

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA750)**

Migration of Contaminated Groundwater Under Control

Facility Name: Exline Inc.
Facility Address: 3256 East Country Club Road, Salina, Kansas 67401
Facility EPA ID #: KSD007127327

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?

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.

The Exline, Inc. (Exline), facility is located at 3256 East Country Club Road in Salina, Kansas (see Figure 1). The facility is about 0.75 mile east of the City of Salina and adjacent to the Scouler Grain Elevator (Scouler). Exline manufactures and repairs industrial engines and engine parts, including chrome plating of some parts.

The Resource Conservation and Recovery Act (RCRA) Facility Assessment identified 18 SWMUs and one AOC (Metcalf and Eddy [M&E] 1989). This list was subsequently revised as part of the RCRA Facility Investigation (RFI) process (Shepard Engineering, Inc. [SEI] 2002b). These SWMUs are listed in Table 1.

For much of its operating history, Exline made use of a surface impoundment to dispose of chrome plating waste. The impoundment was closed in 1984, and about 60,000 gallons of waste were removed from the impoundment at that time (KEJR Science Group [KEJR] 1993). The former impoundment is not included in any lists of SWMUs, presumably because postclosure sampling confirmed that excavation had removed all chromium-contaminated soil from the uppermost 6 inches (Exline 1984). However, the former impoundment was the source of most of the chromium contamination in groundwater at the facility.

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TABLE 1
EXLINE SWMU DESCRIPTIONS

SWMU	Description	Location
1 - Flash Mix Tank	Part of the groundwater treatment system	CPS
2 - Retention Tank	Part of the groundwater treatment system	CPS
3 - Neutralization Tank	Part of the groundwater treatment system	CPS
4 - Clarifier	Part of the groundwater treatment system	East of CPS
5 - Sludge Drying Beds	Part of the groundwater treatment system	East of CPS
6 - Solids Settling Basin/Filter Bed	Part of the groundwater treatment system	East of CPS
7 - Industrial Wastewater Collection Tank	Sump/collection point for process wastewater	CPS basement
8 - Industrial Wastewater Treatment System Tank	Part of the process wastewater treatment system	CPS
9 - Storage Area of Industrial Waste Pretreatment System Solid Waste	Storage of sludge generated from treatment of process wastewater	CPS
10 - Storage Area for Hazardous Waste	Drum storage of wastes generated from treatment of process wastewater	CPS
11 - Storage Area for Chromium Contaminated Soil	Storage of soil from excavation of closed surface impoundment	CPS
12 - Sump for Grit Blaster Wastewater Overflow	Collection point for process wastewater	CPS
13 - Deionizer Regeneration Discharge Area	Disposal area for waste water from deionization columns	West of CPS
14 - Chrome Plating Shop Ventilation Stacks	Area in which chromic acid mists were ventilated from the CPS	South and east of CPS

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**TABLE 1
EXLINE SWMU DESCRIPTIONS (CONTINUED)**

SWMU	Description	Location
15 - Contaminated Soil Area	Area used to store contaminated soil generated following synthetic liner installation in surface impoundment	South and east of former surface impoundment
16 - Industrial Waste Treatment System Surge Tank	Collection point for process wastewater from plating operations	West of CPS
17 - Oil Recovery System	System to remove oil from steam cleaning operations	Northwest of CPS
18 - Recovered Oil Storage Tank	Storage tank for recovered oil	Northwest of CPS
19 - Concrete Culvert Excavation Area	Culvert to direct floodwater from CPS basement	Southeast of CPS

Note:

CPS - Chrome Plating Shop

The RFI, completed in 1993, focused on the following four SWMUs and surface water runoff areas (KEJR 1993). Except where noted, the descriptions below are derived from the RFI (KEJR 1993). Figures in Attachment 1 illustrate the layout of the Exline facility.

