one to four orders of magnitude below the fish-consumption ELCRs. So while the fish-consumption ELCRs indicate potential risks at the off-site upgradient and downgradient locations slightly exceeding the 1e-004 threshold for adults (but not children), the sediment-consumption and dermal-absorption ELCRs indicate no significant cancer risk to children or adults.

Relationship to Kaman Site:

The fish-consumption ELCRs are driven chiefly by the ELCRs for benzo(a)pyrene and benzo(b)fluoranthene as is evident in Tables 8a through 8f. PAHs are not major constituents of concern at the Kaman site, and it is unlikely that the sediment concentrations are the result of releases from AOCs subject to RCRA corrective action. With respect to groundwater from the Kaman site that discharges to the Moosup River adjacent to the site, of the 56 quarterly groundwater samples collected in 2004 from the 14 on-site unconsolidated-deposit and shallow bedrock monitoring wells located just upgradient from the river and analyzed for PAHs, only two samples contained PAHs in concentrations exceeding the Connecticut Surface Water Protection Criteria (SWPC). Perhaps more significantly, as indicated in Table 7, the downgradient exposure-point concentration for benzo(a)pyrene was not significantly higher than the upgradient off-site (SED-14) concentration, and the downgradient benzo(b)fluoranthene concentration was lower than the upgradient off-site concentration. The PAH concentrations in the Moosup River sediment are likely the result of many historical anthropogenic sources, including several mills that historically operated along the river as well as street and parking lot runoff. Therefore, we conclude that the Moosup River downgradient sediment benzo(a)pyrene and benzo(b)fluoranthene concentrations driving the fish-consumption ELCRs to levels slightly above the EPA threshold are not the result of releases subject to RCRA Corrective Action at the Kaman site.

Subsurface Soil: Table 9 lists exceedances of the applicable Connecticut DEC. Similar to the surface soil, the Res DEC applies to areas outside the fence, and the I/C DEC applies to areas inside the fence, except at areas of employee use within AOCs 20 and 30, where the applicable DEC is the Res DEC. Constituents in subsurface soil that exceed the applicable DEC are chromium, PCE and petroleum hydrocarbons.

The subsurface soil samples were analyzed for total chromium. Similar to the surface soil, the more stringent DEC for Cr^{+6} were used as appropriate risk-based levels. However, as was indicated for surface soil the presence of chromium in the hexavalent state is not anticipated. While the total chromium concentrations for some samples exceeded the DEC for Cr^{+6}, only two subsurface soil samples from outside the fence, 87B-16 and 87B-22, contained total chromium at concentrations above the Res DEC for Cr^{+3}.

Air (outdoors): Outdoor air concentrations do not exceed risk-based levels.

Footnotes:

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

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

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

Summary Exposure Pathway Evaluation Table

	Potential **Human Receptors** (Under Current Conditions)						
"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	**Yes**	**No**	**No**	**No**			**No**
~~Air (indoors)~~	___	___	___				
Soil (surface, e.g., <2 ft)	**No**	**No**	**No**	**No**	**No**	**No**	**No**
~~Surface Water~~	___	___			___	___	___
~~Sediment~~	___	___			___	___	___
Soil (subsurface e.g., >2 ft)				**No**			**No**
~~Air (outdoors)~~	___	___	___	___	___		

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

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

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

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

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

Rationale and Reference(s): See following page

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

Rationale and Reference(s): (*) brief description of basis for response for each pathway is provided below:

Residents via "contaminated":
-Groundwater = yes, a potential pathway for human exposure to groundwater contaminated above levels of concern currently exists at off-site domestic supply well DW-6 (6-10 Grove Street), but the pathway is not complete as a granular activated carbon (GAC) treatment system has been installed at the well. At DW-6, where influent TCE concentrations regularly exceed the CTDPH Action Level for Private Wells, the monthly influent, mid-fluent and effluent samples collected from the treatment system provide regular confirmation that the treatment system continues to mitigate potential exposures to TCE-contaminated groundwater. GAC filter systems were installed at three other residences where TCE has been historically detected: DW-4 (34-38 Plainfield Road), DW-8 (6 Pond Street) and DW-16 (26 Pond Street). TCE has not been detected at DW-4 or DW-8 since November and December 2002, respectively, and the premises at DW-16 are unoccupied. The GAC systems at DW-4 and DW-8, while currently inactive with CTDEP's approval, remain in place at these residences and can be put back online should VOCs reappear in the well water. Similarly, once the premises supplied by DW-16 are reoccupied and the well is used once again for consumption, the GAC system will be reactivated and DW-16 will be reinstated to the domestic supply well monitoring program for quarterly monitoring. Monitoring of monitoring wells within and surrounding the VOC plume and of 15 residential wells is ongoing. Should VOCs be detected in the future at any other domestic supply well(s), EPA and CTDEP will be notified and installation of GAC filter system(s) will be considered.
-Soil (surface) = no complete pathway - The only surface soil contamination is on-site, and no residences are on site.

