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DRAFT

REMEDIAL ACTION PLAN

FORMER LENOIR CAR WORKS
LENOIR CITY, TENNESSEE

Prepared for
Environmental Risk Solutions, LLC
5191 Natorp Boulevard
Suite 450
Mason, OH 45040

January 3, 2007

URS Project No.: 20500041.00004

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1.1 INTRODUCTION

URS Corporation (URS) was retained by Environmental Risk Solutions, LLC (ERS) to provide environmental services for the Lenoir Car Works facility located in Lenoir City, Tennessee. The site location is shown on Figure 1. Initial work consisted of completing an additional soil investigation of lead and arsenic at the facility. This report constitutes the Remedial Action Plan (RAP) for the Lenoir City site, and is intended to be generally consistent with Tennessee Department of Environment and Conservation (TDEC) comments, correspondence, and meetings held with ERS throughout 2006 (see Appendix A). The selected remedy and plans for its implementation along with the development of an operation and maintenance (O&M) plan are included in this RAP.

1.2 SITE LOCATION AND DESCRIPTION

The 100-acre site is owned by Southern Regional Industrial Realty (SRIR), a subsidiary of Norfolk Southern Corporation. The Lenoir Car Works, Inc. operated from 1907 until 1985 for the manufacture of rail cars and their components. Multiple buildings at the site were utilized for this purpose, including a ferrous and nonferrous foundry. The manufacturing area in the central portion of the site covered approximately 30 acres. The remaining 70 acres of the site is undeveloped of which approximately 58 acres is covered with dense overgrowth and trees. Most building foundations remain as does the demolished remains of the powerhouse and its smokestack. Former rail spurs traversed portions of the site and merged into the main rail corridor in the northern part of the site.

Approximately 62 acres of the site is covered with slag and foundry sand (SFS) which were waste by-products of foundry operations. A site map is provided as Figure 2 and illustrates the URS sampling grid, the remaining building foundations, site topography, and the extent of SFS.

The site was placed on the Tennessee List of Inactive Hazardous Substances Sites in 1988 and filed with the Loudon County Court House by the TDEC Division of Superfund (TDSF) in 1989. Since then, the site has undergone various removal actions and several site investigations.

1.3 REPORT ORGANIZATION

This RAP is divided into five sections. Section 1 provides the report Introduction, with an explanation of the scope of the RAP and presentation of background site and regulatory information. The Remedial Investigation Results in Section 2 provide an overview of the nature and extent of contamination requiring remedial action consideration. Remedial response objectives and the Purpose for Remedial Action are provided in Section 3. The Conceptual Design and Implementation Plan, in Section 4, identifies the selected remedial action(s) for areas of concern, and presents conceptual design and implementation plan details. Reference documents are cited in Section 5.

2.1 PREVIOUS INVESTIGATIONS

Prior to 2005, six investigations were conducted at the site to delineate the nature and extent of lead and arsenic, evaluate risk to human health and the environment, and assess remedial options. Investigations included work by Roy F. Weston, Inc. (1994), Eder Associates, Inc. (1996, 1998), Malcolm Pirnie (2000), CPF Associates, Inc. (CPF, 2000), and Marshall Miller & Associates (2002). The human health and ecological risk assessment conducted by CPF evaluated risk at the site based on commercial/industrial use. Their evaluation compiled and used all applicable environmental data previously collected. CPF concluded the acceptable lead exposure area concentration calculated with the USEPA blood lead model, assuming a shift in demographics from the 1990 Census, would be 1,500 milligrams per kilogram (mg/kg) (CPF, 2000). For arsenic, the risk assessment found that the 95% UCL exposure area concentration of 34 mg/kg represented an acceptable ($1x10^{-5}$) risk level for long term workers (CPF, 2000).

Although the foundry sand has remained at the property for many decades, a review of soil and shallow groundwater data from onsite monitoring wells indicated that the lead and arsenic in the foundry sand matrix are tightly bound and not migrating. Groundwater at the site and in the immediate vicinity is not used for potable purposes and previous investigations determined that the few existing private wells in the area are either side- or upgradient of the site. Therefore, groundwater is not a concern and was not further evaluated.

2.2 ADDITIONAL SOIL INVESTIGATION

In July 2005, a site topographic survey and placement of a soil sampling grid was conducted as described in the additional investigation work plan (URS, 2005a). The sampling grid was established across the property, with nodes placed every 150 ft and 300 ft along lines running northwest and northeast, respectively. Mr. Randy L. Denton, Tennessee Registered Land Surveyor No. 1152, completed the survey. Survey activities were performed with a Topcon® robotic surveying instrument using standard practices and tying into existing benchmarks. Surveying accuracy was 0.1 ft vertically and horizontally. The site topography and sample location information are provided on Figure 2.

URS completed delineation of the impacted soils using the field portable x-ray fluorescence (XRF) spectrometry analytical technique at 128 surface sample locations. Also, subsurface soil samples were collected for confirmatory laboratory analysis from 13 soil borings using a GeoProbe® and at 10 test pit locations. The results are described in the Draft Report, Lead and Arsenic Delineation, Former Lenoir Car Works, Lenoir City, TN (URS, 2005b).

