**STATE OF WASHINGTON**
**DEPARTMENT OF ECOLOGY**

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| In the Matter of Remedial Action by:<br><br>Ultra Yield Micronutrients, Inc.; and Richard J. Camp Jr.<br><br>RE: Ultra Yield Facility | AGREED ORDER<br><br>No. DE 15869 |

TO: **Ultra Yield Micronutrients, Inc.**
4530 Professional Circle, Suite 201
Virginia Beach, Virginia 23455

**Richard J. Camp Jr.**
226 Warren Acres Road
Yakima, Washington 98901



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## I. INTRODUCTION

The mutual objective of the State of Washington, Department of Ecology (Ecology), Ultra Yield Micronutrients, Inc. (Ultra Yield), and Richard J. Camp Jr. (Mr. Camp) under this Agreed Order (Order) is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Order requires Ultra Yield and Mr. Camp to implement corrective action measures at a former dangerous waste management facility, including the performance of groundwater monitoring, site evaluation and, as necessary, soil excavation.

This Agreed Order No. DE 15869 fully supersedes and replaces Agreed Order No. DE 02HWTRCR-4661.

Ecology believes the actions required by this Order are in the public interest.

## II. JURISDICTION

This Agreed Order is issued pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.050(1). This Order also satisfies the requirements of WAC 173-303-646 through WAC 173-303-64630.

## III. PARTIES BOUND

This Agreed Order shall apply to and be binding upon the Parties to this Order, their successors and assigns. The undersigned representative of each Party hereby certifies that he or she is fully authorized to enter into this Order and to execute and legally bind such Party to comply with this Order. Ultra Yield and Mr. Camp agree to undertake all actions required by the terms and conditions of this Order. No change in ownership or corporate status shall alter Ultra Yield's or Mr. Camp's responsibility under this Order. Ultra Yield and Mr. Camp shall provide a copy of this Order to all agents, contractors, and subcontractors retained to perform work required by this Order, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Order.

## IV. DEFINITIONS

Unless otherwise specified herein, the definitions set forth in RCW 70.105D and



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WAC 173-340 shall control the meanings of the terms used in this Order.

A. Agreed Order or Order: Refers to this Order and each of the attachments to this Order. Attachment A (Corrective Action Plan) and Attachment B (Site Location Map and Facility Diagram) are integral and enforceable parts of this Order. Attachments C, D, E, and F are integral parts of this Order and enforceable to the extent provided in Attachment A (Corrective Action Plan).

B. Area of Concern (AOC): Refers to any area of the Facility where a release of dangerous constituents (including dangerous waste and hazardous substances) has occurred, is occurring, is suspected to have occurred, or threatens to occur.

C. Cleanup Standards: Refers to the standards promulgated under RCW 70.105D.030(2)(e) and includes: (1) hazardous substance concentrations that protect human health and the environment (cleanup levels); (2) the location(s) at the Facility where those cleanup levels must be attained (points of compliance); and (3) additional regulatory requirements that apply to a cleanup because of the type of action and/or the location of the Facility.

D. Corrective Action: Refers to any activities, including investigations, studies, characterizations, and corrective measures, including actions taken pursuant to RCW 70.105D and WAC 173-340, undertaken in whole or in part to fulfill the requirements of WAC 173-303-64620.

E. Corrective Action Plan (2018 CAP): Refers to the document (Attachment A) issued by Ecology concurrent with this Order pursuant to WAC 173-340-360 and WAC 173-340-380, which selected Facility-specific corrective measures and specified cleanup standards (cleanup levels, points of compliance, and other requirements for the corrective measures).

F. Corrective Measure: Refers to any measure or action to control, prevent, or mitigate release(s) and/or potential release(s) of dangerous constituents (including dangerous waste and hazardous substances) that has been reviewed and approved by Ecology for the Facility and set forth in an enforceable document prepared in compliance with the requirements of WAC 173-340, including WAC 173-340-360. Corrective measures may include interim actions as defined by


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WAC 173-340.

G. Dangerous Constituent or Dangerous Waste Constituent: Refers to any constituent identified in WAC 173-303-9905 or 40 C.F.R. Part 264, Appendix IX; any constituent that caused a waste to be listed or designated as dangerous under the provisions of WAC 173-303; and any constituent defined as a hazardous substance under RCW 70.105D.020(13).

H. Dangerous Waste: Refers to any solid waste designated in accordance with WAC 173-303-070 through WAC 173-303-100 as dangerous, extremely hazardous, or mixed waste. Dangerous wastes are considered hazardous substances under RCW 70.105D.020(13).

I. Dangerous Waste Management Unit (DWMU): Refers to a contiguous area of land on or in which dangerous waste is placed, or the largest area in which there is a significant likelihood of mixing dangerous waste constituents in the same area, as defined in WAC 173-303-040.

J. Facility or Ultra Yield Facility: Refers to the land owned by Mr. Camp and the micronutrient fertilizer production plant leased and operated by Ultra Yield, located at 213 West Moxee Avenue, Moxee, Washington, 98936, which is depicted in Attachment B. This includes all contiguous property, regardless of control, affected by release(s) or threatened release(s) of hazardous substances, including dangerous wastes and dangerous constituents, at and from the fertilizer production plant site.

K. Feasibility Study (FS): Refers to the investigation and evaluation of potential corrective measures, performed in accordance with the FS requirements of WAC 173-340-350, which includes the substantive requirements for a Resource Conservation and Recovery Act (RCRA) Corrective Measures Study, and which is undertaken in whole or in part to fulfill the corrective action requirements of WAC 173-303-64620.

L. Parties: Refers to Ecology, Ultra Yield, and Mr. Camp.

M. Permit or Permitting Requirement: Unless otherwise specified, refers to the requirements of WAC 173-303 for applying for, obtaining, maintaining, modifying, and


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terminating dangerous waste management facility permits.

N. Permittees: Refers to Ultra Yield and Mr. Camp.

O. Potentially Liable Persons (PLPs): Refers collectively to Permittees, Bay Zinc Company, Inc. (Bay Zinc), and Kronos Micronutrients, L.P. (Kronos).

P. Resource Conservation and Recovery Act or RCRA: Refers to 42 U.S.C. § 6901 *et seq.* and 40 C.F.R. Parts 239 through 282. Pursuant to RCW 70.105.130, Ecology has delegated authority to implement and enforce the requirements of RCRA under the state Hazardous Waste Management Act (HWMA), RCW 70.105 and WAC 173-303.

Q. RCRA Facility Assessment (RFA) or RFA Report: Refers to the Environmental Protection Agency (EPA)-conducted investigation of release(s) and potential release(s) at the Facility and the information contained in the report entitled "Final RCRA Facility Assessment Report," prepared by Booz Allen & Hamilton, dated November 20, 2000. The RFA Report is incorporated into this Order by this reference as if fully set forth herein.

R. Release: Refers to any intentional or unintentional spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of dangerous waste or dangerous constituents into the environment. It also includes the abandonment or discarding of barrels, containers, and other receptacles containing dangerous waste or dangerous constituents, and includes the definition of "release" in RCW 70.105D.020(32).

S. Remedial Investigation (RI): Refers to a facility-wide investigation and characterization, performed in accordance with the requirements of WAC 173-340, which includes the substantive requirements for a RCRA facility investigation, undertaken in whole or in part to fulfill the corrective action requirements of WAC 173-303-64620.

T. Solid Waste Management Unit (SWMU): Refers to any discernible location at a dangerous waste management facility where solid wastes have been placed at any time, irrespective of whether the location was intended for the management of solid or dangerous waste. Such locations include any area at a dangerous waste management facility at which solid wastes,



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including spills, have been routinely and systematically released, and include regulated units as defined by WAC 173-303.

## V. FINDINGS OF FACT

Ecology makes the following findings of fact, without any express or implied admissions of such facts by the Permittees.

### Facility Ownership

A. Ultra Yield is the tenant and current operator of the Facility, a micronutrient fertilizer production plant located at 213 West Moxee Avenue in Moxee, Washington. Ultra Yield produces zinc sulfate micronutrient fertilizers at the Facility.

B. The Facility was formerly owned and operated by Bay Zinc Company, Inc. (Bay Zinc) and subsequently by Kronos Micronutrients, L.P. (Kronos). Ultra Yield acquired assets from Kronos, entered into a lease agreement with Mr. Camp, and began operating the Facility in March 2017.

C. Mr. Camp, the former President of Kronos, is the current owner of Yakima County Parcel No. 19120123019, the property upon which the Ultra Yield Facility is located.

### Facility History

D. In 1971, Bay Zinc purchased the Facility from American Excelsior Company, which previously used the Facility to produce shredded cottonwood for apple and other fruit packaging material. In the fall of 1972, Bay Zinc made plant modifications and began production of zinc soil amendments.

E. Mr. Camp submitted a RCRA Part A application to the EPA on October 1, 1980. Pursuant to the October 1, 1980 notification, Bay Zinc was issued identification number WAD027530526 by EPA.

F. In April 1987, Bay Zinc submitted a Part B permit application to EPA and



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Ecology.[1] In the application, Bay Zinc identified itself as storing the following dangerous wastes at the Facility: steel mill flue dust (K061), incinerator ash from the combustion of tires, and filter cake that is characteristically hazardous for lead and cadmium (D006 and D008). The wastes were stored in a waste pile, tanks, and containers (railroad cars).

G. On or about November 4, 1988, EPA and Ecology issued a final Joint Permit No. WAD027530526 for the Storage of Hazardous Wastes at the Facility.

H. On November 4, 1998, Joint Permit No. WAD027530526 expired. The Facility has been operating under an expired permit since that date.

I. By 1999, Bay Zinc ceased receiving steel mill flue dust (K061), tire ash (D006 and D008), and brass dust (D006 and D008).

J. On or about November 20, 2000, EPA published a final RCRA Facility Assessment (RFA) Report for the Facility, prepared by Booz Allen & Hamilton, Inc. The purpose of an RFA is to identify those areas at the Facility where release(s) of hazardous substances, as defined in RCW 70.105D.020(13), may have occurred or may be occurring.

K. The 2000 RFA Report identified the following Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the Facility:

1. SWMUs: Rail spur area, container storage area D, rail unloading area/waste loading chute, storage tanks A and B, former waste pile, generator accumulation area, former pickle liquor tank, and maintenance shop accumulation area.

2. AOCs: railroad gate, along east fence, bone yard, near edge of access road, back lot fill area, runoff at north edge of asphalt, western fence boundary, western runoff area, runoff area near liquid fertilizer storage, and loading/unloading area.

L. In February, March, and April of 2002, Linebach Funkhouser Inc. conducted additional soil sampling at the Facility on behalf of Teck Cominco American Incorporated, a

[1] The Facility operated as a dangerous waste management facility on or after November 19, 1980, the date which subjects facilities to RCRA permitting requirements, including interim status requirements pursuant to 42 U.S.C. § 6925 and implementing regulations thereunder, and including authorized state regulations promulgated in WAC 173-303.



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prospective purchaser of equipment from Bay Zinc.

M. On August 30, 2002, Ecology and Bay Zinc entered into Agreed Order No. DE02HWTRCR-4661 for the remediation of soil and groundwater at the Facility. Agreed Order No. DE02HWTRCR-4661 incorporated by reference a Cleanup Action Plan prepared by Ecology (2002 CAP).

1. Between October 2002 and June 2005, Bay Zinc conducted extensive excavation and off-site disposal of over 12,320 tons of contaminated soils. Soil cleanup levels were achieved by excavation in all but the following limited areas:

- Certain grid blocks within a limited area of the Bone Yard Area (AOC-3);
- Certain grid blocks of limited extent along the rail spur line (SWMU-1); and
- Beneath paved areas south and north of the Warehouse and Storage Buildings, and select grid blocks west of the warehouse (zinc contamination only).

2. Ecology allowed soils contaminated with lead, cadmium, zinc, and dioxin to remain on site in discrete areas subject to an environmental (restrictive) covenant dated June 15, 2007. Yakima County Restrictive Covenant No. 7567203 prohibits any soil disturbance in the areas of remaining soil contamination without consulting with and receiving prior permission from Ecology.

N. Groundwater remediation and groundwater monitoring has occurred at the Facility since 1985. Between 2003 and 2006, Bay Zinc performed groundwater remediation via a pump-and-treat system. Current groundwater monitoring results indicate that the groundwater beneath the Facility remains contaminated above cleanup levels.[2] The contaminants of concern in groundwater are cadmium, zinc, sulfate, chloride, and manganese.

P. Release(s) and/or potential release(s) of hazardous substances including, but not limited to lead, zinc, dioxin, and cadmium from SWMUs and AOCs at the Facility and in

[2] Kronos Micronutrients, January 2017, *2016 Annual Report for Well Water Sampling Kronos Micronutrients, L.P. Facility Moxee, Washington.*



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immediately adjacent soils are documented in the RFA Report, the 2002 sampling undertaken by Linebach Funkhouser Inc., and the analytical results from the extensive soil excavation.[3]

Q. Hazardous substances have been and may continue to be released from the Facility into the environment including near-surface soils, soils immediately adjacent to the Facility, and to the groundwater beneath and beyond the Facility.

## VI. ECOLOGY DETERMINATIONS

Ecology makes the following determinations, without any express or implied admissions of such determinations (and underlying facts) by the Permittees.

A. Mr. Camp and Ultra Yield are "persons" within the meaning of RCW 70.105D.020(24).

B. Ultra Yield is an "owner or operator" as defined in RCW 70.105D.020(22) of a "facility" as defined in RCW 70.105D.020(8). Ultra Yield is the current operator of the micronutrient fertilizer production plant located at the Facility. Ultra Yield also leases property at the Facility from Mr. Camp.

C. Mr. Camp is an "owner or operator" as defined in RCW 70.105D.020(22) of a "facility" as defined in RCW 70.105D.020(8). Mr. Camp is the current owner of Yakima County Parcel No. 19120123019 where the Ultra Yield Facility is located.

D. Certain waste and constituents found at the Facility are dangerous wastes and/or dangerous constituents as defined by WAC 173-303 and Section IV of this Order.

E. These dangerous wastes and dangerous constituents are considered hazardous substances within the meaning of RCW 70.105D.020(13).

F. Based upon all factors known to Ecology, including those set forth in the Findings of Fact and the administrative record, Ecology has determined that release(s) and potential release(s) of hazardous substances at and/or from the Facility present a threat to human health and the environment.

[3] Linebach Funkhouser, Inc. September 2005, *Cleanup Action Report.*



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G. Based upon credible evidence, Ecology issued a potentially liable person (PLP) status letter to Ultra Yield dated August 7, 2017, pursuant to RCW 70.105D.040, .020(26), and WAC 173-340-500. By letter dated August 21, 2017, Ultra Yield voluntarily waived its rights to notice and comment and accepted Ecology's determination that Ultra Yield is a PLP under RCW 70.105D.040.

H. Based upon credible evidence, Ecology issued a PLP status letter to Mr. Camp dated August 7, 2017, pursuant to RCW 70.105D.040, .020(26), and WAC 173-340-500. After providing for notice and opportunity for comment, and concluding that credible evidence supported a finding of potential liability, Ecology issued a determination that Mr. Camp is a PLP under RCW 70.105D.040 and notified Mr. Camp of this determination by letter dated September 15, 2017.

I. Pursuant to RCW 70.105D.030(1) and.050(1), Ecology may require potentially liable persons to investigate or conduct other remedial actions with respect to any release or threatened release of hazardous substances, whenever it believes such action to be in the public interest. Based on the foregoing facts, Ecology believes the remedial actions required by this Order are in the public interest.

J. Under WAC 173-340-430, an interim action is a remedial action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance, that corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed, or that is needed to provide for completion of a site hazard assessment, remedial investigation/feasibility study, or design of a cleanup action plan. Any Party may propose an interim action under this Order. If the Parties are in agreement concerning the interim action, the Parties will follow the process in Section VII.H. If the Parties are not in agreement, Ecology reserves its authority to require interim action(s) under a separate order or other enforcement action under RCW 70.105D, or to undertake the interim action itself.



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K. Performance of this Order by the Permittees will concurrently satisfy the requirements for remedial action pursuant to WAC 173-340 and the requirements for corrective action pursuant to WAC 173-303-646 and WAC 173-303.

## VII. WORK TO BE PERFORMED

Based on the Findings of Fact and Ecology Determinations, it is hereby ordered that the Permittees take the following remedial actions at the Facility and that these actions be conducted in accordance with WAC 173-340 and applicable provisions of WAC 173-303, unless otherwise specifically provided for herein.

A. The Permittees shall implement the remedial actions as set forth in the 2018 CAP (Attachment A).

B. Soil Remediation

1. An Environmental Covenant was recorded under Yakima County, Washington Auditor's file number 7567203 that prohibits the altering, modifying or removing of existing structures over the soil in the "Impacted Soil Areas" (defined therein) in any manner that either may result in the release or exposure to the environment of that contaminated soil or create a new exposure pathway, unless authorized by the prior written approval of Ecology. The Environmental Covenant further prohibits any activity at the Facility in the Impacted Soil Areas that may result in the release or exposure to the environment of the contaminated soil that was contained as part of the completed soil remedial action, or create a new exposure pathway.

2. The 2007 Site Management Plan (Attachment D) further requires that any utility repairs or installation or new construction that will extend into soils through cover materials at the Facility are to be conducted in accordance with Section 7.5 of the 2007 Site Management Plan (Attachment D). Although no further soil remediation is required under the 2002 Compliance Management Plan (Attachment C), any future soil remediation at the Facility associated with utility repairs or installation, new construction or otherwise will be


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completed in accordance with the sampling procedures, test methods, evaluation and equipment decontamination procedures as set forth in the 2002 Compliance Management Plan (Attachment C). Excavated soil will be properly characterized, manifested, and disposed of at facilities authorized to receive the material. Replacement fill for excavated areas will come from borrow areas to be established on uncontaminated portions of the property or offsite.

3. A field professional will document the work performed. The field professional will ensure that material is properly staged and manifested, and will monitor health and safety procedures to assure compliance with a Health and Safety Plan. Confirmatory sampling for cadmium, lead, and zinc will be conducted in the excavated area(s) to document that the soil cleanup levels specified in Section 6.0 of the 2018 CAP for those metals have been achieved.

C. Groundwater Remediation

Groundwater remediation shall occur via Monitored Natural Attenuation in accordance with the 2018 CAP (Attachment A) and 2007 Action Plan for Affected Groundwater (Attachment E).

D. In accordance with WAC 173-340-840(5), all environmental sampling data shall be submitted in a format approved by Ecology.

E. The 2018 CAP (Attachment A), 2002 Compliance Management Plan (Attachment C), 2007 Site Management Plan (Attachment D), and 2007 Action Plan for Affected Groundwater (Attachment E) are integral parts of this Order and enforceable to the extent provided in the 2018 CAP. In the event of a conflict among the foregoing documents, the 2018 CAP will control.

F. The Permittees shall comply with the requirements of the Environmental Covenant recorded under Yakima County, Washington Auditor's file number 7567203 on June 15, 2007.

G. The Permittees shall notify Ecology's project manager in writing of any newly-identified SWMU(s), newly-discovered release(s) from known SWMU(s), and newly-discovered


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AOCs at the Facility no later than 30 days after discovery, and shall investigate and report on these areas as directed by Ecology's project manager.

H. If the Parties agree on an interim action under Section VI.J, the Permittees shall prepare and submit to Ecology an Interim Action Work Plan, including a scope of work and schedule, by the date determined by Ecology. Ecology will provide public notice and opportunity to comment on the Interim Action Work Plan in accordance with WAC 173-340-600(16). The Permittees shall not conduct the interim action until Ecology approves the Interim Action Work Plan. Upon approval by Ecology, the Interim Action Work Plan becomes an integral and enforceable part of this Order, and the Permittees are required to conduct the interim action in accordance with the approved Interim Action Work Plan.

I. If Ecology determines that the Permittees have failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to the Permittees, perform any or all portions of the remedial action or at Ecology's discretion allow the Permittees opportunity to correct. The Permittees shall reimburse Ecology for the costs of doing such work in accordance with Section VIII.A (Remedial Action Costs). Ecology reserves the right to enforce requirements of this Order under Section X (Enforcement).

J. Except where necessary to abate an emergency situation, the Permittees shall not perform any remedial actions at the Facility outside those remedial actions required by this Order, unless Ecology concurs, in writing, with such additional remedial actions.

## VIII. TERMS AND CONDITIONS OF ORDER

A. Remedial Action Costs

The Permittees shall pay to Ecology costs incurred by Ecology pursuant to this Order and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or Ecology's contractors for, or on, the Facility under RCW 70.105D, including remedial actions and Order preparation, negotiation, oversight, and administration. These costs shall include work performed both prior to and subsequent to the issuance of this Order. Ecology's costs shall include


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costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). For all Ecology costs incurred, the Permittees shall pay the required amount within 30 days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements will be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within 90 days of receipt of the itemized statement of costs will result in interest charges at the rate of 12 percent per annum, compounded monthly.

In addition to other available relief, pursuant to RCW 19.16.500, Ecology may utilize a collection agency and/or, pursuant to RCW 70.105D.055, file a lien against real property subject to the remedial actions to recover unreimbursed remedial action costs.

B. Designated Project Managers

The project manager for Ecology is:

Name: Tom Mackie, Site Manager
Address: 1250 West Alder Street
Union Gap, Washington 98903
Telephone: 509-575-2803
FAX: 509-575-2809
E-mail: tmac461@ecy.wa.gov

The project manager for Ultra Yield is:

Name: Mark Whitfield
Address: 4530 Professional Circle, Suite 201
Virginia Beach, Virginia 23455
Telephone: 757-487-0656
FAX: 757-487-1280
E-mail: MWhitfield@cameronchemicals.com

The project manager for Mr. Camp is:

Name: Richard J. Camp, Jr.
Address: 226 Warren Acres Road
Yakima, Washington 98901
Telephone: 509-952-0610
E-Mail: rjcamp@bayzinc.com



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Each project manager shall be responsible for overseeing the implementation of this Order. Ecology's project manager will be Ecology's designated representative for the Facility. To the maximum extent possible, communications between Ecology and the Permittees, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the project managers. The project managers may designate, in writing, working level staff contacts for all or portions of the implementation of the work to be performed required by this Order.

Any party may change its respective project manager. Written notification shall be provided to the other party at least 10 calendar days prior to the change.

C. Performance

All geologic and hydrogeologic work performed pursuant to this Order shall be under the direction and supervision of a geologist or hydrogeologist licensed by the State of Washington or under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and RCW 18.220.

All engineering work performed pursuant to this Order shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

All construction work performed pursuant to this Order shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

Any documents submitted containing geologic, hydrogeologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and RCW 18.220.

The Permittees shall notify Ecology in writing of the identity of any engineer(s) and


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geologist(s), contractor(s), subcontractor(s), and others to be used in carrying out the terms of this Order, in advance of their involvement at the Facility.

D. Access

Ecology or any Ecology authorized representative shall have access to enter and freely move about all property at the Facility that the Permittees either own, control, or have access rights to at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing the Permittees' progress in carrying out the terms of this Order; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by the Permittees. The Permittees shall make all reasonable efforts to secure access rights for those properties within the Facility not owned or controlled by the Permittees where remedial activities or investigations will be performed pursuant to this Order. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Facility property owned or controlled by the Permittees unless an emergency prevents such notice. All persons who access the Facility pursuant to this section shall comply with any applicable health and safety plan(s). Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Facility property access.

E. Sampling, Data Submittal, and Availability

With respect to the implementation of this Order, the Permittees shall make the results of all sampling, laboratory results, and/or test results generated by them or on their behalf available to Ecology. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section VII (Work to be Performed), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

If requested by Ecology, the Permittees shall allow Ecology and/or its authorized


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representative to take split or duplicate samples of any samples collected by the Permittees pursuant to implementation of this Order. The Permittees shall notify Ecology 7 days in advance of any sample collection or work activity at the Facility. Ecology shall, upon request, allow the Permittees and/or an authorized representative of the Permittees to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Order, provided that doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section VIII.D (Access), Ecology shall notify the Permittees prior to any sample collection activities unless an emergency prevents such notice.

In accordance with WAC 173-340-830(2)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

F. Public Participation

RCW 70.105D.030(2)(a) requires that, at a minimum, this Order be subject to concurrent public notice. Ecology shall be responsible for providing this public notice and reserves the right to modify or withdraw any provisions of this Order should public comment disclose facts or considerations which indicate to Ecology that this Order is inadequate or improper in any respect.

A Public Participation Plan is required for this Facility. The Parties shall follow the approved 2018 Public Participation Plan (Attachment F).

Ecology shall maintain the responsibility for public participation at the Facility. However, the Permittees shall cooperate with Ecology, and shall:

1. If agreed to by Ecology, develop appropriate mailing lists and prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.


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2. Notify Ecology's project manager prior to the preparation of all press releases and fact sheets, and before meetings related to remedial action work to be performed at the Facility with the interested public and/or local governments. Likewise, Ecology shall notify the Permittees prior to the issuance of all press releases and fact sheets related to the Facility, and before meetings related to the Facility with the interested public and local governments. For all press releases, fact sheets, meetings, and other outreach efforts by the Permittees that do not receive prior Ecology approval, the Permittees shall clearly indicate to their audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

3. When requested by Ecology, participate in public presentations on the progress of the remedial action at the Facility. Participation may be through attendance at public meetings to assist in answering questions or as a presenter.

4. When requested by Ecology, arrange and/or continue information repositories to be located at the following locations:

a. The Moxee Library
255 West Seattle Avenue
Moxee, WA 98936
Phone: 509-575-8854

b. Ecology's Central Regional Office
1250 West Alder Street
Union Gap, Washington 98903
Phone: 509-575-2490

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to this Facility shall be maintained in the repository at Ecology's Central Regional Office in Union Gap, Washington.

G. Retention of Records

During the pendency of this Order, and for 10 years from the date of completion of work performed pursuant to this Order, the Permittees shall preserve all records, reports, documents,

and underlying data in their possession relevant to the implementation of this Order and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors. Upon request of Ecology, the Permittees shall make all records available to Ecology and allow access for review within a reasonable time.

Nothing in this Order is intended to waive any right the Permittees may have under applicable law to limit disclosure of documents protected by the attorney work-product privilege and/or the attorney-client privilege. If the Permittees withhold any requested records based on an assertion of privilege, the Permittees shall provide Ecology with a privilege log specifying the records withheld and the applicable privilege. No Facility-related data collected pursuant to this Order shall be considered privileged.

H. Dispute Resolution

1. In the event that a Permittee elects to invoke dispute resolution, the Permittees must utilize the procedure set forth below.

a. Upon the triggering event (receipt of Ecology's project manager's written decision or an itemized billing statement), the Permittee has 14 calendar days within which to notify Ecology's project manager in writing of their dispute (Informal Dispute Notice).

b. The Parties' project managers shall then confer in an effort to resolve the dispute informally. The Parties shall informally confer for up to 14 calendar days from receipt of the Informal Dispute Notice. If the project managers cannot resolve the dispute within those 14 calendar days, then within 7 calendar days Ecology's project manager shall issue a written decision (Informal Dispute Decision) stating: (1) the nature of the dispute; (2) the Permittees' position with regard to the dispute; (3) Ecology's position with regard to the dispute; and (4) the extent of resolution reached by informal discussion.

c. The Permittee may then request regional management review of the dispute. This request (Formal Dispute Notice) must be submitted in writing to the Central


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Region Hazardous Waste & Toxics Reduction Section Manager within 7 calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting forth: (1) the nature of the dispute; (2) the disputing Party's position with respect to the dispute; and (3) the information relied upon to support its position.

d. The Section Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute (Decision on Dispute) within 30 calendar days of receipt of the Formal Dispute Notice. The Decision on Dispute shall be Ecology's final decision on the disputed matter.

2. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used.

3. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Order, unless Ecology agrees in writing to a schedule extension.

4. In case of a dispute, failure to either proceed with the work required by this Order or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section VII.I or initiating enforcement under Section X (Enforcement).

I. Extension of Schedule

1. A Permittee's request for an extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least 30 days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:


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a. The deadline that is sought to be extended;

b. The length of the extension sought;

c. The reason(s) for the extension; and

d. Any related deadline or schedule that would be affected if the extension were granted.

2. The burden shall be on the Permittee to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

a. Circumstances beyond the reasonable control and despite the due diligence of a Permittee including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by the Permittees;

b. Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty; or

c. Endangerment as described in Section VIII.K (Endangerment).

However, neither increased costs of performance of the terms of this Order nor changed economic circumstances shall be considered circumstances beyond the reasonable control of the Permittees.

3. Ecology shall act upon any Permittee's written request for extension in a timely fashion. Ecology shall give the Permittees written notification of any extensions granted pursuant to this Order. A requested extension shall not be effective until approved by Ecology. Unless the extension is a substantial change, it shall not be necessary to amend this Order pursuant to Section VIII.J (Amendment of Order) when a schedule extension is granted.



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4. At a Permittee's request, an extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding 90 days only as a result of:

a. Delays in the issuance of a necessary permit which was applied for in a timely manner;

b. Other circumstances deemed exceptional or extraordinary by Ecology; or

c. Endangerment as described in Section VIII.K (Endangerment).

J. Amendment of Order

The project managers may verbally agree to minor changes to the work to be performed without formally amending this Order. Minor changes will be documented in writing by Ecology within 7 days of verbal agreement.

Except as provided in Section VIII.L (Reservation of Rights), substantial changes to the work to be performed shall require formal amendment of this Order. This Order may only be formally amended by the written consent of both Ecology and the Permittees. Ecology will provide its consent to a formal amendment only after public notice and opportunity to comment on the formal amendment.

When requesting a change to the Order, a Permittee shall submit a written request to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request is received. If the change is substantial, then the Order must be formally amended. Reasons for the disapproval of a proposed change to this Order shall be stated in writing. If Ecology does not agree to a proposed change, the disagreement may be addressed through the dispute resolution procedures described in Section VIII.H (Dispute Resolution).

K. Endangerment

In the event Ecology determines that any activity being performed at the Facility under this Order is creating or has the potential to create a danger to human health or the environment on or



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surrounding the Facility, Ecology may direct the Permittees to cease such activities for such period of time as it deems necessary to abate the danger. The Permittees shall immediately comply with such direction.

In the event a Permittee determines that any activity being performed at the Facility under this Order is creating or has the potential to create a danger to human health or the environment, the Permittees may cease such activities. The Permittees shall notify Ecology's project manager as soon as possible, but no later than 24 hours after making such determination or ceasing such activities. Upon Ecology's direction, the Permittees shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with the Permittees' cessation of activities, it may direct the Permittees to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, the Permittees' obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended in accordance with Section VIII.I (Extension of Schedule) for such period of time as Ecology determines is reasonable under the circumstances.

Nothing in this Order shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

L. Reservation of Rights

This Order is not a settlement under RCW 70.105D. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any of Ecology's rights or authority. Ecology will not, however, bring an action against the Permittees to recover remedial action costs paid to and received by Ecology under this Order. In addition, Ecology will not take additional enforcement actions against the Permittees regarding remedial actions required by this Order, provided the Permittees comply with this Order.

Ecology nevertheless reserves its rights under RCW 70.105D, including the right to require


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additional or different remedial actions at the Facility should it deem such actions necessary to protect human health or the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Facility.

By entering into this Order, the Permittees do not admit to any liability for the Facility. Although the Permittees are committing to conducting the work required by this Order under the terms of this Order, the Permittees expressly reserve all rights available under law, including but not limited to the right to seek cost recovery or contribution against third parties, and the right to assert any defenses to liability in the event of enforcement.

M. Transfer of Interest in Property

No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Facility shall be consummated by the Permittees without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to the Permittees' transfer of any interest in all or any portion of the Facility and during the effective period of this Order, the Permittees shall provide a copy of this Order to any prospective purchaser, lessee, transferee, assignee, or other successor in said interest; and, at least 30 days prior to any transfer, the Permittees shall notify Ecology of said transfer. Upon transfer of any interest, the Permittees shall notify all transferees of the restrictions on the activities and use of the property under this Order and incorporate any such use restrictions into the transfer documents.

N. Compliance with Applicable Laws

1. All actions carried out by the Permittees pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits or approvals, except as provided in RCW 70.105D.090. At this time, no federal, state, or local requirements have been identified as being applicable to the actions required


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by this Order. The Permittees have a continuing obligation to identify additional applicable federal, state, and local requirements which apply to actions carried out pursuant to this Order, and to comply with those requirements. As additional federal, state, and local requirements are identified, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order, and the Permittees must implement those requirements.

2. All actions carried out by the Permittees pursuant to this Order shall be done in accordance with relevant and appropriate requirements identified by Ecology. At this time, no relevant and appropriate requirements have been identified as being applicable to the actions required by this Order. If additional relevant and appropriate requirements are identified, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order, and the Permittees must implement those requirements.

3. Pursuant to RCW 70.105D.090(1), the Permittees may be exempt from the procedural requirements of RCW 70.94, RCW 70.95, RCW 70.105, RCW 77.55, RCW 90.48, and RCW 90.58 and of any laws requiring or authorizing local government permits or approvals. However, the Permittees shall comply with the substantive requirements of such permits or approvals. For permits and approvals covered under RCW 70.105D.090(1) which have been issued by local government, the Parties agree that Ecology has the non-exclusive ability under this Order to enforce those local government permits and/or approvals. At this time, no state or local permits or approvals have been identified as being applicable but procedurally exempt under this section.

4. The Permittees have a continuing obligation to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order. In the event the Permittees determine that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order, it shall promptly notify Ecology of this determination. Ecology shall determine whether Ecology or the Permittees shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, the Permittees shall promptly consult with the appropriate state


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and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by the Permittees and on how the Permittees must meet those requirements. Ecology shall inform the Permittees in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Order. The Permittees shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency that is necessary for the State to administer any federal law, the exemption shall not apply and the Permittees shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits or approvals.

O. Land Use Restrictions

As detailed in the 2018 CAP, institutional controls are required at the Facility. The Environmental Covenant will be used to implement the institutional controls. The Permittees shall comply with the requirements of the Environmental Covenant recorded under Yakima County, Washington Auditor's file number 7567203 on June 15, 2007. The Environmental Covenant shall restrict future activities and uses of the Facility as agreed to by Ecology and the Permittees.

P. Financial Assurance

1. Financial assurance for corrective action is required by WAC 173-303-64620. Ecology's Financial Assurance Officer shall determine when the Permittees' actions and submissions meet the requirements of WAC 173-303-64620.

2. The Permittees must submit the original executed or otherwise finalized financial assurance instruments or documents to Ecology's Financial Assurance Officer;


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facsimiles or photocopies are not acceptable to meet this requirement. In addition, the Permittees must also submit copies of financial assurance instruments or documents to Ecology's project manager.

3. Unless otherwise specified, the definitions and requirements for allowable financial assurance mechanisms set forth in the current financial assurance rules covering closure and post-closure in 40 C.F.R. §§ 264.141 through .143, .145, .151, and WAC 173-303-620 will be the definitions and requirements for allowable financial assurance for correction action under this Order. It is the intention of the Parties that these definitions and requirements will apply to this corrective action, and the words "corrective action" are hereby substituted for the words "closure" or "post-closure" in the above listed regulations as needed to produce this result.

4. In the absence of final federal regulations governing financial assurance for corrective action, Ecology's Financial Assurance Officer will use the following resources as guidance:

a. The Financial Assurance for Corrective Action Proposed Rule, 51 Fed. Reg. 37,853 (Oct. 24, 1986);

b. The financial assurance provisions of Corrective Action for Releases from Solid Waste Management Units Advance Notice of Proposed Rulemaking, 61 Fed. Reg. 19,432 (May 1, 1996); and

c. The Interim Guidance on Financial Responsibility for Facilities Subject to RCRA Corrective Action (U.S. EPA, Sept. 30, 2003); or

d. Any other guidance applicable to financial assurance and corrective action that may be available at the time.

The financial assurance provisions of the Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities, 55 Fed. Reg. 30,798 (July 27, 1990), may be used as secondary guidance at the discretion of Ecology.


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Unless otherwise specified herein, where the language of this Order conflicts with these rules, proposed rules, notices, and guidance documents, the language of this Order shall prevail.

5. The Permittees submitted to Ecology for review and approval a written cost estimate to cover all activities governed by this Order on April 30, 2018, that included the following activities at the Facility: Implementation of the 2018 CAP, including implementation of the Groundwater Monitoring Program. Ecology approved the written cost estimate in the amount of $139,640.00 on April 30, 2018, subject to the final issuance of this Order. Within 30 days after the effective date of this Order the Permittees shall establish and maintain continuous coverage of financial assurance in the amount of the approved cost estimate and submit the applicable financial assurance documentation per ¶ 2 of this section. Ecology reserves the right to review and revise the Permittees' cost estimate after the 60-day review period. If Ecology revises the Permittees' cost estimate after the 60-day review period, the Permittees will have 30 days after the revision to provide an updated financial assurance instrument.

6. If the Permittees are required to submit an additional work plan(s) under this Order, or to conduct activities related to corrective action not previously part of the original cost estimate, the process outlined in ¶ 5 of this section shall apply in the submission process of an additional work plan(s).

7. If the Permittees believe that the estimated cost of work to complete activities under this Order has diminished below the amount covered by existing financial assurance provided under this Order, the Permittees may submit a written proposal to Ecology to reduce the amount of the financial assurance provided under this section so that the amount of the financial assurance is equal to the estimated cost of the remaining work to be performed. The written proposal shall specify, at a minimum, the cost of the remaining work to be performed and the basis upon which such cost was calculated. If Ecology decides to accept such a proposal, Ecology shall notify the Permittees of its decision in writing. After receiving Ecology's written decision, the Permittees may reduce the amount of financial assurance only in accordance with and to the extent permitted


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by such written decision. Within 30 days after receipt of Ecology's written decision, the Permittees shall submit the applicable financial assurance documentation per ¶ 2 of this section. No change to the form or terms of any financial assurance provided under this section, other than a reduction in amount, is authorized under this paragraph.

8. All cost estimates must be based on the costs to the owner or operator of hiring a third party to complete the work. A third party is neither a parent nor a subsidiary of the Permittees. On a case-by-case basis, Ecology may also determine that a company which shares a common higher-tier corporate parent or subsidiary might not qualify as a third party. A cost estimate may not incorporate any salvage value that may be realized with the sale of wastes, facility structures or equipment, land, or other assets associated with the Facility. The Permittees may also not incorporate a zero cost for wastes that might have economic value.

9. The Permittees shall annually adjust all cost estimates for inflation. Adjustments for inflation shall be calculated in accordance with the procedure outlined in 40 C.F.R. § 264.142(b).

10. Acceptable financial assurance mechanisms are trust funds, surety bonds, letters of credit, insurance, the financial test, and the corporate guarantee. Ecology may allow other financial assurance mechanisms if they are consistent with the laws of Washington State and if the Permittees demonstrate to the satisfaction of Ecology that those mechanisms provide adequate financial assurance.

11. If the Permittees are using the financial test or corporate guarantee to meet their financial assurance obligation, the annual inflationary adjustment shall occur within 90 days after the close of the Permittees' fiscal year. If the Permittees are using any mechanism other than the financial test or corporate guarantee, this adjustment shall occur each year within 30 days after the anniversary of the effective date of this Order.

12. If the Permittees seek to establish financial assurance by using a surety bond for payment or a letter of credit, the Permittees shall at the same time establish and thereafter maintain


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a standby trust fund acceptable to Ecology into which funds from the other financial assurance instrument can be deposited, if the financial assurance provider is directed to do so by Ecology, pursuant to the terms of this Order.

13. The Permittees shall notify Ecology's site manager and Financial Assurance Officer by certified mail of the commencement of a voluntary or involuntary bankruptcy proceeding, naming the Permittees as debtors, within 10 days after commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if it is named as debtor as required under the terms of the corporate guarantee.

a. Once the Permittees have established financial assurance with an acceptable mechanism, as described above, the Permittees will be deemed to be without the required financial assurance:

i. In the event of bankruptcy of the trustee or issuing institution; or

ii. If the authority of the trustee institution to act as trustee has been suspended or revoked; or

iii. If the authority of the institution issuing the surety bond, letter or credit, or insurance policy has been suspended or revoked.

b. In the event of bankruptcy of the trustee or a suspension or revocation of the authority of the trustee institution to act as a trustee, the Permittees must establish a replacement financial assurance mechanism by any means specified in WAC 173-303-620 or other financial instrument as approved by Ecology within 60 days after such an event.

15. Ecology's Financial Assurance Officer is:

Kimberly Goetz
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 360-407-6754
Fax: 360-407-6715
Email: kgoe461@ecy.wa.gov

Q. Periodic Review

As remedial action, including groundwater monitoring, continues at the Facility, the Parties

agree to review the progress of remedial action at the Facility, and to review the data accumulated as a result of monitoring the Facility as often as is necessary and appropriate under the circumstances. At least every 5 years after the initiation of cleanup action at the Facility the Parties shall meet to discuss the status of the Facility and the need, if any, for further remedial action at the Facility. At least 90 days prior to each periodic review, the Permittees shall submit a report to Ecology that documents whether human health and the environment are being protected based on the factors set forth in WAC 173-340-420(4). Ecology reserves the right to require further remedial action at the Facility under appropriate circumstances. This provision shall remain in effect for the duration of this Order.

R. Indemnification

The Permittees agree to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action or death or injuries to persons, or for loss or damage to property, to the extent arising from or on account of acts or omissions of the Permittees, their officers, employees, agents, or contractors in entering into and implementing this Order. However, the Permittees shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Order.

## IX. SATISFACTION OF THIS ORDER

The provisions of this Order shall be deemed satisfied upon the Permittees' receipt of written notification from Ecology that the Permittees have completed the corrective actions required by this Order, as amended by any modifications, and that the Permittees have complied with all other provisions of this Agreed Order.

## X. ENFORCEMENT

Pursuant to RCW 70.105D.050, this Order may be enforced as follows:

A. The Attorney General may bring an action to enforce this Order in a state or federal


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court.

B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Facility.

C. A liable party who refuses, without sufficient cause, to comply with any term of this Order will be liable for:

1. Up to three times the amount of any costs incurred by the State of Washington as a result of its refusal to comply.

2. Civil penalties of up to $25,000 per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under RCW 70.105D.060.

Effective date of this Order: August 27, 2018

**RICHARD J. CAMP, JR.**

Richard J. Camp, Jr.
226 Warren Acres Road
Yakima, Washington 98901

**STATE OF WASHINGTON**
**DEPARTMENT OF ECOLOGY**

Greg Caron, Section Manager
Hazardous Waste & Toxics Reduction
Central Regional Office
1250 West Alder Street
Union Gap, Washington 98903-0009

**ULTRA YIELD MICRONUTRIENTS, INC.**

Mark Whitfield, CFO
4530 Professional Circle, Suite 201
Virginia Beach, Virginia 23455



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Attachment A

2018 Corrective Action Plan


# 2018
# CORRECTIVE ACTION PLAN

**Ultra Yield Micronutrients, Inc.**
**Moxee, Washington**

**Washington State Department of Ecology**
**Hazardous Waste and Toxics Reduction Program**
**Central Regional Office**
**Yakima, WA**

Table of Contents

# 1.0 Introduction

The 2018 Corrective Action Plan (2018 CAP) presents the selected cleanup actions for the Ultra Yield Micronutrients, Inc. (Ultra Yield) Facility, located at 213 West Moxee Avenue, Moxee, Washington. This plan is required as part of the cleanup process established by the Washington State Department of Ecology (Ecology) and has been developed in accordance with the Model Toxics Control Act (MTCA) under RCW 70.105D, and Chapter 173-340 of the Washington Administrative Code (WAC).

The 2018 CAP contains the following:

- A brief description of the Facility;
- The nature and extent of contamination;
- The cleanup standards for contaminants; and
- Ecology's selected cleanup actions.

In accordance with WAC 173-340-360, Ecology has selected the cleanup actions based upon Facility-specific data provided in the following documents, which are on file at Ecology's Central Regional Office. Portions of the 2018 CAP text and figures have been taken directly from these reports:

- Booz Allen & Hamilton, *Final RCRA Facility Assessment Report* (2000)
- Linebach Funkhouser, Inc. (LFI), *Remedial Investigation Report and Voluntary Cleanup Plan* (June 13, 2002)
- Linebach Funkhouser, Inc. (LFI), *Cleanup Action Report Bay Zinc Facility Moxee, Washington* (2005)
- Linebach Funkhouser, Inc. (LFI),*Report of Storm water Release Mitigation Kronos Micronutrients, LP Facility Moxee, Washington* (March 4, 2013)
- Linebach Funkhouser, Inc. (LFI), *Closure Plan Limited Area of Boneyard* (September 3, 2014)
- Kronos Micronutrients, LP, *Summary of EPA Project 100-02* (September 21, 2015)
- Kronos Micronutrients, LP, *Groundwater Analysis: 2003-2015* (2015)
- Kronos Micronutrients, LP, *2016 Annual Report for Water Well Sampling Kronos Micronutrients, L.P. Facility Moxee, Washington* (January 28, 2018)

## 1.1 Declaration

In accordance with WAC 173-340-360(2)(a), the selected cleanup actions meet the threshold requirements; are protective of human health and the environment; comply with applicable state and federal laws; and provide for compliance monitoring. Furthermore, the selected remedies are consistent with the preference of the State of Washington as stated in RCW 70.105D.030(1)(b) for permanent cleanup solutions.

## 1.2 Applicability

The 2018 CAP is applicable only to the Ultra Yield Facility. Cleanup standards and cleanup actions have been developed as an overall remediation process performed under Ecology

oversight using MTCA authority, and should not be considered as setting precedents for other Facilities.

### 1.3 Administrative Record

The documents used to make the decisions discussed in the 2018 CAP are constituents of the administrative record for the Facility. The entire administrative record for the Facility is available for public review by appointment at Ecology's Central Regional Office at 1250 West Alder Street, Union Gap, Washington 98903-0009. To review or obtain copies of the above documents, contact Jackie Cameron, Public Disclosure Coordinator at (509) 575-2027.

## 2.0 Background

### 2.1 Facility Description

The Facility is located near the western edge of Moxee, Washington, approximately six miles east of Yakima (figure 1). The Facility is comprised of maintenance, storage, and processing buildings and structures, along with an office, lab, and staff buildings on approximately eleven acres of land. About sixty percent of the Facility is covered by buildings, asphalt, or concrete pavement. The surrounding properties are not fully developed, but are characterized by light industrial and agricultural land use. The current owner of the property is Richard J. Camp Jr. The current operator of the Facility is Ultra Yield.

### 2.2 Facility History

Ultra Yield purchased the assets of Kronos Micronutrients LP (Kronos) and entered into a lease agreement with Richard Camp in March 2017. Kronos was founded in 2007 by the Richard J. Camp Jr. family, the owners and operators of Bay Zinc, Inc. (Bay Zinc) at the same location. Bay Zinc purchased the Facility in 1971 from American Excelsior Company, a producer of shredded cottonwood for fruit packaging material. Following plant modifications, Bay Zinc began production of zinc soil amendments at the Facility in 1972.

Until the late 1990's, Bay Zinc used an oxysulfate process to manufacture micronutrient (zinc) fertilizer products. This process utilized hazardous materials such as steel mill flue dust, incinerator ash from the combustion of tires, and other characteristic metallic wastes such as brass dust as raw materials. They consisted of dry, powdery, or granular fly-ash like materials. The final product was either sold as a liquid or dried into granules and packaged for shipment.

In June of 1999, a new zinc sulfate process manufacturing plant became operational. The primary raw materials for the new process were zinc fines, which are a byproduct of galvanizing operations. The new process removed cadmium, lead, and other hazardous metals from the final fertilizer product. The hazardous byproducts were stabilized and landfilled at a hazardous waste Facility or recycled through a smelting process.

Prior to the construction of the new zinc sulfate plant, liquid zinc fertilizer was produced in the present day area of the new plant. This process used galvanizer byproducts as raw materials and

the product liquid was obtained from settling tanks. The sludge from the settling tanks was hazardous and transported off-site for proper disposal.

Since June 2001, zinc solution has been used to produce zinc monohydrate fertilizer. No waste is generated from the use of this zinc solution.

### 2.3 Facility Investigations

Bay Zinc's materials handling practices and operations resulted in releases of certain metals (primarily lead, cadmium, and zinc) and inorganics to soil and groundwater at the Facility. Past Facility inspections performed by Ecology, environmental consultants for Bay Zinc, and the U.S. Environmental Protection Agency (EPA) have identified eight solid waste management units (SWMUs) and ten areas of concern (AOCs) at the Facility. Below is a brief chronology of past remediation activities that have occurred.

In 1988, as part of the Facility's Resource Conservation and Recovery Act (RCRA) permit, Bay Zinc developed a plan to address the levels of sulfate, manganese, and zinc detected in groundwater at the Facility. The plan involved installation of two extraction wells to recover contaminated groundwater. The recovered water was to be introduced into the production process at the plant. However, due to limiting factors of the production process, withdrawal rates from the extraction wells were limited. Groundwater monitoring of other monitoring wells on- and off-site continues to present day.

In 1992, 571 tons of contaminated soil were excavated and transported to a hazardous waste landfill in Arlington, Oregon as part of a RCRA closure of an outdoor, unlined waste pile. Confirmational samples taken from the base of the excavation did not exceed toxicity characteristic leaching procedure (TCLP) method levels for metals.

In 1998, approximately 150 tons of visibly contaminated soil were removed from the north end of the rail spur area. However, confirmational samples indicated that the excavation efforts did not remove all the contaminated soil in this area.

In 1999, in order to address areas of observed potential surface soil contamination, Bay Zinc installed stormwater runoff controls. The controls included curbs, collection basins, and sumps to direct stormwater to an on-site holding tank for later introduction into the manufacturing process.

In 2001, the EPA completed a RCRA facility assessment which identified one more area of concern (AOC) and recommended further investigation of the Facility.

In the spring of 2002, a comprehensive Facility investigation identified soil and groundwater contamination within several areas of the Facility. In soil, contaminants of concern include lead, cadmium, zinc, and dioxin. In groundwater, the contaminants of concern are sulfate, chloride, zinc, cadmium, and manganese.

On August 30, 2002, Ecology and Bay Zinc signed Agreed Order No. DE 02HWTRCR-4661 (2002 Order) to ensure the remediation of contaminated soils and groundwater at the Facility (Ecology, 2002). In accordance with the 2002 Order, Bay Zinc submitted and Ecology approved

a Compliance Monitoring Plan (2002 LFI CMP). In accordance with the approved plan, between 2002 and 2005, Bay Zinc:

- Excavated and disposed of 12,320 tons of affected soil from 10 different areas of the Facility;
- Installed a groundwater pump-and-treat system that included an ion exchange groundwater treatment unit;
- Treated approximately 2.5 million gallons of groundwater;
- Established a groundwater monitoring program that is ongoing; and
- Conducted further assessment to delineate the boundaries of the contaminated shallow backfill beneath paved areas.

Although the remedial work conducted by Bay Zinc was extensive, a limited amount of contaminated soil was left in place on-site, and groundwater beneath the Facility remains contaminated.

In 2007, Bay Zinc submitted a revised Site Management Plan (2007 SMP) and Action Plan for Affected Groundwater (2007 APAG) to address the remaining soil and groundwater contamination. The 2007 SMP addressed the remaining soil contamination with a number of requirements. In particular, a deed restriction was to be placed on the property. An Environmental Covenant was recorded under Yakima County, Washington Auditor's file number 7567203 that prohibits the altering, modifying, or removing of existing structures over the soil in the "Impacted Soil Areas" (defined therein) in any manner that either may result in the release or exposure to the environment of that contaminated soil or create a new exposure pathway, unless authorized by the prior written approval of Ecology. The Environmental Covenant further prohibits any activity at the property in the Impacted Soil Areas that may result in the release or exposure to the environment of the contaminated soil that was contained as part of the completed soil remedial action, or create a new exposure pathway. Some examples of activities listed in the Environmental Covenant that are prohibited include drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, bulldozing, or earthwork.

The 2007 SMP further requires that any utility repairs or installation or new construction that will extend into soils through cover materials at the Facility are to be conducted in accordance with Section 7.5 of the SMP. Any soil remediation at the Facility associated with utility repairs or installation, new construction or otherwise will be completed in accordance with the sampling procedures, test methods, evaluation and equipment decontamination procedures as set forth in the 2002 LFI CMP. Although the soil remediation required by the 2002 LFI CMP has been completed, any future soil remediation at the Facility associated with utility repairs or installation, new construction or otherwise will be completed in accordance with the sampling procedures, test methods, evaluation, and equipment decontamination procedures as set forth in the 2002 LFI CMP.

