DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures UnderControl

Facility Name: **Ashland Chemical Company Distribution Services Organization (DSO)**
Facility Address: **8500 South Willow Springs Rd, Willow Springs, IL 60480**
Facility EPA ID #: **ILD 980700538**

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?

__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 "Current Human Exposures Under Control" EI

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

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

	Yes	No	?	Rationale / Key Contaminants
Groundwater	_X__	___	___	VOCs, SVOCs, PAHs, Organochlorine and Organophosphorous Pesticides, metals
Air (indoors)[2]	___	_X__	___	
Surface Soil (e.g., <2 ft)	___	_X__	___	
Surface Water	___	_X__	___	
Sediment	___	_X_	___	
Subsurf. Soil (e.g., >2 ft)	_X__	___	___	Trans-1,2 dichloroethene, tetrachloroethylene, 1,1,1-trichloroethane, toluene, ethylbenzene, xylenes (total), benzene, 1,2-dichloroethane, dichloromethane, 1,2-dichloropropane, trichloroethylene
Air (outdoors)	____	X_	____	

_____ 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.

__X__ 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.

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

Rationale and Reference(s):

SOIL

Soil samples were taken from various locations of the facility during the period from 1992 to 1999, and 2004. Results of soil sampling and comparison to TACO Tier I Industrial Remedial Objectives (ROs) are presented in Tables 1-1 through 1-3. Subsurface soil samples were taken during the removal of three hazardous waste underground storage tanks (USTs). Chemical concentrations above TACO Tier I industrial soil ROs were found around each UST. Four subsurface soil samples were collected from three locations during an upgrade of the groundwater interceptor trench/treatment system (GWTS) in 1999. One subsurface sample was reported to exceed Tier I industrial soil RO for one chemical (trichloroethene). Soil samples were also taken in 1997 as part of the plant upgrade. Four SWMUs (3, 4, 6 and 16) were within the planned facility upgrades. Two subsurface soil samples were collected from each SWMU, except for SWMU 16, and analyzed for VOCs and metals. No Tier I industrial soil ROs exceedances were noted for any of the soil samples.

Soils at the former hazardous waste UST's were excavated and removed. Then, the area was backfilled with clean fill, and capped with a modified RCRA cap. Therefore, they do not pose any risk to the current industrial/commercial and hypothetical future construction worker on site. The analytical results of the surface soil sampling at other potential source areas indicate that surface soils are not impacted.

- Closure Report and Post-Closure Plan, Revision 3, Ashland Chemical, Inc. Industrial Chemicals and Solvents Division, Willow Springs, Illinois. ILD 980700538, July 16, 1992, (Appendix C).
- Interceptor Trench Evaluation, Ashland Chemical Company, Willow Springs, Illinois. ILD 980700538, 2000.

- Soils Investigation For Solid Waste Management Units Within The Plant Upgrade Areas, Ashland Chemical Company, Willow Springs, Illinois. ILD 980700538, December 19, 1997, (Appendix D).

- Technical Memorandum, Environmental Indicator for Surface Soil, URS Diamond, February 18, 2004.

GROUNDWATER

Investigations indicate that the groundwater is impacted in the vicinity of the former USTs. Seventeen 1,000-gallon steel USTs, which provided fuel to the engine test cells operated by the Department of Defense, were closed in place. On the basis of the February 2003 "Final Limited Preliminary Assessment Report", other potential sources of hazardous substances in the groundwater include the above ground storage tanks, which formerly contained diesel fuel, toluene, xylene, mineral spirits, naptha, perchloroethylene and trichloroethylene located at the southeast end of the property and the drainage system associated with the test cells which includes pipes, sumps, and manholes.

Chemical concentrations above the groundwater Class I ROs were found in both the shallow hydrostratigraphic unit (HSU-1) and the deep hydrostratigraphic unit (HSU-2).

Groundwater Risk Evaluation, Ashland Chemical Company, Willow Springs DSO Facility, Willow Springs, Illinois. ILD 980700538, October 8, 1999, (Appendix B).

- 1,1-dichloroethane, 1,4-dichlorobenzene, benzene, chlorobenzene, chloroform, cis-1, 2- dichloroethene, ethylbenzene, methylene chloride, styrene, tetrachloroethene, trichloroethene, and vinyl chloride exceed Class I groundwater ROs in HSU-1. (Section 4.1.1 and Table 4-1).

- 1, 1, 1-trichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, TCE, and vinyl chloride exceed Class I groundwater ROs in HSU-2. (Section 4.1.2 and Table 4-2).

In-Place Tank Closure, Phase I Site Assessment, Willow Springs, Illinois, February 1998, (Appendix C).

- Toluene, tetrachloroethene, trichloroethene, vinyl chloride, benzo(a) anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, naphthalene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, arachlor and atrazine exceed Class I groundwater ROs in the samples collected from the test cells USTs which were closed in place. (Section 3.3, Table 2).
- Antimony, copper, iron, lead, manganese, thallium and nitrate exceed Class I groundwater ROs in the samples collected from the test cells USTs which were closed in place. (Section 3.3, Table 3).

Revised Site Characterization Report, Ashland Chemical Company, Willow Springs DSO Facility, Willow Springs, Illinois, January 18, 1999, (Appendix E).

- Dense Non-Aqueous Phase Liquid (DNAPL) was discovered in monitoring well MW-10D in 1996. Review of historic results from 1985 indicates that free phase DNAPLs were not present in MW-10D (Section 3.2.6).
- DNAPL was not detected in MW-10DR, which replaced MW-10D in 1998 to eliminate the possibility of cross-contamination between stratigraphic units.

