DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99
Revised 9/20/02

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

Facility Name: Former Farmland Industries, Inc. (Coffeyville Resources Terminal, LLC)
Facility Address: P.O. Box 608, North 183 Hwy, Phillipsburg, KS 67661
Facility EPA ID #: KSD007134695

DETERMINATION RESULT: YE

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 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

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

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 __X__ If yes - check here and continue with #2 below.

 _____ If no - re-evaluate existing data, or

 _____ if data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

The Farmland Industries, Inc., (Farmland) facility is located along U.S. Highway 183 on the north edge of Phillipsburg, Kansas (see Figure 1) (Environmental Strategies Consulting, Inc. [ESC] 2004a; U.S. Environmental Protection Agency [EPA] 2003). Farmland encompasses about 160 acres in an area designated for industrial land use; however, agricultural activities occur in the southwestern portions of the facility (Figure 1) (EPA 2003; Booz Allen & Hamilton, Inc. [BA&H] 2000). The surrounding land west, north, and northeast of the facility is agricultural, including Plotner Creek Valley to the west (Figure 2). Residential land and a few industries exist to the south and southeast of Farmland (EPA 2003; ESC 2004a; BA&H 2000). The facility structures include a terminal office area, maintenance shop, equipment storage warehouse, wastewater treatment plant (WWTP), petroleum product storage tanks, and a former refinery process area (ESC 2004a).

Farmland began operations in 1939 as a petroleum refinery and bulk storage terminal. From 1980 to 1992, the Farmland facility also generated, treated, stored, and disposed of hazardous waste from refining, bulk storage, and maintenance operations. In 1992, the facility ceased all refinery operations and began operations as a bulk petroleum terminal—handling, processing, and storing unrefined, intermediate, and refined petroleum products (ESC 2004a; BA&H 2000). The facility was purchased by Coffeyville Resources Terminal, LLC in 2004 (Coffeyville Resources Terminal, LLC [CR] 2004b). The terminal has three areas of operation that include a crude petroleum gathering station, wholesale refined petroleum product storage and sales, and wholesale asphalt product storage and sales. There are also areas containing unused refinery works and aboveground storage tanks. Former Farmland facility owners operated several landfills and surface impoundments, and a WWTP during Farmland's operation (ESC 2004a). Currently, the facility is listed as a small quantity hazardous waste generator (EPA 2003; BA&H 2000). The facility continues to discharge wastewater to Outfall 002 (holding pond) under a National Pollutant Discharge Elimination System permit (ESC 2004a).

Extensive environmental investigations, which include soil, surface water, and groundwater sampling and monitoring, have been performed at the former Farmland facility to evaluate the potential for releases of hazardous constituents from the tank farm and hazardous waste land treatment unit and their migration to Plotner Creek, and to soil and groundwater. During this time, seeps of refined products such as gasoline and diesel (also termed "free product" and "light non-aqueous phase liquid" or LNAPL) have been observed along Plotner Creek. In 1996, Farmland entered into an Administrative Order on Consent with EPA concerning the petroleum terminal. The Administrative Order on Consent required the facility to conduct a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) to determine the nature and extent of releases from nine groups of solid waste management units (SWMUs) and three areas of concern (AOCs) (see Figure 3). Investigations of groundwater, soil, sediment, and surface water contamination continued through 2004, with the RFI completed in October 2004 and updated in January 2005 (CR 2004a; ESC 2004a; EPA 2003).

Investigations including soil and groundwater sampling have been nearly completed on the nine groups of SWMUs as shown in Figure 3. The primary contaminants released to soil, groundwater, and surface water from Farmland's SWMUs are refined products such as gasoline and diesel fuels, metals derived from the refinery process (especially antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, and selenium), volatile organic compounds (VOC), total petroleum hydrocarbons (TPH), and semivolatile organic compounds (SVOC) (ESC 2004a, EPA 2003). Following are brief descriptions of the groups of SWMUs at the facility:

<u>SWMU Group 1 – Storage Tanks and Tank Berms.</u> SWMU Group 1 consists of 48 active and three inactive tank berm areas. The facility generated tank bottom sludge; however, the location and manner of its disposal are unknown. Past industrial disposal standard was to excavate a pit near the tank and bury the sludge. Construction dates of the storage tanks and tank berms are unknown (ESC 2004a).