The 2007 APAG addressed the groundwater contamination by laying out a sampling and analysis plan for long-term groundwater monitoring. Additionally, the Environmental Covenant

prohibits the use of groundwater from the property for residential (domestic) purposes. In addition, the covenant prohibits any activity on the property that will expose contaminated groundwater or change the hydrogeologic conditions that would cause migration of contaminated groundwater, including digging and/or drilling below 5 feet anywhere on the property, unless authorized by the prior written approval of Ecology.

# 3.0 Background

## 3.1 Physical Facility Characteristics

### 3.1.1 Facility Condition

The region around Moxee is semi-arid, receiving approximately seven to nine inches of rain per year. The land surface is quite level, though it slopes very slightly towards the northwest across the Facility. Two irrigation canals and an irrigation drain (Selah/Moxee and Roza Irrigation Canals and the Moxee Drain) are within one mile of the Facility. These canals typically contain water from March through October.

As noted previously, approximately sixty percent of the Facility is covered by pavement or buildings. Significant portions of the remaining unpaved areas have had fill materials (soil, gravel, rocks, and concrete and asphalt debris) placed upon it. In areas that appear less disturbed, the soil consists predominantly of silty clay to silty sand. Soil borings commonly indicate some fill materials and/or gravel ballast beneath paved areas, followed by silty clay to silty sand.

### 3.1.2 Groundwater (Hydrogeology)

Three groundwater producing zones, each separated by a confining layer or aquitard, are present in the subsurface at the Facility. The uppermost groundwater producing zone is comprised of the silty clay to silty sand surficial layer found across the Facility. Depth to groundwater typically occurs at 4 to 6 feet below ground surface (bgs). The depth to the water table varies during the year due to regional irrigation practices. The uppermost aquifer extends to depths of 20 to 28 feetbgs. The uppermost aquifer is unconfined and is underlain by a 15 to 17 feet thick silt and clay layer which serves as an aquitard. A continuous gravel and sandy gravel unit underlies the aquitard and forms the lower aquifer at the Facility. This lower aquifer varies in thickness from 11 to 20 feet. The lower aquifer, in turn, is underlain by a clay confining zone approximately 50 feet thick. Below the clay confining zone is the deep, confined aquifer within the Ellensburg Formation, lying at a depth of 90 to 160 feet bgs. The majority of the water wells in the area are completed in the Ellensburg Formation.

According to the 1989 *Remedial Action Plan*, the lower aquifer is the shallowest aquifer suitable for domestic and irrigation use. Groundwater flow in the lower aquifer is typically to the west-northwest following the general topography of the Facility.

# 4.0 Nature and Extent of Contamination

### 4.1 Soil

Historically, cadmium, lead, and zinc were detected above health-based screening levels in soils across the Facility. Dioxins were also detected above health-based screening levels in selected samples. Between 2002 and 2005, 12,320 tons of contaminated soils were remediated by excavating them and disposing them at a hazardous waste landfill. In spite of extensive excavation and disposal, contaminated soils remain at the Facility in areas where excavation was unsafe or impractical. To address areas where excavation was unsafe or impractical, an environmental (restrictive) covenant was placed on the deed to address the remaining soil contamination. The restrictive covenant addresses contaminated soils located in three general areas: the Warehouse Area, the Bone Yard Area, and the Railspur Area (see Figure 2 in the 2007 SMP).

#### 4.1.1 Warehouse

According to the 2005 Cleanup Action Report and the 2007 SMP, contaminated soil remains beneath the paved areas around the Warehouse and beneath a geotextile fabric which was placed 2 feet bgs in an *"excavated unpaved strip"* adjacent to the west side of the Warehouse. This area is depicted in red crosshatch in Figure 2 of the 2007 SMP.

#### 4.1.2 Bone Yard Area

According to the 2005 Cleanup Action Report and the 2007 SMP, contaminated soil remains in the former Bone Yard Area. The former Boneyard Area was identified as Area of Concern 3 (AOC-3) in the Booz Allen & Hamilton, 2000 Final RCRA Facility Assessment Report, which Bay Zinc prepared for EPA Region 10. This area is also depicted in red crosshatch in Figure 2 of the 2007 SMP.

#### 4.1.3 Railspur Area

According to the 2005 Cleanup Action Report and the 2007 SMP, contaminated soil remains in limited areas of the rail spur line at a depth greater than one foot, and is covered with railroad ballast, ties, and steel track. This area is depicted in red crosshatch in Figure 2 of the 2007 SMP.

### 4.2 Groundwater

The same contaminants found in soils at the Facility are also found in the groundwater beneath the Facility. In 1985, upon discovery of groundwater contamination, a monitoring well network was installed to better understand the nature and extent of contamination as well as to provide conduits to the groundwater to facilitate remedial actions. Groundwater samples were collected and analyzed for contaminants of concern quarterly from 1985 to 2009 and bi-annually from 2009 to the present. In 2007, the APAG was submitted to Ecology to meet the requirements for sampling and analysis plans listed in WAC 173-340-820. A groundwater pump-and-treat system operated from 2003 to 2006, pumping and treating more than 3.5 million gallons of groundwater. Currently the groundwater pump-and-treat system is not operating, and in accordance with the October 2009 amendment to Agreed Order No. DE 02HWTRCR-4661, seven groundwater monitoring wells (MW-1B, MW-2, MW-3, MW-5, MW-8, MW-9, and MW-10) are sampled on a bi-annual basis. In accordance with the APAG, groundwater is sampled and analyzed for pH,

total chloride, sulfate, dissolved cadmium, manganese, and zinc. Analytical data generated from the bi-annual sampling is evaluated and documented at the end of each year in an Annual Groundwater Monitoring Report.

An historical summary of laboratory analytical results from samples collected from 2003 through 2016 is included in the 2016 Annual Groundwater Monitoring Report. The 2016 report summarized the analytical results and trend lines of dissolved cadmium, dissolved manganese, dissolved zinc, chloride, and sulfate from 2003 to 2016.

### 4.2.1 Dissolved Cadmium

According to the 2016 Annual Groundwater Monitoring Report, groundwater continues to be contaminated with dissolved cadmium exceeding the cleanup level for cadmium in groundwater (5 micrograms per liter (µg/L)). During 2016, groundwater samples collected from MW-1B, MW-3, and MW-8 all exceeded the cleanup level for cadmium in groundwater. MW-2, MW-5, MW-9, and MW-10 all had no detectable dissolved cadmium in either the fall or spring samplings.

### 4.2.2 Dissolved Manganese

According to the 2016 Annual Groundwater Monitoring Report, groundwater from all monitoring wells continues to be contaminated with dissolved manganese exceeding the cleanup level for manganese in groundwater (50 µg/L).

### 4.2.3 Dissolved Zinc

According to the 2016 Annual Groundwater Monitoring Report, groundwater continues to be contaminated with dissolved zinc exceeding the cleanup level for zinc in groundwater (5,000 µg/L). All the monitoring wells have downward trend lines and are at lower levels than the levels measured in 2003, except MW-8 which has been trending upward. MW-2, MW-5, MW-9, and MW-10 are all below the 5000 µg/L cleanup level.

### 4.2.4 Chloride

According to the 2016 Annual Groundwater Monitoring Report, groundwater continues to be contaminated with chloride exceeding the cleanup level in groundwater (250,000 µg/L). All the monitoring wells have downward trend lines and are at lower levels than the levels measured in 2003. All the wells except MW-2, MW-8, and MW-9 were below the cleanup level in 2016.

### 4.2.5 Sulfate

According to the 2016 Annual Groundwater Monitoring Report, groundwater continues to be contaminated with sulfate exceeding the cleanup level in groundwater (250,000 µg/L). All the monitoring wells exceeded the cleanup level in 2016 except MW-5 which has been below the cleanup level since 2003.

# 5.0 Risks to Human Health and the Environment

## 5.1 Exposure Pathways

The following discussion of exposure pathways, exposure points, and receptors identifies possible means and locations where human or ecological receptors may come in contact with contaminated media now or in the future. The purpose of the exposure pathway/receptor evaluation is to:

- Assess potential risks and establish remedial actions needed at the Facility; and
- Provide a basis for establishing clean-up levels—that is, determining levels of constituents that can remain in the soil and groundwater and still be adequately protective of human health and the environment.

An exposure pathway is a link between a contaminant source and an exposed receptor (human, animal, plant, etc.). According to the EPA's *Risk Assessment Guidance for Superfund* (1989), an exposure pathway must be considered *complete* for a risk to be present. A complete exposure pathway must include *all* of the following:

- Source and mechanism for release;
- Transport medium;
- Receptor at an exposure point; and
- Route of uptake (ingestion, inhalation, dermal contact).

### 5.1.1 Human Receptors

The sources of hazardous constituents detected in soil and groundwater at the Facility are past releases of zinc sulfate solution and the storage and handling of raw materials, products, and process wastes. An evaluation of pathways and receptors is as follows. Much of the following information was obtained from the 2000, EPA-sponsored, Final *RCRA Facility Assessment Report.*

Surface Water

The closest surface water bodies are irrigation canals and an irrigation drain, including an unnamed canal, the Selah/Moxee Canal, the Roza Canal, and the Moxee Drain. The Moxee Drain and Roza Canal, considered surface waters under Washington State statutes, are located less than a mile from the Facility. Water flows in these irrigation canals from March through October each year. The Yakima River is more than one mile away from the Facility. Recent improvements to the Facility aid in the collection of stormwater runoff from paved areas of the Facility. Furthermore, the Facility is not within a 100-year floodplain. The potential for exposure of human or environmental receptors to constituents from the Facility via surface water is unlikely. Therefore, there are no current complete exposure pathways with regard to surface water.

Groundwater

The shallow groundwater beneath the Ultra Yield Facility has been shown to be contaminated with dissolved cadmium, dissolved manganese, dissolved zinc, chloride, and sulfate. The cleanup level for cadmium was established by Ecology in 1991 by adopting EPA's drinking

water standard (56 Fed. Reg. 3526 (Jan. 30, 1991)). EPA classified cadmium as a Group D carcinogen by the oral route of exposure. The remaining contaminants of concern found in groundwater at the Facility are classified as secondary contaminants, regulated on the basis of aesthetic characteristics rather than human health-based effects. The EPA recommends but does not require secondary contaminant standards for drinking water systems. The uppermost groundwater producing zone is the affected zone of concern. The area of affected groundwater extends through the north-central portion of the Facility. However, some off-site migration of groundwater has occurred into the neighboring western parcel. A municipal supply well for the City of Moxee is located approximately 3,000 feet southeast of the Facility. A second municipal supply well is located more than 3,000 feet to the east of the Facility. Because the predominant groundwater flow in the uppermost aquifer is directed west-northwest across the Facility, and because the Moxee city wells are not withdrawing water from this zone, the potential for contamination to migrate to these wells is extremely unlikely. Therefore, there are no current complete exposure pathways with regard to groundwater.

Soil

Surficial soil is contaminated with lead, cadmium, and zinc at various locations across the Facility. Approximately sixty percent of the Facility is covered by asphalt, concrete pavement, and buildings. The recently completed remedial investigation showed that affected soils occur across the Facility property, plus two areas immediately adjacent to the property boundaries. The Facility is zoned for light industrial purposes. Surrounding land use includes commercial, agricultural, and light industrial purposes. No residential properties adjoin the Facility, but some residential property exists to the south and east of the Facility within the greater Moxee commercial and residential area.

As stated in the EPA's *Final RCRA Facility Assessment Report*, in terms of the general public, "exposure of human or environmental receptors to hazardous materials in the surface soils onsite is unlikely due to a secured fence system that was installed around the entire site to prevent access." However, a complete exposure pathway with regard to soil currently exists for on-site employees and future construction or utility workers who may disturb affected soil.

### 5.1.2 Ecological Receptors

The Facility is completely fenced, and is an active manufacturing operation characterized by Facility worker presence, and frequent semi-truck, forklift, and railcar movement. Again, sixty percent of the Facility is covered by buildings and pavement. In addition, large portions of the unpaved areas are covered with fill materials. Based on these characteristics, the Facility does not appear to provide quality habitat to attract and/or sustain environmental receptors. However, MTCA requires that exposure to potential ecological receptors be documented via a Terrestrial Ecological Evaluation. See section 6.2.2 for discussion of procedures and results of the evaluation.

## 6.0 Cleanup Standards

There are two primary components to determining cleanup standards: cleanup levels and points of compliance. Cleanup levels identify at what concentration a particular hazardous substance

does not threaten human health or the environment. The goal is to address all media contaminated above those concentrations with some remedy that prevents exposure to those materials. Points of compliance designate the location(s) on the Facility where cleanup levels must be met.

### 6.1 Cleanup Levels

Developing cleanup levels involves several steps: determining which method to use; determining the reasonable maximum exposure scenario; developing cleanup levels for individual substances in individual media, taking into account potential cross-media contamination; determining what substances contribute to overall risks at the Facility (indicator hazardous substances or contaminants of concern); evaluating concentrations of single hazardous substances in single media (i.e. soil or water) to select indicators; and adjusting individual concentration levels downward to meet the total cancer risk and hazard index limits specified in MTCA.

There are three methods used to determine cleanup levels under MTCA: Method A, B, and C. Method A is used for routine sites or sites that involve relatively few hazardous substances which have numerical concentration levels available. Method B is the standard method for determining cleanup levels and is applicable to all sites. Method C is a highly conditional method used when a cleanup level under Method A or B is technically impossible to achieve or may cause greater environmental harm. Method C may also be applied to qualifying industrial properties. Cleanup level methods are established for any affected media, including soil, groundwater, surface water, and air. Soil and groundwater are the only affected media at the Ultra Yield Facility.

WAC 173-340-708(2) states: "When defining cleanup requirements at a site that is contaminated with a large number of hazardous substances, the department may eliminate from consideration those hazardous substances that contribute a small percentage of the overall threat to human health and the environment. The remaining hazardous substances shall serve as indicator hazardous substances for purposes of defining site cleanup requirements." Many factors can be considered in determining whether or not a substance should be retained for an analysis of overall site risk or hazard, including:

- Frequency of detection
- Concentration
- Toxicity
- Environmental fate
- Natural background levels
- Mobility and potential for exposure
- Limits of detection (practical quantitation limit of lab analyses)

Ecology has determined that the indicator hazardous substances at this Facility are lead, cadmium, zinc, and dioxin in soils, and sulfate, chloride, manganese, zinc, and cadmium in groundwater.

## 6.2 Facility Cleanup Level Criteria

### 6.2.1 Groundwater

WAC 173-340-720(1)(a) states: "Groundwater cleanup levels shall be based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use conditions." Ecology has determined that the highest beneficial use of groundwater at this Facility is drinking water. Standards developed for this use will be protective of all other uses. Method B is the appropriate method for developing cleanup levels for groundwater at this Facility.

Method B groundwater cleanup levels were developed from:

1) Drinking water criteria that include:
    - Applicable or relevant and appropriate requirements (ARARs) including primary (human health based) maximum contaminant levels (MCLs) or secondary (aesthetic based) MCLs prescribed by the Safe Drinking Water Act (SDWA); and
    - Formula values based on human health under WAC 173-340-730(3)(b)(iii) for those substances for which sufficiently protective, health-based criteria have not been established under ARARs;
2) Levels that protect surface water (based on WAC 173-340-730);
3) Method A cleanup levels for substances that do not have Method B levels; and
4) Levels based on natural or area background of the hazardous substance.

Table 1 shows the applicable cleanup levels that were developed for groundwater at this Facility.

**Table 1. Cleanup levels for groundwater**

| Contaminant | Cleanup Level | Basis |
|---|---|---|
| Sulfate | 250 mg/L | SDWA secondary MCL |
| Chloride | 250 mg/L | SDWA secondary MCL |
| Cadmium | 5 ug/L | SDWA primary MCL |
| Manganese | 50 ug/L | SDWA secondary MCL |
| Zinc | 5 mg/L | SDWA secondary MCL |

### 6.2.2 Soil

The Facility is currently zoned light industrial. However, because of surrounding variability in land use types (agricultural, commercial, and residential), and the potential for future development of the area, Method B cleanup levels are appropriate to protect human health. The cleanup levels developed using Method B will therefore be protective regardless of the ultimate future land use.

To protect human health, Method B soil cleanup levels were developed from:

1) Concentrations established under applicable state and federal laws;
2) Formula values based on human health under WAC 173-340-740(3) for which health based criteria or standards have not been established under applicable state and federal laws;
3) Concentrations which will not cause contamination of groundwater at levels which exceed Method B groundwater cleanup levels;

4) Method A cleanup levels for substances that do not have Method B levels; and
5) Levels based on natural or area background of the hazardous substance.

In addition to human health, it is also necessary to determine if contaminants may pose risks to the environment (plants, animals, and soil biota). MTCA requires that a terrestrial ecological evaluation (TEE) be conducted to:

1) Determine if a release of hazardous substances may harm plants and/or animals;
2) Characterize existing or potential threats to the plants and/or animals; and
3) Establish cleanup standards to protect plants, animals, and ecologically important functions of the soil biota.

Cleanup levels must be established that result in no significant adverse effects on the protection and propagation of terrestrial ecological receptors (WAC 173-340-740(3)(b)(ii)).

When hazardous substances are released to the soil, MTCA requires that "one of the following actions shall be taken: (a) Document an exclusion from any further terrestrial ecological evaluating using the criteria in WAC 173-340-7491; (b) Conduct a simplified terrestrial ecological evaluation as set forth in WAC 173-340-7492; or (c) Conduct a site-specific terrestrial ecological evaluation as set forth in WAC 173-340-7493" (WAC 173-340-7490(2)). Based on information contained in the *Remedial Investigation Report and Voluntary Cleanup Plan*, it was determined that the exclusionary criteria were not applicable to this Facility, and that a simplified TEE was appropriate.

To prevent significant adverse effects on the propagation of terrestrial ecological receptors, soil concentrations from Table 749-2 were used as screening levels as per the procedures for conducting a simplified terrestrial ecological evaluation (WAC 173-340-7492).

The cleanup levels that were developed for Facility soils (Table 2) were primarily the result of Method B levels protective of human health and screening levels from the terrestrial ecological evaluation.

**Table 2. Cleanup levels for soil**

| Contaminant | Cleanup Level | Basis |
|---|---|---|
| Lead | 220 mg/kg | Ecological screening level |
| Cadmium | 36 mg/kg | Ecological screening level |
| Zinc | 24,000 mg/kg | Method B formula value |
| Dioxins (total) | 5 x 10-6 mg/kg | Ecological screening level |

In addition, if the zinc standard of 24,000 mg/L (which is protective of human health) is exceeded in Facility soils, then remediation will be conducted to meet the ecological screening level of 570 mg/L.

### 6.2.3 Surface water, Sediment, Air

There are no contaminants of concern for surface water, sediment, or air.

## 6.3 Points of Compliance

The point of compliance is defined in MTCA as "the point or points where cleanup levels established in accordance with WAC 173-340-720 through WAC 173-340-760 shall be attained"

(WAC 173-340-200). Once those cleanup levels have been attained, the site is no longer considered a threat to human health and the environment.

### *6.3.1 Groundwater*

WAC 173-340-720(8)(a) states: "For groundwater, the point of compliance is the point or points where the groundwater cleanup levels . . . must be attained for a site to be in compliance with the cleanup standards. Groundwater cleanup levels shall be attained in all groundwaters from the point of compliance to the outer boundary of the hazardous plume." The standard point of compliance is established throughout the site from the uppermost levels of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site. Specific points where compliance may be measured at the Facility include Monitoring Well (MW)-1B, MW-2, MW-3, MW-5, MW-8, MW-9, MW-10 and any wells installed on-site or within the affected vicinity of the Facility in the future.

### *6.3.2 Soil*

WAC 173-340-740(6)(d) states: "For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the site from the ground surface to fifteen feet below ground surface. This represents a reasonable estimate of the depth of the soil that could be excavated and distributed at the soil surface as a result of site development activities."

## 7.0 Cleanup Action Objectives

### 7.1 Remedial Action Objectives

The Facility remedial action objectives are intended to protect human health and the environment by eliminating, reducing, or otherwise controlling risks posed through each exposure pathway and migration route. They are developed considering the characteristics of the contaminated medium and the hazardous substances present; migration and exposure pathways; and potential receptor points.

The cleanup action selected shall fulfill the threshold requirements set forth in WAC 173-340-360(2)(a), which include protecting human health and the environment, complying with cleanup standards, and complying with applicable state and federal laws. In addition, WAC 173-340-360(2)(b) states that the selected cleanup action must use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns.

Based on the remedial investigation results, Ecology has determined that soil and groundwater are contaminated at the Facility. Metals-contaminated soils (remaining after previous soil removal actions) are identified and mapped into zones where up to six inches, 1-foot, 2-foot, and 4-foot deep impacted soil is present. Impacted groundwater is present across the north central portion of the Facility, and has migrated across the western property boundary. Groundwater is contaminated with sulfates, chlorides, and dissolved metals.

The remedial action objectives for the Facility are:

1) Prevent exposure (direct contact, ingestion, inhalation) to contaminated soils and groundwater;
2) Minimize leaching of contaminants from soils into groundwater;
3) Prevent impacted groundwater from migrating beyond the property boundaries; and
4) Recover, treat, and properly dispose of contaminated groundwater.

### 7.2 Potential Cleanup Alternatives

Remedial technologies that were potentially applicable to soils and groundwater were presented in the *Remedial Investigation Report and Voluntary Cleanup Plan*. The physical and chemical nature of the Facility contaminants limits the options for remediation. In general, the contaminants of concern do not readily break down in the environment. They tend to bind to soil particles, do not volatilize, and have low water solubilities. Considering the nature of the contaminants and the logistics of Facility operations (ongoing processing at the plant), the following alternatives were identified as potential remedial alternatives for the Facility:

- Soil Remediation Alternatives
  - Excavation and off-site disposal
  - Engineered control with asphalt cover
  - On-site treatment
  - Construction of buildings or other permanent structures over contaminated soil to reduce exposure pathways
- Groundwater Remediation Alternatives
  - Monitored natural attenuation
  - Slurry wall to contain groundwater
  - Groundwater recovery and treatment (pump-and-treat)
  - Groundwater recovery and discharge to publicly owned treatment works
  - Groundwater recovery and discharge to infiltration gallery
  - Groundwater recovery and discharge to spray field

### 7.3 Cleanup Action Criteria to be Applied

MTCA describes the requirements for selecting cleanup actions (WAC 173-340-360). It specifies criteria for approving cleanup actions, the order of preference for cleanup technologies, policies for permanent solutions, the application of these criteria to particular situations, and the process for making these decisions. The criteria and process are discussed below.

#### *7.3.1 Threshold requirements – WAC 173-340-360(2)(a)*

All cleanup actions shall provide:

- *Protection of Human Health and the Environment*- The selected remedy shall reduce the risks posed to human health and the environment by eliminating, reducing, or controlling exposure to these receptors.
- *Compliance with Cleanup Standards* – The selected remedy must comply with cleanup standards as per WAC 173-340-700 through 173-340-760.
- *Compliance with Applicable State and Federal Laws*- The selected remedy shall meet applicable state and federal laws. Local laws, which may be more stringent than specified state and federal law, will govern where applicable.
- *Compliance Monitoring* - Compliance monitoring shall be required for all cleanup actions, as assured by the completion of a compliance monitoring plan per WAC 173-340-410(3).

*7.3.2 Other requirements – WAC 173-340-360(2)(b)*
The selected cleanup action must also provide for:

- *Permanent Solutions* - WAC 173-340-360(3) outlines the requirements and procedures for determining whether a cleanup action uses permanent solutions to the maximum extent practicable.
- *Reasonable Restoration Time Frame* - The preferred cleanup actions must provide for a reasonable restoration time frame, as is outlined in WAC 173-340-360(4).
- *Public Concern* - Public comments received during the comment period for the CAP must be considered by Ecology as described in WAC 173-340-600.

### 7.4 Expectations for Cleanup Action Alternatives

Expectations for cleanup actions are listed in WAC 173-340-370. These expectations include, but are not limited to, the following:

- Emphasis on treatment technologies;
- Destruction, detoxification, and/or removal of all hazardous substances;
- Use of engineering controls;
- Minimization of migration of hazardous substances;
- Consolidation, to the maximum extent practicable, of hazardous substances remaining on-site;
- Performance of active measures to prevent/minimize releases to surface water; and
- Natural attenuation, if appropriate.

## 8.0 Selected Cleanup Action and Evaluation

### 8.1 Selected Cleanup Action

The selected cleanup actions for the Ultra Yield Facility include:

1) For soil: Compliance with the institutional control requirements listed in the Environmental Covenant recorded under Yakima County Auditor's file No. 7567203 dated June 15, 2007. In accordance with the Environmental Covenant, the altering, modifying, or removing of existing structures over the soil in the "Impacted Soil Areas" identified therein in any manner that may result in the release or exposure to the environment of that contaminated soil or create a new exposure pathway is prohibited without the prior written approval by Ecology. The Environmental Covenant further prohibits any activity at the property in the Impacted Soil Areas that may result in the release or exposure to the environment of the contaminated soil that was contained as part of the completed soil remedial action, or create a new exposure pathway. Some examples of activities that are prohibited as provided in the Environmental Covenant include drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, bulldozing, and earthwork. The 2007 SMP further requires that any utility repairs or installation or new construction that will extend into soils through cover materials at the Facility are to be conducted in accordance with Section 7.5 of the SMP. Any soil remediation at the Facility associated with utility repairs or installation, new construction or otherwise will be completed in accordance with the sampling

procedures, test methods, evaluation, and equipment decontamination procedures as set forth in the 2002 LFI CMP. Although the soil remediation required by the 2002 LFI CMP has been completed, any future soil remediation at the Facility associated with utility repairs or installation, new construction or otherwise will be completed in accordance with the sampling procedures, test methods, evaluation, and equipment decontamination procedures as set forth in the 2002 LFI CMP.

2) For groundwater: remediation shall occur via monitored natural attenuation. To ensure that natural attenuation is an effective remediation measure, groundwater shall be monitored in accordance with the 2007 APAG.

### 8.2 Evaluation of Threshold Criteria

As per WAC 173-340-360(2)(a), Ecology has determined that the selected cleanup actions meet the threshold criteria for cleanup actions:

- *Protection of Human Health and the Environment*
  The selected cleanup actions for soil and groundwater address removal and isolation of contaminants, preventing complete exposure pathways between humans, the environment, and the contaminants.
- *Compliance with Cleanup Standards*
  It is anticipated the selected cleanup actions will reduce contaminant concentrations to at or below cleanup levels identified for soil and groundwater.
- *Compliance with Applicable State and Federal Laws*
  The selected cleanup actions will comply with all applicable state and federal laws.
- *Compliance Monitoring*
  Ultra Yield and Mr. Camp will confirm performance of the selected remedial actions and confirm long-term protectiveness of the cleanup in accordance with the Agreed Order (as amended), the 2002 LFI CMP, the 2007 SMP, the 2007 APAG, and the 2007 Restrictive Covenant.

### 8.3 Evaluation of Other Requirements under WAC 173-340-360(2)(b)

The selected cleanup action also provides for:

- *Permanent Solutions*
  When selecting a cleanup action under MTCA, preference shall be given to permanent solutions to the maximum extent practicable using a disproportionate cost analysis. However, WAC 173-340-360(3)(d) provides that a disproportionate cost analysis shall not be required if the department and the potentially liable persons agree to a permanent cleanup action. The selected cleanup actions are acceptable to Ecology and the potentially liable persons. The selected cleanup actions involve removal and/or containment of contaminants in both soil and groundwater, which provides for immediate human health and environmental benefit, as well as long-term effectiveness (permanence) of Facility cleanup. Although not permanent, capping and containment of contaminated soil will be allowed until such time it is disturbed. If and when contaminated soil is disturbed it shall be excavated, managed and disposed of in accordance with this CAP.
- *Reasonable Restoration Time Frame*

After considering the potential risks posed by the site to human health and the environment, the practicability of achieving a shorter restoration time frame, the current use of the site, the potential

future use of the site, the availability of alternative water supplies, the likely effectiveness and reliability of institutional controls, the ability to control and monitor migration of hazardous substances from the site, the toxicity of the hazardous substances at the site; and the natural processes that reduce concentrations of hazardous substances Ecology has determined that the preferred cleanup action provides for a reasonable restoration time frame. Contaminated soil removal activity shall occur if and when contaminated soil (remaining after the previous soil removal actions) is disturbed. Groundwater contamination is expected to naturally attenuate in a reasonable amount of time.

- *Public Concern*
  Public comments received during the comment period for this CAP will be considered and addressed by Ecology.

# 9.0 Additional Requirements

## 9.1 Institutional Controls

Institutional Controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at the Facility as per WAC 173-340-440. They may include physical measures, use restrictions, maintenance requirements for engineered controls, educational notices to inform the public of potential hazards, and financial assurance. If deemed necessary, such controls may be enacted as an element of the cleanup action to ensure protection of human health and the environment.

### 9.1.1 Placement of Institutional Controls

At the end of the soil removal activities that took place between 2003 and 2005, it was determined that containment (as opposed to removal) of contaminants was necessary in three general areas: the Warehouse Area, the Bone Yard Area, and the Railspur Area (see Figure 2 of the 2007 SMP). Pursuant to the requirements of WAC 173-340-440(9), an environmental (restrictive) covenant was executed and recorded as Environmental Covenant under Yakima County Auditor's file No. 7567203 on June 15, 2007. The restrictive covenant runs with the land and is binding on the grantor's successors and assigns.

If, at a later time, it is determined that cleanup levels for soil and groundwater have been attained in a portion of the Facility, institutional controls may be removed with the following limitations:

- Institutional controls will remain in place to prevent tampering with monitoring wells; and
- Institutional controls will remain in place to prevent tampering with any equipment associated with cleanup actions at the Facility.

## 9.2 Permit Requirements

RCW 70.105D.090 exempts remedial actions conducted under a consent decree, order, or agreed order from the procedural requirements of RCW chapters 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 and the procedural requirements of any laws requiring or authorizing local government permits or approvals. However, Ecology shall ensure compliance with the substantive provisions of such state laws and local permits or approvals.

### 9.3 Property Access

For remedial activities both within and beyond the property boundaries of the Facility, Ultra Yield and Mr. Camp shall be responsible for obtaining property access and/or right of way easements in order to conduct cleanup activities including but not limited to access to groundwater monitoring wells.

### 9.4 Compliance Monitoring

Requirements of Compliance Monitoring as stated in WAC 173-340-410 include:

a) *Protection monitoring*: Confirms that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action.
b) *Performance monitoring*: Confirms that the cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards such as construction quality control measurements or monitoring necessary to demonstrate compliance with a permit or, where a permit exemption applies, the substantive requirements of other laws; and
c) *Confirmational monitoring*: Confirms the long-term effectiveness of the cleanup action once cleanup standards have been attained.

#### 9.4.1 Compliance Monitoring Plan

a) *Groundwater*—As provided in Section 4.2 of this CAP, seven groundwater monitoring wells (MW-1B, MW-2, MW-3, MW-5, MW-8, MW-9, and MW-10) are to be sampled on a bi-annual basis. In accordance with the sampling methodology set forth in Section 3.0 of the 2007 Action Plan for Affected Groundwater (APAG) and Sections 4.2 and 4.3 of the 2002 Compliance Monitoring Plan (2002 LFI CMP), groundwater is sampled and analyzed for pH, total chloride, sulfate, dissolved cadmium, manganese, and zinc. Data analysis and evaluation procedures in the 2002 LFI CMP shall be used to demonstrate and confirm compliance. Analytical data generated from the bi-annual sampling is evaluated and documented at the end of each year in an Annual Groundwater Monitoring Report.
b) *Site Cover Monitoring and Maintenance*--Pursuant to Section 7.4 of the 2007 SMP, site cover monitoring and maintenance is required to verify the integrity of site cover materials (asphalt/concrete pavement, clean backfill in unpaved areas), and to properly manage potentially impacted materials encountered during future maintenance or construction activities. Ongoing monitoring and maintenance is to provide continued protection of human health and the environment by minimizing the potential for the creation of complete exposure pathways. Annual site inspections will be made to verify the integrity of all site cover materials pursuant to Section 7.4 of the 2007 SMP. Site inspections will be documented on an inspection checklist, included as Appendix B to the 2007 SMP. A visual inspection will be made for the areas covered with clean fill for evidence of erosion or physical (excavation) damage to the soil cover. The inspection checklist forms will be submitted to Ecology with the Annual Groundwater Report following each annual inspection, documenting general site conditions as well as observed deficiencies. In the event that deficiencies are identified, any proposed or implemented corrective measures will be described on the inspection checklist or in a separate document submitted with the checklist and Annual Groundwater Report.
c) *Soil*—Any utility repairs or installation or new construction that will extend into soils through cover materials at the Facility are to be conducted in accordance with Section 7.5 of the 2007 SMP. Although the soil remediation required under the 2002 LFI CMP has been completed, any soil remediation at the Facility associated with utility repairs or installation, new

construction or otherwise will be completed in accordance with the sampling procedures, test methods, evaluation and equipment decontamination procedures as set forth in the 2002 LFI CMP.

d) *Future Modifications*--The referenced sections of the 2007 APAG and 2007 SMP and the referenced sections and the soil sampling procedures, test methods, evaluation and equipment decontamination procedures of the 2002 LFI CMP shall be followed until otherwise updated or replaced with the approval of Ecology.

### 9.5 Health and Safety Plan

The Health and Safety Plan (HASP) included in the 2007 SMP shall take precedence until changed or replaced by Ecology. The Health and Safety Plan shall be reviewed prior to any subsurface work in the Impacted Soil Areas as identified in the Environmental Covenant or that would encounter groundwater to ensure its relevance and effectiveness unless it has been reviewed within one (1) year prior to such work.

## 10.0 Implementation Schedule

Submittal of the following documents for Ecology's review and approval will be required:

1) Annual Groundwater Monitoring Report – submitted by March 30 of the year following the year monitoring occurs.

2) Review of the Facility Health and Safety Plan – The Health and Safety Plan shall be reviewed prior to any subsurface work in the Impacted Soil Areas as identified in the Environmental Covenant or that would encounter groundwater unless it has been reviewed within one (1) year prior to such work and the results of that review shared with Ecology.

3) Annual Facility Cover Monitoring and Maintenance Report– The Permittees shall provide Ecology with maintenance and monitoring verification checklists with a description of significant work activities that affected the cover in accordance with the 2007 SMP at the time of submission of the annual groundwater monitoring report.

It may be appropriate to combine the information in these various documents into one report to avoid unnecessary duplication. Where the information is contained in other documents, it may also be appropriate to incorporate those documents by reference.

Additionally, a final cleanup action report will be submitted no later than three months after completion of the cleanup actions.

## 11.0 References Cited

Booz Allen & Hamilton. 2000, Final *RCRA Facility Assessment Report, Bay Zinc Company.* Prepared for USEPA Region 10, Seattle, WA. November 2000.

John Mathes & Associates, Inc. 1989. *Remedial Action Plan Performance Evaluation Report.* Prepared for the Bay Zinc Company.

Kronos Micronutrients, LP, 2015, *Summary of EPA Project 100-02.*

Kronos Micronutrients, LP, 2015, *Groundwater Analysis: 2003-2015*

Kronos Micronutrients, LP, *2016 Annual Report for Water Well Sampling Kronos Micronutrients, L.P. Facility Moxee, Washington* (January 28, 2017)

Linebach Funkhouser, Inc. 2002, *Remedial Investigation Report and Voluntary Cleanup Plan,* Bay Zinc Company, Inc., Moxee, Washington. Prepared for Teck Cominco American, Inc.

Linebach Funkhouser, Inc. 2002, *Compliance Monitoring Plan.* Prepared for the Bay Zinc Company, Inc., Moxee, Washington.

Linebach Funkhouser, Inc. 2005, *Cleanup Action Report Bay Zinc Facility.* Prepared for the Bay Zinc Company, Inc., Moxee, Washington.

Linebach Funkhouser, Inc. 2007, *Site Management Plan,* Bay Zinc *Company, Inc., Moxee, Washington.*

Linebach Funkhouser, Inc. 2007, *Action Plan for Affected Groundwater,* Bay Zinc Company Facility, Moxee, Washington.

Linebach Funkhouser, Inc., 2013 *Report of Storm Water Release Mitigation Kronos Micronutrients, LP Facility Moxee, Washington* (March 4, 2013)

Linebach Funkhouser, Inc. 2014, *Closure Plan Limited Area of Boneyard,* Bay Zinc Company Facility, Moxee, Washington.

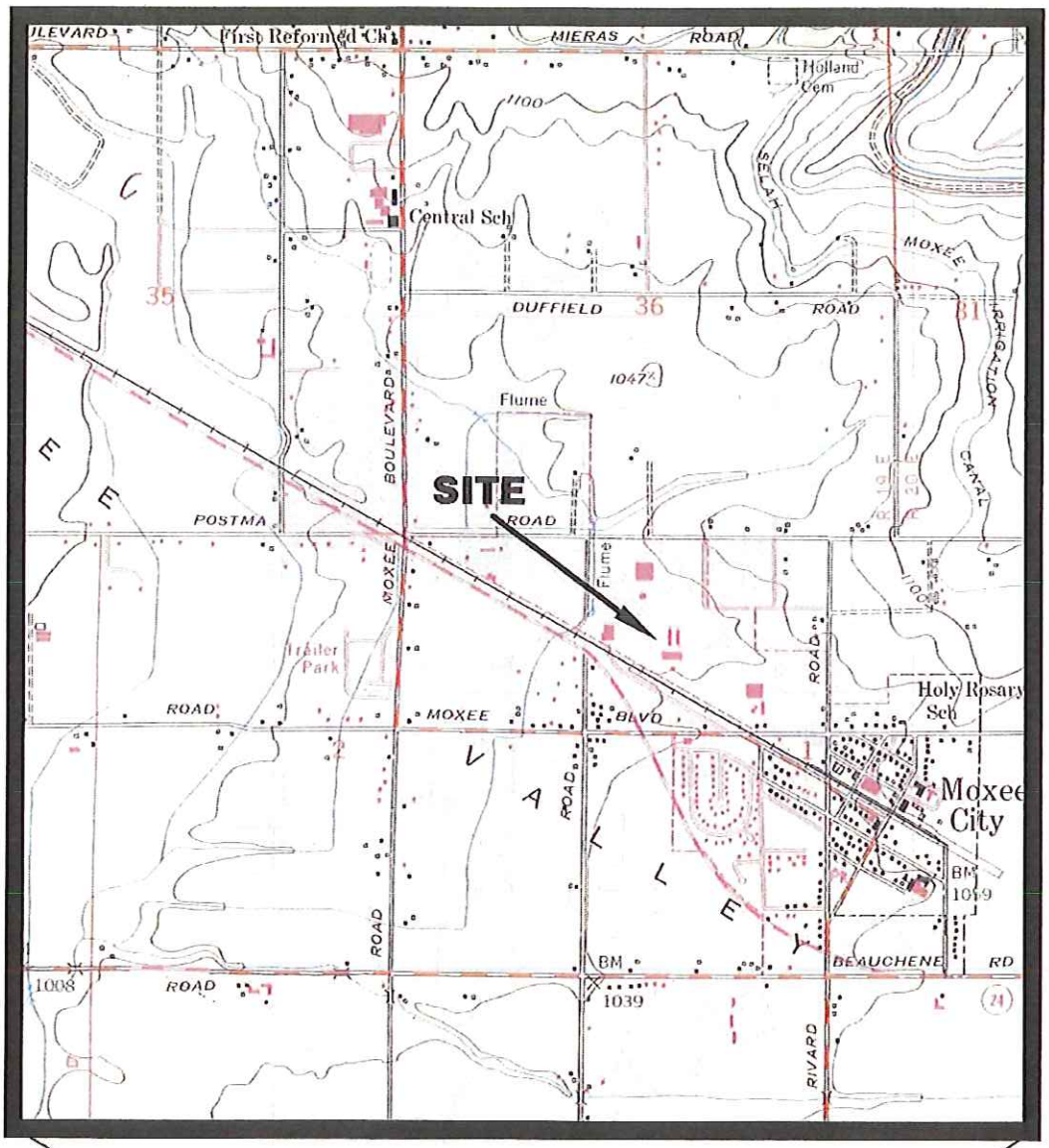
U.S. Environmental Protection Agency. 1989. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual.* Office of Emergency and Remedial Response Washington, DC. EPA/540/1-89/002.

Environmental Covenant recorded under Yakima County, Washington Auditor's file number 7567203 on June 15, 2007.

Attachment B

Site Location Map and Facility Diagram

SOURCE: U.S. GEOLOGICAL SURVEY; 7.5 MINUTE SERIES (TOPOGRAPHIC)
YAKIMA EAST QUADRANGLE, WASHINGTON; DATED 1985

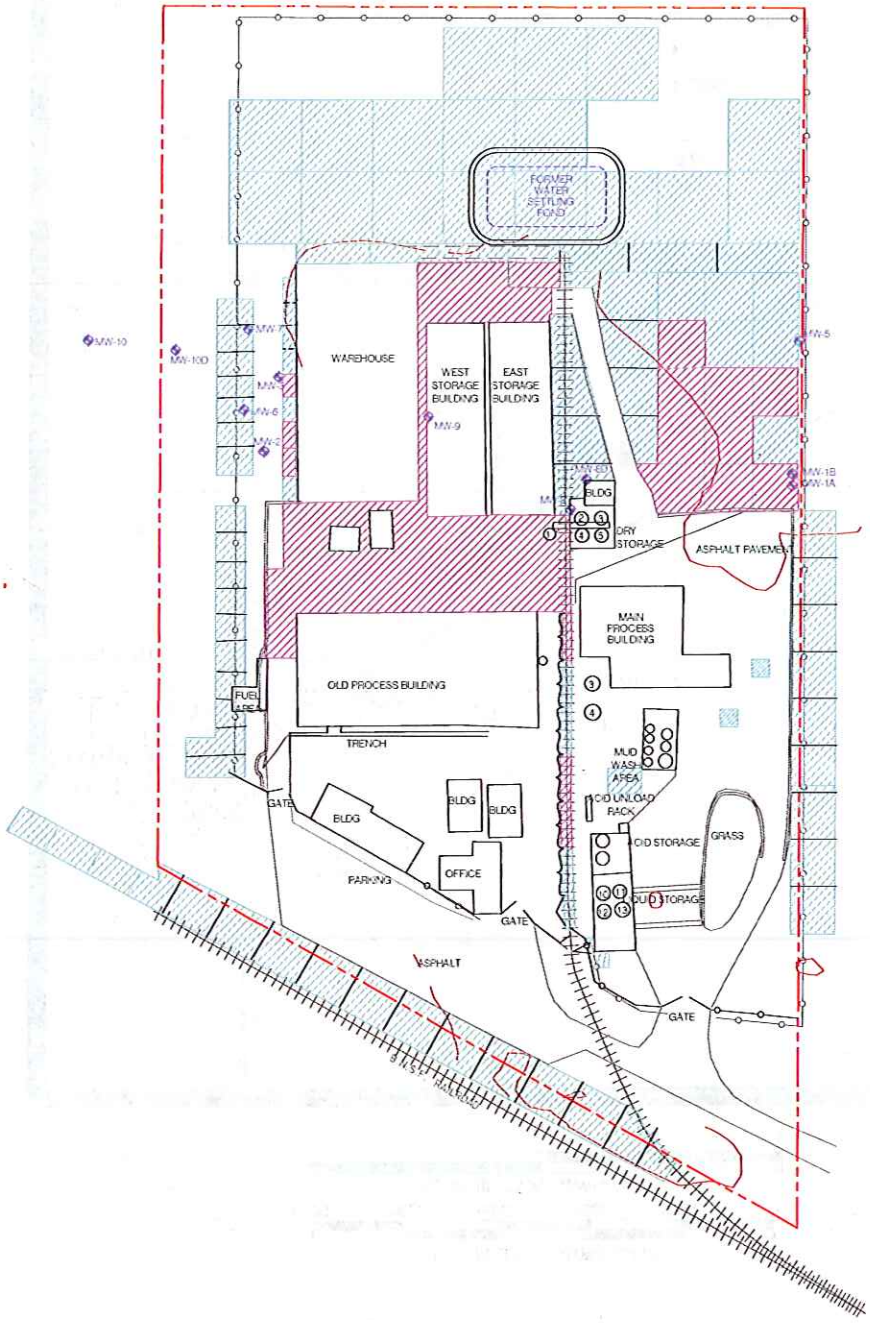



BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON

Linebach Funkhouser, Inc.
*environmental compliance & consulting*

SITE LOCATION MAP

| PROJECT NO: | SCALE: | FILENAME: | FIGURE: |
|---|---|---|---|
| 100-02 | - | 10002-1C | 1 |
| | | PLOT DATE: 4/12/05 | |




LEGEND

PROPERTY LINE

MONITORING WELL LOCATION

AREAS WHERE SOIL REMEDIATION GOALS WERE ATTAINED IN 2007. NO RESTRICTIONS.

AREAS WHERE NON-RESTRICTED USE CLEANUP GOALS WERE NOT ATTAINED IN 2007. AREA BEING MANAGED IN PLACE THROUGH APPROVED SITE MANAGEMENT PLAN AND ENVIRONMENTAL COVENANT.

SCALE (ft)

| | | |
|---|---|---|
| SITE LAYOUT MAP | SCALE: 1"=100' | FIGURE 3 |
| | DATE: 04/01/13 | |
| KRONOS MICRONUTRIENTS 301 W. CHARRON ROAD MOXEE, YAKIMA COUNTY, WASHINGTON | PROJ#: 100-02 | |
| | DRAWN BY: MKA | |
| | CHECKED BY: | |

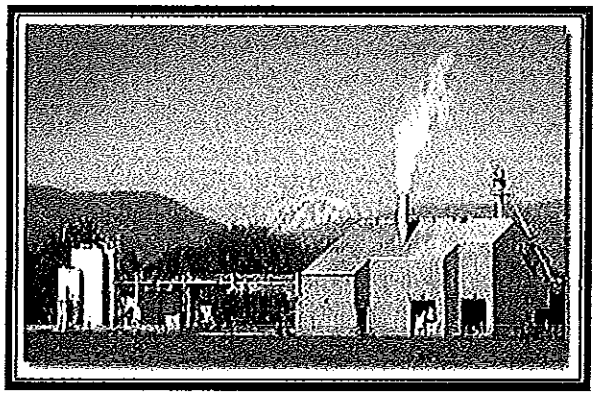
Linebach Funkhouser, Inc.
*environmental compliance & consulting*

Attachment C

2002 Compliance Monitoring Plan

# COMPLIANCE MONITORING PLAN





**Prepared for:**

**Bay Zinc Company, Inc.**
**Moxee, Washington**

**Prepared by:**

**Linebach ▪ Funkhouser, Inc.**
*environmental compliance & consulting*

**Linebach ▪ Funkhouser, Inc.**
*environmental compliance & consulting*

October 18, 2002

Mr. Greg Caron
Washington Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

*Re: Compliance Monitoring Plan*
*Bay Zinc Facility*
*Moxee, Washington*
*Linebach Funkhouser Project Number 100-02*

Dear Mr. Caron:

Linebach Funkhouser, Inc. (LFI), consultant for the Bay Zinc Company, Inc. (Bay Zinc) has prepared this Compliance Monitoring Plan regarding soil and groundwater remediation activities to be conducted at Bay Zinc's Moxee, Washington facility. The attached Plan includes details of soil sampling and analysis to be conducted to assure that remediation goals provided in the approved Cleanup Action Plan (CAP) for the site have been met. The enclosed Plan is being submitted to comply with the Agreed Order established between Bay Zinc and the Washington Department of Ecology (Ecology). The Compliance Monitoring Plan has been prepared to support the June 13, 2002 Remedial Investigation Report/Voluntary Cleanup Plan prepared by LFI, and the August 2002 CAP prepared by Ecology. Separate plans describing the groundwater remediation system to be installed and site health and safety procedures to be enacted during the course of remediation activities are included as appendices.

Bay Zinc and LFI look forward to moving ahead with the site remediation work. Please contact either of the undersigned if you have any questions.

Sincerely,

Bradley L. Coyle
Staff Geologist

Roy V. Funkhouser, P.G.
Principal
Washington Certified Hydrogeologist No. 2090

cc: Richard Camp, Bay Zinc Company
Greg Schoen, Teck Cominco American, Inc.

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## 1.0 BACKGROUND

The Bay Zinc Company, Inc. (Bay Zinc) operates a zinc micronutrient fertilizer manufacturing facility in Yakima, Washington. An Agreed Order, signed on August 30, 2002, was established between Bay Zinc and the Washington Department of Ecology (Ecology) to address soil and groundwater at the site impacted by historic releases. A *Remedial Investigation Report/Voluntary Cleanup Plan* (RI/VCP) dated June 13, 2002, was prepared by Linebach Funkhouser, Inc. (LFI) and submitted to Ecology. The RI/VCP was incorporated into a *Cleanup Action Plan* prepared by Ecology and included by reference in the aforementioned Agreed Order.

Based on the Remedial Investigation results, the following areas of the site were designated for soil cleanup:

- SWMU-1 (Rail Spur Area – Container Storage Area C)
- AOC-1 (Railroad Gate Area)
- AOC-2 (East Fence Line)
- AOC-3 (Boneyard)
- AOC-5 (Back Lot Fill and Adjoining Areas)
- SWMU-6 (Mud Wash Area)
- AOC-7/AOC-8 (Areas Along the Western Fence Line and the Warehouse)
- AOC-10 (Loading/Unloading Areas Around the "New Building" Housing the Zinc Sulfate Process)
- South Property Line along the Railroad Tracks

The selected treatment option for soil, as described in the RI/VCP, was excavation and off-site disposal. Groundwater will be remediated via pumping, treatment and subsequent discharge either to a drainage field to be constructed at the site or to the City of Moxee sewer system. A Groundwater Treatment System/Discharge Plan is in Appendix A. Further details regarding sampling and analytical procedures that will be used to confirm that remediation standards have

been met are provided in the following sections of this document, which has been prepared as a supplement to the RI/VCP and the CAP.

## 2.0 OBJECTIVES

The overall objective for remediation at the site is to eliminate or manage environmental risk to human health and the environment. Much of this objective has already been met in that:

- The waste pile source area has been removed and storage and operational procedures that lead to past releases have been mitigated by the additions of paving, curbing, stormwater collection basins, and other operational changes within the past few years.
- Approximately 150 tons of the most highly affected soil have already been excavated and removed from the rail car unloading area in SWMU-1.
- The majority of the site is covered by buildings and pavement.
- The area surrounding the site is served by a public water supply.
- The primary complete exposure pathway is limited to on-site employees and potential construction workers possibly involved in future excavation.

The key constituents driving the remediation efforts and the risk-based goal for each is as follows:

**Soil**

| Constituents | Remediation Goal |
|---|---|
| ➢ Cadmium | 36 milligrams per kilogram (mg/kg) |
| ➢ Lead | 220 mg/kg |
| ➢ Zinc | 24,000* mg/kg |

*If the zinc standard of 24,000 mg/kg is exceeded, cleanup will be conducted to meet a standard of 570 mg/kg.

In addition to the three aforementioned metals, confirmatory sampling for dioxin will also be conducted in SWMU-1 (Rail Spur Area) where steel mill dust (K061 waste) was stored. The cleanup goal for dioxin (total) is 5.0 x 10E-06 mg/kg.

**Groundwater**

| Constituent | Remediation Goal |
|---|---|
| ➢ Chloride | 250 mg/l* |
| ➢ Sulfate | 250 mg/l* |
| ➢ Cadmium | 0.005 mg/l |
| ➢ Manganese | 0.05 mg/l* |
| ➢ Zinc | 5.0 mg/l* |

* Represents USEPA Secondary Maximum Contaminant Levels (MCLs) for drinking water supplies. Secondary MCLs are based on aesthetic (not health-based) criteria. USEPA recommends secondary standards to water systems, but does not require systems to comply. According to Mr. Byron Adams with the City of Moxee (Public Utilities Section), elevated levels of sulfate in shallow groundwater are representative of background conditions in and around Moxee due to the highly agricultural nature of the area and the extensive application of fertilizers containing sulfate. If background conditions in the future are shown to be in excess of USEPA Secondary MCLs, cleanup standards will be adjusted to reflect the background concentrations.

## 3.0 OVERVIEW OF PLANNED REMEDIATION EFFORTS

A discussion of remedial alternatives considered for use at the site and a presentation of the selected options was included in LFI's RI/VCP dated June 13, 2002, previously submitted and accepted by Ecology. An overview of the remediation activities to be conducted is as follows.

### 3.1 Soil

The proposed remedial action pertaining to affected soil is excavation, off-site disposal, and reclamation supported by confirmation sampling. We anticipate that approximately 10,790 tons of soil (1,355 tons hazardous; 9,435 tons non-hazardous) will be removed from the facility for off-site disposal.

