DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

Facility Name: England Air Force Base
Facility Address: Alexandria (Rapides Parish), Louisiana
Facility EPA ID #: EPA ID No. LA9572124452, AI# 9029

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

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

   _____ If no - re-evaluate existing data, or

   _____ if data are not available skip to #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 "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).

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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): **Contaminated groundwater at England Air Force Base is limited to three distinct contaminant plumes; these are the SWMU No. 41 plume, the SWMU No. 47 plume, and AOC No. 39 plume. Table 1 list the status of these groundwater plumes. Figure 2 shows the location of these groundwater plumes (AOC 39, or SS-45 is located in the area south and east of the runway.**

The SWMU No. 41 plume consists of dissolved-phase chlorinated VOC constituents originating from the closed landfill. The groundwater plume at SWMU No. 47, the Petroleum, Oil, and Lubricants (POL) Yard, consists of VOCs, SVOCs and PAHs associated with diesel and gasoline contamination. The groundwater plume at AOC No. 39 consists of TCE and its breakdown products, including *cis-* and *trans-* DCE and Vinyl Chloride.

See Attachment 3, "Description and Status of SWMUs/AOCs" for a description of each of these plumes. See Attachment 4 for a listing of references providing detailed information regarding type and concentrations of contaminants, vertical and horizontal extent of plumes, and site-specific, risk-based remedial goals.

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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): **Migration of contaminated groundwater at each of the three plumes has stabilized, based on a review of the most recent groundwater analytical data generated as part of the Long-Term Monitoring (LTM) programs and data generated during the most recent phase of site investigation. The horizontal and vertical extent of the each of these contaminant plumes has been delineated and a groundwater monitoring program has been implemented in order to monitor any potential migration of contaminated groundwater and evaluate constituent concentrations over time.**

The SWMU No. 41 groundwater plume is monitored by a system of upgradient and downgradient monitoring wells. Although some of the downgradient wells have exhibited concentrations of constituents exceeding BCT-concurred action levels, additional plume-defining wells downgradient of these locations continue to exhibit no detections. There is evidence of limited discharge of contaminated groundwater to adjacent surface water, Big Bayou; see response to Question No. 4, below, for additional information. The groundwater contaminant plume at this site is limited to the upper most aquifer. Figure 3 depicts the SWMU 41 landfill, monitoring well locations and the extent of groundwater contamination. Table 2 provides the most recent groundwater monitoring data for SWMU 41.

The SWMU No. 47 groundwater plume (SS-21) is also monitored by a network of monitoring wells designed to ensure that the plume is not migrating. Results of ongoing groundwater monitoring indicate that the plume is stable (FEC, 2002). Downgradient wells at the site exhibit no detections of site-related constituents. The groundwater contaminant plume at this site is limited to the upper most aquifer. Figures 4 and 5 show the location of SWMU 47, groundwater monitoring wells, and extent of TPH-GRO and TPH-DRO, respectively. Table 3 provides the most recent groundwater monitoring data for SWMU 47.

AOC No. 39, also know as the TCE plume or SS-45, consists of two distinct areas (Areas 800 and 2500) exhibiting concentrations of TCE and it's breakdown products. Each of these areas are monitored by extensive monitoring well networks designed to detect any potential migration of the contaminant plume and to evaluate the potential for natural attenuation processes to degrade the chlorinated hydrocarbons. Each plume consist of an intermediate and a deep impacted zone. Based on the results of groundwater monitoring, there is evidence that natural attenuation is occurring at the site. Additionally, groundwater monitoring results through 2002 indicate that the Area 800 plume is stable is both the intermediate and the deep zone; the Area 2500 plume appeared to be stable in the deep zone, while some contaminant detections in previously uncontaminated wells suggested that the intermediate plume of the Area 2500 plume may not be stable. (Tetra Tech, 2002a and 2002b). The preliminary results of subsequent investigation during 2003 indicate that the existing area of groundwater contamination at Area 2500 intermediate plume has not significantly

migrated. (BCT-Meeting, Personal Communication, 2003.) Permanent monitoring wells will be installed downgradient of the plume in uncontaminated areas to act as sentry wells 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. These wells will be placed within a reasonable proximity of the plume in order to incorporate the anticipated formal remedy of MNA and allow a limited area for natural attenuation and will be subject to periodic monitoring to ensure that the plume is not migrating. This determination will be revisited on an annual basis in order to verify that the contaminant plume remains stable. Additionally, groundwater from the impacted zone will not be utilized at the site due to groundwater use restrictions encompassing the entire site. In addition to limiting the potential for exposure to contaminated groundwater, this measure minimizes the possibility for mobilizing the plumes due to pumping from adjacent groundwater wells. Figures 6, 7, and 8 show the location of AOC 39 (SS-45), groundwater monitoring wells, and the extent of TCE, *cis*-1,2-DCE, and Vinyl Chloride, respectively. Table 4 provides the most recent groundwater monitoring data for AOC 39 (SS-45).

