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, North Plant**
Facility Address: **720 South Woods Street, West Memphis, Arkansas**
Facility EPA ID#: **ARD980621288**

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 (Booz Allen, 2004). 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 North 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 North Plant consists of a main process building and a small structure situated along the northern property boundary that housed the bumper strip line. The main process building for the North Plant housed two offices, a process area with electroplating lines, a bumper preparation area, a bumper polishing area, a raw materials storage area, a bumper storage area, a chemical storage area, a hazardous waste treatment area, and a packaging area. Figure 2 of the CSM illustrates the layout of the North Plant property (Booz Allen, 2004). The SWMUs identified for the North Plant include the Electroplating Line Area (SWMU-1), the Bumper Preparation and Storage Area (SWMU-2), the Black Beauty Storage Area (SWMU-3), the Bumper Polishing Area (SWMU-4), the North Raw Materials Storage Area (SWMU-5), the South Raw Materials Storage Area (SWMU-6), the Chemical Storage Area (SWMU-7), the Wastewater Treatment Area (SWMU-8), the Chromium Strip Line Area (SWMU-9), and the North and South Plant Drainage Ditch (SWMU-10). A detailed summary of the SMWUs and site conditions is presented in the CSM (Booz Allen, 2004). It should be noted that the TCFOA facility contained one AOC, the Crawfordsville Site (AOC 1), which received waste from both the North and South Plants. AOC 1 is located approximately 50 miles from the TCFOA facility and was issued a separate EPA ID number. Therefore, it is not considered to be a part of the North Plant (BDLI, 1997; Booz Allen, 2004).

During site investigation activities, three releases of hazardous waste were confirmed at the North Plant. The first release consisted of electroplating solutions from the sumps/pits associated with the Electroplating Line Area (SWMU 1). Spills and overflows of electroplating solutions from electroplating activities were stored in sumps/pits for extended amounts of time and eventually degraded the lining of the electroplating line area, which resulted in releases to subsurface soils. The second release occurred at the Chemical Storage Area (SWMU 7) located in the west-central portion of the North Plant building. Contaminants stored in this unit were released in an easterly direction and impacted an adjacent grass and soil-covered area approximately 30 feet long and 15 feet wide (Booz Allen, 2004). A third release occurred at the Bumper Polishing Area (SWMU 4), which produced metal particulates by grinding and polishing of bumpers. Exhaust fans vented metals particulates out of the west wall of the North Plant and deposited them in the North and South Plant Drainage Ditch (SWMU 10), which was located off site, adjacent to the east property boundary of the North Plant. Site investigation activities at SWMU 10 identified elevated concentrations of chromium, copper, and nickel in ditch sediments. As a result of contamination identified during Phase I and II site investigation activities, remediation activities were performed at the north end of the North and South Plant Drainage Ditch in March and April of 1998. The remediation consisted of excavating impacted materials and off site disposal at a licensed solid waste disposal facility. To confirm that all impacted soils had been removed from the North Ditch, TCFOA collected confirmatory samples from five locations in the bottom of the excavation pit and from six locations on the sidewalls of the excavation. Results for all confirmatory samples were

below residential screening levels (Booz Allen, 2004).

During preparation of the CSM, releases were also suspected at the Chromium Strip Line Area (SWMU 7) and the Wastewater Treatment Area (SWMU 8). Soil samples were collected adjacent to SWMU 7 in February 2004, and analyses failed to detect the presence of hazardous constituents. SWMU 8 has not been investigated; however, this unit is situated inside the main North Plant building on a concrete floor, surrounded by secondary containment. Therefore, a release of contaminants from this unit to environmental media is unlikely (Booz Allen 2004; Ecology and Environment, Inc. 2004).

References:

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

Belin, John I. 2002. Personal communication with Derrick Warrick of the Arkansas Department of Environmental Quality regarding The Colonel's Factory Outlet of Arkansas North and South Plants and the Crawfordsville Property. October 28.

Booz Allen Hamilton. 2004. *Conceptual Site Model for the Colonel's Factory Outlet of Arkansas, Inc.*, North Plant. May 19.

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

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 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 are 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 known to range in thickness from 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 that reportedly acts as a hydrologic confining layer that separates the overlying water bearing zones (Quaternary-age alluvium and Cockfield Formation) from the underlying units. The aquitard of the Cook Mountain Formation is encountered at approximately 300 feet bgs and is believed to range in thickness from approximately 50 to 150 feet (USEPA, 1990; BLDI, 1996).

Investigative soil borings drilled in 1996 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).

[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).

To determine the depth to groundwater and physical characteristics of the soils at the site, 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. The boring was advanced in the South Plant area. Results indicated that the hydraulic conductivity values ranged from 4.1×10^{-5} cm/sec in shallow subsurface soils (five to seven feet bgs) to 1.8×10^{-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 hydraulic conductivity 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).

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

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-1, SB-2, and SB-3. Boring SB-1 is located on site to the southwest of SWMU 9. On-site structures prevented the advancement of SB-2 on SB-3 at on-site locations. Borings SB-2 and SB-3 are located off site to the south of SWMUs 1 and 6, respectively. 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, antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, and vanadium, noted in bold in Table 1 below. Table 1 also presents the groundwater data from a second sampling event in July 2005 (performed by Booz Allen Hamilton [BAH]). 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-01	**SB-02**	**SB-03**	**GW-01**	**GW-02**
Aluminum	**202000 J**	9030 J	**48900 J**	200U	**1600**
Arsenic	**58.8**	15.0 U	**8.0 J**	10U	10U
Barium	**3690**	835	1580	200U	**280**
Cadmium	**25.3**	1.3 J	**5.8**	2.0U	2.0U
Chromium	**306**	18.0	59.6	5.0U	5.0U
Iron	**321000**	**29600**	**91700**	**800**	**2500**
Lead	**326**	14.9 UB	**74.7**	3.0U	3.0U
Manganese	**10300**	547	**3540**	**240**	**160**
Vanadium	**466**	25.7J	**127**	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, and BAH 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.

References:

[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:

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

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