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

May 4, 2010

Prepared For:

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Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

Susan M. Crowley, CEM 1428 Exp.:03/08/11
Crowley Environmental LLC

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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 within 10 feet (ft) below grade surface (bgs) 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 generally defined as concentrations exceeding NDEP worker BCLs, or modified risk-based goals as agreed upon by NDEP. For metals where background concentrations exceed BCLs (e.g., arsenic), "contaminated" soil is defined as concentrations that result in a determination that, for the whole of the RZ, concentrations are greater than background. 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).

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:

- Dust Mitigation Plan and Clark County Dust Permit Application (Appendix A);
- Perimeter Air Monitoring Plan (Appendix B);
- Stormwater Pollution Prevention Plan (Appendix C);
- Example Contractor Health and Safety Plan, Table of Contents (Appendix D);
- Transportation Plan (Appendix E);
- Remediation Schedule (Appendix F);
- Historic Manganese Tailing Pile Cross-Sections (Appendix G); and
- Environmental Covenants (Appendix H)

1.1 Site Description and History

The Site is located approximately 13 miles southeast of the city of Las Vegas in an unincorporated area of Clark County, Nevada, and lies in Sections 1, 12 and 13 of Township 22 S, Range 62 E, (see Figure 2). The approximately 450-acre Site is located within the BMI complex, owned and operated by multiple chemical companies, one of which is Tronox.

The BMI complex was first developed by the U.S. government in 1942 as a magnesium plant for World War II operations. Later, a part of the BMI complex was leased by Western Electrochemical Company (WECCO) that would ultimately become the Tronox Site. WECCO produced manganese dioxide, sodium chlorate, sodium, and other perchlorates. WECCO also produced ammonium perchlorate (a powerful oxidizer) for the Navy during the early 1950s using a plant that was constructed on property owned by the Navy. WECCO merged with American Potash and Chemical Company (AP&CC) in 1956, with continued production of ammonium perchlorate for the Navy. In 1967, AP&CC merged with Kerr-McGee Corporation (Kerr-McGee) and began production of boron chemicals in the early 1970s. The production processes included elemental boron, boron trichloride (a colorless gas used as a reagent in organic synthesis), and boron tribromide (a colorless fuming liquid compound used in a variety of applications). The production of boron tribromide was discontinued in 1994, and the production of sodium chlorate and ammonium perchlorate were discontinued in 1997 and 1998, respectively. Perchlorate was reclaimed at the Site using existing equipment until early 2002.

In 2005, Kerr-McGee Chemical LLC became Tronox LLC. Tronox's Henderson facility continues to produce electrolytic manganese dioxide, used in the manufacture of alkaline batteries; elemental boron, a component of automotive airbag igniters; and boron trichloride,

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 in the upper 10 feet of the subsurface at concentrations above Basic Comparison Levels (BCLs) and other Site-specific comparison criteria[1], 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.

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

[1] *Criteria 1 (dark blue polygons on Figure 3):* Arsenic greater than 18 milligrams per kilogram (mg/kg), chrysotile long fiber count greater than 13, amphibole long fiber count greater than 1, dioxin greater than 2,200 parts per trillion (ppt), all other constituents greater than NDEP worker basic comparison levels (BCLs).
Criteria 2 (light blue polygons on Figure 3): Arsenic greater than 7.2 and less than 18 mg/kg, chrysotile long fiber count greater than 5 and less than or equal to 13, dioxin greater than 1,000 and less than or equal to 2,200 ppt, and low levels of polycyclic aromatic hydrocarbons (PAH)s.
Criteria 3 (teal polygons): one long amphibole fiber with no other risk drivers.

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 on Figure 3 and defined in footnote[1]). 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)[2] 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.

[2] There were no samples within the upper 10 feet of soil where BTEX compounds were reported above worker BCLs.

The pre-confirmation samples will be used to refine the horizontal and vertical extent of impacted soil and to prepare excavation plans and "cut-lines" needed to meet NDEP cleanup requirements. Northgate anticipates that after establishment of excavation cut-lines, the RZs shown on Figure 1 will meet NDEP criteria for statistically "homogeneous" areas for conducting HRAs. If adjustments are needed, final RZs will be consistent with the CSM and the results of the pre-confirmation soil sampling, and statistical requirements. The final excavation plan for each RZ will contain figures that have updated cut-lines based on CSM review and pre-confirmation data. Remediation cut-lines will be reviewed with NDEP prior to preparation of the final excavation plan.. The reader is referred to the Northgate 2010 document for additional details regarding pre-confirmation sampling.

1.3 Site Conditions

The Site is generally rectangular in shape with the long side in the north-south direction. Elevations across the Site range from 1,677 to 1,873 feet above mean sea level. The land surface slopes toward the north at a gradient of approximately 0.023 feet per foot (ft/ft). The developed portions of the Site have been modified by grading to accommodate plant facility buildings, surface impoundments, access roads, a landfill, and other Site features.