See Attachment 3, "Description and Status of SWMUs/AOCs" for a description of each of these plumes. See Attachment 4 for a listing of references providing detailed information regarding type and concentrations of contaminants, vertical and horizontal extent of plumes, and site-specific, risk-based remedial goals.

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

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

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

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

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

Rationale and Reference(s): **As referenced above, there is evidence that contaminated groundwater is discharging to surface water from the SWMU No. 41 plume on the downgradient edge of the landfill near the confluence of the unnamed drainage ditch and Big Bayou.**

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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

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

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

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

Rationale and Reference(s): **Indirect evidence from Passive Vapor Diffusion Sampling (PVDS) and analysis of tree cores taken in Big Bayou adjacent to SWMU No. 41 indicate the potential for chlorinated VOCs to discharge from contaminated groundwater to the sediments and surface water in Big Bayou (BRAC Closure Team (BCT) meeting, 2003). However, these potential discharges are not expected to be significant due to fact that the results of surface water and sediment sampling at these locations in Big Bayou reveal no detectable concentrations of site-related constituents in these media. (AFCEE, 2003.) Additionally, the maximum concentration of each contaminant discharging into surface water is less than 10 times the BCT-concurred action levels for groundwater.**

See Attachment 3, "Description and Status of SWMUs/AOCs" for a description of each of these plumes. See Attachment 4 for a listing of references providing detailed information regarding type and concentrations of contaminants, vertical and horizontal extent of plumes, and site-specific, risk-based remedial goals.

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

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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

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

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

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

Rationale and Reference(s): **Not Applicable**

[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.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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): **Of the SWMUs/AOCs identified in the original permit for England AFB, three SWMUs/AOCs, including SWMU No. 41 (the Sanitary Landfill; LF-5), SWMU No. 47 (the POL Sludge Pit and Yard; WP-02), and AOC 39 (the TCE Plume; SS-45; POI-332), have been recommended for long-term monitoring. SWMU No. 41 has been closed with a RCRA composite cover system. Limited excavation was conducted at SWMU 47 to remove constituents of concern from surface and subsurface soils. Monitored Natural Attenuation is the proposed remedy for AOC No. 39. The operations and maintenance, inspection, monitoring and response requirements for these units will be specified in the RCRA/HSWA Permit Renewal. For a detailed description of each of these SWMUs/AOCs and supporting documentation, please see text and references in attachment.**

Currently, during periodic Base Realignment and Closure (BRAC) Closure Team (BCT) meetings between LDEQ, USEPA, the Air Force, and the Local Reuse Authority (LRA), monitoring and response issues are addressed and decisions are reached regarding future actions. Through this mechanism, the monitoring programs for each of these groundwater plumes are managed in order to ensure that the plumes are properly monitored to ensure that no migration is occurring and that response actions are taken as necessary to prevent potential exposure to humans or the environment.

Currently, all groundwater plumes at the England AFB facility are monitored by a network of groundwater monitoring wells and the monitoring program is administered through the BCT Meeting process. In the future all monitoring, response and corrective actions will be administered pursuant to a RCRA/HSWA Corrective Action Permit, currently being prepared by the Louisiana Department of Environmental Quality with the cooperation of the USEPA-Region 6 and the Air Force. All permit conditions will be designed to ensure that the plumes are properly monitored so that no migration is occurring and that response actions are taken as necessary to prevent potential exposure to humans or the environment. (See "RCRA/HSWA Permit Renewal Application" Air Force Base Conversion Agency, October 30, 2001.)

See Attachment 3, "Description and Status of SWMUs/AOCs" for a description of each of these plumes. See Attachment 4 for a listing of references providing detailed information regarding type and concentrations of contaminants, vertical and horizontal extent of plumes, and site-specific, risk-based remedial goals. Attachment 5 provides draft post-closure plans for SWMU No. 41, SWMU No. 47 (SS-21), and AOC No. 39 (SS-45). These post-closure plans specify requirements for monitoring, inspection, and operation & maintenance of the proposed final remedies for these areas and provide specific information regarding location and construction details of groundwater monitoring wells. The requirements of these post-closure plans will be incorporated into the RCRA/HSWA Corrective Action Permit.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

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).

__YE__ 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 England Air Force Base, EPA ID No. LA9572124452, AI#9029 , located at Alexandria, Louisiana. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

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

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

Completed by (signature) [signature] Date 6/30/2003
(print) Steve Archibald
(title) Geologist 2

Supervisor (signature) Narendra M. Dave Date 6/30/2003
(print) Narendra M. Dave
(title) Geological Manager
(EPA Region or State)Louisiana DEQ

Locations where References may be found:

LDEQ Records Management – Hazardous Waste Files
LDEQ Records Management – Ground Water Files
U. S. EPA – Region 6 Files
On-site facility records and correspondence files

Contact telephone and e-mail numbers

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