EVERETT SMELTER SITE

Everett,Washington

INTEGRATED
FINAL CLEANUP ACTION PLAN
and
FINAL ENVIRONMENTAL IMPACT STATEMENT
for the
UPLAND AREA

Volume I

Puget Sound Reduction Works facility looking east. December 10, 1895.
Duryee Collection. Courtesy of Everett Public Library

by
Washington State Department of Ecology

November 19, 1999

Smelter at Everett before 1907.
Courtesy of Everett Public Library.

INDEX TO
EVERETT SMELTER SITE
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This document consists of four volumes.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office, 3190 - 160th Ave. S.E. • Bellevue, Washington 98008-5452 • (206) 649-7000

Cover Letter

November 19, 1999

RE: Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area, Everett Smelter Site, Everett, Washington

This document presents the Washington State Department of Ecology's selected cleanup actions for the Upland Area of the Everett Smelter Site, Everett, Washington.

The Everett Smelter Site is a portion of northeast Everett with soil contaminated by arsenic, lead, and other metals. The contamination was caused by emissions from the Everett Smelter between 1894 and 1912 and by material left behind when the smelter was demolished between 1912 and 1915. The site is divided into a Lowland Area, which is low-lying land bordering the Snohomish River, and an Upland Area, which is more elevated land away from the river. The Upland Area is further divided into the Former Arsenic Trioxide Processing Area, the portion of the historical smelter facilities used for processing arsenic trioxide, and the Peripheral Area, which surrounds the Former Arsenic Trioxide Processing Area. Land use in the Upland Area is now residential, commercial, and recreational.

Contamination is to be cleaned up under the authority of the Model Toxics Control Act, Chapter 70.105D RCW.

Arsenic and lead in soil are associated in a manner such that cleaning up arsenic will result in cleanup of lead and other metals as well. Soil with arsenic concentrations of up to 73 per cent is present in the Former Arsenic Trioxide Processing Area. The high concentrations are due to the presence of spilled arsenic trioxide product and flue dust which remains on-site. Soil with lesser concentrations of arsenic (less than 1,000 mg/Kg, and generally less than 500 mg/Kg) exists in the surrounding area peripheral to the Former Arsenic Trioxide Processing Area, which is called the Peripheral Area.

The primary choice to be made among cleanup alternatives was whether: (1) to send all contaminated soil to an **Off-Site Disposal** facility; (2) to send highly-contaminated soil from the Former Arsenic Trioxide Processing Area (greater than 3,000 mg/Kg arsenic) off-site and consolidate lesser contaminated soil excavated from the Peripheral Area in a **Consolidation Facility** constructed within the Former Arsenic Trioxide Processing Area; or (3) to send only the **most** highly contaminated (greater than 20,000 mg/Kg arsenic) soil off site and consolidate both lesser contaminated soil from the Peripheral Area and highly contaminated soil (3,000 to 20,000 mg/Kg arsenic) from the Former Arsenic Trioxide

Processing Area in an **On-Site Containment Facility** within the Former Arsenic Trioxide Processing Area.

A choice also had to be made whether to require compliance with regulatory cleanup standards in all contaminated soils throughout the site or to allow a **containment remedy** to be used in yards of residences in the Peripheral Area surrounding the Former Arsenic Trioxide Processing Area. Regulatory requirements provide that soil within 15 feet of the ground surface with contaminant concentrations exceeding the cleanup level of 20 mg/Kg arsenic be cleaned up to protect against human exposure via direct contact; however, the regulation also provides that a containment remedy may be used, provided a compliance monitoring program ensures the long-term integrity of the containment system. In considering a containment remedy, decisions had to be made regarding what constitutes sufficient containment.

The selected cleanup actions include: (1) Excavation and replacement with clean soil of all accessible soil with arsenic concentrations exceeding the cleanup level of 20 mg/Kg which is within 12 inches of the surface; (2) **Containment** of accessible contaminated soils beneath a depth of 12 inches by 12 inches of clean soil and of inaccessible soils by buildings, pavement, and other appropriate barriers to contact; (3) Off-site disposal of all highly contaminated soil (arsenic exceeding 3,000 mg/Kg), which occurs within the Former Arsenic Trioxide Processing Area; (4) Construction of a **Consolidation Facility** within the Former Arsenic Trioxide Processing Area for disposal of less-contaminated soil excavated from the surrounding Peripheral Area, with less contaminated soil which cannot be accommodated within the volume capacity of the Consolidation Facility being sent off-site to a permitted landfill; (5) Institutional controls to maintain the integrity of the cleanup actions; (6) Monitoring to evaluate whether the cleanup actions are meeting their goals; and (7) Contingency plans for additional cleanup actions if monitoring indicates the cleanup is not meeting its goals.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Final Environmental Impact Statement