Concrete Culvert Areas. An 18-inch concrete culvert was constructed to divert water from the basement of the chrome plating shop (see Attachment 1). When a surface impoundment was constructed in 1968, the section of the culvert underlying the impoundment was removed. The remainder of the culvert was removed in 1989. This culvert was never used to carry process wastewater, and sampling of soil in the area of the culvert and culvert outfall showed no signs of contamination.

Brown-stained Soil. A 30- by 26-foot area of stained soil was located south of the machine shop (see Attachment 1). Scrap metals and machining waste were stored in this area from 1969 until 1986. The RFI concluded that most staining was probably from iron oxide. However, analysis of soil samples from the area revealed concentrations of chromium and lead significantly above background levels.

SWMU 13 - Deionizer Regeneration Discharge Area. From 1968 until 1985, Exline discharged wastewater from the deionizer (DI) columns to an area west of the chrome plating shop (see Attachment 1). The waste solution included sulfuric acid, sodium hydroxide, and the ions removed from raw water during deionization. In addition, in 1975, Exline used the DI columns to remove iron and chromium from process wastewater. As a result of this practice, soil in the area may have become

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contaminated. Soil samples from the area had chromium concentrations that significantly exceeded background concentrations.

SWMU 14 - Chrome Plating Shop Ventilation Stacks. Ventilation systems in the chrome plating shop remove chromic acid mist from the work environment and vent it to the area around the southeastern corner of the shop (see Attachment 1). Although concrete pads and curbs were constructed near the ventilation stacks to intercept chromium residue, some chromium falls on surrounding soils. Concentrations of chromium in soil samples collected from the area around the ventilation stacks are significantly higher than those of background samples.

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.

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

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

2. Is **groundwater** known or reasonably suspected to be "**contaminated**" 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?

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 Exline facility is located in the Smoky Hill geomorphic province of central Kansas. It is underlain by about 50 feet of unconsolidated Pleistocene alluvium, with clays and silts predominating at the surface and sands and gravels in the 15 to 20 feet above Permian bedrock (M&E 1989). The bedrock has very low permeability in the area of the facility and acts as an aquitard (KEJR 1993). Pleistocene sediments are the primary aquifer at the facility, and all monitoring wells and piezometers are screened in the sands and gravels (KEJR 1993). This aquifer also is used for drinking water and irrigation in areas around the facility (KEJR 1993). The water level in these wells is about 25 feet below ground surface (bgs) (KEJR 1993; SEI 1996, 1999, 2000, 2001a, 2002a).

For much of its operating history, Exline made use of a surface impoundment to dispose of chrome plating waste. From 1968 until 1980, Exline discharged waste to an unlined surface impoundment intended for evaporative disposal of wastes (Kansas Department of Health and Environment [KDHE] 1985). In addition to plating waste, the impoundment received steam cleaning rinse wastewater, wastewater from the recharge of DI columns, and caustic cleaner wastewater (KEJR 1993). After a liner was installed in 1980, the impoundment began to fill rapidly, indicating that wastewater previously had been infiltrating, rather than evaporating (KDHE 1985). Chromium was first detected in groundwater, when the first monitoring wells were installed in 1982 (M&E 1989). The impoundment was closed in 1984, and about 60,000 gallons of waste were removed from the impoundment at that time (KEJR 1993). Other than the Exline and Scoular facilities, no other sources of metals or volatile organic compounds (VOC) are present in the immediate area (KEJR 1993).

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Ongoing sampling of groundwater at the Exline facility reveals concentrations of chromium in excess of the U.S. Environmental Protection Agency (EPA) MCL for chromium. The MCL for total chromium is 0.1 milligram per liter (mg/L). Because the unconsolidated aquifer is used for drinking water, this MCL is the appropriate risk-based standard. In 1984, before groundwater extraction and treatment began, the highest concentration of hexavalent chromium at the facility was 17 mg/L in a sample collected from Well C-9 (J.C. Butler Associates [Butler] 1987). Total chromium concentrations at the beginning of treatment were as high as 540 mg/L in Extraction Well B-3 (Butler 1987).

