DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 6/30/05
RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **The Colonel's Factory Outlet of Arkansas, South Plant**
Facility Address: **804 South Woods Street, West Memphis, Arkansas**
Facility EPA ID#: **ARD035663301**

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.

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 objectives of the RCRA Corrective Action program, the EIs 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 groundwater 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 Determination status codes should remain in the 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).

Facility Information

The Colonel's Factory Outlet of Arkansas, Inc. (TCFOA), located at 720 and 804 South Woods Street, West Memphis, Arkansas performs copper, nickel, and chrome plating of recycled automotive bumpers. The property was purchased by Donald Williamson in March 1993 from National Bumper Exchange (NBE), which began electroplating activities at the 804 South Woods Street location on October 12, 1958. Figure 1 of the Conceptual Site Model (CSM) shows the location of the property. TCFOA is listed under the Standard Industrial Classification Code 3471: Electroplating, Plating, Polishing, Anodizing, and Coloring (Booz Allen, 2004).

TCFOA owns two separate properties that each generated hazardous waste from separate bumper recycling operations. These two properties are physically separated by another business—formerly Delta Roofing Company. The North Plant (EPA ID ARD980621288) is located at 720 South Woods Street and the South Plant (EPA ID ARD035663301) is located at 804 South Woods Street. Collectively, these two properties are referred to as the West Memphis sites and occupy approximately three acres. The sites' geographical coordinates are approximately 35°08'10" north latitude and 90°11'04" west longitude (Booz Allen, 2004). This EI determination specifically focuses on the South Plant site.

The TCFOA North and South Plants were metal plating shops with known generated waste, which included RCRA listed metal plating treatment sludge, spent powdered activated carbon filters from the nickel plating operations, metal particulate wastes from the polishing shops, and paint/solvent wastes from the painting operations. TCFOA operations included containerized wastes stored throughout the operating and storage areas (Booz Allen, 2004).

The South Plant consists of four main buildings. These four main buildings include a small office building, a main process building and two warehouse storage buildings. Several SWMUs and AOCs were identified in the South Plant. Figure 2 of the CSM report provides a site layout for the South Plant. The SWMUs identified for the South Plant include the North Warehouse Building Northeast Warehouse Room (SWMU-1), the North Warehouse Building Southeast Hazardous Waste Storage Area (SWMU-2), the North Warehouse Building Maintenance Area (SWMU-3), North Warehouse Building Paint Shop Area (SWMU-4), Wastewater Treatment System Area (SWMU-5), the Electroplating Line Area (SWMU-6), the Chemical Storage Area (SWMU-7), the Main Building Southeast Warehouse Room 1 (SWMU-8), the Main Building Southeast Warehouse Room 2 (SWMU-9), and the North and South Plant Drainage Ditch (SWMU-10). Additionally, the South Plant has two AOCs identified: the Polishing Shop Discolored Soil Area (AOC-2) and the Northeast Area (AOC-3). A third AOC (the Crawfordsville Site [AOC 1]) was identified in the CSM; however, this AOC is located approximately 50 miles from the South Plant and was issued a separate EPA ID number. Therefore, it is not considered to be a part of the South Plant. A detailed summary of SMWUs, AOCs, and site conditions is presented in the CSM report (BDLI, 1997; Booz Allen, 2004).

Three releases of hazardous waste have been confirmed at the South Plant. The first release area is a release of electroplating solutions from the sumps/pits associated with the electroplating line area (SWMU 6). Spills and overflows of electroplating solutions from electroplating activities were stored in the sumps/pits for extended amounts of time and eventually released to subsurface soils. The second potential release point is believed to have occurred through the numerous exhaust fans that pulled large volumes of metal particulates out of the grinding and polishing rooms and deposited them on the soils located east of the polishing shop room. This release area is referred to as the Polishing Shop Discolored Soil Area (AOC 2). The third release area is located in the northeast corner of the South Plant and is referred to as the Northeast Area (AOC 3). This area is believed to have been filled with spent sand blasting sand generated in bumper polishing activities (Booz Allen, 2004).

Releases are also suspected at the Wastewater Treatment System Area (SWMU 5) and the Chemical Storage Area (SWMU 7). However, these units have not been investigated. Regardless, exposure to potential releases from these units is highly unlikely for the same reasons cited below for the units for which releases have been confirmed (Belin, 2004).

References:

BDLI, Inc. 1997. *Final Site Investigation Report – The Colonel's Factory Outlet of Arkansas, Inc.* June 11.

Belin, John I. 2004. Personal communication with William Smith of the H&H Equipment Company during a site reconnaissance visit to the Colonel's North and South Plants. September 16.