Soil will be excavated with a backhoe or similar equipment and stockpiled on plastic or asphalt pavement at the facility, or loaded directly into dump trucks for transportation off-site. Stockpiled soil will be securely covered with plastic to prevent run-off. The extent of soil removal will be based on confirmation sampling results.

Following verification that the cleanup objectives have been met, the excavation will be backfilled with soil from borrow areas to be established in an undeveloped open field owned by Mr. Richard Camp immediately adjacent to the east side of the Bay Zinc facility property line. The backfilled areas will be graded (the facility is generally flat with no significant slope), and then capped with gravel or seeded with native grass.

### 3.2 Groundwater

Existing groundwater extraction well MW-8 will be initially used to contain groundwater migration and remove affected water from the uppermost groundwater producing zone. Simple capture zone calculations made by LFI indicate that a pumping rate of 4 to 5 gpm from MW-8 will provide a capture zone that will extend to the edge of the western (downgradient) property boundary.

MW-8 will initially be pumped at a rate of approximately 4 gpm over a 90-day performance evaluation period. During the 90-day performance evaluation period, water levels in on-site monitoring wells will be collected on a monthly basis. Additionally, the monitoring wells will be sampled and analyzed for sulfate, chloride, zinc, manganese, and cadmium. Collected data will be analyzed to confirm the effectiveness of the groundwater extraction system. Existing recovery well MW-9, or an additional new recovery well, may be added to the system based on the system performance evaluation.

Pumped groundwater will be routed into the City of Moxee sewer system for discharge through Moxee's publicly owned treatment works (POTW). Some of the generated water may be used as process make-up water, and incorporated into the manufacturing process on site. An ionization system will be installed to pretreat groundwater prior to discharge.

After the 90-day performance evaluation period, groundwater monitoring and system operation and maintenance activities will be initiated. Select monitoring wells to be approved by Ecology will be sampled and analyzed for key constituents of concern. Once cleanup criteria have been met for four consecutive quarters, the recovery system will be shut down. If, subsequent to the shut-down of the recovery system, groundwater concentrations remain below cleanup levels for four consecutive quarters and show no significant increasing trends, groundwater remediation will be considered complete.

Based on the rate of progress of the groundwater pump-and-treat system to reach remediation goals, a groundwater recharge area (infiltration field) has been designed for potential future installation in a location adjacent to the eastern boundary of the Bay Zinc facility, hydraulically upgradient of the site. The infiltration field may also be installed in the future and used as a mechanism to enhance the purge rate of water through the uppermost groundwater producing zone, or potentially as an alternative to the City of Moxee sewer system for the receipt of treated groundwater from the ion exchange unit. Should the infiltration field be installed in the future, Ecology will be notified. Bay Zinc's understanding is that water potentially added to any such infiltration system will need to meet drinking water criteria. A design of an infiltration system that may be considered for use in the future is included in Appendix A.

## 4.0 SAMPLING/ANALYSIS PLAN

A discussion of sampling locations, procedures, and analytical parameters pertaining to remediation confirmation activities is provided in the following sections. Implementation of the sampling and analysis plan will to some extent be an iterative process. Sampling locations may be added or rearranged in the field based on initial results. In general, sampling and analytical work and professional oversight will be in accordance with the requirements presented in the Cleanup Action Plan and Agreed Order.

## 4.1 Soil Sampling

A site layout showing areas of the site from which soil is to be excavated as part of the remediation activities was presented in the aforementioned RI/VCP, and is included as Figure 1 of this Confirmation Sampling Plan. Proposed confirmation sampling locations have been superimposed onto Figure 1. A discussion of the sampling approach to be enacted in each of the areas highlighted in Figure 1 is as follows.

### 4.1.1 SWMU-1: Rail Spur Area – Container Storage Area C

SWMU-1 consists of two general areas:

- Exposed soil in a general triangular area between the east storage building and the boneyard. The triangular area is connected to a approximately 50-foot long northern extension of the railspur.
- Soil between the ties of the central/southern portion of the railspur extending south of the triangular area to the facility entrance gate.

Remediation confirmation sampling in each of the two SWMU-1 areas will be as follows.

*Triangular Area/Northern Portion of Rail Spur*

Approximately 18 inches of soil was removed from this area as part of previous assessment and remediation activities conducted by Bay Zinc in 1998. The portion of the railroad spur extending northward through the triangular area will initially be removed prior to soil excavation. Soil comprising the existing surface grade will be excavated throughout the triangular area using a backhoe to a depth of approximately two feet. The soils generated from SWMU-1 will be disposed of as hazardous waste in an approved landfill, which we anticipate will be Waste Management Inc.'s facility in Arlington, Oregon.

After approximately 2-feet of soil has been removed across the area, four grid blocks, each with dimensions of approximately 40 feet by 40 feet, will be established. Discrete grab samples will

be collected from 5 locations within each grid block (each corner of the block and in the middle) and composited in a clean, plastic-lined bucket. The composite sample will be properly labeled and analyzed for lead, zinc, cadmium, and dioxin (total). Additionally, 5 grab samples will be collected from the rail spur extension area north of the triangular area. The grab samples will be mixed into one composite sample that will be analyzed for lead, zinc, and cadmium.

Samples to be analyzed for lead, zinc, and cadmium will be sent to a local laboratory and analyzed using a 'rush' (24-hour) schedule. If analytical results indicate that levels of these constituents are still in excess of cleanup goals, additional excavation work will be conducted. Soil will not be excavated below the water table.

*Central/Southern Portion of Rail Spur*

Soil between the ties of the railroad track spur extending from the aforementioned triangular area southward to the southern gate of the operational facility will be excavated to a depth of approximately 12 inches from top of grade. Soil excavation will be accomplished using a small backhoe or similar earth moving piece of machinery. Soils will be excavated between individual railroad ties along the full length of the track.

A grab soil sample will be collected between every other railroad tie over a distance of approximately 20 feet. Sample will be transferred to a clean, plastic-lined bucket using a decontaminated hand trowel. Over each 20 foot interval, the grab samples representative of that interval will be composited and containerized in a properly labeled clean sample jar. The composite samples will be analyzed for zinc, lead, and cadmium.

4.1.2 AOC-1: Railroad Gate Area

Surficial soil in AOC-1, an area of limited extent at the southwest corner of the liquid storage area near the railroad spur gate will be excavated to a depth of approximately 6 inches. Upon completion of excavation, 2 composite confirmation soil samples will be prepared from 4 grab

samples taken from the area. The two composite samples will be analyzed for zinc, lead, and cadmium.

4.1.3 AOC-2 (East Fence Line)

The area located immediately along the east fence line will be excavated to a depth approximately 6 inches. The section of the fence extending through the area of concern will be removed prior to excavation. Upon completion of excavation of this unpaved area, confirmation sampling will be performed through the collection of surficial grab samples at intervals of approximately 10 feet along the fence line. Composite samples, each consisting of 5 grab samples, will be transferred to a properly labeled container. The samples will then be analyzed for the key constituents of total lead, cadmium, and zinc.

4.1.4 AOC-3 (Bone Yard)

Soils from AOC-3 will be excavated to a depth of approximately 12 inches using a backhoe or similar piece of excavation machinery. Once the excavation has been completed, confirmatory sampling will be performed to confirm that contaminated soils have been removed. A grid system of 40 foot by 40 foot blocks will be used. Surficial soil samples will be collected from five grab locations within each grid block (4 corners and middle) using a decontaminated hand trowel or shove. The grab samples collected from each block with then be composited into one sample representative of that respective block. Samples for laboratory analysis will be placed in a properly marked container and analyzed for total lead, cadmium, and zinc.

4.1.5 AOC-5 (Back Lot Area)

Soils in the Back Lot Area will be excavated to a depth of 6 inches. Additionally, the areas that are mounded with backfill dirt from the construction of the warehouse will be excavated to a depth of 4 feet. Confirmatory sampling will be performed in all of these areas.

A grid system composed of 60 foot by 60 foot blocks will be established. Five grab samples will be taken within each grid block and then composited in a clean, plastic-lined bucket. Samples will then be obtained in properly labeled sample containers from the bucket. A composite sample representative of each grid block will be analyzed for total lead, cadmium, and zinc.

4.1.6 SWMU-6, AOC-10 and Other Areas of Concern

SWMU-6 (Mud-Wash Area), AOC-10 (Areas Around the "New Building"), and another area of concern located southeast of the warehouse will be excavated to a depth of 12 inches (except for one area east of the New Building, which will be excavated to 4 feet) using a backhoe or other piece of excavating equipment. Generally, we except the overall area of excavation will be approximately the same in each of these areas. Each of these areas will be conceptually divided into halves; an eastern section and a western section. Three grab samples will be taken from each of the two sections and composited in a clean, plastic-lined bucket. A sample representative of each half will be analyzed for total lead, cadmium, and zinc.

With respect to the area to be excavated to 4 feet, grab samples will be obtained from each half of the pit at depths of approximately 2-feet below grade from the walls and also from the floor of each of the two halves. In each half of the pit, two composite samples will be prepared: a composite representative of the pit walls, and a composite representative of the pit floor. Samples will be analyzed for total lead, cadmium and zinc.

4.1.7 AOC-7 (West-Central Fence Boundary/West Side of Warehouse Boundary)

Soils will be removed to a depth of approximately 6 inches along a portion of the west-central fence boundary and also along the western side of the warehouse using a backhoe or similar piece of excavating equipment. Upon completion of the removal of these soils, confirmatory sampling will be performed to confirm that contaminated soils have been removed. Surficial grab samples will be taken from the approximate locations within each grid shown in Figure 1 and composited into one sample representative of that discrete grid. Composite samples will be

analyzed for total lead, cadmium, and zinc. Sampling grids will be established in each of the areas as shown in Figure 1.

4.1.8 AOC-8 (Southwestern Run-Off Area near Fence)

Soils will be removed to a depth of approximately 6 inches along the southwestern fence boundary using a backhoe or similar piece of excavating equipment. Upon completion of the removal of these soils a sampling grid will be established as shown in Figure 1. Four to five surficial grab samples will be collected and composited into one sample representative of that discrete grid. Composite samples will be analyzed for total lead, cadmium, and zinc.

4.1.9 South Property Line along Railroad Track

The area trending east-west along the southern property boundary adjacent to the railroad tracks will be excavated to a depth of approximately 6 inches. This area is located immediately to the south of the paved parking areas between the edge of the asphalt and the railroad tracks. Upon completion of the excavation to 6 inches, confirmation sampling will be conducted.

Confirmation sampling will be conducted using a grid system to show that the area has been remediated and does not require additional excavation. To accomplish this task, a grid with approximate dimensions of 40 feet by 40 feet will be established throughout the entirety of the excavated area. A grab sample will be taken from the midpoint and the four corners of each grid block using a hand trowel. The five grab samples will then be composited in a clean, plastic-lined bucket. A composite sample representative of each grid block will be placed in a properly labeled container and shipped to an analytical laboratory to be analyzed for zinc, lead, and cadmium. If analytical results indicate that levels of constituents in a given grid block(s) exceed the remediation goals, excavation will continue.

## 4.2 Groundwater Sampling

The main constituents of concern in groundwater at the site are zinc, manganese, cadmium, sulfate, and chloride. To track the progress of groundwater remediation efforts, Bay Zinc will monitor all the associated monitoring wells and sample the upper aquifer monitoring wells (MW-1B, MW-2, MW-3, MW-4, MW-5, MW-9, and MW-10) on a quarterly basis. Deeper monitoring wells installed into the next lower groundwater producing zone will be sampled annually. An influent (pre-treatment) and effluent (post-treatment) sample from the pumping well (MW-8) will also be collected on a quarterly basis, or more frequently if required to meet City of Moxee sewer discharge requirements. The locations of monitoring wells at the site are shown on Figure 1.

As stated, groundwater sampling will be conducted on a quarterly basis for the first year. Upon completion of one full calendar year of monitoring, an evaluation of groundwater remediation progress will be made. Based on the results of quarterly monitoring, recommendations regarding future monitoring (i.e. parameters to be included and need for quarterly versus semi-annual monitoring) will be developed. Prior to any change in the monitoring regime, Ecology will be notified for approval.

Proper groundwater sample collection procedures will be conducted to ensure that collected samples are representative of the groundwater producing zone being sampled. Each element of the sampling procedure will be followed closely during all sampling events so that variations in analytical data cannot be attributed to variations in sampling procedures. A discussion of groundwater sampling procedures is provided in the following subsections.

### 4.2.1 Static Water Level Measurement

Due to the shallow nature and potential for rapid elevation change of the upper-most groundwater producing zone located at the Bay Zinc site, groundwater elevation recordings will be conducted as a first step in the sampling process. Groundwater levels will be obtained from all of the monitoring wells on the subject site using an electronic water level indicator. Water

levels will be recorded to the nearest 0.01 foot. Between well recordings, the water level indicator will be decontaminated using a dilute nitric acid rinse and a deionized water rinse to minimize the possibility of cross-contamination.

4.2.2 Well Purge Volumes

Groundwater samples taken for analysis must contain only water representative of the aquifer being sampled. For this reason, each well must be purged until the well is thoroughly flushed of standing water.

To achieve this task, a portable submersible pump (Rediflow or equivalent) will be used to purge the wells. To reduce the potential for cross contamination between wells, each well will be equipped with its own dedicated discharge hose. Hoses will be marked with their corresponding well number and will be cleaned and stored between uses. Before each use, the pump will be decontaminated by emptying is chamber and rising the chamber and discharge hose with deionized water. Clean, disposable latex gloves will be worn when handling the hoses to prevent introduction of contaminants into the wells and/or cross-contamination.

As a back-up to the submersible pump, a disposable or Teflon bailer will be utilized to remove the necessary volumes of purge water from the monitoring wells. If bailing is utilized, any non-disposable bailer will be decontaminated using a dilute nitric acid rinse followed by a thorough rinse with deionized water. Poly-rope or nylon twine will be utilized to lower and raise the bailers into the wells.

All of the wells being sampled will be purged of at least three casing volumes before sampling. Some of the monitoring wells may have very low yields and may be purged dry before three casing volumes can be removed. In this instance, the well will be purged to dryness and sampled as soon as sufficient recharge has occurred. Specific conductance, temperature, and pH measurements will be recorded in the field at the time of sampling.

Purge water will be discharged either to the on-site stormwater collection system and utilized in the manufacturing process, or into the City of Moxee sewer system.

4.2.3 Sample Withdrawal

Samples will be collected within 24 hours of purging using the aforementioned electric pump. If the electric pump becomes inoperable or if the pump is not available, a new disposable bailer or clean Teflon bailer will be utilized to obtain the necessary volume for analytical sample submission.

All of the upper groundwater producing zone monitoring wells (MW-1B, MW-2, MW-3, MW-4, MW-5, MW-9, and MW-10) will be analyzed for dissolved manganese, dissolved zinc, dissolved cadmium, total sulfate, and total chloride by an accredited analytical laboratory. Groundwater samples to be analyzed for dissolved metals will be field filtered through a disposable 45 micron filter. The samples will be containerized in properly labeled containers with appropriate preservatives if necessary. These containers will be provided by the contracted analytical laboratory. The contract laboratory will be responsible for certification that the containers were prepared following EPA standard protocol.

Samples will be transferred in the field from the sampling equipment directly to the container that has been specifically prepared for that analytical parameter or set of EPA approved compatible parameters. Samples will be either shipped via overnight courier or hand delivered to the laboratory in an iced cooler along with proper chain-of-custody forms. A seal will be affixed to each cooler. A copy of this chain-of-custody will be retained and filed.

4.2.4 Quality Assurance and Quality Control

The purpose of the field quality control program is to ensure the reliability of data. Two types of QA/QC samples will be collected during the course of remediation confirmation and monitoring activities at the site:

- Equipment Rinsate Blanks
- Sample Duplicates

With respect to soil sampling, one equipment rinsate blank will be collected during each day of field activities. The equipment blank will consist of a sample of deionized water that has been used for the final rinse of sampling equipment. The final rinseate will be decanted into a sample container for analysis. A duplicate soil sample will be collected from each of the areas of concern being excavated. The equipment blanks and duplicate samples will be analyzed for zinc, cadmium, and lead. In terms of groundwater sampling, one equipment rinsate blank and one duplicate sample will be collected during each quarterly sampling event. Samples will be analyzed for zinc, manganese, cadmium, sulfate, and chloride.

Duplicate sampling locations will not be disclosed to the analytical laboratory. The team member who obtains the sample will properly log the sample on the chain-of-custody form and make note of the location from where the duplicate sample was obtained.

Laboratory analysis will only be performed by contract accredited laboratories that maintain an internal quality assurance and quality control program to minimize misinterpretations of analytical results from analytical equipment and to ensure that proper data is being communicated concerning the sampling points. Samples analyzed in the laboratory will have a maximum acceptable detection limit that does not exceed to the Maximum Contaminant Level (MCL) for that constituent.

4.2.5 Field Logbook

The sampler(s) will maintain a field logbook for all sampling events performed at the subject site. Data may also be entered onto specially prepared Field Data Log Sheets. At the start of each day, the names of the sampler(s) and weather condition will be recorded. Data obtained during the ongoing groundwater sampling events will be entered into the logbook and may include: the well identification number, well depth, static water level depth measurements, turbidity and color, odors, amount of water yielded from the well, sample ID numbers, well purging procedures, date and time of collection of the analytical sample, other field observations, and analytical data and methods requested.

Any corrections will be made by striking out the incorrect entry with a single line such that the original entry is not obliterated. The person making the correction will also initial and date the entry.

### 4.3 Decontamination Procedures

Sampling equipment will be cleaned before collection of each sample, and sample personnel will wear clean, disposable gloves for each separate sample collected. Decontamination procedures for sampling equipment will include the following:

- Wash with solution of Alconox and deionized water
- Rinse with deionized water
- Rinse with 0.1 M solution of nitric acid
- Rinse with deionized water

Following excavation activities involving the affected soil, the tires and bucket of the excavation equipment will be decontaminated with a high-pressure washer. Decontamination fluids will be captured and containerized. The fluids will be incorporated into the manufacturing operations as process make-up water or discharged into the City of Moxee Sewer System. During excavation activities, soil will be wetted as necessary to prevent the generation of visible dust.

## 4.4 Laboratory Analysis

USEPA approved methods will be used to analyze samples collected at the site. Analytical methods will be as follows:

Soil

- Dioxin by EPA Method 8290
- Total Lead (Pb), Total Cadmium (Cd), and Total Zinc (Zn) by EPA Method 6010

Groundwater

- Chloride EPA Method 300 Series
- Sulfate EPA Method 300 Series
- Cadmium EPA Method 200 Series
- Manganese EPA Method 200 Series
- Zinc EPA Method 200 Series

A summary of the planned confirmation soil samples to be collected from the various areas of concern is presented as follows.

**Table 1**
**Summary of Soil Samples and Laboratory Analyses**

| Sample Area | Anticipated Depth of Excavation | Analyses |
|---|---|---|
| SWMU-1 | 2 Feet | Dioxin, Pb, Cd, Zn |
| Railroad Track Spur | 12 Inches | PB, Cd, Zn |
| South Property Line Area | 6 Inches | PB, Cd, Zn |
| AOC-2 | 6 Inches | |
| AOC-3 | 12 Inches | PB, Cd, Zn |
| AOC-5 | 6 Inches/4 Feet | PB, Cd, Zn |
| AOC-7 | 6 Inches | PB, Cd, Zn |
| AOC-8 | 6 Inches | PB, Cd, Zn |
| Other Areas | Varies | PB, Cd, Zn |

## 5.0 SCHEDULE

As presented in the approved Cleanup Action Plan, soil excavation work will be conducted in three phases. The implementation schedule for the project is provided below.

**Table 2**
**Schedule of Implementation**

| Task | Area of Concern | Completion Date |
|---|---|---|
| Submit Groundwater Remediation System Work Plan, Compliance Monitoring Plan ("CMP"), and Health and Safety Plan ("HSP") | Recovery Well MW-8 | Within six weeks of receipt of Ecology written approval of CAP |
| Complete Installation of Ground Water Remediation System and Commence Operation of System | -- | Within three months of receipt of Ecology written approval of Work Plan, CMP and HSP |
| Report of Performance Evaluation | -- | Within six months of receipt of Ecology written approval of Work Plan, CMP and HSP |
| Initiate Soil Removal Activities*-1st Phase | SWMU-1 South Property Line | Within six months of receipt of Ecology written approval of Work Plan, CMP and HSP |
| Confirmation Sampling and Task Completion Report – 1st Phase | | Within one month of receipt of Ecology writte4n final confirmation samples. |
| Initiate Soil Removal Activities*-2nd Phase | AOC-2 AOC-3, AOC-7, AOC-8 | Within nine months of receipt of Ecology written approval of Work Plan, CMP and HSP |
| Confirmation Sampling and Task Completion Report – 2nd Phase | -- | Within one month of receipt from laboratory(ies) of all final confirmation samples. |
| Initiate Soil Removal Activities*-3rd Phase | Back Lot | Within 21 months of receipt of Ecology written approval of Work Plan, CMP and HSP |
| Submit Final Cleanup Action Report, including results of conformational sampling for soils and ground water remediation | -- | Within one month after receipt of final soil sampling confirmation results for al areas and results showing four consecutive quarters of ground water monitoring with no significant increase(s) in ground water constituents of concern |

* "Activities" include, but are not limited to, making arrangements with landfills and remediation contractors, obtaining access to railroad rights-of-way, and actual soil excavation and removal.

## 6.0 REPORTING

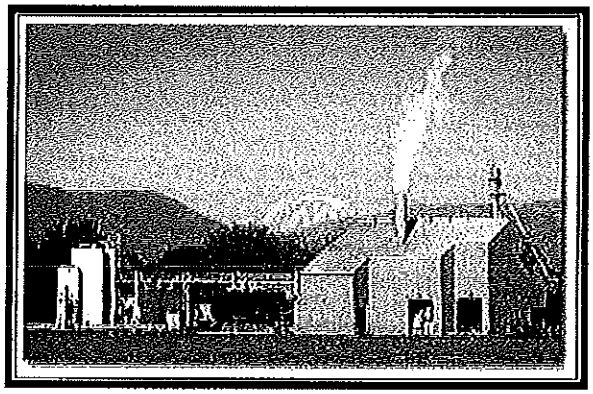
In accordance with the approved Cleanup Action Plan, the following reports will be generated.

- Report of Groundwater Performance Evaluation
- Soil Remediation Progress Report – First Phase

- Soil Remediation Progress Report – Second Phase
- Final Remediation Report

The reports will include a description of field activities and work completed. Analytical results will be summarized in tables and figures, as appropriate, and laboratory reports will be included as appendices. Field records, photographs, and disposal manifests will also be included.

# GROUNDWATER TREATMENT SYSTEM / DRAINFIELD DESIGN PLAN



**Prepared for:**

**Bay Zinc Company, Inc.**
**Moxee, Washington**

**Linebach ▮ Funkhouser, Inc.**
*environmental compliance & consulting*

October 18, 2002

Mr. Greg Caron
Washington Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

*Re: Groundwater Treatment System / Drainfield Design Plan*
*Linebach Funkhouser Project Number 100-02*

Dear Mr. Caron:

Linebach Funkhouser, Inc. (LFI), consultant for the Bay Zinc Company, Inc. (Bay Zinc) has prepared this Design Plan regarding the installation of a groundwater treatment system at Bay Zinc's Moxee, Washington facility. The attached Plan includes details of an ion exchange groundwater treatment system to be installed, and a drainage field that may be constructed to receive the treated discharge water as an alternative to discharge into the City of Moxee sewer system. The installation of the groundwater treatment system will be completed as part of the work being conducted in compliance with the Agreed Order established between Bay Zinc and the Washington Department of Ecology.

Bay Zinc and LFI look forward to moving ahead with the site remediation work. Please contact Mr. Roy Funkhouser if you have any questions.

Sincerely,

L. Wayne Cassady, P.E.
Principal, Scientific Studies Company
Washington Registered Engineer No. 39066

Roy V. Funkhouser, P.G.
Principal, LFI
Washington Certified Hydrogeologist No. 2090

cc: Richard Camp, Bay Zinc Company
Greg Schoen, Teck Cominco American, Inc.

4059 Shelbyville Road ▮ Louisville, KY 40207 ▮ (502) 895-5009 ▮ Fax (502) 895-4005

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## 1.0 BACKGROUND/PURPOSE

The Bay Zinc Company, Inc. (Bay Zinc) operates a zinc micronutrient fertilizer manufacturing facility in Yakima, Washington. An Agreed Order, signed on August 30, 2002, was established between Bay Zinc and the Washington Department of Ecology (Ecology) to address soil and groundwater at the site impacted by historic releases. A *Remedial Investigation Report/Voluntary Cleanup Plan* (RI/VCP) dated June 13, 2002, was prepared by Linebach Funkhouser, Inc. (LFI) and submitted to Ecology. The RI/VCP was incorporated into a Cleanup Action Plan that was accepted by Ecology and included as an attachment to the aforementioned Agreed Order.

The selected treatment option for groundwater, as described in the RI/VCP, is extraction via pumping with subsequent treatment and discharge. Further details regarding the treatment and discharge system to be installed at the Bay Zinc site are provided in the following sections of this document, which has been prepared as a supplement to the RI/VCP.

## 2.0 GROUNDWATER TREATMENT SYSTEM

Existing groundwater extraction well MW-8 will be used to contain groundwater migration and remove affected water from the uppermost groundwater producing zone. MW-8 will be pumped at a rate of approximately 5 gallons per minute (gpm) over an initial 90-day performance period. Adjustments to the pumping rate will be made (if any are necessary) following the 90-day period to contain and control groundwater migration.

Based on the results of assessment activities conducted to date, the recovered groundwater is expected to contain elevated levels of certain inorganic constituents, particularly zinc, sulfate and chloride. None of the key detected constituents in groundwater are listed as primary drinking water contaminants. Based on LFI's discussions with Mr. Byron Adams of the City of Moxee, chloride and sulfate levels in groundwater are known to be commonly elevated in the Moxee area. Consequently, LFI's initial conceptual design for the disposal of pumped water involved direct discharge (without pretreatment) into the City of Moxee sewer system. However, upon

review of the estimated influent concentrations developed by LFI (conservatively based on site-specific historic groundwater monitoring results), the City of Moxee expressed concern over the projected potential concentration of zinc (150 mg/l) in the influent to be generated.

To address concerns regarding zinc, a metal recovery ion exchange (MRIX) system will be installed to reduce the zinc concentration levels below 5.0 mg/l. The MRIX system will be skid-mounted and will feature microprocessor control, complete prefiltration, and efficient regenerate usage. A summarized description of operation is as follows:

- Recovered groundwater will initially pass through a buffer tank, where the pH will be adjusted to the optimum required by the ion exchange resin.
- Water will pass through a media pre-filter to remove sediment.
- Filtered water will then be directed through columns of ion exchange resin.
- The columns will be reverse-rinsed and backwashed with 8-15% acid solution, fresh water, and 5% sodium hydroxide.

A more detailed description of the groundwater treatment system to be installed, including a process flow diagram, is in Appendix A. Estimated influent and effluent (after pre-treatment) chemical characteristics of the groundwater to be recovered are in Table 1. [SEE ATTACHED TABLE 1 NEXT PAGE. 10/30/02 GC.]

## 3.0 DISCHARGE/DRAINFIELD DESIGN

After pretreatment, recovered groundwater will be discharged either to the City of Moxee sewer system or to a hydraulically upgradient drainage field to be potentially installed on property owned by Mr. Richard Camp (Bay Zinc owner), adjacent to the east side of the fenced Bay Zinc property line. The drainage field option presents the opportunity to enhance recharge to the system, essentially recirculating recovered groundwater back through the aquifer and expediting the rate of groundwater cleanup. The proposed potential drainfield site is along the eastern border of the site, at the approximate mid length of the property line. Further discussion of the proposed area's capabilities to serve as a drainfield, and a presentation of the design plan, is as follows.

# Table 1
## Estimated Influent and Effluent Characteristics of Recovered Groundwater

## Bay Zinc Facility
## Moxee, Washington

| Influent | | Effluent | |
|---|---|---|---|
| pH | 7.8 | pH | 8-11 |
| Temperature | 59.5 °F | Temperature | NO CHANGE |
| Spec. Conductance | 4024 μmohs/cm | Spec. Conductance | 4,200 |
| Zinc | 150 mg/l | Zinc | 0.02 mg/l |
| Cadmium | 0.19 mg/l | Cadmium | 0.01 mg/l |
| Sulfate | 1320 mg/l | Sulfate | NO CHANGE |
| Chloride | 306 mg/l | Chloride | NO CHANGE |
| Sodium | 480 mg/l | Sodium | 530 mg/l |
| Manganese | 35.5 mg/l | Manganese | NO CHANGE |
| Flow Rate | 5 gpm | Flow Rate | NO CHANGE |

Note: Influent concentrations represent conservative estimates based on historic monitoring well sampling data.

Effluent concentrations were provided by Remco Engineering, the supplier of the ion exchange water treatment system to be used.

Based on a review of the Natural Resource Conservation Service (NRCS) Soil Survey for Yakima County, and our site observations, the site soils are the Umapine series. The Umapine are deep, relatively poorly drained silt loams which formed in alluvium. The soil survey indicates that these soils have significant limitations in applications such as septic tank absorption fields. A discussion of the drainfield design is presented in the following sections.

### 3.1 Percolation Test Methodology

A series of percolation tests were conducted at the proposed drainage field site to evaluate the rate of infiltration and determine the size of the absorption field needed to accommodate a discharge rate of approximately 5 gallons per minute (gpm). Five percolation test holes were excavated by shovel to depths ranging from approximately three feet to four feet. The test holes were widely spaced in the proposed drainfield area. Test hole diameters at half depth were approximately six inches.

After excavating, the test hole sidewalls and bottoms were scarified and cleaned to decrease the effects of polishing and clogging the soil profile and thereby decreasing the rate of infiltration during testing. A thin layer of aggregate was placed in the bottom of the hole to limit disturbance as the water was poured into the holes. The test holes were presoaked by filling them and allowing the water to stand overnight. The holes were covered with plastic to limit losses due to evaporation. Testing was resumed the following day by filling each of the holes and monitoring them on 10 minute intervals until three consecutive measurements yielded 1/8 inch or less of drop in standing water for three of the test holes. Test holes were refilled during testing to maintain a suitable water level. Depths to the water surface were measured to 1/16 inch using a steel tape measure.

### 3.2 Percolation Test Results

Soil conditions encountered in each of the five percolation test holes were consistent across the area, and consisted of approximately four inches of topsoil overlying the Umapine layer. Select soil samples were collected for laboratory analysis of physical parameters (natural moisture

content and Atterberg limits) to identify the soil types. The soil samples were collected from three separate holes at depths of 46 to 47 inches, 41 to 43 inches, and 35 to 37 inches, respectively. The soil classification testing indicated all three samples as silt (ML) near the clay/silt range on the classification chart.

Percolation test results are as follows.

| Test Hole | Rate (mpi*) | Comment(s) |
|---|---|---|
| 1 | 13 | Stabilized |
| 2 | 6 | Lowest infiltration rate |
| 3 | 12 | Stabilized |
| 4 | 13 | Stabilized |
| 5 | 8 | Lowest infiltration rate |

* mpi=minutes per inch

Two test holes did not yield stabilizing drops but did yield a pattern of taking significant water in the first several readings and then decreasing with each 10-minute reading. In the case of these two test holes, the lowest rate of drop was used to conservatively represent the percolation rate for the hole.

The test holes that stabilized yielded consistent results for infiltration. The two test holes that did not stabilize indicated the presence of a lense of soil which absorbed higher rates of water than layers deeper in the holes.

An average test result was calculated by first discarding the lowest and highest rates of infiltration, 13 mpi and 6 mpi respectively. The remaining values, 13, 12, and 8 mpi were averaged to produce a design value of 11 mpi. It should be noted that any reasonable approach analyzing the percolation rates (i.e., include all data or eliminate the lower values of 6 and 8) produce average values which yield the same recommended soil treatment surface area, since the tabular range is from 6 to 15 mpi. The various possible analyses of the test hole data yield values ranging from 10 to 13. The recommended soil treatment area in square feet per gallon per day is 1.27.

### 3.3 Design Considerations

The design flow from the treatment system will be approximately five gallons per minute or 7,200 gallons per day (GPD). According to design guidelines, if the discharge pipe is bedded on up to 24 inches of rock (thus increasing available void space) the drainfield area can be reduced by up to 40 percent (18 inches of rock bedding = 34 percent reduction and 12 inches of rock bedding = 20 percent reduction). The following table summarizes the calculated drainfield area relative to the rock bedding depths.

| Bedding Depth Inches | Drainfield Area (Square Feet) | Dimensions (Ft x Ft)* |
|---|---|---|
| 0 | 9,180 | 153 x 60 |
| 12 | 7,320 | 122 x 60 |
| 18 | 6,060 | 101 x 60 |
| 24 | 5,520 | 92 x 60 |

* The 60-foot width may be changed and was simply selected as a dimension that appeared to fit the adjacent property dimensions and the area of our testing.

Freeze depths for the Yakima/Moxee area are reportedly as deep as 24 inches and therefore any pipe leading to the drainfield and the drainfield pipe itself should be held to a minimum depth of cover of 36 inches to prevent freezing. Discharge pipes are often recommended to be installed at 1 to 2 percent slopes to promote flow and create a sufficient pipe velocity to cleanse the pipe of sediment. Since this pipe system is planned to only carry water and not wastewater with solids, a slope as little as 0.5 percent should be sufficient to maintain flow while not creating unreasonable depths for the drainfield pipe.

## 4.0 RECOMMENDATIONS

Based on the project requirements, the following recommendations have been developed.

- An 18-inch aggregate bedding depth should be used. Drainfield piping should also be covered with stone to create additional storage volume.

- The stone utilized should be lightly compacted rounded stone to maximize void space storage for water as it enters the soil subgrade.

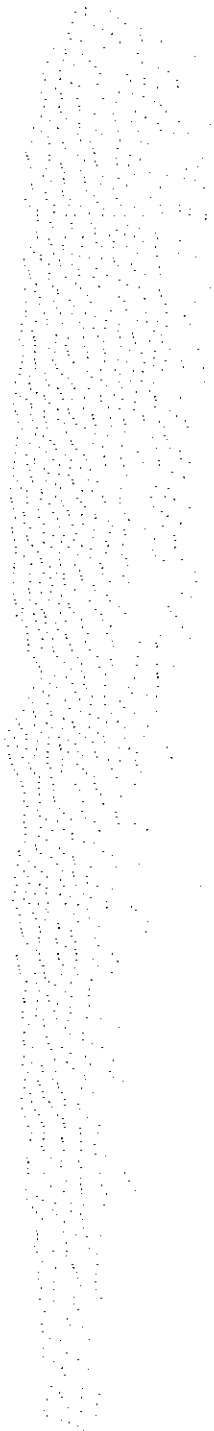
- The drainfield should be capped with a 6-inch layer of the excavated soil. Soil from the excavation should also be placed as a short berm around the drainfield to prevent runoff from entering or exiting the drainfield.

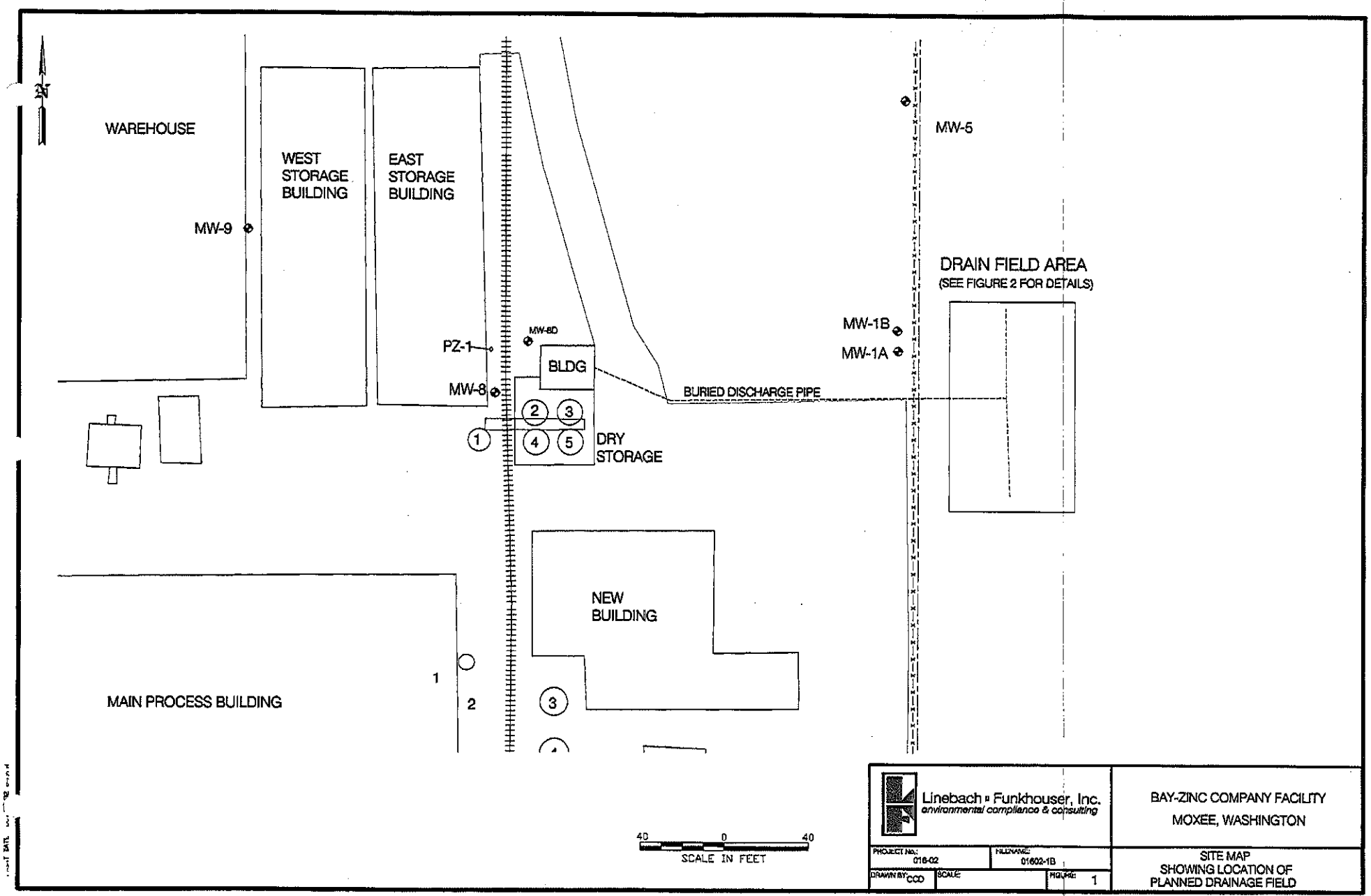
- The pipe used in the field should be perforated to release the water along its length. The pipe should be on approximately 0.5 percent slope.

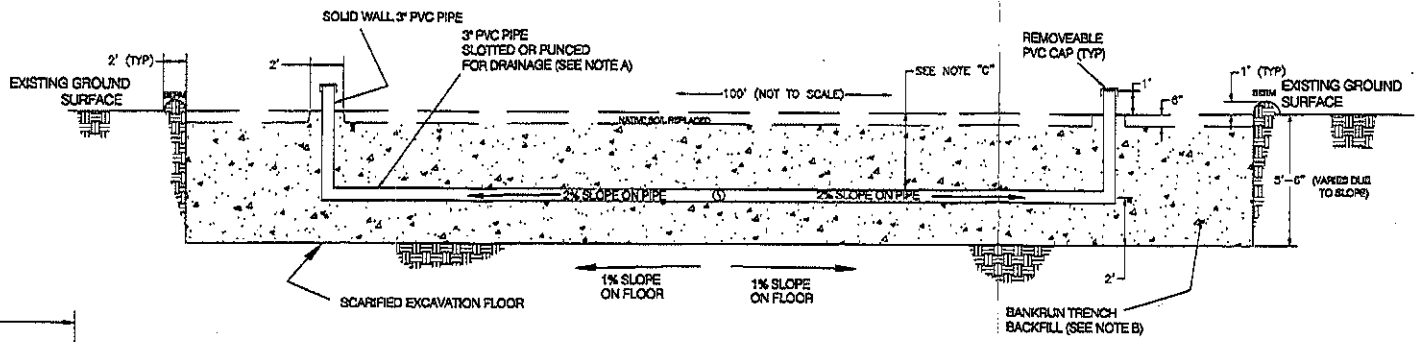
- A pipe section at a 90-degree vertical angle should be placed at the terminus of each horizontal pipe in the drainfield to allow overflow and to serve as a water depth gauging location.

- An engineering plan and detail sheet pertaining to the drainfield construction recommendations are provided in Figure 1.

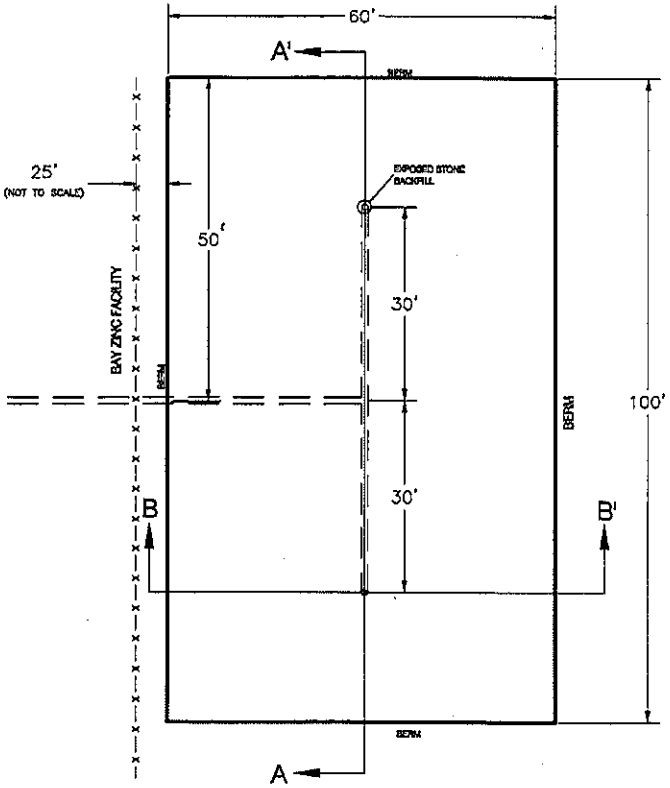
# Figures



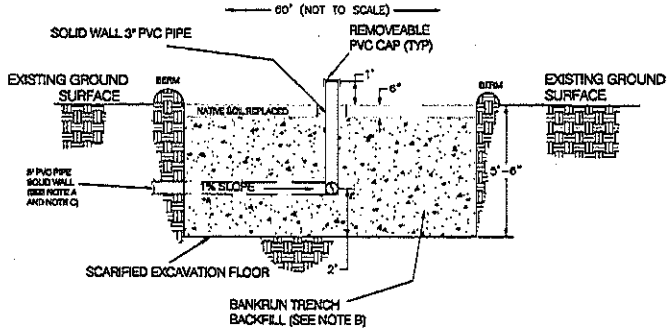

WAREHOUSE
WEST STORAGE BUILDING
EAST STORAGE BUILDING
MW-9
MW-5
DRAIN FIELD AREA
(SEE FIGURE 2 FOR DETAILS)
MW-1B
MW-1A
MW-8D
PZ-1
BLDG
MW-8
BURIED DISCHARGE PIPE
1
2
3
4
5
DRY STORAGE
NEW BUILDING
MAIN PROCESS BUILDING
1
2
3
40
0
40
SCALE IN FEET
Linebach Funkhouser, Inc.
environmental compliance & consulting
BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON
PROJECT NO.: 016-02
FILENAME: 01602-1B
DRAWN BY: CCD
SCALE:
FIGURE: 1
SITE MAP
SHOWING LOCATION OF
PLANNED DRAINAGE FIELD




SECTION A - A'




DRAINFIELD PLAN




SECTION B - B'

NOTE:

A - SCHEDULE 40 POLYVINYL CHLORIDE (PVC) PIPE, PROPERLY GLUED AT ALL JOINTS. USE STANDARD PVC FITTINGS.

B - USE LIGHTLY COMPACTED BANKRUN TRENCH BACKFILL, WASHED ROUNDED STONE, WASHINGTON DEPARTMENT OF TRANSPORTATION (WDOT) SPECIFICATION, SECTION 9-03.12(4) 100% PASSING 1" SIEVE, 0 TO 2% PASSING 200%.

C - MINIMUM OF 3 FOOT OF SOIL / STONE COVER ON PIPE AT ALL LOCATIONS OF PIPE LEADING TO AND IN THE DRAINFIELD.

Linebach Funkhouser, Inc.
*environmental compliance & consulting*

BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON

| PROJECT No.: 016-02 | FILENAME: 01602-2B |
|---|---|
| DRAWN BY: CCD | SCALE: |

FIGURE: 2

VARIOUS CROSS SECTIONS OF DRAINAGE FIELD

PRINT DATE: DEC/ 2004

# APPENDIX A

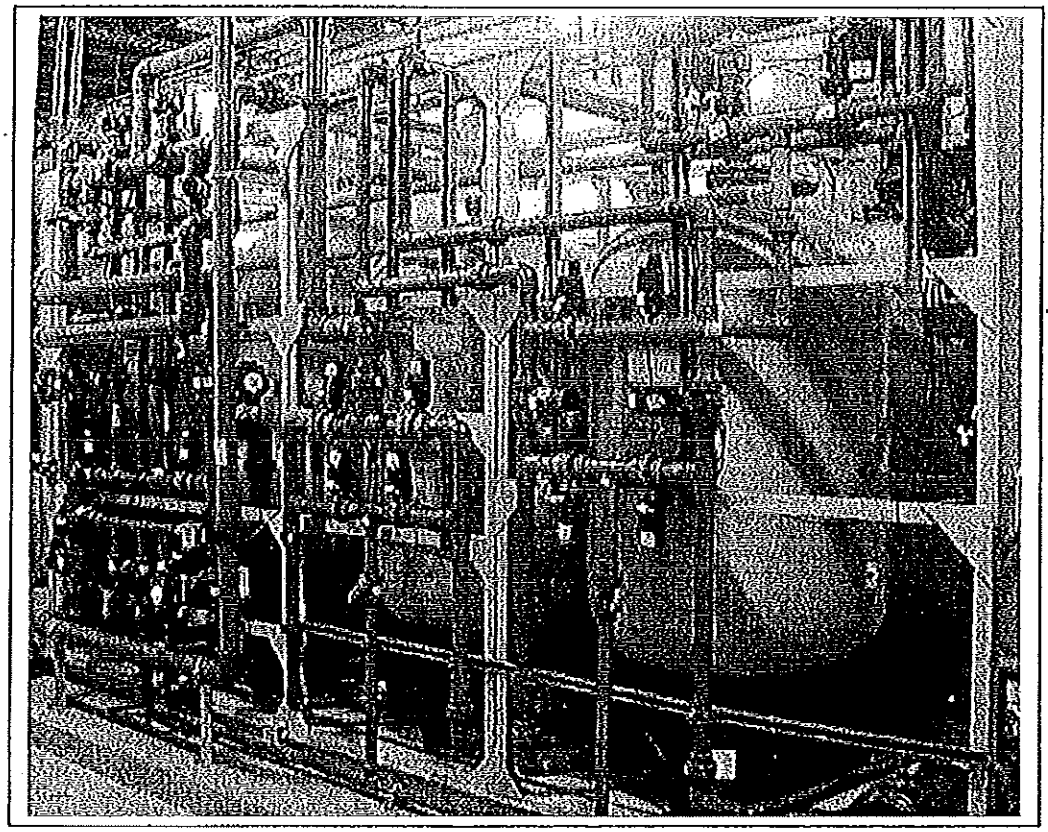
# GROUNDWATER TREATMENT SYSTEM DESIGN SPECIFICATIONS

REMCO ENGINEERING PRESENTS TO

LINEBACK AND FUNKHOUSER, INC

QUOTE 2045A

# A METAL RECOVERY ION EXCHANGE PLANT RATED AT 10 GPM NOMINAL, 8 LB ZINC PER REGENERATION



SEPTEMBER 12, 2002

**REMCO ENGINEERING**

*Water and Wastewater Treatment Systems*

COVER PHOTO: 180 GPM SYSTEM AT MULTEK ZUHAI, CHINA

SEPTEMBER 12, 2002

Mr. Doug Lineback
Lineback and Funkhouser, Inc
4059 Shelbyville Road
Louisville, Ky 40207

Re: MRIX Zinc Recovery System

SUBJECT: REMCO ENGINEERING PROPOSAL 2045A

Dear Mr. Lineback:

We thank you for the opportunity to submit our quotation 2045 for a Metal Recover Ion Exchange system (MRIX) for zinc in ground water treatment. We are pleased that you recognize Remco Engineering as a premium supplier for water and wastewater treatment systems. We are excited about the opportunity to support your continuous improvement efforts at your facility.

As your system supplier we provide:

- A strong, innovative, and experienced implementation team.
- An organization committed to support Linebach and Funkhouser, Inc..
- An experienced and efficient project management and engineering staff.
- The highest quality hardware and controls available in the industry.
- An organization committed to Linebach and Funkhouser, Inc.'s satisfaction.
- A wastewater treatment system that has 10+ years of operating reliability data in many different types of facilities.

We are offering the superior combination of both a quality product and creative design skills, backed by more than 12 years experience in the design, manufacture, and installation of water and wastewater treatment systems.

Please be assured that you have the full and complete support of the entire Remco Engineering organization to an on-time, first class implementation of world class automation.

We look forward to working with you on this project.

Sincerely,

Robert E. Mesick

President

## 1.0 ION EXCHANGE SYSTEM

### 1.1 Description of operation

The Remco Metal Recovery Ion Exchange (MRIX) process is unique in that all of our skid mounted systems are complete water treatment units featuring microprocessor control, very low water use, complete prefiltration and *VERY* efficient regenerant usage.

Waste water is collected from your process rinsewater holding tanks and held in the main buffer tank, which is included with all systems. This tank is sized for 20-30 minute retention. It serves as a buffer when the flow exceeds the design flow rate and also allows service or maintenance without interrupting production. Here the waste stream is pH adjusted to the optimum required by the ion exchange resin. The water is then transferred through a media pre-filter where sediment is removed.

This transfer is accomplished with an ultrasonic analog output level controller that is interfaced with the main PLC. In operation the tank must be at the upper level control point and at the correct pH before the system goes on line (pumps through columns). The system stays on line until the tank reaches a second level setpoint. This mechanism assures us of always having a buffering action that accommodates a varying incoming pH while delivering a very stable pH to the ion exchange resin columns. Our system utilizes duplex feed pumps, reserving one pump for standby operation. With this arrangement, down time is kept at a minimum.

The media filter is a column of sand like material (Aluminum silicate) that works as a depth filter. The more it is run, the finer it filters. When flow drops below the design flow rate, the filter is backwashed into a bag filter with the separated liquid being returned to the buffer tank. The contents of this sediment are entirely dependent on what debris may be going down the drains. Any dissolved metal contained in the liquid portion of the backwash is pH adjusted and processed back through the system. *NOTHING GOES TO DRAIN WITHOUT PASSING THROUGH THE COLUMNS.*

From the media filter the filtered metal bearing water is directed through the top of the first column of ion exchange resin out the bottom and into the top of the second column. From here it is discharged to the sewer. This configuration is referred to as lead/lag. Their respective positions to the flow of the rinse waters changes during the regeneration operation. It is in these columns where the metal ions are exchanged and captured on the exchange sites of the resin.

The ion exchange resin used varies with the application but for this example we use a weak acid chelated resin, used for Nickel, Zinc, Lead and Copper recovery. This resin is used in the sodium form. A metal ion is exchanged for a sodium ion in a similar fashion to a home water softener. For example, a Copper ion is captured when it passes through the column and is exchanged for two Sodiums. This is because the chemical valence of Copper is 2, Sodium 1, therefore, 1 Copper = 2 Sodium when exchanged. We are not *de*-ionizing (DI) the water but exchanging one ion (ion exchange) for another. The advantage of this process is that you only capture what you need to remove from solution and not what you are permitted to let pass.

As the ion exchange process continues, the resin slowly fills up with metal. The point at which regeneration is required is determined by monitoring the stream after is has passed through the lead (first) column and before is reaches the lag (second) column. An increase in the metal concentration entering the lag column indicates the lead column is exhausted and requires regeneration. The operator pushes a button that initiates the microprocessor to begin the regeneration cycle.

The complete cycle is simple to describe, but involves a number of valves, timed cycles, and switching. Rather than depend on manual operation and the possibility of error, a microprocessor assures you of proper functioning and very low levels of metal in the effluent.