Monitoring well abandonment of five existing wells (MW-1 through MW-5) was performed on October 5, 2005 by pressure grouting the casing from total depth to ground surface using a tremie tube. The grout slurry consisted of Portland cement and bentonite powder, mixed to achieve a density of approximately 13.5 to 14.1 lbs/gal. Wellhead protectors were removed and the ground surface was graded to conform to the surrounding area. URS personnel visually confirmed the complete filling of the well casing and wellhead with the grout mixture.

3.1 OBJECTIVES

The remedial actions presented in Section 4 of this report were selected so as to result in a post remedy scenario that is protective of human health and the environment and compliant with applicable standards for management of wastes at the site.

To achieve this end result, the following remedial action goals were established:

1. Control the disturbance of subsurface soils in areas of concern;
2. Eliminate direct contact of human and terrestrial or aquatic species with impacted media above remediation guidelines; and
3. Maintain remedy effectiveness and reliability.

Achievement of remedial action goals will block potential exposure pathways and risks associated with lead and arsenic.

3.2 REMEDIAL LEVELS

Remedial levels were established through a combination of various regulatory guidance and site specific risk considerations. The remedial endpoint for lead concentrations in soil at the site was determined by TDEC based on EPA Region IV guidance and precedents set for similar commercial/industrial sites in Tennessee. Cleanup levels for arsenic were developed based on the risk assessment work reported by CPF Associates (2000).

The following paragraphs identify the cleanup criteria.

3.2.1 Lead Cleanup Levels in Soil

- Lead in soil less than 1,500 mg/kg requires no action and can remain uncapped.
- Lead in soil greater than 1,500 mg/kg may potentially fail TCLP analysis and must be capped with 24 inches of clean fill material.

ERS may choose to run TCLP analysis on soil sample locations exceeding 1,500 mg/kg outside of the current proposed cover boundary to determine if the sample location should be included under the cap.

3.2.2 Arsenic Cleanup Levels in Soil

- Arsenic in soil less than 34 mg/kg (95% upper confidence limit (UCL) of the mean within an evaluation area) requires no action and can remain uncapped.
- Arsenic in soil greater than 34 mg/kg (95% UCL) must be covered with 24 inches of clean fill.
- Arsenic concentrations exceeding 100 mg/kg may potentially fail TCLP analysis and must be covered with 24 inches of clean fill. However, ERS may choose to run TCLP analysis on soil

sample locations exceeding 100 mg/kg outside of the current proposed cover boundary to determine if the sample location must be included under the cap.

3.3 STATISTICAL EVALUATION

Statistical evaluation of the arsenic data was performed to identify locations where no further action is necessary. This statistical analysis is based on three evaluation areas described as the southern, central, and northern portions of the property (divided based on the areas within Quadrants A through R as depicted on Figure 3), and discussed below.

3.3.1 Methods

Exposure scenarios were developed by dividing the site into three subunits: the Southern Area (Quadrants A, B, C, J, K, and L); the Central Area (Quadrants D, E, F, M, N, and O); and the Northern Area (Quadrants G, H, I, P, Q, and R). Data were grouped according to the three subunits. Data used in the statistical calculations were reported in Eder (1996, 1998), and URS (2005b), and are summarized in Table 1. Data points that would lie under the proposed cover, or were to be excavated and moved under the cover, were not included in the analyses. Arsenic XRF data points that were determined to be biased high due to high lead concentrations were not included in the analyses. For each subunit, data were used to calculate an exposure concentration and compared with the arsenic regulatory threshold of 34 mg/kg. The exposure concentration for arsenic was represented by the 95% UCL using USEPA's ProUCL Software Version 3.00.02.

3.3.2 Results

3.3.2.1 Southern Area

A portion of the Southern Area will be covered for lead remediation (see Section 4). The arsenic data in the Southern Area, excluding points under areas to be covered and points that were biased high due to interference with lead, were used to calculate a 95% UCL as an estimate of exposure. The 95% UCL for the XRF data was 21.4 mg/kg arsenic (Table 2). Because the exposure concentration is less than the regulatory threshold, no additional remediation is required for the Southern Area.

3.3.2.2 Central Area

Much of the Central Area will be covered for lead remediation. The arsenic samples outside of the proposed cover and not biased high were used to calculate a 95% UCL for the Central Area. The resulting value is 30.8 mg/kg arsenic (Table 3). Because the exposure concentration is less than the regulatory threshold, no additional remediation is required for the Central Area.

3.3.2.3 Northern Area

A portion of the Northern Area will be covered for lead remediation, and relatively high concentration arsenic "hot spots" outside of the lead impacted area are being removed and consolidated in the covered area. The 95% UCL for arsenic samples outside of the proposed

cover and not biased high is 30.0 mg/kg (Table 4). Because the exposure concentration is less than the regulatory threshold, no additional remediation is required for the Northern Area.

4.1 CONCEPTUAL DESIGN

This section presents a conceptual design and plan for implementation of the remedial action. In part due to the heterogeneous distribution of lead and arsenic in soil throughout the investigational area, the plan is multi-faceted in terms of the remedial action applied to a particular area (one or more of no further action, covering, and institutional controls). Where covering is applied it will extend to predefined limits based on the comprehensive database developed to date. Confirmation sampling will be conducted prior to construction to determine if RAP boundaries are inclusive of all impacted materials based on the remedial endpoint concentrations. The Confirmation Sampling Plan is discussed in Section 4.2.

