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: **Dixie Metals Company**
Facility Address: **Highway 531, East Heflin, Louisiana, 71039**
Facility EPA ID#: **LAD055792097**

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 former Dixie Metals Company (Dixie Metals) site is situated on approximately 46 acres on Highway 531 in Webster Parish in Heflin, Louisiana. The site is bounded to the north by residential areas, to the west by the abandoned Louisiana and Arkansas Railroad and several homes, to the east by the Tri-State Concrete Company, and to the south by residential and undeveloped areas and Parmer's Creek. The site operated as a sawmill from 1933 until 1968, when it was purchased by Heflin Industries and redeveloped as a battery breaking and lead reclamation/secondary smelting facility. General Battery Corporation (which became a wholly-owned subsidiary of Exide Technologies, Inc., in 1987) acquired the facility under the name of Dixie Metals in 1974. Operations at the Dixie Metals facility ceased in March 1982, and decommissioning activities were initiated in June 1982. The site is currently clear of former equipment and buildings, except for the battery breaker building, warehouse, office, and pump house (Ref. 2).

The facility recovered and recycled lead, primarily from spent lead-acid batteries. Materials generated from the facility included sulfuric acid, battery casings, and lead. Sulfuric acid from the spent batteries was collected and neutralized in sumps in the battery breaker building, pumped to adjacent steel settling tanks, and ultimately discharged to the North Lagoon. During periods of high rainfall, water in the North Lagoon would overflow into a drainage ditch and flow to the South Lagoon. The North and South Lagoons operated as RCRA-regulated units until 1983 when both lagoons were drained, excavated to remove lead-contaminated sediment, and backfilled with clean soil. Lead-impacted soils were also removed from the drainage ditch connecting the North and South Lagoons (Ref. 2).

Site investigations were conducted in 2000 and 2004 to assess on- and off-site soil impacts, and sediment impacts in Parmer's Creek. The investigations identified arsenic and lead contamination in on-site surface and subsurface soil over the majority of the site. Arsenic, barium, cadmium, and lead contamination were also reported in surface and subsurface soil at several off-site sample locations. Parmer's Creek sediment results indicated lead concentrations above relevant standards approximately 2,400 feet downstream of the property boundary. Groundwater quality and flow direction are monitored by a network of ten groundwater monitoring wells at the Dixie Metals site. Arsenic, cadmium, and lead were reported at low levels in various wells during the 2004 investigation (Ref. 1).

In March 2004, Exide Technologies submitted a Revised Remedial Action Work Plan (RAWP) for the former Dixie Metals site. This work plan includes demolition of on-site buildings, excavation of lead-contaminated soil and sediment (both on- and off-site), construction of an on-site containment cell for contaminated soil and sediment, and site restoration activities (Ref. 2). The RAWP is currently in a public review/comment period and yet to be finalized and implemented.

References:

1. Remedial Action Investigation Report, Former Dixie Metals Site, Heflin, Louisiana, prepared by Advanced Geosciences Corp., dated March 24, 2004.
2. Revised Remedial Action Work Plan, Former Dixie Metals Site, Heflin, Louisiana (Version 5.0), prepared by Advanced Geosciences Corp., dated March 25, 2004.

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?

   _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:

The surface geology of the Dixie Metals site is characterized by Pleistocene Terrace deposits that are generally less than 100 feet thick. These deposits contain a complex interbedding of relatively impervious soils to depths of 20 to 40 feet below ground surface (bgs), underlain by more permeable sands with varying amounts of silt and gravel. The Sparta Sand aquifer, which underlies and is hydraulically connected to the Pleistocene Terrace deposits, consists of fine- to medium-grained sand interbedded with clay. Sparta Sand aquifer thickness at the site is not reported, but is known to be 500 to 750 feet thick in the eastern part of the Salt Dome Basin. The Sparta Sand aquifer is separated from the underlying Wilcox-Carrizo aquifer by the Cane River Formation, which acts as a confining layer that is reportedly 240 feet thick in the Heflin area (Ref. 1).

Nine groundwater monitoring wells were installed in 1982 and 1983. The wells were designated MW-1 through MW-6 and WW-2A through WW-4A. The wells were completed with 10 to 20 feet of well screen to maximum depths of 59 feet bgs. Slug test results indicate hydraulic conductivities in the range of 10^{-6} cm/sec. Groundwater elevation data obtained from these wells indicate that groundwater flow direction is to the south (Ref. 1). The wells are not referenced in recent documents (Refs. 2 and 3); therefore, it is assumed that the wells have been abandoned. Seven groundwater monitoring wells (MW-101 through MW-107) were installed during initial sampling activities in 2000 and three additional groundwater monitoring wells (MW-108 through MW-110) were installed during supplemental sampling activities in 2004 (Ref. 2). The wells were installed with 10 feet of screen from 50 to 60 feet bgs, except for MW102 (49 to 59 feet bgs), MW-106 (47 to 57 feet bgs), and MW-107 (46.5 to 56.5 feet bgs). Based on the most recent water level data collected in February 3, 2004, depth to water ranges from 31.09 to 46.69 feet bgs. Groundwater elevation data indicate that flow direction is towards the south with a hydraulic gradient of 0.00267 ft/ft in the north to 0.0004 ft/ft in the south (Ref. 2). There also appears to be a eastern component of flow along the eastern property boundary.