Everett Smelter Site, Upland Area Cleanup

Description of Proposal: Clean up accessible soils contaminated with arsenic, lead, and lesser amounts of other metals (cadmium, antimony, mercury, and thallium) within the Upland Area of the Everett Smelter Site. Site a consolidation facility to contain contaminated soils on site with concomitant land use changes by the City of Everett to accommodate the siting of the facility. (Refer to Fact Sheet 24 for more information.)

Location: Everett, Washington.

Proposed Date of Implementation: Begin April 2000.

Lead Agency: Washington State Department of Ecology, 3190 160th Avenue SE, Bellevue, WA 98008-5452.

Responsible Official: Tim Nord (Contact: David L. South, 425-649-7200 dsou461@ecy.wa.gov.

Agency Action: Issuance of the *Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area of the Everett Smelter Site*.

Required Licenses: None. MTCA cleanups are exempt from the procedural requirements of state and local laws which would require permits to be obtained. RCW 70.105D.090. Ecology is to ensure that remedial actions comply with the substantive provisions of laws which would require permits but for this exemption. Ecology will discuss substantive requirements for conducting cleanup operations with state agencies, including other Ecology Programs, and with local governments as appropriate and ensure the substantive provisions of appropriate requirements are met.

Authors and Principal Contributors and Subject Area:

Blum, Michael. Ecology, TCP, SWRO. Attachment B1 – New Science Review.

Dagel, Mark. R.G. SAIC. Appendix A – Evaluation of SEPA Scoping Elements.

Feldcamp, Michael. Esq. Ecology, TCP, HQ. Appendix B – Responsiveness Summary.

Glass, Gregory L. Environmental Consultant. Attachment B1 – New Science Review.

Jech, Daryl. P.E. SAIC. Appendix A – Evaluation of SEPA Scoping Elements.

Kennedy, Cynthia. Preston Gates & Ellis. Land Use Analysis.

Landles, Robert. City of Everett. Land Use Analysis.

McCormack, Craig. Ph.D. Toxicologist, Ecology, TCP, HQ. Attachment B1 – New Science Review.

Pearman, Douglas. SAIC. Appendix A – Evaluation of SEPA Scoping Elements.

South, David L. Ph.D., P.E. Site Manager, Ecology, TCP, NWRO. FCAP/FEIS main text and Appendix B – Responsiveness Summary.

Turk, Ted. Ph.D. SAIC. Appendix A – Evaluation of SEPA Scoping Elements.

Weiner, Kenneth. Esq. Preston Gates & Ellis. Land Use Analysis.

White, Jim W. Ph.D. Washington State Department of Health, Toxicologist. Attachment B1 – New Science Review.

Date of Issue: November 19, 1999.

Date of Final Action: The date of Ecology's final cleanup decision is November 19, 1999. The date of the City of Everett's final action (decision on a change in the comprehensive plan and land use designation) is expected in 2000.

Subsequent Environmental Review: This SEPA action is not part of a phased review. Future development within the site is not part of the cleanup actions; such development may require SEPA review, but not as part of these cleanup actions. A cleanup action plan for the Lowland Area of the Everett Smelter Site is anticipated to be issued in 2001.

Location of Documents: Washington State Department of Ecology, Central Files, 3190 160th Avenue SE, Bellevue, WA; Everett Public Library, Reference Desk, 2702 Hoyt, Everett, WA; Snohomish Health District, 3020 Rucker, Everett, WA; Asarco Information Center, 545 Hawthorne, Everett, WA. The documents may also be viewed and downloaded from the Internet (http://www.wa.gov/ecology/tcp/cleanup.html).

Cost: $250 for printed report; $10 for CD. Contact: Ecology, Central Files, Call Sally Perkins at 425-649-7190 or sper461@ecy.wa.gov.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Commitment to Cleanup:
Final cleanup plans available

Everett Smelter Site

Fact Sheet 24

The Washington State Department of Ecology (Ecology) has finalized the cleanup plan for the Upland Area of the Everett Smelter Site. The cleanup actions that have been selected are described in the *Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area* (FCAP/FEIS).

