

**Removal Action Work Plan  
for Phase B Soil Remediation of Remediation Zones RZ-B through RZ-E  
Tronox LLC  
Henderson, Nevada**

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## 1.0 INTRODUCTION

Northgate Environmental Management, Inc. (Northgate) has prepared this Removal Action Work Plan (RAW) for the Tronox LLC (Tronox) facility located in Henderson, Nevada (the Site). This RAW presents the methods and procedures to be used to implement the remedial alternative approved by the Nevada Division of Environmental Protection (NDEP) to address contaminated soil at the Site.

The objective of this RAW is to present a cleanup strategy that complies with the NDEP Order December 14, 2009 to remove all impacted soil from the Site by the end of 2010, which will reduce the human health risks associated with contaminated soil in four areas defined as Remediation Zones (RZs) -B through -E (Figure 1). For purposes of the RAW and designation of potential remediation areas, “contaminated” soil is defined as concentrations exceeding NDEP worker BCLs, or the modified site-specific risk-based concentration (RBRC) for dioxin/furans (in terms of a 2,3,7,8-TCDD) of 2,700 mg/kg (ppt). For arsenic, the target remediation goal of 7.2 mg/kg will be used for surface soil as it represents a regionally accepted background concentration. There are no NDEP BCLs for asbestos; therefore, “contaminated” soil is defined as one or more long fibers (amphibole) and/or five or more long fibers (chrysotile). Remediation is focused on removing impacted soils exceeding the criteria indicated above within the 0-10 feet below the ground surface (bgs) soil column for protection of human health. Additionally, excavation areas will also address elevated concentrations of contaminants and the leaching to groundwater pathway and may require additional excavation beyond 10 feet bgs on an excavation polygon-specific basis.

Soil sampling in RZ-A did not identify soils exceeding NDEP clean-up criteria and is therefore not included in this RAW. A human health risk assessment will be conducted for RZ-A in accordance with the Health Risk Assessment Work Plan (HRA WP; Northgate, 2010a) similar to that planned for RZ-B through RZ-E once soil remediation is completed. The scope of work presented in this RAW is based on the results of the Phase A and B Source Area Investigations (ENSR, 2006 and ENSR, 2008) and discussions with NDEP, during which the scope and approach to remediation were determined on February 5th, 12th, and 22nd of 2010. Additional investigation/confirmation testing work has been approved by NDEP (Northgate, 2010b). This new investigation data will be incorporated into RZ-specific addenda to the RAW. This RAW is intended to be consistent with NDEPs decisions regarding remediation goals and Northgate’s human health risk evaluations presented to NDEP during meetings and discussions. Soil remediation work will be performed in accordance with this RAW, including the Standard Operating Procedures (SOPs) established by Basic Remediation Company (BRC, 2009a-j) for the Black Mountain Industrial (BMI) complex and the Quality Assurance Project Plan (QAPP; AECOM and Northgate, 2009) . Additionally, Northgate has prepared the following plans to be implemented as Appendices to this RAW:



used in the pharmaceutical and semiconductor industries and in the manufacture of high-strength boron fibers for products including sporting equipment and aircraft parts.

During the 1970s, the U.S. Environmental Protection Agency (U.S. EPA), the State of Nevada, and Clark County investigated potential environmental impacts from the BMI companies' operations including atmospheric emissions, groundwater and surface water discharges, and soil impacts (Ecology and Environment, 1982). From 1971 to 1976, Tronox (then Kerr-McGee) modified its manufacturing process and constructed lined surface impoundments to recycle and evaporate industrial wastewater. In 1976, the facility achieved zero discharge status regarding industrial wastewater management. In 1980, the U.S. EPA requested specific information from the BMI companies regarding their manufacturing and waste management practices by issuing Section 308 letters. In 1994, NDEP issued a Letter of Understanding (LOU) to Kerr-McGee that identified 69 specific areas or items of interest and indicated the level of environmental investigation they wanted Kerr-McGee to conduct.

Tronox has continued to undertake environmental investigations to assess environmental conditions at the Henderson facility. A detailed discussion of the specific areas or items of interest identified in the LOU and a list the products made, years of production, and approximate waste volumes for WECCO, AP&CC, and Tronox are found in the Conceptual Site Model document (ENSR, 2005).

During meetings held on February 5th, 12th, and 22nd of 2010, the scope and approach of work for soil remediation at the Site was presented to NDEP. On behalf of Tronox, Northgate presented maps showing proposed boundaries of potential remediation areas where chemical constituents are present above Basic Comparison Levels (BCLs) and other Site-specific comparison criteria, based on the results of sampling during the Phase A and B Source Area Investigation programs. Tronox also presented proposed pre-confirmation sampling locations to further refine the vertical and horizontal extent of the proposed remediation areas. Remediation areas continue to be discussed with NDEP and modified and refined as necessary as additional data are received.

At the conclusion of the February 22, 2010 meeting, NDEP and Tronox discussed the conceptual scope and implementation of the soil remediation program needed to comply with the December



2009 Order. Section 2.0 of this RAW, and the support plans included as appendices to this RAW, present the detailed scope of work, consistent with previous discussions with NDEP.

## 1.2 Background

Chemical analyses of soil samples collected during the Phase A and B sampling programs showed that within the upper 10 feet of soil, there are locations where dioxin, hexachlorobenzene (HCB), and other semi-volatile organic compounds (SVOCs); polychlorinated biphenyls (PCBs), asbestos, metals, organochlorine pesticides (OCPs); and/or perchlorate exceed the various BCL related criteria.

Voronoi/Thiessen remediation polygons were generated for the Site using the Phase A and B soil analytical data. The remediation polygons define areas with BCL exceedances or other criteria (as specified in paragraph 2 of the Introduction). There are a few locations where total petroleum hydrocarbons (TPH) exceed 100 milligrams per kilogram (mg/kg) but individual concentration of TPH constituents such as benzene, toluene, ethyl benzene, xylenes (BTEX)<sup>1</sup> or the individual PAHs do not exceed worker BCLs. As approved by NDEP, “TPH only” RZs are not included as potential excavation locations. In total, 107 remediation polygons have been retained for further characterization, refinement, and remediation.

During the meeting on February 22, 2010, NDEP suggested that the Site would be divided into five RZs that are based on geographic groupings of detections of chemicals and conceptual site model (CSM) considerations. Figure 1 shows the five RZs (named RZ-A through RZ-E).

In the Work Plan dated March 9, 2010 (Northgate, 2010b) and conditionally approved by NDEP on March 23, 2010 (REF), Northgate described the approach for “pre-confirmation sampling” within the four RZs where soil remediation is required. The pre-confirmation sampling work plan includes:

- Data tables for samples collected during Phase A and B investigations for each of the 107 remediation polygons that have been used to depict areas targeted for remediation in this and previous documents;
- A description of the proposed pre-confirmation sampling program; and
- The sampling rationale.

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<sup>1</sup> There were no samples within the upper 10 feet of soil where BTEX compounds were reported above worker BCLs.