Wherever material is managed in place, institutional controls and ongoing operations and maintenance of the remedy will ensure its reliability and efficiency. The cover area for soil remediation is presented on Figure 3.

4.2 REMEDIAL ACTION IMPLEMENTATION

The proposed remedial action for the facility involves installing a cover, at least 24 inches thick, over foundry sand areas containing lead and arsenic at concentrations greater than remedial action levels as presented in Section 3.2.

4.2.1 Site Preparation

The areas of the site subject to remediation will be surveyed to mark the proposed cover area boundaries and excavation locations. A land surveyor registered in the State of Tennessee will perform all pre-construction and final as-built surveys.

Clearing will be performed where necessary for cover construction. Vegetation that does not pose any interference with the construction work or equipment access will be identified before clearing begins and will be marked as protected. Trees and other vegetation will be cleared at grade (i.e., cut off at the ground surface). Cleared materials will be consolidated in a designated area on site. Cleared vegetation will be managed through natural degradation or will be burned on site in accordance with local regulations.

Prior to installing the cover, sediment and erosion control measures will be installed to protect against erosion and to prevent sediment from leaving the project site. A system of diversion ditches will convey offsite water around the impacted areas allowing the cover to be installed and permanently stabilized. During the period of time when the cover is being installed and stabilized, typical erosion control devices such as silt fencing, straw bale barriers, rock check dams and temporary sediment traps will be employed to trap on-site sediment. During construction of the cover, temporary seeding and mulching in general accordance with TDOT specifications (see below) may be utilized where any graded area is to be left inactive for more than 15 days, to protect the newly compacted areas from surface erosion during the remainder of the cover installation. However, ERS plans to follow the installation and compaction of the cover as soon as possible with the placement of soil capable of sustaining vegetative growth (the top 6-inch layer), and permanent seeding and vegetation will be installed in general accordance with TDOT specifications (see below). Periodic inspection and maintenance will be required to

ensure performance of the stabilization and permanent measures are adequately protecting the site from erosion (see Section 4.2.10).

Permanent Cover Seeding Mixtures

Seeding Dates	Grass Seed	Percentages
February 1 to July 1	Kentucky 31 Fescue	80%
	Korean Lespedeza	15%
	English Rye	5%
June 1 to August 15	Kentucky 31 Fescue	55%
	English Rye	20%
	Korean Lespedeza	15%
	German Millet	10%
April 15 to August 15	Bermudagrass (hulled)	70%
	Annual Lespedeza	30%
August 1 to December 1	Kentucky 31 Fescue	70%
	English Rye	20%
	White Clover	10%
February 1 to December 1	Kentucky 31 Fescue	70%
	Crown Vetch	25%
	English Rye	5%

Source: TDOT Standard Specifications

Temporary Cover Seeding Mixtures

Seeding Dates	Grass Seed	Percentages
January 1 to May 1	Italian Rye	33%
	Korean Lespedeza	33%
	Summer Oats	34%
May 1 to July 15	Sudan - Sorghum	100%
May 1 to July 15	Starr Millet	100%
July 15 to January 1	Balboa Rye	67%
	Italian Rye	33%

These above described measures are part of the plan that will be utilized, as necessary, to prevent stormwater run-off from eroding cleared areas of the property and in accordance with the

Stormwater Pollution Prevention Plan and the General Permit for Alteration of Wet Weather Conveyances, described in Section 4.2.6.

4.2.2 Confirmation Sampling

Once the proposed cover boundaries are surveyed and marked, confirmation samples will be collected to ensure that SFS materials exceeding lead and arsenic action levels are included under the cover. Confirmatory samples will be collected from 0 to 0.5 ft below ground surface (bgs) and 1.0 ft to 2.0 ft bgs from representative material (SFS only) at locations approximately 50 ft laterally from the proposed cover boundary at approximately 150 ft increments. Confirmatory sample locations are presented on Figure 4.

Additional confirmation samples will be collected from the vicinity of SB-33, SB-42, and HA-1 where historical analytical data indicate arsenic concentrations exceeding the action levels are present. Confirmation samples of SFS will be collected at four locations approximately 25-feet north, south, east, and west from the planned excavation boundaries (except at HA-1 which is bordered on the northwest by the railroad).

Confirmation samples will also be collected north, south, east, and west of SB-29 to determine if lead concentrations exceeding 1,500 mg/kg detected at the original soil boring location were an anomaly. If lead and arsenic concentrations are below their respective action levels at these sample locations around SB-29, SFS from this area will be left in place and not consolidated within the cover area boundary.

Four additional confirmation samples will be collected from areas between the northernmost rail spurs of the site (see Figure 4).

Eight additional confirmation samples will be collected within or around the perimeter of the former Railcar Manufacturing Building to determine if arsenic concentrations observed during the XRF survey were biased by elevated lead concentrations. If earthen floors are present on the building foundation, up to four of the eight samples will be collected from locations within the building footprint.