Since treatment began, chromium concentrations have generally declined, with some increases related to increased precipitation, causing increased flushing of chromium from the vadose zone (KEJR 1993; SEI 2001a, 2002a). Attachment 2 shows changes in chromium concentrations over time in samples collected from the extraction wells. However, wells in the central portion of the facility, in the area of the closed surface impoundment, still have concentrations of chromium in excess of 0.1 mg/L. Attachment 3 shows isoconcentration maps of total chromium in groundwater at the facility. The highest concentrations are in samples collected from the more upgradient extraction wells. Table 2 summarizes some of the recent results in which concentrations of chromium exceeded or approached MCLs.

**TABLE 2
CHROMIUM CONCENTRATIONS IN GROUNDWATER**

Well	Well Type	Chromium Concentration (mg/L)	Sample Date
C-4	Monitoring	0.138	May 7, 2001
D-1	Monitoring	0.062	August 30, 2001
B-7	Extraction	2.150	September 28, 2001
C-9	Extraction	0.220	September 28, 2001
E-3	Extraction	2.780	September 28, 2001

Notes:

mg/L milligrams per liter

Source: Shepard Engineering, Inc. 2002a. "Groundwater Monitoring Annual Report, Exline, Inc., Salina, Kansas." January 29.

Groundwater at the Exline facility is also contaminated with VOCs. Downgradient residential wells sampled in 1988 did not have detectable chromium concentrations but did have elevated concentrations of VOCs, primarily carbon tetrachloride and ethylene dibromide (EDB). VOCs also have been detected in extraction wells on the Exline property (M&E 1989). In 1991, an air stripper was added to the existing treatment system to remove VOCs from groundwater before discharging the water to city sewers (KEJR 1993). Annual groundwater monitoring reports have focused entirely on concentrations of

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chromium (SEI 1996, 1999, 2000, 2001a, 2002a), although the RFI asserts that VOC concentrations have continued to meet permit requirements (KEJR 1993).

The Scoular facility appears to be the source of most, but perhaps not all, of the VOC contamination. Reports from KDHE have confirmed that carbon tetrachloride and EDB in groundwater are probably derived from a 1963 spill of grain fumigant at Scoular (1998). However, 1,1-dichloroethane, 1,1-dichloroethene, and tetrachloroethene also have been detected in monitoring wells at Scoular at concentrations that slightly exceed or approach MCLs (KDHE 1998). These solvents may originate from degreasing practices at the Exline facility or from waste disposal practices at the Scoular facility (KDHE 1998). Because groundwater is extracted from beneath the Scoular facility, the site of known VOC spills, an air stripper system was installed as part of the Exline treatment system in order to meet Exline's discharge requirements (KEJR 1993). Currently, VOC contamination is being managed from the Scoular site and is generally not seen by EPA to be derived from the Exline facility (EPA 1989; KDHE 1998).

Footnotes:

"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).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "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 flow under the facility currently is controlled by the Exline extraction system. Groundwater generally flows southwest to northeast in the area but is now largely influenced by the treatment system (M&E 1989; SEI 1996, 1999, 2000, 2001a, 2002a). Attachment 4 shows maps of the piezometric surface. The treatment system was installed in 1985. In it, water is pumped from the aquifer, treated to remove chromium, then discharged to city sewers (M&E 1989). Additional extraction wells were installed in 1988 (two wells) and 1989 (one well) to improve the system's performance (KEJR 1993). Exline now operates a total of four extraction wells as part of the treatment system - SC-2 and C-9 on the Scouler property and E-3 and B-7 on the Exline property (KEJR 1993). These four wells operate 24 hours per day, removing about 45 gallons per minute (KEJR 1993). Two high-volume dewatering wells on Scouler property - SC-1 and SC-3 - also act to control the groundwater gradient (SEI 2001a). Additional refinements to the Exline treatment system include an irrigation system to flush chromium from the vadose zone into groundwater, from which it subsequently could be removed through the extraction wells and an air stripper system to remove VOCs from groundwater (KEJR 1993).