Workers via "contaminated":
-Groundwater = no complete pathway. There are no operating on-site water supply wells (or other opportunities for production worker contact with contaminated groundwater).
-Soil (surface) = no complete pathway. AOC-02 samples collected from beneath building slab. AOC-07A sample from MW-10D collected from beneath paved area. Soil stabilization measures completed at on-site AOCs 07A (paved), 20 (paved) and 30 (fenced) in October 2002 removed pathway/potential human exposure risk with regard to shallow soil contamination. Landscaper/maintenance worker contact with on-site surface soil contamination cannot be reasonably expected under current conditions.

Day-Care (or other non-production and possibly sensitive receptor uses (e.g., schools, hospitals, etc.)) via "contaminated":
-Groundwater = no complete pathway. No day care or other sensitive uses (e.g., schools, hospitals, etc.) can be reasonably expected near contaminated groundwater plume, and these receptors are not expected to have other contact with contaminated groundwater.
-Soil (surface) = no complete pathway - No day care or other sensitive uses can be reasonably expected near contaminated soil.

Construction (workers) via "contaminated":
- Procedures are in place to ensure that any construction workers that may encounter contaminated media on-site will be health and safety trained pursuant to 29 CFR 1910.120.

Trespassers via "contaminated":
-Soil (surface) = no complete pathway – At two AOCs outside the facility fence (AOC-01 and AOC-38), surface soil is not contaminated above levels of concern. Soil stabilization measure (paving) completed outside fence at AOC-07A in October 2002 removed pathway/potential human exposure risk with regard to shallow soil contamination. No trespassers are expected within fenced area of facility (fence is well maintained), and inspection of fenced-in area of facility has not provided evidence of trespassers under current conditions.

Recreation (users) via "contaminated":
-Soil (surface) = no complete pathway – In areas outside the facility fence, either surface soil is not contaminated above levels of concern or soil stabilization measures completed (paving at AOC-07A) removed pathway/potential human exposure risk. Recreational users are not expected within fenced area of facility, and inspection of fenced-in area of facility has not provided evidence of recreational users under current conditions.

Food contaminated via:
-Groundwater = no complete pathway - No food items are produced/grown in contact with "contaminated" groundwater.
-Soil (surface) = no complete pathway - No food items are produced/grown in contact with "contaminated" surface soil (e.g., no foods are produced on-site and no off-site surface soil has been identified to be "contaminated".
-Soil (subsurface) = no complete pathway - No food items are produced/grown in contact with "contaminated" subsurface soil (e.g., no foods are produced on-site and no off-site surface soil has been identified to be contaminated".

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

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

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

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

Rationale and Reference(s):
Groundwater – A potential pathway for human exposure to groundwater contaminated above levels of concern currently exists at off-site domestic supply well DW-6. The GAC filter system that has been installed at DW-6 is a measure for minimizing exposure; exposures to contaminated groundwater from this well cannot be reasonably expected to be significant for this pathway. The GAC systems at DW-4 and DW-8, while currently inactive, remain in place at these residences and can be put back online should VOCs reappear in the well water. Similarly, once the premises supplied by DW-16 are reoccupied and the well is used once again for consumption, the GAC system will be reactivated and DW-16 will be reinstated to the domestic supply well monitoring program for quarterly monitoring. Monitoring of monitoring wells within and surrounding the VOC plume and of 15 residential wells is ongoing. Should VOCs be detected in future results for any other domestic supply well(s), EPA and CTDEP will be notified and installation of GAC filter system(s) will be considered.

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

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

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

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

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

Rationale and Reference(s): _____

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

✓ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Kaman Aerospace Corporation facility, EPA ID #CTD065529158, located at 100 South Main Street, Moosup, Connecticut under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

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

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

Completed by (signature) Signature on File _____ Date _____
(print) Robert A. O'Meara
(title) RCRA Facility Manager

Supervisor (signature) Signature on File _____ Date _____
(print) Matt Hoagland
(title) Chief, RCRA Corrective Action Section
(EPA Region or State) Region 01

Locations where hardcopy References may be found:

Kaman Corporation, 1332 Blue Hills Avenue, Bloomfield, CT
Connecticut Dept. of Environmental Protection - File Room - 79 Elm Street, Hartford, CT
USEPA Region 1 Offices, 90 Canal Street, Boston, MA
Town of Plainfield First Selectman's Office, 8 Community Avenue, Plainfield, CT
Northeast District Department of Health, 136 Main Street, Danielson, CT

Contact telephone and e-mail numbers

(name) Robert A. O'Meara
(phone #) 617.918.1360
(e-mail) omeara.bob@epamail.epa.gov

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