Confirmatory samples will be collected using a hand auger or other physical or mechanical means. Confirmatory samples collected will be submitted for analysis for total lead and arsenic. For lead and arsenic concentrations exceeding their respective total lead or arsenic action levels, ERS may choose to run TCLP analysis to determine if the sample location should be included under the cap. Confirmation sample locations are presented on Figure 4.

4.2.3 Test Pits

Test pits will be installed in the northern subunit in the two locations where surface topography anomalies were identified by TDEC. The test pits will be installed at 50-ft intervals using mechanical means along two transects in each area, roughly north-south and east-west. Test pit depths will be to native material. Visual observations will be made to determine if fill materials other than SFS are present. Sampling will be performed if disposed wastes other than SFS are observed. Analytical parameters will be discussed with TDEC prior to sample collection.

4.2.4 Cover Material

A minimum 24-inch (total thickness) cover will be installed on the impacted SFS as shown on Figure 3. Suitable, compactable material will be used for the sub-base (bottom 18 inches) of the cover. Soil capable of sustaining vegetation will be placed on top as part of the cover materials. This soil layer will be a minimum of 6 inches. Cover thickness will be verified during construction using standard surveying methods.

Samples of the fill material were collected and submitted for chemical analysis for volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) and RCRA metals. In addition, the fill material samples were also submitted for grain size analysis and Atterberg Limits. Analytical and geotechnical data for compactable cover materials are included as Appendix B.

Samples of soil capable of sustaining vegetative growth (the top 6-inch layer) will be collected and analyzed for arsenic, lead and TRPH to ensure acceptability of the material. These results will be submitted when they become available.

4.2.5 Cover Construction

Prior to cover installation, site construction debris (i.e., brick rubble) may be used to level low lying areas within the cover boundaries. Impacted SFS from isolated areas outside of the cover boundary (e.g., HA-1, SB-33, and SB-42) will be excavated and relocated to areas within the cover boundary. This material may be used to fill voids or depressions that may be present within the cover area. A flat drum roller with vibrator will be used to level the site in preparation of the cover construction. The vibrating roller will ensure that all voids and depressions have been filled and settled.

Cover installation will begin once the cover area has been suitably prepared. The cover material will be placed in a front to back progression so as to limit disturbance of the impacted SFS. The cover material will be placed at the site in loose lifts equal to or less than eight inches. An 815 Caterpillar articulating sheeps foot compactor (or equivalent) will be used to compact the cover material to 95% of maximum dry density. The flat drum roller may also be used to aid in achieving compaction requirements. Soil tests will be conducted during the cover construction by a local geotechnical firm to ensure the cover materials meet 95% of maximum dry density and adhere to ASTM D698 standards and testing requirements.

A final cover layer, consisting of a minimum of 6 inches of soil capable of sustaining vegetation, will be installed upon completion of the sub-base installation. Once the full 24-inch cover is complete, the area will be seeded with appropriate grass seed mixtures to be determined based on the time of year (expected late Spring/early Summer) and the locale (Knoxville area). Final grading will consist of a smooth surface with consistent grade to promote surface drainage and minimize erosion. The finished grade cover elevations are shown on Figure 5, along with erosion prevention and sediment control features.

Areas with existing concrete foundations will be cleaned of surficial debris and will be left uncovered.

4.2.6 Required Permits

The following permits would likely apply to the site.

Water Quality Control Act

As site activity involves the disturbance of more than one acre of land, an NPDES Permit for Discharges of Stormwater Associated with Construction Activities will be required. The Construction General Permit (CGP) requires that a site-specific Stormwater Pollution Prevention Plan (SWPPP) be developed, and that the site be inspected on a regular basis to ensure compliance with the SWPPP. SWPPP requirements include the identification of stormwater outfalls, design and installation of erosion prevention and sediment control measures, maintenance and inspection of stormwater controls, identification of pollution prevention measures and control of non-stormwater discharges, and inclusion of local stormwater requirements. Typical erosion prevention and sediment control measures include silt fences and straw-bale barriers, rip-rap, and sediment retention ponds (see Figures 5 and 6). The use of water to control fugitive dust and wash vehicles is allowed under the CGP.

The subject site is covered under the General Permit for Alteration of Wet Weather Conveyances issued by Tennessee Division of Water Pollution Control. This general permit allows for the alteration of wet weather conveyances as long as specific erosion and sediment control measures are taken, such as use of erosion and sediment controls and implementation of pollution prevention measures. ERS will follow the terms and conditions of the General Permit for Alteration of Wet Weather Conveyances in order to minimize the discharge of sediment and contaminants from the site.

Air Pollution Control Act

Site activities may generate nuisance dust from earth moving and cover construction. Dust control measures will be implemented during construction activities at the site to minimize the generation of dust and to prevent fugitive dust emissions from extending beyond the site property boundary. Dust generation may be associated with excavation activities, truck traffic, ambient wind traversing stockpiled SFS, loading of transport vehicles, and other earthwork.

