

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

**RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA725)
Current Human Exposures 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 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 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 "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 EIs 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 is 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 the 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).

- 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 [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 (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>VOCs (primarily trichloroethylene (TCE),</u>
Air (indoors) ²	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>tetrachloroethene, cis-1,2-</u>
Surface Soil (e.g., <2 ft)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>dichloroethane, vinyl chloride), SVOCs</u>
Surface Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>(phenols, benzene, chlorobenzene),</u>
Sediment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>metals (arsenic, copper, lead).</u>
Subsurf. Soil (e.g., >2 ft)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>(See below for rationale on all</u>
Air (outdoors)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>contaminated media)</u>

_____ 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): In 1989, the RCRA Corrective Action Process was initiated at the American Airlines MCI-Maintenance and Engineering Base (American Airlines). To date, this process has included a RCRA Facility

Assessment (RFA), a RCRA Facility Investigation (RFI), Corrective Measures Study (CMS), and Corrective Measures Implementation (CMI). These reports, along with a Current Conditions Report (CCR), detail the nature and extent of contamination in soil and groundwater at each of the Solid Waste Management Units (SWMUs). The media of concern at the American Airlines M&E Base are soil, groundwater and surface water. The contaminants of concern are VOCs, SVOCs, and metals. Figures 1 and 2 summarize the nature and extent of groundwater and soil contamination present at the American Airlines M&E Base. The relative magnitude of the contamination present is represented by the different shades of color.

Surface and Subsurface Soil and Sediment:

Regarding soils and sediment, remedial activities for these media were completed at numerous SWMUs throughout the corrective action process. The remedial activities are detailed in the RFI Report (March 1994) and CMI Report (March 2001). Contamination remains in soils of the two regulated land disposal units (SI Area and Ravine Area) and SWMU 8, however these areas have been capped to prevent the possibility of human contact with contaminated soil and restrict the downward infiltration of water from precipitation. Other SWMUs have residual soil contamination; however, since most of the American Airlines M&E Base is under pavement or other cover, the potential for direct exposure to contaminated soil is low. A risk assessment demonstrates that the remaining soil and sediment contamination does not pose any current risk to human health and the environment. Potential risk may exist in the event on-site workers are exposed to contaminated soil and sediment during construction activities. The attached Table 1 identifies the record of type, location and concentrations of hazardous wastes and/or hazardous constituents remaining in the soil at the American Airlines M&E Base.

Additionally, in accordance with Special Permit Condition V.C. of the Missouri Hazardous Waste Management Facility Permit, American Airlines M&E Base is required to notify the Missouri Department of Natural Resources (department) prior to any planned future construction, excavation, or maintenance and repair activities to be conducted at any SWMUs with residual soil contamination to ensure that any necessary precautions are taken when disturbing and/or exposing any contaminated environmental media at the facility. American Airlines M&E Base must also file restrictions in the property chain of title and complete deed notification requirements to identify the presence of soil and groundwater contamination exceeding background or risk-based concentrations at the American Airlines M&E Base in an effort to assist in preventing future exposure to residual contamination in soil and groundwater.

Groundwater/ Surface Water:

Water quality is continually monitored on a semi-annual basis in accordance with the approved December 1998 Sampling and Analysis Plan, and results are reported and submitted to the department. Samples are collected from the Surface Impoundment (SI) Area, Ravine Area, Superhangar/Wetdock Area, Barrel House/Oleum Still Area and SWMU 8. Areas of impacted groundwater were

characterized and summarized in the 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 land disposal 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). Figures 3-7 illustrating the monitoring well locations for each area are attached, and Table 2 identifies the record, type, location and concentrations of hazardous wastes and/or constituents remaining in the groundwater.

Concentrations of several contaminants have been detected at levels slightly above the Groundwater Protection Standards (see Table 3) specified in the Post-Closure Permit and are reported in the Semi-Annual Groundwater Corrective Action Reports. The most recent groundwater monitoring report submittal was for January through June of 2001. Tables 4-8 summarizing this groundwater analytical data are attached.

All but two of the exceedences during July-December 2000 were in samples taken from monitoring points within the known areas of contamination. These areas, the Ravine Area and Barrel House/Oleum Still Area, have been shown not to present a risk to human health. One exceedence occurred at a compliance well – M238 in the Ravine Area. 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 that the exceedences are not statistically significant. 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 Barrel House/Oleum Still Area, monitoring wells in the known contamination showed detections of VOCs at concentrations above GPSs. Perimeter downgradient wells were all found to be non-detect for VOCs, except for M114 with TCE detected at 71 µg/L. Of the two wells screened in bedrock, one was non-detect and the other had a total VOC concentration of 2 µg/L.

At the Superhangar/Wetdock Area, monitoring wells within the source area of contamination had VOC detections exceeding the GPSs. Although several locations had detections above GPSs, surface water samples indicate that none of the constituents of concern have migrated to surface water. Total lead exceeded the GPS at three monitoring wells; however, historically, field filtered split samples have not had lead concentrations reported in the dissolved form.

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.

