

**STREAMLINED RISK EVALUATION AND  
IDENTIFICATION OF REMOVAL ACTION  
OBJECTIVES**

**NON-TIME-CRITICAL REMOVAL ACTION**

**Viburnum Trend Haul Roads Site, Missouri**

**September 19, 2008**

*Prepared by:*



2500 55<sup>th</sup> Street, Suite 200  
Boulder, Colorado 80301

730 17<sup>th</sup> Street, Suite 925  
Denver, Colorado 80202



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# **Streamlined Risk Evaluation and Identification of Removal Action Objectives Non-Time-Critical Removal Action**

## **Viburnum Trend Haul Roads Site, Missouri**

### **1.0 INTRODUCTION**

This Streamlined Risk Evaluation and Identification of Removal Action Objectives report ("Report") has been prepared on behalf of The Doe Run Resources Corporation, Teck Cominco American Incorporated, Cyprus Amax Minerals Company, Homestake Lead Company of Missouri, and DII Industries, LLC (collectively referred to herein as "The Respondents") as part of a Non-Time-Critical Removal at the Viburnum Trend Haul Roads Site (VTHR Site). It is being submitted concurrently with an Engineering Evaluation/Cost Analysis Work Plan (NewFields 2008).

This Report has been prepared in accordance with the requirements of an Administrative Order on Consent (AOC), US Environmental Protection Agency (USEPA) Docket No. CERCLA-07-2007-0014, effective date May 25, 2007 (referred to herein as the AOC for Non-Time-Critical Removal Action). The Non-Time-Critical Removal Action follows a Time-Critical Removal Action that has been performed at the VTHR Site pursuant to an AOC, USEPA Docket No. CERCLA-07-2005-152, effective date March 1, 2005.

The VTHR Site is located in southeastern Missouri within Reynolds, Iron, and Dent counties, approximately 90 miles southwest of St. Louis and consists of residential properties and child high use areas that are adjacent to or in the vicinity of the Haul Road segments identified in Exhibit A to the AOC Statement of Work (SOW). The VTHR Site itself consists of 22 Segments of Missouri State Routes 21, 32, 49, 72, AC, B, J, KK, N, O, Y, and TT. These are presented on Figure 1.

As part of the Time-Critical Removal Action, soils with lead levels exceeding 1,200 parts per million (ppm) were removed from residential yards and child high use areas. In these yards, soils with lead in excess of 400 ppm were also removed and replaced. The Non-Time-Critical Removal Action addresses those remaining residential yards and child high use areas that have been identified as containing soil lead levels above levels of concern for the protection of human health.

## 1.1 Report Content and Organization

Per the requirements of the AOC SOW, this document describes the following:

- Section 2.0 Removal Action Objective (RAO). Description of the constituent of concern, the exposure pathways and the remedial action objective (RAO) to provide protection of human health.
- Section 3.0 Preliminary Risk Evaluation. Provides the preliminary risk evaluation, based on USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model using default input parameters.

## 2.0 REMOVAL ACTION OBJECTIVE

### 2.1 Exposure Pathways and Constituent of Concern

Lead in soil is the constituent of concern for the VTHR Site. Elevated lead concentrations have been detected in surficial soil in residential yards and child high use areas. Other constituents that were detected during the Removal Site Evaluation (RSE), conducted by Tetra Tech EM, Inc. under contract to the USEPA, included arsenic, cadmium, and zinc. However, these constituents were all present below their associated residential preliminary remediation goals (PRGs) and eliminated as constituents of concern in soil. Sampling of residential and municipal water wells at the VTHR Site during the RSE did not reveal concentrations of lead above the federal maximum concentration levels (MCL) of 15 µg/L. Consequently, lead in groundwater is not considered to be a concern for the VTHR Site.

Local residents are the primary population potentially exposed to lead in soil under the current and reasonably anticipated future land uses for the Non-Time-Critical Removal Action. The only complete exposure pathways are incidental ingestion of lead in surficial soils and inhalation of lead in dust generated from surface soil. Therefore, the exposure pathways of concern for adult and children residents are incidental ingestion of soil and inhalation of dust in and about the home and yard.

### 2.2 Removal Action Objective

The overall cleanup goal for the VTHR Site is to protect human health. As discussed in the previous section, residents are the primary population potentially exposed to soil

under the current and reasonably anticipated future land uses. For the VTHR Site, the specific RAO is to:

Limit exposure to lead in soil such that no more than 5 percent of young children (72 months or younger) who live within the Site have blood lead levels higher than 10 µg/dL.

