

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: Fort Dodge Animal Health, Inc.
Facility Address: Charles City, Iowa
Facility EPA ID #: IAD005275540

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.

Manufacturing of animal health biologics, pharmaceuticals, feed additives, and fine chemicals began at the Fort Dodge Animal Health, Inc. (FDAH) facility location in 1951. The facility originally was owned by Salsbury Laboratories, Inc., and later by Solvay Animal Health, Inc. (Solvay). In 1991, Cambrex Corporation purchased the fine chemicals and feed additives manufacturing facilities identified as Salsbury Chemicals, Inc. (Salsbury), including Chemical Production I and II, the Wastewater Treatment Plant (WWTP), and 43 acres of associated property. American Home Products Corporation purchased the remainder of the Solvay facility in March 1997 and changed the name to FDAH. Facility location and layout maps are provided in Attachment 1.

Production facilities and storage structures on the FDAH and Salsbury properties include Pharmaceutical Production, Biological Production, Chemical Production I and II, the Extraction Plant, Warehouses 1 and 2, the Eastern Tank Farm (formerly identified as Storage Tank Area 1), the Southern Tank Farm (formerly identified as Storage Tank Area 2 and including Waste Sulfuric Acid Tanks 460, 630, and 631, and Waste Methanol Tank 153), and the Closed Waste Water Treatment Surface Impoundment. Also included are the facility product and waste lines, most notably an old sewer line running northeast from the facility and an 18-inch diameter sewer line running north to its outlet at Sherman Creek. Facility layout maps are provided in Attachment 1. Listed chemical constituents historically or currently managed in these locations are provided in Table 1 in Appendix 1.

Existing and historical SWMUs identified at FDAH are listed and described below.

- **Waste Sulfuric Acid Tanks 460, 630, and 631.** Tanks 630 and 631 are 20,255-gallon, fiberglass tanks located east of the wastewater treatment surface impoundment and south of the Chemical Production I building. These tanks are within the Southern Tank Farm area. Tank 460 is a 13,000-gallon, stainless-steel tank located immediately east of Tank 631. All of the tanks,

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which store spent sulfuric acid, are located within concrete secondary containment structures designed to prevent releases (Conestoga-Rovers & Associates [CRA] 1991). Waste Sulfuric Acid Tanks 460, 630, and 631 were identified as interim-status units (Ecology & Environment, Inc. [E&E] 1986).

- **Waste Methanol Tank 153.** Tank 153 is a 7,000-gallon steel tank located east of Tank 460. This tank is within the Southern Tank Farm Area. Tank 153, which stores waste methanol, is contained within a concrete secondary containment structure designed to prevent releases (CRA 1991). Waste Methanol Tank 153 was identified as an interim-status unit (E&E 1986).
- **Waste Container Accumulation Area.** The hazardous waste container accumulation area was located in Warehouse 1, an enclosed area with no floor drains. Warehouse 1 is the pharmaceutical building addition, located just south of the building's truck loading docks. The waste container accumulation area was identified as an interim-status unit (E&E 1986). In August 1994, the U.S. Environmental Protection Agency (EPA) certified that the waste container accumulation area had been closed in accordance with applicable requirements (EPA 1994).
- **Wastewater Treatment Surface Impoundment.** The WWTP was an on-site chemical, physical, and biological treatment facility that received process wastewater from the organic chemical production operation. Chemical treatment consisted of precipitation and neutralization, physical treatment consisted of resin adsorption, and biological treatment consisted of extended aeration of activated sludge. The chemical treatment facility and equalization lagoon were constructed in 1965, the physical treatment facility in 1979, and the biological treatment facility in 1984. Wastes generated in association with the WWTP included process wastewater and sludges and *de minimis* amounts of off-specification commercial products. The wastewater treatment surface impoundment had a capacity of about 1,000,000 gallons. The impoundment handled 150,000 gallons of wastewater on a typical day; however, it was designed to handle up to 500,000 gallons on peak days (E&E 1986). In April 1985, releases to the environment from the wastewater treatment surface impoundment were reported. Hazardous constituents within the wastewater included arsenic, phenols, and 1,1,2-trichloroethane (TCA) (Salsbury 1985a). The wastewater treatment surface impoundment was identified as an interim-status unit (E&E 1986). In 1989, the wastewater treatment surface impoundment was closed in place as a landfill. Associated piping and manholes outside the impoundment perimeter were flushed and disposed of within the closed impoundment. Closure activities were completed on April 18, 1990 (CRA 1991).