The most recent groundwater quality data from wells MW-101 through MW-110 were collected in February 2004 (Ref. 2). Samples collected during this effort were analyzed for arsenic, cadmium, and lead. Although all three metals were reported in various wells, only cadmium and lead were detected above Louisiana Department of Environmental Quality (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) groundwater screening standard (GW_SS) values. Table 1 presents the concentrations of cadmium and lead reported in groundwater beneath the Dixie Metals site above relevant RECAP standards.

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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).

Table 1. Constituents Detected in Groundwater Above RECAP Standards (mg/L)

Constituent	Well I.D.	Concentration[1]	RECAP GW_SS[2]	RECAP GW2[2]	Site-Specific Groundwater Criteria (GW2 * DAF2)[2]
Cadmium(Total and Dissolved)	MW-105	0.0069	0.005	0.005	0.037
Dissolved Lead	MW-103	**0.24**	0.015	0.015	0.111
Total Lead	MW-103	**1.1 J**	0.015	0.015	0.111
	MW-101	0.022 J	0.015	0.015	0.111

Notes:
1. Samples collected and laboratory analyzed in February 2004 (Ref. 2).
2. Criteria listed are the Risk Evaluation Corrective Action Program (RECAP) GW_SS, Groundwater Class 2A Drinking Water (GW2), and the RECAP site-specific criteria with calculation of the dilution and attenuation factor (DAF2) based on aquifer thickness and distance to the nearest point of exposure.
3. J = Concentration qualified as estimated.

Cadmium was detected in groundwater in monitoring well MW-105 (total and dissolved = 0.0069 mg/L) above its RECAP GW_SS of 0.005 mg/L. Monitoring well MW-105 is located downgradient of the former main landfill area in the eastern portion of the site. As indicated in Table 1, the cadmium concentration in monitoring well MW-105 also exceeds the RECAP GW2 value. However, under RECAP, it is possible to develop a site-specific groundwater screening criteria, which is calculated as the product of the GW2 value and an associated DAF2. Input parameters for selection of an appropriate DAF2 include the distance from the point of compliance (POC) to the point of exposure (POE) and the thickness of the source area (Sd).

According to a retired town council representative interviewed by Booz Allen and EPA Region 6 representatives in March 2005, the residents of Heflin are connected to public water supply. Consequently, it appears that residential wells are not a potential POE. A query of the Louisiana Department of Transportation and Development's Registered Wells Database lists three public supply wells located within a two-mile radius of the former Dixie Metals facility. Two of these public supply wells are located in Heflin, northwest of the former Dixie Metals facility, and the third well is located approximately 1.5 miles southwest of the former Dixie Metals facility. The three public supply wells are screened in the Wilcox Aquifer, which underlies and is hydraulically isolated from the Sparta Sand aquifer and the saturated units underlying the site (Ref. 1). Because site-related contamination is not present in the Wilcox Aquifer, the three public supply wells do not represent a potential POE. Nevertheless, to be conservative, a distance to the POE of 251 to 500 feet was used and the thickness of source area (Sd) was assumed to be equal to twice the screened interval (i.e., 20 feet). According to RECAP, the appropriate DAF2 for these conditions is 7.4. The resulting site-specific groundwater criterion for cadmium is 0.037 mg/L. As presented in Table 1, cadmium in well MW-105 does not exceed the conservative site-specific groundwater criteria.

Total and dissolved lead were detected in monitoring well MW-103 (1.1 and 0.24 mg/L, respectively) above the RECAP GW_SS of 0.015 mg/L in February 2004 (Ref. 2). These lead concentrations also exceed the site-specific groundwater criteria for lead (0.111 mg/L) calculated using the appropriate DAF2. However, because downgradient wells MW-104 and MW-106 report lead concentrations below the GW_SS, impacts to groundwater in the area of MW-103 appear to be limited in aerial extent. Total lead was also reported at 0.022 mg/L in well MW-101. Although this concentration is above the generic GW_SS, the site-specific groundwater criterion for lead has not been exceeded.