The site is a portion of northeast Everett, Washington, which is contaminated by arsenic, lead, and other metals. The contamination was caused by emissions from the Everett Smelter between 1894 and 1912, and by material left behind when the smelter was demolished between 1912 and 1915. The property was sold in various parcels between 1915 and 1936, and homes were built on many of the parcels.

Draft cleanup plans were presented to the public for comment in January 1999. Ecology received comments from 90 citizens and other interested persons. Ecology carefully considered all the comments received and has responded to them. The FCAP/FEIS includes the Responsiveness Summary prepared to address the comments.

The FCAP/FEIS has integrated State Environmental Policy Act (SEPA) requirements with the cleanup plan and includes an evaluation of the environmental elements (i.e., impacts to ground water, surface water, etc., or impacts due to traffic, noise, etc.) identified during the SEPA scoping process.

The final cleanup plan calls for the following actions:

- Remove accessible contaminated soil that is within 12 inches of the surface with arsenic levels above 20 mg/Kg. Replace with clean soil.

- Remove accessible contaminated soil that is below 12 inches with arsenic above certain specified levels. Replace with clean soil.

- Remove highly contaminated material within the Former Arsenic Trioxide Processing Area (also known as the fenced area) from the neighborhood.

- Construct a consolidation facility within the Former Arsenic Trioxide Processing Area to contain the less contaminated soil removed from the yards in a way that will leave the land able to be developed for future commercial, recreational, and multi-family uses.

- Leave inaccessible contaminated soil on site, contained beneath existing permanent structures and pavement.

- Implement measures to address adverse environmental impacts associated with cleanup activities and the future use of the property where a consolidation facility will be located.

- Implement institutional controls to manage contamination left on site.

- Protect ground water and surface water by removing contaminated soil.

- Monitor to evaluate whether the cleanup actions are meeting their goals.

- Develop contingency plans for additional cleanup actions if monitoring indicates the cleanup is not meeting its goals.

Ecology's next step is to issue an Enforcement Order to ASARCO Incorporated (Asarco), the party identified as liable for the contamination at the site. The order will direct Asarco to implement the cleanup actions. Ecology anticipates the order will be presented for a 30-day public comment period in January 2000.

The schedule for implementing the cleanup actions will depend upon whether Asarco complies with the Enforcement Order and the availability of funding if Ecology conducts the cleanup actions.

Ecology continues to be committed to clean up this site and is pursuing additional funding from the Legislature to conduct cleanup in the Summer of 2000 should Asarco refuse to comply with the Enforcement Order.

You can view the FCAP/FEIS

Information Repositories

Everett Public Library, 2702 Hoyt, Everett
Snohomish Health District, 3020 Rucker, Everett
Asarco Information Center, 545 Hawthorne, Everett
Department of Ecology, 3190 160th Ave. SE, Bellevue

Obtain your own copy

Call Ecology Central Files at 425-649-7190.
Cost: $250 for printed document; $10 for CD.

View the FCAP/FEIS on the Internet at http://www.wa.gov/ecology/tcp/cleanup.html.

Ecology Contact: Susan Lee, Public Involvement, 425-649-7138 or slee461@ecy.wa.gov.

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List of Acronyms and Abbreviations

ARARs	Applicable or Relevant and Appropriate Requirements
Asarco	ASARCO Incorporated
CAP	Cleanup Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act – The federal Superfund law.
DCAP/DEIS	Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EMC	Everett Municipal Code
EPA	U.S. Environmental Protection Agency
FCAP/FEIS	Integrated Final Cleanup Action Plan and Final Environmental Impact Statement
FS	Feasibility Study
GIS	Geographic Information System
GMA	Growth Management Act
IEUBK model	Integrated Exposure Uptake Biokinetic model
mg/Kg	milligrams per kilogram (same as parts per million)
mg/L	milligrams per liter (same as parts per million)
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
OCF	On-Site Containment Facility
PLP	Potentially Liable Person
PSAPCA	Puget Sound Air Pollution Control Authority
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SEPA	State Environmental Policy Act
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TWG	Technical Work Group
µg/L	micrograms per liter (same as parts per billion)
WAC	Washington Administrative Code

Declarative Statement

Consistent with Chapter 70.105D RCW, "Model Toxics Control Act," as implemented by Chapter 173-340 WAC, "Model Toxics Control Act Cleanup Regulation," it is determined that the selected cleanup actions are protective of human health and the environment, attain federal and state requirements which are applicable or relevant and appropriate, comply with cleanup standards, provide for compliance monitoring, use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns raised during public comment on the Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement.