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 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. ___

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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 [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	<u>X</u>	—	—	_____
Air (indoors) ²	—	<u>X</u>	—	_____
Surface Soil (<2 feet)	—	<u>X</u>	—	Please See
Surface Water	—	<u>X</u>	—	Description Below
Sediment	—	<u>X</u>	—	_____
Subsurface Soil (>2 feet)	<u>X</u>	—	—	_____
Air (outdoors)	—	<u>X</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.

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.

_____ If unknown (for any media) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

For each media at FDAH, the following rationale and contaminants were considered.

Soil (surface and subsurface). Two locations within the study area have historically shown surface (<2 feet deep) and subsurface (>2 feet deep) soil contamination with total arsenic concentrations above the EPA-specified action level of 80 milligrams per kilogram (mg/kg) (CRA 1993; Waste Technology, Inc. 1996). The first area of soil contamination encompasses the overflow wier, the 18-inch-diameter sewer, and the 18-inch-diameter sewer outlet at Sherman Creek. Impacted soils are located south and north of Highway 14 and extend north of the facility to Sherman Creek. Impacted soils in this area cross FDAH property, the highway right-of-way, and City of Charles City property. The second area of soil contamination includes the Eastern Tank Farm and Southern Tank Farm. Both tank farms are located on FDAH property and are part of active production facilities.

Historically, two 40 Code of Federal Regulations (CFR) Part 261 Appendix VIII constituents have been detected in facility soils above EPA Region 9 soil screening levels (SSL) for migration to groundwater. Arsenic and 1,1,2-TCA have exceeded their respective SSLs at dilution attenuation factors (DAF) of 1

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and 20. However, only arsenic has exceeded an EPA-specified soil action level (80 mg/kg). In samples collected from the vicinity of the Southern Tank Farm, arsenic was detected at concentrations up to 8,180 mg/kg in surface soil and 45,900 mg/kg in subsurface soil. Table 2 in Appendix 1 lists the facility-specific Appendix VIII contaminants historically detected in soil at FDAH.

In response to the above detections, FDAH implemented interim/stabilization measures (ISM) consisting of excavation and off-site disposal of contaminated soils in the above locations. Verification soil sampling in the excavated areas indicated that the bulk of the soil remaining had total arsenic concentrations below the EPA-specified 80-mg/kg action level. Exceptions included some sidewall verification samples with arsenic concentrations up to 267 mg/kg. These soils were considered to be impossible or impractical to remove; however, they were located under existing structures or were covered with 2.5 to 3 feet of clean backfill.

In November 2000, FDAH conducted surficial soil sampling on public property areas where soil was remediated during the above ISMs. The public property areas included the City of Charles City's Wildwood Golf Course and the Iowa Department of Transportation Highway 14 right-of-way, located north of FDAH. Total arsenic detections in surficial soil ranged from 3.3 to 38.2 mg/kg in the stormwater swale area of the Wildwood Golf Course and from 4.5 to 21.5 mg/kg in the stormwater swale discharge area at Sherman Creek. Total arsenic detections ranged from 6.7 to 24.8 mg/kg along the Highway 14 right-of-way. The statistical mean and 95 percent upper confidence level total arsenic concentrations were 10.1 and 12.1 mg/kg, respectively, for the Wildwood Golf Course, and 13.3 and 16.0 mg/kg, respectively, for the Highway 14 right-of-way. These concentrations exceed the facility-specific average background concentration for total arsenic of 6 mg/kg and the EPA Region 9 Preliminary Remediation Goal (PRG) for total arsenic in industrial soil of 2.7 mg/kg.

Surface Water and Sediment. Surface water discharge at FDAH is regulated by Iowa National Pollutant Discharge Elimination System (NPDES) Permit 3405001. A series of drainages at FDAH divert all surface water runoff and cooling tower overflow drainage to a single permitted outfall (001) on the northern facility boundary. About 1,000 feet north of the boundary, the outfall flows into Wildwood Creek, an unclassified stream. About 1 mile northeast of FDAH, Wildwood Creek joins the Cedar River, an Iowa Class B water body protected for wildlife, aquatic, or semi-aquatic life, and secondary contact water use. No surface water intakes for drinking water are located within 3 miles of FDAH.