<u>SWMU Group 2 – Landfills, Landfarms, and Debris Disposal Trenches.</u> SWMU Group 2 consists of 10 SWMUs, including four landfarms, three landfills, and three debris areas. The landfarms were used for soil and waste remediation, including treatment of listed refinery wastes. The landfills were used for demolition and construction debris, and the debris disposal trenches accepted inorganic materials such as asbestos and metal (ESC 2004a).

<u>SWMU Group 3 – Scrap Yards and Debris Areas.</u> SWMU Group 3 contains three scrap yards operated by Farmland for metal and used equipment, and three scrap yards constructed by previous landowners used for agricultural equipment, vehicle bodies, and lumber (ESC 2004a).

<u>SWMU Group 4 – Former and Existing Sludge Pits.</u> SWMU Group 4 consists of nine pits used for disposal of lime, asphalt, polymer, and oil. The lime pits accepted materials used to neutralize caustic treatment chemicals. The asphalt pits accepted waste asphalt and soils from production and distribution spills. The polymer pits accepted processing residuals from the hydrofluoric acid alkylation process. The oil pits accepted waste oils from the former refining process (ESC 2004a).

<u>SWMU Group 5 – Leaded Tank Bottom Disposal Areas.</u> SWMU Group 5 contains seven SWMUs used for leaded gasoline storage. The facility generated leaded tank bottom sludge; however, the location and manner of its disposal are unknown. Past industrial disposal standard was to excavate a pit near the tank and bury the sludge. Records indicate that 34,000 pounds of leaded gasoline tank bottom sludge were buried near Tank 5506 or other tanks in 1977. At the time of disposal, the sludge was mixed with sand and aerated to dry (ESC 2004a).

<u>SWMU Group 6 – Former and Existing Ponds.</u> SWMU Group 6 consists of 25 SWMUs, including caustic, sourwater, and oily ponds, and evaporation or stormwater lagoons. These ponds and lagoons were used in the refinery operation to hold spent process liquids and treated wastewater. Many of these units have been backfilled and new structures constructed over them (ESC 2004a).

<u>SWMU Group 7 – Areas of Identified Impacted Soil.</u> SWMU Group 7 includes 11 SWMUs and AOCs 2 and 3. The SMWUs under this group are diverse in location and content, and include tanks of asphalt, diesel, and gasoline; seeps along Plotner Creek, and the truck loading rack for refined products. AOC 2 includes the central drainage ditch located in the northeast portion of the process areas. The contents in the ditch drained to the facility WWTP. AOC 3 encompasses the tetra-ethyl lead building located along the railroad tracks in the southeastern portion of the facility. The building housed the equipment utilized to formulate leaded gasoline by a flowthrough process. The tetra-ethyl tanks were removed in 1992, and the other formulation equipment was returned to the manufacturer. The building was razed and the foundation was removed (ESC 2004a).

<u>SWMU Group 8 – Wastewater Treatment Plant-Associated SWMUs.</u> SWMU Group 8 includes four SWMUs associated with the on-site WWTP and AOC 1, which encompasses the facility sewer system covering the entire southeastern portion of the facility. The facility sewer system included four wastewater units (separator and

clarifiers) in close proximity to one another in the east central portion of the facility. The system transported stormwater and wastewater discharge from the facility to the WWTP. The sludge from the sewer system was removed and disposed of in 1992. The sewer system had been installed in the early 1940s, and leakage during its operation is suspected (ESC 2004a).

