

**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:** Dulles International Airport  
**Facility Address:** Dulles, Virginia 20166  
**Facility EPA ID #:** VA6690500909

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?

- If yes - check here and continue with #2 below.
- If no - re-evaluate existing data, or
- If data are not available, skip to #8 and enter "IN" (more information needed) status code.

**BACKGROUND**

Washington-Dulles International Airport (Facility) is located on approximately 10,000 acres of fenced, improved land in southeastern Loudoun County, Virginia. The Facility is owned by the Federal Aviation Administration (FAA) and leased by the Metropolitan Washington Airport Authority (MWAA). The Facility is a civilian aviation facility for domestic and international flights. Airport activities include those managed by MWAA and those managed by airport tenants, including airlines, car rental facilities, and hotels. In 1992, the U.S. Environmental Protection Agency (EPA) contracted a RCRA Facility Assessment of the Facility. 13 solid waste management units (SWMUs) and 11 areas of concern (AOCs) were identified during the site inspection. SWMUs and AOCs include vehicle maintenance shops, drum storage areas, satellite accumulation areas, underground storage tanks (USTs), aboveground storage tanks (ASTs), airport terminal areas, fire station, and clean up of the fire training facility in accordance with the Virginia Hazardous Waste Management Regulations.

**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).

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1. Is **groundwater** known or reasonably suspected to be “**contaminated**”<sup>1</sup> 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?

- 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):**

Since 1992, shallow groundwater beneath the facility has been investigated under several regulatory cleanup programs including RCRA closure, UST Program, and RCRA Corrective Action. SWMUs #1, #2, #3, #4, and AOC #2 make up what used to be the fire training facility (FTF). MWAA conducted a DEQ approved risk assessment that demonstrated that groundwater risk associated with these SWMUs and AOC is within EPA Region 3’s acceptable risk range of 10<sup>-4</sup> to 10<sup>-6</sup> for carcinogens and less than EPA’s acceptable hazard index of 1 for non-carcinogens. DEQ Department of Waste Resource Management issued a closure letter for groundwater for the FTF on September 6, 1995. In addition, the Facility Investigation Report, dated October 2015, for AOC #1 (Large Fire Training Pit) indicated that previously identified constituents of concern were no longer present in the groundwater beneath this AOC.

The groundwater in the vicinity of AOC#3, AOC#4, and AOC#6 was monitored in November 2000. This monitoring was performed in conjunction with the routine monitoring of groundwater performed to detect releases from the subsurface fuel distribution system that surrounds the main airport operations. That monitoring indicated that concentrations of methyl tertiary butyl ether (MtBE) and total petroleum hydrocarbons –diesel range organics (TPH-DRO) were present below levels of concern, and that there were no concentrations of benzene, toluene, ethylbenzene, and total xylenes (BTEX) above detection limits. .

The Results of Investigation, Phase I Environmental Indicator Information Needs report dated August 2, 2007 indicated that levels of previously detected propylene glycol have attenuated in the area of AOC#7 and the monitoring results from five wells in that area indicate that propylene glycol was not detected during the last monitoring event. In addition, seven monitoring wells were sampled in the area of AOC#8. BTEX constituents were not detected in any sample for the seven monitoring wells except for one well that had a detection of total xylenes of 1 ug/L, which is below EPA’s Maximum Contaminant Level (MCL) of 10,000 ug/L for total xylenes. MtBE was detected in three monitoring wells at concentrations (ranging from 1 to 29 ug/L), which is within the same risk range as the EPA Region 3 screening level for ingestion of 43ug/L.

Groundwater monitoring of AOC#1 was completed in August 2015. Previously, 1,1-dichloroethene, 1,2-dichloroethane, and 1,1,2-trichloroethane had been detected in the groundwater monitoring wells located at this AOC. However, the most recent monitoring data indicates that no VOCs or SVOCs are present in the groundwater above analytical method detection limits. Results of these sampling events indicate that groundwater contaminants observed above RSLs have attenuated since initially observed in 1992 and will likely continue to attenuate. In addition, these results confirm the limited horizontal and vertical extent of the contaminants and indicate that practically no migration has occurred since 1992. Groundwater monitoring will be conducted periodically in the future to verify stability and evaluate ongoing attenuation and/or dissipation of contaminants present in groundwater.