Historically, hazardous constituents potentially were released from overflow of the surface water impoundment to surface water. Following reported overflows of the surface water impoundment in 1984 and 1985, facility samples collected from NPDES Outfall 001 revealed total arsenic concentrations of 1,830 micrograms per liter ($\mu\text{g/L}$) in August 1985 and 430 $\mu\text{g/L}$ in November 1985. Outfall 001 arsenic detections exceeded the EPA Maximum Contaminant Level (MCL) of 10 $\mu\text{g/L}$. Similarly, sediment samples collected downstream of Outfall 001 contained elevated levels of arsenic and orthonitroaniline relative to upstream sediment samples. In 1990, closure of the surface water impoundment was completed, and no releases of wastewater to surface water or detections of arsenic above the MCL have been documented in the record since that time.

Groundwater. The RCRA Facility Investigation (RFI) Report documented that historical facility operations contributed to bedrock groundwater contamination at, and in the vicinity of, the FDAH

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facility (CRA 1993). The report identified two locations in the study area as exhibiting groundwater contamination: the production facility and an old sewer line in the northeastern corner of the study area. Beneath the FDAH and Salsbury production facilities are two groundwater plumes contaminated primarily with arsenic and 1,1,2-TCA. One plume is located in the Upper Limestone Unit (ULU); the other plume is located in the Upper Cedar Valley Aquifer (UCVA). Beneath the old sewer line is a 1,1,2-TCA plume located in the ULU.

The RFI Report and subsequent data collected indicate that a number of facility-specific 40 CFR Part 261 Appendix VIII volatile organic compounds (VOC) historically have exceeded their respective MCLs or PRGs in ULU groundwater: benzene; 1,2-dichloroethane (DCA); 1,1,-dichloroethene (DCE); methylene chloride; tetrachloroethene; 1,1,2-TCA; trichloroethene (TCE); and vinyl chloride. Detections were compared to EPA Region 9 PRGs only where no MCL was established for a compound. The following base, neutral, and acid-extractable organic compounds (BNA) historically have exceeded their respective MCLs or PRGs in groundwater: aniline, methyl phenol (p-cresol), m-dinitrobenzene, 2-nitroaniline, and pentachlorophenol. Additionally, the following metals historically have exceeded their respective MCLs or PRGs in groundwater: arsenic, barium, cadmium, chromium, and lead. The RFI Report and subsequent data collected also indicate that a number of facility-specific 40 CFR Part 261 Appendix VIII VOCs, BNAs, and metals historically have exceeded their respective MCLs or PRGs in UCVA groundwater: 1,2-DCA; 1,1,-DCE; methylene chloride; 1,1,2-TCA; TCE; vinyl chloride; 2-nitroaniline; arsenic; and barium. Tables 3 and 4 in Appendix 1 identifies the facility-specific Appendix VIII constituents historically present in ULU and UCVA groundwater, respectively.

FDAH recently installed a groundwater extraction and treatment system which has reduced contaminant levels in groundwater. The first semiannual sampling event following installation of this system was conducted in January 2002 (see Attachment 2). Samples collected during this event revealed that the following constituents exceeded their respective MCLs in ULU groundwater: 1,2-DCA; 1,1-DCE; 1,1,2-TCA; vinyl chloride; arsenic; and lead. In UCVA groundwater, 1,1,2-TCA, vinyl chloride, and arsenic exceeded their respective MCLs. Tables 3 and 4 in Appendix 1 identify the facility-specific Appendix VIII constituents present in ULU and UCVA groundwater, respectively.

In addition to groundwater analytical data, soil and sediment analytical data may be used to determine whether contamination at the FDAH is likely to leach from soil to groundwater. However, FDAH implemented ISMs consisting of the excavation and off-site disposal of contaminated soils. Following this effort, the bulk of the soil remaining had total arsenic concentrations below the EPA-specified 80-mg/kg action level. Exceptions were some sidewall verification samples with arsenic concentrations up to 267 mg/kg. These soils were impossible or impractical to move; however, the concentrations of arsenic detected therein were well below EPA Region 9 SSLs at DAFs 1 and 20.

Air (indoor and outdoor). Air sampling has not been reported by the facility. Historically, volatile organic vapors were potentially released from chemical process wastewaters directed to the wastewater treatment surface impoundment; however, this SWMU was closed in 1990. Other potential sources of volatile organic emissions include nonregulated units such as chemical process areas and the hot aerated biological treatment unit. Potential sources of particulate emissions include nonregulated units such as the product packaging areas and the biological refuse and trash incinerator. Although a local resident registered a complaint with Iowa Department of Air, Water, and Waste Management (IDWAWM) in

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1985 regarding chemical odor emissions from the facility, the RCRA Facility Assessment (RFA) for FDAH facility indicates that IDWAWM inspections identified no air emissions (E&E 1986).

