

US EPA ARCHIVE DOCUMENT

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: BASF Inc. (North Works Facility)
Facility Address: 1609 Biddle Ave., Wyandotte, MI 48192
Facility EPA ID #: MID 064 197 742

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).

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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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			Metals, VOC and SVOC
Air (indoors) ²		X		No buildings above the contaminated subsurface soil. Groundwater contaminants did not exceed the indoor volatilization criteria.
Surface Soil (e.g., <2 ft)	X			Arsenic, 1,2 Dichloropropane, bis(2-chlorisopropyl)ether and SVOCs
Surface Water	X			A total of 19 wells exceeded the part 201 groundwater surface water interface criteria for a wide range of contaminants.
Sediment	X			PAH, PCB, polychlorinated naphthalene and polychlorinated terphenyls.
Subsurf. Soil (e.g., >2 ft)	X			Chemicals exceeded criteria (see below)
Air (outdoors)	X			Benzene, naphthalene, 1,2 dichloropropane through soil volatilization criteria

— 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

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.

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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):

The 1999 Phase I RFI evaluated the nature and extent of four solid waste management units (SWMU's), and five areas of concern (AOC). Subsequent to the completion of the Phase I RFI Report, two additional AOC's (AOC 1 and AOC 8) were investigated as part of a “Toluene Remediation Investigation”. The exposures of workers to contaminated surface soils/fill as well as subsurface soils are reasonably expected to be significant because surface/subsurface soil/fill concentrations are above the applicable Michigan Department of Environmental Quality (MDEQ) Part 201 of Michigan Act 451 generic screening levels at numerous SWMU's and AOC's at the site. The applicable generic Part 201 soil screening criteria includes: industrial and commercial drinking water criteria, groundwater contact protection criteria, soil volatilization to indoor air inhalation criteria, infinite source volatile soil inhalation criteria for ambient air, particulate soil inhalation criteria, industrial and commercial II direct contact criteria and groundwater surface water interface protection criteria. Surficial and subsurface on-site soil contamination exceeded the most stringent of these criteria at several of the SWMU's and AOC's.

The site is currently active with daily chemical production and manufacturing activities taking place. The Phase I RFI soil sampling data revealed that all areas (SWMU's and AOC's) investigated (with the exception of one area RFIMW 08) exceeded at least one of the most conservative generic Part 201 soil screening criteria. The following summarizes the SWMU's and AOC's where generic Part 201 soil screening criteria were exceeded and hence can be reasonably expected to be pose as a significant exposure to applicable receptor populations: a) AOC 2 - arsenic exceeds the direct contact criteria, b) AOC 4 - several PAH's, i.e., benzo(a)anthracene, benzo(b)pyrene, benzo(b)fluoroanthracene, benzo(k)fluoroanthracene, chrysene, indeno(1,2,3-CD)pyrene, naphthalene, and phenanthrene exceed the soil direct contact criteria with several PAH's also exceeding the soil volatilization indoor air criteria and the infinite source volatile soil inhalation criteria for ambient air, c) AOC 6 - arsenic, benzene, benzo(a)pyrene, benzo(b)fluoroanthracene, dibenz(A,H)anthracene exceeded the soil direct contact criteria with benzene also exceeding the soil volatilization to indoor air inhalation criteria and the groundwater protection criteria. AOC7A, 7C, and SWMU G and H exceeded the direct contact criteria, and SWMU F and SWMU H exceeded direct contact criteria as well as ambient volatilization criteria.

References: (1) BASF Corporation, Final Phase I RCRA Facility Investigation Report, Vol. 1-3, February 1999; (2) BASF Corporation, RCRA Corrective Measures Study Field Program Report, March 2000; (3) BASF Corporation Risk Screening Summary Report, April 2005

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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)	No	Yes	No	Yes	No	No	No
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	No	No	No
Air (outdoors)	No	Yes	No	Yes	No	No	No

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):

Although contaminated, groundwater, surface water and sediment may not provide complete exposure pathway for

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

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the potential receptors for the following reasons:

All of the contamination is on-site. There are no residences, day-care, recreational opportunities, or food production on-site. The site is completely fenced to prevent trespassers from coming on-site. On-site groundwater is not used as a source of drinking water in Detroit and the nearby suburbs such as Wyandotte. The City of Wyandotte, Michigan Plumbing Code state in Article 3, Section P-303 "the water distribution system of any building in which plumbing fixtures are installed shall be connected to a public water main and sewer system, respectively". Hence the contaminated groundwater on-site is prohibited from potable usage by restrictive covenant. Tap water comes from Lake St. Clair and the Detroit River.