Final Limited Preliminary Assessment Report, Former Air Force Test Cells Site, Willow Springs, IL, February 2003, (Appendix A).

Footnotes:

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

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile

contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

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

Instructions for Summary Exposure Pathway Evaluation Table:

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

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

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

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

YES 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):

The following information was obtained from

1. Groundwater Risk Evaluation. Ashland Chemical Company, Willow Springs DSO Facility, Willow Springs, Illinois. ILD 980700538, October 8, 1999, (Appendix B).
2. Final Limited Preliminary Assessment Report, Former Air Force Test Cells Site, Willow Springs, IL, February 2003, (Appendix A).
3. Closure Report and Post-Closure Plan, Revision 3, Ashland Chemical, Inc. Industrial Chemicals and Solvents Division, Willow Springs, Illinois. ILD 980700538, July 16, 1992, (Appendix C).
4. Technical Memorandum, Environmental Indicator for Surface Soil, URS Diamond, February 18, 2004.

The site is not used for habitation, has no full time residents, and does not house any recreational, healthcare, day care, or playground facilities. No recreational areas are located within the facilities boundary, and no growth of crops, grazing of livestock, or harvesting of fish occurs on the property. There are no human exposures to contaminated groundwater on- or off-site. A well-maintained security fence surrounds the site.

Groundwater – No complete pathway because there are no potable wells on residential property completed in the shallow sand or gravel perched aquifer within 2,500-foot radius of the site and Willow Springs receives its water from Lake Michigan. Workers: Groundwater – No complete pathway because there are no supply wells onsite. Water for all operational use is obtained from the village of Willow Springs. A vendor supplies drinking water in the form of 5-gallon water bottles. There are no construction activities under the current use. If construction activities were to take place in the future, pathways to groundwater via inhalation and dermal exposures are potentially complete at locations where shallow groundwater (5-12 feet bgs) is present. Groundwater is collected and treated in a groundwater interceptor trench/treatment system.

Indoor Air - Most of the facility is covered with structures, pavement, and concrete. Air beneath the manhole covers in the warehouse is suspected to contain trichloroethylene, vinyl chloride, and carbon tetrachloride based on field screenings. However, the manholes were previously sealed prior to using the building as a warehouse (Appendix A, Preliminary Assessment, Section 5.4). Also buildings onsite do not have basements and all building slabs are 12 inches thick or more. (Appendix A, Groundwater Risk Evaluation, Section 3.4) Although the depth to water table in the shallow hydrostratigraphic unit is relatively shallow (5 – 9 ft below ground surface (bgs)), the mean value for hydraulic conductivity is 1.487 ft/day suggesting that the soil is fairly impermeable and no volatilization of VOCs from groundwater to indoor air is expected (Appendix B, Groundwater Risk Evaluation, Section 2.2.2).

Surface Water - Although Tier 2 modeling suggests exceedances of Class I groundwater ROs and human criteria for surface water bodies, storm water sampling results reported all compounds either non-detect or below surface water quality criteria. (Appendix B, Groundwater Risk Evaluation, Sections 4.4 and 4.5). In addition, there are no complete surface water exposure pathways (e.g., wading) associated with the surface water body on the adjacent railroad property due to the strict site access control.

Sediment – There are no sediments on-site. No sediment samples were collected from the storm water retention pond. However, sediments in the pond are not expected to be impacted because surface water sampling results reported that all compounds were either non-detect or below surface water quality criteria that no contamination is present in the sediments.

Subsurface Soil - Trans-1,2 dichloroethene, tetrachloroethylene, 1,1,1-trichloroethane, toluene, ethylbenzene, xylenes (total), benzene, 1,2-dichloroethane, dichloromethane, 1,2-dichloropropane, trichloroethylene were reported in subsurface soil samples at levels exceeding Tier 1 inhalation ROs for industrial/commercial worker. There are no construction activities under the current use. If construction activities were to take place in the future, pathways to soil via inhalation, incidental ingestion and dermal exposures are potentially complete. Potential risks to the hypothetical future construction workers are negligible because health and safety programs are in place that requires proper PPE for any construction or environmental work.

Outdoor Air – A carbon filter was installed on the air stripper as an upgrade to the groundwater treatment sytem July of 2004, eliminating the outdoor air pathway.

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)?

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

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

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

Rationale and Reference(s):

Groundwater

Potential risks to the hypothetical future construction workers are negligible from a risk perspective because health and safety programs are in place that requires proper PPE for any construction or environmental work. Further, the Groundwater Risk Evaluation Report indicates that the cancer and non-cancer risks for industrial/commercial and construction worker exposure are within the acceptable risk range and below the hazard threshold established by EPA.

Subsurface Soil

Soils at and around the former hazardous waste USTs were excavated and removed. Then the area was backfilled with clean fill and capped with a modified RCRA cap. Therefore, they do not pose a significant risk to the industrial/commercial and construction worker on site. Only one exceedance was noted in the soil samples collected (from 7.5 to 8 ft bgs) during the groundwater interceptor trench upgrade. The concentration of trichloroethylene was found to be slightly above the TACO Tier I soil RO for industrial/commercial exposure through inhalation. However, risk to construction workers that are potentially associated with the inhalation pathway is negligible because health and safety programs are in place that requires proper PPE for any construction or environmental work.

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

YE 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 Ashland Chemical Company facility, EPA ID # ILD 043 369 446, located at Calumet City, Illinois under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

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

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

Completed by (signature) _____ Date _____
(print) John Nordine
(title) Geologist

Supervisor (signature) _____ Date _____
(print) George Hamper
(title) Chief, Corrective Action Section
(EPA Region or State) EPA Region 5

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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.