Air (indoors and outdoors):

To estimate vapor phase concentrations of VOCs at receptor points both outside and inside a building, American Airlines M&E Base conducted vapor transport modeling. Vapor migration potential from soil to air and from surface water to air was determined; however, vapor migration from groundwater to ground surface was not evaluated because of the distance to the water table and the predominance of silty clay soil at the American Airlines M&E Base making migration of significant concentrations unlikely to reach ambient air at the surface in significant or measurable concentrations. The results of the vapor phase concentrations were then used for the indoor and outdoor exposure scenarios in a baseline risk assessment. Areas that were indicated as potentially posing significant human health risk were then included in the CMS. The risk assessment is contained in Appendix D of the February 1996, CMS. All SWMUs at the American Airlines M&E Base were found to either be below risk-based screening levels or to not pose unacceptable risks to human health.

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) suggests 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)

<u>"Contaminated" Media</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	<u>no</u>	<u>yes</u>	<u>no</u>	<u>yes</u>			<u>no</u>
Air (indoors)							
Soil (surface, e.g., <2 ft)	<u>no</u>	<u>yes</u>	<u>no</u>	<u>yes</u>	<u>no</u>	<u>no</u>	<u>no</u>
Surface Water	<u>no</u>	<u>yes</u>			<u>yes</u>	<u>yes</u>	<u>no</u>
Sediment							
Soil (subsurface e.g., >2 ft)	<u>no</u>	<u>yes</u>		<u>yes</u>		<u>no</u>	
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): Groundwater at the American Airlines M&E Base is not a potential drinking or domestic water source, therefore residents were not considered a potentially exposed population. Because groundwater occurs at depths greater than 20 feet, the only potential for exposure to contaminated groundwater exists in the event contaminated groundwater comes into contact with workers during construction and/or sampling activities. A potential exposure pathway to contaminated surface water is where groundwater discharges to Todd Creek and Brush Creek. Again, exposure to

surface water may occur to workers during construction and/or sampling activities. In addition, recreational child trespassers could be a completed exposure pathway through swimming activities via incidental ingestion, dermal contact, and vapors emanating from chemicals in surface water. However, the potential for trespassers is highly unlikely due to the extreme security measures implemented at the American Airlines M&E Base. In addition to airport security, American Airlines M&E Base maintains its own security fence at the perimeter of the property and a security force to control access to the Base.

Exposure of on-site workers to contaminated soil during construction activities was considered a potentially complete pathway via incidental ingestion, dermal contact, and inhalation of particulates and vapors originating from contaminated soil.

The media with potentially completed exposure pathways were screened against established risk-based concentration levels and, if those screening levels were exceeded, were evaluated for potential risk to human health in the CMS Report (February, 1996). The risk assessments determined that there was no unacceptable risk to human health from contaminants in soil and groundwater.

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

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 cannot 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): Each medium was evaluated for its potential impact on human health in the Corrective Measures Study (CMS Report) (February, 1996). In summary, contaminant levels were first compared to federal and state protection standards, including risk-based concentrations (RBCs) to screen for exceedences. Chemical concentrations detected in soil were screened against RBCs developed to protect for the following pathways: exposure by ingestion of chemicals in soil, chemical transfer from soil to air and exposure by inhalation, and chemical transfer from soil to groundwater and exposure through tap water use. If concentrations in soil were above RBCs, then migration of contaminants in the unsaturated zone was modeled to determine if contaminants were predicted to reach groundwater. When mass loading to the water table was indicated, modeling was performed to predict contaminant concentrations at the receptor locations – discharge to Todd Creek and Brush Creek. If concentrations in groundwater exceeded RBCs, then saturated zone transport modeling was performed to predict concentrations at Todd Creek or Brush Creek. A baseline risk assessment was conducted for each AOC where contaminants exceeded RBCs at the receptor location. The risk assessments determined that there was no unacceptable risk to human health from contaminants in soil and groundwater.

Screening of surface water data collected at Todd Creek indicated contaminant levels in excess of MCLs and Missouri Column VII Water Quality Criteria. Groundwater at the SI Area discharges into Todd Creek. Although the SI Area was determined not to present a potential risk to human health, American Airlines M&E Base installed an interceptor trench and vacuum enhanced groundwater extraction (VEGE) system at the SI Area to prevent/minimize discharge of impacted groundwater to surface water. Following initial flushing out of residual contamination between the trench and the headwaters of the creek, discharge of contaminated water to the creek is expected to subside and be diverted to the treatment system associated with the interceptor trench. The analytical results demonstrate that the VEGE system is operating as designed and is effectively removing VOCs prior to discharge to the POTW. In addition, migration of VOCs in the subsurface at SWMU 8 to Brush Creek was identified to exceed protection standards based on modeling results. However, the risk assessment concluded that there was no significant risk at Brush Creek from the levels of contamination predicted from the model. Despite these findings, corrective actions were recommended by American Airlines M&E Base to control the identified source of VOC contamination as a preventive action, therefore American Airlines M&E Base installed a barrier wall and protective cover at SWMU 8 to prevent migration of remaining contamination. Additionally, long-term groundwater monitoring programs have been implemented at the SI area, Ravine Area, Superhangar/Wetdock Area, Barrel House/Oleum Still Area and SWMU 8. Groundwater is sampled at key locations to monitor for contaminant migration. Implementation of these corrective measures is described in detail in the CMI Report (March, 2001).

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?

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

Facility: American Airlines MCI-Maintenance and Engineering Base
CA 725
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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
RCRA Corrective Action and Permits Branch
Air, RCRA, and Toxics Division
901 N. 5th Street
Kansas City, KS 66101

Contact telephone and e-mail numbers

(Name): Natalie Roark
(Phone #): (573) 751-3553
(E-mail): nrroarn@mail.dnr.state.mo.us

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.