_____

David L. South, Site Manager, Northwest Regional Office — Date

_____

Tim Nord, Section Manager, Toxics Cleanup Program — Date

Environmental Summary

Introduction

The Everett Smelter Site is a portion of northeast Everett contaminated principally by arsenic and lead, with lesser amounts of other metals (cadmium, antimony, mercury, and thallium). The contamination was caused by emissions from the Everett Smelter between 1894 and 1912, and by material left behind when the smelter was demolished between 1912 and 1915. Figure ES-1 shows the regional location of the site.

The site is divided into Upland and Lowland areas (Figure ES-2). This Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area summarizes the environmental issues in the Upland portion of the site and alternative actions evaluated to address those issues. It describes the cleanup actions selected by the Washington State Department of Ecology and the rationale used to select them.

The Upland portion of the site is divided into two areas: the Former Arsenic Trioxide Processing Area and the Peripheral Area. The Former Arsenic Trioxide Processing Area is the area in which arsenic trioxide was produced during smelter operations. Very high concentrations of arsenic occur in this area. Homes in this area, which is zoned for residential use, have been purchased by ASARCO Incorporated, the last operator of the smelter, and demolished. The area is currently fenced.

The Peripheral Area is an area of residential, commercial, and recreational land use outside of the Former Arsenic Trioxide Processing Area, but excluding the Lowland Area. It includes the area within the Community Protection Measures boundary, an area defined by soil sampling (See Exhibits 1 and 2, in pockets) as having or potentially having arsenic, lead, and related metals (cadmium, antimony, mercury, and thallium) above regulatory levels.

Need for and Objective of Cleanup

The cleanup is designed to reduce the risks to human health and the environment associated with soils contaminated with arsenic, lead, and other metals in the Upland Area of northeast Everett. Contaminated soils in the residential communities raise health concerns because of, among other concerns, the potential for ingestion by children in the course of their normal activities in residential yards.

In the Former Arsenic Trioxide Processing Area, underground flues are still in place and contain highly contaminated flue dust. Spilled arsenic trioxide has been encountered at one property and may exist in other locations. Soil contamination from flue dust and spilled product is much greater in the Former Arsenic Trioxide Processing Area than in the Peripheral Area, and therefore presents greater risks to human health and the environment.

Figure ES-1: Regional Location Map (Same as Figure 1-1).

Figure ES-2: Site Features (Same as Figure 1-2).

The clean-up effort must restore safe and normal residential use in the Peripheral Area and clean up the Former Arsenic Trioxide Processing Area in a manner which will allow future use which is compatible with the surrounding area. The cleanup must be permanent to the maximum extent practicable, which entails balancing the long-term effectiveness of removing contamination from the neighborhood with the short-term impacts to the neighborhood during cleanup and the costs of the cleanup.

Cleanup Alternatives

It is considered impracticable to clean up contaminated soil currently located beneath structures and pavement, which is considered inaccessible. Three basic alternatives were considered to clean up accessible soils – that is, soils not beneath permanent structures or pavement which could be or could readily become accessible to direct contact by residents, with children being the most sensitive individuals who could be exposed. These alternatives were:

(1) **Off-Site Disposal:** Excavating and sending all accessible soil from both the Peripheral Area and the Former Arsenic Trioxide Processing Area off-site to a facility permitted to accept such soil;

(2) **Consolidation Facility:** Excavating and sending highly contaminated soil within the Former Arsenic Trioxide Processing Area off-site, consolidating lower concentration accessible soil excavated and replaced in the Peripheral Area into the Former Arsenic Trioxide Processing Area to the degree possible in the 6 acres available, and sending the balance of the soil excavated and replaced in the Peripheral Area off-site; and

(3) **On-Site Containment Facility:** Excavating highly contaminated soil within the Former Arsenic Trioxide Processing Area, constructing an On-Site Containment Facility in the excavated area 2 acres in size, and replacing the highly contaminated soil in the remaining 4 acres of the Former Arsenic Trioxide Processing Area; then consolidating lower concentration accessible soil excavated and replaced in the Peripheral Area into the Former Arsenic Trioxide Processing Area in a Consolidation Facility to the degree possible, and sending the balance of the soil excavated and replaced in the Peripheral Area off-site. The On-Site Containment Facility would be constructed to higher standards than the Consolidation Facility because it would contain material with much higher concentrations of arsenic and lead than the Consolidation Facility. Materials with the highest concentrations of arsenic (>20,000 mg/Kg) would be sent off-site.