Booz Allen Hamilton. 2004. *Conceptual Site Model for the Colonel's Factory Outlet of Arkansas, Inc*., South Plant. March 31.

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) 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.

_X_ 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:

The TCFOA Plants (North and South) are located in the coastal plain physiographic province of Arkansas. Geologically, the area is made up of sediments that were deposited by the Mississippi River and its tributaries. From youngest to oldest (ground surface to deeper sediments), the geologic units that are significant for understanding the hydrogeology of the site are:

- Tunica Soil Series
- Quaternary-age alluvium
- Tertiary-age Cockfield Formation
- Tertiary-age Cook Mountain Formation

The Tunica Soil Series consists of poorly drained, dark grayish brown clays. The Tunica Soil Series is developed on top of the Quaternary-age alluvium and generally extends to a depth of approximately five feet below the ground surface (bgs). The Tunica soils grade into the underlying Quaternary-age alluvium which also is very clay rich near the top (USEPA, 1990; BLDI, 1996).

The Quaternary-age alluvium consists of clay, silt, sand, and gravel that is present in alluvial and terrace deposits. This formation typically consists of clay and silt near the ground surface and grades to sand and gravel at depth. The Quaternary-age alluvium is know to range in thickness between approximately 100 to 150 feet (USEPA, 1990; BLDI, 1996).

The Cockfield Formation lies beneath the Quaternary-age alluvium. The Cockfield Formation is a loosely consolidated bedrock formation consisting of fine to medium-grained sand and clay beds that dip downward to the southeast. The Cockfield Formation is known to be approximately 150 to 200 feet thick in the vicinity of the TCFOA sites. The top of the Cockfield Formation is approximately 150 feet bgs at the site (USEPA, 1990; BLDI, 1996).

The Cook Mountain Formation lies beneath the Cockfield Formation. The Cook Mountain Formation consists of clay strata in the site area and is a hydrologic confining layer that separates the overlying water bearing zones (Quaternary-age alluvium and Cockfield Formation) from all underlying units. The aquitard of the Cook Mountain Formation is approximately 300 feet bgs and is believed to range in thickness from approximately 50 to 150 feet (USEPA, 1990; BLDI, 1996).

To determine the depth to groundwater and physical characteristics of the soils at the North and South Plants, ADEQ (formerly ADPC&E) requested that TCFOA drill a deep boring down to a depth of 50 feet and collect soil samples to determine permeability, grain size, and Atterburg limits.

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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).

According to correspondence from Mr. Daniel Clanton, ADEQ, soil borings installed during the Phase I and Phase II site investigations were logged every six inches during sampling and all samples were classifies as silty clays. In addition, permeability tests were performed at the 5-7 foot, 10-12 foot, and 15-17 foot intervals. Natural in place permeabilities ranged from 3.1 x 10^{-5} cm/sec (at the 5-7 foot depth interval) to 6.2 x 10^{-6} cm/sec at the 10-12 foot depth interval) (Clanton, 2003).

Results of a geotechnical analysis conducted on soil samples from a temporary well installed at the South Plant indicated that the permeability of soils ranged from 4.1 x 10^{-5} cm/sec in shallow subsurface soils (five to seven feet bgs) to 1.8 x 10^{-3} cm/sec in deep subsurface soils (greater than 23 feet bgs). Grain size of soils in the five to seven feet bgs, 10 to 12 foot bgs, 15 to 17 foot bgs, and greater than 23 foot bgs zones were 0.011 mm, 0.003 mm, 0.018 mm, and 0.150 mm, respectively. It should be noted that grain size and permeability in the greater than 23 foot bgs zone were estimated because samples could not be collected due to the granular nature of the soils (very fine sand) (BDLI, 1997).

Investigative soil borings drilled as part of the site investigation to a maximum depth of 15 feet bgs penetrated clay and silt-dominated sediments of Tunica Soil Series and Quaternary alluvium. No granular soils or groundwater bearing material were encountered in any of the soil borings drilled during site investigations (BLDI, 1996).

During site investigation activities conducted during February 2004, three groundwater samples were collected from soil borings advanced using direct push technology (DPT). The soil borings/groundwater samples were designated SB-4, SB-5, and SB-7. Boring SB-4 was advanced several feet to the north of SWMU 4, boring SB-5 was advanced at the northeast corner of AOC 3, and boring SB-7 was advanced at the southeast corner of AOC 2. Groundwater samples collected during this investigation were analyzed for total metals and mercury. Metals detected above the EPA Region 6 Human Health Medium-Specific Screening Levels (MSSLs) and/or the Federal Maximum Contaminant Levels (MCLs) include aluminum, arsenic, barium, cadmium, chromium, iron, lead, manganese, nickel, and vanadium are shown in bold in Table 1 below. Table 1 also presents the concentrations of those analytes detected from the July 2005 sampling event for comparison. The purpose of the second sampling event was to collect groundwater samples closer to source areas and utilize a 0.45-micron filter in the field to determine if the metals constituents were associated with the solid particles in the groundwater samples. (Field notes from the 2004 sampling event reported high levels of turbidity in the groundwater samples.)