Dust control measures during earthwork may include the following:

- Mist or spray water while performing excavation and grading activities and while loading transport vehicles;
- Limit vehicle speeds on unpaved portions of the property to keep dust to a minimum;
- Control excavation activities to minimize the generation of dust;
- Minimize drop heights while loading transport vehicles; and,
- Cover any stockpiled SFS generated from excavation activities with plastic sheeting or tarps.

Additional dust control measures may be implemented, as necessary, especially if windy conditions persist.

Additionally, the potential to generate lead and arsenic emissions during cover construction activities exists. However, based on historical concentrations for both constituents, it is unlikely emissions will exceed 5 tons per year for each air contaminant or 1,000 pounds for either hazardous air pollutant. Based on this information, the site may be considered an insignificant emissions unit and may need a written variance from TDEC Division of Air Pollution Control (DAPC) for construction activities.

Solid Waste Management Act

Cleared vegetation and construction debris generated during clearing and cover construction activities will be disposed on site in an area(s) not to exceed one acre, cumulatively. The cleared vegetation will be allowed to degrade naturally or will be burned in accordance with local regulations. The site would not be required to have a permit for disposal and management of these materials.

Hazardous Waste Management Act

Although lead and arsenic impacted materials that may potentially fail TCLP analysis are present at the site, it is the intent of this RAP to cover and manage the impacted materials in place. Existing impacted SFS from areas outside the cover boundary will be excavated and consolidated within the cover boundary for management. No new potentially hazardous materials will be generated at the site nor will any additional waste materials be brought on site for disposal during the RAP implementation. Therefore, no hazardous waste permits would be required for the site.

4.2.7 General Site Concerns During Construction Activities

Air Monitoring

Periodic air monitoring for arsenic, lead, and total suspended particulates (TSP) will be conducted using high-volume samplers. Air samples will collected for a 24-hour duration at units positioned approximately eight to ten feet above ground surface. Sample flow rates will be adjusted between 1.1 and 1.7 m^3/min. Air samples will be collected along the site boundary down wind of the work area (to be determined by wind direction). An additional sampling device will be placed upwind of the work area.

Air samples will be collected daily for the first six working days during significant grading and cover construction activities. If analytical results are below TDEC DAPC Ambient Air Quality Standards, air samples will be collected weekly for the remainder of construction activities with alternating weeks being analyzed for TSP only.

Air samples will be submitted to STL-Knoxville under standard chain of custody for laboratory analysis. TSP samples will be submitted on a 24-hour turn-around-time (TAT), whereas metal samples will be submitted for three-day TAT. Depending on the first round of analytical data results, TAT for TSP and metals may be adjusted.

Material Tracking to Public Right-of-Way

The construction exit roadway will be constructed in such a manner as to knock loose material from vehicle tires as they exit the site. The construction exit will be constructed using a base

layer of crushed rock or geotextile filter fabric top dressed with No. 1 or No. 2 stone (1.5-inch to 3.5-inch diameter). The length and width of the construction exit will be determined in the field but should be a minimum of 50 ft by 20 ft as presented on Figure 6. Periodic top dressing may be required during cover construction activities to ensure the integrity and effectiveness of the construction exit. Additionally, materials spilled, dropped, washed, or tracked from vehicles onto public roadways will be removed immediately.

Access and Security

Access to the site will be through one gate, located in the southwest corner of the site. This gate will be locked when construction activities are not being performed.

Water

Water for decontamination, dust suppression, and other purposes will either be available via an existing city water line or from site surface water (e.g., a sediment retention pond). Arrangements will be made to allow construction personnel to access this water.

Equipment Decontamination

Prior to exiting areas of elevated lead and arsenic concentrations, equipment that has contacted such media will be pressure washed.

4.2.8 Long-Term Care

Once the cover has been installed, the area will be revegetated. Long-term operations and maintenance (O&M) will include annual inspections to verify the continued performance of the cover. During these inspections, special notice will be made to ensure that there is no erosion of cover materials. Any areas that require revegetation or repair will be addressed promptly.

4.2.9 Institutional Controls

This section discusses the conceptual implementation of institutional controls.

4.2.9.1 Land Use Limitations

As necessary for areas in which soils containing lead and arsenic above the action levels remain in place and are covered, certain land use prohibitions and restrictions regarding site activities that could potentially result in the disturbance of the cover and subsurface soils are required. These include restrictions related to the cover boundaries, property use prohibitions, and operations and maintenance to maintain cover integrity.

The following information/items and restrictions will be implemented at the site.

- Any site activities that may potentially result in the disturbance of the cover or subsurface soils are prohibited unless approved by TDEC. This includes, but is not limited to, construction of new commercial or industrial facilities. Prior to construction, surveys, studies, analyses, investigations, or plans will be prepared and reviewed by TDEC as applicable.

- Any domestic use of shallow groundwater beneath the subject property is prohibited.
- The site will be used only for commercial or industrial purposes. Construction of residential facilities is expressly prohibited.
- Hunting and recreational activities are expressly prohibited.
- The following specific activities will be permitted within the boundaries of the affected areas:
    - Maintenance of drainage ditches in the area,
    - Maintenance/rehabilitation of existing utilities, and
    - Maintenance of the contaminant soil cover, designed to eliminate or minimize exposure to the subsurface soils in this area.