When the regeneration cycle is started, the lead column is taken off line while the following (lag) column with its available exchange sites is switched to the primary position and continues to process the wastewater. The exhausted lead column is then reverse rinsed from bottom to top with water. The rinse water is discharged to the holding/buffer tank(s).

Next, the column is backwashed with of 8-15 % acid solution. The acid backwash supplies hydrogen ions, which exchange with the metal ions on the resin. The resin cannot hold on to the metals at low pH. The metal ions and the acid are returned to the regenerant tank as metal salt. There is approximately 10 gallons of solution per cubic foot of resin.

The column is then rinsed with fresh water with the rinse diverted to the head of the system as it contains some metal and will require pH adjustment and polishing for metal removal. After a complete fresh water rinse, a solution of 5% sodium hydroxide is passed through the column. This replaces the hydrogen ions on the resin with Sodium and prepares the column for operation.

If the column were left in the hydrogen form, every time a metal ion came by, it would be exchanged for the Hydrogen ion. This would lower the pH at that point in the column and cause another metal ion to be released; this would cause the metal to pass through the column (not good).

The column is backwashed again to remove the excess caustic and this rinse water, as with the others, is diverted to the head of the system for processing. The entire regeneration cycle takes about 3-5 hours depending on the system size and customer requirements.

The regenerated column is placed back on line in the lag position. The column that was previously second is now lead. The clean column is always second in line. By monitoring and regenerating when levels rise between the columns we are always assured of low metal concentration in the effluent because the waste stream is always flowing through a column with available exchange sites.

There are several methods for recovering the metal from the regenerant solution. One is to collect the metal as a salt by evaporation. Some salts such as the Sodium forms of Cyanide and Chromium or the Sulfate or Chloride salts of Copper and Nickel have a slight value which allow for reclamation at minimal costs. The metallic elements such as Copper, Nickel, Zinc, etc. it is possible to recover the pure metal by electrowinning (plating).

## 1.2 Buffer tank

The buffer tank is a heavy-duty polyethylene for maximum chemical resistance. The tank is sized for a 20+ minute total retention at a flow of 10 gpm, to provide surge protection and buffering capacity for rapid pH adjustment and uninterrupted operation.

1.2.1 One (1) total ,300 gallon capacity.

1.2.2 Polyethylene composite construction

1.2.3 1.5" bottom port and valve

1.2.4 Level controls mounted on top surface

1.2.5 Manway for access

### 1.3 IX pressure vessels

Fiberglass construction with extended bases allowing bottom drains for air blowdown of solutions. Special construction insures low operating cost and low water usage during regeneration.

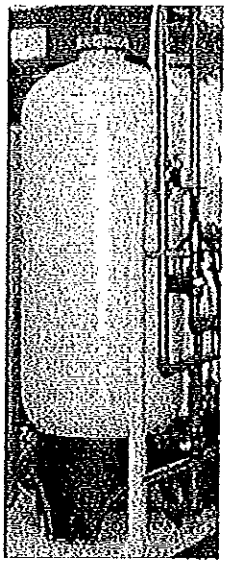


**Figure 1 Composite fiberglass column**

1.3.1 Two (2) Thermowound fiberglass ASME tanks, 16" diameter x 72" high

1.3.2 Each column has 6 cu. ft. capacity.

1.3.3 Each tank has top inlet and bottom outlet distributor screens

1.3.4 Union fittings for attaching tanks to manifold system

1.3.5 Extended base

### 1.4 Ion exchange resin

Non-proprietary resin insures cost effective ion removal. Resin is selected for maximum effectiveness and efficiency for each particular application.

1.4.1 System requires 10 cu. ft total, 5 cu. ft. per column

1.4.2 Macroporous resin, styrene-divinyl benzene base

1.4.2.1 Chelated, Iminodiacetic acid type functional group

## 1.5 Valve stack manifold

With automatic column switching, the system regenerates completely and returns on line with tanks in reversed order. One column is always in-service. Modular valve complex allows independent operation of either column during regeneration. Air blowdown completely empties columns between steps during regeneration, maximizing ion recovery and rinsing efficiency.

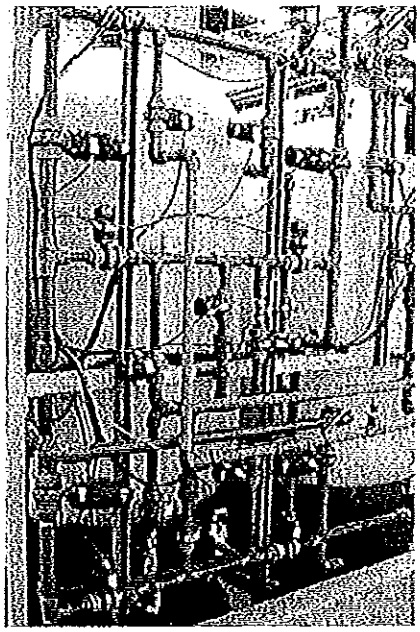


**Figure 3 MRIX valve stack**

1.5.1 Dual column regeneration manifold

1.5.2 1" inlet connection

1.5.3 Plumbed to unions for connection to IX Tanks

1.5.4 3/4" backwash water input - pneumatic operated solenoid valve, with flow rate restrictor

1.5.5 1" outlet with 0-10 gpm digital flowmeter

1.5.6 Sample ports for monitoring effluent between columns

1.5.7 Dual Air blowdown check valves

1.5.8 Acid regenerant diverter valve

1.5.9 Automatic drain shutoff during regeneration

1.5.10 1" Sch 80 PVC main flow lines

1.5.11 3/4" inch Sch 80 PVC backwash flow lines

1.5.12 Microprocessor controlled

1.5.13 Pushbutton (Nema 4x) with indicator light for each column to initiate regeneration.

1.5.14 Flow direction indicator lights on main panel

### 1.6 Electrical control panel

Touch screen panel controls and monitors all functions. Menu display with visual and audible alarms for notification. Easy process changes by front panel operation of timers and counters. Password protected to prevent unauthorized operation. The system can be interfaced to central computer system. Non-metallic fittings, pushbuttons and lights insure long life and good appearance. Nema 4x corrosion resistant fiberglass enclosure.

1.6.1 All switches Nema 4x

1.6.2 Air input fittings

1.6.3 3-way air solenoids for air operated valves.

1.6.4 Microprocessor to operate backwash timing cycles

1.6.5 Indicating on switch with latching relay

1.6.6 Internal circuit breaker

1.6.7 Emergency "Off" mushroom head push button

1.6.8 Regeneration initiation from display panel with cycle in-progress indicator and description of process step on display

1.6.9 Program timing is adjustable through the display panel.

1.6.10 System monitors and displays regeneration status on panel display.

1.6.11 Selectable automatic or manual operation.

### 1.7 Media filters

The media filter(s) are for TSS (total suspended solids) reduction.

1.7.1 Fiberglass construction with extended bases allowing bottom drains for air blowdown of solutions. Special construction insures low operating cost and low water usage during regeneration.

1.7.2 Thermowound fiberglass tank required, 16" diameter x 72" high each

1.7.3 Each tank contains top-inlet and bottom-outlet distributor screens

1.7.4 Union fittings for attaching tanks to manifold system

1.7.5 Extended base

1.7.6 Each column rated at 7 to 21 gpm at 5 -15 gpm/surface sq. ft.

1.7.7 Filter media – 8" graded gravel base with Alumina Silicate media.

1.7.8 Filter media - 4 ft3 per vessel,

## 1.8 Media filter valve stack

Progressive operation and backwash valve stack manifold with automatic switching. Modular valve complex allows backwashing of each filter and column independently during operation.

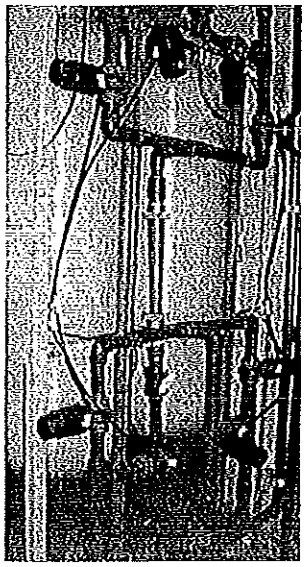


Figure 4 Media Filter

1.8.1 Column backwash manifold

1.8.2 Plumbed to unions for connection to Tanks

1.8.3 1.0" backwash water input - pneumatic operated solenoid valve, with flow rate restrictor

1.8.4 1.0" outlet and inlet connections

1.8.5 PVC butterfly diverter valve

1.8.6 1.0" Sch 80 PVC main flow lines

1.8.7 Microprocessor controlled

## 1.9 IX Feed pumps

1.9.1 Centrifugal pumps (2) – duplex operation insures continuous operation. Each pump independently operated. Model NPE.

1.9.2 AISI 316L Stainless steel wetted pump parts for corrosion resistance.

1.9.3 Mounted on main skid.

1.9.4 Motor starters located in main control panel, DIN rail mounted.

1.9.5 A/B switch (Nema4x) in main electrical enclosure.

1.9.6 1.5 HP, 480V, 3 phase, 60 HZ, TEFC, 1.15 SF electric motor(s).

1.9.7 True union ball valves on pump inlet and outlet.

1.9.8 True union ball check valve on pump outlet for duplex configuration.

## 1.10 Level controls – Ultrasonic

1.10.1 Ultrasonic transducer.

1.10.2 One (1) required for IX feed buffer tank.

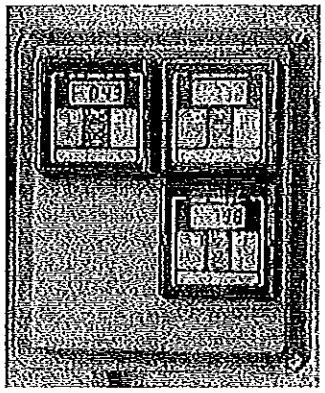
1.10.3 Wired to main control panel, 4-20 ma output.

1.10.4 Level control interfaced with PLC programmable controller. AT Low liquid level indication, system reverts to recirculation mode through the buffer tank.

1.10.5 Continuous level readout from tank bottom to 10" from top of tank.

## 1.11 Automatic pH adjust

Sealed Nema 4x enclosures and capable of adjusting pH in either direction insure that minimal time is required for pH adjustment. Mounting the pH probe in the line after pump insures minimal response time. Caustic and acid feeds mounted in return line to buffer tank insure rapid mixing of both.



Control Panel with pH and ORP controllers

1.11.1 Nema 4x enclosure with pH meter

1.11.2 pH meters with dual alarm set points, 4-20 ma

1.11.3 Inline mounted pH probe, interface cable, PVC housing

1.11.4 Dual 120 g/d per day metering pumps

1.11.5 On/off switch (Nema 4x) in main electrical enclosure

1.11.6 Plug-in relays to switch pump (saves wear on controller output relay)

1.11.7 pH controller output interlocks PC to prevent off pH operation

## 1.12 Acid backwash module

Regeneration with 10% Sulfuric acid solution (3N) using 1.3 X theoretical equivalency in a recirculation mode. System "blows down" previous rinse water to prevent dilution of the regenerant. A short leach rinse follows acid regeneration to remove the interstitial salts left in the resin and returns this to the regenerant tank.

1.12.1 Regenerant tank, 100 gallon, Polyethylene

1.12.2 Acid regeneration pump, 1/6 hp, magnetic drive centrifugal, skid mounted.

1.12.3 Acid transfer pump for neat acid into Acid dilution / feed tank.

1.12.4 Plumbed to regeneration manifold.

1.12.5 Wired to main control panel.

1.12.6 Microprocessor initiates pumping.

1.12.7 Front panel on/off override switch (Nema 4x) for draining tank.

1.12.8 All interconnecting piping and valves rated at 10 gpm continuous duty, schedule 80 PVC

1.12.9 Automatic Mix Option – After each regeneration cycle, the regenerant is pumped to a customer supplied treatment tank and the next batch of regenerant acid is automatically made up in the correct proportions for the next regeneration.

### 1.13 Caustic backwash system

Caustic is used to prep the resin although an incomplete conversion is used. The only purpose for using a caustic backwash is to prevent the pH from dropping low between the columns. An eductor adds caustic to the rinse water. The system is programmed to allow a caustic refresh of a spent column to obtain a longer useful life between regeneration's.

1.13.1 Feed from 30 or 50% caustic mix tank.

1.13.2 Water and caustic ½" air operated valves

1.13.3 Polypropylene or PVC eductor

1.13.4 Plumbed to regeneration manifold

1.13.5 Wired to main control panel, Microprocessor initiates flow

1.13.6 All interconnecting plumbing and valves rated at 20 gpm continuous duty, schedule 80 PVC

### 1.14 *Power Purge*™ air blowdown (regenerate and rinse water conservation)

After each regeneration step, the column being regenerated is emptied of all solution by an air pressurization system. The solution in the tank is sent to the buffer tank if it is rinse water or to the acid regenerant tank if it is regenerant or leachate. This insures that water and regenerant is used with maximum efficiency and minimizes water use. Multiple rinses can be used to generate a counterflow effect if water use must be minimized. This process allows the recovery of a very concentrated metal salt solution.

1.14.1 Air regulator

1.14.2 Air valve mounted in control panel interfaced to microprocessor controller

1.14.3 Check valve/backflow preventer

1.14.4 Programmed air blowdown cycle in backwash program

1.14.5 Acid backwash diverter valve

### 1.15 Resin regeneration sensing (breakthrough detection)

Automatically senses the state of the lead column and signals the operator to begin regeneration. Interface to programmable controller available for automatic initiation of resin regeneration.

1.15.1 Between column sensor, inline mounting, and interface cable

1.15.2 Air operated valves divert flow to allow selective sensing of lead column in both lead/lag flow modes: column A to B and B to A

1.15.3 Two electrical solenoid valves in main control enclosure for diverter valve operation

1.15.4 Microprocessor interface and alarm indication of the need to regenerate on the main control panel

### 1.16 Computer Monitor and Control, Hardware and Software

**Graphical interface control software including desktop computer, 19" monitor, network card, and control software suitable for use with Koyo PLC controller. Includes design, layout, startup and debugging of software for PLC interface. Includes graphical display of system functions, real time monitoring and data logging of system parameters. Software includes the following functions:**

1.16.1 Multiple Screen display of MRIX and/or batch treatment system

1.16.2 Remote select of pump on/off

Flow and pH monitoring and data logging computer, 19" monitor, network card, and control software suitable for use with Koyo PLC controller. Includes design, layout, startup and debugging of software for PLC interface. Includes graphical display of system functions, real time monitoring and data logging of system parameters. Software includes the following functions:

1.16.3 Multiple Screen display of MRIX and batch treatment system

1.16.4 Remote select of pump on/off

1.16.5 Flow and pH monitoring and data logging

1.16.6 Help screen access from individual display screens

1.16.7 Real time data from all logged processes with full immediate access to historical data

1.16.8 Complete access to all counter settings and realtime regeneration status and logging of regeneration cycles.

1.16.9 Process status and state of operation (tank fill, empty, state of regeneration, etc.)

1.16.10 Display of process times (time remaining, etc.)

1.16.11 Manual override of system operations (password)

1.16.12 Real time graphing and display of system operations (pH, flow, etc.)

1.16.13 Ultrasonic level controls for 2 tanks (buffer and regenerant).

1.16.14 Pressure sensor for the media filters

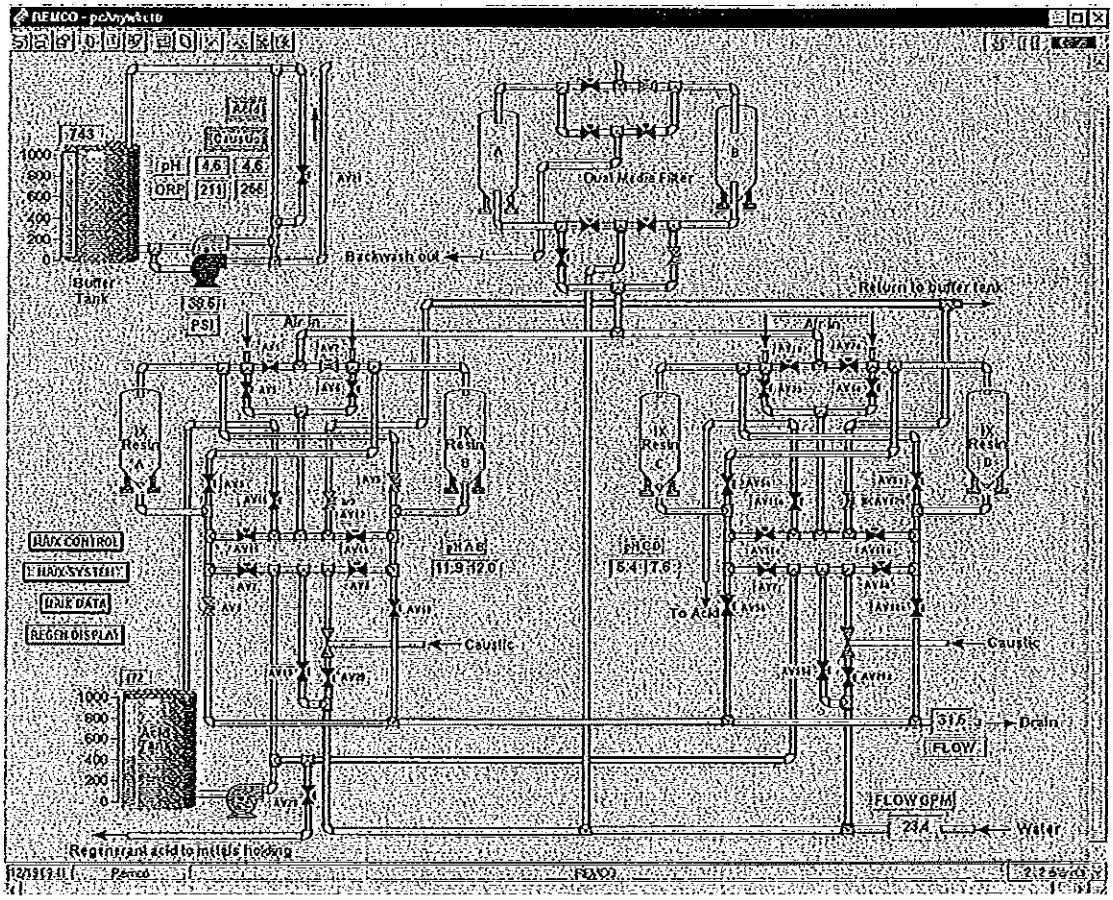



**Figure 6. System display screen. Color coded active devices and pipes.**

1.16.15 Allows Remco Engineering to monitor the systems operation via a phone dial-up connector or via the Internet. Requires direct connection to outside line passing in-house PBX or phone system. Joint use with fax line acceptable in most installations.

1.16.16 Includes upgraded controller,

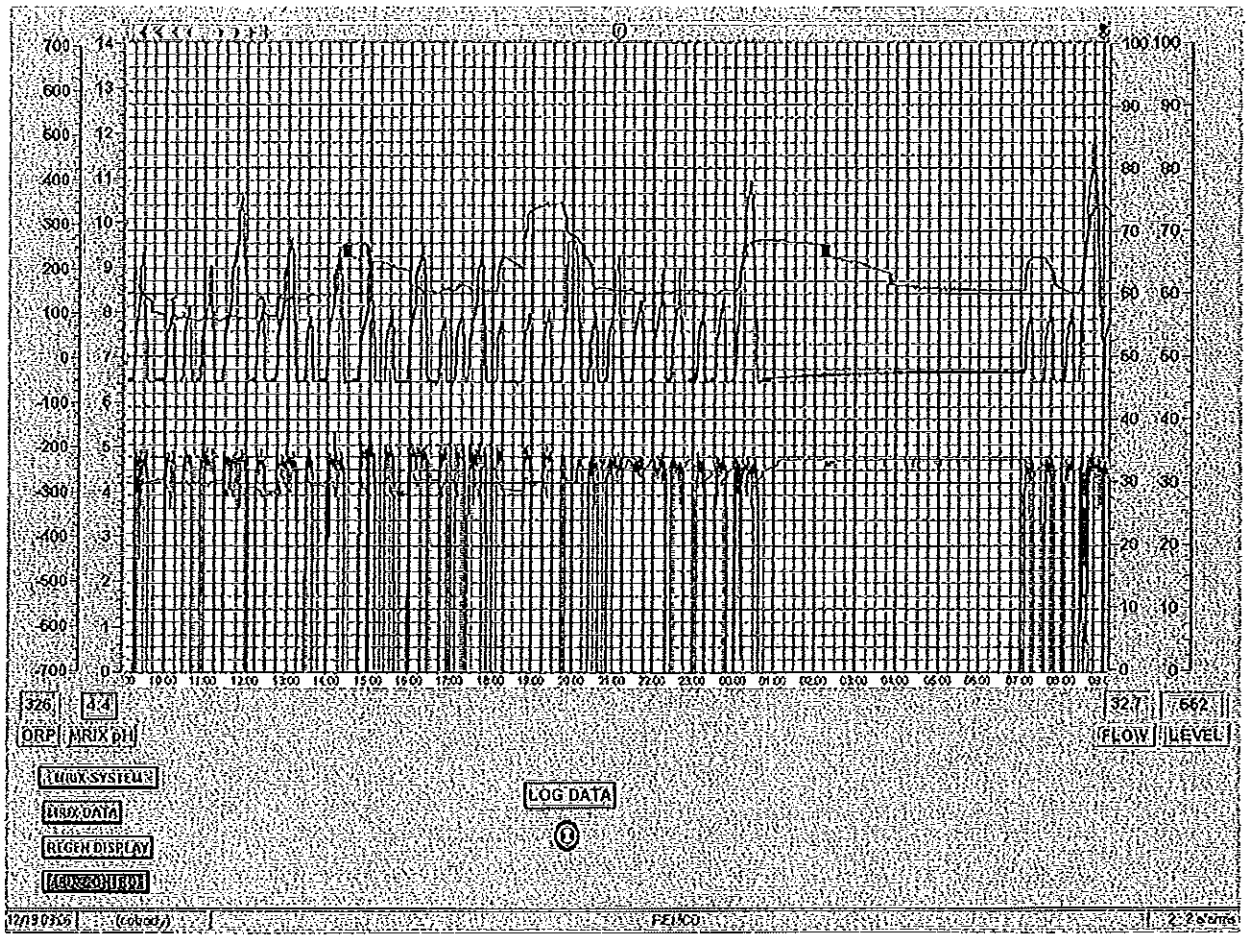



**Figure 7. Data Display screen with multiple data streams**

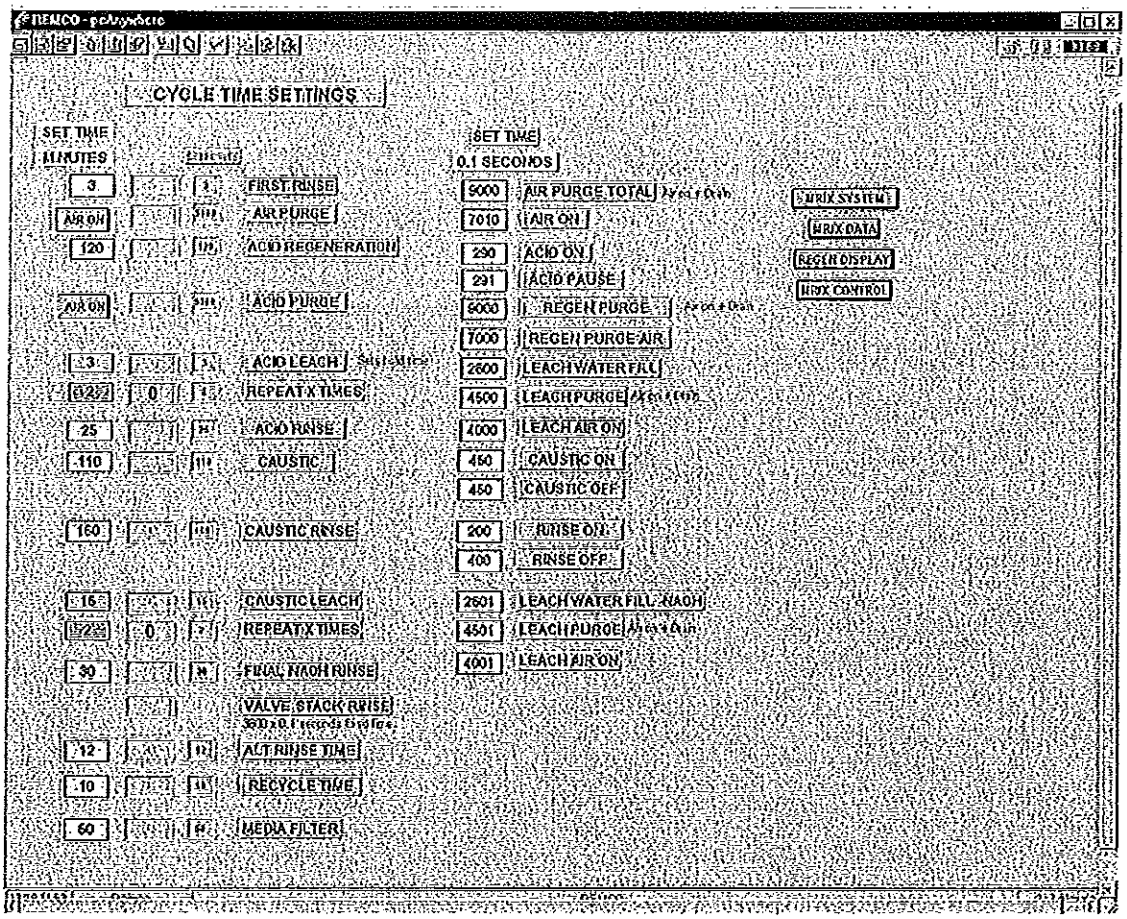



**Figure 8 Interactive Display screen for setting timers and counters**

## 2.0 INSTALLATION AND WARRANTY

### 2.1 Installation Assistance

2.1.1 Remco will provide five (5) man days for installation and commissioning assistance. Any additional days are extra and will be charged at the rate of $850 per man day.

2.1.2 Airfare, ground transportation, transfers, lodging, meals and other related out of pocket and administrative expenses are not included and will be billed separately.

### 2.2 Installation requirements

To enable a timely installation and start-up of the proposed system, it is the Owner's responsibility to:

1. Prepare the work site to permit the unloading, installation, testing and acceptance of the equipment.
2. Set the system in place.
3. Connect electrical, air and water to provided terminal points at the boundary of the system as required.
4. Remove and/or relocate any building obstructions, such as ducting, lighting fixtures and wiring, drains, piping, structural steel, electrical wiring, conduit, etc. which interfere with the equipment clearances.
5. Perform and accept responsibility for all excavations, drainage, pilings, foundations, masonry, and concrete work, concrete lining, steel, and other building modifications, which may be deemed necessary for the proper installation of the equipment.
6. Provide a free and clear work and installation area, with all existing equipment and inventory removed.
7. Maintain the work site in a watertight condition, and orderly state; free of debris and obstructions.
8. Collect and remove all packing materials from equipment shipping. Remco Engineering is responsible to maintain a clean work area and place trash in the Owner provided containers.

9. Provide access to and use of facilities, such as washrooms, lunchroom/cafeteria, telephones, copiers, and FAX machines for Remco Engineering employees and/or subcontractors.

10. Provide suitable electric current, lighting, compressed air, water, heat, precise power, and air drop locations, as required for the installation, testing, acceptance, and operation of the system. Materials and sizing details are to be provided by Remco Engineering on the detailed system design drawings. The Owner is to supply power drops from the plant power supply up to, and including, disconnects at each control panel so requiring.

11. Ensure that voltage supplies for the system's hardware and control devices not vary more than +/- 10%. Frequency variation must not exceed +/- 1%. Voltage supplies for the system's logic control hardware and software must be further refined by line conditioning. Unless otherwise provided for in the proposal, The customer is responsible for supplying clean and conditioned power to the previously listed logic controls equipment at +/- 5%. Frequency variations are not to exceed +/- 1%. Clean and conditioned power will ensure proper system operation and prevent the loss of data.

12. Provide any lighting fixtures and wiring, as required.

13. Provide any and all area guarding or barriers around the system.

14. Provide all 110-volt electrical utility outlets and wiring, as required.

15. Unload the trucks containing Remco Engineering products when they arrive.

16. Provide forklift availability for the duration of the installation.

17. Provide the necessary conduit and conductors from the main switch to the breaker panel located on each system.

18. Provide a ½" air line, complete with shut-off valve and regulator to the combo unit located the main control panel.

19. If required, obtain local city electrical code specifications and booklets for Remco Engineering.

20. If required, obtain any local permits so that electrical work on the equipment can be performed.

21. Hire a local electrician if required for installation.

## 2.3 Warranty and suggested spare parts kit (spare parts kit optional)

2.3.1 Limited one year parts warranty

2.3.2 Limited 90 day labor warranty

2.3.3 As an option, Remco Engineering can furnish a number of commissioning spares that have the highest potential of needing replacement. Include but not exclusive of:

2.3.3.1 Seal kits for each type of pump.

2.3.3.2 Rebuild kit for each type and size of diaphragm pump.

2.3.3.3 Air Solenoids, one of each size and type.

2.3.3.4 Column screen, top and bottom

2.3.3.5 Ultrasonic level transducer sensor, 1 each.

2.3.3.6 Relays, one of each type.

2.3.3.7 pH and ORP probe, 1 of each with one connecting cable.

2.3.3.8 Automatic valves, one of each type and size.

2.3.3.9 Check and ball valves, tru-union, one of each type and size.

2.3.3.10 Pressure sensor, one of each type and size.

The success of any system of this nature depends upon the customer assuming ownership of the system. It is critical to the success of the project that an individual is assigned to become the "owner" or "champion" of the system. This assigned individual must become intimately familiar with every detail of the system. It is not possible for Remco Engineering to anticipate every detail or potential procedural change in operation that this process may cause for the customer. While Remco Engineering is responsible for the training of customer personnel in the proper use of the system, it is the responsibility of the customer to successfully integrate the system into the their operation. On-going system management and adherence to disciplines is, and must be, the responsibility of the customer

## 2.4 Acceptance Test Plan

An acceptance test plan is necessary to define the conclusion of the project. This plan defines the criteria for Linebach and Funkhouser, Inc. acceptance of the system as well as the tasks necessary for Remco Engineering to supply as deliverables. The system is considered complete and accepted by Linebach and Funkhouser, Inc. when these tests and conditions are met. This is both in Linebach and Funkhouser, Inc. and Remco Engineering's best interest to mutually agree to these conditions at the beginning of the project.

Typically we work with a customer to mutually develop an Acceptance Test Plan, (ATP). We expect that this plan will be iterative and, ultimately reflect those items that are important to and specific to the contracted requirements of this project. We will be happy to meet with customer and work through any issues you may want to adjust.

Items that are generally covered in the ATP include:

- Mechanical System Elements.
- Verify system layout and installation per drawings
- Verify manual and/or automatic operation of the system
- Check for and fix all leaks
- General Mechanical Inspection. Inspect for:
    - Base installation.
    - Area clear of all construction debris, tools, ladders, extra parts, etc.

- General Electrical Inspection. Inspect for:
  - Loose or unattached connectors/wire ends.
  - Frayed cable/wire.
  - Proper installation of conduit, wire way, cabinets, and boxes.
  - Conductors entering cabinets and boxes protected from abrasion.
  - System properly grounded.
  - Safety labels in place.
- Performance Acceptance
  - System meets all effluent parameters 2 weeks after startup.
  - System runs smoothly in automated mode with no operator intervention required.
  - MRIX System regenerates efficiently and returns to compliance after regeneration.

## 3.0 TRAINING

Training of Linebach and Funkhouser, Inc. personnel is designed to be comprehensive and to cover all equipment supplied by Remco Engineering. The following categories of personnel will be trained. Items to be covered are listed below:

### 3.1 Supervisor/System Manager Training

- Description of manual and automatic operation.
- Hands on operation of MRIX system.
- Troubleshooting procedures
- Waste treatment theory and chemistry

### 3.2 Operator Training

It will be necessary for Linebach and Funkhouser, Inc. supervisors to take part in the training process. This is an important step because in the future day to day operation of the system, The customer's operators will look to the supervisors for assistance.

- Description of Operation.
- Overview of Mechanical Features.
- Hands on instruction and system walk through of controls.

### 3.3 Maintenance Training

- Description of operation
- Mechanical and Electrical features
- Schematics
- Documentation
- Routine preventative maintenance and adjustments
- Spare parts (Not included in price. This is an option)
- System walk through

## 4.0 SYSTEMS MAINTENANCE

Any system of this magnitude requires periodic and normal maintenance. A well-designed industrial product should be easy to maintain and work on. This principle applies not only to individual product but also to the interaction of that product with other elements of a system and to the overall system design. The Remco Engineering system design and products have several maintenance advantages.

**Periodic maintenance**

We recommend a periodic maintenance schedule. A Remco Engineering system has these items to check on this schedule:

- Calibrate sensors weekly
- Daily check for water leak and identify and repair immediately
- Follow maintenance check list issued with the system

# Appendix B

# Health and Safety Plan

**Linebach ▪ Funkhouser, Inc.**
*environmental compliance & consulting*

Project Number 100-02
Project Name Teck Cominco American

Bay Zinc – Moxee, Washington

# HEALTH AND SAFETY PLAN

## REVIEW AND APPROVAL

FIELD SAFETY COORDINATOR _____ 10/18/02
Date

PROJECT MANAGER/PRINCIPAL _____ 10/18/02
Date

**Responsibilities for Field Safety Coordinator:** Primary on-site contact for LFI's health and safety procedures during field activities. Has the authority to stop LFI operations if conditions are judged to be hazardous to on-site personnel or the public. Responsible for implementation of this health and safety plan.

## DATES OF PLANNED FIELD ACTIVITIES

Activities are scheduled to be performed the week of October 21, 2002 during normal business hours.

## EMERGENCY PHONE NUMBERS

| | |
|---|---|
| Hospital: | 911 (As attached) |
| Fire: | 911 |
| Police: | 911 |

** Verify emergency phone numbers and the location of nearest hospital prior to beginning work. Attach map to hospital if needed.*

## SITE INFORMATION

1. **Hazardous/Toxic Materials** (known or suspected)

   Chemical hazards associated with potential vapor inhalation and/or skin contact and skin absorption of zinc sulfate, lead, cadmium, and traces of wood preservatives are possible. However, previous sampling and monitoring activities indicate that airborne levels will

likely not present significant personnel exposure concerns. Anticipated contaminants of concern at the site include zinc sulfate, lead, cadmium and traces of wood preservatives (dioxin). Material Safety Data Sheets (MSDS's) for these chemicals are provided in this plan.

The planned activities are to remediate soil and groundwater and sample in areas surrounding the former and current zinc fertilizer manufacturing facilities/areas.

## 2. Hazard Assessment

The following hazard assessment is based on previous assessment activities and knowledge of historical facility operations. The known chemical hazards at this site include petroleum products, metals and traces of wood preservatives.

- **Chemical Hazards**

The known chemical hazards at this site include zinc sulfate, lead, cadmium and traces of wood preservatives (dioxin). Exposure limits and related information are presented below.

Exposure Limits:

| Material/Chemical Name | OSHA ACGIH PEL or TLV | Health and Safety Comments |
|---|---|---|
| Zinc Sulfate | Not Established | Inhalation/Ingestion/Eye Irritant/Skin Irritant |
| Lead | 0.05 $mg/m^3$ | Inhalation/Ingestion/Eye Irritant/Skin Irritant |
| Cadmium | 0.005 $mg/m^3$ | Inhalation/Ingestion/Eye Irritant/Skin Irritant |
| Wood Pres./Dioxin | Not Applicable | Inhalation/Skin Contact |

- **Operational Hazards**

Prior to commencement of field activities, the Field Safety Coordinator will conduct a site reconnaissance to identify any visible hazards, or operational hazards created from work activities. Physical hazards inherent to construction activities and power-operated equipment may exist.

➢ **Heat Stress**

Field activities in hot climates create a potential for heat stress. The warning symptoms of heat stress include fatigue; loss of strength; reduced accuracy, comprehension and retention; and reduced alertness and mental capacity. To prevent heat stress, personnel shall receive adequate water supplies and electrolyte replacement fluids, and maintain scheduled work/rest periods. Pulse rate and body temperature shall also be monitored as appropriate.

- **Cold Stress**

  Field activities in cold climates create a potential for cold stress. The warning symptoms of cold stress include reduced coordination, drowsiness, impaired judgment, fatigue, and numbing of the toes, fingers, nose and ears. To prevent cold stress, personnel shall wear appropriate clothing and maintain scheduled work/rest periods, with rest periods taken in a sheltered and heated location.

- **Tools and Equipment**

  Tools and equipment used by LFI shall be inspected prior to use, maintained in safe condition, and determined adequate for their designated use. Leather gloves shall be donned when using tools that are designed to cut or trim materials.

- **Noise Hazard**

  Operation of equipment may present a noise hazard to workers. Personnel will be provided with hearing protection for use when noise levels are excessive.

**3. Decontamination Activities**

All tools and equipment will be decontaminated using water, non-phosphate containing soap. Additionally, all sampling equipment will be decontaminated using all of the above plus a nitric acid solution rinse to ensure that contamination is not transported off-site.

## EMERGENCY PROCEDURES

In the event of personnel overexposure (i.e., skin contact, inhalation, ingestion), the following procedures shall be implemented.

**1. Skin Contact**

Remove any contaminated equipment and clothing. Thoroughly wash area with soap and water.

**2. Inhalation**

Move to fresh air, remove any respiratory protection equipment.

**3. Eye Contact**

Flush with water or eye wash solution for at least 15 minutes. Seek medical help if necessary.

**4. Ingestion**

Seek medical help if necessary.

**5. Personnel Injury**

A first aid kit shall be readily available in the case of an injury. Administer first aid and/or seek medial help if necessary. Medical emergencies take precedence over decontamination procedures. Know route to nearest telephone or on-site cellular telephone and medical facility. Maps to the nearest hospital are included in this plan.

**6. Potential or Actual Fire/Explosion**

If it is safe to do so, on-site personnel may use available fire fighting equipment to control or extinguish the fire, and remove or isolate materials which may contribute to the fire. Contact the fire department, project manager and/or client company officials as appropriate.

**7. Spill or Release of Hazardous Material**

Clean up, isolate or contain spill as appropriate. Contact emergency response personnel, project manger, and/or client company officials as appropriate.

| Contact: | Doug Linebach | Roy Funkhouser | Bill Johnston |
|---|---|---|---|
| Office: | 502-895-5009 | 502-895-5009 | 502-895-5009 |
| Home: | 502-244-6812 | 502-452-1407 | 502-458-2209 |

**8. Evacuation Procedures**

In the event of an emergency that requires an evacuation of the site, verbal instruction will be given by the Field Safety Coordinator to evacuate the area. Personnel will immediately exit the site to the predesignated upwind "clean" location. The Field Safety Coordinator will account for LFI personnel, and will advise personnel of further instruction if necessary. The Field Safety Coordinator will also advise responding off-site emergency personnel if necessary. Personnel shall not re-enter the site until the emergency conditions have been corrected, and the Field Safety Coordinator has authorized re-entry.

## WORK PROCEDURES

**1. Planned Field Activities**

The objectives of this remediation project include: soil excavation and confirmation sampling. Confirmation samples will be collected following removal of the impacted soils. Activities will also include installation of a groundwater treatment system

The sampling activities will be conducted under the direct supervision of LFI personnel using a subcontractor for trackhoe services.

All soils removed during excavation at the site will be disposed of and documented in an appropriate manner.

**2. Anticipated Site or Personnel Monitoring Procedures**

Work Zones will be delineated on the site with caution tape and traffic cones, and flow of site personnel among the zones will be controlled. The establishment of demarcated work zones will help ensure that personnel are properly protected against potential working hazards, and work activities and contamination are confined to the appropriate areas. The work zones established around the sampling activities will be communicated to all on-site personnel by the LFI representative. Dusty conditions will be controlled with water to prevent airborne contaminants.

Overall hazards are considered to be low with regard to site remediation activities. The primary hazards associated with the work activities at this site will be heavy equipment operations. The chemical hazards at this site are considered very low with minimal potential for personnel exposure, based on previous sampling and monitoring activities.

**Work Zone Perimeters Identified?:** Yes. Access to the excavation and sampling locations will be limited to authorized and trained personnel who have completed OSHA 40-hour and 8-hour Hazwoper refresher training, and medical monitoring requirements.

**Zones of Contamination Identified?:** Yes. The potential presence of soil and/or groundwater contamination has been assessed by LFI during investigation activities that have previously occurred on this site however, additional zones may be identified as remediation activities progress across the subject site.

**Work Limitations?:** Yes. All work will be conducted during daylight hours. Outside work activities will be suspended in the event of severe inclement weather or unforeseen field conditions.

**3. Protective Clothing and Equipment**

All personnel within the established work zone shall don level 'D' personal protective equipment (PPE). The level of PPE may be changed at any time by the Field Safety Coordinator based on observations made in the field or if other potentially dangerous situations are encountered. Leather gloves shall be donned when using tools designed to cut and trim materials.

**4. Decontamination Procedures**

- Personnel: Wash affected area with soap and water. If irritation, burning, or other discomfort occurs, contact a physician immediately.

- Equipment: Wash affected equipment using non-phosphate detergent, rinse with deionized water, and, if needed, utilize a dilute nitric acid rinse. Repeat if necessary.

## 5. Work Precautions

- The "buddy system" shall be enforced for field activities involving the potential overexposure to hazardous or toxic materials. Each person should observe their partner for symptoms of chemical over exposures, heat stress or cold stress, and provide assistance when warranted.

- Absolutely no eating, drinking, or using tobacco products, while on the site. Smoking is prohibited on Bay Zinc property.

- Women who know or suspect they are pregnant should consult with their Physician prior to performing duties on any site which may expose them to chemical agents.

- Barricades, traffic cones, orange/reflective vests, additional personnel or any other appropriate measures shall be employed to warn motorists and protect personnel at congested or heavy traffic sites.

- Wear gloves, steel-toed boots, and hard hats at applicable times while at the work site.

- Wash all exposed skin areas with soap and water before departing from the site.

- Remove and change any non-impervious clothing that becomes contaminated during site activities.

- Only enter authorized areas of the site, as directed by the Field Safety Coordinator.

- Confined spaces, trenches, or manholes shall not be entered without prior consent of the Project Manager or Principal, and then only after proper respiratory protection equipment is donned and entry permits are complete.

- Safety belts with lifelines shall be worn whenever there is a potential for falling off of an elevated work platform, equipment, tank, etc. For example, leaning over a wastewater treatment aeration basin to collect a sample.

- Use safe and secure procedures for sample storage and shipment.

## PERSONNEL AUTHORIZATION

By initialing and dating this form, the listed individual acknowledges that he/she has read and understands and will comply with the requirements of this Health and Safety Plan.

| | Name | Date |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

MSDS Number: C0070 * * * * * *Effective Date: 09/14/00* * * * * *Supercedes: 09/15/98*

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec:703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# CADMIUM, 1000 ug/mL (0.10% w/v)

## 1. Product Identification

**Synonyms:** Atomic Absorption Standard
**CAS No.:** Not applicable to mixtures.
**Molecular Weight:** Not applicable to mixtures.
**Chemical Formula:** Cd and HNO3 in H2O
**Product Codes:** 6924

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Cadmium | 7440-43-9 | < 1% | Yes |
| Nitric Acid | 7697-37-2 | 1 - 2% | Yes |
| Water | 7732-18-5 | 97 - 98% | No |

## 3. Hazards Identification

**Emergency Overview**

**DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE. MAY AFFECT RESPIRATORY SYSTEM, KIDNEYS, PROSTATE, AND BLOOD. CANCER HAZARD. CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.**

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

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Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

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**Potential Health Effects**

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Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The following hazards are for concentrated solutions. Hazards of less concentrated solutions may be reduced. Degree of hazard for reduced concentrations is not currently addressed in the available literature.

**Inhalation:**
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
**Ingestion:**
Corrosive! Swallowing can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
**Skin Contact:**
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
**Eye Contact:**
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
**Chronic Exposure:**
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid. Chronic exposure to cadmium, even at relatively low concentrations, may result in permanent damage to the kidney and lung, may damage the liver, may cause anemia, loss of smell, and increase risk of cancer of the lung and of the prostate.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders, or eye or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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# 4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
**Ingestion:**
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
**Skin Contact:**
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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## 5. Fire Fighting Measures

**Fire:**
Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
**Explosion:**
Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
**Fire Extinguishing Media:**
Use any means suitable for extinguishing surrounding fire.
**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

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## 7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
- OSHA Permissible Exposure Limit (PEL) -
For nitric acid:
2 ppm (TWA).
For cadmium, elemental and compounds:
0.005 mg/m3 (TWA); 0.0025 mg/m3 (Action Level); OSHA Cancer Hazard.

- ACGIH Threshold Limit Value (TLV) -
For nitric acid:
2 ppm (TWA); 4 ppm (STEL).
For cadmium, elemental and compounds (inhalable particulate):
0.01 mg/m3 (TWA), A2 - Suspected human carcinogen.
For cadmium, elemental and compounds (respirable fraction):
0.002 mg/m3 (TWA), A2 - Suspected human carcinogen.

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). Canister-type respirators using sorbents are ineffective. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
**Skin Protection:**
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as

needed in areas of unusual exposure to prevent skin contact.
**Eye Protection:**
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
**Other Control Measures:**
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing cadmium compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1027).

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## 9. Physical and Chemical Properties

**Appearance:**
Clear, colorless liquid.
**Odor:**
Odorless.
**Solubility:**
Soluble in water.
**Specific Gravity:**
No information found.
**pH:**
1.0 (0.1M HNO3)
**% Volatiles by volume @ 21C (70F):**
ca. 99
**Boiling Point:**
No information found.
**Melting Point:**
No information found.
**Vapor Density (Air=1):**
Not applicable.
**Vapor Pressure (mm Hg):**
Not applicable.
**Evaporation Rate (BuAc=1):**
No information found.

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## 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage.
**Hazardous Decomposition Products:**
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible

organics.
**Conditions to Avoid:**
Heat, flames, ignition sources and incompatibles.

## 11. Toxicological Information

**Toxicological Data:**
Nitric acid: Investigated as a mutagen and reproductive effector. Cadmium: Oral rat LD50 2330 mg/kg; Inhalation rat LC50 25 mg/m3/30M; Investigated as a tumorigen, mutagen and reproductive effector.

**Reproductive Toxicity:**
For cadmium: May damage the reproductive system.

**Carcinogenicity:**
For cadmium:
EPA / IRIS classification: Group B1 - Probable human carcinogen, limited human evidence.
Regulated by OSHA as a carcinogen.

--------\Cancer Lists\----------

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|
| Cadmium (7440-43-9) | Yes | No | 1 |
| Nitric Acid (7697-37-2) | No | No | None |
| Water (7732-18-5) | No | No | None |

## 12. Ecological Information

**Environmental Fate:**
No information found.
**Environmental Toxicity:**
No information found.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

**Domestic (Land, D.O.T.)**

**Proper Shipping Name:** CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
**Hazard Class:** 8
**UN/NA:** UN3264
Packing Group: III
**Information reported for product/size:** 500ML

**International (Water, I.M.O.)**

**Proper Shipping Name:** CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
**Hazard Class:** 8
**UN/NA:** UN3264
Packing Group: III
**Information reported for product/size:** 500ML

**International (Air, I.C.A.O.)**

**Proper Shipping Name:** CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
**Hazard Class:** 8
**UN/NA:** UN3264
Packing Group: III
**Information reported for product/size:** 500ML

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# 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Cadmium (7440-43-9) | Yes | Yes | No | Yes |
| Nitric Acid (7697-37-2) | Yes | Yes | Yes | Yes |
| Water (7732-18-5) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\----------

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Cadmium (7440-43-9) | Yes | Yes | No | Yes |
| Nitric Acid (7697-37-2) | Yes | Yes | No | Yes |
| Water (7732-18-5) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\----------

| Ingredient | -SARA 302- RQ | TPQ | -------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Cadmium (7440-43-9) | No | No | Yes | No |
| Nitric Acid (7697-37-2) | 1000 | 1000 | Yes | No |
| Water (7732-18-5) | No | No | No | No |

--------\Federal, State & International Regulations - Part 2\----------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Cadmium (7440-43-9) | 10 | No | No |
| Nitric Acid (7697-37-2) | 1000 | No | No |
| Water (7732-18-5) | No | No | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

**WARNING:**
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

**Australian Hazchem Code:** None allocated.
**Poison Schedule:** S6
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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# 16. Other Information

**NFPA Ratings:** Health: 3 Flammability: 0 Reactivity: 0
**Label Hazard Warning:**
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE. MAY AFFECT RESPIRATORY SYSTEM, KIDNEYS, PROSTATE, AND BLOOD. CANCER HAZARD. CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
**Label First Aid:**
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
**Product Use:**
Laboratory Reagent.
**Revision Information:**
MSDS Section(s) changed since last revision of document include: 8, 11.
**Disclaimer:**
**********

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide**

**to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.**

**********

**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **L2347** * * * * * *Effective Date: 11/02/01* * * * * *Supercedes: 11/17/99*

MSDS Material Safety Data Sheet

*From:* Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# LEAD METAL

## 1. Product Identification

**Synonyms:** Granular lead, pigment metal; C.I. 77575
**CAS No.:** 7439-92-1
**Molecular Weight:** 207.19
**Chemical Formula:** Pb
**Product Codes:**
J.T. Baker: 2256, 2266
Mallinckrodt: 5668

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Lead | 7439-92-1 | 95 - 100% | Yes |

## 3. Hazards Identification

**Emergency Overview**

**POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.**

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

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Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

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**Potential Health Effects**

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**Inhalation:**

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

**Ingestion:**

POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

**Skin Contact:**

Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

**Eye Contact:**

Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

**Chronic Exposure:**

Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

**Aggravation of Pre-existing Conditions:**

Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

---

## 4. First Aid Measures

**Inhalation:**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get

medical attention.
**Ingestion:**
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
**Skin Contact:**
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

## 5. Fire Fighting Measures

**Fire:**
Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.
**Explosion:**
Not considered to be an explosion hazard.
**Fire Extinguishing Media:**
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

---

## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

## 7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
For lead, metal and inorganic dusts and fumes, as Pb:
-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m3 (TWA)
For lead, elemental and inorganic compounds, as Pb:
-ACGIH Threshold Limit Value (TLV): 0.05 mg/m3 (TWA), A3 animal carcinogen
ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).
For lead, inorganic:
-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m3 (TWA)
**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
**Skin Protection:**
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
**Eye Protection:**
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.
**Other Control Measures:**
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

## 9. Physical and Chemical Properties

**Appearance:**
Small, white to blue-gray metallic shot or granules.
**Odor:**
Odorless.
**Solubility:**

Insoluble in water.
**Density:**
11.34
**pH:**
No information found.
**% Volatiles by volume @ 21C (70F):**
0
**Boiling Point:**
1740C (3164F)
**Melting Point:**
327.5C (622F)
**Vapor Density (Air=1):**
No information found.
**Vapor Pressure (mm Hg):**
1.77 @ 1000C (1832F)
**Evaporation Rate (BuAc=1):**
No information found.

---

## 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage.
**Hazardous Decomposition Products:**
Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.
**Conditions to Avoid:**
Heat, flames, ignition sources and incompatibles.

---

## 11. Toxicological Information

**Toxicological Data:**
Investigated as a tumorigen, mutagen, reproductive effector.
**Reproductive Toxicity:**
Lead and other smelter emissions are human reproductive hazards. (Chemical Council on Environmental Quality; Chemical Hazards to Human Reproduction, 1981).
**Carcinogenicity:**
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

--------\Cancer Lists\----------

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Lead (7439-92-1) | No | No | 2B |

## 12. Ecological Information

**Environmental Fate:**
When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.
**Environmental Toxicity:**
No information found.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

Not regulated.