This objective is consistent with USEPA's guidance (USEPA 2003) that USEPA should "...limit exposure to soil lead levels such that a typical child or group of similarly exposed children would have an estimated risk of no more than 5 percent of exceeding the 10 µg/dL blood lead level." It is assumed that the acceptable exposure point concentration that is protective of the sensitive subpopulation described above could be reasonably assumed to be protective of other sensitive receptors.

### **3.0 STREAMLINED RISK EVALUATION**

As required by the SOW, this risk evaluation uses USEPA's IEUBK model for determining risks and establishing cleanup goals. The IEUBK model combines estimates of lead intake from lead in air, water, soil, dust, diet, and other ingested media with an absorption model for the uptake of lead from the lung or gastrointestinal tract and a biokinetic model of lead distribution and elimination from a child's body to predict the likely distribution of blood lead concentrations for children ages six months through 84 months exposed to lead in these environmental media (USEPA 1994). The model also predicts the risk (e.g. probability) that a typical child, exposed to specified media lead concentrations, will have a blood lead level greater than or equal to the level associated by USEPA with adverse health effects (USEPA 2002).

Using the default values for the model (e.g., a bioavailability of 60 percent), an exposure point concentration or preliminary action level of 400 ppm lead in soil is derived that is protective of a child receptor and meets the RAO established above.

The lead bioavailability of Viburnum soils was quantified at the St. Joe Minerals Corp – Viburnum Site (referred to as the "City of Viburnum Site"). The City of Viburnum Site is proximate to the VTHR Site, thus the lead bioavailability or lead bioaccessibility is believed to be similar in nature.

Lead bioaccessibility was determined for 24 composite soil samples collected during the City of Viburnum Site Preliminary Assessment/Site Inspection (NewFields 2006). The samples represent 24 yard areas (one each from 24 properties) with total lead concentrations ranging from 413 mg/Kg to 1,190 mg/Kg. These 24 properties also

encompass the representative geographical locations of all the properties at the City of Viburnum Site as well as the VTHR Site.

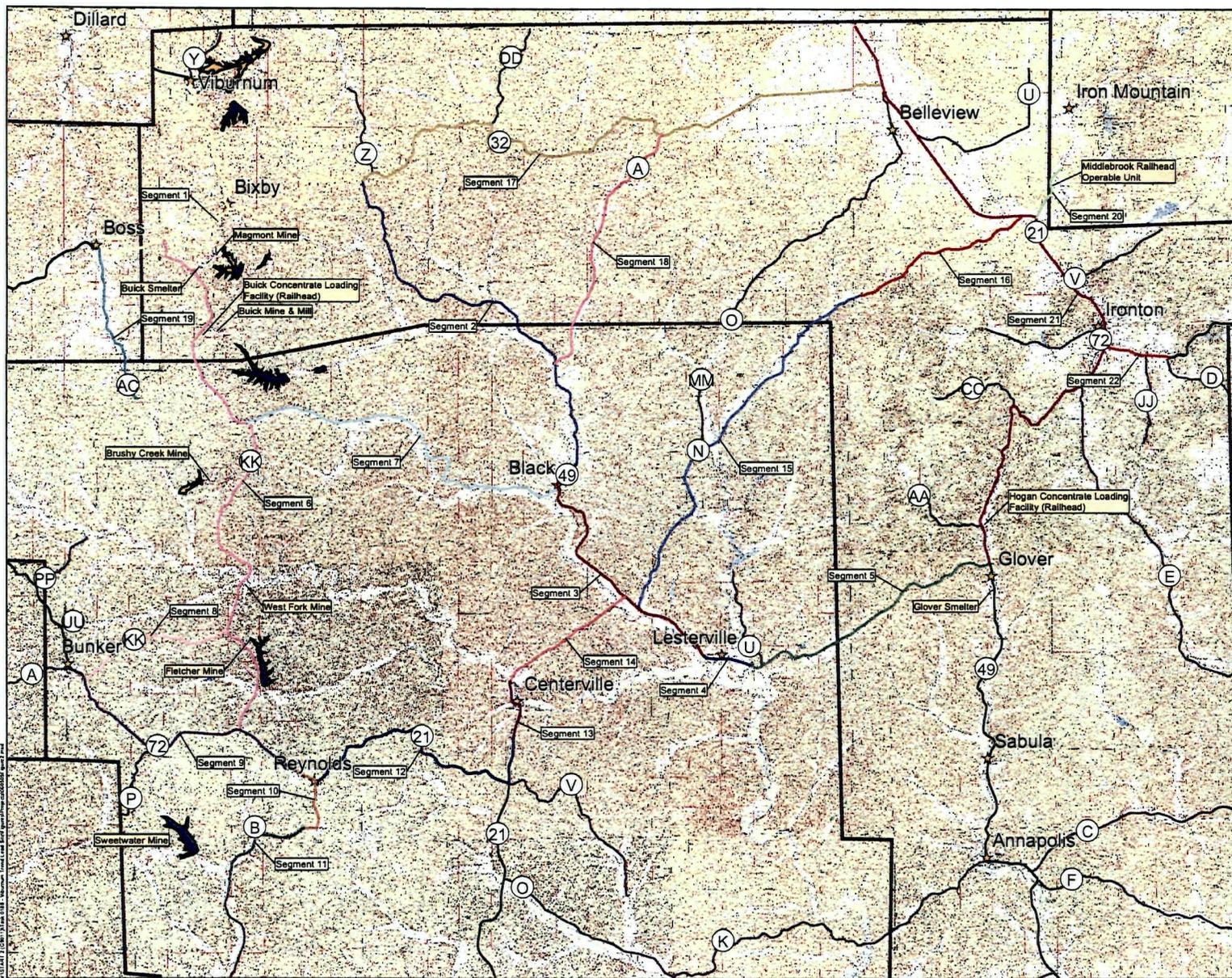
The Solubility/Bioavailability Research Consortium (SBRC) extraction process based on the *in vitro* Relative Bioavailability Leaching Procedure (RBLP) was used to determine lead bioaccessibility. The average lead bioaccessibility for the composite soil samples was  $78.9 \pm 7.4\%$  and  $63.5 \pm 8.5\%$  (average  $\pm$  standard deviation) at pH 1.50 and 2.25, respectively. A pH of 1.50 is prescribed for *in vitro* lead bioaccessibility determination. However, lead bioaccessibility determined at pH 2.25 correlated better to *in vivo* bioavailability for soils treated with phosphate amendment. Individual sample results are presented in "Preliminary Work Plan for Phosphate Amendment, St. Joe Minerals Corporation – Viburnum Site" (Gradient 2007).