The major buildings that exist on the Site include Unit Buildings 1 through 6. These were the main buildings during World War II magnesium production. Unit Building 3 is currently used by Tronox for offices and storage. Unit Buildings 5 and 6 are currently used by Tronox for production of manganese dioxide, with Unit 5 also used for storage. Unit Buildings 1, 2, and 4 are not currently used and have been partially demolished. Other buildings exist on the Site including an administrative office building, a wash room building, Tronox production facilities, water treatment facilities operated by Veolia Water North America, a laboratory building, former perchlorate production facilities, and other buildings. Included within the Site is a 600- by 750-foot area owned and operated by the lime producer Chemstar. Three ponds exist at the northern end of the Site that will remain in use during the remediation and will be retained by Tronox (see Figure 4).

Manganese tailings have been stockpiled and capped with soil over approximately 8.6 acres in the eastern central portion of the Site. The historic tailings pile will be removed from the Site between approximately May to July of 2010, as further described in Section 4 of this RAW.

The Site is crossed by asphalt and concrete roads, dirt roads, and railroad spurs. One of the rail spurs is still in service. An extensive network of active and inactive underground utility lines is

present under the roads and open areas at the Site. A drainage ditch (Beta Ditch) crosses the Site from west to east. During the main production era, the Beta Ditch was the main drainage for liquid wastes that flowed to the pond areas to the east. Currently the Beta Ditch is blocked by an earthen dam near the eastern end. According to Timet, drainage from the Beta Ditch from the Tronox Site will no longer be allowed.

Within the boundaries of the Site are the Sale Parcels A, B, C, D, E, F, G, H, and I. These parcels are at the edges of the Site at the north, west, and south sides (see Figure 4). The Sale Parcels are not currently in use. This RAW does not include any removal actions on the Sale Parcels. Excavation of impacted soil on the Sale Parcels has been addressed in accordance with a work plan submitted to and approved by NDEP (Basic Environmental Company, 2008). Excavation and removal of soil from the Sale parcels began in March 2010 and will be completed in April 2010.

2.0 SCOPE OF WORK

Soil excavation is planned for RZs -B, -C, -D, and -E, depicted on Figure 3. These areas may be modified based on CSM review and analytical results from the pre-confirmation sampling. Areas where remediation will not occur due to Tronox operations include the ponds in RZ-D and the Leach Plant. These areas will require institutional or engineering controls (see Section 6.0)/Environmental Covenants. Information resulting from the pre-confirmation sampling will be incorporated into addenda to the RAW's specific section for each RZ. If revisions are needed, RZ addenda to this RAW will be prepared and will present revised RZ figures.

Based on NDEP guidance during recent meetings, Northgate will excavate to depths of 6 inches below existing grades in areas impacted by asbestos above risk-based goals. Contaminated RZs will be excavated to pre-determined depths based on existing and pre-confirmation soil sampling data. The nature of impactment in each polygon is shown on Figure 3. Excavated soil will be transported for permanent off-Site disposal at the Apex Landfill in Las Vegas or other approved landfills, in accordance with sampling results and landfill acceptance criteria.

All work conducted as part of this RAW will be in accordance with the following plans:

- Dust Mitigation Plan and Clark County Dust Permit (Appendix A);
- Perimeter Air Monitoring plan (Appendix B);
- Stormwater Pollution Prevention Plan (Appendix C);
- Site Health and Safety Plan (Example Table of Contents in Appendix D); and
- Transportation Plan (Appendix E).

2.1 Site Preparation

This section describes the Site preparation activities that will be performed prior to excavating and transporting soil from the Site. These include excavation area clearing and grubbing, well abandonment, documentation of pre-excavation Site conditions, permitting, and establishment of Site controls.

Demolition, if any, will take place prior to soil remediation and will be under a separate contract. However, to facilitate scheduling of the remediation, excavation can commence in portions of the RZ other than the potential demolition areas. Demolition will not be used as a basis for delaying excavation in an entire RZ.

Features and concrete slabs will be demolished. Concrete, brick, CMU blocks, wood, sheetrock, and other demolition debris will be transported to an approved off-Site landfill for disposal. Concrete and other non-vegetative debris in contact with contaminated soil is assumed to be impacted and will not be recycled. Any buildings to be demolished will be surveyed in advance for the presence of asbestos, lead-based paint, fluorescent tubes, ballasts containing PCBs, refrigerants, mercury-containing devices such as thermostats, and other hazardous materials. Materials found in the survey will be removed in accordance with applicable federal, state, and local regulations

If needed, demolition will take place in the RZs before soil remediation has commenced in that zone.