Metal contaminants, such as arsenic, do not pose a volatilization hazard to human receptors. However, VOCs have been detected in facility soil and groundwater and should be evaluated as potential air contaminants. The Johnson-Ettinger model was used to model the approximate impact of volatile contaminants on indoor air quality. In order to present a worst-case scenario, the model was calculated using the maximum 1,1,2-TCA, 1,1-DCE, and vinyl chloride concentrations detected in groundwater over the past 2 years, exposure duration and frequency values derived for residential exposures, and the maximum depth of enclosure. Resulting indoor air quality estimates are conservative when used in an industrial setting, primarily because the worker exposure duration is typically less than the residential exposure duration. 1,1,2-TCA, 1,1-DCE, and vinyl chloride were selected as the contaminants of concern, based on their continued presence in groundwater at concentrations exceeding the federal MCL.

Results of the Johnson-Ettinger model indicate that indoor air does not pose a hazard to workers at FDAH. The modeled target risks for indoor air were 1.6×10^{-6} for 1,1,2-TCA, 4.6×10^{-5} for 1,1-DCE, and 3.0×10^{-7} for vinyl chloride, all of which fall within or below the acceptable cancer risk range of 10^{-4} and 10^{-6} levels. Consequently, the target risk for outdoor air also would fall below the acceptable risk range – a result of outdoor air dispersion and the absence of a confined space. Appendix 2 shows the calculations and results of the Johnson-Ettinger model.

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).

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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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

“Contaminated” Media	Potential Human Receptors (Under Current Conditions)						
	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	no	yes	no	no	no	no	no
Air (indoors)	—	—	—	—	—	—	—
Soil (surface, e.g., <2 ft)	no	yes	no	yes	yes	yes	no
Surface Water	—	—	—	—	—	—	—
Sediment	—	—	—	—	—	—	—
Soil (subsurface e.g., >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).

X 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.

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Rationale and Reference(s):

For each pathway provided, the basis for the response is described below.

Resident

Groundwater = Incomplete Pathway. Institutional and engineering controls prevent residents from encountering groundwater with arsenic concentrations above EPA MCLs. In addition to these controls, the facility has implemented IMS and corrective measures to reduce overall groundwater contamination beneath the facility and adjacent properties.

The current Code of Ordinances for the City of Charles City, Iowa, requires that all residences and businesses be connected to the public water system (see Attachment 3). Additionally, the Code of Ordinances allows no physical connection between the public water supply and any private well or water system.

Historically, as many as 20 private groundwater wells have been identified within a 0.5-mile radius of the facility (E&E 1986). In 1985, drinking water samples collected from one residential well located south of the facility revealed concentrations of arsenic up to 70 µg/L, above the EPA MCL of 10 µg/L. In response to this detection, the residential well was sealed and a City of Charles City water line was directed to the residence (Salsbury 1985b). The potential for a complete pathway was eliminated because IDWAWM and the facility implemented engineering controls to prevent residential exposure to groundwater.

A door-to-door well survey conducted in 1994 and 1995 identified 14 private residential wells within 0.5 mile of the facility. The survey identified groundwater wells at 6 private residences to the northwest of the facility, 5 private residences to the northeast, and 3 private residences to the east. Ten of the wells were plugged and abandoned. The remaining 4 wells were inactive and were beyond the extent of FDAH groundwater contamination, due to locations across Sherman Creek or crossgradient from the facility. The nearest open, active groundwater wells were identified greater than 1 mile east of and crossgradient from the facility.

Subsurface Soil = Incomplete Pathway. Residents are not likely to encounter subsurface soil with arsenic concentrations above the EPA-specified action level. Soils with arsenic concentrations above the action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill.

Surface Soil = Incomplete Pathway. Arsenic-contaminated surface soils do not extend to residential properties. Arsenic-contaminated surface soils adjacent to the facility are located on golf courses and city rights-of-way.

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Worker

Groundwater = Complete Pathway. Groundwater potentially provides a complete pathway to workers who operate, maintain, or come into contact with water from the industrial process wells at FDAH (E&E 1986).

Subsurface Soil = Incomplete Pathway. Workers are not likely to encounter subsurface soil with arsenic concentrations above the EPA-specified action level. Soils with arsenic concentrations above the action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill.