## 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Lead (7439-92-1) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\----------

| | | --Canada-- | | |
|---|---|---|---|---|
| Ingredient | Korea | DSL | NDSL | Phil. |
| Lead (7439-92-1) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\----------

| | -SARA 302- | | ------SARA 313------ | |
|---|---|---|---|---|
| Ingredient | RQ | TPQ | List | Chemical Catg. |
| Lead (7439-92-1) | No | No | Yes | No |

--------\Federal, State & International Regulations - Part 2\----------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Lead (7439-92-1) | 10 | No | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

**WARNING:**
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

**Australian Hazchem Code:** None allocated.
**Poison Schedule:** S6
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

# 16. Other Information

**NFPA Ratings:** Health: 3 Flammability: 1 Reactivity: 0
**Label Hazard Warning:**
POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
**Label First Aid:**
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
**Product Use:**
Laboratory Reagent.
**Revision Information:**
MSDS Section(s) changed since last revision of document include: 8.
**Disclaimer:**
**********

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide**

**to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.**
**********

**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **Z0858** * * * * * *Effective Date: 11/02/01* * * * * *Supercedes: 11/17/99*

**MSDS** Material Safety Data Sheet

*From:* Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# ZINC METAL POWDER

## 1. Product Identification

**Synonyms:** Powdered zinc; blue powder; CI77945; CI Pigment Black 16
**CAS No.:** 7440-66-6
**Molecular Weight:** 65.37
**Chemical Formula:** Zn
**Product Codes:**
J.T. Baker: 4282
Mallinckrodt: 8681

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Zinc | 7440-66-6 | 96 - 97% | Yes |
| Zinc Oxide | 1314-13-2 | 0 - 3% | Yes |
| Lead | 7439-92-1 | 0 - 0.3% | Yes |

## 3. Hazards Identification

**Emergency Overview**

**WARNING! HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR. WATER REACTIVE. MAY AFFECT THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM (lead component).**

**J.T. Baker SAF-T-DATA(tm)** Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; CLASS D EXTINGUISHER
Storage Color Code: Orange (General Storage)

**Potential Health Effects**

**Inhalation:**
No adverse effects expected but dust may cause mechanical irritation. The effects may be expected to resemble those of inhaling an inert dust; possible difficulty in breathing, sneezing, coughing. When heated, the fumes are highly toxic and may cause fume fever.
**Ingestion:**
Extremely large oral dosages may produce gastrointestinal disturbances, due both to mechanical effects and the possibility of reaction with gastric juice to produce zinc chloride. Pain, stomach cramps and nausea could occur in aggravated cases.
**Skin Contact:**
May cause irritation.
**Eye Contact:**
May cause irritation.
**Chronic Exposure:**
No adverse health effects expected.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

## 4. First Aid Measures

**Inhalation:**
Remove to fresh air. Get medical attention for any breathing difficulty.
**Ingestion:**
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
**Skin Contact:**
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15

minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

## 5. Fire Fighting Measures

**Fire:**

Autoignition temperature: ca. 460C (ca. 860F)

The listed autoignition temperature is for Zinc powder (layer); dust cloud is ca. 680C (1255F). Zinc powder is not pyrophoric but will burn in air at elevated temperatures. Bulk dust in damp state may heat spontaneously and ignite on exposure to air. Releases flammable hydrogen gas upon contact with acids or alkali hydroxides. Contact with strong oxidizers may cause fire.

**Explosion:**

Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

**Fire Extinguishing Media:**

Smother with a suitable dry powder (sodium chloride, magnesium oxide, Met-L-X).

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

## 6. Accidental Release Measures

Remove all sources of ignition and provide mild ventilation in area of spill. Substance may be pyrophoric and self-ignite. Clean-up personnel require protective clothing, goggles and dust/mist respirators. Sweep or vacuum up the spill in a manner that does not disperse zinc powder in the air and place the zinc in a closed container for recovery or disposal.

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

## 7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

# 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
None for Zinc metal.
-OSHA Permissible Exposure Limit (PEL):
10 mg/m3 (TWA), for zinc oxide fume
-ACGIH Threshold Limit Value (TLV):
5 mg/m3 (TWA), 10 mg/m3 (STEL) for zinc oxide fume.

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece particulate respirator (NIOSH type N100 filters) may be worn for up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids. glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
**Skin Protection:**
Wear protective gloves and clean body-covering clothing.
**Eye Protection:**
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

# 9. Physical and Chemical Properties

**Appearance:**
Gray or bluish-gray powder.
**Odor:**
Odorless.
**Solubility:**
Insoluble in water.
**Density:**
7.14
**pH:**
No information found.
**% Volatiles by volume @ 21C (70F):**
0
**Boiling Point:**
907C (1665F)
**Melting Point:**
419C (786F)
**Vapor Density (Air=1):**
No information found.

**Vapor Pressure (mm Hg):**
1 @ 487C (909F)
**Evaporation Rate (BuAc=1):**
No information found.

---

## 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage. Moist zinc dust can react exothermically and ignite spontaneously in air.
**Hazardous Decomposition Products:**
Hydrogen in moist air, zinc oxide with oxygen at high temperature. Zinc metal, when melted, produces zinc vapor which oxidizes and condenses in air to form zinc fume.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
Zinc powder can react violently with water, sulfur and halogens. Dangerous or potentially dangerous with strong oxidizing agents, lower molecular weight chlorinated hydrocarbons, strong acids and alkalis.
**Conditions to Avoid:**
Heat, flames, ignition sources and incompatibles.

---

## 11. Toxicological Information

Zinc: Irritation skin, human: 300 ug/3D-I mild; investigated as a mutagen.

--------\Cancer Lists\----------

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|
| Zinc (7440-66-6) | No | No | None |
| Zinc Oxide (1314-13-2) | No | No | None |
| Lead (7439-92-1) | No | No | 2B |

---

## 12. Ecological Information

**Environmental Fate:**
No information found.
**Environmental Toxicity:**
No information found.

---

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

# 14. Transport Information

**International (Water, I.M.O.)**

**Proper Shipping Name:** ZINC POWDER, NON-PYROPHORIC
**Hazard Class:** 4.3, 4.2
**UN/NA:** UN1436
Packing Group: II
**Information reported for product/size:** 100LB

**International (Air, I.C.A.O.)**

**Proper Shipping Name:** ZINC POWDER, NON-PYROPHORIC
**Hazard Class:** 4.3, 4.2
**UN/NA:** UN1436
Packing Group: II
**Information reported for product/size:** 100LB

---

# 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Zinc (7440-66-6) | Yes | Yes | No | Yes |
| Zinc Oxide (1314-13-2) | Yes | Yes | Yes | Yes |
| Lead (7439-92-1) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\----------

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Zinc (7440-66-6) | Yes | Yes | No | Yes |
| Zinc Oxide (1314-13-2) | Yes | Yes | No | Yes |
| Lead (7439-92-1) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\----------

| Ingredient | -SARA 302- RQ | TPQ | -------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Zinc (7440-66-6) | No | No | Yes | No |
| Zinc Oxide (1314-13-2) | No | No | No | Zinc compoun |
| Lead (7439-92-1) | No | No | Yes | No |

--------\Federal, State & International Regulations - Part 2\----------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Zinc (7440-66-6) | 1000 | No | No |
| Zinc Oxide (1314-13-2) | No | No | No |
| Lead (7439-92-1) | 10 | No | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: Yes (Mixture / Solid)

**WARNING:**
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

**Australian Hazchem Code:** 4Y
**Poison Schedule:** S6
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

# 16. Other Information

**NFPA Ratings:** Health: 1 Flammability: 1 Reactivity: 1 Other: **Water reactive**
**Label Hazard Warning:**
WARNING! HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR. WATER REACTIVE. MAY AFFECT THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM (lead component).
**Label Precautions:**
Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Keep away from heat and flame.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
**Label First Aid:**
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.
**Product Use:**
Laboratory Reagent.
**Revision Information:**
MSDS Section(s) changed since last revision of document include: 8.
**Disclaimer:**
**********

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no**

**representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.**
**********

**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

# BAY ZINC COMPANY INC.

(509) 248-4911 or (800) 5431-4086
*FAX: (509) 248-4916*
P. O. Box 167, Moxee City Washington 98936
www.bayzinc.com

Liquid
Zinc Solutions

Dry
Zinc Granules


## MATERIAL SAFETY DATA SHEET

BLU-MIN® ZINC SULFATE MONOHYDRATE Revised: 06/01/02

SECTION I


Bay Zinc Company
301 W. Charron Road
P.O. Box 167
Moxee, Washington 98936

Phone: (509) 248-4911
FAX: (509) 248-4916


SECTION II -- INGREDIENTS

Zinc Sulfate Monohydrate $ZnSO_4 \cdot H_2O$
CAS Number 7446-20-0 UN# 3077
Zinc Sulfate Monohydrate TLV, PEL not established
Control as "nuisance dusts" (particulates not otherwise classified) at 10 mg/m$^3$ TWA.

SECTION III – PHYSICAL/CHEMICAL CHARACTERISTICS

BLU-MIN ZINC SULFATE MONOHYDRATE consists of colorless, odorless crystals and granules. Specific Gravity is 3.28 and Solubility is 48.9 g $ZnSO_4 \cdot H_2O$ at 105° C (221° F). At approximately 680° C (1256° F) sulfur trioxide is given off and above 930° C (1706° F) zinc oxide is formed.

SECTION IV – FIRE, EXPLOSION AND REACTIVITY DATA

BLU-MIN ZINC SULFATE MONOHYDRATE is not flammable or explosive. It is stable but will decompose in extreme heat. Use NIOSH/MSHA approved SCBA when fighting fire in an enclosed space and in the presence of BLU-MIN ZINC SULFATE MONOHYDRATE.

SECTION V – HEALTH HAZARD DATA

Routes of entry are via inhalation, ingestion and skin. Acute health hazards and symptoms may include irritation of eyes, skin and respiratory tract; breathing difficulty in form of dust; and irritation of mucous membranes. Swallowing may cause strong stomach cramps and diarrhea. Chronic health hazards include irritation and dermatitis. Zinc sulfate monohydrate is not noted as carcinogenic by NTP, IARC or OSHA.

continued

*Best Blu-Min Brand in the West*

SECTION V – HEALTH HAZARD DATA (continued)

**EMERGENCY FIRST AID:**

INHALATION: Remove to fresh air and seek medical help.

EYES: Flush with plenty of water for about 15 minutes and call a physician.

SKIN: Remove contaminated clothing, wash exposed area well.

INGESTION: If conscious, give plenty of water, seek medical help.

SECTION VI – PRECAUTIONS FOR SAFE HANDLING AND USE

Store in a clean dry area. In case of a spill, wear proper personal protection and sweep up or vacuum for proper disposal. Since the product will break down and dissolve in water, clean-up will be easier if kept dry. The best method of disposal is to use the material for its original intended use if possible. Otherwise, dispose of in accordance with all federal, state and local regulations.

SECTION VII – CONTROL MEASURES

Ventilate working area to maintain the TLV's and PEL's. For respiratory protection in a dusty environment, use a NIOSH/MSHA approved respirator; in an enclosed area use SCBA. Use eye protection and protective gloves as required. Other protective equipment that may be appropriate are an apron, eye-wash fountain and a safety shower.

END

# BAY ZINC COMPANY INC.

(509) 248-4911 or (800) 5431-4086
*FAX: (509) 248-4916*
P. O. Box 167, Moxee City Washington 98936
www.bayzinc.com

Liquid
Zinc Solutions

Dry
Zinc Granules


## MATERIAL SAFETY DATA SHEET

BLU-MIN® ZINC SULFATE MONOHYDRATE — Revised: 06/01/02

SECTION I


Bay Zinc Company
301 W. Charron Road
P.O. Box 167
Moxee, Washington 98936

Phone: (509) 248-4911
FAX: (509) 248-4916


SECTION II -- INGREDIENTS

Zinc Sulfate Monohydrate — $ZnSO_4 \cdot H_2O$
CAS Number 7446-20-0 — UN# 3077
Zinc Sulfate Monohydrate TLV, PEL not established
Control as "nuisance dusts" (particulates not otherwise classified) at 10 mg/m$^3$ TWA.

SECTION III – PHYSICAL/CHEMICAL CHARACTERISTICS

BLU-MIN ZINC SULFATE MONOHYDRATE consists of colorless, odorless crystals and granules. Specific Gravity is 3.28 and Solubility is 48.9 g $ZnSO_4 \cdot H_2O$ at 105° C (221° F). At approximately 680° C (1256° F) sulfur trioxide is given off and above 930° C (1706° F) zinc oxide is formed.

SECTION IV – FIRE, EXPLOSION AND REACTIVITY DATA

BLU-MIN ZINC SULFATE MONOHYDRATE is not flammable or explosive. It is stable but will decompose in extreme heat. Use NIOSH/MSHA approved SCBA when fighting fire in an enclosed space and in the presence of BLU-MIN ZINC SULFATE MONOHYDRATE.

SECTION V – HEALTH HAZARD DATA

Routes of entry are via inhalation, ingestion and skin. Acute health hazards and symptoms may include irritation of eyes, skin and respiratory tract; breathing difficulty in form of dust; and irritation of mucous membranes. Swallowing may cause strong stomach cramps and diarrhea. Chronic health hazards include irritation and dermatitis. Zinc sulfate monohydrate is not noted as carcinogenic by NTP, IARC or OSHA.

continued

SECTION V – HEALTH HAZARD DATA (continued)

**EMERGENCY FIRST AID:**

INHALATION: Remove to fresh air and seek medical help.

EYES: Flush with plenty of water for about 15 minutes and call a physician.

SKIN: Remove contaminated clothing, wash exposed area well.

INGESTION: If conscious, give plenty of water, seek medical help.

SECTION VI – PRECAUTIONS FOR SAFE HANDLING AND USE

Store in a clean dry area. In case of a spill, wear proper personal protection and sweep up or vacuum for proper disposal. Since the product will break down and dissolve in water, clean-up will be easier if kept dry. The best method of disposal is to use the material for its original intended use if possible. Otherwise, dispose of in accordance with all federal, state and local regulations.

SECTION VII – CONTROL MEASURES

Ventilate working area to maintain the TLV's and PEL's. For respiratory protection in a dusty environment, use a NIOSH/MSHA approved respirator; in an enclosed area use SCBA. Use eye protection and protective gloves as required. Other protective equipment that may be appropriate are an apron, eye-wash fountain and a safety shower.

END

MAPQUEST

< Back

SEND TO PRINTER

**FROM:**

**Moxee, WA**
**US**

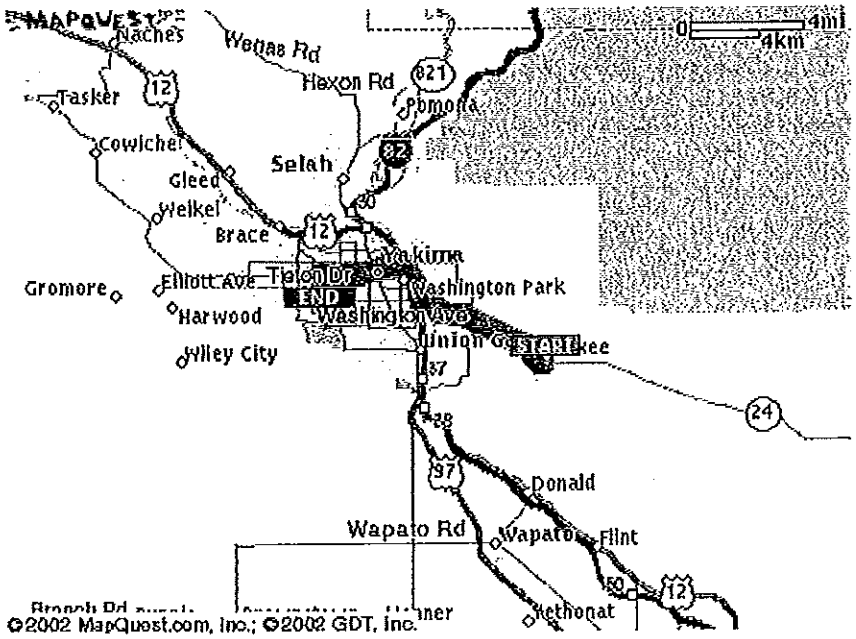
**TO:**

**2811 Tieton Dr**
**Yakima, WA**
**98902-3761 US**

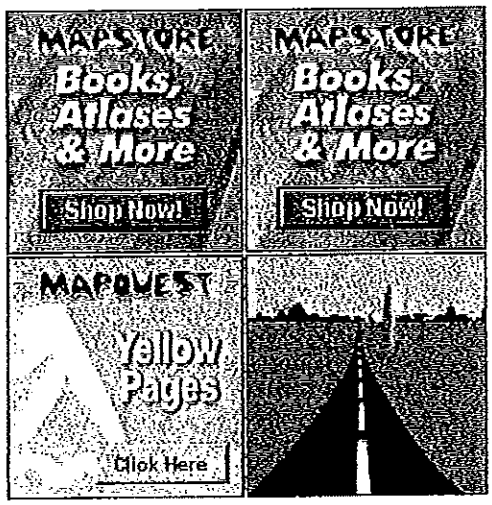
**Total Distance:** 9.66 miles

**Total Estimated Time:** 28 minutes

| DIRECTIONS | DISTANCE |
|---|---|
| ⚠ There are 0.30 miles between your starting location and the beginning of your driving directions. Use maps to get from your starting location to the beginning of your route. | |
| ⚠ There are 0.50 miles between the end of your directions and your destination. Use maps to get from the end of your route to your destination. | |
| **1:** Start out going Northwest on WA-24. | 5.11 miles |
| **2:** Take the I-82 W ramp. | 0.39 miles |
| **3:** Merge onto I-82 W. | 0.87 miles |
| **4:** Take the YAKIMA AVE exit- exit number 33- towards TERRACE HTS. | 0.10 miles |
| **5:** Keep LEFT at the fork in the ramp. | 0.49 miles |
| **6:** Merge onto E YAKIMA AVE. | 1.41 miles |
| **7:** E YAKIMA AVE becomes SUMMITVIEW AVE. | 1.29 miles |
| **Total Estimated Time:** **28 minutes** | **Total Distance:** **9.66 miles** |







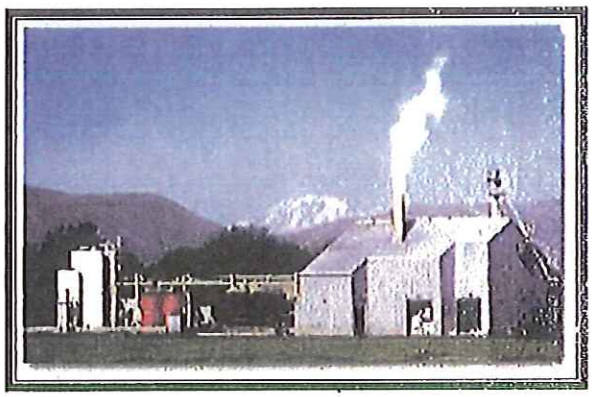

**ORIGIN:**
Moxee, WA
US

**DESTINATION:**
2811 Tieton Dr
Yakima, WA
98902-3761 US

Attachment D

2007 Site Management Plan

# SITE MANAGEMENT PLAN



**Bay Zinc Company, Inc. Facility**
**Moxee, Washington**

**Prepared by:**

Linebach ▫ Funkhouser, Inc.
*environmental compliance & consulting*

Linebach ▪ Funkhouser, Inc.
*environmental compliance & consulting*

February 5, 2007

Mr. Greg Caron
Site Manager - Hydrogeologist
Washington Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

*Re: Site Management Plan*
*Bay Zinc Company Facility*
*Moxee, Washington*
*Linebach Funkhouser Project Number 100-02*

Dear Mr. Caron:

Linebach Funkhouser, Inc. (LFI), consultant for the Bay Zinc Company, Inc. (Bay Zinc), has prepared the attached Site Management Plan (SMP) for the Bay Zinc facility in Moxee, Washington (i.e. the site). The SMP is a follow-up to the Cleanup Action Report for the site dated September 29, 2005, and is being submitted as a final component to completing the 2002 Agreed Order established between Bay Zinc and the Washington Department of Ecology (Ecology). Bay Zinc established the Agreed Order with Ecology largely to satisfy the requirements of a business transaction in which Bay Zinc was involved that pertained to the sale of certain assets of the facility.

The enclosed SMP is a revision to the August 22, 2006 SMP originally submitted to Ecology, and includes additions and clarifications requested by Ecology in a November 1, 2006 comment letter. As requested by Ecology, results from a landfill survey of the areas to be included in a Restrictive Covenant are included in Appendix D of the attached SMP.

In the November 1, 2006 letter, Ecology also requested that a groundwater monitoring plan be submitted to describe the mechanism for evaluating whether key constituents are continuing to migrate off-site. As requested by Ecology, that monitoring plan will be submitted under separate cover for Ecology's review, comment and approval.

As part of implementing the Agreed Order remediation activities, Bay Zinc:

- Excavated and disposed of over 12,320 tons of affected soil over a 3-year period from 10 different areas of the site.

114 Fairfax Avenue Louisville, KY 40207 (502) 895-5009 Fax (502) 895-4005

- Enhanced the existing groundwater remediation system and groundwater monitoring program that has been in operation at the site since 1985. As a component of Bay Zinc's Resource Conservation and Recovery Act (RCRA) permit, the requirement for groundwater remediation and monitoring was already independently established and underway approximately 18 years prior to the Agreed Order. Groundwater monitoring and remediation efforts will continue subsequent to termination of the 2002 Agreed Order. Over 3.5 million gallons of groundwater have been pumped since 2003, during the tenure of the Agreed Order alone.

- Conducted further assessment to delineate the boundaries of affected shallow backfill beneath asphalt paved areas on the south and east sides of the New Warehouse. These areas are included in the attached SMP.

In implementing the Agreed Order, since late 2002, Bay Zinc has invested in excess of $1.2 million to diligently implement soil and groundwater remediation work at the site.

LFI and Bay Zinc appreciate the input and assistance Ecology has provided during the course of implementing the Agreed Order and look forward to continuing to work with Ecology as groundwater remediation and monitoring efforts continue under the pre-existing regulatory program. Please contact the undersigned at 502-895-5009 if you have any questions about the enclosed SMP or the project in general.

Sincerely,

Bradley L. Coyle
Project Geologist

Roy V. Funkhouser, P.G.
Principal
Washington Certified Hydrogeologist No. 2090

cc: Richard Camp, Bay Zinc Company, Inc.
Lyle Beaudoin, Teck Cominco American Inc.

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# 1.0 INTRODUCTION

Bay Zinc Company, Inc. (Bay Zinc) operates a micronutrient fertilizer manufacturing facility in Moxee, Washington, approximately 6 miles east of Yakima (Figure 1). The facility covers approximately 11 acres. Property surrounding the Bay Zinc facility is used and zoned for light industry and agricultural purposes. Environmental assessment and remediation activities have been conducted at the site at various time periods since the 1980s.

In February, March and April of 2002, extensive environmental assessment work was conducted at the Bay Zinc property in association with a transaction involving certain assets of the facility. The work was conducted to evaluate soil and groundwater potentially affected by historic releases at the site. Assessment results were included in a June 13, 2002 *Remedial Investigation Report/Voluntary Cleanup Plan* (RI/VCP), prepared by Linebach Funkhouser, Inc. (LFI) and submitted to the Washington Department of Ecology (Ecology).

On August 30, 2002, an Agreed Order was established between Bay Zinc and the Washington Department of Ecology (Ecology) to address the aforementioned detections of constituents identified in the RI/VCP. Bay Zinc initiated the request for establishing the Agreed Order, which was a component of the aforementioned asset purchase. Following a public review period, the Agreed Order was approved and considered final by Ecology on October 8, 2002. The Agreed Order included by reference a *Cleanup Action Plan* (CAP) prepared by Ecology. The CAP included provisions for:

- Excavation and off-site disposal of soil from previously identified solid waste management units (SWMUs) and areas of concern (AOCs).
- Continued use of Bay Zinc's existing groundwater recovery system to control groundwater migration and remove affected water from the uppermost groundwater horizon.
- Installation of an ion-exchange groundwater treatment unit to enhance Bay Zinc's existing system, if necessary, to satisfy City of Moxee sewer discharge requirements.

- Quarterly groundwater monitoring with the possibility to revert to semi-annual monitoring after the first full calendar year of quarterly monitoring, based on the results and receipt of approval from Ecology.

Extensive excavation and off-site disposal of over 12,320 tons of affected soil was conducted between October 2002 and June 2005. A portion of the rail spur line and underlying affected soil was torn out and replaced. Enhancements to the groundwater recovery system were made in accordance with the Agreed Order in 2003, and voluntarily by Bay Zinc in 2005 above-and-beyond the Agreed Order requirements. Over 3.5 million gallons of groundwater have been pumped since 2003.

## 2.0 DESCRIPTION OF CURRENT CONDITIONS

A description of current environmental conditions at the site, serving as the basis for this SMP, is provided in the following sections.

### 2.1 Remaining Areas/Constituents of Concern – Soil

In implementing the Agreed Order, remedial activities were conducted in all of the general areas of the site that served as drivers of the environmental investigation and remedial activities conducted over the past several years. As described in detail in the September 29, 2005 *Cleanup Action Report* provided to Ecology, projected depths of excavation targeted by the Agreed Order in each of the SWMUs and AOCs were achieved, with excavation efforts actually exceeding the targeted depths in several of the areas. With respect to soil, Ecology's non-restricted use cleanup levels were achieved in all but the limited following areas:

- Certain grid blocks within a limited area of the Bone Yard Area (AOC-3). As can be seen in Appendix A of this document (Table 4), exceedences were for zinc only, and those exceedences were solely with regard to Ecology's conservative default risk-based level (570 mg/kg) for ecological receptors (i.e. no human receptor risk). Depth of impact in some of these remaining grids extends to approximately 6 feet.

- Certain grid blocks of limited extent along the Rail Spur Line (SWMU-1). As can be seen in Appendix A (Table 1), exceedences were for lead only. The limited

areas in which the exceedences (i.e. lead in excess of 220 mg/kg) occurred are now buried beneath a 2-foot thick cover of clean gravel backfill and the steel rails for the rail spur.

- Beneath a limited extent of paved areas south and north of the Warehouse and Storage Buildings, and select small isolated grid blocks west of the Warehouse (exceedences for zinc only). The depth of impact ranged from approximately 3 feet (cadmium and lead) to 5 feet (zinc). Confirmation sampling results are summarized in Appendix A (Tables 7 and 10).

A site map depicting the areas is provided in Figure 2.

## 2.2 Remaining Area/Constituents of Concern – Groundwater

Based on review of the data, LFI has developed the following summary and conclusions regarding groundwater at the site:

- Monitoring data continues to confirm that affects to groundwater at the site are limited to the shallow, uppermost groundwater horizon. Groundwater constituents of concern have historically been:

  - Zinc
  - Manganese
  - Cadmium
  - Sulfate
  - Chloride

  With the exception of cadmium, all of the groundwater constituents of concern are secondary drinking water constituents, whose presence in groundwater is generally of concern only from an aesthetic (taste, staining of fixtures, etc.) standpoint.

- Manganese is essentially the only constituent now being detected sitewide at a concentration exceeding its respective conservative cleanup goal. Individual constituents at concentrations exceeding cleanup goals are predominantly limited to certain wells in limited areas of the site.

- The highest overall levels of constituents in groundwater at the site are in:

  - Well MW-1B (southeast corner of the Boneyard).

  - Wells MW-2, MW-3, and MW-9 (around the Warehouse).

The interpreted area of affected shallow groundwater at the site is shown in Figure 3. This area has shown little, if any change since groundwater monitoring was initiated at the site over 20 years ago. The groundwater potentiometric surface (i.e. water table) at the site is relatively flat, with generally less than 2 feet of elevation difference across the entire width of the site. The flat water table and the silty nature of the uppermost groundwater horizon limits ongoing movement of the area of affected groundwater.

- Exceedences of groundwater cleanup goals appear to be largely confined within the facility boundaries. The only exceedences detected in downgradient off-site well MW-10 tend to be for manganese and sulfate. Again, manganese and sulfate are secondary drinking water constituents (listed for predominantly aesthetic purposes) that are known to naturally occur in excess of secondary drinking water standards in some areas of the shallow groundwater system around Moxee and Yakima. Manganese has occasionally been detected even at the upgradient well (MW-5) at a concentration exceeding its respective Secondary Drinking Water Standard.

  Erickson and Norton (1993) reported manganese concentrations in Yakima County ranging from 0.2 to 0.5 mg/l. Turney (1986) reported an elevated manganese concentration of 0.3 mg/l in the Yakima area. Manganese levels in groundwater in nearby Franklin County has been documented to range from less than 0.1 to 0.7 mg/l (Erickson and Norton, 1993). Based on the regional groundwater studies by Erickson and Norton (1993) and Turney (1986), wells MW-3, MW-8, and MW-9 are the only wells that have consistently shown detections of manganese at concentrations in excess of what can reasonably be interpreted as naturally occurring levels of manganese in the Yakima area.

  Larson (1993) reported that the Moxee Aquifer in the general area of the Bay Zinc site contains groundwater that exceeds Secondary Drinking Water Standards for specific conductance (700 umhos/cm). Chloride, sulfate and other inorganic parameters are common contributors to specific conductance (SpC). Larson documented the highest overall levels of SpC in the Moxee Aquifer to be in the Moxee area, decreasing downgradient toward the Yakima River.

## 3.0 PURPOSE

Bay Zinc has completed the significant work activities established in the Agreed Order, and would like to receive a Notice-of-Completion letter from Ecology with respect to that Agreed Order.

Despite Bay Zinc's substantial efforts, including a financial investment of over $1.2 million since 2002 in an attempt to reach conservative non-restricted use (clean closure) standards, the non-restricted use standards for soil in certain limited remaining areas of the site (and for groundwater in certain wells) could not be attained. Bay Zinc understands that the non-restricted use cleanup standards would have to be achieved to receive "No-Further-Action" (NFA) status from Ecology.

Further intensive efforts beyond those already expended by Bay Zinc in an attempt to achieve the conservative non-restricted use (NFA) standards at this point would provide diminishing returns and would significantly jeopardize the financial standing of Bay Zinc. Consequently, Bay Zinc is submitting this Site Management Plan to address remnant issues in support of the receipt of a Notice-of-Completion (rather than an NFA) with respect to the Agreed Order, with the understanding that the Notice-of-Completion will be associated with restricted-use of groundwater and soil in certain areas of the Site. These restrictions will be backed by a Restrictive Covenant.

## 4.0 PREVIOUS INVESTIGATIONS AND REMEDIATION ACTIVITIES

Details of past assessment and remediation activities at the Bay Zinc site are provided in various documents previously submitted to Ecology including:

Booz Allen & Hamilton. 2000. *Final RCRA Facility Assessment Report, Bay Zinc Company.* Prepared for USEPA Region 10, Seattle, WA. November 2000.

ERC, Inc. 1999. *Stormwater Runoff Control Plan.* Consulting report prepared for the Bay Zinc Company. April 1999.

ERC, Inc. 1993. *Waste Pile Closure Report.* Consulting report prepared for the Bay Zinc Company. February 1993.

John Mathes & Associates, Inc. 1989. *Remedial Action Plan Performance Evaluation Report.* Consulting report prepared for the Bay Zinc Company. August 1989.

Linebach Funkhouser, Inc. 2002. *Remedial Investigation Report/Voluntary Cleanup Plan.* Consulting report prepared for the Bay Zinc Company. June 2002.

Linebach Funkhouser, Inc. 2002. *Compliance Monitoring Plan.* Consulting report prepared for the Bay Zinc Company. October 2002.

Linebach Funkhouser, Inc. 2004. *Summary of Remediation Progress.* Consulting report prepared for the Bay Zinc Company. May 2004.

Linebach Funkhouser, Inc. 2005. *Summary of Groundwater Corrective Action Progress -2004.* Consulting report prepared for the Bay Zinc Company. April 2005.

Linebach Funkhouser, Inc. 2005. *Cleanup Action Report.* Consulting report prepared for the Bay Zinc Company. September 2005.

All of the above-referenced documents are on file at Ecology's Central Regional Office in Yakima, Washington, A general summary of previous environmental investigations and remediation activities with respect to the overall Agreed Order to which this SMP applies is provided in the following sections.

### 4.1 Pre-Agreed Order Activities

1988-1995

Bay Zinc submitted a RCRA Part B Permit Application in October of 1985 pertaining to an on-site waste pile, and in 1988 received a final Joint Permit for the Storage of Hazardous Waste from USEPA Region 10. In 1985, groundwater monitoring wells were installed and groundwater monitoring was initiated. Concentrations of sulfate, manganese, and zinc exceeding USEPA secondary maximum contaminant levels (Secondary MCLs) for drinking water were detected in certain wells. Secondary MCLs are generally regarded as aesthetic-based standards (i.e. established for staining of fixtures, taste components, etc.). Additionally, prior to 1985, the on-site pad for zinc sulfate reaction vessels was not fully contained. The lack of containment was also believed by Ecology to have potentially contributed constituents to groundwater. The aforementioned waste pile was also uncovered until 1986, when designed run-on and run-off controls were added.

In 1988, Bay Zinc submitted a *Preliminary Remedial Action Plan and Data Summary Report* to USEPA Region 10 and Ecology. The document included data from groundwater monitoring being conducted as part of Bay Zinc's RCRA permit. The Plan also called for the installation of two on-site extraction wells to address sulfate, manganese, and zinc detected in certain onsite monitoring wells at concentrations in excess of Secondary MCLs. The wells were installed to enhance the removal of the overall highest levels of the aforementioned constituents, and assist in the control of groundwater migration. Recovered groundwater was contained in an on-site holding tank, and used as process make-up water.

1992-1998

In 1992, the aforementioned waste pile was removed and properly disposed-of along with 571 tons of affected underlying soil. A *Waste Pile Closure Report* was submitted to Ecology in 1993, and subsequently approved. In November of 1998, as part of the removal of visible contamination from the Rail Spur Area, approximately 150 tons of additional soil and railroad ballast were excavated and properly disposed of.

1999-2000

In 1999, a *Stormwater Runoff Control Plan* was prepared for the site, following a site reconnaissance by Ecology and Bay Zinc representatives. The Stormwater Plan was prepared to address areas of observed surface contamination caused by stormwater runoff from asphalt and concrete areas of the facility. Nine areas of concern (AOCs) were identified in the Stormwater Plan. Bay Zinc subsequently installed stormwater collection basins and curbs along asphalt areas to re-direct stormwater.

In 2000, a contractor for USEPA Region 10 (Booz Allen & Hamilton) conducted a RCRA Facility Assessment (RFA) at the site and issued a *Final RCRA Facility Assessment Report*. The RFA identified 8 solid waste management units (SWMUs) and 10 AOCs. One AOC, a Loading/Unloading Area, was added to the 9 AOCs previously outlined in Bay Zinc's *Stormwater Runoff Control Plan*. The SWMUs and AOCs are listed as follows:

SWMUs

1. Rail Spur Area
2. Container Storage Area D
3. Rail Unloading Area/Waste Loading Chute
4. Storage Tanks A and B
5. Former Waste Pile
6. Generator Accumulation Area
7. Former Pickle Liquor Tank
8. Maintenance Shop Accumulation Area

AOCs

1. Railroad Gate
2. Along East Fence
3. Bone Yard
4. Near Edge of Access Road
5. Back Lot Fill Area
6. Runoff at North Edge of Asphalt
7. Western Fence Boundary
8. Western Runoff Area
9. Runoff Area Near Liquid Fertilizer Storage
10. Loading/Unloading Area

2002

In 2002, extensive sampling was conducted in each of the SWMUs and AOCs to assess the horizontal and vertical extent of affected subsurface material. Results were incorporated into an Agreed Order established to address remediation efforts associated with the SWMUs and AOCs, to be implemented by Bay Zinc.

### 4.2 Post-Agreed Order Activities

Following the formal approval of the Agreed Order in October of 2002, corrective action work was conducted in each of the aforementioned SWMUs and AOCs. In accordance with the provisions of the Agreed Order, over 12,320 tons of affected soil were excavated and properly disposed of.

Agreed Order targeted depths of excavation in each of the SWMUs and AOCs were achieved, with excavation efforts actually exceeding the targeted depths in several of the areas. With respect to soil, Ecology's non-restricted use cleanup levels were achieved in all but the following areas:

- Certain grid blocks within a limited area of the Bone Yard (AOC-3).
- Certain grid blocks of limited extent along the Rail Spur Line (SWMU-1).
- Beneath a limited extent of paved areas south and north of the Warehouse and East/West Storage Buildings, and select small isolated grid blocks west of the Warehouse.

The areas are shown in Figure 2. Tables from LFI's *Cleanup Action Report* containing confirmation sampling data on excavation depths and detected constituents are included in Appendix A.

As previously discussed, groundwater remediation efforts at the site have been underway since the late 1980s. Upgrades to the groundwater remediation system made in compliance with the Agreed Order, and more aggressive remediation efforts expended since 2003 appear to have had a limited positive effect in reducing overall levels of monitored constituents; however, after 20 years of ongoing groundwater remediation and monitoring activities, certain of the conservative non-restricted use cleanup standards listed in the Agreed Order, predominantly for the non-significant-health-risk secondary MCL constituents, have still not been able to be reached despite the stepped-up efforts.

## 5.0 CONCEPTUAL SITE MODEL

In the June 13, 2002 *Remedial Investigation Report/Voluntary Cleanup Plan* for the site, LFI presented a Conceptual Site Model (CSM). The CSM included LFI's interpretation of site conditions including the existing status, nature and extent of constituents in soil and groundwater at the site, and the geologic conditions affecting potential future exposure of these constituents to human health and the environment. The CSM was based on a review of a significant body of

historic data and reports pertaining to environmental investigations and regulatory activities at the site, several of which are listed in Section 3.0 of this SMP. Data collected since 2002 has further confirmed the general accuracy of LFI's CSM. Updates to the CSM pertaining to human health and the environment exposure issues, on which this SMP has been based, are presented in the following sections.

### 5.1 Source Areas

The three historic interpreted source areas at the site, described in the 2002 CSM, have now been addressed as follows and are no longer a significant threat to human health and the environment:

| Source | Remedy |
|---|---|
| • Historic Deposition of Constituents to Soil Via Stormwater Runoff Across Paved Areas | Between 2002 and 2005, over 12,000 tons of soil, affected predominantly by lead and to a lesser extent zinc and cadmium, in some areas to depths of approximately 6 feet, were excavated and properly disposed of off-site.<br><br>Curbing and sumps were installed in 2000 to control surface water runoff remain in place. |
| • Former Raw Material Waste Pile (SWMU-5) and Historic Spills of Zinc Sulfate Solution | The former Waste Pile was removed, affected soil excavated, and the area formally closed in accordance with Ecology regulations in 1993. The area is now capped with a storage building and concrete floor. |
| • Historic Releases of Constituents to Soil in Unpaved Areas of the Site Due to Past Product Handling and Housekeeping Procedures. | Virtually the entire area of the site in which active manufacturing and storage operations are conducted is now paved or within buildings. All product storage tanks are aboveground and situated above paved areas. |

There are no known remaining release source areas present at the site.

### 5.2 Site Geology/Hydrogeology

Site soils consist of silty sand and silty clay. The site has a gradual slope to the northwest. The region around Moxee is semi-arid, receiving approximately nine inches of rain per year. Two

irrigation canals (Moxee Drain and Roza Canel) are within one mile of the facility, but the canals only have water flows from March to October. The Yakima River, the primary drainage feature for the area, is more than a mile from the facility.

The uppermost groundwater horizon underlying the facility consists of silty sand to sandy silt. Depth to groundwater in this zone generally ranges from approximately 3 to 6 feet, depending on the season of year. The uppermost groundwater horizon extends to a depth of approximately 20 to 28 feet below ground surface (bgs). The uppermost zone is underlain by a silt and clay layer ranging in thickness from 15 to 17 feet which serves as an aquitard. A continuous gravel and sandy gravel unit underlies the silty clay aquitard and forms the lower aquifer at the site. The lower aquifer varies in thickness from 11 to 20 feet underneath the site. The lower aquifer in turn is underlain by a clay confining zone approximately 50-feet thick. A deep, confined aquifer in the Ellensburg formation underlies this confining zone at a depth of 90 to 160 feet below ground surface (bgs). The majority of the production water wells in the area are in the Ellensburg formation. Based on information provided in a *Remedial Action Plan Performance Evaluation* Report for the site prepared by John Mathes & Associates, Inc. (1989), the lower aquifer is the shallowest aquifer suitable for domestic and irrigation use.

The predominant direction of groundwater migration in the uppermost aquifer is west-northwest, following the general topography of the area. Based on long-term groundwater monitoring results, there is no significant downward vertical gradient between the uppermost groundwater horizon and the lower aquifer. Long-term groundwater monitoring results show that the lower aquifer has not been affected. Past studies have shown than the hydraulic conductivity of the uppermost groundwater horizon at the site is variable (reflecting the heterogeneity of the subsurface material), ranging from $4.5 \times 10^{-5}$ cm/sec to $7.8 \times 10^{-3}$ cm/sec.

## 6.0 EXPOSURE PATHWAY/RECEPTOR EVALUATION

The following discussion of exposure pathways, exposure points, and receptors identifies possible means and locations where human or other biotic receptors may come in contact with

constituents at the Site either now or at some point in the future. The purpose of this exposure pathway/receptor evaluation is to:

- Assess potential environmental risks, if any, remaining at the site.
- Provide a basis for establishing site management actions to assure that exposure pathways remain incomplete in the future.

An exposure pathway is the course a constituent takes from a source to an exposed receptor. According to the USEPA (1989), for a risk to be present at all, an exposure pathway must be considered *complete*. A complete exposure pathway must include *all* of the following:

- Source and Mechanism for Release
- Transport Medium
- Receptor at an Exposure Point
- Route of Uptake (e.g. ingestion)

### 6.1 Human Health Evaluation

As stated previously, the source of constituents detected in soil and groundwater at the site is believed to have been past releases of zinc associated with fertilizer manufacturing operations and former housekeeping practices associated with the storage of product raw materials. An evaluation of pathways and receptors is as follows.

Surface Water

There is no current complete exposure pathway with regard to surface water. The closest surface water bodies are irrigation canals, including an unnamed canal, the Moxee Drain, and the Roza Canal. The Moxee Drain and Roza Canal, considered surface waters under Washington State statutes, are located less than a mile from the facility. Water flows in these irrigation canals from March through October of each year. The Yakima River is more than one mile away from the site. Recent improvements to the facility aid in the collection of stormwater runoff from paved areas of the facility. Furthermore, the site is not within a 100-year floodplain. Therefore, the

potential for exposure of human or environmental receptors to constituents from the site via surface water is not likely.

Groundwater

There is no current complete exposure pathway with regard to groundwater. Assessment data indicate that the predominant constituents of concern in groundwater are considered by the USEPA as secondary parameters, regulated on the basis of cosmetic or aesthetic effects rather than health-based effects. USEPA has established secondary standards as a guideline for public water supply systems, but does not require public systems to comply. The area of affected groundwater is a relatively limited band extending through the north-central portion of the site (Figure 3). The direction of groundwater flow is westward across the site; however, the water table is relatively flat which limits significant migration. Affected groundwater is largely contained on-site. The depth to the uppermost groundwater horizon is approximately 4 feet.

The uppermost groundwater horizon is the affected zone of concern. There are no wells immediately downgradient of the site producing from the affected zone and no discharge of affected groundwater to a surface water body is occurring. A municipal supply well for the City of Moxee is located approximately 3,000 feet southeast of the site. A second municipal supply well is located more than 3,000 feet to the east of the facility. Because the predominant direction of groundwater movement in the uppermost aquifer is west-northwest, and the water table is relatively flat (resulting in a minimal rate of migration), the potential for constituents to migrate from underneath the site to these wells is unlikely.

Air

Air does not constitute a significant exposure pathway to human or ecological receptors. The primary potential exposure scenario via the air pathway would be wind dispersal of product or affected soil. Based on the detections of elevated concentrations of lead and zinc in soil (now removed) along ditch lines and adjacent to paved areas, historic stormwater runoff appears to have been the primary mechanism for the dispersal of constituents around the site. Over 12,000 tons of

affected soil were excavated and removed from the site as part of the Agreed Order, which further diminishes wind dispersal issues.

Soil

No complete exposure pathway with regard to soil currently exists. Over 12,000 tons of exposed surficial soil affected by elevated levels of lead, cadmium, and zinc at various locations of the property has been excavated and removed in concert with Bay Zinc's Agreed Order with Ecology. Soil beneath approximately 60 percent of the site, including limited areas of affected soil remaining near the Warehouse, is covered by pavement and buildings with slab concrete floors. The remedial investigation conducted in support of the aforementioned Agreed Order showed that the affected soil was predominantly limited to the site property and a few limited areas immediately adjacent to the property boundaries, which were subsequently excavated and removed.

Even prior to Bay Zinc's extensive soil removal efforts in 2002-2005, as stated in USEPA Region 10's 2000 RFA Report for the Bay Zinc site, "exposure of human or environmental receptors to hazardous materials in the surface soils onsite is unlikely due to a secured fence system that was installed around the entire site to prevent access." That secured fence system remains in place. While there is no current complete exposure pathway with regard to soil, a possible future complete exposure pathway to soil for on-site employees and possible future construction workers could be created if those workers happen to break through the pavement covering the limited area of remaining affected soil. Overall risk to employees and future construction workers would be nominal based on the limited number of constituents present, short-term exposures, and limited route of uptake (predominantly dermal contact) workers would be exposed to. Nonetheless, this SMP contains provisions to address this potential future exposure pathway.

### 6.2 Ecological Evaluation

As part of past work at the site, a State Environmental Policy Act (SEPA) checklist and a Simplified Terrestrial Ecological Evaluation (STEE) was completed in accordance with

Washington's Model Toxics Control Act (MTCA) requirements. Documentation regarding the SEPA checklist and the STEE was included in the *Remedial Investigation Report/Voluntary Cleanup Plan* for the site, dated June 13, 2002. Based on site sampling results and review of the SEPA checklist, even before the extensive remediation work conducted over the past 4 years was conducted, Ecology determined that the site did not present a risk to significant wildlife populations.

No threatened or endangered species exist on site. The site is completely fenced, and is an active manufacturing operation. Sixty percent of the site is covered by buildings, tanks, and pavement and extensive removal of affected surficial soil from unpaved areas of the site has been completed. The site is zoned for industrial use. Potential environmental receptors would be limited to those species common to industrial settings (predominantly birds and rodents).

## 7.0 SITE MANAGEMENT ACTIONS

As stated in Ecology's August 2002 *Cleanup Action Plan* for the Bay Zinc site, which was incorporated into the Agreed Order by reference, the overall remedial action objectives for the site were:

- Prevent exposure to contaminated soils and groundwater
- Reduce the potential for leaching of contaminants from soils into groundwater
- Prevent further migration of impacted groundwater

Bay Zinc believes these three Agreed Order objectives have been met as a result of the extensive soil removal work and upgrades to the groundwater recovery system at the site since 2002.

Despite Bay Zinc's substantial efforts, including a financial investment of over $1.2 million since 2002 in an attempt to reach conservative residential non-restricted property use standards as described in this SMP, the non-restricted property use closure standards for soil in certain remaining limited areas of the site, and for groundwater in certain wells were not able to be attained. Bay Zinc believes that further intensive efforts to achieve the residential clean-closure standards at this point would provide diminishing returns (particularly in light of the fact that the

site and surrounding areas are zoned for light industrial and agricultural use), and would significantly jeopardize the financial standing of the company. Bay Zinc understands that the clean closure unrestricted-use cleanup standards would have to be achieved to receive a "No-Further-Action" (NFA) classification from Ecology. Based on the results of intensive efforts since 2002 that show the current impracticability (and lack of risk-based need) of obtaining an NFA at this time, Bay Zinc wishes to move forward with the following actions to support receipt of a Notice-of-Completion with respect to the Agreed Order.

### 7.1 Soil

A Restrictive Covenant will be emplaced to support in-place management of the limited remaining areas of affected soil.

Warehouse

Areas of remaining affected soil beneath paved areas of the site, which includes most of the area around the Warehouse, will remain in place, with the existing pavement serving as a cover to effectively prohibit the occurrence of a complete exposure pathway. The excavated, unpaved strip adjacent to the west side of the Warehouse has already been lined with a geotextile fabric and backfilled with over 2 feet of clean fill to surface grade. No unauthorized excavation in these areas will be allowed. As described in a following subsection (7.4), pavement and clean backfill material serving as covers over the limited remaining areas of affected soil will be routinely inspected and repaired whenever these cover materials have been compromised, significantly deteriorated, or removed. A Health and Safety Plan for excavation workers who may potentially cut through the cover in the future will also be emplaced (Section 7.6).

Bone Yard

Zinc is the only constituent remaining at concentrations in excess of clean closure (No-Further-Action) standards in the Bone Yard (AOC-3). The remaining zinc levels are an order of magnitude less than human health-based screening levels USEPA and Ecology have established

as acceptable for residential property, but are higher than the default ecological-based cleanup standard Ecology is imposing. This limited area is not a suitable habitat for ecological receptors. Remaining affected limited grid blocks in the Bone Yard will be covered by a minimum of 1 foot of clean (non-contaminated) fill material and graded. If the area is to be paved, a minimum 6-inch layer of clean aggregate subgrade material will be added as a base for the asphalt/concrete pavement. The aforementioned Restrictive Covenant, Health and Safety Plan, and cover monitoring and maintenance procedures will apply to the applicable area of the Bone Yard.

Railspur

The lead in soil in the limited areas of the railspur line is at a depth greater than 1 foot, and is covered by railroad ballast, ties, and steel track. There is no complete exposure pathway, and no unauthorized excavation into these areas will be allowed. The aforementioned Restrictive Covenant, Health and Safety Plan, and monitoring/maintenance procedures will apply to the affected remaining areas.

### 7.2 Groundwater

Groundwater remediation and monitoring efforts have been ongoing at the site since 1985. There currently is redundancy with respect to regulatory programs that are driving the ongoing groundwater remediation efforts (i.e. the MTCA Agreed Order *and* Ecology's RCRA Program). Bay Zinc included an approach to groundwater issues in the Agreed Order of 2002 with a more intensive effort in mind to try to reach cleanup goals within a 3-year timeframe, and satisfy requirements of the aforementioned business transaction involving certain assets of the facility. While Bay Zinc met the overall level of effort requirements of the Agreed Order, the conservative nonrestrictive use drinking water standards were still not able to be met for certain constituents despite Bay Zinc's stepped-up efforts. Consequently, groundwater monitoring and remediation efforts will need to extend beyond the targeted 3-year timeframe of the Agreed Order. Bay Zinc will continue with groundwater monitoring and remediation efforts, as the company has since 1985, under the auspices of Ecology's hazardous waste program (which has had regulatory authority over groundwater actions at the site since 1985).

7.2.1 Recovery Well Operation

Groundwater recovery has been ongoing at the site since the late 1980s, independently of the 2002 Agreed Order. As part of Bay Zinc's historical RCRA compliance obligations, two groundwater pumping wells (MW-8 and MW-9) were installed at the site in 1988 to control groundwater migration and remove affected groundwater from the uppermost groundwater horizon. One of these two wells (MW-9) was never able to pump much more than 0.5 gallons per minute (gpm) from the silty uppermost groundwater horizon, and was not extensively used.

In 2005, Bay Zinc drilled two additional wells in an attempt to increase the pumping rate and enhance the rate of groundwater remediation. Bay Zinc will continue with groundwater remediation and monitoring efforts under the auspices of the existing historic RCRA obligations. LFI believes that over the 20 year time-frame of groundwater remediation at the site, the effectiveness of ongoing active groundwater remediation has reached asymptotic conditions and is producing diminishing returns. Now that source areas and significant areas of affected soil overlying the water table have been removed from the site, LFI believes that there is minimal potential for continued movement of the area of affected groundwater, regardless of whether aggressive pumping is conducted or not. LFI anticipates that a trial period of non-pumping will be instituted in 2007, with quarterly plume stability monitoring conducted to confirm asymptotic conditions and show that the area of affected groundwater is not moving. Bay Zinc will include details of future groundwater monitoring and the planned methodology for evaluating plume stability in a separate plan to be provided to Ecology for approval.

7.2.2 Groundwater Monitoring

Groundwater monitoring will continue to be conducted at the site under the auspices of Bay Zinc's RCRA permit, as it has since 1985. The existing monitoring well network will continue to be sampled in the same manner it currently is. As described in Section 7.2.1, a cessation of pumping will begin in 2007, followed by quarterly plume stability monitoring. If the plume is shown not to be stable, Bay Zinc will re-implement more aggressive remediation efforts. If the plume is shown to be stable, Bay Zinc will revert to semi-annual sampling, until closure

requirements under the existing permit are met. As mentioned in Section 7.2.1, details for proposed plume stability monitoring including the criteria to be used to demonstrate "stable" conditions will be provided to Ecology in a separate plan for review and approval.

### 7.3 Restrictive Covenant

A restrictive covenant will be filed with the appropriate City of Moxee/Yakima County government offices. The restrictive covenant will restrict the use of affected soils and groundwater beneath the site, and will assure that protections provided to human health and the environment are maintained.

### 7.4 Site Cover Monitoring and Maintenance

The purpose of site cover monitoring and maintenance will be to verify the integrity of site cover materials (asphalt/concrete pavement, clean backfill in unpaved areas), and to properly manage potentially impacted materials encountered during future maintenance or construction activities. Ongoing monitoring and maintenance will provide continued protection of human health and the environment by minimizing the potential for the creation of complete exposure pathways.