2.1.1 Work Area Preparation

Prior to performing soil excavation activities, the following remediation support features will be established/constructed. These features are delineated in Figure 5:

- Access routes for authorized visitor and contractor Site ingress and egress;
- Haul roads to the public access roads;
- Dust-control water source(s);
- Visitor area;
- Management/engineering trailers;
- Parking areas for workers, vehicles, and heavy equipment;
- Debris storage area; and
- Vehicular and personnel decontamination areas.

If present, vegetation will be removed from excavation areas and access routes. Soil attached to plant roots will be shaken loose and left on the ground surface in the area in which the vegetation was present, to be collected with the other soils from the area. The vegetation will be relocated and temporarily stockpiled within the debris storage area (Figure 5), where it will be tested to determine whether chemicals within Site soils have bio-accumulated within plant material at levels that would cause it to be unsuitable for disposal at a municipal landfill. In the event that vegetation, after testing, meets disposal requirements in municipal landfills, they will be so disposed. In the event that contaminant levels in vegetation dictate that they be disposed in hazardous waste landfills, they will be so disposed. The testing will be consistent with requirements from potential disposal sites. Debris present in excavation areas will be removed

from those areas and relocated in the debris storage area (Figure 5). This area is a rectangular plot approximately 60 by 150 feet. Debris will be removed from this area promptly and long term accumulation is not expected. If debris shows evidence of containing potentially hazardous materials, it will be stockpiled separately within the debris storage area. Small dirt berms will be created in order to provide containment of any contamination and in order to avoid storm water run-on onto and run-off from this area. Underground pipes, electrical conduits, water and sewer lines in the remediation areas will be identified, located, and de-energized, locked out, or blinded off prior to commencement of excavation, as appropriate.

2.2 Well Abandonment

A number of monitoring wells have been installed in the proposed remediation areas as part of historical field investigations. Locations of existing monitoring wells are depicted in Figure 6. The earth-moving activities planned as part of remediation may destroy the surface expression of these wells; therefore, Northgate will evaluate whether protection of the existing monitoring wells in planned excavation areas and access routes is feasible. The results of this evaluation will be provided in the RZ-specific addenda to the RAW.

Prior to initiation of soil excavation activities and building of access roads, Northgate will abandon wells or work around them, as appropriate. Northgate and Tronox acknowledge that similar wells may need to be reinstalled after the remediation work is completed, in order to continue groundwater characterization and remediation activities, as needed. Wells located outside excavation areas and access routes will be retained, clearly marked, and Northgate will instruct the remediation contractor to employ measures to protect these wells from damage during remediation. Well abandonment procedures will be performed in accordance with Nevada Division of Water Resources (NDWR) requirements.

2.3 Establish Pre-Excavation Conditions

The Site will be surveyed, visually inspected, and photographed. The entire Site has been topographically mapped, using 1-foot elevation contours. These contours are depicted as elevations above the standard North American Vertical Datum (NAVD; NAVD, 1988; shown in Figure 7). The NAVD is a benchmark used to precisely measure the surface topography, and subsurface lithography and hydrology data in the future, irrespective of changes to the surface topography.

All areas to be excavated as well as ditches and other areas requiring remediation will be staked in the field and posted with weatherproof signage prior to commencement of excavation.

2.4 Permitting

Prior to commencing soil excavation activities, required permits will be obtained from the associated oversight agency. The following permits are anticipated for this project:

- Northgate will submit to NDWR a completed Affidavit of Intent to Abandon Monitoring Well for each such well prior to abandonment;
- A permit to remediate asbestos-containing materials will be obtained from the Clark County Environmental Health Department;
- A Dust Control Permit will be obtained from the Clark County Department of Air Quality and Environmental Management (DAQEM). It includes a Dust Control Mitigation Plan; and
- A permit will be obtained from Nevada Department of Transportation (NDOT), if required, to transport soil on State roads. Northgate will also seek City of Henderson concurrence on the plan for transportation of impacted material.

2.5 Site Controls

Current access to the Site is controlled by a perimeter fence with locking gates and security personnel. Northgate expects that it will be necessary to provide additional access point(s) during the course of remedial activities. Therefore, as part of the remedial activities, additional gate(s) and security personnel will be provided, as necessary, to prevent unauthorized entry to the Site.

Additional Site controls will be employed to control traffic flow, including pedestrian traffic, within the Site during remediation. These Site controls are necessary to direct the following:

- Remediation workers;
- Vendors and subcontractors (e.g., equipment mechanics, materials delivery, trucking subcontractors, laboratory couriers); and
- Site visitors (e.g., agency staff, elected or appointed government officials, journalists).

