B&L Landfill

Groundwater Alternatives Evaluation

Prepared for

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January 2007

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List of Abbreviations and Acronyms

Acronym/Abbreviation	Definition
AOC	Area of Contamination
ARARs	Applicable or relevant and appropriate requirements
ASARCO	ASARCO, LLC
BOF	Basic oxygen furnace material
bgs	Below ground surface
CAAs	Cleanup Action Areas
CAMU	Corrective Action Management Unit
CAP	Cleanup Action Plan
CBN/T Site	Commencement Bay Nearshore/Tideflats Superfund Site
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	Cubic feet per second
COCs	Contaminants of concern
COD	Chemical oxygen demand
Corps	U.S. Army Corps of Engineers
CSM	Conceptual Site Model
CULs	Cleanup levels
CWA	Clean Water Act
DOC	Dissolved organic carbon
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EMNA	Enhanced Monitored Natural Attenuation
EEI	Ecology and Environment, Inc.
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FWS	Free water surface
GAE	Groundwater Alternatives Evaluation
gpd	Gallons per day
gpm	Gallons per minute
HAZWOPER	Hazardous Waste Operations and Emergency Management
I-5	Interstate 5

Acronym/Abbreviation	Definition
LDRs	Land disposal restrictions
LEL	Lower explosive limit
LFG	Landfill gas
MNA	Monitored Natural Attenuation
MSA	Magnuson-Stevens Act
MSL	Mean sea level
MTCA	Washington State Model Toxics Control Act
Murray	Murray Pacific Corporation
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	Net present value
O&M	Operations and maintenance
ORP	Oxidation-reduction potential
OSHA	Occupational Safety and Health Act
PLPs	Potentially liable parties
POTW	Publicly Owned Treatment Works
PRB	Permeable Reactive Barrier
PSCAA	Puget Sound Clean Air Authority
QA/QC	Quality assurance/quality control
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
Redox	Reduction-oxidation
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SEPA	State Environmental Policy Act
SMS	Sediment Management Standards
SR	State route
SRB	Sulfate-reducing bacteria
SSF	Sub-surface flow
SVOCs	Semivolatile organic compounds
TDS	Total dissolved solids

Acronym/Abbreviation	Definition
TPCHD	Tacoma-Pierce County Health Department
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOCs	Volatile organic compounds
WDFW	Washington State Department of Fish and Wildlife
WISHA	Washington Industrial Safety and Health Act
WSDOT	Washington State Department of Transportation

Executive Summary

EXECUTIVE SUMMARY

This Groundwater Alternatives Evaluation (GAE) explores alternatives for addressing groundwater contamination at the B&L Landfill (the Landfill) in Milton, Washington. The Landfill is the subject of a 1989 Consent Decree between the Washington State Department of Ecology (Ecology) and Murray Pacific Corporation (Murray), which resulted in a 1991 Cleanup Action Plan (CAP). The Remedial Action identified in the CAP was substantially completed in 1993, pursuant to a 1991 Enforcement Order directed by Ecology to ASARCO, Inc. (ASARCO), Murray, and Executive Bark Corporation—the Landfill operator. Remediation of groundwater contamination was reserved as a contingency action and was not a component of the 1993 construction. This document presents a comparative evaluation of potential alternatives to address groundwater contamination that is now known to exist in a wetlands area north of the Landfill. The selected alternatives will be added to the existing remedy for the site.

BACKGROUND AND PROBLEM STATEMENT

The B&L Landfill primarily received wood waste generated from the sweeping of log sort yards in Tacoma, Washington in the late 1970s and early 1980s. Much of this wood waste contained slag byproduct from the ASARCO copper smelter in Ruston, Washington. The slag was sold to the log yard operators (including Murray) by ASARCO for use as ballast to provide a durable rolling surface for heavy equipment in the yards. ASARCO misrepresented the slag to be a safe, inert substitute for the gravel that had been used traditionally as ballast material. In fact, the slag contained significant amounts of metals, including arsenic. When runoff, infiltrating rainwater or groundwater came into contact with the slag, arsenic leached from the slag and dissolved into the water. In the early to mid-1980s, environmental regulators and public health officials became aware that arsenic in runoff from the log yards and the Landfill was a source of contamination to surface water, including Hylebos Creek.

In 1990, a remedial investigation and focused feasibility study (RI/FS) performed by Murray defined the nature and extent of contamination at the Landfill and recommended a remedial approach. This approach included the consolidation and capping of Landfill materials with installation of a bottom liner; ditch remediation; installation of landfill gas collection wells and a leachate monitoring system; installation of a stormwater collection pond and infiltration trenches; institutional controls (site fencing); and routine monitoring of surface water and groundwater. The remedy embodied in the 1991 CAP substantially met the elements of the U.S. Environmental Protection Agency's (USEPA) Presumptive Remedy for a municipal landfill cleanup and was very similar to the preferred alternative listed in the RI/FS. Its major difference was that it omitted a liner, assuming that Landfill consolidation and capping alone would be sufficiently protective of groundwater at the site.