Annual site inspections will be made to verify the integrity of all site cover materials. Site inspections will be documented on an inspection checklist, included as Appendix B. A visual inspection will be made for the areas covered with clean fill for evidence of erosion or physical (excavation) damage to the soil cover. The inspection checklist forms will be submitted to Ecology following each annual inspection, documenting general site conditions as well as observed deficiencies. In the event that deficiencies are identified, Bay Zinc will describe any proposed or implemented corrective measures.

## 7.5 Utility Line Installation/Repairs/New Construction

Utility repairs or installations that stand to extend through site cover materials into affected soil in any of the restricted-use areas of the site shall be conducted in conformance with the standards set forth below.

- The contractor performing the work shall be informed of the content of the SMP and Health and Safety Plan by an authorized Bay Zinc representative.
- The SMP and associated Health and Safety implications will be included as a component of Bay Zinc's orientation and training program for new employees as well as contractors who may, through the nature of the their work onsite, come in contact with affected soil.
- Any affected soil that is excavated shall be separated and segregated from non-affected soil to the extent practicable. To the extent practicable, excavated affected soil shall be placed into plastic sheeting or an impervious surface and covered, or placed into a covered roll-off box.
- Upon completion of work, excavated affected soil from beneath the covered areas may be placed back into the original excavation from which the soil came, and the excavation restored as long as the restoration is in a manner consistent with the original site cover condition. If off-site disposal of excess affected soils is necessary, the soils shall be characterized for proper disposal at an accredited facility in accordance with the applicable regulations and the receiving facility's requirements. At a minimum, the pre-disposal analysis will likely include pH and metals analyzed by an accredited laboratory using USEPA's toxicity characteristic leachate procedure (i.e. TCLP Metals). Once laboratory results are received, those results should be provided to the disposal facility for completion of final disposal arrangements.

## 7.6 Health and Safety Plan

Workers potentially exposed in the future to affected soil beneath covered areas as part of site utility installation, new construction, or other improvements will be required to follow the Site Health and Safety Plan, included in Appendix C.

### 7.7 Reporting

As stated in Section 7.4, site cover maintenance and monitoring verification checklists with a description of significant work activities that affected the cover will be provided to Ecology on an annual basis. Groundwater monitoring reports will be submitted an annual basis in the same fashion that they currently are.

## 8.0 SCHEDULE

Implementation of this SMP will begin following receipt of approval from Ecology, and the filing of the Restrictive Covenant.

## 9.0 REFERENCES

Booz Allen & Hamilton. 2000. *Final RCRA Facility Assessment Report, Bay Zinc Company.* Prepared for USEPA Region 10, Seattle, WA. November 2000.

ERC, Inc. 1999. *Stormwater Runoff Control Plan.* Consulting report prepared for the Bay Zinc Company. April 1999.

ERC, Inc. 1993. *Waste Pile Closure Report.* Consulting report prepared for the Bay Zinc Company. February 1993.

Erickson, D. and D. Norton. 1990. *Washington State Agricultural Chemicals Pilot Study.* Washington State Department of Ecology.

John Mathes & Associates, Inc. 1989. *Remedial Action Plan Performance Evaluation Report.* Consulting report prepared for the Bay Zinc Company. August 1989.

Larson. A.G. 1993. *Pesticide Residues in the Moxee and Ahtanum Surficial Aquifer.* Washington State Department of Ecology. Water Body No. WA-37-1040GW.

Linebach Funkhouser, Inc. 2002. *Remedial Investigation Report/Voluntary Cleanup Plan.* Consulting report prepared for the Bay Zinc Company. June 2002.

Linebach Funkhouser, Inc. 2002. *Compliance Monitoring Plan.* Consulting report prepared for the Bay Zinc Company. October 2002.

Linebach Funkhouser, Inc. 2004. *Summary of Remediation Progress.* Consulting report prepared for the Bay Zinc Company. May 2004.

Linebach Funkhouser, Inc. 2005. *Summary of Groundwater Corrective Action Progress -2004.* Consulting report prepared for the Bay Zinc Company. April 2005.

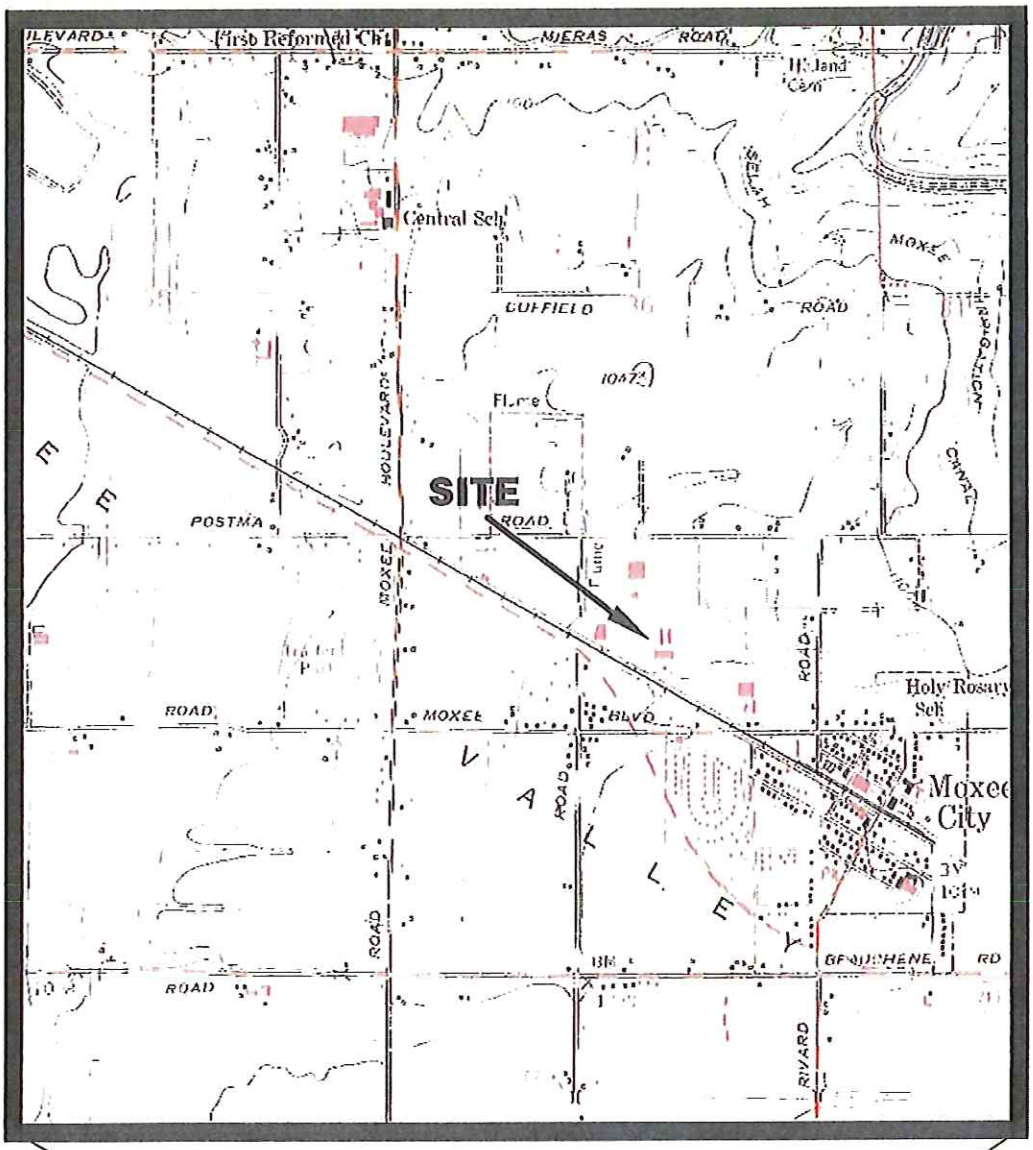
Linebach Funkhouser, Inc. 2005. *Cleanup Action Report.* Consulting report prepared for the Bay Zinc Company. September 2005.

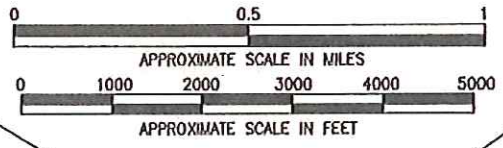
Turney, G.L. 1986. *Quality of Groundwater in Southeastern and South Central Washington.* U.S. Geological Survey Water Resources Investigation Report 84-4262.

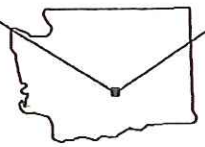
U.S. Environmental Protection Agency. 1989. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual.* Office of Emergency and Remedial Response Washington DC. EPA/540/1-89/002.

# Figures

SOURCE: U.S. GEOLOGICAL SURVEY; 7.5 MINUTE SERIES (TOPOGRAPHIC)
YAKIMA EAST QUADRANGLE, WASHINGTON; DATED 1985



BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON

Linebach Funkhouser, Inc.
*environmental compliance & consulting*

SITE LOCATION MAP

| PROJECT NO: | SCALE: | FILENAME: | FIGURE: |
|---|---|---|---|
| 100-02 | - | 10002-1C | 1 |
| | | PLOT DATE: 4/12/05 | |

# Appendix A

# Corrective Action Confirmation Soil Sampling Data Tables

**Table 1**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**SWMU-1: Container Storage Area C and Railspur Line**

**Container Storage Area C**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium Sample Depth (ft) | | Lead Sample Depth (ft) | | Zinc Sample Depth (ft) | | Dioxin Sample Depth (ft) | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 6 | 2 | 6 | 2 | 6 | 2 | 6 |
| SWMU-1-2 | 6 | 0.64 | ND | 389 | 11.5 | 5,039 | 293 | -- | 1.65 |
| SWMU-1-3 | 6 | ND | ND | 370 | 17.8 | 3,991 | 1,824 | -- | 0.03 |
| SWMU-1-4 | 4 | 1.61 | -- (a) | 81 | -- (a) | 2,184 | -- (a) | -- | 4.82 (a) |
| SWMU-1-5 | 4 | ND | -- (a) | 14.5 | -- (a) | 149 | -- (a) | -- | 0.05 (a) |
| Cleanup Standard | | 36 | | 220 | | 24,000 | | 5 | |

**Railspur Line**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | Lead | Zinc |
|---|---|---|---|---|
| SWMU-1-6 | 1.5 | 3.85 | ND | 8,857 |
| SWMU-1-7 | 1.5 | 9.81 | 145 | 15,031 |
| SWMU-1-8 | 1.5 | 11.6 | 228 | 8,135 |
| SWMU-1-9 | 1.5 | 16.4 | 418 | 7,513 |
| SWMU-1-10 | 1.5 | 22.8 | 59.6 | 6,288 |
| SWMU-1-11* | 1.5 | 12.8 | 184 | 10,352 |
| SWMU-1-12 | 1.5 | ND | 118 | 1,555 |
| SWMU-1-14 | 1.5 | 13.3 | 1,770 | 14,262 |
| Cleanup Standard | | 36 | 220 | 24,000 |

Note:
Samples collected on November 5-7, 2002.
All concentrations in milligrams per kilogram, except dioxin. Dioxin levels for SMWU-1-2 through SWMU-1-5 are parts per trillion total dioxin Toxic Equivalency Factor concentrations.
* SWMU-1-11 was blind duplicate sample of SWMU-1-10.
There was no sample labeled SWMU-1-13.
Samples along the Railspur Line were collected at depths approximately 1 to 1.5 feet below the base of the railroad ties.
-- Not sampled.
Depths listed are in feet below surface grade.
ND: Not detected at laboratory method detection limit.
(a) Sampling depth was 4 feet below surface grade.

**Table 2**
**Confirmation Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-1: Railroad Gate Area**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | | | Lead | | | Zinc | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (ft) | | | Sample Depth (ft) | | | Sample Depth (ft) | | |
| | | 1 | 1.5 | 2.5 | 1 | 1.5 | 2.5 | 1 | 1.5 | 2.5 |
| AOC-1-1 | 2.5 | 26.8 | 27.9 | 0.433 | 2,034 | 1,408 | 15 | 35,106 | 29,292 | 71.1 |
| AOC-1-2 | 2.5 | ND | ND | 8.4 | 52.9 | 229 | 11.4 | 4,846 | 6,976 | 9,300 |
| Cleanup Standard | | 36 | | | 220 | | | 24,000/570* | | |

Note:
Samples collected on December 12, 2002, July 16, 2004, and August 25, 2004.
All concentrations in milligrams per kilogram (mg/kg).
* If the zinc standard of 24,000 mg/kg is exceeded, Ecology has stipulated that a cleanup standard of 570 mg/kg zinc be met for no-further-action status.
Sampling depths shown are feet below original surface grade.
ND: Not detected at laboratory method detection limit.

**Table 3**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-2: East Fence Line**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | Lead | Zinc |
|---|---|---|---|---|
| AOC-2-1 | 0.5 | ND | 115 | 3,789 |
| AOC-2-2 | 0.5 | ND | 14.0 | 6,572 |
| AOC-2-3 | 0.5 | ND | 31.3 | 5,083 |
| AOC-2-4 | 0.5 | ND | 14.2 | 4,440 |
| AOC-2-5 | 0.5 | 6.47 | 33.5 | 4,430 |
| AOC-2-6 | 0.5 | ND | 31.8 | 1,177 |
| AOC-2-7 | 0.5 | ND | 24.4 | 181 |
| AOC-2-8 | 0.5 | ND | ND | 210 |
| AOC-2-9 | 0.5 | ND | ND | 132 |
| Cleanup Standard | | 36 | 220 | 24,000 |

Note:
Samples collected on November 14, 2002.
Samples collected at excavation depth of 0.5 feet below surface grade.
All concentrations in milligrams per kilogram.
ND: Not detected at laboratory method detection limit.

**Table 4**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-3: Bone Yard**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | Lead | | | | Zinc | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth (ft) | Sample Depth (ft) | | | | Sample Depth (ft) | | | | | | | |
| | | 1 | 1 | 1.5 | 2 | 2.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 |
| AOC-3-1 | 1 | 8.53 | 31.1 | -- | -- | -- | 2320 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-2 | 1 | 17.7 | 354 | 1.81 | -- | -- | 15400 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-3 | 1 | 1.08 | 16.9 | -- | -- | -- | 607 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-4 | 1 | 1.59 | 37.7 | -- | -- | -- | 909 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-5 | 1 | 0.963 | 14.7 | -- | -- | -- | 334 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-6 | 1.5 | 22.4 | 2710 | 59.5 | -- | -- | 84600 | 21800 | 123 | -- | -- | -- | -- | -- |
| AOC-3-7 | 1.5 | 13.3 | 915 | 81.5 | -- | -- | 14000 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-8 | 1 | 1.41 | 34.0 | -- | -- | -- | 740 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-9 | 1 | 2.45 | 125 | -- | -- | -- | 1050 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-10 | 2.5 | 18.6 | 6030 | 6520 | 1050 | 20.6 | 160000 | 114000 | 22100 | 7670 | 1500 | -- | -- | -- |
| AOC-3-11 | 2.5 | 12.8 | 2070 | 722 | 1800 | 12.5 | 44400 | 30000 | 20900 | 1240 | -- | 884 | 830 | -- |
| AOC-3-12 | 1.5 | 12.5 | 1700 | 169 | -- | -- | 24600 | 7650 | -- | -- | -- | 188 | -- | -- |
| AOC-3-13 | 1 | 6.41 | 197 | -- | -- | -- | 5440 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-14 | 2 | 30.2 | 5620 | 1460 | 79.8 | -- | 167000 | 64200 | 7350 | 3270 | -- | 108 | -- | -- |
| AOC-3-15 | 1.5 | 13.2 | 4070 | 185 | -- | -- | 172000 | 17900 | -- | -- | -- | 88.5 | -- | -- |
| AOC-3-16 | 1.5 | 4.87 | 282 | 170 | -- | -- | 7450 | -- | -- | -- | -- | -- | -- | -- |
| AOC-3-17 | 2 | 27.3 | 9170 | 448 | 203 | -- | 164000 | 24600 | 6760 | 2400 | -- | 119 | -- | -- |
| AOC-3-18 | 1.5 | 15.4 | 2010 | 32.4 | -- | -- | 85400 | 6710 | -- | -- | -- | 1580 | 773 | 8000 |
| AOC-3-19 | 1.5 | 12.6 | 1960 | 9.17 | -- | -- | 39000 | 4080 | -- | -- | -- | 1140 | 243 | -- |
| Cleanup Standard | | 36 | 220 | | | | 24,000/570* | | | | | | | |

Note:
Samples collected August 11-20, 2003, except for samples 3-1, 3-5, 3-9, and 3-13, which were collected on June 29, 2004.
All concentrations are in milligrams per kilogram (mg/kg).
* If the zinc standard of 24,000 mg/kg is exceeded, Ecology has stipulated that a cleanup standard of 570 mg/kg zinc be met for no-further-action status.
Sampling depths shown are feet below original surface grade.
-- Not sampled.

**Table 5**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-5: Back Lot Area**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium Sample Depth (ft) | | | Lead Sample Depth (ft) | | | Zinc Sample Depth (ft) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 | 1-3 | 4 | 0.5 | 1-3 | 4 | 0.5 | 1-3 | 4 |
| AOC-5-1 | 0.5 | 0.59 | -- | -- | 87.7 | -- | -- | 8697 | -- | -- |
| AOC-5-2 | 0.5 | ND | -- | -- | 69.1 | -- | -- | 5624 | -- | -- |
| AOC-5-3 | 0.5 | ND | -- | -- | 21.5 | -- | -- | 265 | -- | -- |
| AOC-5-4 | 1 | 12.5 | -- | -- | 253 | 16.8(a) | -- | 5139 | -- | -- |
| AOC-5-5** | 4 | 32.0 | -- | 0.56 | 836 | -- | 0.53 | 17107 | -- | 29.4 |
| AOC-5-6** | 4 | -- | -- | 0.64 | -- | -- | ND | -- | -- | 32.4 |
| AOC-5-7** | 4 | 16.2 | 10.3(b) | 0.52 | 258 | 812(b) | ND | 25450 | 6,640(b) | 30.1 |
| AOC-5-8** | 4 | ND | 32(b) | 0.81 | 15.0 | 5,340(b) | 0.55 | 6461 | 14900(b) | 174 |
| AOC-5-9 | 0.5 | ND | -- | -- | 29.1 | -- | -- | 219 | -- | -- |
| AOC-5-10 | 1 | 81.8 | ND(a) | -- | 1855 | ND(a) | -- | 16629 | 573(a) | -- |
| AOC-5-11** | 4 | 21.1 | 40.7(b) | 1.99 | 1759 | 2080(b) | 47.5 | 12027 | 10000(b) | 936 |
| AOC-5-12** | 4 | -- | 39.3(b) | 0.73 | -- | 1880(b) | 0.86 | -- | 17900(b) | 36.9 |
| AOC-5-13** | 4 | -- | 8.49(b) | 2.19 | -- | 949(b) | 2.69 | -- | 6500(b) | 56.8 |
| AOC-5-14** | 4 | -- | 17.9(b) | 2.07 | -- | -- | 5.43 | -- | -- | 63.6 |
| AOC-5-15*** | 0.5 | ND | -- | -- | ND | -- | -- | 94.3 | -- | -- |
| AOC-5-16 | 0.5 | ND | -- | -- | 132 | -- | -- | 1990 | -- | -- |
| AOC-5-17 | 0.5 | ND | -- | -- | 30.3 | -- | -- | 303 | -- | -- |
| AOC-5-18 | 3 | -- | 232(b) | 1.62(c) | -- | 7190 | 3.32(c) | -- | 246000(b) | 142(c) |
| AOC-5-19 | 3 | -- | 52.6(b) | 0.99(c) | -- | 3970(b) | 3.85(c) | -- | 29300(b) | 30.4(c) |
| AOC-5-20 | 3 | -- | 57.1(b) | 4.49(c) | -- | 4990(b) | 15.0(c) | -- | 3000(b) | 563(c) |

**Table 5 -- Continued**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-5: Back Lot Area**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium Sample Depth (ft) | | | Lead Sample Depth (ft) | | | Zinc Sample Depth (ft) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 | 1-3 | 4 | 0.5 | 1-3 | 4 | 0.5 | 1-3 | 4 |
| AOC-5-21 | 3 | -- | 4.91(b) | 1.94(c) | -- | 224(b) | 4.16(c) | -- | 1520(b) | 84.1(c) |
| AOC-5-22 | 1 | 10.7 | -- | -- | 1261 | 86.7 | -- | 19200 | 9286 | -- |
| AOC-5-23 | 1 | ND | -- | -- | 386 | 44.6 | -- | 7400 | 479 | -- |
| AOC-5-24 | 1 | ND | -- | -- | 341 | 65.2 | -- | 4990 | 1240 | -- |
| Cleanup Standard | | 36 | | | 220 | | | 24,000/570* | | |

Note:
Samples collected April 29 – May 28, 2003, November 4, 2003, and August 25, 2004.
All concentrations are in milligrams per kilogram (mg/kg).
ND: Not detected at laboratory method detection limit.
* If the zinc standard of 24,000 mg/kg is exceeded, Ecology has stipulated that a cleanup level of 570 mg/kg be met for no-further-action status.
** Total excavation depth from top surface of grid block area covered by historic backfill was approximately 4 feet.
*** Represents portion of the grid block not covered by historic backfill. AOC-5-14 results are also considered to be representative of limited area of backfill stockpile on grid block AOC-5-15.
Depths listed are in feet below original surface grade.
-- Not Applicable/Not Sampled
(a) 1 foot sampling depth
(b) 2 foot sampling depth
(c) 3 foot sampling depth

**Table 6**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**SWMU-6: Mud Wash Area**

| Sampling Location | Excavation Depth (ft) | Cadmium Sample Depth (ft) | | Lead Sample Depth (ft) | | Zinc Sample Depth (ft) | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 1 | 2 | 1 | 2 |
| SWMU 6-2 (E) | 2 | 4.1 | 1.1 | 261 | 2.54 | 1900 | 36.2 |
| SWMU 6-1 (W) | 1 | 1.3 | -- | 25 | -- | 450 | -- |
| Cleanup Standard | | 36 | | 220 | | 24,000 | |

Notes:
Samples collected on July 15, 2004 and August 12, 2004
All concentrations in milligrams per kilogram (mg/kg)
Sampling depths shown are feet below original surface grade
-- Not applicable/not sampled

**Table 7 (page 1 of 3)**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-7/AOC-8 and West Side of Warehouse**

**AOC-7: West-Central Fence Line**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | Lead | Zinc |
|---|---|---|---|---|
| AOC-7-1 | 0.5 | ND | 12.3 | 97.8 |
| AOC-7-2 | 0.5 | ND | 12.9 | 149 |
| AOC-7-3 | 0.5 | ND | 65.9 | 95.4 |
| AOC-7-4 | 0.5 | ND | 124 | 1607 |
| AOC-7-5 | 0.5 | ND | 12.5 | 236 |
| AOC-7-6 | 0.5 | ND | 10.8 | 124 |
| 7-6 Duplicate | 0.5 | ND | 11.1 | 75.9 |
| AOC-7-7 | 0.5 | ND | 11.6 | 134 |
| Cleanup Standard | | 36 | 220 | 24,000 |

Note:
Samples collected on November 19, 2002.
Samples collected at excavation depth of 0.5 feet below surface grade.
All concentrations in milligrams per kilogram.
ND – Not detected at laboratory method detection limit.
Duplicate – Blind duplicate sample.

**Table 7 (page 2 of 3)**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-7/AOC-8 and West Side of Warehouse**

**AOC-8: Southwest Fence Line**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium | Lead | Zinc |
|---|---|---|---|---|
| AOC-8-1 | 0.5 | ND | 11.4 | 656 |
| AOC-8-2 | 0.5 | 8.89 | 22.8 | 1379 |
| AOC-8-3 | 0.5 | 5.39 | 13.2 | 2038 |
| AOC-8-4 | 0.5 | ND | 120 | 988 |
| AOC-8-5 | 0.5 | 6.22 | 38.4 | 1099 |
| AOC-8-6 | 0.5 | 0.34 | 20.6 | 758 |
| AOC-8-7 | 0.5 | ND | 56.9 | 819 |
| 8-7 Duplicate | 0.5 | ND | 57.6 | 838 |
| AOC-8-8 | 0.5 | 2.44 | 216 | 2405 |
| AOC-8-9 | 0.5 | 20.6 | 190 | 5882 |
| AOC-8-10 | 0.5 | 6.41 | 150 | 4033 |
| Cleanup Standard | | 36 | 220 | 24,000 |

Note:
Samples collected on November 19, 2002.
Samples collected at excavation depth of 0.5 feet below surface grade.
All concentrations in milligrams per kilogram.
ND – Not detected at laboratory method detection limit.
Duplicate – Blind duplicate sample.

**Table 7 (page 3 of 3)**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-7/AOC-8 and West Side of Warehouse**

**West Side of Warehouse**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium Sample Depth (ft) | | | | | | Lead Sample Depth (ft) | | | | | | Zinc Sample Depth (ft) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 |
| WH-1 | 3 | 3.14 | 0.81 | ND | 82.7 | 117 | 1.57 | 845 | 520 | 57.5 | 9885 | 12900 | 35.5 | 4854 | 2913 | 408 | 50843 | 47200 | 263 |
| WH-2 | 3 | 17.7 | 5.07 | 6.10 | 52.8 | 41.2 | 4.94 | 1590 | 783 | 1184 | 5065 | 51.0 | 38.7 | 8640 | 5548 | 6044 | 27440 | 3660 | 487 |
| WH-3 | 3 | 3.87 | 14.1 | ND | 48.7 | 73.7 | 1.23 | 557 | 1414 | 348 | 4303 | 1070 | 13.0 | 3578 | 6639 | 1003 | 24180 | 10600 | 94.0 |
| WH-4 | 3 | ND | 1.52 | ND | 28.2 | 85.3 | 4.67 | 289 | 534 | 39.1 | 5575 | 1990 | 26.1 | 2340 | 3230 | 1034 | 22059 | 11600 | 453 |
| WH-5 | 3 | 1.23 | 0.26 | 25.1 | 118 | 73.9 | 5.45 | 545 | 479 | 2368 | 5816 | 301 | 175 | 3804 | 2893 | 12970 | 32575 | 6270 | 1080 |
| WH-6 | 3 | ND | 7.96 | 34.2 | 88 | 37.2 | 13.1 | 399 | 3082 | 5082 | 834 | 109 | 107 | 2480 | 12366 | 22718 | 16734 | 3880 | 2010 |
| WH-6 Dupe | 3 | ND | -- | -- | -- | -- | -- | 336 | -- | -- | -- | -- | -- | 2245 | -- | -- | -- | -- | -- |
| WH-7 | 3 | 1.15 | 23.5 | 30.7 | 178 | 34.5 | 22.0 | 634 | 6138 | 8603 | 39.7 | 659 | 18.6 | 3290 | 27072 | 34203 | 17136 | 4760 | 2140 |
| WH-7 Dupe | 3 | -- | -- | -- | -- | -- | 17.2 | -- | -- | -- | -- | -- | 15.7 | -- | -- | -- | -- | -- | 1800 |
| WH-8 | 3 | 3.30 | 26.8 | 12.2 | 27.8 | 19.2 | -- | 789 | 4215 | 755 | 30.3 | 19.2 | -- | 5223 | 28056 | 4968 | 3766 | 2090 | -- |
| WH-8 Dupe | 3 | -- | 29.8 | -- | -- | -- | -- | -- | 5550 | -- | -- | -- | -- | -- | 31646 | -- | -- | -- | -- |
| WH-9 | 3 | 53.1 | 26.9 | 26.5 | 64.1 | 9.55 | -- | 589 | 3026 | 430 | 78.4 | 43.7 | -- | 6800 | 15456 | 5182 | 9067 | 1170 | -- |
| Cleanup Standard | | 36 | | | | | | 220 | | | | | | 24,000/570* | | | | | |

Note:
Samples collected December 5-12, 2002; July 22-24, 2003.
All concentrations in milligrams per kilogram (mg/kg).
Sampling depths shown are feet below surface grade.
ND – not detected at laboratory method detection limit.
Dupe – Blind duplicate sample.
-- - not analyzed.
* If the zinc standard of 24,000 mg/kg is exceeded, Ecology has stipulated that a cleanup standard of 570 mg/kg zinc be met for no-further-action status.

**Table 8**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**AOC-10/NB-1: Areas East and South of the "New Building"**

| Sampling Location | Excavation Depth (ft) | Cadmium | Lead | Zinc |
|---|---|---|---|---|
| | | Sample Depth (ft) | Sample Depth (ft) | Sample Depth (ft) |
| | | 4 | 4 | 4 |
| NB-1-1 (West) Wall | 4 | 4.4 | 5.04 | 2,700 |
| NB-1-1 (West) Floor | 4 | 7.4 | 3.42 | 4,400 |
| NB-1-2 (East) Wall | 4 | 9.5 | 4.85 | 5,000 |
| NE-1-2 (East) Floor | 4 | 17 | 4.90 | 5,600 |
| AOC-10-1 (West) Wall | 4 | 0.57 | 3.74 | 29 |
| AOC-10-1 (West) Floor | 4 | 1.1 | 5.42 | 32 |
| AOC-10-2 (East) Wall | 4 | 0.87 | 4.45 | 27 |
| AOC-10-2 (East) Floor | 4 | 0.96 | 5.23 | 31 |
| Cleanup Standard | | 36 | 220 | 24,000 |

Notes:
Samples collected July 17, 2004
All concentrations in milligrams per kilogram
Depths listed are feet below base of asphalt surface pavement

**Table 9**
**Confirmation Soil Sampling Results**
**Bay Zinc Facility – Moxee, WA**
**Southern Property Line**

| Sampling Location | Grid Block Excavation Depth (ft) | Cadmium Sample Depth (ft) | | Lead Sample Depth (ft) | | Zinc Sample Depth (ft) | |
|---|---|---|---|---|---|---|---|
| | | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 |
| SP-1-1 | 0.5 | ND | -- | 154 | -- | 1780 | -- |
| SP-1-2 | 0.5 | ND | -- | 62.4 | -- | 653 | -- |
| SP-1-3 | 1.0 | 13.8 | ND | 1236 | 82.6 | 8422 | 1294 |
| 1-3 Dupe | 0.5 | 5.45 | -- | 856 | -- | 5804 | -- |
| SP-1-4 | 0.5 | ND | -- | 208 | -- | 1537 | -- |
| SP-1-5 | 1.0 | 0.67 | ND | 287 | 26.4 | 2307 | 287 |
| SP-1-6 | 0.5 | ND | -- | 39.7 | -- | 255 | -- |
| SP-1-7 | 0.5 | ND | -- | 39.5 | -- | 243 | -- |
| SP-1-8 | 0.5 | ND | -- | 14.8 | -- | 633 | -- |
| SP-1-9 | 0.5 | ND | -- | 95.9 | -- | 1079 | -- |
| SP-1-10 | 0.5 | ND | -- | 126 | -- | 1319 | -- |
| SP-1-11 | 0.5 | ND | -- | 53.0 | -- | 345 | -- |
| SP-1-12 | 0.5 | ND | -- | 32.9 | -- | 186 | -- |
| SP-1-13 | 0.5 | ND | -- | 50.5 | -- | 274 | -- |
| SP-1-14 | 0.5 | ND | -- | 155 | -- | 859 | -- |
| Cleanup Standard | | 36 | | 220 | | 24,000 | |

Note:
Samples collected November 12-19, 2002.
All concentrations in milligrams per kilogram.
Depths listed are in feet below surface grade.
ND – Not detected at laboratory method detection limit.
-- - Not sampled.

**Table 10 (Page 1 of 6)**
**Soil Sampling Results - Cadmium**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

CADMIUM

| Sample Location | Soil Sample Interval Depth - Feet Below Grade | | | | | |
|---|---|---|---|---|---|---|
| | 0' - 1' | 1' - 2' | 2' - 3' | 3' - 4' | 4' - 5' | 5' - 6' |
| N-1 (a) | **460** | -- | -- | -- | -- | -- |
| N-2 (a) | **53.1** | -- | 8.08 | -- | -- | -- |
| N-3 | -- | **828** | 20 | 0.59 | -- | -- |
| N-4 | -- | -- | **229** | 0.77 | -- | -- |
| N-17 (b) | 11.3 | -- | **231** | 0.42 | -- | -- |
| N-18 (b) | -- | -- | 20.7 | 3.56 | -- | -- |
| | | | | | | |
| S-1 (a) | **40.4** | -- | -- | -- | -- | -- |
| S-2 (a) | **53.4** | -- | 0.73 | -- | -- | -- |
| S-3 | -- | **150** | 0.93 | -- | -- | 1.03 |
| S-4 | -- | **53.8** | 0.92 | -- | -- | -- |
| S-5 | -- | 26.0 | -- | -- | -- | -- |
| S-6 | -- | -- | -- | -- | -- | -- |
| | | | | | | |
| W-1 (a) | **126** | -- | 13.8 | -- | -- | -- |
| W-3 | -- | **47.5** | **153** | 3.04 | -- | 0.54 |
| W-4 | -- | 15.2 | **112** | 0.63 | -- | -- |
| W-5 | -- | **57.2** | **37.9** | 1.93 | -- | -- |
| W-10 (b) | 12.2 | -- | 0.47 | -- | -- | -- |
| W-11 (b) | 7.60 | -- | **41.6** | 1.48 | -- | -- |
| W-12 (b) | 0.77 | -- | 4.31 | -- | -- | -- |
| W-13 (b) | 2.23 | -- | 0.67 | -- | -- | -- |
| W-14 (b) | 23.4 | -- | 0.57 | -- | -- | -- |
| W-15 (b) | 18.9 | -- | 0.75 | -- | -- | -- |
| W-16 (b) | 5.34 | -- | 4.72 | -- | -- | -- |
| | | | | | | |
| E-1 (a) | **123** | -- | -- | -- | -- | -- |
| E-2 (a) | **95.3** | -- | 30.8 | -- | -- | -- |
| E-3 | -- | **186** | 1.82 | -- | -- | 0.90 |
| E-4 | -- | **212** | **51.0** | 9.41 | -- | -- |
| E-5 (b) | **42.9** | -- | **45.0** | 0.46 | -- | -- |
| E-6 (b) | 4.54 | -- | 4.86 | -- | -- | -- |
| E-7 (b) | 24.9 | -- | 0.52 | -- | -- | -- |
| E-8 (b) | 7.15 | -- | 1.17 | -- | -- | -- |
| E-9 (b) | 4.02 | -- | 35.3 | -- | -- | -- |

Note:
Samples collected on January 18, 2005. Samples denoted with (a) were collected on August 12, 2004.
Samples denoted with (b) were collected on April 20, 2005.
All analytical data shown in milligrams/kilogram (mg/kg)
Concentrations listed in bold type exceed the 36 mg/kg cleanup goal for Cadmium
-- - Not Analyzed / No sample collected from this interval
Depth of excavated area = 2 feet below base of asphalt

**Table 10 (Page 2 of 6)**
**Soil Sampling Results - Cadmium**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

CADMIUM

| Sample Location | Soil Sample Interval | | |
|---|---|---|---|
| | 0 - 1' | 1 - 2' | 2 - 4' |
| U8-A | 2.02** | -- | -- |
| U5-B | -- | -- | 15.9 |
| U5-C | 164** | -- | -- |
| U2-A | 24** | -- | -- |
| U2-B | 0.8** | -- | 0.8 |
| GP-451 | 0.45 | 0.76 | 0.46 |
| GP-453 | 42 | 0.59 | 0.32 |
| SS-7 | 3.7 | -- | -- |
| U1-F | 4.8** | -- | 0.8 |
| U1-G | 19** | -- | -- |

Samples collected as part of Site Investigation work conducted in February - March, 2002
** Results are for sampled interval of 0-2'
Soil sample intervals are feet below grade

**Table 10 (Page 3 of 6)**
**Soil Sampling Results - Lead**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

LEAD

| Sample Location | Soil Sample Interval Depth - Feet Below Grade | | | | | |
|---|---|---|---|---|---|---|
| | 0' - 1' | 1' - 2' | 2' - 3' | 3' - 4' | 4' - 5' | 5' - 6' |
| N-1 (a) | **34,000** | -- | -- | -- | -- | -- |
| N-2 (a) | **6,970** | -- | **325** | -- | -- | -- |
| N-3 | -- | **35,500** | 37.1 | 2.40 | -- | -- |
| N-4 | -- | -- | **25,400** | 10 | -- | -- |
| N-17 (b) | **1040** | -- | **29,500** | 8.50 | -- | -- |
| N-18 (b) | -- | -- | **3,600** | 3.96 | -- | -- |
| | | | | | | |
| S-1 (a) | **11,000** | -- | -- | -- | -- | -- |
| S-2 (a) | **8,020** | -- | 5.65 | -- | -- | 5.05 |
| S-3 | -- | **1,570** | 5.88 | -- | -- | -- |
| S-4 | -- | **458** | 7.36 | -- | -- | -- |
| S-5 | -- | **1730** | -- | -- | -- | -- |
| S-6 | -- | 9.67 | 3.45 | -- | -- | -- |
| | | | | | | |
| W-1 (a) | **11,800** | -- | **510** | -- | -- | -- |
| W-3 | -- | **6,430** | **17,000** | 8.63 | -- | 3.51 |
| W-4 | -- | **671** | **8,160** | 7.30 | -- | -- |
| W-5 | -- | **6,510** | 54 | 1.93 | -- | -- |
| W-10 (b) | **1450** | -- | 7.19 | -- | -- | -- |
| W-11 (b) | 7.19 | -- | 6.16 | -- | -- | -- |
| W-12 (b) | 15.7 | -- | 106 | -- | -- | -- |
| W-13 (b) | 8.89 | -- | 14.1 | -- | -- | -- |
| W-14 (b) | **2,780** | -- | 6.62 | -- | -- | -- |
| W-15 (b) | **2,560** | -- | 6.76 | -- | -- | -- |
| W-16 (b) | **310** | -- | 424 | -- | -- | -- |
| | | | | | | |
| E-1 (a) | **13,400** | -- | -- | -- | -- | -- |
| E-2 (a) | **16,000** | -- | **1,870** | -- | -- | -- |
| E-3 | -- | **22,600** | 37.5 | -- | -- | 6.23 |
| E-4 | -- | **13,800** | 23.7 | -- | -- | -- |
| E-5 (b) | **6,440** | -- | 60.2 | -- | -- | -- |
| E-6 (b) | **333** | -- | **395** | 7.93 | -- | -- |
| E-7 (b) | **3,920** | -- | 14.9 | -- | -- | -- |
| E-8 (b) | **535** | -- | 21.1 | -- | -- | -- |
| E-9 (b) | 158 | -- | 5.62 | -- | -- | -- |

Samples collected on January 18, 2005. Samples denoted with (a) were collected on August 12, 2004.
Samples denoted with (b) were collected on April 20, 2005.
All analytical data shown in milligrams/kilogram (mg/kg)
Concentrations listed in bold type exceed the 220 mg/kg cleanup goal for Lead
-- - Not Analyzed / No sample collected from this interval
Depth of excavated area = 2 feet below base of asphalt

**Table 10 (Page 4 of 6)**
**Soil Sampling Results - Lead**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

**LEAD**

| Sample Location | Soil Sample Interval | | |
|---|---|---|---|
| | 0 - 1' | 1 - 2' | 2 - 4' |
| U8-A | 4.04** | -- | -- |
| U5-B | -- | -- | 752 |
| U5-C | 128** | -- | 24 |
| U2-A | 11.6** | -- | -- |
| U2-B | 11.2** | -- | 8.7 |
| GP-451 | 4.25 | -- | -- |
| GP-453 | 1,730 | 5.75 | 4.94 |
| SS-7 | 95.8 | -- | -- |
| U1-F | 8.0** | -- | 6.6 |
| U1-G | 23.6** | -- | -- |

Samples collected as part of Site Investigation work conducted in February - March, 2002
** Results are for sampled interval of 0-2'
Soil sample intervals are feet below grade

**Table 10 (Page 5 of 6)**
**Soil Sampling Results - Zinc**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

ZINC

| Sample Location | Soil Sample Interval Depth - Feet Below Grade | | | | | |
|---|---|---|---|---|---|---|
| | 0' - 1' | 1' - 2' | 2' - 3' | 3' - 4' | 4' - 5' | 5' - 6' |
| N-1 (a) | **145,000** | -- | -- | -- | -- | -- |
| N-2 (a) | **24,200** | -- | 2,000 | -- | -- | -- |
| N-3 | -- | **224,000** | **10,500** | **891** | -- | -- |
| N-4 | -- | -- | **241,000** | 97.5 | -- | -- |
| N-17 (b) | 10,800 | -- | **105,000** | 42.7 | -- | -- |
| N-18 (b) | -- | -- | 20,700 | 346 | -- | -- |
| | | | | | | |
| S-1 (a) | **49,500** | -- | -- | -- | -- | -- |
| S-2 (a) | **48,300** | -- | 44.2 | -- | -- | -- |
| S-3 | -- | **27,700** | 87.7 | -- | -- | 46.2 |
| S-4 | -- | **24,100** | 77.6 | -- | -- | -- |
| S-5 | -- | **19,100** | -- | -- | -- | -- |
| S-6 | -- | -- | -- | -- | -- | -- |
| | | | | | | |
| W-1 (a) | **81,300** | -- | **3,690** | -- | -- | -- |
| W-3 | -- | **53,200** | **165,000** | 111 | -- | 32.5 |
| W-4 | -- | -- | **74,600** | 57 | -- | -- |
| W-5 | -- | **48,900** | **22,500** | **875** | -- | -- |
| W-10 (b) | **15,700** | -- | 63.6 | -- | -- | -- |
| W-11 (b) | 2,170 | -- | 22,200 | -- | -- | -- |
| W-12 (b) | 308 | -- | 1,570 | -- | -- | -- |
| W-13 (b) | 649 | -- | 71.6 | -- | -- | -- |
| W-14 (b) | 18,600 | -- | 51.0 | -- | -- | -- |
| W-15 (b) | 23,000 | -- | 52.1 | -- | -- | -- |
| W-16 (b) | 1,920 | -- | 1,710 | -- | -- | -- |
| | | | | | | |
| E-1 (a) | **98,800** | -- | -- | -- | -- | -- |
| E-2 (a) | **81,300** | -- | **9,350** | -- | -- | -- |
| E-3 | -- | **250,000** | 237 | -- | -- | 49.0 |
| E-4 | -- | **124,000** | **3410** | **1140** | -- | -- |
| E-5 (b) | **58,100** | -- | **36,400** | -- | -- | -- |
| E-6 (b) | 2,760 | -- | 11,900 | -- | -- | -- |
| E-7 (b) | **36,200** | -- | 273 | -- | -- | -- |
| E-8 (b) | 9,110 | -- | 2,250 | -- | -- | -- |
| E-9 (b) | 4,320 | -- | 20,000 | -- | -- | -- |

Samples collected on January 18, 2005. Samples denoted with (a) were collected on August 12, 2004.
Samples denoted with (b) were collected on April 20, 2005.
All analytical data shown in milligrams/kilogram (mg/kg)
Concentrations listed in bold type exceed the 24,000/570 mg/kg cleanup goal for Zinc
-- - Not Analyzed / No sample collected from this interval
Depth of excavated area = 2 feet below base of asphalt

**Table 10 (Page 6 of 6)**
**Soil Sampling Results - Zinc**
**Bay Zinc Facility - Moxee, WA**
**Warehouse Entryway AOC**

ZINC

| Sample Location | Soil Sample Interval | | |
|---|---|---|---|
| | 0 - 1' | 1 - 2' | 2 - 4' |
| U8-A | 1,689** | -- | -- |
| U5-B | -- | -- | 11,662 |
| U5-C | 12,400** | -- | -- |
| U2-A | **25,200**** | -- | -- |
| U2-B | 128** | -- | -- |
| GP-451 | 65 | 300 | 59 |
| GP-453 | **320,000** | 87 | 52 |
| SS-7 | 2,000 | -- | -- |
| U1-F | 880** | -- | -- |
| U1-G | 19,600** | -- | -- |

Samples collected as part of Site Investigation work conducted in February - March, 2002
** Results are for sampled interval of 0-2'
Soil sample intervals are feet below grade

# Appendix B

# Annual Site Inspection Reporting Form and Checklist

**Environmental Site Management Plan**
**Operation and Maintenance**
**Annual Inspection and Monitoring Checklist**
**Bay Zinc Facility**
**Moxee, Washington**

The following is a checklist that has been developed to assist Bay Zinc Company, Inc. with implementing the environmental Operations and Maintenance (OM) activities specified in the Site Management Plan.

| O&M Component | | | |
|---|---|---|---|
| **1.0 Field Survey/Pavement Cover/Inspection** | | | |
| Perform a walking survey/inspection to ensure that the material serving as an environmental cover is being maintained and to detect any potential breaches in the cover such that the underlying affected soils could be exposed. Survey/inspection should include the following areas. | | | |
| • | Parking / Asphalt Paved Areas<br>Observe paved areas covering affected soil (see Figure 2 of Site Management Plan). Note any odors, visible discoloration, or cracks or other breaches where underlying fill may be exposed. | Inspection Completed | Comments |
| – | West Warehouse Entryway and Adjoining Areas South of the East and West Storage Buildings | Yes / No | |
| – | Area Northeast of the West Warehouse/North of the East and West Storage Buildings | Yes / No | |
| – | Corridor Between Warehouse and West Storage Building | Yes / No | |
| • | Unpaved Areas (Soil/Gravel Covered)<br>Observe all unpaved areas of the site covering affected soil (Figure 2 of Site Management Plan). Note any signs of subsidence (e.g., obvious visible low areas where standing water may accumulate). Check for the presence of large cracks on the surface. Note any signs of significant erosion that may lead to exposure of underlying affected soil. | Yes / No | |
| • | Monitoring Wells.<br>Observe the condition of each monitoring well, noting the condition of the concrete pad and steel protective casing. Ensure that each well is properly closed with a locking plug and steel protective casing. | | |
| – | Bone Yard | Yes / No | |
| – | Railspur Area | Yes / No | |

| | | | |
|---|---|---|---|
| **2.0 Record Keeping** | | | |
| Within 30 days following each inspection, a copy of the following information should be provided to the Washington Department of Ecology, Hazardous Waste and Toxics Reduction Program in Yakima. Originals should be filed on-site with other pertinent environmental records maintained by Bay Zinc's representative responsible for environmental, health and safety issues. | | | |
| – | Date, nature of work and names & affiliations of involved parties when asphalt/pavement/gravel/soil is disturbed in deed-restricted areas. Attach photographs and a map noting the specific locations disturbed. | Yes / No / Not Applicable | |
| – | Laboratory results of soil waste profile testing for any soil from deed-restricted areas that is excavated and disposed off-site. | Yes / No / Not Applicable | |
| – | Bill-of-lading or manifests pertaining to soil disposed-of off-site. | Yes / No / Not Applicable | |
| – | Copy of any pertinent reports, surveys, or studies involving future assessment/removal of affected soil conducted by engineers/consultants. | Yes / No / Not Applicable | |
| **3.0 Miscellaneous Comments** | | | |
| Any additional comments or observations made during annual inspection? | | Yes / No | |

**Inspected By:** _____ **Date:** _____

# Appendix C

# Health and Safety Plan

# HEALTH AND SAFETY PLAN
# UTILITY LINE/CONSTRUCTION WORK
# IN SITE MANAGED AREAS

## BAY ZINC FACILITY
## MOXEE, WASHINGTON

## REVIEW AND APPROVAL

AUTHORIZED FIELD SAFETY COORDINATOR _____
Name Date

**Responsibilities of Field Safety Coordinator:** Primary on-site contact for health and safety procedures during field activities. Has the authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public. Responsible for implementation of this health and safety plan. Prior to commencing subsurface excavation activities through site cover materials into the areas of potentially affected soil, a "tailgate" meeting will be conducted to familiarize workers/contractors conducting the excavation activities at these locations with site conditions and elements of this Plan.

## DATES OF PLANNED FIELD ACTIVITIES

Planned activities for which this Health and Safety Plan applies:

_____

Dates of field work: _____

## EMERGENCY PHONE NUMBERS

Hospital: 911 (As attached)
Fire: 911
Police: 911

** Verify emergency phone numbers and the location of nearest hospital prior to beginning work. Attach map to hospital if needed.*

## SITE INFORMATION

1. **Hazardous/Toxic Materials** (known or suspected)

   Chemical hazards associated with potential dust inhalation and/or skin contact of zinc sulfate, lead, and cadmium are possible. However, previous sampling and monitoring activities indicate that airborne levels will likely not present significant personnel exposure concerns. Anticipated contaminants of concern at the site include zinc sulfate, lead, and cadmium. Material Safety Data Sheets (MSDS's) for these chemicals are provided in this plan.

Planned activities for this are to _____

## 2. Hazard Assessment

The following hazard assessment is based on previous assessment and remediation activities and knowledge of historical facility operations. The known chemical hazards at this site include inorganics and metals.

- **Chemical Hazards**

The known chemical hazards at this site include zinc sulfate, lead, and cadmium. Exposure limits and related information are presented below.

Exposure Limits:

| Material/Chemical Name | OSHA ACGIH PEL or TLV | Health and Safety Comments |
|---|---|---|
| Zinc Sulfate | Not Established | Inhalation/Ingestion/Eye Irritant/Skin Irritant |
| Lead | 0.05 $mg/m^3$ | Inhalation/Ingestion/Eye Irritant/Skin Irritant |
| Cadmium | 0.005 $mg/m^3$ | Inhalation/Ingestion/Eye Irritant/Skin Irritant |

- **Operational Hazards**

Prior to commencement of field activities, the Field Safety Coordinator will conduct a site reconnaissance to identify any visible hazards, or operational hazards created from work activities. Physical hazards inherent to construction activities and power-operated equipment may exist.

➢ **Heat Stress**

Field activities in hot climates create a potential for heat stress. The warning symptoms of heat stress include fatigue; loss of strength; reduced accuracy, comprehension and retention; and reduced alertness and mental capacity. To prevent heat stress, personnel shall receive adequate water supplies and electrolyte replacement fluids, and maintain scheduled work/rest periods. Pulse rate and body temperature shall also be monitored as appropriate.

➢ **Cold Stress**

Field activities in cold climates create a potential for cold stress. The warning symptoms of cold stress include reduced coordination, drowsiness, impaired judgment, fatigue, and

numbing of the toes, fingers, nose and ears. To prevent cold stress, personnel shall wear appropriate clothing and maintain scheduled work/rest periods, with rest periods taken in a sheltered and heated location.

- **Tools and Equipment**

  Tools and equipment used shall be inspected prior to use, maintained in safe condition, and determined adequate for their designated use. Leather gloves shall be donned when using tools that are designed to cut or trim materials.

- **Noise Hazard**

  Operation of equipment may present a noise hazard to workers. Personnel will be provided with hearing protection for use when noise levels are excessive.

**3. Decontamination Activities**

All tools and equipment will be decontaminated using water, non-phosphate containing soap. Additionally, all sampling equipment will be decontaminated using all of the above plus a nitric acid solution rinse to ensure that contamination is not transported off-site.

## EMERGENCY PROCEDURES

In the event of personnel overexposure (i.e., skin contact, inhalation, ingestion), the following procedures shall be implemented.

**1. Skin Contact**

Remove any contaminated equipment and clothing. Thoroughly wash area with soap and water.

**2. Inhalation**

Move to fresh air, remove any respiratory protection equipment.

**3. Eye Contact**

Flush with water or eye wash solution for at least 15 minutes. Seek medical help if necessary.

**4. Ingestion**

Seek medical help if necessary.

**5. Personnel Injury**

A first aid kit shall be readily available in the case of an injury. Administer first aid and/or seek medial help if necessary. Medical emergencies take precedence over decontamination procedures. Know route to nearest telephone or on-site cellular telephone and medical facility. Maps to the nearest hospital are included in this plan.

**6. Potential or Actual Fire/Explosion**

If it is safe to do so, on-site personnel may use available fire fighting equipment to control or extinguish the fire, and remove or isolate materials which may contribute to the fire. Contact the fire department, and/or Bay Zinc officials as appropriate.

**7. Spill or Release of Hazardous Material**

Contact Bay Zinc company officials. Be aware that in the past, Ecology has levied significant (>$10,000) fines for improper handling/disposal of material by employees. Clean up, isolate or contain spill as appropriate. Contact emergency response personnel as appropriate.

| | | |
|---|---|---|
| Contact: | Richard Camp | Greg Mitch |
| Office: | 509-248-4911 | 509-248-4911 |
| Cell: | 509-952-0610 | 509-952-0612 |

**8. Evacuation Procedures**

In the event of an emergency that requires an evacuation of the site, verbal instruction will be given by the Field Safety Coordinator to evacuate the area. Personnel will immediately exit the site to the predesignated upwind "clean" location. The Field Safety Coordinator will account for personnel, and will advise personnel of further instruction if necessary. The Field Safety Coordinator will also advise responding off-site emergency personnel if necessary. Personnel shall not re-enter the site until the emergency conditions have been corrected, and the Field Safety Coordinator has authorized re-entry.