Visitors must be escorted by Tronox or Tronox trained security personnel. No visitors will be allowed on the Site without escorts, with the exception of NDEP representatives who have completed the Tronox safety training program and will be on-Site to observe the remedial work. Properly trained NDEP personnel will be required to check in to the administrative office and receive a badge and vehicle pass on a daily basis. Signs posted on the fencing will warn visitors against unauthorized entry onto the Site. All personnel will be required to attend a tailgate health and safety briefing before entering the exclusion zone. Security personnel will be present 24 hours a day, 6 days a week, for the duration of the remediation project.

3.0 REMEDIATION

This section describes the remediation activities, including excavation procedures, the methods for transporting soils to the landfill, air monitoring procedures, decontamination procedures, and documentation. As previously discussed, the Transportation Plan (included as Appendix E) describes the transportation routes to be followed and procedures for managing the off-Site disposal of materials.

3.1 Soil Excavation

Northgate and Tronox plan to remediate the Site from south to north in the order of the four RZs (-B, -C, -D, and -E; see Figure 1). RZ-A does not have exceedances over the BCLs for on-Site workers. A human health risk assessment will be performed for RZ-A, but no excavation or removal action is proposed for this area. Soil remediation will occur in RZs B through E.

3.1.1 Excavation Procedures

A contractor will be retained to complete the excavations in accordance with the plans and specifications developed for this work, under the direction of the Northgate Project Manager. Prior to initiation of excavation, the areas to be remediated will be marked in the field by a licensed land surveyor.

The contractor will utilize construction equipment (e.g., scrapers, dozers, excavators, etc.) as appropriate to remove the soil containing elevated concentrations of chemicals and asbestos to the depths and lateral extent specified. The soil may be loaded directly into trucks for off-Site disposal or may be temporarily stockpiled within the remedial area before being loaded and off-hauled. During the transport phase, these stockpiled soils will be loaded onto dedicated trucks for direct disposal at Apex landfill (non-hazardous waste) or US Ecology landfill (hazardous waste). Non-hazardous contaminated soil and asbestos containing soils will be disposed of at the Apex landfill. Air monitoring procedures as described in the PAMP, differ for remediation areas impacted with chemicals and those impacted with asbestos.

Northgate anticipates that approximately 440,000 cubic yards of soil will be excavated and removed from the Site with the exception of the manganese tailings located in RZ-C. The actual volume will depend on the results of confirmation and pre-confirmation sampling. For volume estimating purposes, Northgate has assumed that a minimum of 6 inches of soil will be excavated from the locations determined to require remediation due to the presence of asbestos Areas impacted with asbestos and chemicals will be excavated to levels below approved cleanup levels.

The planned depths will be confirmed, as necessary, prior to excavation by the pre-confirmation sampling program. Excavation within each area to be remediated will be performed until the specified excavation depths are attained.

In order to minimize the potential for cross-contamination during hauling of soil within the Site, Northgate and Tronox proposes the following actions that will be taken as appropriate depending on the on-Site transportation route; need for access by Tronox, Veolia, and inspection personnel; and the location of the remediation area with respect to haul routes:

A. Allow the haul trucks to utilize a designated haul route within the Site that can be isolated from on-Site traffic through use of barricades, fences, traffic control personnel. Haul routes will be cleaned of impacted residue before turning over to normal traffic use; and

B. Utilize a portable truck wheel wash in landlocked areas, where Alternate A above cannot be applied, at the edge of the remediation area to perform decontamination prior to entering internal roads used by normal Tronox, Veolia, and inspection personnel traffic.

Following completion of remediation of the Site, decontamination areas will be remediated by removing all decontamination equipment, collecting and analyzing surface soil sample from the perimeter and bottom of the wheel wash stations, track-out stations, personnel decontamination areas, and excavating and disposing of soil, as appropriate.

In order to maintain slope stability of the pond embankments for Ponds GW-11, WC-West and WC-East, the Contractor will not approach closer than 50 feet horizontally from the toe of the berms with the planned remedial excavation. These areas will later be addressed through institutional and engineering controls as discussed further in Section 6.0.

Excavation areas terminated in the event of an unexpected condition (e.g., significant subsurface obstruction or facilities that prevent soil removal) will be identified in the field notes and described in the interim status and removal action completion reports (Sections 4.1 and 4.2). If such areas are encountered, alternative remedial approaches will be considered and discussed with NDEP. When excavation in a given area ceases, it will be graded to reduce physical safety hazards such as steep slopes. Excavations will be sloped in accordance with the Occupational Safety and Health Administration (OSHA) guidelines presented in 29 CFR 1926, Subpart P – Excavations. Specifically, sloping guidelines are presented in Appendix B of 1926 Subpart P, with supporting soil classification guidelines in Appendix A of the same subpart. Excavations

will be inspected by a licensed professional civil engineer, whose task it shall be to verify that excavations are being carried out in conformance with the grading plan. Furthermore, as noted in Section 3.1.4, a licensed surveyor will conduct a post-excavation topographic survey. In addition to the sloping requirement, temporary fencing will be placed along the perimeter of excavations deeper than 5 feet. Portions of the excavation sidewalls may also be flattened or the excavation partially backfilled to facilitate vehicle traffic or soil handling activities.