For all alternatives considered, institutional controls – 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 site – are required to manage contamination left on-site, including managing soil beneath pavement and structures which may become

accessible in the future. The institutional controls are discussed in Section 6.7. They include: (1) Deed covenants for the Former Arsenic Trioxide Processing Area to ensure that the site where contaminated soil has been stored is properly maintained and not disturbed; (2) Permit requirements which recognize that future construction work in the neighborhood may disturb soil contamination remaining under the surface; (3) Maintenance of a database of environmental monitoring; (4) Worker protection for employees working on the site; (5) Small quantity and large project soil disposal program to help property owners dispose of contaminated soil excavated during work on their property; (6) A public education program; (7) Exposure testing program for residents if residents so request; (8) On-going investigations of soil-management practices; (9) Evaluation of the effectiveness of institutional controls, and alternative plans for controls that are not working; (10) A Community Advisory Committee to assist in developing and implementing the institutional controls; (11) A dispute resolution program; and (12) A mechanism to ensure long-term financing for ongoing cleanup, monitoring, and institutional controls.

Surface water, ground water, and storm drain sediment contamination issues are expected to be addressed by soil cleanup actions. Monitoring will evaluate whether concentrations of arsenic, lead, and other metals in surface water, ground water, and storm drain sediment meet regulatory requirements, and contingency plans will be developed and invoked if monitoring results indicate the necessity to do so.

Comparison of Alternatives

Each of the three cleanup alternatives – Off-Site Disposal, construction of a Consolidation Facility, and construction of an On-Site Containment Facility (with associated Consolidation Facility) – would result in short-term impacts during cleanup associated with excavation of contaminated soil, replacement with clean soil, and, if done, construction of either the On-Site Containment Facility or Consolidation Facility using construction equipment and trucks for soil haulage.

Not taking any of these actions would avoid the short-term cleanup- and construction-related impacts (discussed below), but would result in unavoidable significant adverse environmental impacts. Contamination would continue to pose risks to human health and the environment in excess of those permitted by law. Future development of the Former Arsenic Trioxide Processing Area would be precluded, and future development within the Peripheral Area could be affected by the presence of contamination, and hence risks, in excess of levels permitted by regulation. Residents would continue to be subjected to increased health risks when engaging in routine activities at their homes.

All three cleanup alternatives would generate similar clean-up and construction-related impacts, although in varying degrees, including dust from excavation and hauling equipment, construction equipment and truck noise, truck interference with local traffic, and aesthetic impacts of excavation. The adverse impacts may be mitigated with

landscape buffers and traffic controls. Mitigation measures would be implemented to minimize dust, noise and traffic.

Of the three cleanup alternatives, the Off-Site Disposal alternative is the most expensive, and would have the greatest short-term impacts because it involves excavation and replacement of the greatest volume of soil. However, redevelopment of the Former Arsenic Trioxide Processing Area for continued single-family residential use would be possible after this alternative was implemented. Therefore, this alternative would have no significant long-term adverse environmental impacts on future land use within the Former Arsenic Trioxide Processing Area.

Either landfilling activity would have greater long-term impacts than Off-Site Disposal within the Former Arsenic Trioxide Processing Area. Redevelopment over a Consolidation Facility would be limited to mixed-use commercial and multi-family residential housing uses and would require changing the site zoning and land use designation.

An On-Site Containment Facility poses greater long-term risks than a Consolidation Facility because of the high concentrations of arsenic which would be contained in such a facility.

Cleanup actions within the Peripheral Area are the same for all three alternatives. Accessible contaminated soil exceeding cleanup levels within the top 12 inches of soil and exceeding specified remediation levels below a depth of 12 inches (See Figure ES-3) must be removed and replaced with clean soil. Soil with contamination between remediation levels and cleanup levels left on-site will be contained with a minimum thickness of 12 inches of clean soil. These actions were developed with input from citizens regarding the depth to which common homeowner activities occur, as shown in Table ES-1.

Table ES-1: Citizen Identified Activities.

Activity	Estimated Depth
Soil mixing by biologic activity (earthworms, moles, ants, etc.)	12”(?)
Mowing, raking, sweeping	6”
Kids/Pets digging	12”
Gardening	18”
Tree planting	24”
Re-sodding	6”
Irrigation system installation	12”+
Paving/install sidewalk	12”
General landscaping	24”
Deck foundation	24”
Fence posts	30”
Tank removal	60”
Utility Poles	to 108”

Figure ES-3: Selecting Remediation Levels in the Upland Area of the Everett Smelter Site (Same as Figure 6-7).