## WORK PROCEDURES

**1. Planned Field Activities**

The objectives of this project include: potential excavation through site cover material into affected soil.

All soils removed during excavation at the site will be disposed of and documented in an appropriate manner, in accordance with Section 7.5 of the Site Management Plan. Prior to any off-site disposal of excavated soil, the soil will need to be sampled to meet the specific disposal requirements of the receiving accredited disposal facility approved by Bay Zinc Company Management. At a minimum, the pre-disposal analysis will likely include key metals analyzed by an accredited laboratory using USEPA's toxicity characteristic leachate procedure (i.e. TCLP Metals). Once laboratory results are received, final arrangements can be made with the disposal facility.

**2. Anticipated Site or Personnel Monitoring Procedures**

Work Zones will be delineated on the site, as deemed necessary by the Field Safety Coordinator, and flow of site personnel among the zones will be controlled. The establishment of demarcated work zones will help ensure that personnel are properly protected against potential working hazards, and work activities and contamination are confined to the appropriate areas. The work zones established around the sampling activities will be communicated to all on-site personnel by the Field Safety Coordinator. Dusty conditions will be controlled with water, as necessary, to prevent airborne contaminants.

Overall hazards are considered to be low with regard to site environmental conditions. The primary hazards associated with the work activities at this site will be heavy equipment operations. The chemical hazards at this site are considered very low with minimal potential for personnel exposure, based on previous sampling, remediation and monitoring activities.

**Work Zone Perimeters Identified?:** Yes. Access to the excavation and sampling locations will be limited to authorized and trained personnel who have been familiarized with this Plan.

**Zones of Contamination Identified?:** Yes. The potential presence of soil and/or groundwater contamination has been assessed during investigation activities that have previously occurred on this site.

**Work Limitations?:** Yes. All work will be conducted during daylight hours. Outside work activities will be suspended in the event of severe inclement weather or unforeseen field conditions.

**3. Protective Clothing and Equipment**

All personnel within the established work zones shall don level 'D' personal protective equipment (PPE). The level of PPE may be changed at any time by the Field Safety Coordinator based on observations made in the field or if other potentially dangerous situations are encountered. Leather gloves shall be donned when using tools designed to cut and trim materials.

**4. Decontamination Procedures**

- Personnel: Wash affected area with soap and water. If irritation, burning, or other discomfort occurs, contact a physician immediately.

- Equipment: Wash affected equipment using non-phosphate detergent, rinse with deionized water, and, if needed, utilize a dilute nitric acid rinse. Repeat if necessary.

5. **Work Precautions**

- The "buddy system" shall be enforced for field activities involving the potential overexposure to hazardous or toxic materials. Each person should observe their partner for symptoms of chemical over exposures, heat stress or cold stress, and provide assistance when warranted.

- Absolutely no eating, drinking, or using tobacco products, while on the site. Smoking is prohibited on Bay Zinc property.

- Women who know or suspect they are pregnant should consult with their physician prior to performing duties on any site which may expose them to chemical agents.

- Barricades, traffic cones, orange/reflective vests, additional personnel or any other appropriate measures shall be employed to warn motorists and protect personnel at congested or heavy traffic sites.

- Wear gloves, steel-toed boots, and hard hats at applicable times while at the work site.

- Wash all exposed skin areas with soap and water before departing from the site.

- Remove and change any non-impervious clothing that becomes contaminated during site activities.

- Only enter authorized areas of the site, as directed by the Field Safety Coordinator.

    - Confined spaces, trenches, or manholes shall not be entered without prior consent of the Bay Zinc management personnel, and then only after proper respiratory protection equipment is donned and entry permits are complete.

- Safety belts with lifelines shall be worn whenever there is a potential for falling off of an elevated work platform, equipment, tank, etc. For example, leaning over a wastewater treatment aeration basin to collect a sample.

- Use safe and secure procedures for sample storage and shipment.

Prepared For: Bay Zinc Company
Moxee, Washington

Prepared By: Linebach Funkhouser, Inc.
Louisville, Kentucky

Date: February 5, 2007

## PERSONNEL AUTHORIZATION

By initialing and dating this form, the listed individual acknowledges that he/she has read and understands and will comply with the requirements of this Health and Safety Plan.

| | Name | Date |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

# Appendix D

## Land Survey Information for Restrictive Covenant

## LEGAL DESCRIPTION FOR ENVIRONMENTAL COVENANT

That portion of the West half of the Northwest quarter of Section 1, Township 12 North, Range 19 East, W.M. described as follows:

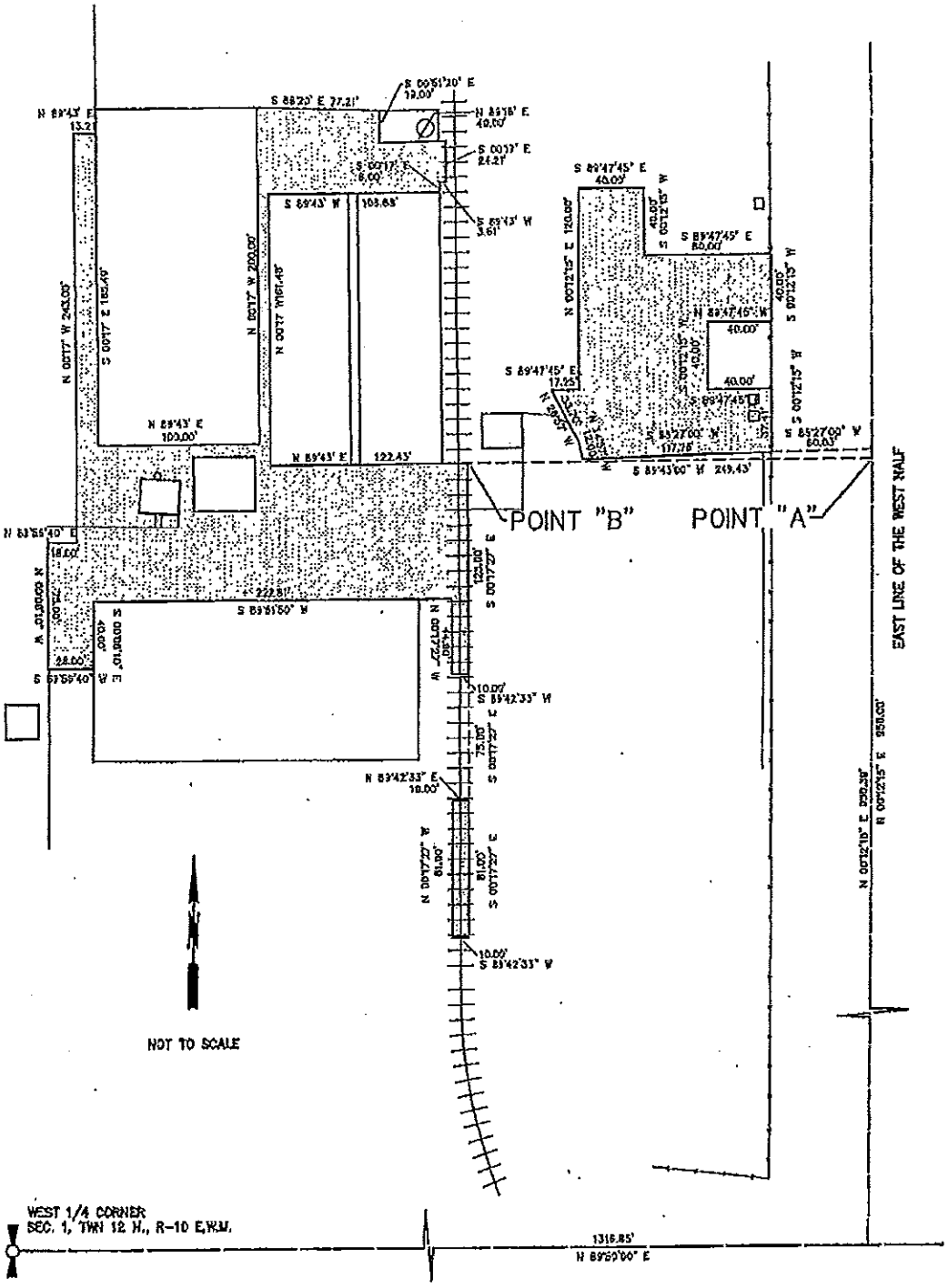
Beginning at the Southwest corner of said Northwest quarter of Section 1; thence North 89°50'00" East along the South line thereof 1316.86 feet to the Southeast corner of the West half thereof; thence North 0°12'15" East along the East line of the West half of the said Northwest quarter 950.39 feet to a point hereinafter called Point "A"; thence South 89°43' West 249.43 feet to the True Point of Beginning and a point hereinafter called Point "B"; thence South 0°17'27" East 125.00 feet; thence South 89°42'33" West 10.00 feet; thence North 0°17'27" West 44.90 feet; thence South 89°51'50" West 222.81 feet; thence South 0°08'10" East 40.00 feet; thence South 89°56'40" West 28.00 feet; thence North 0°08'10" West 75.00 feet; thence North 89°56'40" East 18.00 feet; thence North 0°17' West 243.00 feet; thence North 89°43' East 13.21 feet; thence South 0°17' East 185.49 feet; thence North 89°43' East 100.00 feet; thence North 0°17' West 200.00 feet; thence South 88°20' East 77.21 feet; thence South 0°51'20" East 19.00 feet; thence North 89°18' East 40.00 feet; thence South 0°17' East 24.21 feet; thence South 89°43' West 3.61 feet; thence South 0°17' East 6.00 feet; thence South 89°43'West 106.88 feet; thence South 0°17' East 161.48 feet; thence North 89°43' East 122.43 feet to the Point of Beginning.

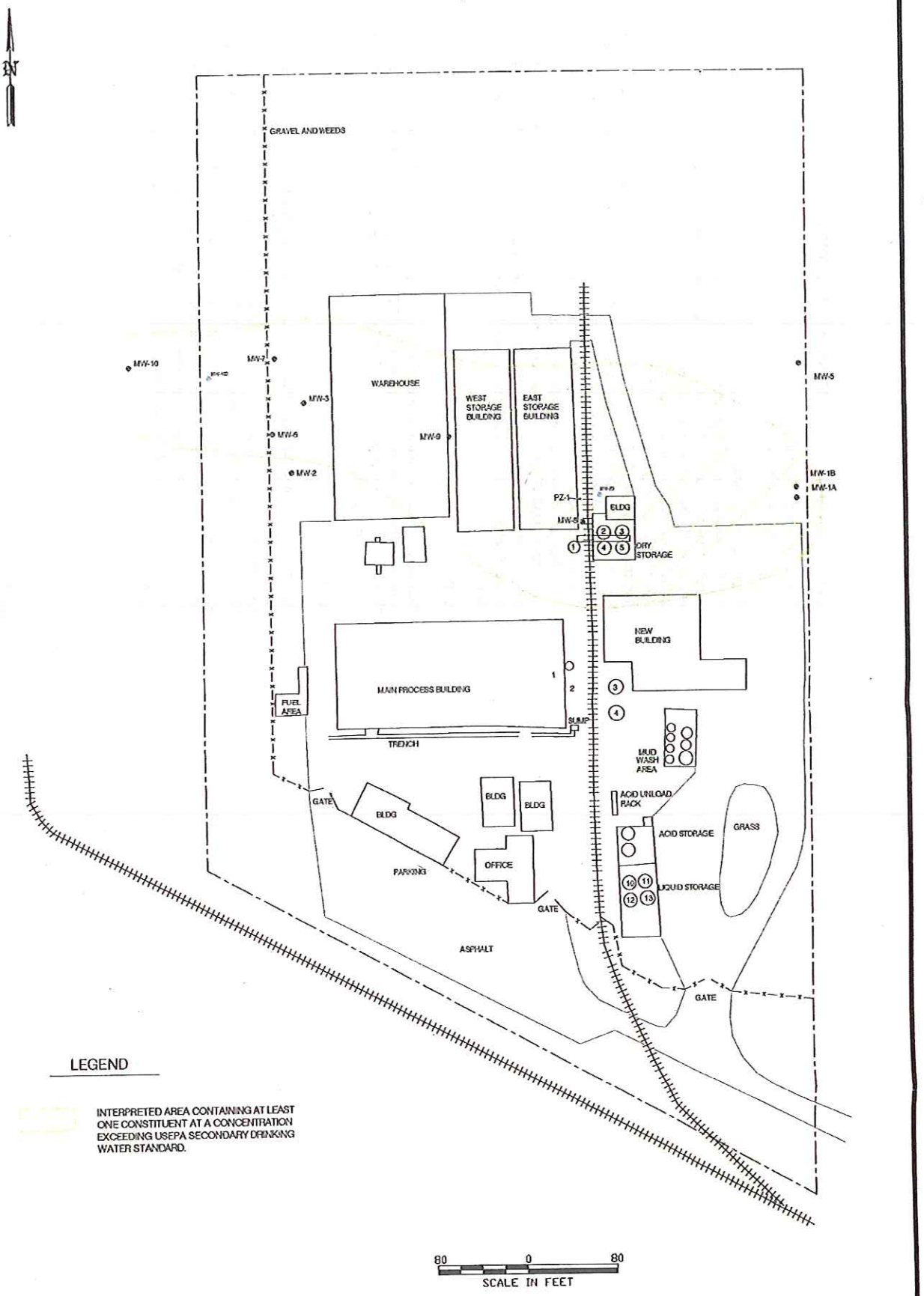
AND

Beginning at the above described Point "B"; thence South 0°17'27" East 200.00 feet to the True Point of Beginning; thence continuing South 0°17'27" East 81.00 feet; thence South 89°42'33" West 10.00 feet; thence North 0°17'27" West 81.00 feet; thence North 89°42'33" East 10.00 feet to the Point of Beginning.

AND

Beginning at the above described Point "A"; thence continuing North 0°12'15" East along the East line of the West half of said Northwest quarter 5.61 feet; thence South 88°27' West 60.03 feet to the True Point of Beginning; thence continuing South 88°27' West 117.75 feet; thence North 14°57' West 12.00 feet; thence North 28°57' West 33.70 feet; thence South 89°47'45" East 17.25 feet; thence North 0°12'15" East 120.00 feet; thence South 89°47'45" East 40.00 feet; thence South 0°12'15" West 40.00 feet; thence South 89°47'45" East 80.00 feet; thence South 0°12'15" West 40.00 feet; thence North 89°47'45" West 40.00 feet; thence South 0°12'15" West 40.00 feet; thence South 89°47'45" East 40.00 feet; thence South 0°12'15" West 37.41 feet to the True Point of Beginning.


POINT "B"
POINT "A"
EAST LINE OF THE WEST HALF
NOT TO SCALE
WEST 1/4 CORNER
SEC. 1, TWN 12 N., R-10 E.W.M.
1316.85'
N 89°59'00" E




BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON

FILENAME: 10002-1D
PROJECT No: 100-02
DRAWN BY: CCD
PRINT DATE: 7/25/06

Linebach Funkhouser, Inc.
*environmental compliance & consulting*

MAP SHOWING INTERPRETED AREA OF AFFECTED GROUNDWATER

FIGURE: 3

## LEGAL DESCRIPTION FOR ENVIRONMENTAL COVENANT

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**AND**

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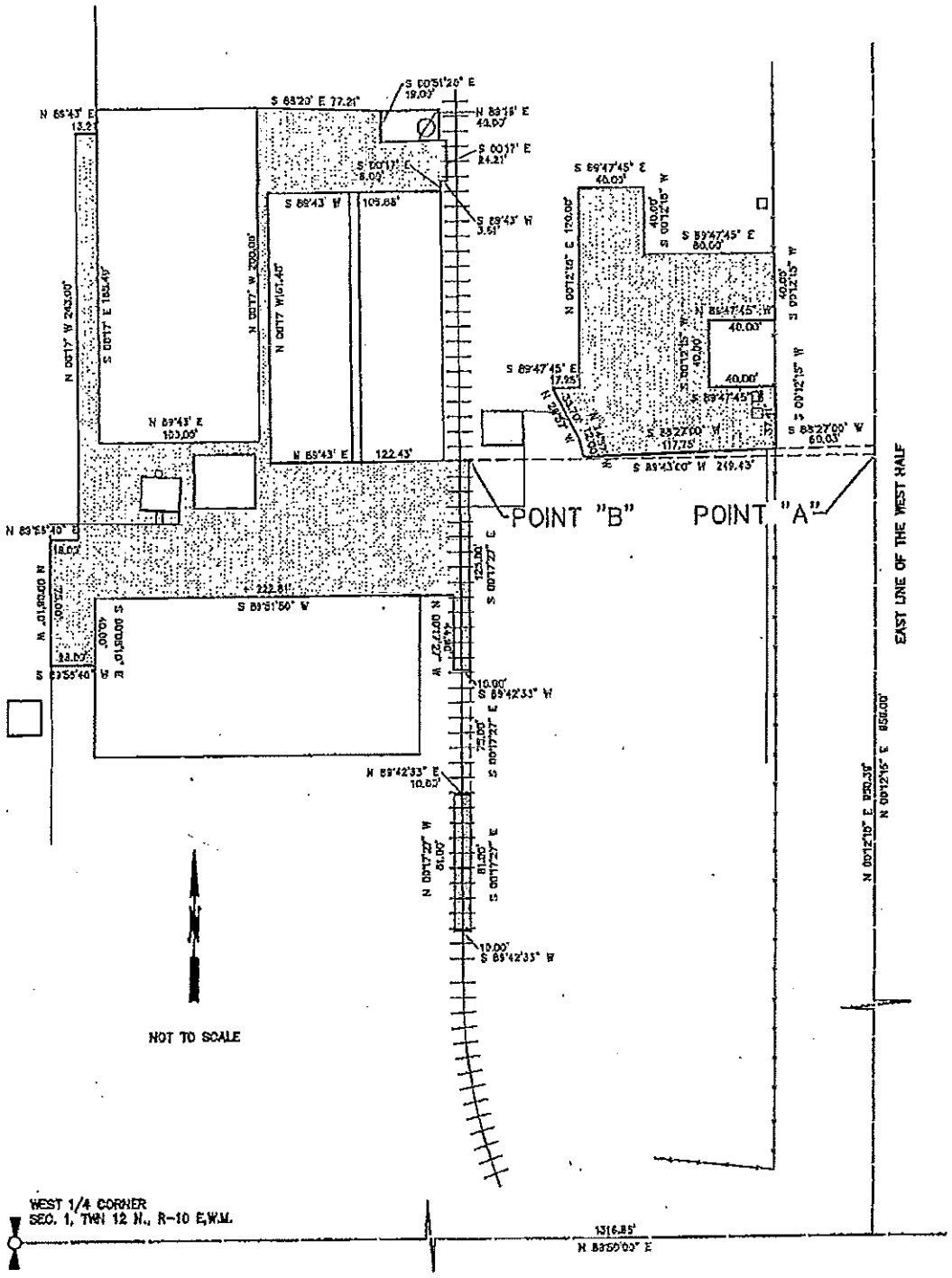
Bay Zinc
#06337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NOT TO SCALE
WEST 1/4 CORNER
SEC. 1, TWN 12 N., R-10 E.W.M.
1316.85'
N 88°50'02" E

Attachment E

2007 Action Plan for Affected Groundwater

Linebach ▪ Funkhouser, Inc.
environmental compliance & consulting

March 13, 2007

Mr. Greg Caron
Site Manager – Hydrogeologist
Washington Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

***Re:*** ***Action Plan for Affected Groundwater***
***Bay Zinc Company Facility***
***Moxee, Washington***
***Linebach Funkhouser Project Number 100-02***

Dear Mr. Caron:

Linebach Funkhouser, Inc. (LFI) has prepared this Action Plan to describe the planned monitoring, testing, and analysis procedures that will be conducted to address affected groundwater at the Bay Zinc Company (Bay Zinc) facility in Moxee, Washington. This work will be conducted as a follow-up (and a condition of) Bay Zinc's receipt of a Notice-of-Completion from the Washington Department of Ecology (Ecology) for environmental remediation actions conducted in accordance with a 2002 Agreed Order. As requested by Ecology in correspondence and a meeting with Bay Zinc in November of 2006, the Action Plan includes a description of measures that will be used to assess whether constituents in groundwater at Bay Zinc's property are migrating offsite through the groundwater pathway, potentially triggering the need to re-start groundwater recovery wells that were shut-down in December of 2006.

## 1.0 BACKGROUND

On October 8, 2002, an Agreed Order was finalized between Bay Zinc and Ecology to address the detection of certain metals and inorganic constituents in soil and groundwater at Bay Zinc's micronutrient fertilizer manufacturing facility in Moxee, Washington (Figure 1). In compliance

with the Agreed Order, Bay Zinc conducted the following work between October 2002 and June 2005:

- Excavation and disposal of over 12,320 tons of affected soil.
- Removal and replacement of a portion of the on-site rail spur line and underlying affected soil.
- Installation of an ion-exchange groundwater treatment system and removal of over 3.5 million gallons of groundwater.

With respect to soil, conditions of the Agreed Order were met through the aforementioned excavation work as well as a risk-based Site Management Plan, dated February 5, 2007. With respect to groundwater, based on previous aquifer test results by others and conceptually projected rates of affected groundwater removal, a restoration timeframe of three years was initially projected for groundwater (p. 13 of the approved Cleanup Action Plan). Recovery wells were originally installed at the site in 1987 and groundwater monitoring has actually been ongoing since 1985. Despite Bay Zinc's stepped-up groundwater removal efforts over a period that actually extended over 4 years (2003-2006), concentrations of certain metal and inorganic constituents in groundwater were still not able to be remediated to the point where Ecology's targeted cleanup goals were achieved.

Following the aforementioned removal of affected soil in 2002-2005, potential groundwater contaminant source areas were greatly reduced if not completely eliminated. The Bay Zinc site and surrounding area is zoned for light industrial use. Risk-based remediation work shows that no complete exposure pathways remain on site and there are no domestic or industrial wells downgradient of the site in the affected shallow zone of groundwater. Based on the results of groundwater monitoring dating back to 1987 and the four years of concentrated remediation efforts since 2002, Bay Zinc believes that continued operation of the groundwater remediation pumping system is of marginal additional value.

Based on discussions between Bay Zinc and Ecology in November of 2006, Ecology agreed that continued operation of the groundwater pumping wells could be suspended in December of 2006

in favor of a groundwater monitoring-only approach to confirm that groundwater conditions were essentially stable. In a letter dated November 22, 2006, Ecology requested that Bay Zinc develop a procedure for evaluating the overall stability of groundwater conditions and determining whether pumping needs to be resumed. That criteria is included in following sections of this Action Plan.

Site Hydrogeologic Conditions

Site soils consist of silty sand and silty clay. The site has a gradual slope to the northwest. The region around Moxee is semi-arid, receiving only approximately nine inches of rain per year. Very little recharge occurs to the uppermost groundwater producing zone in the summer and fall. Two irrigation canals (Moxee Drain and Roza Canel) are within one mile of the facility, but the canals only have water flows from March to October. The Yakima River, the primary drainage feature for the area, is more than a mile from the facility.

The uppermost groundwater producing zone underlying the facility consists of silty sand to sandy silt and is not particularly suitable for domestic or commercial use. Depth to groundwater in this zone generally ranges from approximately 3 to 6 feet, depending on the season of year. The uppermost groundwater producing zone extends to a depth of approximately 20 to 28 feet below ground surface (bgs).

The uppermost zone is underlain by a silty clay layer which generally serves as an aquitard and ranges in thickness from approximately 15 to 17 feet. A continuous gravel and sandy gravel unit underlies the silty clay aquitard and forms the lower aquifer at the site. The lower aquifer varies in thickness from approximately 11 to 20 feet underneath the site.

The lower aquifer in turn is underlain by a clay confining zone approximately 50 feet thick. A deep, confined aquifer in the Ellensburg formation underlies this confining zone at a depth of 90 to 160 feet below ground surface (bgs). The majority of the production water wells in the area are in the Ellensburg formation. The lower aquifer is the shallowest aquifer suitable for domestic and irrigation use.

The predominant direction of groundwater migration through the uppermost aquifer is west-northwest across the site, following the general topography of the area. Past assessments have shown that there is no significant downward vertical gradient between the uppermost groundwater producing zone and the lower aquifer. Past studies have also shown that the hydraulic conductivity of the uppermost groundwater producing zone at the site is variable (reflecting the heterogeneity of the subsurface material), ranging from $4.5 \times 10^{-5}$ centimeters per second (cm/sec) to $7.8 \times 10^{-3}$ cm/sec.

Monitoring Wells

During the course of past monitoring and assessment work at the site, groundwater monitoring wells have been installed in the uppermost groundwater producing zone as well as the next lower zone beneath the aforementioned silty clay aquitard. Wells in the uppermost zone include:

- MW-1B
- MW-2
- MW-3
- MW-5
- MW-8 (pumping well)
- MW-9 (pumping well)
- MW-10
- PZ-1

Deeper zone wells include:

- MW-1A
- MW-6
- MW-7
- MW-8D
- MW-10D

Wells MW-8D and MW-10D are telescoping (double casing/limited interval) wells, in which the uppermost zone was cased-off from the lower zone. Well construction details for the wells are summarized in Table 1. Well logs and construction records are in Appendix A. Monitoring well locations are shown in Figure 2.

Analysis of Historical Monitoring Results

Groundwater monitoring has been ongoing at the site since 1985. In general, monitoring results have shown that:

- Depth to groundwater in the uppermost groundwater producing zone varies seasonally ranging from approximately 3 feet in the early spring to 6 feet or more in the summer/fall.

- Detected concentrations of the key constituents being monitored have historically fluctuated greatly during the course of the year. The fluctuation is likely associated with depth-to water levels which, as mentioned above, can vary as much as 3 feet or more in a 12-month period.

- Soil removal and groundwater recovery efforts conducted between 2002 and 2005 have resulted in significant overall reductions of constituents in groundwater in well MW-1B, historically shown as containing some of the highest concentrations at the site (and therefore interpreted to be near a past release source area). Pumping well MW-8 has also shown a decreasing trend with respect to three of the five key constituents.

Monitoring wells MW-2, MW-3, and MW-10 are near the downgradient boundary of the site and are relatively close to one another. Sampling results from these wells, which collectively can be used to monitor potential off-site groundwater migration, vary widely at times between wells, reflecting the potential occurrence of highly localized conditions at each location. However, with respect to trends since approximately mid-September of 2005 (when the bulk of the soil removal work was completed), results have been generally consistent as follows:

- Sulfate appears to be stabilizing or decreasing in MW-2, decreasing in MW-3, and following a spike in June of 2006 (which LFI believes to be suspect), decreasing or stabilizing in MW-10. Chloride is relatively stable in all three wells.

- Cadmium, following a suspect reported peak, appears to be stable in MW-2, decreasing in MW-3, and decreasing in MW-10.

- Zinc is relatively stable in MW-2 and MW-10, and decreasing in MW-3.

- Manganese appears to be potentially increasing in MW-2, decreasing in MW-3, and stable in MW-10. Time-trend plots dating back to January of 2003 for these three wells are included in Appendix B.

## 2.0 PURPOSE

The purpose of this Action Plan is to describe the:

- Groundwater monitoring well network to be maintained and sampled at the site, and the schedule for that sampling.

- Criteria to be used to determine the conditions that will trigger a resumption of groundwater pumping.

## 3.0 PROCEDURES

The following uppermost groundwater producing zone wells have historically been sampled and continue to be included in the groundwater monitoring network. These wells will be sampled quarterly:

- MW-1B
- MW-2
- MW-3
- MW-5
- MW-8
- MW-9
- MW-10

The following lower groundwater producing zone wells will be sampled once each year:

- MW-1A
- MW-8D
- MW-10D

Sampling Methodology and Parameters

Groundwater sampling and analysis procedures will be consistent with those previously described in the approved *Compliance Monitoring Plan* dated October 18, 2002. In general, prior to sampling and purging, the static water level elevation in each well will be measured and recorded using an electronic water level indicator. Each well will then be purged by removing at least three casing volumes. Sampling of each monitoring well will be conducted using clean, disposable polyethylene bailers. After collection, groundwater samples will be packed on ice and shipped to a laboratory acceptable to Ecology. Appropriate chain-of-custody documentation will accompany the samples. In accordance with the former Agreed Order, samples will be analyzed for dissolved manganese, dissolved zinc, dissolved cadmium, total sulfate, and total chloride.

## 4.0 DATA ANALYSIS/REPORTING

Consistent with the approved past procedures, an annual report of the quarterly groundwater sampling will be prepared and submitted to Ecology. The report will include:

- A summary table of analytical results for the year.
- A summary table of groundwater elevation measurements for the year.
- Maps showing the interpreted groundwater potentiometric surface for each quarter of monitoring.
- Time-trend plots for key constituents detected in each well. The plots will include historical data beginning with quarterly sampling initiated in January of 2003.
- A description of any significant variation from the sampling procedures described in this Action Plan.
- A description of proposed changes or variations to the sampling network and procedures for the upcoming year.

## 5.0 CRITERIA FOR ACTIVATING GROUNDWATER PUMPING SYSTEM

Groundwater pumping wells are currently onsite for the purpose of controlling groundwater migration. An ion-exchange groundwater treatment unit is also onsite. Recovery of groundwater from the uppermost groundwater producing zone has been ongoing to one extent or another since 1987. The silty nature of the uppermost zone has hindered groundwater removal, with pumping capacities from the primary existing upper zone recovery well (MW-8) being generally 3 gallons per minute or less. Despite previous efforts to redevelop wells MW-8 and MW-9, production remains low. Well MW-9 is incapable of supplying a sufficient quantity of water for continuous pumping.

Following receipt of Ecology's approval (letter to Bay Zinc dated November 22, 2006), Bay Zinc suspended groundwater pumping operations on December 1, 2006. Based on the source area removal efforts and the lack of complete exposure pathways associated with the affected groundwater, Bay Zinc is implementing a groundwater monitoring program to demonstrate that conditions are remaining largely stable.

Because of seasonal depth-to-water fluctuations that can be in excess of three feet at the site and the associated historical spikes of the key constituents being monitored (which are also naturally occurring to some extent), conditions do not lend themselves well to statistical analysis. Consequently, the following criteria will be used to confirm overall plume stability and to establish whether active pumping should be resumed:

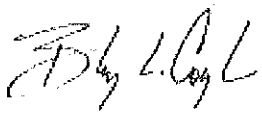
- Time-trend plots for each monitored constituents will continue to be produced for the wells in the uppermost zone.
- As previously discussed, natural localized variability appears to exist between the three downgradient wells, making it difficult to assess whether offsite migration is occurring based on the single results from any one of the three wells. However, at least since mid-2005, it appears that concentrations of most of the key constituents in the three downgradient wells have generally either decreased or stabilized. If trend plots in the three downgradient wells (MW-2, MW-3 and MW-10) collectively and consistently indicate increasing trends of 3 or more of the 5 key constituents following the completion of quarterly monitoring at the end of each year, groundwater recovery efforts will be resumed.

## 6.0 SCHEDULE

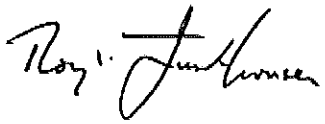
Semi-annual groundwater monitoring at the site was historically conducted from 1985 through 2002. Quarterly groundwater monitoring was initiated in 2003 and continues to date. Groundwater monitoring will continue on a quarterly basis throughout 2007 and 2008. Monitoring through the end of 2008 will result in the collection of 8 quarters of data pursuant to the cessation of pumping on December of 2006, and a total of 6 years of quarterly data following the onset of significant remediation efforts in late 2002. If constituent trends in wells remain generally consistent (overall stable or decreasing), showing that affected groundwater is generally limited to the boundaries of the Bay Zinc property, Bay Zinc will seek Ecology's approval for managing the remaining affected area of affected groundwater through a Restrictive Covenant. (Bay Zinc is already moving forward to implement a Restrictive Covenant with respect to soil in limited areas of the site). Once the Restrictive Covenant for groundwater is in place, groundwater monitoring will be terminated.

Bay Zinc appreciates Ecology's input and looks forward to moving forward with implementation of this Action Plan. Please contact the undersigned at 502-895-5009 if you have technical questions about the Action Plan.

Sincerely,



Bradley L. Coyle, CHMM
Project Geologist



Roy V. Funkhouser, P.G.
Principal Hydrogeologist
Washington Certified Hydrogeologist No. 2090

cc: Dick Camp, Bay Zinc Company

Table: Monitoring Well Construction Details

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1. Site Location Map
2. Map Showing Monitoring Well Locations

Appendices:

A. Monitoring Well Construction Records
B. Time-Trend Plots for Key Downgradient Property Boundary Wells

# Table

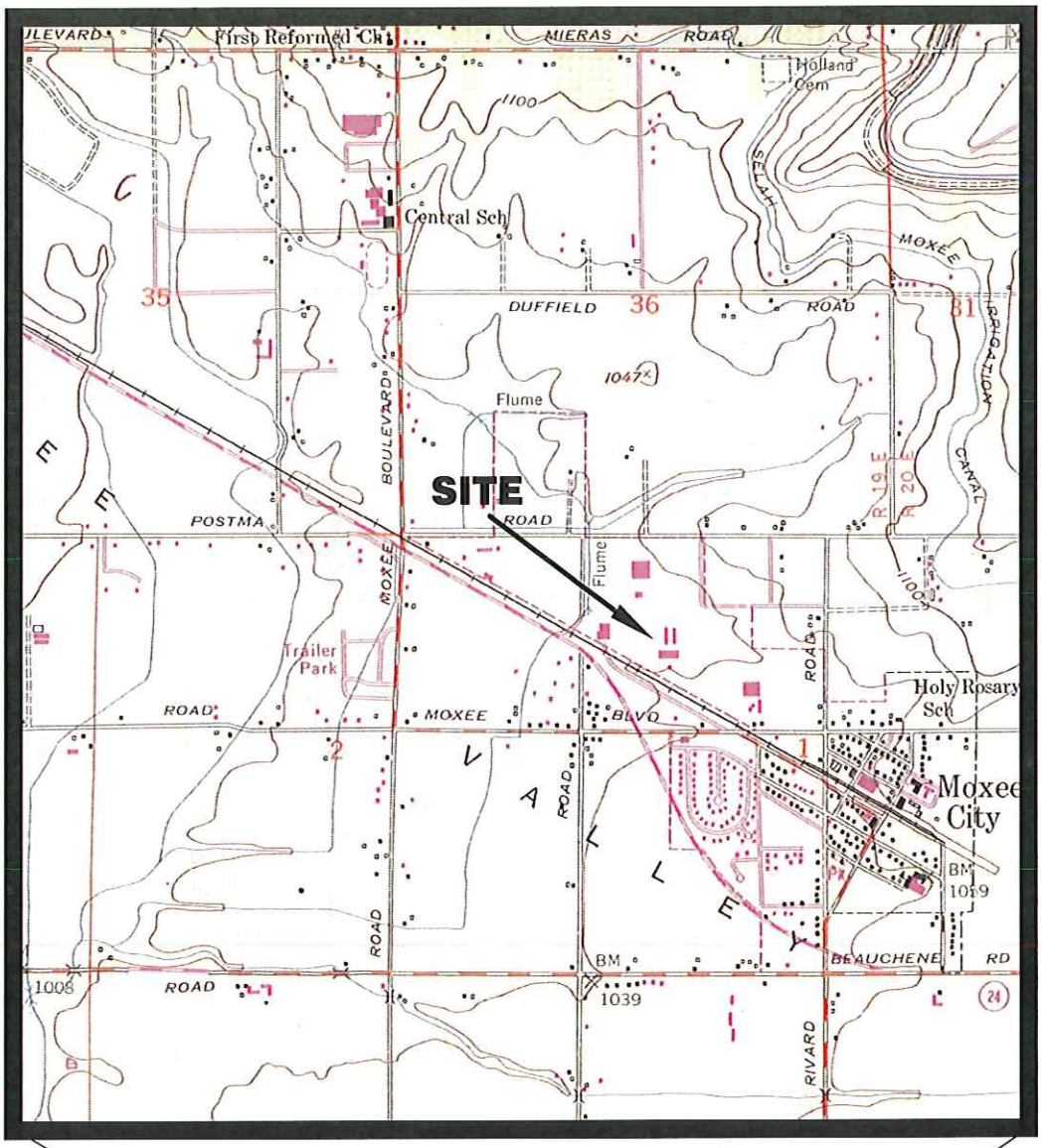
**Table 1**
**Monitoring Well Construction Details**
**Bay Zinc Company**
**Moxee, Washington**

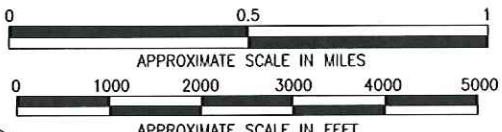
| Well ID | Depth in Feet BGL | Screened Interval Feet BGL | Well Diameter | Screen Slot Size | Date Installed |
|---|---|---|---|---|---|
| MW-1A (L) | 46 | 33 - 43 | 2-inch | 0.010 | 3/85 |
| MW-1B (U) | 18.5 | 5 - 15 | 2-inch | 0.010 | 3/85 |
| MW-2 (U) | 18 | 5 - 15 | 2-inch | 0.010 | 3/85 |
| MW-3 (U) | 18 | 5 - 15 | 2-inch | 0.010 | 3/85 |
| MW-5 (U) | 21 | 8 - 18 | 2-inch | 0.010 | 3/10/87 |
| MW-6 (L) | 51 | 38 - 48 | 2-inch | 0.010 | 3/30/87 |
| MW-7 (L) | 52 | 37 - 47 | 2-inch | 0.010 | 3/31/87 |
| MW-8 (U) | 22 | 10 - 20 | 5-inch | 0.010 | 7/3/87 |
| MW-8D (L) | 48 | 38 - 48 | 2-inch | 0.020 | 2/26/02 |
| MW-9 (U) | 22 | 8 - 18 | 5-inch | 0.010 | 1/12/88 |
| MW-10 (U) | 20 | 7 - 17 | 2-inch | 0.010 | 4/12/88 |
| MW-10D (L) | 43 | 33 - 43 | 2-inch | 0.020 | 2/26/02 |
| PZ-1 (U) | 21 | 10 - 20 | 2-inch | 0.020 | 1/12/1988 |

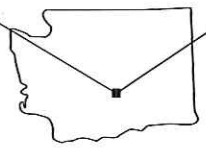
Notes:
U - Uppermost Groundwater Producing Zone Well
L - Lower Groundwater Producing Zone Well

# Figures

SOURCE: U.S. GEOLOGICAL SURVEY; 7.5 MINUTE SERIES (TOPOGRAPHIC)
YAKIMA EAST QUADRANGLE, WASHINGTON; DATED 1985



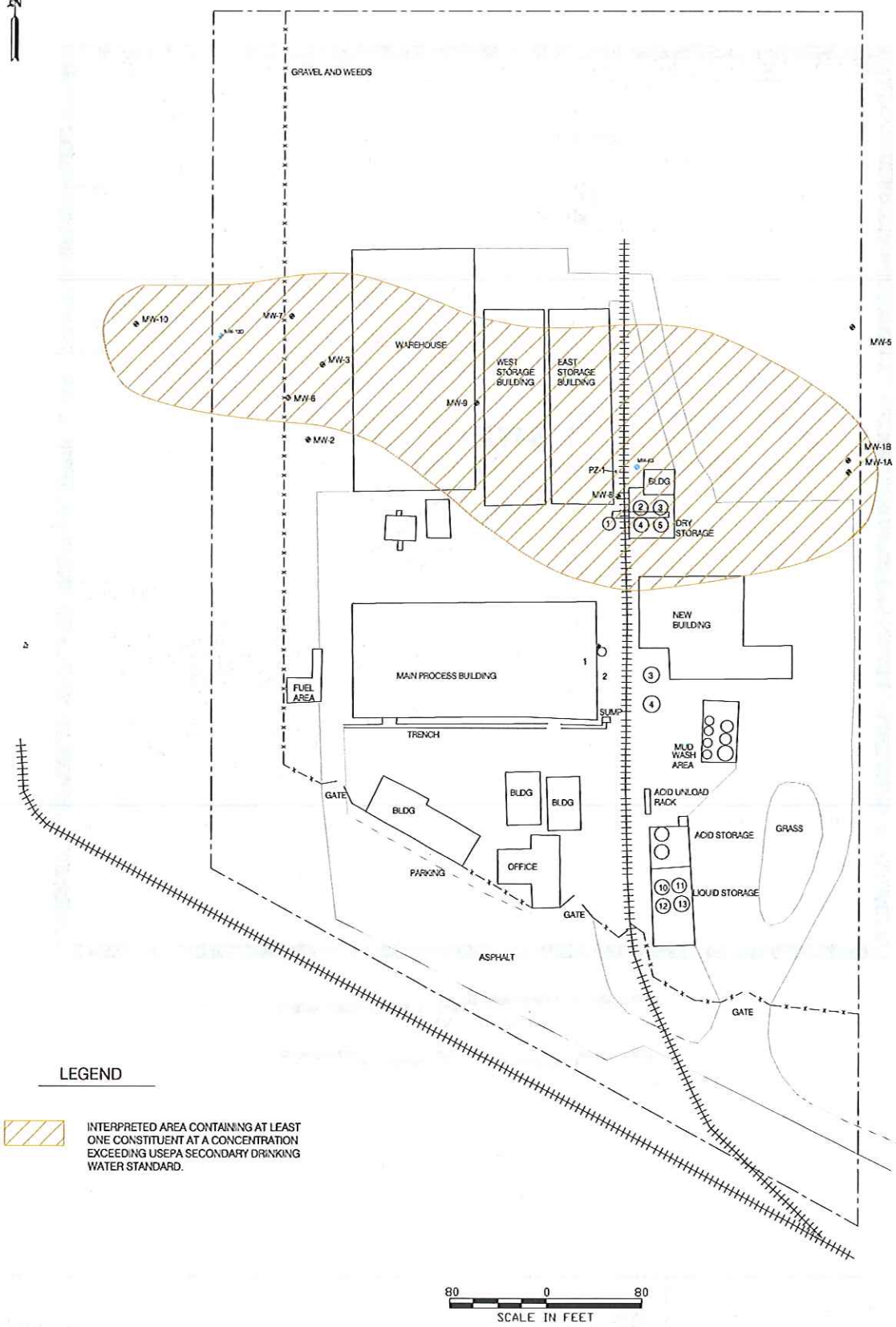



BAY-ZINC COMPANY FACILITY
MOXEE, WASHINGTON

Linebach ▪ Funkhouser, Inc.
*environmental compliance & consulting*

SITE LOCATION MAP

| PROJECT NO: | SCALE: | FILENAME: | FIGURE: |
|---|---|---|---|
| 100-02 | - | 10002-1C | 1 |
| | | PLOT DATE: 4/12/05 | |




| | | |
|---|---|---|
| BAY-ZINC COMPANY FACILITY<br>MOXEE, WASHINGTON<br>FILENAME: 10002-1D<br>PROJECT No.: 100-02 DRAWN BY: CCD<br>PRINT DATE: 3/11/07 | Linebach • Funkhouser, Inc.<br>*environmental compliance & consulting* | MAP SHOWING<br>MONITORING WELL LOCATIONS<br>FIGURE: 2 |

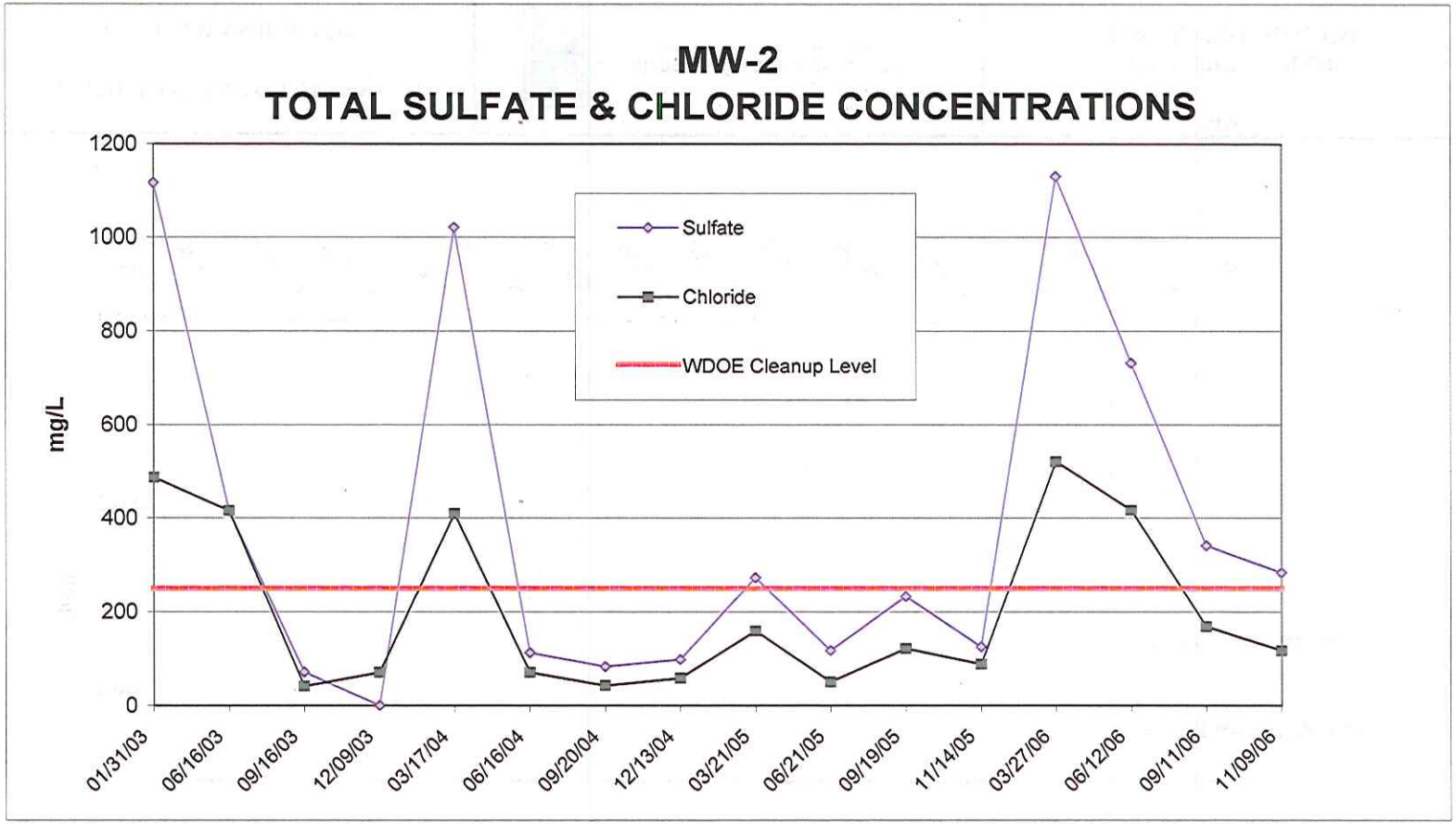
# Appendix A

# Monitoring Well Construction Records

# Appendix B

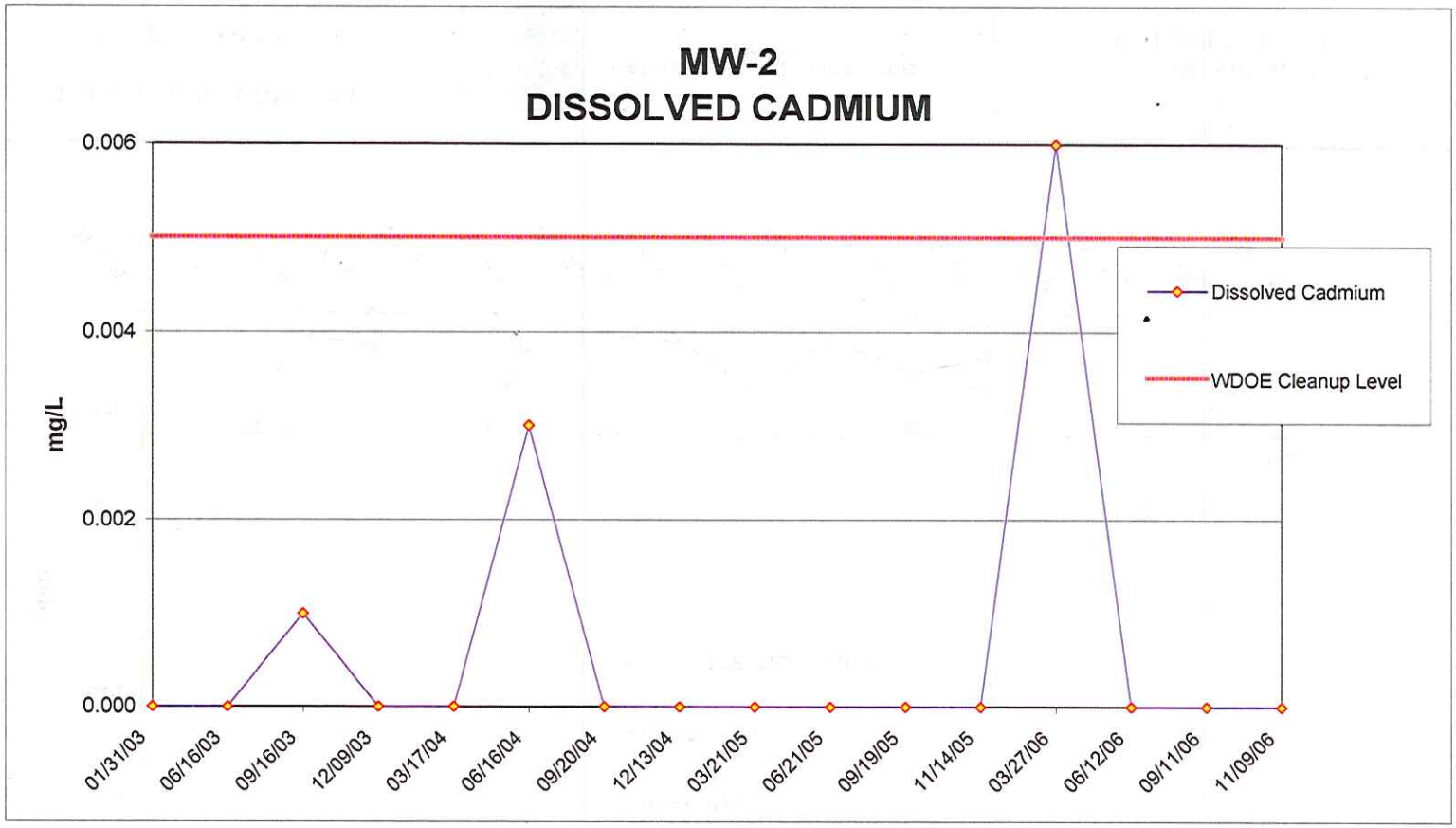
# Time-Trend Plots for Key Downgradient Property Boundary Wells