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**Supporting Documentation:**

1. Facility Investigation Report, Applied Environmental, October 2015
2. Groundwater Characterization Study, Air BP Fueling Operations, GeoTrans, Inc., July 2009
3. Phase I Environmental Indicator Information Needs, Supplemental Investigation of Pre-regulation Areas and AOC#2, URS Corporation, November 29, 2007
4. Results of Investigation, Phase I Environmental Indicator Information Needs, Addendum 2, URS Corporation, November 13, 2007
5. Groundwater Characterization Study, New Fuel Settling Facility, URS Corporation, October 9, 2007
6. Results of Investigation, Phase I Environmental Indicator s, URS Corporation, August 2, 2007
7. Department of Environmental Quality's UST Program files, 1993-2015
8. Air BP, 2006. Third Quarter 2006 Groundwater Monitoring & Annual Sampling Report, Air BP Facility Hydrant System and New Fuel Farm, GeoTrans, Inc, August 2006

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).

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2. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?
- 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”<sup>2</sup>).
  - If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”<sup>2</sup>) – 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):**

The groundwater assessments completed under the DEQ tank and the RCRA programs are described above. Based on the results of these activities, a number of contaminants in groundwater including BTEX, MtBE, 1,1-dichloroethene, 1,2-dichloroethane, and 1,1,2-trichloroethane and propylene glycol that were identified as constituents of potential concern have attenuated.

Groundwater monitoring will be conducted periodically in the future to verify stability and evaluate ongoing attenuation and/or dissipation of contaminants present in groundwater.

**References:**

1. Facility Investigation Report, Applied Environmental, October 2015
2. Groundwater Characterization Study, Air BP Fueling Operations, GeoTrans, Inc., July 2009
3. Phase I Environmental Indicator Information Needs, Supplemental Investigation of Pre-regulation Areas and AOC#2, URS Corporation, November 29, 2007
4. Results of Investigation, Phase I Environmental Indicator Information Needs, Addendum 2, URS Corporation, November 13, 2007
5. Groundwater Characterization Study, New Fuel Settling Facility, URS Corporation, October 9, 2007
6. Results of Investigation, Phase I Environmental Indicator s, URS Corporation, August 2, 2007
7. Department of Environmental Quality’s UST Program files, 1993-2015
8. Air BP, 2006. Third Quarter 2006 Groundwater Monitoring & Annual Sampling Report, Air BP Facility Hydrant System and New Fuel Farm, GeoTrans, Inc, August 2006

<sup>2</sup> “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.

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3. Does “contaminated” groundwater **discharge** into **surface water** bodies?
- 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):**

Cub Run transects the central portion of the facility near several of the identified SWMUs and AOCs, particularly AOC#1. However, it is not likely that a discharge to surface water will occur based on the stability and attenuation of identified COCs. Further, based upon the assessments completed by the facility to date, neither VOCs, SVOCs, metals, or propylene glycol are present in groundwater above applicable RSLs that would indicate a discharge of contaminated groundwater to surface water could occur.

**References:**

1. Groundwater Characterization Study, Baseline Report, Air BP Fueling Operations, GeoTrans, Inc., July 2009
2. Phase I Environmental Indicator Information Needs, Supplemental Investigation of Pre-regulation Areas and AOC#2, URS Corporation, November 29, 2007
3. Results of Investigation, Phase I Environmental Indicator Information Needs, Addendum 2, URS Corporation, November 13, 2007
4. Groundwater Characterization Study, Baseline Report, New Fuel Settling Facility, URS Corporation, October 9, 2007
5. Results of Investigation, Phase I Environmental Indicator Information Needs, URS Corporation, August 2, 2007
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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration<sup>3</sup> 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<sup>3</sup> 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<sup>3</sup> 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<sup>3</sup> 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):**

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

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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<sup>4</sup>)?
- 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-assessments, 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):**

<sup>4</sup> 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.

<sup>5</sup> 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-system.

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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?”

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):**

It is anticipated that groundwater monitoring will periodically be performed in the future to verify stability and evaluate ongoing attenuation and/or dissipation of contaminants in shallow groundwater. The Facility currently monitors groundwater for the requirements of DEQ petroleum program related to their operation of an above-ground storage tank and hydrant fuel system. DEQ and EPA will coordinate with the Facility to implement a monitoring well network, from these and additional wells that enables evaluation of shallow groundwater conditions at the Facility.



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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).

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 Washington-Dulles International Airport, EPA ID # VA6690500909, located in Dulles, VA 20166. 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 reevaluated 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) *Kurt Kochan* Date 02/4/2016

(print) Kurt Kochan \_\_\_\_\_

(title) CA Project Manager \_\_\_\_\_

Supervisor (signature) *Brett Fisher* Date 02/4/2016

(print) Brett Fisher P.G. \_\_\_\_\_

(title) CA Team Lead \_\_\_\_\_

(EPA Region or State) VA \_\_\_\_\_

Locations where References may be found:

US EPA Region III  
Land and Chemicals Division  
1650 Arch Street  
Philadelphia, PA 19103

Virginia Department of Environmental Quality  
Office of Remediation Programs  
629 East Main Street  
Richmond, VA 23219

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