Effectiveness of Mitigation Measures

Mitigation of the potentially significant adverse impacts of cleanup include:

- ***Dust and traffic control during cleanup:*** Dust would be controlled during soil excavation by moistening sufficiently to prevent generation. Traffic due to removal of soil would be controlled according to a Construction and Traffic Management Plan.

- ***Landscaping within the Former Arsenic Trioxide Processing Area:*** Landscaping would be used to minimize the noise and dust generated by clean-up and construction of a Consolidation Facility. A wide swath of perimeter landscaping would provide a natural buffer between an on-site landfill and future commercial and/or mixed family residential site use and surrounding residences in the Peripheral Area.

- ***Access traffic control for the Former Arsenic Trioxide Processing Area:*** A temporary construction access into the Former Arsenic Trioxide Processing Area would be located so as to cause the least conflict with surrounding uses.

- ***Provision for redevelopment of the Former Arsenic Trioxide Processing Area:*** A Final Site Restoration Plan will define the final grade and conditions of the Former Arsenic Trioxide Processing Area in order to assure developable building pads are available for future site reuse. At the conclusion of cleanup, the Former Arsenic Trioxide Processing Area would have to be able to accept infrastructure to serve potential future site reuse to the extent reasonably foreseeable.

- ***Institutional Controls:*** A program of institutional controls would manage residual contamination remaining in the Upland Area of the Everett Smelter Site to make it unlikely that people will come into contact with it.

Areas of Controversy

There were two primary areas of controversy regarding selection of the cleanup actions for the Upland Area of the Everett Smelter Site:

- Whether to allow an On-Site Containment Facility or Consolidation Facility to be built within the Former Arsenic Trioxide Processing Area or to require Off-Site Disposal of all accessible contaminated soil, and

- The degree to which accessible contaminated soil must be excavated and replaced with clean soil.

With regard to whether to allow an On-Site Containment Facility or Consolidation Facility to be built within the Former Arsenic Trioxide Processing Area or to require Off-Site Disposal of all accessible contaminated soil, Ecology first carefully considered threshold requirements within the MTCA Cleanup Regulation (Chapter 173-340 WAC), then balanced short-term impacts, long-term effectiveness, cost, and other regulatory criteria to achieve a cleanup that meets threshold requirements and is permanent to the maximum extent practicable. The remedies had similar short-term impacts, but varied in the amount of highly contaminated soils that were left within the Former Arsenic Trioxide Processing Area.

Off-Site Disposal of all excavated material would not include construction of an On-Site Containment Facility or a Consolidation Facility in the Former Arsenic Trioxide Processing Area, and would enable this area to be returned to single-family residential use. This is the most costly of the action alternatives considered.

Construction of an On-Site Containment Facility and adjacent Consolidation Facility within the Former Arsenic Trioxide Processing Area would result in leaving soil in the neighborhood with arsenic concentrations of up to 20,000 part per million in the On-Site Containment Facility. These concentrations could cause permanent health effects or even death upon a single exposure should the containment ever be breached. Construction of an On-Site Containment Facility is neither compliant with relevant and appropriate provisions of the Dangerous Waste Regulation, including siting requirements for landfill containing federally-designated hazardous waste, nor permitted by substantive requirements of the City of Everett zoning code and growth management plan. This is the least costly of the action alternatives considered.

Construction of a Consolidation Facility would result in leaving soil in the neighborhood with arsenic concentrations of up to 3,000 mg/Kg. Although there is some risk of permanent health effects upon a single exposure to material in the upper end of the range of concentrations left on site, the combination of factors that would have to occur, including breach of containment and high exposure by a sensitive individual during the time the breach remains open, is considered sufficiently unlikely to be an acceptable societal risk. Construction of a Consolidation Facility requires changes in zoning of the Former Arsenic Trioxide Processing Area, and possibly within the surrounding area as well, to permit multi-family and mixed-use commercial land use. These land uses are anticipated to place the property under control of owners who can ensure that the required institutional controls are implemented. Construction of a Consolidation Facility is intermediate in cost between Off-Site Disposal and construction of an On-Site Containment Facility.