Both the RI/FS and the CAP rejected the "dig and haul" remedial alternative, by which the Landfill material would have been excavated and removed to a hazardous waste disposal facility, as being disproportionately expensive, compared to other alternatives. A reevaluation of the cost of this alternative confirms that it remains disproportionately expensive nor would it address the underlying groundwater plume.

In 1991, a judgment in a federal lawsuit found that ASARCO had failed to inform the log yard operators of the dangers presented by the slag. ASARCO was held liable for 79 percent of the costs to clean up the Landfill and the Landfill operator was assigned 14 percent. The remaining responsibility was assigned to Murray (7 percent). When the operator later became insolvent, ASARCO and Murray agreed to split its residual responsibility, which made ASARCO liable for approximately 92 percent and Murray for 8 percent of the cleanup. ASARCO and its consultant agreed to take the lead role in the implementation of the selected remedy and the long-term monitoring.

In 2001, ASARCO presented monitoring data to Ecology that indicated arsenic-contaminated groundwater was continuing to migrate into agricultural drainage ditches adjacent to the Landfill, and new wells identified a much larger groundwater plume (than previously realized) existed in the wetlands north of the Landfill. ASARCO submitted a Contingency Plan that proposed a study of potential remediation alternatives for groundwater. ASARCO did not complete implementation of the plan. In February 2005, a Second Amendment to the 1991 Enforcement Order required the implementation of activities outlined in the 2001 Contingency Plan. ASARCO declared bankruptcy in August 2005, and Murray stepped forward and assumed responsibility for the development of a remedial strategy to address the groundwater contamination—including a substantial investigative effort to understand current conditions at the Landfill and adjacent wetlands.

EVALUATION OF ALTERNATIVES FOR GROUNDWATER

This report is based on data collected pursuant to the monitoring program outlined in the Contingency Plan and on additional information developed by Murray and Floyd|Snider during the 2006 field season. The report defines three distinct but interrelated Cleanup Action Areas (CAAs) for implementation of a groundwater remedy: (1) the Landfill and perimeter ditches, (2) the wetlands area north of the Landfill, and (3) the End-of-Plume area along 12th St. E. (an abandoned right-of-way that allows access into the wetlands).

A broad range of potentially available technologies are identified in the report for each of the three action areas. These alternatives are screened on the bases outlined in WAC 173-340-360, including effectiveness in meeting remedial objectives; implementability (either technical or administrative), and cost compared to other feasible alternatives. Retained alternatives are evaluated in detail with respect to their overall protectiveness of human health and the environment; regulatory compliance; long and short-term effectiveness; permanence; reductions in contaminant toxicity volume and mobility; implementability; and cost. Based on this analysis, the evaluation report presents three preferred remedies for addressing groundwater contamination associated with the three CAAs. These remedies, in combination, will form a comprehensive remedy for groundwater at the site.

THE PREFERRED REMEDY

For the B&L Landfill itself, the remedy will consist of source control to eliminate leachate discharge and contain groundwater beneath the landfill that is already contaminated with arsenic. This will be achieved by the installation of a perimeter slurry wall around the refuse that is tied into both the existing landfill cap and a low-permeability unit (the Upper Silt Aquitard) located 15 to 20 feet below the base of the Landfill. Following installation of the slurry wall,

contaminated sediments in the adjacent agricultural drainage ditches will be excavated. It is assumed that these ditches eventually will be buried or rerouted as part of development of adjacent parcels by others.

Within the wetlands area, a short-term groundwater pump-and-treat approach will be used to remove a mass of dissolved arsenic from the groundwater plume beneath the wetlands. Arsenic in this area is slowly partitioning onto soils, but much still remains in groundwater, which seasonally discharges to land surface and which migrates to the End-of-Plume area. The goal of this effort is to decrease concentrations of arsenic discharging to land surface and to limit downgradient migration of the arsenic.

At the End-of-Plume area along the unused 12th St. E. right-of-way, the preferred remedy will be in-situ treatment to precipitate out dissolved arsenic followed by monitored natural attenuation. In-situ treatment will accelerate the natural restoration time frame and increase the permanence of the remedy. New monitoring wells located in the downgradient reaches of the plume and sentinel wells (beyond the limits of the plume) will ensure the effectiveness of this remedy component.

The preferred remedy in each Action Area will include the establishment and/or continuation of institutional controls (i.e., signs, fencing, and land use restrictions) to limit public access to potentially contaminated media. Implementation of the remedies will require the cooperation of impacted landowners and stakeholders to allow for the construction, operation, and long-term maintenance of the various remedial components.

The combination of aggressive source control at the Landfill, reducing the mass of the wetlands plume, and in situ treatment at the downgradient edge to prevent further migration of the plume will all serve to meet the Washington State Model Toxics Control Act (MTCA) requirements for cleanup and to protect current and future potential downgradient receptors from arsenic releases from the B&L Landfill.