4.2.9.2 Deed Restrictions

For areas in which soils containing lead and arsenic above remediation levels remain in place, deed recordation and the purchase agreement or lease agreement upon property transfer will also incorporate land use controls. The deed recordation will, in perpetuity, notify any potential purchaser of the property that the parcel contains potentially impacted media. The purchase agreement(s) and deed recordation or lease agreements will reference this RAP and other environmental documents that contain the rationale for the notice and restrictions. The property disposal agent will ensure that the transfer documents for real property reflect the land use controls. The owner's legal office and its telephone number will be included as a point of contact in the purchase agreement. Final deed restriction language for the site will be agreed between property owner and TDEC.

4.2.9.3 Warning Signs

Permanent warning signs will be posted at selected locations to warn against digging or other intrusive activities without compliance to provisions outlined in this RAP.

4.2.10 Operations and Maintenance (O&M) Requirements

Implementation of O&M requirements will ensure that protective measures (e.g., pavement and soil covers) and institutional controls (e.g., signs and barriers) remain in good condition. O&M requirements include documented inspections, as well as any necessary repairs or replacement, of materials (e.g., signs, posts, fencing). The following sections outline the roles and responsibilities for O&M and provide a detailed description of O&M requirements for the site.

4.2.10.1 O&M Roles and Responsibilities

ERS has overall responsibility for O&M activities and reporting to TDEC. The responsible person is:

Kevin Iler
Environmental Risk Solutions, LLC

5191 Natorp Boulevard – Suite 450
Mason, OH 45040
Phone: (513) 229-8860
Fax: (513) 229-7195
E-mail: *kiler@environmentalrisksolutions.com*

A local contractor, who may change from time-to-time, will conduct field activities (inspections, reporting to ERS, and repairs, as needed). The contractor is:

Contractor to be Determined

4.2.10.2 Vegetative Cover Inspection

Vegetative cover inspections will be conducted monthly until a permanent ground cover is established in soil cover areas. After that time, the inspection frequency will be reduced to quarterly for the first year, then annually as described in Section 4.2.8. Inspections will focus on the condition of vegetative cover, the development of erosion in cover materials, and performance and condition of erosion control devices (if any following the development of vegetative cover). Measures, clean-outs and repairs necessary to correct developing issues will be described generally and specific items will be indicated with remedial action completion dates noted as the measures are implemented. How the surface vegetation in the covered areas is managed (i.e., mowed periodically or allowed to grow naturally) will be determined by the current land owner and future site usage.

4.2.10.3 Other O&M Responsibilities

Permanent warning signs, posts, and area fencing will also be inspected during the vegetative cover inspections. Damaged signs will be repaired or replaced, as needed, within one month of inspection or other, unscheduled, observations of damage. Additionally, in areas where the integrity of the cover has been compromised (i.e., erosion, soil sampling, utility maintenance or placement), the following O&M requirements for intrusive work and/or repair are required:

- Workers must be properly trained in handling impacted materials and must be provided proper personal protection equipment as well as MSDS sheets on the chemicals of concern
- Any work within the cover area must be conducted in a fashion that is protective of health and environment, and must be constructed in a manner that does not create a preferential pathway for the migration of the impacted material away from the final footprint
- Protective cover shall be restored to equal or better than the original condition after any work is conducted with the usage restricted area
- Any impacted material removed from beneath the cover shall be properly handled and appropriately disposed offsite at a properly licensed facility or by permit, or replaced beneath an equivalent protective cover on site within the area of the original cover.

4.2.10.4 Reporting

O&M inspections and repairs will be summarized and reported to TDEC on an annual basis. All site inspection reports and follow-up reports of needed repairs, since the date of the previous report to TDEC, will be compiled and appended to each annual submittal to TDEC.

4.2.11 Determination of Remedial Action Completion

Completion of remedial actions at the site will satisfy the following conditions:

- A full set of remedial measures was defined;
- The facility has completed construction and installation of all required remedial measures; and,
- Site specific media cleanup objectives, which were selected based on current and reasonably expected future land use, have been met.

For the site, closure would be of the type described as "Remedial Action Complete with Controls". The implementation of "controls" is an additional measure required to ensure the remedy remains protective of human health and the environment and involves performance of required operation and maintenance, monitoring actions, and/or compliance with and maintenance of any institutional controls.

4.2.12 Health and Safety

All fieldwork performed as part of the remedial action shall be conducted in accordance with a Site-Specific Health and Safety Plan (HASP) prepared for the site. The HASP shall be prepared in accordance with the requirements of Title 29, Code of Federal Regulations (CFR) 1910.120 to provide safe working conditions for personnel implementing the remedial actions, as well as any subcontractors, vendors, and visitors accessing the work site. The HASP will cover, at a minimum, the following topics.

- Chemical specific hazard analysis
- Personal protective equipment
- Personnel health and safety monitoring
- Work activity hazard assessments
- Incident Reporting

Prior to implementing field activities, all site personnel and subcontractors shall be fully briefed on the contents of the HASP and presented a written copy of the plan, when requested. All site personnel and subcontractors involved in the project will be required to abide by the provisions of the plan and to sign a Compliance Agreement form.