Excavation and hauling equipment will be fueled directly from a fuel truck brought onto the Site for that purpose; equipment fueling will be conducted only within a designated and lined fueling area. The designated fueling area is shown on Figure 5. Following completion of project fueling needs, surface soil samples will be collected and analyzed from the designated fueling and the areas will be remediated, as appropriate.

3.1.2 Health and Safety

Remediation activities will be performed in accordance with the Health and Safety Plan (HSP: Appendix D) developed for Site remediation activities by the contractor selected for this project. This HSP shall apply to the contractor's employees and subcontractors. The parameters of this HSP shall contain the items noted in the Example Table of Contents shown in Appendix D. Briefly, the HSP shall include the following:

- Identification of chemical and physical hazards associated with the remediation activities;
- Minimum training requirements for Site workers;
- Minimum Personal Protective Equipment (PPE) for Site workers and visitors and criteria for upgrades;
- Air monitoring requirements for workers' breathing zone and the Site perimeter (for public protection);
- A Site Hazard Analysis including chemical, non-chemical and biological hazards;
- Decontamination procedures;
- Emergency information, such as emergency telephone numbers and directions to the nearest hospital; and
- Administrative requirements, such as documentation of training, daily health and safety tailgate meetings, and documentation of air monitoring.

3.1.3 Dust Control

Specific dust control procedures and requirements are presented in the Dust Mitigation Plan provided in Appendix B. These procedures consist of wetting surface soil in the immediate excavation areas and along transport routes prior to and during excavation and transportation activities. Water is available for use from hydrants located throughout the Site except hydrants within the active plant areas. The remediation contractor may elect to install a raised storage tank to rapidly fill water trucks. The proposed location for a raised storage tank is near an existing hydrant east of the maintenance Building (See Figure 5).

During excavation activities, air monitoring will be conducted in accordance with the Perimeter Air Monitoring Plan (Appendix B) and HSP to verify that Site workers are protected and off-Site dust transport is controlled.

3.1.4 Post-Excavation Grade Survey

After excavation is deemed complete, Northgate will direct a licensed surveyor to conduct a post-excavation topographic survey. Northgate will use the information from this survey to confirm that excavation cut-lines have been achieved and to prepare a detailed topographic map representing post-remediation conditions; this map will use a 0.5-foot elevation interval. In addition, the post-excavation map will be prepared using colored contours that depict the depths.

3.1.5 Post-Excavation Backfilling

Tronox may elect to backfill some of the excavations with imported backfill material. Such backfilling will be performed by the Contractor in accordance with the remediation plans and specifications. Backfill materials will be tested by Northgate for geotechnical and environmental requirements, and testing results will be provided to NDEP for approval, before being accepted for on-Site use.

3.2 Soil Transportation to Approved Landfill

After soils are excavated, they will be loaded onto dedicated trucks for direct transportation to Apex Landfill or another approved landfill. Measures will be taken to minimize the potential for impact to other areas of the Site as described in Section 3.1.1. Air monitoring during these loading activities will be performed as discussed in Section 3.3 to evaluate the effectiveness of dust suppression measures. As described below, soils excavated from the Site that are non-hazardous will be transported in covered trucks to Apex Landfill, approximately 37 miles away

from the Site. Excavated soils that are hazardous waste will be transported to U.S. Ecology landfill, located approximately 119 miles from the Site. The Transportation Plan (Appendix E) includes haul route descriptions and route maps for both disposal facilities. All operators and vehicles will be properly licensed by the Nevada Department of Transportation. If the waste is profiled as hazardous, operators will possess a valid hazardous waste hauler license and will be certified to handle hazardous waste.

Access and haul routes will be clearly marked in the field with weatherproof signage. It is anticipated that the haul routes will not cross or enter Boulder Highway; rather, the haul route from the Site will utilize 4th Street to reach West Lake Mead Drive. Trucks will turn right at a signaled intersection and drive approximately ¼-mile to reach Highway 93/95 to the west. Before leaving the Site, trucks will travel through gravel track-out aprons to minimize any carry-on transport of materials onto 4th Street. These track-out aprons will be routinely refreshed to maintain efficacy. Because the access routes will be "wetted" to suppress dust, some mud may be generated, and it is likely that this mud would be transferred to truck tires and the vehicle body. When needed, prior to leaving the Site, the transport trucks will be decontaminated by scraping, sweeping, and/or a water spray to avoid transfer of dirt to the road pavement. In addition, each truck will be inspected prior to leaving the Site to verify that any loose soil or mud has been removed from tires and the truck body. Spillage of soils from trucks during transport will be minimized by not overloading the transport vehicles, by grading smooth haul roads, and by employing trucks with enclosed or covered cargo bays. Dust will be controlled by the application of water in accordance with the Dust Mitigation Plan (Appendix A). At a minimum, after excavation/transport operations cease for a given day, any affected portion of 4th Street will be cleaned using a street sweeper to remove any soils from the roadway. Soils removed from access routes will be disposed of at an approved landfill.