SWMU Group 9 – Miscellaneous SWMUs. SWMU Group 9 consists of nine SWMUs from the former refinery operations, including an underground storage tank and former washing, sand blasting, and tank bottom disposal areas (ESC 2004a).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act] from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

__X__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

______ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

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

Rationale and Reference(s):

The surficial geology beneath the Farmland facility is comprised of four geologic units: Quaternary alluvium, Quaternary loess, the Tertiary Ogallala Formation, and the Cretaceous Niobrara Formation. The expansive Niobrara Formation provides the base on which the three younger units are deposited. The Quaternary alluvium and loess consist of silt and clayey sand and silt, extending to an average of about 30 feet below ground surface (bgs) at the Farmland facility but varying in thickness from 15 to 45 feet. The underlying Tertiary Ogallala Formation extends another 40 to 60 feet bgs and consists primarily of silt, sand, and gravel. Beneath that, the chalky limestone and shale of the Cretaceous Niobrara Formation extends another 300 to 650 feet bgs. The Niobrara Formation is underlain by another approximately 400 feet of Cretaceous shale (ESC 2004a).

Groundwater beneath the Farmland facility is found primarily in the Tertiary Ogallala Formation, although groundwater may also be present in the overlying Quaternary loess where topography is low or when the water table is unusually high. Below the Ogallala, the underlying Niobrara Formation serves as an aquitard and restricts the downward migration of groundwater. Groundwater is unconfined and is encountered at an average depth of 30-40 feet below ground surface (bgs). Groundwater flows primarily to the south-southwest, with small localized easterly components possibly due to operation of groundwater contamination recovery wells (see Appendix A, which presents the three most recent consecutive quarters of water level elevation and free product thickness maps).

The groundwater sampling network consists of 39 monitoring wells and one industrial well (CR 2004a). In addition, the facility has 42 recovery wells that were installed to recover LNAPL and control contamination migration from the facility property. LNAPL recovery was initiated in 1984 on a voluntary basis, and then formally reviewed and approved under the Consent Order by EPA in April 1997 (ESC 2005). The recovery wells make up five distinct remedial systems at the facility. The State of Kansas also has two groundwater and LNAPL recovery wells that make up a sixth remedial system southeast of the facility. Locations of the monitoring wells and recovery wells are shown on all figures in Appendices A and B.

Groundwater samples at the Farmland facility have been collected quarterly since 1997 in accordance with the RFI work plan and several interim measures work plans. Groundwater samples are analyzed for metals, VOCs, TPH,

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[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).

and SVOCs (ESC 2004a). In addition, the thickness of the LNAPL is measured quarterly in all monitoring wells in the vicinity of the petroleum terminal. Depths of the wells are measured annually (ESC 2005).

Groundwater at the Farmland facility is contaminated with refined product, metals, VOCs, TPH, and SVOCs. According to the analytical data, the groundwater contamination is facility wide. The highest concentrations of dissolved contamination are located in the center of the plume—specifically beneath monitoring well IM-04—and off site under the residential neighborhood to the south. Table 1 shows the maximum concentrations of metals, VOCs, TPHs, and SVOCs in samples collected since the beginning of Farmland investigations. Nine metals—antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, and selenium—exceeded their relevant EPA maximum contaminant levels (MCL) and industrial Kansas Department of Health and Environment (KDHE) Risk-based Standards for Kansas (RSK) concentrations for groundwater. Ten VOCs exceeded their relevant EPA MCL and industrial RSK concentrations —benzene, 1,1-dichloroethene, 1,2-dichloroethane, ethylbenzene, styrene, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and vinyl chloride. One SVOC exceeded its EPA MCL and industrial RSK concentrations—bis(2-ethylhexyl)phthalate.