Surface Soil = Complete Pathway. Surface soil potentially provides a complete pathway to workers who perform duties in contact with bare earth. Arsenic concentrations in surface soil typically exceed EPA Region 9 Industrial PRGs.

Day Care

Groundwater = Incomplete Pathway. The groundwater to Day Care pathway is incomplete, because no Day Care or other facility serving sensitive populations is located near or draws water from the groundwater contamination plume.

Subsurface Soil = Incomplete Pathway. The subsurface soil to Day Care pathway is incomplete, because no Day Care or other facility serving sensitive populations is located near the contaminated soil. Soils with arsenic concentrations above the EPA-specified action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill.

Surface Soil = Incomplete Pathway. The surface soil to Day Care pathway is incomplete, because no Day Care or other facility serving sensitive populations is located near the contaminated soil.

Construction Worker

Groundwater = Incomplete Pathway. Construction workers are not likely to encounter groundwater, even with excavation equipment, because depths to groundwater typically exceed 15 feet below ground surface.

Subsurface Soil = Complete Pathway. Subsurface soil potentially provides a complete pathway to construction workers operating excavation equipment and working in pits or trenches. Soils with arsenic concentrations above the EPA-specified action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill. Although these soils were impossible or impractical to remove as part of an ISM, they were accessible on the sidewalls of the ISM excavation trenches. Additionally, if structures or piping were removed from the Southern Tank Farm, arsenic-contaminated soils would be more easily accessible.

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Surface Soil = Complete Pathway. Surface soil potentially provides a complete pathway to workers who perform duties in contact with bare earth. Arsenic concentrations in surface soil typically exceed EPA Region 9 Industrial PRGs.

Trespasser

Groundwater = Incomplete Pathway. Trespassers are not likely to come into contact with groundwater at FDAH, because this would require unlocking and pumping secured groundwater wells.

Subsurface Soil = Incomplete Pathway. Trespassers are not likely to encounter subsurface soil with arsenic concentrations above the EPA-specified action level. Soils with arsenic concentrations above the action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill.

Surface Soil = Complete Pathway. Surface soil potentially provides a complete pathway to trespassers who come into contact with bare earth. Arsenic concentrations in surface soil typically exceed EPA Region 9 Industrial PRGs.

Recreation

Groundwater = Incomplete Pathway. This pathway is incomplete, because no recreational users are expected to come into contact with groundwater at FDAH. Groundwater wells are secured with locks and metal protective casings.

Subsurface Soil = Incomplete Pathway. This pathway is incomplete, because no recreational users are expected to come into contact with subsurface soil at FDAH. Subsurface soils with arsenic concentrations above the EPA-specified action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill.

Surface Soil = Complete Pathway. Surface soil potentially provides a complete pathway to recreational users. Arsenic concentrations in surface soils from the Wildwood Golf Course typically exceed EPA Region 9 Industrial PRGs.

Food

Groundwater = Incomplete Pathway. This pathway is incomplete, because no food items are produced or grown in contact with contaminated groundwater. Off-site migration of groundwater has occurred to the north and east of the site, where land is occupied by a golf course and a residential area. Agricultural land is located to the west and south of the site.

Subsurface Soil = Incomplete Pathway. This pathway is incomplete, because no food items are produced or grown in contact with contaminated subsurface soil. No food items are produced or grown on site, and no off-site soil where food items are produced or grown has been identified as contaminated by facility activities.

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Surface Soil = Incomplete Pathway. This pathway is incomplete, because no food items are produced or grown in contact with contaminated surface soil. No food items are produced or grown on site, and no off-site soil where food items are produced or grown has been identified as contaminated by facility activities.

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

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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 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.”

 X 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):

The complete exposure pathways identified above include Worker to Groundwater, Construction Worker to Subsurface Soil, and Construction Worker, Worker, Trespasser, and Recreational User to Surface Soil.

Groundwater potentially provides a complete pathway to workers who operate, maintain, or come into contact with groundwater from the industrial process wells at FDAH (E&E 1986). Three industrial process wells are located at FDAH. Analytical results for groundwater samples collected from the process wells have not been reported by the facility. However, given recent contaminant concentrations in groundwater, facility health and safety practices, and commercial worker exposure parameters (see Table 5, Appendix 1), exposures for this pathway cannot reasonably be expected to be significant. Additionally, a potable water sample collected from the facility water supply during the RFI revealed one barium detection at 500 µg/L, below the EPA MCL of 2,000 µg/L. No other contaminants were detected above reporting limits. Exposures for the completed Worker to Groundwater pathway cannot reasonably be expected to be significant.