Northgate anticipates that approximately 4,000 cubic yards of soil will be loaded and transported each day, based on one 12-hour shift (the actual volume being dependent on the number of trucks used and daily conditions). Assuming the use of 38-ton capacity trucks, an estimated average of 150 truckloads will be transported each day. It is anticipated that two shifts will be required during portions of the remediation program. As noted in the project schedule presented in Appendix F, and assuming these volumes, transportation activities are expected to be completed by the end of 2010 as required by NDEP.

3.2.1 Transportation Routes

Transportation routes (visitor and contractor ingress/egress and haul road) to be employed during remediation are described and shown in the Transportation Plan (Appendix E). Transportation times from the Site to disposal facilities will be dependent on the specific excavation location within the Site, location of disposal facility (Apex or US Ecology), weather conditions, and traffic. Maps illustrating the routes from the work area to the above landfills, the estimated travel time, and the contact person, address, and phone number, are presented in Figures 3 and 4 of Appendix E.

In the event of an accident resulting in a spill of soils being transported, the truck driver will immediately contact the Northgate field representative overseeing remediation activities. The Northgate representative will immediately inspect the Site of the accident and notify the remediation project Health and Safety Officer (HSO) and the local emergency management agencies. The potential for immediate threat to workers and people nearby will be evaluated, and the Northgate representative, with input from the HSO and any local agencies involved, will instruct the remediation contractor to immediately take appropriate corrective steps to rectify the problem. Any spilled material will be returned to the truck (or another truck, if the original truck is disabled) and transport to the landfill will be completed. If the spill occurred on a public roadway, the spilled material will be removed with the Transportation Plan (Appendix E).

3.2.2 Soil Unloading

The soil will be transported to and unloaded at Apex Landfill, or another approved land disposal facility. Once transport trucks are in the landfill area, they will be directed to a "working face" where the contents of the truck will be uncovered and dumped. Trucks will then proceed across "rumble strips," track-out aprons, and wheel washing stations before leaving the landfill to return to the Site.

3.2.3 Dust Control During Transport

As previously noted, soil will be pre-wetted before excavation and soil excavation will be conducted using a water spray as needed for dust suppression. This moisture is not likely to significantly evaporate during travel to the landfill. Loads will also be covered for the duration of travel. Fugitive dust from impacted soils during trucking to the landfill will thereby be prevented. In light of these mitigation measures, air monitoring along the transport route is not planned. Dust creation along the on-Site haul roads will be minimized by regular application of water from water trucks.

3.3 Air Monitoring

Site and perimeter air monitoring will be performed in accordance with the Perimeter Air Monitoring Plan (PAMP; Appendix B) for fugitive dust emissions, chemicals of concern and volatile chemical emissions if any, as described in the PAMP and the HSP. The air monitoring will be used to evaluate the effectiveness of dust control measures in mitigating emissions. If emissions exceed the action levels, actions will be taken in accordance with the PAMP to bring the emissions into conformance with the plan. Actions include additional wetting of the soil, covering of exposed soil stockpiles, use of dust palliatives, ceasing operations if the wind velocity exceeds the value set in the PAMP, and ceasing operations until effective measures are implemented.

3.3.1 Site Monitoring

The Contractor's typical HSP specifies breathing zone and personal air monitoring be conducted within active areas undergoing soil excavation, loading, and unloading. The description of these types of air monitoring is provided below.

3.3.1.1 Breathing Zone Monitoring

Breathing zone monitoring will typically be required for personnel working in active excavation zones where they may be exposed above the exposure action levels as noted in the HSP. The "breathing zone" refers to the area from the top of the shoulders to the top of the head. The protocol for conducting breathing zone monitoring is outlined in the HSP.

Prior to entering an excavation area, the HSO will have established the appropriate level of PPE based on either the previous experience with similar activities conducted elsewhere at the Site, or the results of the personal air monitoring program discussed below. Once work has commenced, breathing zone monitoring will be conducted by measuring total organic vapors (TOV) and dust in air samples every 30 minutes. Decisions to modify PPE will be made by comparing sustained breathing zone TOV (based on photo-ionization detector [PID]) and total dust levels (based on MiniRAM readings) to the criteria presented in the HSP. The HSO may make recommendations to the contractor regarding breathing zone monitoring and appropriate respiratory and personal protection for their workers.