TABLE 1

MAXIMUM CONCENTRATIONS OF CONSTITUENTS IN GROUNDWATER

Constituent	Concentration (mg/L)	Well	Date	EPA MCL (mg/L)	Residential RSK (mg/L)	Other Wells Exceeding MCL
Total Metals						
Antimony	0.05	CRA-2	6/29/97	0.006	0.006	A-4, CRA-5, IM-3, IM-4, IM-7, PBS-22, OBS-23, OBS-113
Arsenic	0.67	OBS-104	6/29/97	0.01	0.01	A-2, B-1, B-2, BB-1, CRA-1, CRA-2, CRA-3, CRA-5, H-1, H-3, IM-1, IM-2, IM-3, IM-4, IM-5, IM-6, IM-7, IM-8, IM-10, IM-11A, IM-14, IM-15, IM-16, IM-17, IM-18, IM-19, IM-20, IM-22, MW-2, MW-2A, NL-1, OBS-5, OBS-8, OBS-12, OBS-15, OBS-16, OBS-20, OBS-22, OBS-26, OBS-33, OBS-37, OBS-38, OBS-39, OBS-101, OBS-102, OBS-104, OBS-109, OBS-111, OBS-112, OBS-113, OBS-114, OBS-115, OBS-116, OBS-118, OBS-201, OBS-203, OBS-204, OBS-207, OBS-210, OBS-211, OBS-214, OBS-215, OBS-216, OBS-217, OBS-218, OBS-302, OR-2, PR-1, PR-2, PR-5, PR-6, TW-2, A-4

TABLE 1

MAXIMUM CONCENTRATIONS OF CONSTITUENTS IN GROUNDWATER

Constituent	Concentration (mg/L)	Well	Date	EPA MCL (mg/L)	Residential RSK (mg/L)	Other Wells Exceeding MCL
Barium	7.19	BB-1	6/14/04	2	2	B-2, CRA-3, IM-04, IM-07, IM-14,IM-15, IM-22, OBS-05, OBS-12, OBS-15, OBS-20, OBS-26, OBS-39, OBS-40, A-4
Beryllium	0.005	IM-16		0.004	0.004	
Chromium	39.5	PR-2	6/28/97	0.1	0.1	MW-1, MW-2, MW-2A
Lead	0.96	IM-01	9/7/99	0.015*	0.015	CRA-1, CRA-2, IM-3, IM-4, IM-5, IM-6, IM-8, IM-10, IM-16, IM-18, IM-20, OBS-12, OBS-16, OBS-22, OBS-33, OBS-35, OBS-104, OBS-115, OBS-207, OR-2, PR-2, PR-5
Nickel	2.34	PR-2	NA	NA	0.1	
Selenium	0.31	PR-2	6/28/97	0.05	0.05	OBS-113
Vanadium	0.9	PR-2	NA	NA	0.11	
Volatile Organic Compounds						
Benzene	14	B-2	6/28/97	0.005	0.005	B-1, CRA-3, IM-1, IM-2, IM-4, IM-5, OBS-5, OBS-12, OBS-16, OBS-20, OBS-26, OBS-202, IW-2
1,1-dichloroethene	0.0152	IM-17	NA	0.007	0.007	
1,2-dichloroethane	4.12	IM-01	6/8/99	0.005	0.005	IM-4, IM-5, IM-6, OBS-16
Ethylbenzene	2.58	IM-01	6/14/01	0.7	0.7	B-1, IM-2, IM-4, IM-5, IM-6, OBS-5, OBS-12, OBS-16, OBS-22, OBS-26, OBS-115, OBS-201, OBS-202, OBS-204, TW-2
Tetrachloroethene	0.0266	IM-17	9/15/98	0.005	0.005	IM-17
Toluene	13	B-1	6/28/97	1	1	IM-1, IM-2, IM-3, IM-4, IM-5, IM-6, OBS-12, OBS-16, OBS-26, OBS-202, OBS-204, TW-2
1,1,2-trichloroethane	0.0648	OBS-16	6/10/99	0.005	0.005	
Vinyl chloride	0.0023	IM-11	NA	0.002	0.002	
Semivolatile Organic Compounds						
Benzo(a)pyrene	0.0012	B-1	6/28/97	0.0002	0.0002	
bis(2-ethylhexyl)phthalate	0.24	CRA-3	6/29/97	0.006	0.006	IM-1, IM-5, IM-6, OBS-12, OBS-16, OBS-39, OBS-109, OBS-201, OBS-203, OBS-207, OBS-211, OBS-212, OBS-215, CRA-3

TABLE 1

MAXIMUM CONCENTRATIONS OF CONSTITUENTS IN GROUNDWATER

Constituent	Concentration (mg/L)	Well	Date	EPA MCL (mg/L)	Residential RSK (mg/L)	Other Wells Exceeding MCL
2,4-dimethylphenol	3.8	CRA-2	6/18/03	NA	0.28	
Di-n-octylphthalate	0.04	OBS-16	NA	NA	0.01	
Fluorene	0.57	B-2	6/28/97	NA	0.07	
Naphthalene	8	IM-01	6/6/00	NA	0.1	
Phenol	24	CRA-2	9/18/02	NA	9	

Notes:

Table derived from the 2004 Final RCRA Facility Investigation Report (ESC 2004a).