Ecology concluded that siting a Consolidation Facility within the Former Arsenic Trioxide Processing Area achieves the best balance of permanence, protection of human health and the environment, and cost. The manner in which this conclusion was reached is discussed in Section 5.4. A change in site zoning and comprehensive plan land use designation is expected to be made for the Consolidation Facility. This FCAP/FEIS is expected to be

used by the City when it makes a decision regarding a change in the City's comprehensive plan and land use designation to allow for a consolidation facility.

With regard to the degree of soil excavation and containment, Ecology also carefully considered threshold requirements within the MTCA Cleanup Regulation (Chapter 173-340 WAC), then balanced short-term impacts, long-term effectiveness, cost, and other regulatory criteria to achieve a cleanup that meets threshold requirements and is permanent to the maximum extent practicable. Ecology chose to use a combined soil removal and containment remedy rather than implement a permanent remedy, which would require removing all soils with contamination exceeding cleanup levels to a depth of fifteen feet.

Meeting threshold requirements in implementing this combined removal and containment remedy resulted in requiring excavating accessible soil exceeding the arsenic cleanup level of 20 mg/Kg to a depth of 12 inches, and replacing it with clean soil. Below a depth of 12 inches, accessible contaminated soil may be left in place beneath 12 inches of clean soil so long as the arsenic concentration does not exceed certain remediation levels. Remediation levels for arsenic concentrations in accessible soil with depth are summarized on Figure ES-3, and the determination is discussed in Section 6.2.1.1.

Major Conclusions

It is not practicable to remove all contaminated soils. The clean-up plan must balance long-term protection of human health with short- and long-term costs and disruption from clean-up, in order to ensure that the costs are proportionate to the expected environmental benefits or reduced risks. Ecology has determined that the cost of removing soil beneath existing structures and paving, termed inaccessible soil, is disproportionate to the risks to human health and the environment posed by such soil. Residual risks posed by contaminated soil beneath existing structures and pavement will be managed by institutional controls to ensure the soils are properly managed if exposed during future site activities.

People are more likely to be exposed to contaminants in surface soils. Accessible contaminated soil exceeding cleanup levels within the top 12 inches of soil and exceeding specified remediation levels below a depth of 12 inches (See Figure 6-7) must be removed and replaced with clean soil. Soil with contamination between remediation levels and cleanup levels left on-site will be contained with a minimum thickness of 12 inches of clean soil.

The most dangerous materials in the Former Arsenic Trioxide Processing Area must be removed. Material with arsenic concentrations which pose a risk of permanent health effects or death upon a single exposure must be removed from the neighborhood to protect human health and the environment. An On-Site Containment Facility for material with high levels of contamination is not protective of human health and the environment.

A Consolidation Facility for soil with relatively low levels of contamination will be compatible with the adjacent residential community. A Consolidation Facility may be constructed within the Former Arsenic Trioxide Processing Area so long as it is buffered from the adjacent residential community with landscaping and adequate traffic access is provided for future commercial, recreational, and multi-family development. Construction of a Consolidation Facility will require changes in zoning and land use designation.

Institutional controls will be necessary to manage residual contamination: A program of administrative and physical controls will be required to manage residual contamination remaining on site. Implementation of these controls will require coordination among Ecology, local governments, and persons with potential liability for the cleanup. Citizen input will be sought regarding the implementation of institutional controls.

Selected Cleanup Actions

Ecology has selected cleanup actions which include:

- Removing accessible soil in the Peripheral Area with contamination above cleanup levels which is within 12 inches of the surface and replacement with clean soil;

- Removing accessible soil in the Peripheral Area with contamination above specified remediation levels at depths below 12 inches (See Figure 6-7) and containment of residual contaminated accessible soil on-site with at least 12 inches of clean soil;

- Removing highly contaminated material within the Former Arsenic Trioxide Processing Area from the neighborhood;

- Constructing a Consolidation Facility within the Former Arsenic Trioxide Processing Area to contain the less contaminated soil from the Peripheral Area in such a manner as to be developable for future mixed-use commercial and multi-family residential housing;

- Leaving inaccessible contaminated soil on-site, contained beneath existing structures and pavement;

- Implementing measures to mitigate adverse environmental impacts associated with remediation activities and future use of the Consolidation Facility in Former Arsenic Trioxide Processing Area for mixed multi-family residential and commercial use;

- Implementing institutional controls to manage residual contamination left on-site;

- Protecting ground water and surface water by removal of contaminated soil;
- Monitoring to evaluate whether the cleanup actions are meeting their goals; and
- Developing contingency plans for additional cleanup actions if monitoring indicates the cleanup is not meeting its goals.