The Michigan Department of Environmental Quality (MDEQ) performed a sediment investigation in the Trenton Channel of the Detroit River. The results of this investigation are presented in a report entitled *Results of the Trenton Channel Project Summary Surveys 1993-1996*, dated July 1997. That report documents the presence of metals, PAHs, PCBs, oil and grease, and other contaminants throughout the Trenton Channel. Other industrial facilities located along the Trenton Channel have contributed to the sediment contamination, and this facility might have contributed as well. Trenton Channel sediment issues will be addressed through a separate project under the supervision of U.S. EPA's Great Lakes Program Office and the MDEQ. Accordingly, the sediment issues are outside the scope of this environmental indicator determination.

Consumption of fish from the Detroit River is limited due to several fish advisories. There is currently an advisory banning consumption of carp. There are also fish consumption advisories for freshwater drum, northern pike (for women and children), redhorse sucker (for women and children), walleye, and yellow perch (for women and children). These fish consumption advisories are size-dependent. Consult the *Michigan Fish Advisory Guide* for species lengths.

Although the groundwater is contaminated, a subsurface barrier wall and pump and treatment system are already in place to minimize the migration of contaminated ground water to Detroit river.

Five AOCs and three SWMUS were identified with exceedance of part 201 screening criteria through one or more exposure pathways. The Current worker activity is limited to either maintenance or facility workers. Maintenance workers are responsible for routine landscaping (i.e. grass cutting) and other minor repair activities and hence may be exposed to contaminated on-site soils. In addition, this receptor population may become exposed to on-site contaminants via inhalation of volatile organic compounds from contaminated surficial soils. Construction/Utility Workers may be required to perform soil excavations, trenching or other construction activities during a specified time period and hence may become exposed to contaminated surficial and subsurface soils and contaminated groundwater.

References: (1) BASF Corporation, Final Phase I RCRA Facility Investigation Report , Vol. 1-3, February 1999; (2) BASF Corporation, RCRA Corrective Measures Study Field Program Report, March 2000; (3) BASF Corporation Risk Screening Summary Report, April 2005; (4) Results of the Trenton Channel Project Summary Surveys 1993-1996, Michigan Department of Environmental Quality and USEPA, July 1997.

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)

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

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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
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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.”

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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.”

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

Rationale and Reference(s): The soil contamination identified in different SWMUs and AOCs although present complete exposure pathway for routine workers, it is unlikely that the exposure is considered significant. The rationale is provided below for the individual SWMUS and AOCs.

The maximum arsenic concentration that exceeded the screening criteria of 37 ppm in surface soil for direct contact criteria was 41 ppm, 62.4 ppm and 101 ppm respectively for AOC2, AOC 7A and SWMU G. Although the maximum concentration exceeded the screening criteria, the average concentration of arsenic in these areas were found to be well below the screening concentration and as a result considered to be equivalent to less than 1e-05.

SWMU H: The maximum subsurface soil concentration of 1,2 dichloropropane in SWMU-H is 50000 ppm with an average concentration of 4570 ppm when compared to the part 201 screening criteria of 7.4 ppm for indoor air volatilization, 31 ppm for ambient air volatilization and 550 ppm for direct contact. Although the mean concentration of 1,2 dichloropropane exceeded all these criteria the most relevant pathway is infinite source soil volatilization influencing ambient air inhalation. There are no occupied structures above this trench and therefore indoor air is not a medium of concern. Routine workers and construction workers normally under current conditions are not likely exposed to subsurface soil contamination. SWMU H is a group of ditches that have all been filled in with relatively clean material with grass growing on it. Since SWMU H and AOC 5 lie in dichloropropane area, This area was assessed for VOC emission rates. Air samples were collected from the flux chamber. Three sample locations were sampled three times each. At each location, samples were collected on three different days. The analytical data from these three locations were then compared to ambient air concentration. 1,2 dichloropropane was not detected in any of these locations and in the ambient air with the reporting limit of 0.8 ppb. Literature suggests that 1,2 dichloropropane has been detected at low levels in ambient air with an average level in air of about 0.022 ppb. Although the air analysis warrants further investigation with respect to more sensitive detection limits, for EI determination, the reported detection limits were compared against OSHA PEL limits. The

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exposure to ambient air concentration of for routine workers was found to be significantly less compared to OSHA PEL at 72.3 ppm.