*	EPA has not established a MCL for lead. The EPA action level is used (EPA 2004).
**	EPA Secondary MCL (EPA 2004).
EPA	U.S. Environmental Protection Agency
KDHE	Kansas Department of Health and Environment
MCL	Maximum contaminant level
NA	Not available
mg/L	Milligrams per liter
RSK	Risk-based Standards for Kansas

In addition to dissolved contaminants, LNAPL was found in wells throughout the facility (ESC 2005). According to a characterization study on the LNAPL at the Farmland facility, the plumes consist of a combination of refined petroleum products including gasoline, naphthalene, jet fuel, kerosene, diesel, and oil gas (ESC 2004a). The maximum thickness of the LNAPL measured in the second half of 2004 from one of the monitoring wells was 8.25 feet (ESC 2005).

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

__X__ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

______ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

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

Rationale and Reference(s):

Groundwater contamination at the former Farmland-Phillipsburg facility resulted from many years of activities at the former refinery, and this contamination occurs in two distinct forms at the facility. The first is in the form of refined products such as gasoline and diesel fuels, which form layers which essentially float on the subsurface water table because these products are less dense than water. These products are often described in the site reports as "free product" and also as "light non-aqueous phase liquids" (LNAPL); Appendix A presents maps showing the known locations of these layers. The second form of groundwater contamination at the facility is contamination dissolved in the groundwater itself; Appendix B presents maps showing these plumes of dissolved contaminants. The source(s) of the dissolved contamination are the floating layers of product, and thus the borders of the plumes of dissolved contamination circumscribe the area underlain by the floating layers.

At the former Farmland facility, the "existing area of contaminated groundwater" may be defined by a set of perimeter groundwater monitoring points starting at the northwest edge of the plumes and moving south and around the plumes, including wells OBS-203, OBS-212, OBS-215, OBS-109, OBS-214, OBS-112, IM-18, IM-13, IM-23, IM-17, IM-11A, OBS-209, and OBS-116 (see figures in Appendix A).

Appendix A presents the last three quarters of combination water table elevation and free product thickness maps. During this time the configurations and locations of the areas of free product accumulation have remained relatively stable and within the existing area of contaminated groundwater. The EPA believes the stability of the free product is the result of various factors, including: (1) the sources of the free product, such as leaking storage tanks, have not contributed free product to the subsurface for many years, leaving a finite amount of subsurface product, (2) the facility has been removing the free product from the subsurface through recovery wells at various rates since 1984, and has been removing it during the latest six-month period at a rate of approximately 55 gallons per day or approximately 10,000 gallons in six months (Semi-Annual Progress Report dated 7-10-06), and (3) floating

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[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

contamination, in the form of pockets of free product, is subject to becoming "trapped" by low-permeability layers such as clays depending upon their geometry and fluctuations of the water table.

Appendix B presents the last three quarters of groundwater data for two key dissolved contaminants, benzene and arsenic. These contaminants were selected early on during the corrective action process to represent the configuration of the entire dissolved plume because they occur throughout the main plume of dissolved contamination and they represent two of the contaminants with the highest health risk. The plume of dissolved contamination as represented by the benzene and arsenic isoconcentration contour maps in Appendix B has remained stable within the area of existing groundwater contamination. Because the sources of dissolved contamination are the areas of free product, the EPA believes the stability of the dissolved plume is due to the stability of the free product, as described in the previous paragraph.