Subsurface soil potentially provides a complete pathway to construction workers operating excavation equipment and working in pits or trenches. Soils with arsenic concentrations above the EPA-specified action level are contained within a limited area of the Southern Tank Farm, under structures or 2.5 to 3 feet of backfill. Although these soils were impossible or impractical to remove as part of an ISM, they

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were accessible on the sidewalls of ISM excavation trenches. Additionally, if structures or piping were removed from the Southern Tank Farm, arsenic-contaminated soils would be more easily accessible. Verification soil sampling of the sidewalls revealed arsenic concentrations up to 267 mg/kg. This concentration is over three times the EPA-specified action level and nearly 100 times the EPA Region 9 PRG for arsenic in industrial soil (cancer endpoint). However, those standards were developed for an on-site commercial worker, as opposed to a construction worker with more limited exposure parameters (see Table 5, Appendix 1). Potentially, a commercial worker would be exposed up to 50,000 hours per year, while a construction worker only would be exposed up to 192 hours per year. Taking into consideration the contaminant concentrations and construction worker exposure parameters, exposures from the completed Subsurface Soil to Construction Worker pathway cannot reasonably be expected to be significant.

Surface soil potentially provides a complete pathway to workers, construction workers, trespassers, and recreational users. Concentrations of total arsenic in November 2000 surface soil samples collected from remediated public properties north of FDAH ranged from 3.3 to 38.2 mg/kg and exceeded the facility-specific average background concentration for total arsenic of 6 mg/kg and the EPA Region 9 PRG for total arsenic in industrial soil of 2.7 mg/kg. However, the industrial PRG standard was developed for an on-site commercial worker, as opposed to a construction worker, trespasser, or recreational user with more limited exposure parameters. Potentially, a commercial worker would be exposed up to 50,000 hours per year, while a construction worker, trespasser, or recreational user would be exposed fewer than 192 hours per year. Taking into consideration the contaminant concentrations and exposure parameters, exposures from the completed Surface Soil to Construction Worker, Surface Soil to Trespasser, and Surface Soil to Recreational User pathways cannot reasonably be expected to be significant. The industrial PRG standard is applicable to the worker, so potential exposure from the completed Surface Soil to Worker is expected to be significant.

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.

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5. Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

 X 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):

Although the arsenic exposure can be shown to be significant as compared to EPA Region 9 PRGs, arsenic levels are within acceptable limits according to risk-based guidance in EPA’s Proposed Statement of Basis for FDAH. The Proposed Statement of Basis requires that soil clean-up levels yield an overall risk-based level of less than 1×10^{-4} for industrial property use (CRA 2001). The maximum arsenic concentration detected in the November 2000 surface soil sampling event was 38.2 mg/kg. The approximate risk level resulting from this detection is about 1.4×10^{-5} for industrial property use, below the required 1×10^{-4} risk-based level.

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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):

- 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 FDAH facility, EPA ID #IAD005275540, located in Charles City, Iowa, 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.

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Completed by _____ Original signed by _____ Date 9/19/02

(signature)
Brian Mitchell
Project Manager, RCRA Corrective Action & Permits Branch
EPA Region 7

Supervisor _____ Original signed by _____ Date 9/24/02

(signature)
John Smith
Branch Chief, RCRA Corrective Action & Permits Branch
EPA Region 7

Locations where References may be found:

EPA Region 7 Headquarters
RCRA Files
901 North 5th Street
Kansas City, Kansas 66101

Contact telephone and e-mail numbers:

Brian Mitchell
(913) 551-7633
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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.

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- Ecology & Environment, Inc. (E&E). 1986. "RCRA Facility Assessment, Preliminary Review, Salsbury Laboratories, Charles City, Iowa." August 20.
- EPA. 1994. Letter Certifying Completion of Closure for Solvay, Charles City, Iowa. From D. Lininger, EPA. To N.A. Leipzig, Solvay. August 8.
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- Salsbury. 1985b. Letter Regarding Installation of Metered City of Charles City Water and Abandonment of the Mildred Boggess Residential Well. From N.A. Leipzig, Salsbury. To W.M. Jinkinson, Iowa Department of Water, Air, and Waste Management. August 14.
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