SWMU F: The maximum concentration of Arsenic at 63.9 ppm exceeded the direct contact criteria. However, the average concentration of 23.2 ppm in soil was lesser than the screening criteria of 37 ppm. 1,2 dichloropropane in soil exceeded ambient air volatilization criteria. However, ambient air analysis confirmed the insignificance of this exposure pathway. 1,2 dichloropropane found at 0.8 ppb in ambient air was considerably lesser than OSHA PEL of 72.3 ppm.

AOC 4: The maximum and mean concentration of benzopyrene, benzoanthracene, benzo(b)fluoranthene, indenopyrene, benzo(k)fluoranthene exceeded soil direct contact criteria. Phenanthrene, toluene, naphthalene, benzene, benzopyrene and chrysene exceeded one or more part 201 risk screening criteria. AOC-4 is a tar pit that has been covered with gravel. All of the sample results reported for AOC-4 are subsurface soil samples. The contaminants identified in subsurface soil do not pose risk to routine workers or construction workers through direct contact at current conditions. However, ambient volatilization from subsurface may be of significant concern to routine workers. There is no evidence to indicate that coal tar might ooze upward through the gravel. Benzene and naphthalene were the two major contaminants identified exceeding the inhalation criteria. The ambient air concentration of 0.62 ppb of benzene detected in the site is found to be much lesser than OSHA PEL limit of 1ppm. Naphthalene was not detected in the ambient air at a reporting limit of 0.74 ppb which is significantly less compared to a OSHA PEL of 10 ppm.

AOC-6 :The maximum concentration of benzopyrene, arsenic , benzene, benzoanthracene, dibenzathracene and benzo(k)fluoranthene exceeded the soil direct contact criteria. The sample results reported for AOC-6 are all subsurface soil samples. Except benzopyrene the average concentration of other constituents were under the screening criteria. Although the average concentration of benzopyrene at 13.9ppm exceeded the screening criteria at 8 ppm, routine workers may not be at risk since the contamination is at subsurface. AOC 6 is a tar pit that has been covered with soil and has grass growing on it. Further, the limited exposure period which is approximately 1 hour per day in the contaminated location would likely result in higher screening criteria than compared to 8 hour exposure period as suggested by part 201 exposure assumptions. Benzene and naphthalene were the two major contaminants identified exceeding the inhalation criteria in this AOC . The ambient air concentration of 0.62 ppb of benzene detected in the site is found to be much lesser than OSHA PEL limit of 1ppm. Naphthalene was not detected in the ambient air at a reporting limit of 0.74 ppb which is significantly less compared to a OSHA PEL of 10 ppm.

Any subsurface excavation work would be covered by the facility's health and safety plan. Construction workers would be required to use the appropriate personal protective equipment to prevent unacceptable human health exposures whenever they come in direct contact with highly contaminated subsurface soils, buried wastes, or contaminated groundwater.

References: (1) BASF Corporation, Final Phase I RCRA Facility Investigation Report , Vol. 1-3, February 1999; (2) BASF Corporation, RCRA Corrective Measures Study Field Program Report, March 2000; (3) BASF Corporation Risk Screening Summary Report, April 2005

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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):

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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):

X

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

_____ facility, EPA ID #

_____, located at _____ 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	6/30/2005
	(print)	Juan Thomas		
	(title)	Environmental Scientist/Project Manager		

Supervisor	(signature)		Date	6/30/2005
	(print)	George Hamper		
	(title)	Corrective Action Section Chief		
	(EPA Region or State)	Region V		

Locations where References may be found:
USEPA Region V WPTD Records Center 77 W. Jackson Blvd Chicago, IL. 60604

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Locations where References may be found:

Contact telephone and e-mail numbers

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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.