The EPA did note that during the most recent reporting period covering September 2005 - March 2006, perimeter wells IM-17 and IM-18 exhibited low levels of dissolved contamination not seen in a while. IM-17 had been dry or, as in December 2005, had insufficient water for sampling (ESC 2006, page 22) for a three-year period from March 2003 until March 2006, and although benzene, tetrachloroethene, and 1,1,1-trichloroethane were detected in March 2006, these compounds had all been found in this well at these levels previously during the late 1990s. While IM-18 had a detection of benzene at 16.7 ppb in March 2006, the EPA believes this could have possibly resulted from its location within the influence of one of the operating recovery well systems where groundwater flow patterns may become variable. The EPA believes these detections must be evaluated with consideration of the overall size of the contaminant plume and the existing area of groundwater contamination, which is approximately one mile long and one-half mile wide.

The vertical extent of contamination has been assessed at two areas of the facility which represent known areas of significant contamination. The free product, as discussed previously, floats on the surface of the water table and thus vertical migration to depth is not an issue. The Niobrara Formation is described in the geologic literature as a chalky limestone and shale several hundred feet thick and characterized as an aquitard, and it forms the lower boundary of the contaminated Ogallala Formation, so it is believed that it serves to limit the downward migration of dissolved contamination. During the RFI, the EPA requested that the facility evaluate the vertical distribution of contamination throughout the Ogallala, so this was done at two locations where significant levels of contamination was known to be present by installing three-well clusters, each cluster having one well screened at the top, one in the middle and one in the lower portion of the Ogallala (RFI Report, Section 5.3.5, 2004). At one well cluster located in the southwest part of the facility property, the shallow well (OBS-15) had benzene at 2700 ppb, the intermediate well (OBS-301) had benzene at 6.1 ppb, and in the deep well (OBS-302) at the base of the Ogallala, benzene was not detected. At a well cluster located in the east-central part of the facility property, the shallow well (OBS-5) had benzene at 12,400 ppb, the intermediate well (TW-2) had benzene at 2110 ppb, while the deep well at the base of the Ogallala did not detect benzene. Thus, the EPA believes that the vertical extent of the dissolved contamination is most likely restricted to the shallow to intermediate area of the aquifer.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

 __X__ If yes - continue after identifying potentially affected surface water bodies.

 _____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

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

Rationale and Reference(s):

At the former Farmland facility there are currently three (3) surface water basins that contain water. SWMUs 110 and 111 receive treated effluent from the facility's wastewater treatment plant under a NPDES permit, and SWMU 116 receives stormwater runoff during significant precipitation events. Based on the relative elevations of these units and the elevation of groundwater in wells adjacent to these units, groundwater does not discharge into these basins as the water table is approximately 12 to 15 feet below these units.

The Farmland facility is located between two small streams, Plotner Creek and an unnamed tributary of Spring Creek. Both Plotner Creek and Spring Creek are tributaries of Deer Creek, a perennial stream that discharges to the North Fork Solomon River. Plotner Creek is located along the western boundary of the facility, and the unnamed tributary is located east of the facility. Based on elevations of the water table and the streambeds of Plotner Creek and the unnamed tributary, contaminated groundwater is potentially capable of discharging only to Plotner Creek.

Plotner Creek is a small, intermittent stream since it can become dry during part of the year. It generally flows in response to significant precipitation events or extended wet weather conditions. Where monitoring wells are located very near the surveyed gauging stations in the streambed, groundwater elevations tend to coincide with the streambed elevation, sometimes slightly higher and sometimes slightly lower. At times when the water table is slightly higher than the streambed, groundwater can discharge into Plotner Creek under "gaining stream" conditions, and when the water table is lower than the streambed groundwater no longer discharges into Plotner Creek under "losing stream" conditions.