CPF Associates, Inc. 2000. Human Health and Ecological Risk Assessment Report. Lenoir Car Works Site – Lenoir City, Loudon County, Tennessee. November 21, 2000.

Eder Associates. 1996. Phase II Remedial Investigation, Lenoir City Car Works Site. Lenoir City, Loudon County, Tennessee. September 1996.

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Malcolm Pirnie, Inc. 2000. Focused Feasibility Study. Lenoir Car Works, Lenoir City, Tennessee. December 2000.

Marshall Miller and Associates. 2002. "Hot Spot" Confirmation and Delineation Report. Southern Region Industrial Realty, Former Lenoir Car Works Site, Lenoir City, Loudon County, Tennessee. June 26, 2002.

Roy F. Weston. 1994. Site Characterization Report, Lenoir Car Works. Lenoir City, Tennessee. December 1994.

URS Corporation. 2005a. Work Plan for Investigation and Remediation, Former Lenoir Car Works Site, Lenoir City, TN. June 15, 2005.

URS Corporation. 2005b. Draft Report, Lead and Arsenic Delineation, Former Lenoir Car Works Site, Lenoir City, TN. September 13, 2005.

TABLES

Table 1.
Data Used for Statistical Calculations - Arsenic
Former Lenoir City Car Works
Lenoir City, Tennessee

Northern Area			Central Area			Southern Area		
Sample Location	As (mg/kg)		Sample Location	As (mg/kg)		Sample Location	As (mg/kg)	
1	8.24	X	46	18.84	X	80	8.17	X
2	6.85	X	48	41.46	X	81	6.27	X
3	0.89	X	50	13.03	X	82	7.29	X
4	5.17	X	55	12.18	X	86	9.03	X
5	15.71	X	56	20.64	X	87	1.01	X
6	12.8	X	57	16.24	X	88	2.21	X
7	8.06	X	62	27.12	X	89	5.5	X
8	2.02	X	63	11.53	X	90	7.78	X
10	0	X	64	16.83	X	95	6.61	X
11	8.44	X	71	62.17	X	96	17.99	X
12	8.19	X	72	6.96	X	97	0.18	X
13	3.52	X	73	23.49	X	98	12.28	X
14	0	X	74	20.85	X	99	9.71	X
16	102.69	X	HA-13	6.1	I	100	25.64	X
17	10.33	X	SB-22	10	I	101	19.64	X
21	5.43	X	SB-22	10	I	102	0	X
23	22.59	X	SB-37	13.3	I	104	7.04	X
24	8.84	X	SB-24	6.9	I	105	10.76	X
25	53.98	X	SB-36	55.8	I	106	3.94	X
26	3.23	X	TP-4	27.9	I	107	4.11	X
27	28.04	X	77	56.8	I	108	3.53	X
28	3.64	X	SB-25	4.6	I	109	3.71	X
33	25.09	X	SB-38	45.2	I	113	26.79	X
38	20.16	X	SB-3	9.3	I	114	19.72	X
39	12.97	X	HA-12	34.7	I	115	3.82	X
TP 6	43	X	49	60.8	I	116	6.48	X
SB-25	4.6	I	SB-35	2.9	I	117	18.51	X
HA-4	3	I				118	12.67	X
SB-5	9.5	I				119	7.83	X
TP-7	12.5	I				100o (129)*	43.74	X
HA-5	40.2	I				104o (130)*	16.15	X
HA-3	53.6	I				105o (131)*	10.25	X
SB-28	17.7	I				82o (123)*	22.49	X
SB-31	14.3	I				88o (124)*	20.12	X
19	27	I				90o (125)*	0.28	X
20	3.5	I				94o (126)*	70.71	X
SB-30	9.4	I				96o (127)*	8.93	X
SB-27	2.9	I				98o (128)*	43.2	X
SB-34	14.5	I				SB-2	0.41	I
						HA-15	6	I
						83	16	I
						HA-16	6	I
						HA-14	6	I
						93	16.3	I
95% UCL	30.0			30.8			21.4	

Data Sources: URS (2005b), Eder (1996), Eder (1998).

* Sample location with lowercase "o" indicates offset from original sample location by 15-20m; renumbered in ( ) for identification on Figure 4.

X - XRF data

I - ICP (Laboratory) data

Table 2
Southern Area Statistical Analysis - Arsenic
Former Lenoir Car Works
Lenoir City, Tennessee

Data File	Southern Area			Variable:	Arsenic All Data		
Raw Statistics				Normal Distribution Test			
Number of Valid Samples			44	Shapiro-Wilk Test Statisitic			0.75479
Number of Unique Samples			42	Shapiro-Wilk 5% Critical Value			0.944
Minimum			0	Data not normal at 5% significance level			
Maximum			70.71				
Mean			12.60909	95% UCL (Assuming Normal Distribution)			
Median			8	Student's-t UCL			16.00364
Standard Deviation			13.39438				
Variance			179.4095				
Coefficient of Variation			1.06228				
Skewness			2.495948				
Gamma Statistics Not Available							
Lognormal Statistics Not Available							
				95% Non-parametric UCLs			
				CLT UCL			15.93051
				Adj-CLT UCL (Adjusted for skewness)			16.74238
				Mod-t UCL (Adjusted for skewness)			16.13028
				Jackknife UCL			16.00364
				Standard Bootstrap UCL			15.81033
				Bootstrap-t UCL			17.42216
RECOMMENDATION				Hall's Bootstrap UCL			18.4151
Data are Non-parametric (0.05)				Percentile Bootstrap UCL			16.05909
				BCA Bootstrap UCL			16.87909
Use 95% Chebyshev (Mean, Sd) UCL				95% Chebyshev (Mean, Sd) UCL			21.41092
				97.5% Chebyshev (Mean, Sd) UCL			25.21949
				99% Chebyshev (Mean, Sd) UCL			32.70066