The current treatment system appears to have reduced the amount of chromium contamination at the facility. In the four extraction wells, chromium concentrations have generally been declining with time (see Attachment 2). In the two wells on Scouler property, chromium concentrations have flattened out at very low or undetectable levels (SEI 2001a). In the two Exline extraction wells, chromium concentrations have also declined, with a notable spike during the record precipitation of 1993 (SEI 2001a).

The treatment system also appears to have stabilized the migration of the chromium contamination plume. Six wells outside of the plume have been designated as compliance wells - B-4, B-5, B-6, G-1, D-3, and SC-1 (KEJR 1993). These wells consistently have very low or undetectable concentrations of chromium (KEJR 1993; SEI 1996, 1999, 2000, 2001a, 2002a). Chromium has been detected in B-4 and D-3, on occasion. Samples from these wells are consistently more turbid than those from other wells. However, in the last few years, sediment in samples from these wells has been allowed to settle, making

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chromium undetectable (SEI 2001a). In addition, three residences within 1,000 feet of the facility are sampled regularly, and all have undetectable chromium (KEJR 1993). Samples collected in one residential well in May 2001 did have detectable chromium (0.32 mg/L), but subsequent samples have showed no detectable chromium (SEI 2001b).

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.

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

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

X 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):

Based on the available documentation, it appears unlikely that contaminated groundwater is discharging into surface water bodies. Surface water samples were collected from storm drains as part of the RFI. These samples had detectable concentrations of chromium, but all were below the MCL (KEJR 1993). No permanent bodies of surface water lie within the Exline property (KEJR 1993). The nearest surface water bodies include several stock ponds and an intermittent stream that is a tributary of the Smoky Hill River (U.S. Geological Survey [USGS] 1977); all are about 0.25 mile from the facility. Because of the lack of surface water in the area of the groundwater plume, the controlled migration of the groundwater plume, the depth to groundwater (usually about 25 feet bgs), and the lack of chromium in surface water samples, it is unlikely that contaminated groundwater is a significant source of chromium to nearby surface water bodies.

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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration³ 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)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ 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 concentration³ 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 concentrations³ 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):

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

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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 implemented⁴)?

_____ 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):

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

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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):

Exline has conducted groundwater quality monitoring as part of a corrective action program since the mid-1980s. Samples are collected for total and hexavalent chromium, and water levels are measured quarterly in all monitoring and extraction wells. Samples from extraction wells also are analyzed on a weekly basis for hexavalent chromium, as required by Exline's discharge permit (M&E 1989).

Revisions to the current monitoring plan are awaiting KDHE approval. If approved, Exline will install six new monitoring wells. Most of the existing monitoring wells will be used for quarterly piezometric measurements or will be abandoned (SEI 2002a).

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8. Check the appropriate RCRIS 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).

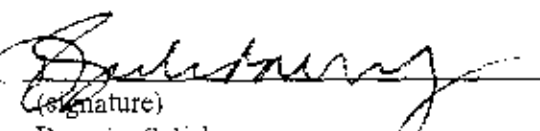
YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Exline, Inc., facility, EPA ID # KSD007127327, located at Salina, Kansas. 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.

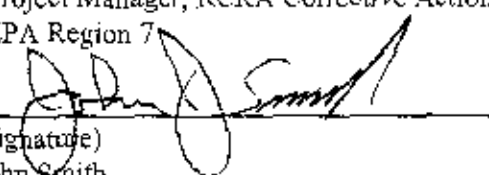
NO - Unacceptable migration of contaminated groundwater is observed or expected.

IN - More information is needed to make a determination.

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Completed by  Date 8/16/02
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