

**Documentation of Environmental Indicator Determination
in accordance with EPA Interim Final Guidance 2/5/99**

**RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA750)
Migration of Contaminated Groundwater Under Control**

Facility Name: American Airlines MCI-Maintenance and Engineering Base
Facility Address: 9200 N.W. 112th Street, Kansas City, MO 64195
Facility EPA ID #: MOD043935048

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

Definition of Environmental Indicators (for 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 EIs 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 EIs 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 groundwater 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 Determination status codes should remain in RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be “**contaminated**”¹ above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act]) 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): Most recent groundwater data indicated several contaminants detected above appropriate protective “levels.” These “levels” are the Groundwater Protection Standards (GPSs) established in the Post-Closure Permit for the Surface Impoundment Area, Ravine Areas and the remaining areas on the site (see attached Table 1 and 2). The most recent groundwater sampling results are reported in the 2001 Semi-Annual Groundwater Corrective Action Report January-June (August, 2001) and are summarized in the following paragraphs. Tables 3 through 7 reporting this analytical data are attached. In addition, Table 8 summarizing the type, location, and identification of hazardous wastes and/or constituents exceeding GPSs at individual SWMUs is attached.

Footnotes:

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

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

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): American Airlines MCI-Maintenance and Engineering (M&E) Base has installed numerous monitoring wells throughout the following locations at the M&E Base Kansas City International Airport: Surface Impoundment Area (SI Area), Ravine Area, Superhangar/Wetdock Area, Barrel House/Oleum Still Area and SWMU 8 (see attached Figure 1). Areas of impacted groundwater were characterized and summarized in the RCRA Facility Investigation (RFI) (March, 1994). Wells at the SI Area (RCRA regulated unit) include twelve groundwater wells and two surface water sampling points where groundwater discharges to Todd Creek. These samples are analyzed for VOCs and total petroleum hydrocarbons. At the Ravine Area (RCRA regulated unit), nine well locations are monitored and analyzed for VOCs and total metals including arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. Six groundwater wells and two surface water locations in the west tributary of Todd Creek are monitored in the Superhangar/Wetdock Area. These samples are analyzed for VOCs, total copper, and total lead. At the Barrel House/Oleum Still Area, ten monitoring wells are sampled and analyzed for VOCs only. Finally at SWMU 8, three wells and the sump are sampled and analyzed for VOCs, cyanide, and the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Figure 2 summarizes the nature and extent of groundwater contamination present at the American Airlines M&E Base. The relative magnitude

of the contamination present is represented by the different shades of color. Figures 3 through 7 illustrate the groundwater monitoring well network for each area.

Based on the identified contaminants and predicted plume behavior, networks of monitoring wells were designed and installed to allow tracking of contaminant concentrations in source/plume areas. Additionally, perimeter and compliance wells were installed to monitor for the possibility of contaminant migration. Currently, wells are sampled on a semi-annual basis in accordance with the MDNR approved Groundwater Sampling and Analysis Plan (SAP) (December, 1998). Annual and semi-annual reports of the results have been produced since 1986 for the SI Area, with other areas being added to the sampling strategy as they were identified.

A total of 40 monitoring wells are sampled twice each year, in addition to one sump and several surface water sample locations where groundwater recharges surface water bodies. Areas of groundwater contamination are expected to remain within the dimensions of the "existing area of groundwater contamination" as documented in the 2001 Semi-Annual Groundwater Corrective Action Report (August, 2001) and the Corrective Measures Implementation Report (March, 2001).

Current results of groundwater sampling at the SI Area confirmed that contaminated groundwater has not migrated. All perimeter wells were reported as non-detect for VOCs and all metals, except for cyanide, are well below the GPS at one location. One general water quality well (located within the documented plume area) indicated concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene, and vinyl chloride above GPSs. Other wells in the area had detectable VOC concentrations that were below GPSs. VOCs were detected at both surface water sampling locations, but the levels were below GPSs.

At the Ravine Area, the most recent sampling data indicated an exceedence in one compliance well and a couple of questionable results. Two general groundwater quality wells had VOC detections, but the concentrations appear to have remained relatively unchanged. Metals detected in the Ravine Area were all below GPSs with the exception of an anomalous detection of thallium at two locations. These two locations were resampled and sent to different laboratories for analysis where all results were non-detect. All compliance wells were non-detect except for M238 which tested positively for cis-1,2-DCE, TCE, and PCE with TCE and PCE at concentrations in excess of the GPS. In July-December 2000, TCE was detected at a concentration of 7.7 µg/L which exceeds the GPS of 5 µg/L. The monitoring report submittal for January-June of 2001 indicated detections of TCE at 13 µg/L and PCE at 6.7 µg/L, and the most recent groundwater sampling event in October 2001 had detections of TCE at 10.4 µg/L and PCE at 4.6 µg/L. Statistical methods were employed to demonstrate whether the exceedences are statistically significant as presented in the CMI Report (March, 2001). Currently, the concentrations of TCE and PCE fall within their respective calculated tolerance intervals thereby

indicating statistical insignificance. Additionally, QA/QC review of the three VOC detections at M238 for the January through June 2001 data reported that the results were qualified as estimated because they had elevated surrogate percent recoveries. The current recommendation is for additional sampling to evaluate the possibility of a trend.