It must be pointed out that it is difficult to assess any contribution that contaminated groundwater could have on Plotner Creek because in the past, free petroleum product (primarily diesel and gasoline) was released for several years from seeps adjacent to Plotner Creek, first noted in 1972. Although the installation and operation of several remediation recovery well systems in the areas of these seeps has eliminated this problem, and has also reduced the discharge of contaminated groundwater to the creek as well, residual contamination remains within the sediments of Plotner Creek as confirmed when sediment samples were collected from the streambed in several locations during the RFI. At three locations, total petroleum hydrocarbons in the sediments ranged from 14 to 28 mg/kg, and arsenic ranged from 2.2 to 2.5 mg/kg. Also at these three locations, surface water samples were collected four times between April 2003 and April 2004 during RFI fieldwork. Three facility-related contaminants were detected in the surface water, including total petroleum hydrocarbons at up to 650 ppb and arsenic up to 15 ppb, which were also found in the sediments. Another facility-related contaminant was also detected in the surface water samples: bis(2-ethylhexyl)phthalate was found at up to 10 ppb. Bis(2-ethylhexyl)phthalate was not detected in the sediment samples; however the detection limits were high (500 ppb) so there may be levels of it in the sediment that could have resulted in the 10 ppb maximum level found in the surface water. Because the more volatile contaminants such as benzene, toluene, ethylbenzene, xylenes, and 1,2-dichloroethane were not found in the surface water samples, it is believed that the surface water contamination is most likely the result of residual contamination within the sediments of the creek rather than the discharge of contaminated groundwater into the creek.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

__X__ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Where the elevation of the streambed of Plotner Creek is known at the gauging stations, the nearest monitoring wells upgradient of the creek, which could under "gaining stream" conditions potentially discharge contaminated groundwater into Plotner Creek, were evaluated based on the most recent available analytical data in order to assess the levels of contamination:

At gauging station GS-001, the nearest upgradient monitoring wells are OBS-216 and OBS-201. Well OBS-216 had one contaminant, arsenic, at 24 ppb (10x MCL = 100 ppb)(ESC 2006). Well OBS-201 had ethylbenzene at 239 ppb (10x MCL=7000 ppb) and xylenes at 386 ppb (10x MCL=100,000 ppb)(ESC 2006).

At gauging station GS-002, well OBS-38 is the nearest upgradient well and was most recently sampled in March 2004 during the RFI. Well OBS-38 had 1,2-dichloroethane at 12.7 ppb (10x MCL=50 ppb), 75.2 ppb ethylbenzene (10x MCL=7000 ppb), 147 ppb xylenes (10x MCL=100,000 ppb), and arsenic at 17 ppb (10x MCL=100 ppb).

At gauging station GS-003, well IM-18 is the nearest upgradient monitoring well. Well IM-18 had benzene at 16.7 ppb (10x MCL=50 ppb) and arsenic at 30 ppb (10x MCL=100 ppb)(ESC 2006).

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

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

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

Rationale and Reference(s): NA

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

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

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

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

_____ If no - enter "NO" status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Groundwater samples at the former Farmland facility (now Coffeyville Resources Terminal, LLC) have been collected quarterly since 1997 (ESC 2004a). The facility will continue to monitor the groundwater sampling network as required under the 3008(h) Consent Order between the facility and EPA. As conditions warrant in the future, this sampling network may be modified in order to remain protective of human health and the environment.

In addition, the facility will also operate and maintain the recovery wells that were installed to control contamination migration from the facility property. These recovery well systems may also be modified in the future as necessary in order to remain effective. LNAPL and contaminated groundwater recovery was initiated in 1984 and is continuing; and this will serve to continually improve the environmental conditions at the facility and surrounding area. Sampling and monitoring of media in addition to groundwater will take place as necessary in order to protect human and the environment.

8. Check the appropriate RCRA Info status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Former Farmland Refinery (now Coffeyville Resources Terminal LLC) facility, EPA ID # KSD007134695, located at P.O. Box 608, North 183 Hwy, Phillipsburg, Kansas 67661. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

______ NO - Unacceptable migration of contaminated groundwater is observed or expected.

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

Completed by Wray R. Rohrman (signature) Date 9-28-06
Wray Rohrman
Project Manager, RCRA Corrective Action & Permits Branch
EPA Region 7

Supervisor Lynn M Slugantz (signature) Date 9-28-06
Lynn Slugantz
Branch Chief, RCRA Corrective Action & Permits Branch
EPA Region 7

Locations where References may be found:

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