Table 3
Central Area Statistical Analysis
Former Lenoir City Car Works
Lenoir City, Tennessee

Data File	Central Area			Variable:	Arsenic All Data	
Raw Statistics			Normal Distribution Test			
Number of Valid Samples		27	Shapiro-Wilk Test Statisitic			0.852273
Number of Unique Samples		26	Shapiro-Wilk 5% Critical Value			0.923
Minimum		2.9	Data not normal at 5% significance level			
Maximum		62.17				
Mean		23.54222	95% UCL (Assuming Normal Distribution)			
Median		16.83	Student's-t UCL			29.58414
Standard Deviation		18.40667				
Variance		338.8056	Gamma Distribution Test			
Coefficient of Variation		0.781858	A-D Test Statistic			0.402315
Skewness		1.018679	A-D 5% Critical Value			0.759503
			K-S Test Statistic			0.111682
Gamma Statistics			K-S 5% Critical Value			0.170904
k hat		1.774212	Data follow gamma distribution			
k star (bias corrected)		1.601768	at 5% significance level			
Theta hat		13.26912				
Theta star		14.69764	95% UCLs (Assuming Gamma Distribution)			
nu hat		95.80743	Approximate Gamma UCL			30.82838
nu star		86.49549	Adjusted Gamma UCL			31.37083
Approx.Chi Square Value (.05)		66.05264				
Adjusted Level of Significance		0.0401	Lognormal Distribution Test			
Adjusted Chi Square Value		64.91049	Shapiro-Wilk Test Statisitic			0.969535
			Shapiro-Wilk 5% Critical Value			0.923
Log-transformed Statistics			Data are lognormal at 5% significance level			
Minimum of log data		1.064711				
Maximum of log data		4.129873	95% UCLs (Assuming Lognormal Distribution)			
Mean of log data		2.851249	95% H-UCL			35.37886
Standard Deviation of log data		0.829783	95% Chebyshev (MVUE) UCL			42.49589
Variance of log data		0.688539	97.5% Chebyshev (MVUE) UCL			50.48972
			99% Chebyshev (MVUE) UCL			66.19205
			95% Non-parametric UCLs			
			CLT UCL			29.3689
			Adj-CLT UCL (Adjusted for skewness)			30.11094
			Mod-t UCL (Adjusted for skewness)			29.69989
			Jackknife UCL			29.58414
			Standard Bootstrap UCL			29.1804
			Bootstrap-t UCL			30.81708
RECOMMENDATION			Hall's Bootstrap UCL			29.77454
Data follow gamma distribution (0.05)			Percentile Bootstrap UCL			29.74741
			BCA Bootstrap UCL			30.12
Use Approximate Gamma UCL			95% Chebyshev (Mean, Sd) UCL			38.98304
			97.5% Chebyshev (Mean, Sd) UCL			45.66429
			99% Chebyshev (Mean, Sd) UCL			58.78832

Table 4
Northern Area Statistical Analysis - Arsenic
Former Lenoir Car Works
Lenoir City, Tennessee

Data File	Northern Area			Variable:	Arsenic All Data		
Raw Statistics				Normal Distribution Test			
Number of Valid Samples			39	Shapiro-Wilk Test Statisitic			0.710391
Number of Unique Samples			38	Shapiro-Wilk 5% Critical Value			0.939
Minimum			0	Data not normal at 5% significance level			
Maximum			102.69				
Mean			16.22	95% UCL (Assuming Normal Distribution)			
Median			9.4	Student's-t UCL			21.56417
Standard Deviation			19.79553				
Variance			391.863				
Coefficient of Variation			1.22044				
Skewness			2.693194				
Gamma Statistics Not Available							
Lognormal Statistics Not Available							
				95% Non-parametric UCLs			
				CLT UCL			21.43389
				Adj-CLT UCL (Adjusted for skewness)			22.89456
				Mod-t UCL (Adjusted for skewness)			21.79201
				Jackknife UCL			21.56417
				Standard Bootstrap UCL			21.37931
				Bootstrap-t UCL			23.84778
RECOMMENDATION				Hall's Bootstrap UCL			26.09575
Data are Non-parametric (0.05)				Percentile Bootstrap UCL			21.74641
				BCA Bootstrap UCL			24.10846
Use 95% Chebyshev (Mean, Sd) UCL				95% Chebyshev (Mean, Sd) UCL			30.03693
				97.5% Chebyshev (Mean, Sd) UCL			36.01553
				99% Chebyshev (Mean, Sd) UCL			47.75933

FIGURES