# MW-2
## TOTAL SULFATE & CHLORIDE CONCENTRATIONS



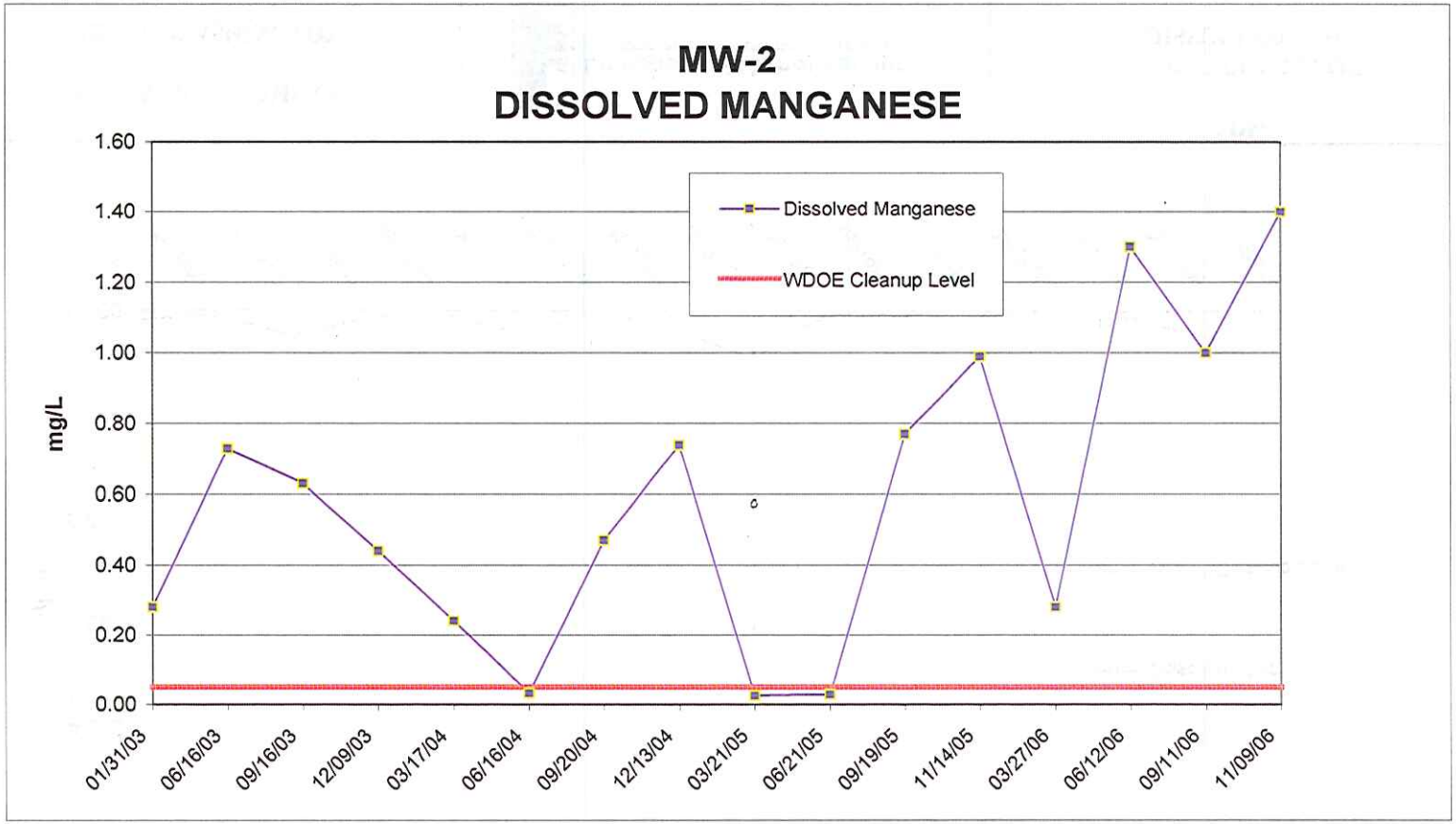

Note: MCL 250 mg/l

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-2<br>TIME TREND PLOT<br>TOTAL SULFATE/CHLORIDE<br>JANUARY 2003 - NOVEMBER 2006 |




Note: MCL 0.005 mg/l Cadmium

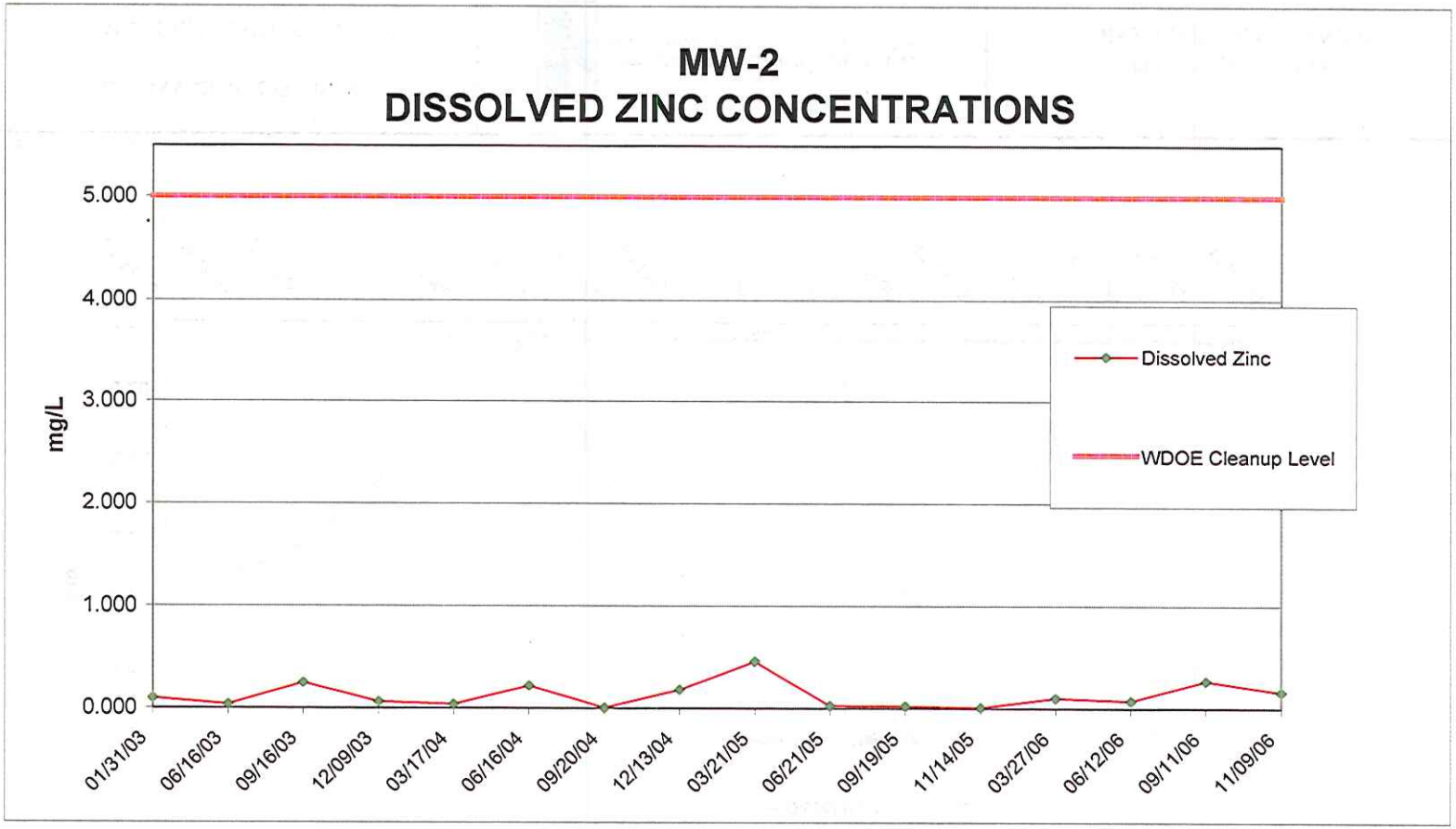
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-2<br>TIME TREND PLOT<br>DISSOLVED CADMIUM<br>JANUARY 2003 - NOVEMBER 2006 |




Note: MCL 0.05 mg/l Manganese

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-2<br>TIME TREND PLOT<br>DISSOLVED MANGANESE<br>JANUARY 2003 - NOVEMBER 2006 |

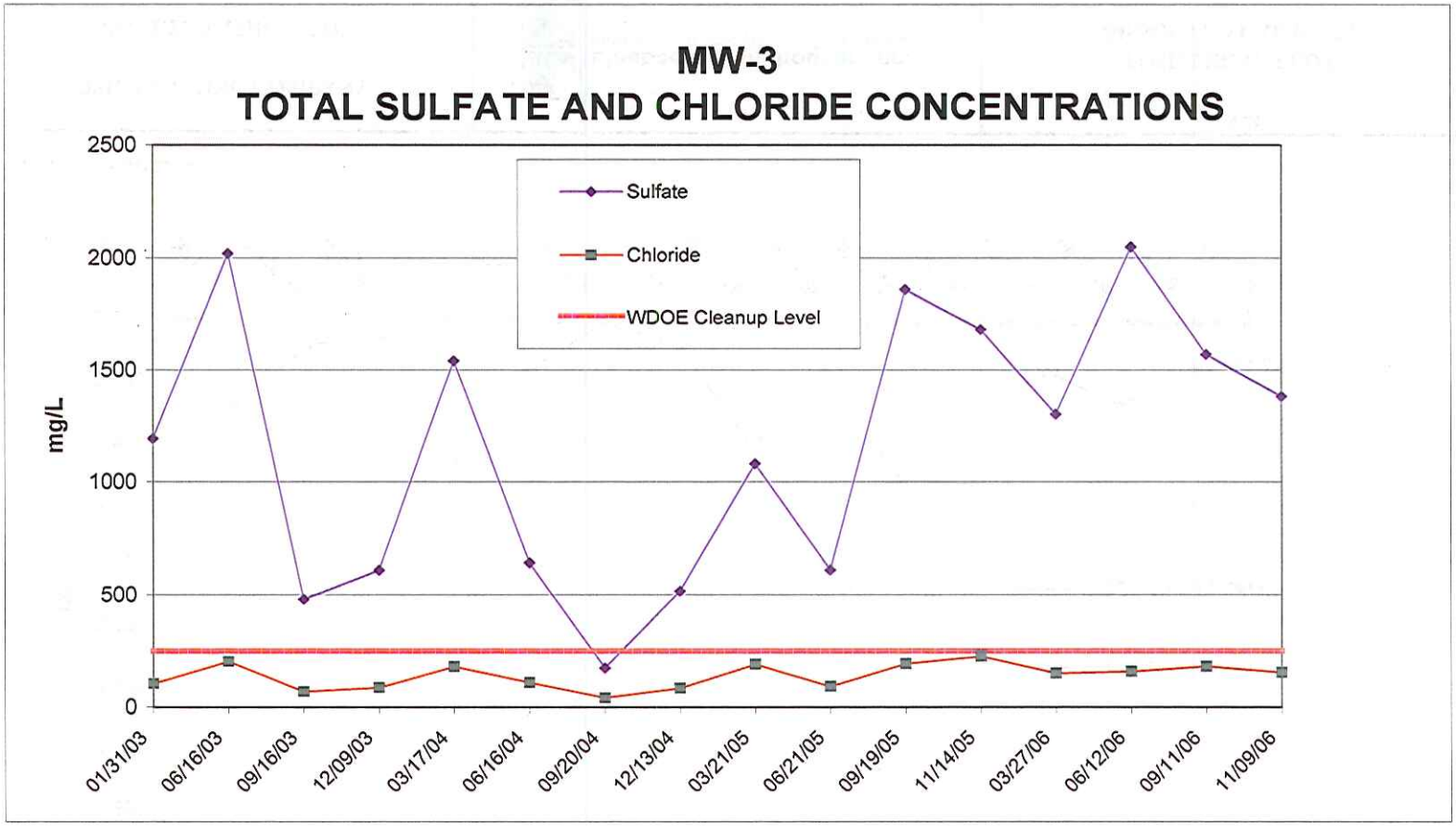
# MW-2
# DISSOLVED ZINC CONCENTRATIONS




Note: MCL 5.0 mg/l

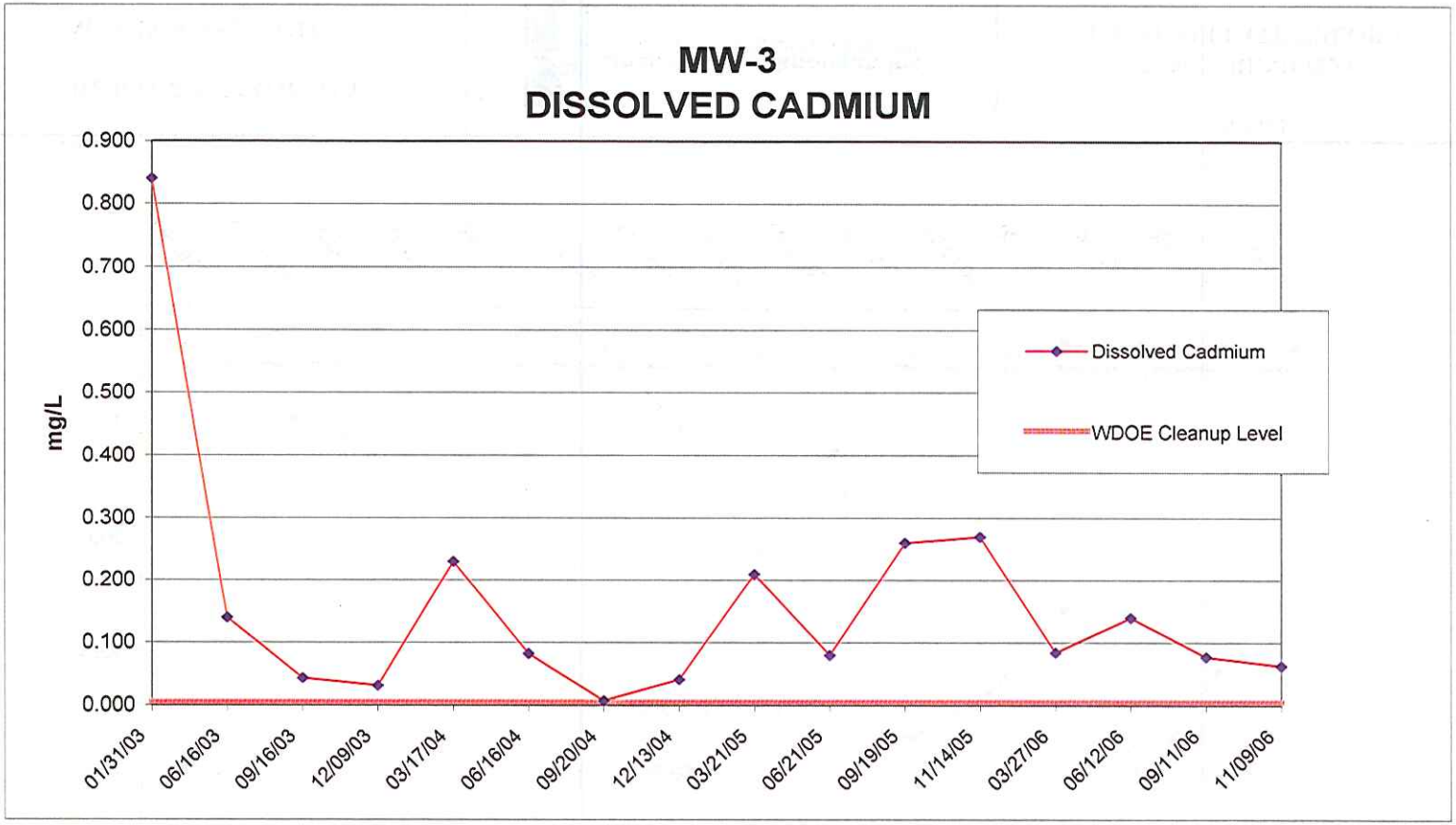
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-2<br>TIME TREND PLOT<br>DISSOLVED ZINC<br>JANUARY 2003 - NOVEMBER 2006 |

# MW-3
## TOTAL SULFATE AND CHLORIDE CONCENTRATIONS



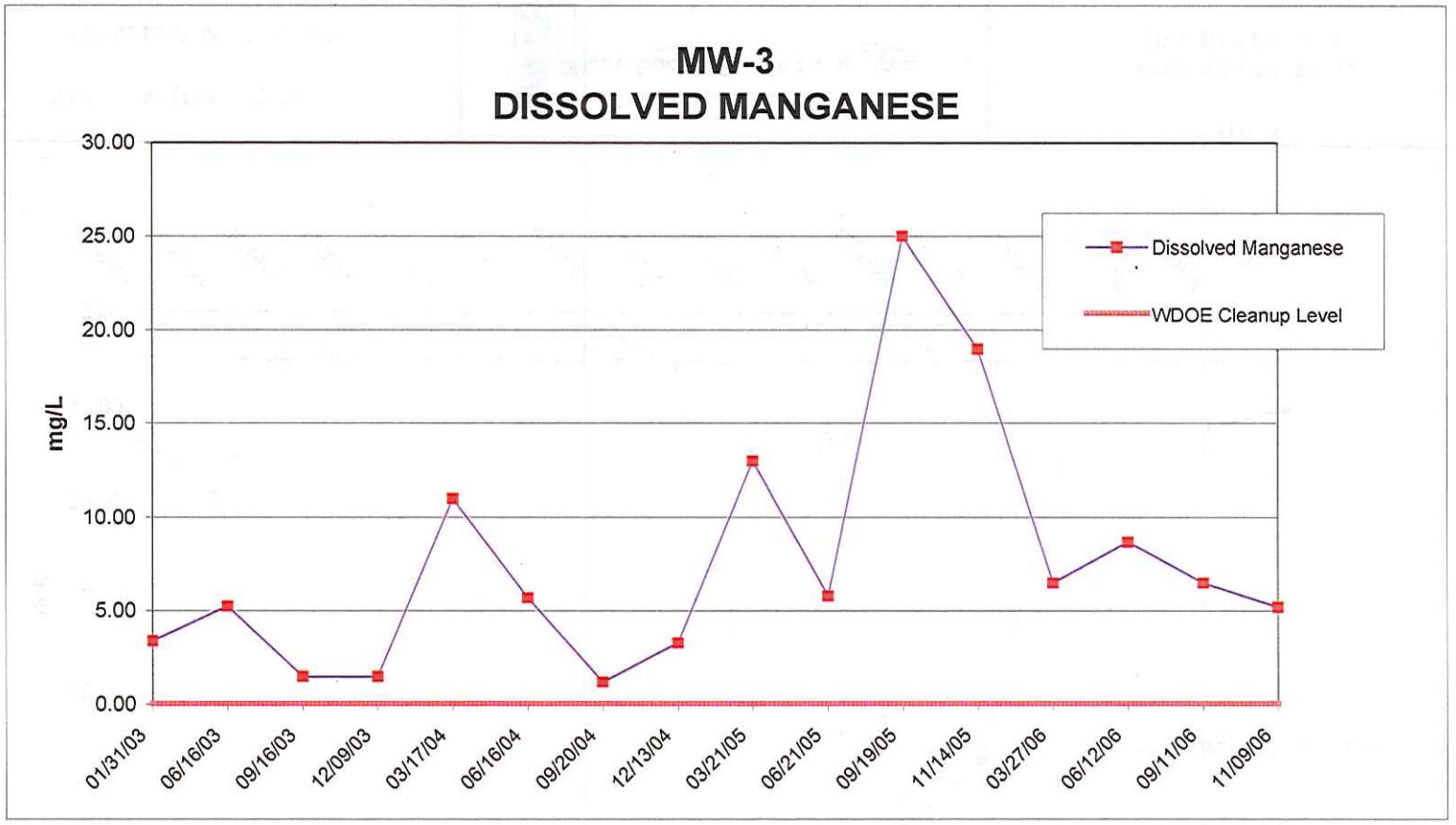

Note: MCL 250 mg/l

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-3<br>TIME TREND PLOT<br>TOTAL SULFATE/CHLORIDE<br>JANUARY 2003 - NOVEMBER 2006 |



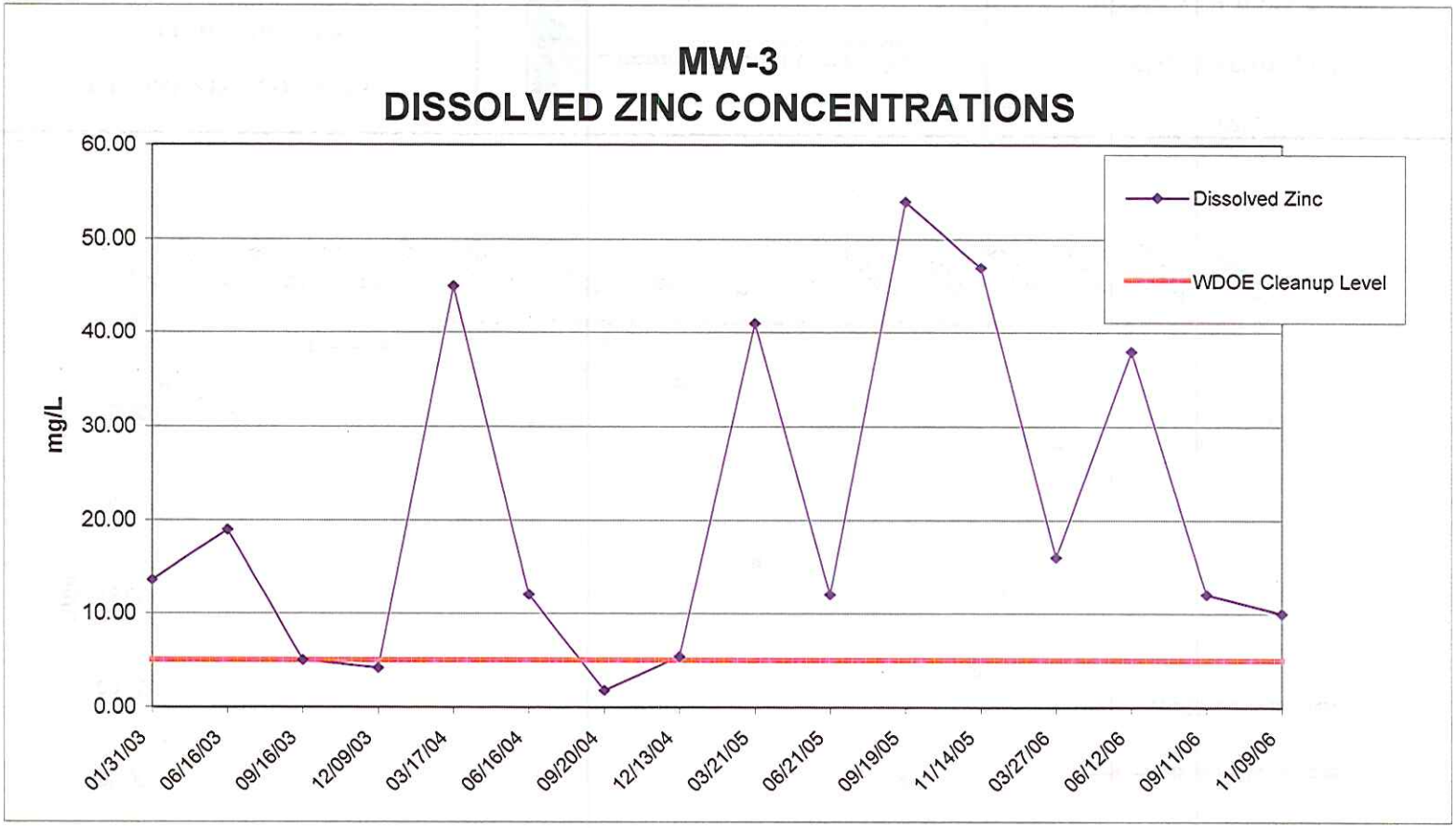

Note: MCL 0.005 mg/l Cadmium

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-3<br>TIME TREND PLOT<br>DISSOLVED CADMIUM<br>JANUARY 2003 - NOVEMBER 2006 |




Note: MCL 0.05 mg/l Manganese

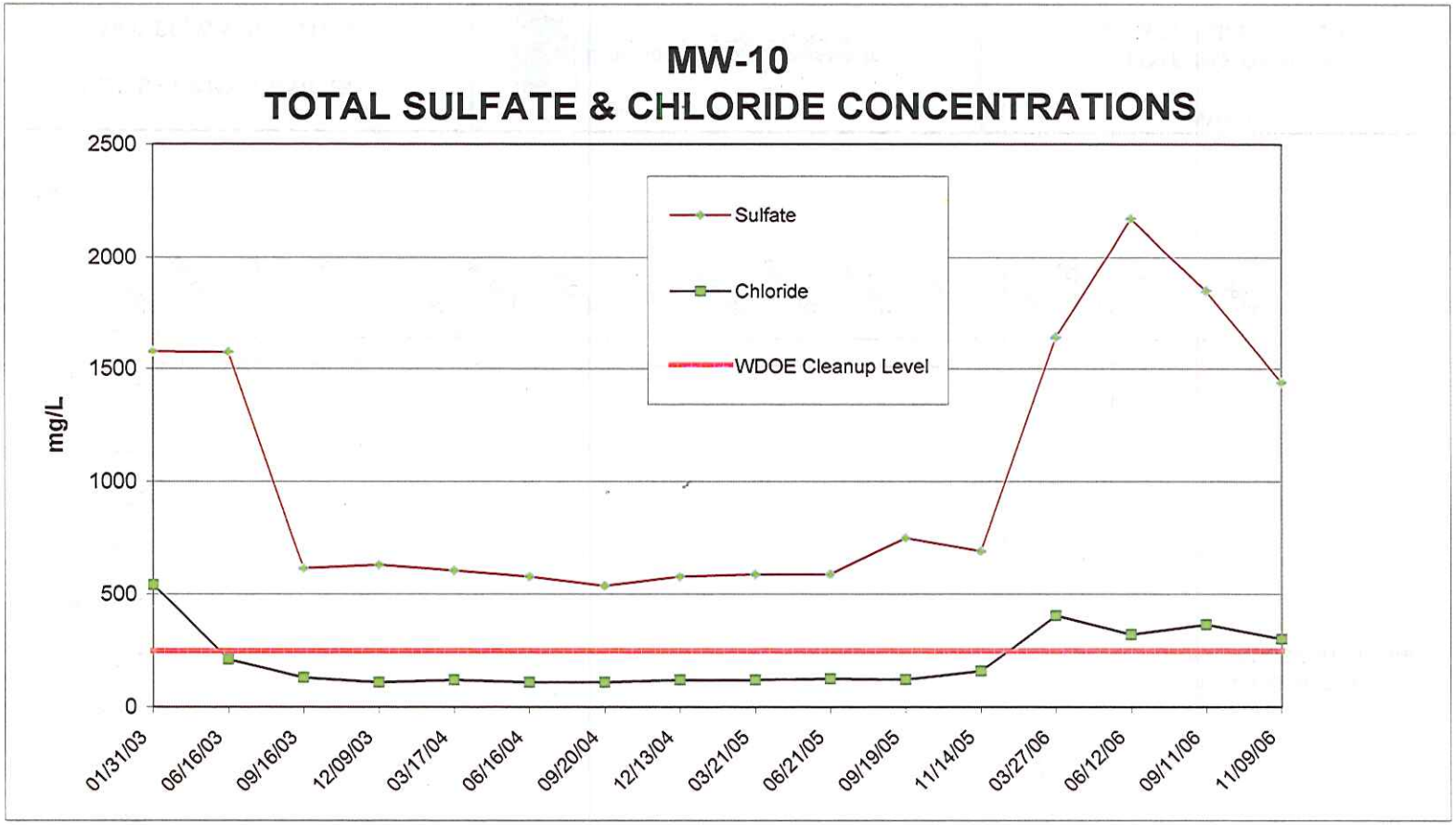
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-3<br>TIME TREND PLOT<br>DISSOLVED MANGANESE<br>JANUARY 2003 - NOVEMBER 2006 |




Note: MCL 5.0 mg/l

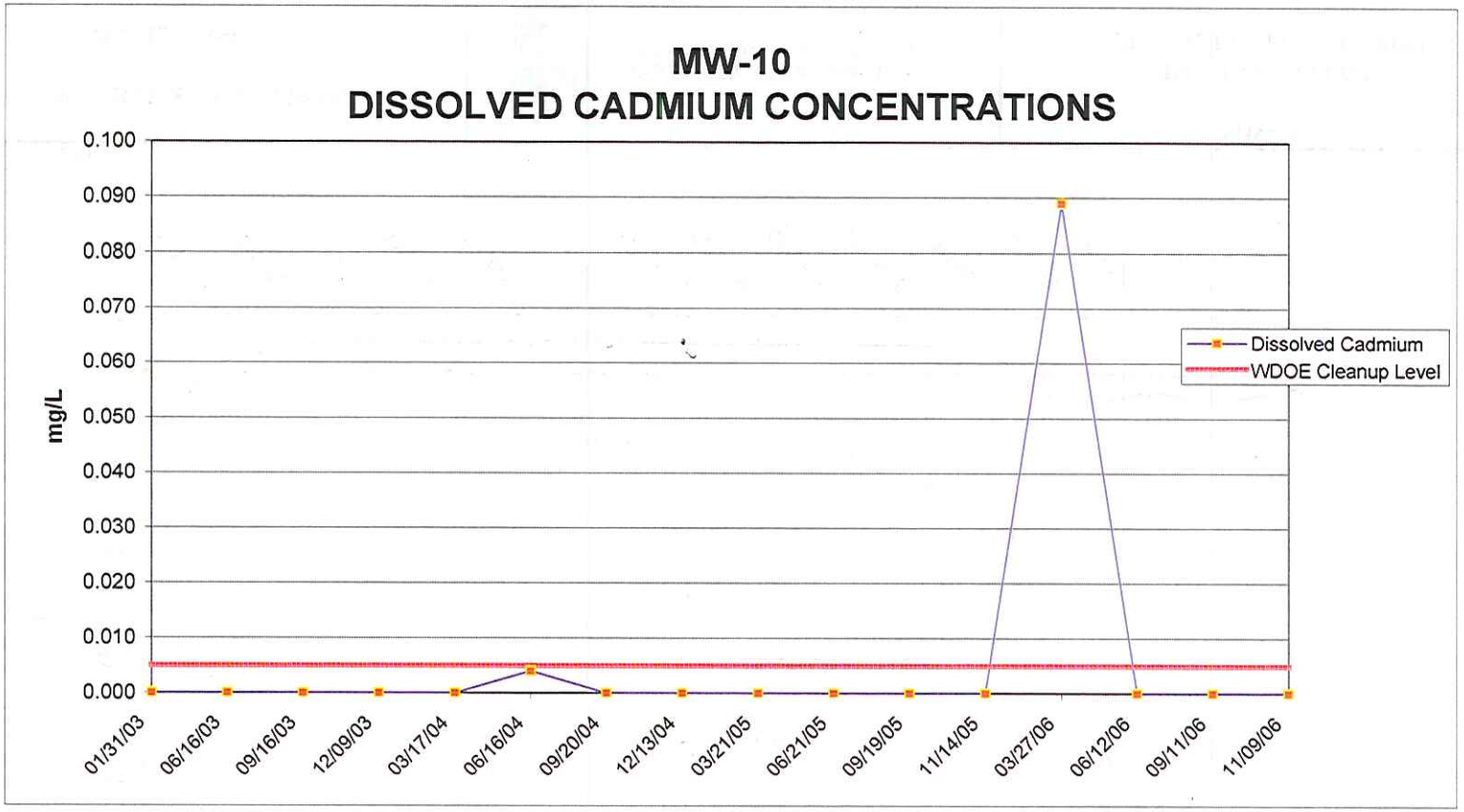
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-3<br>TIME TREND PLOT<br>DISSOLVED ZINC<br>JANUARY 2003 - NOVEMBER 2006 |

# MW-10
## TOTAL SULFATE & CHLORIDE CONCENTRATIONS




Note: MCL 250 mg/l

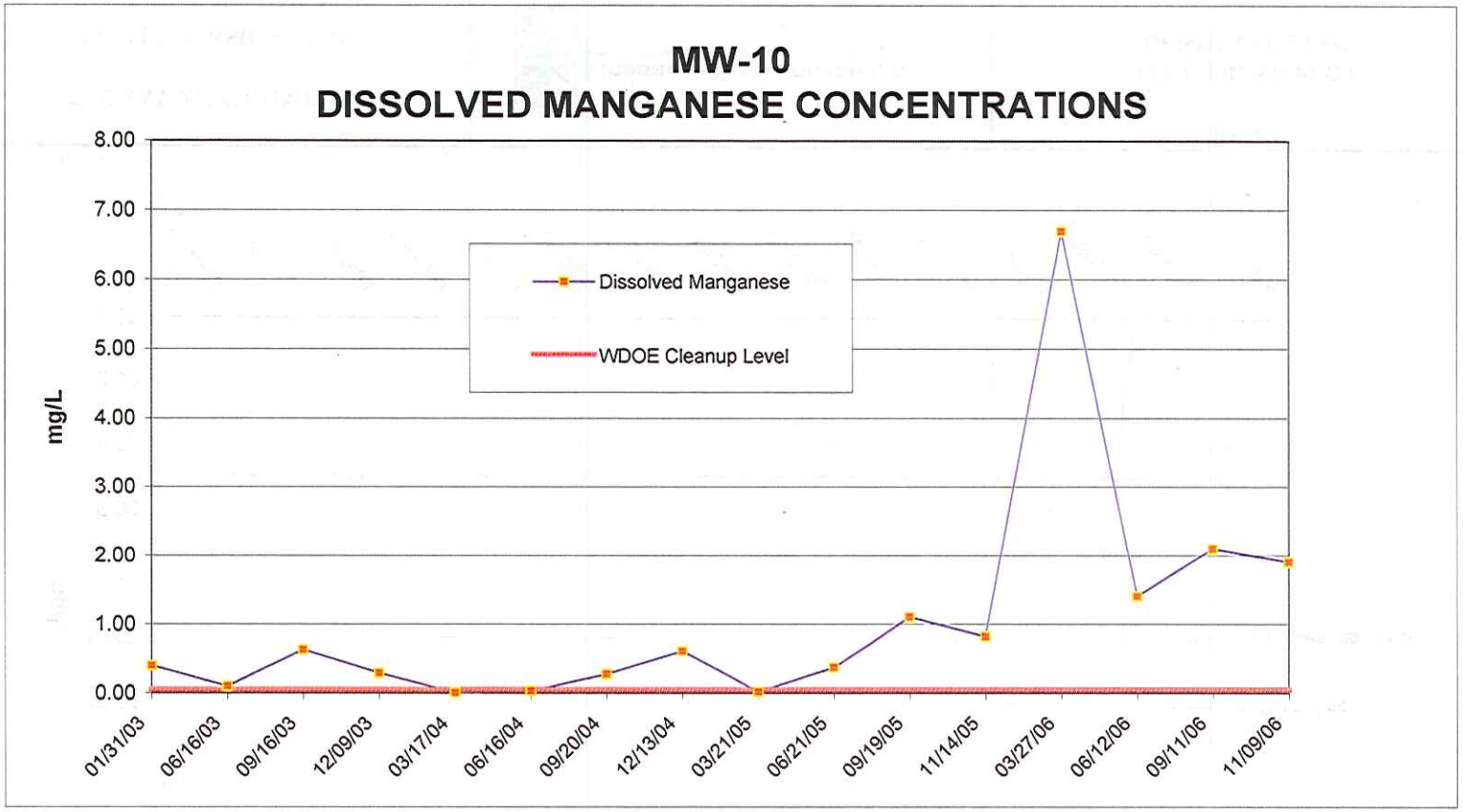
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-10<br>TIME TREND PLOT<br>TOTAL SULFATE/CHLORIDE<br>JANUARY 2003 -NOVEMBER 2006 |




Note: MCL 0.005 mg/l Cadmium

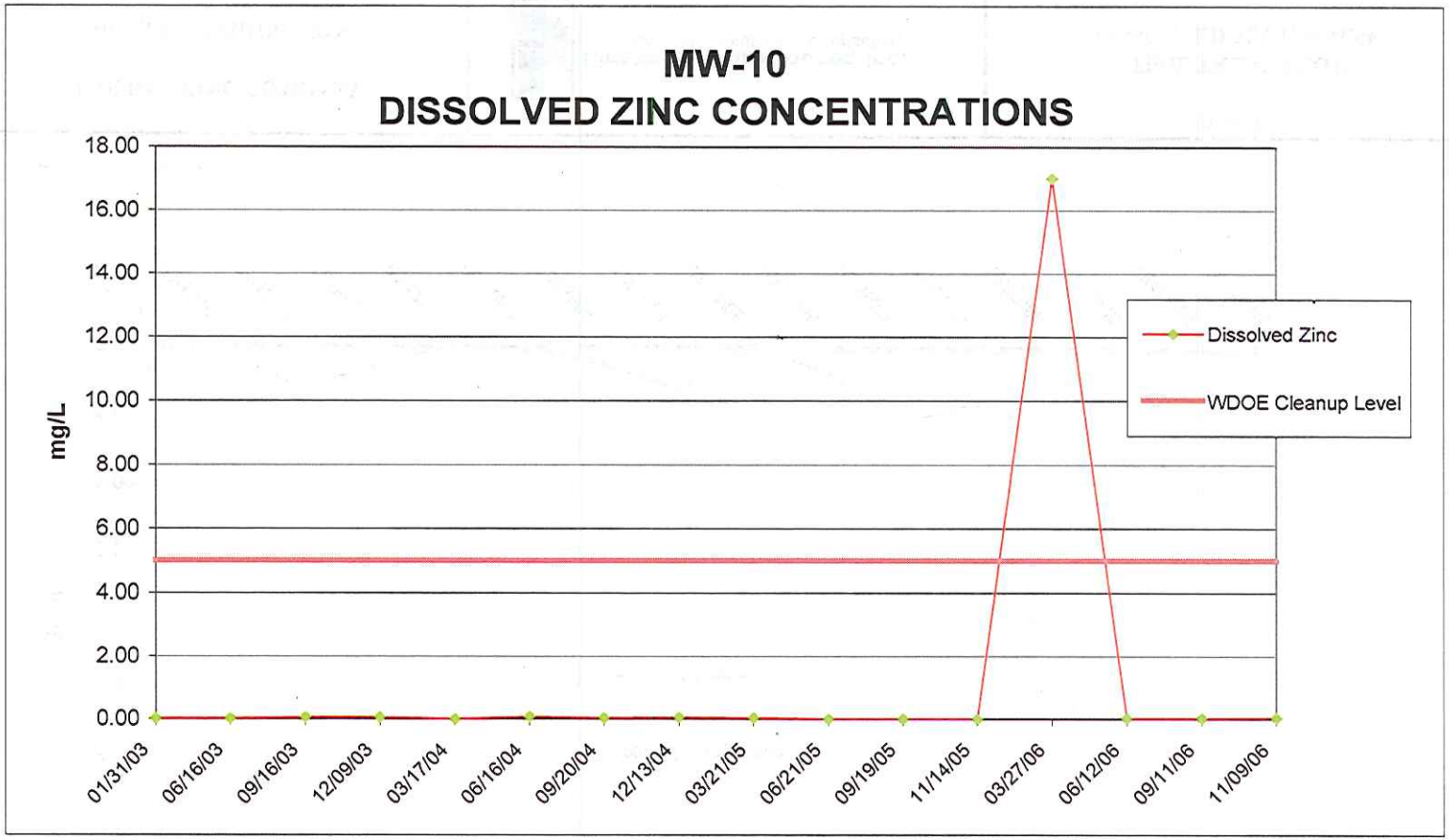
| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-10<br>TIME TREND PLOT<br>DISSOLVED CADMIUM<br>JANUARY 2003 - NOVEMBER 2006 |

# MW-10
# DISSOLVED MANGANESE CONCENTRATIONS




Note: MCL 0.05 mg/l Manganese

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-10<br>TIME TREND PLOT<br>DISSOLVED MANGANESE<br>JANUARY 2003 - NOVEMBER 2006 |




Note: MCL 5.0 mg/l

| | | |
|---|---|---|
| THE BAY ZINC COMPANY<br>MOXEE, WASHINGTON<br>PROJECT NUMBER 100-02 | Linebach ▪ Funkhouser, Inc.<br>*environmental compliance & consulting* | MW-10<br>TIME TREND PLOT<br>DISSOLVED ZINC<br>JANUARY 2003 - NOVEMBER 2006 |

Attachment F

2018 Public Participation Plan

DEPARTMENT OF
ECOLOGY
State of Washington

# Public Participation Plan

## Ultra Yield Micronutrients Facility
## 213 W Moxee Ave
## Moxee, WA 98936

*Facility Site ID: 17964725*
*Cleanup Site ID: 4444*

February 2018

## Publication and Contact Information

This plan is available on the Washington Department of Ecology's Ultra Yield website.

For more information contact:

Central Regional Office
1250 West Alder Street
Union Gap, Washington 98903
509-575-2490

Washington State Department of Ecology - www.ecology.wa.gov

| | |
|---|---|
| o Headquarters, Olympia | 360-407-6000 |
| o Northwest Regional Office, Bellevue | 425-649-7000 |
| o Southwest Regional Office, Olympia | 360-407-6300 |
| o Central Regional Office, Yakima | 509-575-2490 |
| o Eastern Regional Office, Spokane | 509-329-3400 |

***Accommodation Requests:*** *To request Americans with Disabilities Act accommodation including materials in a format for the visually impaired, call Ecology at 360-407-6700. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.*

# Public Participation Plan

## Ultra Yield Micronutrients Facility

Hazardous Waste and Toxics Cleanup Program
Central Region
Washington State Department of Ecology
Union Gap, Washington

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# Table of Contents

# Public Involvement in Contamination Cleanup

Ultra Yield Micronutrients (Ultra Yield) currently operates a micronutrient fertilizer production facility (facility) at 213 West Moxee Ave. in Moxee, Washington. The facility was formerly owned and operated by Bay Zinc Company, Inc. (Bay Zinc) and then by Kronos Micronutrients, L.P. Ultra Yield purchased the assets of Kronos in March of 2017 and began leasing the property upon which the facility is located from the owner, Richard J. Camp, Jr., the former president of Kronos. The Washington State Department of Ecology (Ecology) developed this public participation plan (plan) in cooperation with the Permittees, Ultra Yield and Richard J. Camp Jr. The purpose of the plan is to provide information on how Ecology, the permittees and the public can promote meaningful community involvement during cleanup.

The plan describes ways we will inform the public about investigations and cleanup related activities at this site. We encourage the public to learn about and get involved in decision-making opportunities. This plan identifies how and when the public can get involved during different stages of the site cleanup process.

Specifically, this plan is for an agreed order, draft corrective action plan, and corrective action permit for the Ultra Yield Micronutrients site (site).

## Site contacts

To be included in the site record, comments about the cleanup process must be submitted during comment periods. Questions and informal comments or information about the site's history are welcome anytime.

### Ecology

Tom Mackie, site manager
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903-0009
509-575-2803

Bridgette Valdez-Kogle, public involvement coordinator
360-407-7616

### Permittees

Ultra Yield Micronutrients, Inc.
4530 Professional Circle, Suite 201
Virginia Beach, Virginia 23455

Richard J. Camp Jr.
226 Warren Acres Road
Yakima, Washington 98901

## Public Participation Grants

Grants may be available to neighborhood committees, non-profits, and other groups interested in the site. These funds may be used to provide additional public involvement opportunities, receive technical assistance, and enhance the public's understanding of the cleanup process.

For more information about public participation grants, please contact Lynn Gooding at 360-407-6062. You may also visit the Public Participation Grant website.

# State and Federal Cleanup Laws

Ecology uses the Model Toxics Control Act (MTCA) and accompanying regulations for cleanup activities.

This plan is required under MTCA, a law that passed in 1989. MTCA provides guidelines for contaminated site cleanup in Washington State and sets standards to ensure the cleanup protects human health and the environment.

## Model Toxics Control Act (MTCA)

The state's Model Toxics Control Act (MTCA) began as a grassroots citizen's initiative in 1988, and started the process of systematically cleaning up contaminated sites in Washington. Under MTCA, a current or past property owner or operator may be held responsible for cleaning up contamination on, or coming from, their property to standards that are safe for human health and the environment.

Ecology implements MTCA and oversees cleanups in the state and issues regulations and guidance governing those cleanups. The regulations are found in Chapter 173-340 Washington Administrative Code (WAC). Ecology investigates reports of property contamination, and if the contamination is seen as a significant threat to human health or the environment, the contaminated property is placed on the Hazardous Sites List, and the cleanup process begins.

Public participation is an important part of cleanup under the MTCA process. Participation needs are assessed at each cleanup site according to the level of public interest and the degree of risk posed by the contamination. Individuals who live near the site, community groups, businesses, government, other organizations, and interested parties have the opportunity to get involved by commenting on the cleanup process.

## Hazardous Waste Regulations

There are federal and state regulations governing the management of hazardous wastes. The United States Congress enacted the Resource Conservation and Recovery Act (RCRA), an amendment to the Solid Waste Disposal Act in 1976 to ensure safe management and disposal of municipal and industrial waste generated nationwide. RCRA has been amended several times, including in 1984 with the Hazardous and Solids Waste amendments that expanded the scope and requirements of RCRA. The United States Environmental Protection Agency (EPA), pursuant to the RCRA, 42 U.S.C. Sec. 6901 *et. seq.*, as amended, authorized the State of Washington to administer RCRA. The Washington State Legislature designated Ecology as the State agency with the authority to implement RCRA. Ecology has authority to issue this Permit in accordance with RCW 70.105.130 and is responsible for enforcement of all conditions of this Permit."

The goals of RCRA are to:

- Protect human health and the environment.
- Reduce waste and conserve energy and natural resources.
- Reduce or eliminate generation of hazardous waste as quickly as possible.

Subtitle C of RCRA established a program to handle hazardous wastes from "cradle to grave." Owners and operators of waste treatment, storage, and disposal (TSD) facilities are required to submit a permit application covering all aspects of design, operation, maintenance, and closure of the facility. RCRA requires owners and operators of these facilities to clean up contamination resulting from *past* and *present* practices, which includes practices of previous owners. These cleanup activities are known as corrective action.

Ecology and the U.S. Environmental Protection Agency (EPA) jointly issued a hazardous waste permit to this facility on November 4, 1988 The permit stipulated how wastes stored at the facility were to be managed. After ten years of operation, the permit expired and by 1999, the facility was no longer storing hazardous waste.

In 1999, the EPA conducted a RCRA Facility Assessment (RFA) investigation at the facility. The purpose of the RFA was to identify those areas at the facility where releases of hazardous substances may have been occurring. On November 20, 2000, EPA published a final RCRA RFA Report. In response to the RFA Report, Ecology and Bay Zinc, the former owner and operator, entered into an agreed order for the remediation of soil and groundwater at the facility. Between October 2002 and June 2005, Bay Zinc conducted extensive excavation and off-site disposal of 12,320 tons of contaminated soils. Between 2003 and 2006, Bay Zinc also performed groundwater remediation using a pump-and-treat system. Groundwater monitoring has been on-going at the facility since 1985. Since the facility no longer stores hazardous waste and because residual contamination remains, Ecology is replacing the expired permit to store dangerous waste with a Permit for Corrective Action. The new Permit for Corrective Action addresses how the contamination currently remaining at the site will be addressed.

Federal RCRA and state dangerous waste regulations require public participation throughout all stages of the permitting and cleanup of waste management facilities. Ecology is inviting the public to comment on the draft Permit for Corrective Action, a draft Agreed Order, a draft Corrective Action Plan, and this Public Participation Plan.

# Site History

## Land use

Operating as the Bay Zinc Company, Inc. and Kronos Micronutrients, L.P.., zinc micronutrient fertilizers were produced at this facility from 1972 to 2017. In March 2017, the business was sold to Ultra Yield Micronutrients, Inc., and the land upon which the facility is located was leased to Ultra Yield by the owner, Richard J. Camp, Jr. Several types of industrial processes have been used to produce both liquid and granular zinc fertilizer at the facility. Until 1999, the zinc bearing raw materials included dry, powdery or granular, fly-ash like products, including steel mill flue dust, incinerator ash from combusted tires, and other metallic wastes such as brass dust and zinc fines. By 1999, Bay Zinc had discontinued the use of the steel mill flue dust, incinerator ash and brass dust.

## Past leaks lead to contamination

As a result of past product storage activities, operational practices, and historic liquid zinc sulfate spills, hazardous waste have been released to the environment at the site.

Soils in limited areas are still contaminated with lead, cadmium, and zinc at concentrations above MTCA human and environmental health levels. Groundwater is also still contaminated with chloride, sulfate, manganese, zinc and cadmium at levels that exceed MTCA human and environmental health levels.

## Cleanup plans

### Past cleanup actions

The Bay Zinc Company made significant progress toward cleaning up the property. Over 12,320 tons of contaminated soil and approximately 2.5 million gallons of contaminated water were cleaned up between 2002 and 2005.

Although the remedial work conducted at the facility was extensive, some contaminated soil was left on site beneath buildings and pavement, and groundwater beneath the site remains contaminated.

### Current cleanup efforts

In January 2018, Ecology and the permittees, Ultra Yield and Richard Camp, began negotiations on a new permit and agreed order that will address the environmental contamination that remains at the site. The negotiations concluded with the development of the following draft documents available for public review:

- An Agreed Order
- Corrective action plan
- Corrective action permit
- This Public participation plan

## Area community

The site is located in Moxee, a small city with a population of about 3,338. The site is located in an industrial area of the city, near the railroad and rural Yakima County. The neighboring properties are mostly agriculture, industrial, and commercial. However, there are new housing developments nearby.

Ecology will reach out to community organizations as part of our outreach and provide information in other languages as appropriate following federal guidance.[1] The non-English language most widely spoken in the Moxee area is Spanish. Ecology will provide outreach materials and services in Spanish. We strive to make our public participation efforts as inclusive as possible and welcome your input about how to best reach the nearby community.

The Confederated Tribes and Bands of the Yakama Nation is a Sovereign Nation that owns land nearby. Their land is not affected by the contamination. However, Ecology will ensure that the Yakama Nation will be informed during decision-making process for this site and has ample opportunity to be involved throughout the process on a government-to-government basis.

[1] Guidance to Environmental Protection Agency Financial Assistance Recipients Regarding Title VI Prohibition Against National Origin Discrimination Affecting Limited English Proficient Persons, 69 Fed. Reg. § 35602 (June 15, 2004).

# Public Participation Activities

Members of the public may ask questions, submit informal comments, or share site information at any time. Interested parties do not need to wait for a formal public comment period to contact Ecology.

However, to be included in the formal site record, comments about the Permit for Corrective Action, the Agreed Order, or the Corrective Action Plan must be submitted during formal comment periods. In addition, the public is invited to review site documents before they become final. This is the most direct and influential way to learn more about the site and be involved in the cleanup's decision-making.

## How we share information with the community

### Formal comment periods

During specific stages of the cleanup, Ecology will mail notices about public comment periods to addresses inside the site's "affected area," generally within a 1/4-mile radius of the site and to interested organizations and individuals. These notices will provide general information about the site, contact information for submitting comments, and times and locations of public meetings or hearings or how to request one if not yet scheduled.

Ecology may also develop documents outside of comment periods to keep the community updated on the site's status. These informational documents will be available online and at document repositories. Print copies may be mailed to the nearby community if we feel the message warrants the associated cost and resources.

Comment period notices and other site announcements may also be posted in various locations throughout the community (for example, local businesses, schools, libraries).

In general, we hold 30-day public comment periods. However, if there is a dangerous waste permit associated with the comment period, we will hold a 45-day public comment period. We may extend public comment periods due to public interest.

### Postal mailing list

Ecology creates and maintains a mailing list that includes addresses within a 1/4-mile radius of the site and relevant local, state, and federal government contacts. These people will receive public comment notices when draft documents are available.

We will add individuals, organizations, and other interested parties to the mailing list as requested. If you would like to be added to the mailing list for this site, please contact Bridgette Valdez-Kogle at 360-407-7616.

### Site Register

Public comment periods, events, and other cleanup notices are published in Ecology's *Site Register*. The *Site Register* is available on Ecology's website.

To receive the Site Register by email, please contact Cheryl Ann Bishop at 360-407-6848 or subscribe online.

### Newspaper display ads or legal notices

We announce public comment periods and events in ads or notices published in the Yakima Herald and El Sol de Yakima. We will also place notice on our Public Events Calendar.

### Ecology's website

We maintain a website for the Ultra Yield Micronutrients site. The website provides site information, and you may download cleanup documents.

### Document repositories

During public comment periods, you can find print documents at the following locations:

**The Moxee Library**
255 W. Seattle
Moxee, WA 98936
509-575-8854

**Washington Department of Ecology**
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903-0009

To schedule an appointment, please contact Jackie Cameron at 509-575-2027.

## How to share information with us

### Public comment periods

Formal 30-day comment periods allow interested members of the public to comment on draft documents, legal agreements, and proposed cleanup actions. If there is significant interest, Ecology may extend the public comment period.

We may also identify public concerns and cleanup goals by meeting with and soliciting information from interested community members and organizations. To collaborate with us about this site, please contact Bridgette Valdez-Kogle at 360-407-7616.

Following a comment period, we publish all the input we received and respond to significant comments and questions.

### Public events

We hold public meetings, workshops, open houses, and public hearings based on community interest. These events are held at locations close to the site that meet Americans with Disabilities Act standards. Public meetings, workshops, open houses, and hearings are always announced in advance using a variety of methods.

## Plan Amendments

Ecology developed this plan following MTCA regulations (WAC 173-340-600). We review it as the cleanup progresses and amend it as necessary. You may suggest amendments to Bridgette Valdez-Kogle at 360-407-7616.

This plan includes information for the public regarding opportunities for public involvement and comment. The outreach activities discussed in this section reflect Ecology's current plans for keeping the public informed and providing ways for those interested in the site to communicate their concerns and questions to us.

If you feel the planned outreach activities and mechanisms described in this plan are insufficient, or should otherwise be modified, we will work to find solutions. New outreach activities or outreach tools established as a result can be implemented right away, with or without amending this plan.