Table 1. Constituents Detected in Groundwater from February 2004 and July 2005 (μg/L)

Analyte	February 2004			July 2005	
	SB-04	**SB-05**	**SB-07**	**GW-01**	**GW-02**
Aluminum	3700 J	**182000 J**	**40600 J**	200U	**1600**
Arsenic	15.0 U	**78.6**	**7.6J**	10U	10U
Barium	746	**3240**	1360	200U	**280**
Cadmium	0.60 J	**26.8**	9.3	2.0U	2.0U
Chromium	7.7 J	**193**	**134**	5.0U	5.0U
Iron	**18500**	**311000**	**96600**	**800**	**2500**
Lead	7.8 UB	**417**	**137**	3.0U	3.0U
Manganese	425	**13200**	**1780**	**240**	**160**
Nickel	48.1	**295**	**9920**	40U	40U
Vanadium	9.1 J	**396**	**121**	50U	50U

Notes:
1. MSSL refers to the EPA Region 6 Human Health Medium-Specific Screening Levels in μg/L.
2. MCL refers to the Federal Maximum Contaminant Level in μg/L.
3. J = Concentration qualified as estimated.

4. U = Concentration below instrument detection limit.
5. B = Analyte found in blank.
6. Data source is E&E, 2004.

During site investigation activities conducted in July 2005, groundwater samples were collected from two soil borings advanced using DPT. The soil borings/groundwater samples, designated CFO-GW-01 and CFO-GW-02, were located east of the Polishing Shop and west of the Paint Shop, respectively. Groundwater samples collected during this investigation were analyzed for volatile organic compounds (VOCs) and total and dissolved metals and mercury. No VOCs or metals were detected above the EPA Region 6 Human Health MSSLs and/or the MCLs (Booz Allen, 2005). Based on the 2005 sampling results, it is evident that the higher metal concentrations noted from the 2004 sampling event were biased high and that elevated metals detected in the groundwater samples are not representative of actual conditions in groundwater. We therefore conclude that groundwater sample results from the 2005 sampling event more accurately reflect the actual groundwater conditions at the site.

References:

BLDI, Inc. 1996. *Site Investigation Report – The Colonel's Factory Outlet of Arkansas, Inc.* January 5.

BDLI, Inc. 1997. *Final Site Investigation Report – The Colonel's Factory Outlet of Arkansas, Inc.* June 11.

Booz Allen Hamilton. 2005. *Trip Report – Groundwater Sampling Event at the Colonel's Factory Outlet of Arkansas, Inc.* September 23.

Clanton, Daniel. 2003. Correspondence to Nancy Fagan Re: The Colonel's Factory Outlet of Arkansas Data Gaps and Information Needs. January 17.

Ecology and Environment, Inc. 2004. *Investigation Report, Colonel's Factory Outlet.* May 7.

USEPA. 1990. *Preliminary Assessment and Site Inspection Report for the National Distributors Warehouse Company.* September 20.

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)?

____ 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.

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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.

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

____ 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:

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 ecosystems 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 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 ecosystem.

____ 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:

[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 ecosystems 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 ecosystems), 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 specialist, including an ecologist) adequately protective of receiving surface water, sediments, and ecosystems, 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 ecosystem.

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

Rationale:

[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?"

   ____ 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:

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).

X YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified.

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

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

Rationale:
Since sampling data collected in 2005 reported results that do not have high metal concentrations, we conclude that the 2004 sampling results were not indicative of actual groundwater conditions at the site.

Completed by	(signature)	[signed]	Date September 30, 2005
	(print)	Jim Rigg	
	(title)	Geologist Supervisor	

Supervisor	(signature)	[signed]	Date September 30, 2005
	(print)	Tammie Hynum	
	(title)	Manager, Active Sites Branch, HWD	
	(EPA Region or State)	ADEQ	

Locations where references may be found:

Arkansas Department of Environmental Quality - Hazardous Waste Division and Records Section
8001 National Drive
Little Rock, AR 72209

Contact telephone number and e-mail:

Daniel Clanton
501-682-0834
CLANTON@adeq.state.ar.us

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8001 National Drive
Little Rock, AR 72209

Contact telephone number and e-mail:

Daniel Clanton
501-682-0834
CLANTON@adeq.state.ar.us