3.3.1.2 Personal Air Monitoring

Personal air monitoring will only be required if breathing zone or work zone monitoring results indicate that exposures over the action level may have occurred. Because there is no reliable method for determining real-time concentrations of most of the Site-related chemical classes, their concentrations in airborne dust will be assessed based on personal air monitoring results. The protocol for personal air monitoring is outlined in the HSP. The results of the personal air monitoring will be evaluated each day to determine if changes in PPE dust control measures are necessary.

3.3.2 Perimeter Air Monitoring

A program for monitoring airborne dust at points upwind and downwind of active excavation areas is detailed in the Perimeter Air Monitoring Plan (Appendix B). In addition to the monitors upwind and downwind of the active excavation area, upwind and downwind monitors will also be located at the perimeter of the Site. The results of the monitoring program will be used to determine the effectiveness of the dust control measures being employed, and to indicate whether it is necessary to implement changes to those measures.

3.4 Decontamination Procedures

The specific equipment decontamination procedures that will be conducted during the remediation of Site soils are described in this section. Equipment decontamination will include the following:

- Sampling equipment decontamination will be conducted between individual sampling points to avoid potential cross-contamination as described in the project SOPs (BRC, 2009).
- Minor decontamination such as scraping off of residual soils (i.e., those adhering to equipment) may be conducted as deemed necessary within the work Site.

Construction equipment decontamination will be conducted at the equipment decontamination pad prior to equipment leaving the Site. The following steps will be used to decontaminate construction equipment:

- Personnel will use proper PPE and observe all HSP rules.
- Equipment heavily caked with soil and/or other material will be scraped off with a flatbladed scraper. The scrapings will be placed in the soil staging area for disposal with the excavated soils.

- Equipment will be decontaminated using steam cleaning equipment prior to departure from the work Site. The condensate will be managed as set forth below. As previously noted, prior to accessing unimpacted areas of the Site and public roads, the transport trucks will be driven across gravel track out aprons, with mud scraping and/or use of a water spray to be performed at the dedicated decontamination area as needed to mitigate the potential for impacted Site soils to be spread.

Excavation equipment decontamination will primarily be performed at the designated decontamination area located as shown on Figure 5. This area will be designed by the Contractor. Decontamination water will be pumped from the collection area into a storage tank, which will be periodically sampled and analyzed to determine appropriate disposal. Some additional decontamination areas may also be needed within separate RZs based on the type of activity performed. Supplemental decontamination stations, if any, will be designed to contain waste water and soils generated during decontamination (i.e., bermed, sloped, and lined with plastic sheeting). Rinse water generated at those supplemental stations will be added to the storage tank for the main decontamination area and disposed of with that wastewater. Soils scraped off equipment or the road will be collected, and retained at the Site, until they can be added to truck loads of soils being transported for disposal at the landfill.

4.0 REMOVAL OF HISTORIC MANGANESE TAILINGS

Manganese tailings have been stockpiled and capped with soil over approximately 8.6 acres in the eastern central portion of the Site. This material is a non-hazardous solid waste product generated in the production of electrolytic-grade manganese dioxide. Tronox plans to relocate this historic tailings stockpile to the Apex landfill, consistent with its ongoing transport and disposal of the manganese tailings generated by its current manufacturing operations.

The total volume of the historic manganese tailings stockpile is approximately 213,000 cubic yards (ENSR, 2007). The tailings vary in thickness from approximately 5 to 30 feet. Appendix G includes three cross-sections through the tailings pile, showing the configuration of the tailings pile, and historic surface features that underlie the tailings.

Tronox plans to remove this tailings pile, with NDEP oversight, between May and July, 2010, in accordance with the schedule provided to NDEP. The contractor loading and transporting this material will control dust emissions in accordance with a dust control permit issued by Clark County Department of Air Quality and Environmental Management. The contractor will install various erosion and sediment control measures in accordance with Tronox's existing NPDES storm water permit and SWPPP. These measures include installation of silt fences and gravel bag barriers to limit sediment erosion and retain runoff on the Site.

Following the removal and off-Site disposal of the historic manganese tailings, Tronox will collect confirmation samples in accordance with a plan submitted to and approved by NDEP to confirm that the underlying soil is not chemically-impacted.

5.0 REPORTING, DOCUMENTATION, & PUBLIC PRESENTATION ACTIVITIES

Daily logs, field notes, and digital photographs will be prepared to document each day's field activities and relevant observations of Site conditions and remediation progress. During and following completion of the remedial actions at the Site, Northgate will prepare reports to the NDEP to document the progress of remedial activities and the proper completion of remediation. In addition, reporting will be performed in accordance with the various permitting requirements of other involved agencies. The following is a listing of reports that Northgate anticipates will be generated during the remediation project.