At the Superhangar/Wetdock Area, VOCs detected above GPSs included PCE (one location), TCE (five locations), cis-1,2-DCE (three locations), vinyl chloride (one location), methylene chloride (two locations), and benzene (one location). Total copper detections in all monitoring wells were below GPSs. Total lead exceeded the GPS in three monitoring wells, but historical data has indicated that filtered samples from these locations have not had dissolved lead detected in them. The two surface water sample locations at the Superhangar/Wetdock Area were found to be non-detect for VOCs, copper, and lead thus indicating that there has not been plume migration to the surface water. In addition, recharge due to precipitation in the Superhangar Area is minimal given that most of the area is covered by concrete and buildings.

Monitoring wells at the Barrel House/Oleum Still Area in the known contamination showed detections of at least one VOC at concentrations above GPSs. Of the two wells screened in bedrock, one was non-detect and the other had a total VOC concentration of 2 µg/L. Perimeter wells were all below GPSs, except for MW114 with TCE detected at 71 µg/L. The subsurface conditions at the Barrel House consist of a thick overburden of glacial till (approximately 75 ft). The monitoring wells in the area are screened at the water table (30-40 ft. below ground surface (bgs)) and at 65-75 ft bgs for the lower till. The underlying bedrock is the Rock Lake Shale, which has an extremely low hydraulic conductivity from slug tests during the RFI and has no volatile organic compound (VOC) contamination from monitoring wells located in the area. This information is the basis for the conclusion determined in the RFI that the Rock Lake Shale is an aquitard. Therefore, contaminated groundwater migration is only horizontal in the Barrel House Area.

The horizontal migration of groundwater in the Barrel House Area is minimal due to the low hydraulic conductivity of the glacial till material. The Barrel House is also located in the center of the 400 acre facility which in turn is surrounded by restricted property owned by the City of Kansas City Aviation Department. There is contamination detected in perimeter monitoring wells for the glacial till downgradient of the Barrel House Area (M114, M110). However, immediately down gradient of the Barrel House Area is the Superhangar Area (see attached Figure 8). The nearest down gradient well from the Barrel House Area is Monitoring Well M113. This well has been sampled several times and shows no detection of VOCs above the GPSs. Therefore, the migration of contamination from the Barrel House Area has not reached the Superhangar Area. The Superhangar Area does have an independent plume of VOC groundwater contamination that in turn has perimeter monitoring wells. The extent of VOC groundwater contamination in the Superhangar Area is defined by the existing monitoring well network. The

conclusion is that although there have been exceedances of GPSs for VOCs in the perimeter monitoring wells at the Barrel House, the downgradient groundwater quality is well defined and a great distance to any potential receptor as demonstrated in the groundwater fate and transport modeling from the CMS.

All groundwater samples taken from the SWMU 8 area were non-detect with the exception of M234. The only VOC detected was cis-1,2-DCE, but it was below the GPS. All RCRA metals were below GPSs except for lead at M234.

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?

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): An interceptor trench was installed at the north end of the SI Area because contamination was known to be migrating from the SI Area to the surface waters of Todd Creek (RCRA Corrective Measures Implementation Report, March 2001). VOCs were detected at both surface water sampling locations, but the levels were below GPSs. After residual contamination between the trench and surface water is flushed out, migration of contaminated groundwater to surface water should diminish.

Groundwater from the Superhangar/Wetdock Area discharges to the west tributary of Todd Creek. Non-detect sampling results from two locations in the creek demonstrate that groundwater discharging to the creek from this area is not contaminated. The two surface water sample locations were found to be non-detect for VOCs, copper, and lead.

5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ of each contaminant discharging

into surface water is less than 10 times the appropriate groundwater “level,” and there are no other conditions (e.g., the nature or 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 concentration³ 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.

_____ If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ 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 concentrations³ greater than 100 times the 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): The contaminants discharging to the creek from the SI Area are PCE, TCE, cis-1,2-DCE, and vinyl chloride. The concentrations of all contaminants are below the GPS and are thus considered to be “insignificant.” No other conditions exist that would significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations.

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

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 implemented⁴)?

_____ 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 specialist(s), 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 cannot be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments and/or eco-systems.

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

Rationale and Reference(s): _____

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

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

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify

that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

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

If no - enter “NO” status code in #8.

If unknown - enter “IN” status code in #8.

Rationale and Reference(s): Groundwater sampling and monitoring will continue in accordance with the Missouri Hazardous Waste Facility Permit (MOD043935048) and the approved Sampling and Analysis Plan (December, 1998). Tables 9 through 15 summarizing the sampling frequency and parameters for the regulated units and SWMU areas are attached. Results will be presented in Semi-Annual Groundwater Reports as required by the permit.

8. Check the appropriate RCRA Info 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 American Airlines M&E Base facility, EPA ID # MOD043935048, located at Kansas City International Airport. 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.

Facility: American Airlines MCI-Maintenance and Engineering Base
CA 750
Page 10 of 10

Completed by: (Signature) Original signed by Natalie Roark _____ Date: 5/30/02
(Print) Natalie Roark, P.E. _____
(Title) Environmental Engineer III _____

Supervisor: (Signature) Original signed by Richard Nussbaum _____ Date 5/31/02
(Print) Richard A. Nussbaum, P.E., R.G. _____
(Title) Chief, Corrective Action Unit _____
(State) Missouri Department of Natural Resources
Hazardous Waste Program _____

Locations where References may be found:

EPA and the Missouri Department of Natural Resources have received copies of all reports and correspondence in reference to this facility. The American Airlines M&E Base facility files are located at: _____

Missouri Department of Natural Resources _____

Hazardous Waste Program _____

1738 East Elm Street _____

Jefferson City, MO 65101 _____

and _____

U.S. Environmental Protection Agency, Region VII _____

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