Based on this analysis, only total and dissolved lead exceedances in well MW-103 will be carried forward for further evaluation in this EI determination.

References:

1. RCRA Equivalency Demonstration for the RCRA Regulated Units at the Former Dixie Metals Facility, Heflin, Louisiana, prepared by Exide Corporation, dated February 1992.
2. Remedial Action Investigation Report, Former Dixie Metals Site, Heflin, Louisiana, prepared by Advanced Geosciences Corp., dated March 24, 2004.
3. Revised Remedial Action Work Plan, Former Dixie Metals Site, Heflin, Louisiana (Version 5.0), prepared by Advanced Geosciences Corp., dated March 25, 2004.

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:

Total and dissolved lead concentrations were reported in monitoring well MW-103 above the LDEQ RECAP GW_SS of 0.015 mg/L in February 2004 (Ref. 1). Downgradient wells MW-104 and MW-106 (located approximately 280 and 235 feet from MW-103, respectively) reported lead concentrations below the GW_SS, which indicates that impacts to groundwater are limited in areal extent. Because there is significant distance (approximately 250 feet) between unimpacted sentinel wells MW-104 and MW-106 and the downgradient site boundary, lead-impacted groundwater observed at well MW-103 can be considered stable and contained within the existing area of contamination at the Dixie Metals site.

References:

1. Remedial Action Investigation Report, Former Dixie Metals Site, Heflin, Louisiana, prepared by Advanced Geosciences Corp., dated March 24, 2004.

[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.

_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:

The headwaters of Parmer's Creek form in the southern portion of the site and flows to the southeast. On-site stormwater runoff is collected in two drainages. One drainage extends along the western edge of the site and joins the headwaters of Parmer's Creek, and the other flow towards the east along the northern edge of site and eventually flows into Parmer's Creek (Ref. 1).

As discussed in the response to Question No. 2, the lead-impacted groundwater in the vicinity of monitoring well MW-103 is bounded by downgradient wells MW-104 and MW-106. The absence of elevated lead concentrations in well MW-106, which is located upgradient of Parmer's Creek, indicate that contaminated groundwater is not discharging to Parmer's Creek.

References:

1. RCRA Equivalency Demonstration for the RCRA Regulated Units at the Former Dixie Metals Facility, Heflin, Louisiana, prepared by Exide Corporation, dated February 1992.
2. Remedial Action Investigation Report, Former Dixie Metals Site, Heflin, Louisiana, prepared by Advanced Geosciences Corp., dated March 24, 2004.

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:

Not applicable. See the response to Question 4.

[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:

Not applicable. See the response to Question 4.

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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:

Following completion of Remedial Action activities, groundwater monitoring will be continued to evaluate the effectiveness of the on-site containment cell cap in preventing leaching of lead to groundwater (Ref. 2). Monitoring wells MW-105 and MW-108 through MW-110 will be sampled on a semi-annual basis for the first year, annually through year five, and bi-annually thereafter. Samples will be laboratory analyzed for total and dissolved lead, arsenic and cadmium, and total dissolved solids. The 2004 remedial action work plan states that the need to perform future sampling of existing wells MW-101 through MW-104 and MW-106 and MW-107 will be based on groundwater sampling results obtained during the Remedial Action Investigation and submitted in the associated March 24, 2004 report. Because lead exceedances were reported at well MW-103 (Ref. 1), it is assumed that this well and downgradient wells MW-104 and MW-106 will be included in future groundwater monitoring efforts and incorporated in to the final RAWP.

References:

1. Remedial Action Investigation Report, Former Dixie Metals Site, Heflin, Louisiana, prepared by Advanced Geosciences Corp., dated March 24, 2004.
2. Revised Remedial Action Work Plan, Former Dixie Metals Site, Heflin, Louisiana (Version 5.0), prepared by Advanced Geosciences Corp., dated March 25, 2004.

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. Based on a review of the information contained in this EI determination, more information is needed to determine whether "Migration of Contaminated Groundwater" is "Under Control" at the **Dixie Metals Company** facility, EPA ID #**LAD055792097**, located in **Heflin, Louisiana**. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Rationale:

Information pertaining to the future groundwater monitoring programs that will verify that contaminated groundwater has remained within the existing area of contaminated groundwater is required to respond positively to Question 7.

Approved by: (signature) John Halk Date 6/30/05
(print) John Halk JOHN HALK
(title) Remediation Services Manager

Supervisor (signature) Douglas Bradford Date 6/30/05
(print) Douglas Bradford
(title) Geologist Supervisor
(EPA Region or State) Louisiana Department of Environmental Quality, EPA Region 6

Assistance completing the environmental indicator form provided by Lucas Kingston, Booze Allen Hamilton

Locations where references may be found:

LDEQ Public Records.

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