The lead bioavailability results indicate that the bioavailability within VTHR soils is similar to the IEUBK model default and thus support USEPA's preliminary action level of 400 ppm total lead in soil.

#### 4.0 REFERENCES

- Gradient Corporation (Gradient), 2007. *Draft Preliminary Work Plan for Phosphate Amendment, St. Joe Minerals Corp – Viburnum Site, Viburnum, Missouri*. May.
- NewFields, 2006. *Preliminary Assessment/Site Inspection Report. St. Joe Minerals Corp. Viburnum Site, Iron County, Missouri*. July.
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- USEPA, 1994. *Technical Support Document: Parameters and Equations Used in the Integrated Exposure Uptake Biokinetic Model for Lead in Children*. OSWER #9285.7-22. December.
- USEPA, 2002. *Short Sheet: Overview of the IEUBK Model for Lead in Children*. OSWER #9285.7-13. August.
- USEPA, 2003. *Superfund Lead-Contaminated Residential Sites Handbook*. Prepared by the Environmental Protection Agency Lead Sites Workgroup (LSW), OSWER 9285.7-50. August.

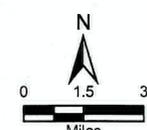
**FIGURE**



★

Legend  
 ★ City/Town  
 Viburnum Road Segment

- Segment 1
  - Segment 2
  - Segment 3
  - Segment 4
  - Segment 5
  - Segment 6
  - Segment 7
  - Segment 8
  - Segment 9
  - Segment 10
  - Segment 11
  - Segment 12
  - Segment 13
  - Segment 14
  - Segment 15
  - Segment 16
  - Segment 17
  - Segment 18
  - Segment 19
  - Segment 20
  - Segment 21
  - Segment 22
- County Boundary  
 Tailings Pile  
 Tailings Pond



Source: Iron, CO USGS 7.5 Minute Topo Quad  
 ESRI Media Kit 2001

Viburnum Trend Haul Roads Site  
 Viburnum, Missouri

**Figure 1**  
 Viburnum Trend Haul Road Segments

Tetra Tech EM Inc.

Date: 08/05/05 Drawn By: Colin Wilks Project No.: 0307404-0188-02