- Daily Progress Reports (to be prepared by the selected remediation contractor) documenting daily activities. Northgate will submit these reports to NDEP via e-mail within two business days. In addition to this summary daily report, the contractor will also keep field notes and daily logs;
- Daily photographic and video record. This record will be kept by Northgate documenting remediation activities;
- Interim Status Reports submitted to NDEP on a monthly basis; and
- Removal Action Completion Report.

The above documents will be retained by Northgate for a 5-year period after completion of the work.

5.1 Interim Status Reports

The purpose of the monthly status reports will be to keep the NDEP informed of the progress of remedial activities at the Site. The reports will present a summary of the remediation progress during the previous month, including as appropriate:

- Significant milestones;
- Locations where excavation has been completed;
- Locations where special control measures (except dust control, which is a routine measure) were necessary and/or where excavation had to be prematurely terminated due to any reason; and
- Estimates of volumes of soil excavated, stockpiled and transported off-Site for disposal (monthly and cumulative).

Other information (e.g., discovery of significant environmental conditions previously unidentified) will be provided in the monthly status reports. Interim status meetings will also be conducted by telephone to supplement these written reports.

5.2 Removal Action Completion Report

At the conclusion of remediation, a Removal Action Completion Report will be prepared for each of the RZs (RZ-B through RZ-E). These four reports will document completion of the remediation and will include descriptions of the remediation activities performed, including data collection procedures and a summary of post-remediation Site conditions based on those data. Copies of the daily logs, field notes, Site maps, surveying results (including plan and cross-sectional maps comparing pre-and post-excavation conditions), and pertinent analytical results will be provided. The report will also include a summary of any locations where excavation was prematurely terminated due to the presence of ground water or for any other reason. The results of the closure risk assessment will be included as appendices to the Removal Action Completion Report.

6.0 INSTITUTIONAL AND ENGINEERING CONTROLS

It is Tronox's intent to remove all contaminated soils in the upper 10 feet in accordance with approved NDEP goals. However, as appropriate, in areas of the Site where existing infrastructure or facility operations preclude the removal of soil exceeding remedial goals, engineering controls and/or institutional controls will be implemented. Two areas of the Site slated for engineering controls and/or institutional controls are: 1) The vicinity of Ponds GW-11, WC-E and WC-W (located in RZ-D) and 2) the Leach Plant and associated facilities (located in RZ-B). Both of these areas of the Site are operational and cannot be remediated at this time. Institutional controls will include environmental covenants to limit future use of impacted areas. Engineering and institutional controls, memorialized by use of environmental covenants, would mitigate risk until such time as the physical feature which prevents direct remediation is removed, and then will help ensure that removal is done in a way agreeable to NDEP.

Areas where institutional and/or engineering controls will be required will be shown on the individual RZ excavation plans for review and approval by NDEP. If institutional and/or engineering controls are necessary within part of a RZ, remediation will proceed in all other areas of the RZ where such controls are not required. Environmental covenants will be implemented as discussed below and in Appendix H.

6.1 Environmental Covenants

After implementing the RAW, Tronox proposes to record environmental covenants, as appropriate, on parcels with impacted soil, soil gas or groundwater exceeding remedial goals. These covenants would be filed with Clark County, pursuant to the "Uniform Environmental Covenants Act" [NRS § 445D.010 et seq.]. These covenants would "run with the land" and would inform potential future landowners/users of the nature and extent of environmental conditions at the parcel. Environmental covenants typically restrict landowners from using or developing sites in ways which might pose a risk to human health or the environment and would grant NDEP the power to control future development and use of the parcel. Appendix H includes a proposed template to be used for each parcel where an environmental covenant is proposed; proposed restriction(s) to incorporate within each environmental covenant, as appropriate, depending on the nature of environmental conditions (e.g., impacts to soil, soil gas or groundwater); and an assessor's parcel map that identifies the parcel numbers and boundaries associated with the Tronox Site. Environmental covenants may be recommended for soil deeper than 10 feet, if appropriate, and based on confirmatory sample results for deeper soils. Environmental covenants will be recommended for soil-gas and groundwater use at the Site since groundwater underlying the Tronox facility will likely be impacted for the foreseeable future.

7.0 SCHEDULE

Northgate plans to initiate soil remediation activities upon NDEP approval of the RAW and associated plans (Appendices B through H). The first task will be to obtain the pertinent permitting for the remediation activities; this will be done as soon as approval of those documents is received. Site preparation (well abandonment, construction of access routes/decontamination pads/wheel washing stations/re-fueling pads, etc.) will then be performed.

Once initiated, Northgate presently estimates the duration of the remediation activities will be completed by the end of 2010. Operations will be conducted in one to two shifts five days a week, as necessary to meet the project schedule. Northgate will maintain and provide a detailed project schedule to NDEP for the remediation effort. A remediation schedule is attached as Appendix F.

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FIGURES

APPENDIX A
DUST MITIGATION PLAN

APPENDIX B
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