Ecology's selected clean-up alternative will limit future use of the Consolidation Facility footprint largely to paved uses or uses that do not involve the potential for frequent disturbance of a cap. This will preclude continued single-family residential use, as well as uses functionally similar to single-family residential uses, such as halfway houses and detoxification centers, within the boundaries of the zone change.

Future land uses which are preserved include: recreational and open space, such as parks; multi-family housing; retail and commercial; offices, including dental and medical offices and clinics; educational facilities; churches; small institutions; and public facilities.

Figure ES-4 is a conceptual diagram of site conditions before and after cleanup.

Environmental Review for Redevelopment of the Former Arsenic Trioxide Processing Area after Cleanup

Post-cleanup redevelopment of the Former Arsenic Trioxide Processing Area is not part of the actions covered by this cleanup, and any impacts associated with such redevelopment would be the subject of separate environmental considerations. This Integrated Final Cleanup Action Plan and Final Environmental Impact Statement is not part of a phased SEPA review with respect to such redevelopment actions.

Figure ES-4: Conceptual Sketch of Conditions in the Upland Area of the Everett Smelter Site Before and After Cleanup. (Same as Figure 9-1)

Chapter 1 - Introduction

1.1 Purpose, Scope, and Format

The Everett Smelter Site is located in the northeastern part of the City of Everett, Snohomish County, Washington (Figures 1-1 and 1-2). The site is contaminated by arsenic and other metals. The contamination was caused by emissions from the Everett Smelter between 1894 and 1912, and by material left behind when the smelter was demolished between 1912 and 1915.

The site has been divided into two major areas for the purposes of remediation: the Upland Area and the Lowland Area. The Upland Area and the Lowland Area are separated by a steep slope which runs along the east side of East Marine View Drive. The steep slope is included in the Lowland Area.

The purpose of this Integrated Final Cleanup Action Plan and Final Environmental Impact Statement (FCAP/FEIS) is to describe remedial actions to be conducted within the Upland Area, which is further divided into the Former Arsenic Trioxide Processing Area (also known as the Fenced Area)[1] and the Peripheral Area. The Lowland Area will be the subject of a separate cleanup action plan. The Lowland Area cleanup action plan may identify additional remedial actions to be taken in the Peripheral and Former Arsenic Trioxide Processing Areas necessary to address ground water and/or surface water contamination in the Lowland Area. The FCAP/FEIS:

- Summarizes the human health and environmental issues regarding the site;
- Summarizes the evaluation of the alternatives according to the remedy selection criteria pursuant to the Model Toxics Control Act (MTCA) Cleanup Regulation, Chapter 173-340 WAC;
- Summarizes the evaluation of environmental impacts as required by the State Environmental Policy Act (SEPA), Chapter 43.21C RCW, including actions to be taken pursuant to the Growth Management Act (GMA), Chapter 36.70A RCW; and
- Describes the cleanup actions selected by the Washington State Department of Ecology (Ecology) pursuant to its authority under the Model Toxics Control Act, Chapter 70.105D RCW.

[1] The term “fenced area” refers to a portion of the site purchased by Asarco and fenced. It encompasses the Former Arsenic Trioxide Processing Area.

Figure 1-1: Regional Location Map.

Figure 1-2: Site Features.

This document is an integrated cleanup action plan and environmental impact statement. Both MTCA and SEPA require that their respective procedures and documents be integrated to the maximum extent practicable, RCW 43.21C.036. This document also contains the land use analysis for amendments to the City of Everett land use actions required to implement the selected remedy, including comprehensive plan and zoning code amendments under GMA. SEPA and GMA likewise encourage use of integrated documents. This document follows the alternate format for integrated documents, as provided by the SEPA Rules (WAC 197-11-235(2), 262, and 640) and as explained to the public at public meetings regarding the site.

In response to a number of comments on the format of the Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement (DCAP/DEIS), the format of the FCAP/FEIS has been revised to be more consolidated and better integrated than the draft. Appendix A has been more accurately titled "Evaluation of SEPA Scoping Elements," rather than its title in the draft, to reflect the fact that it provides supporting information and is not a separate document.

The document is divided into four volumes. Volume I contains the main text of the cleanup action plan and Appendix A, an analysis of the environmental elements identified during the SEPA scoping process. Volume I includes:

- A SEPA Cover Letter, Fact Sheet, Required Declarative Statement, and Environmental Summary near the beginning of the document;
- A summary of the Remedial Investigation, as supplemented by the supporting documents (see Section 1.4, Chapter 10, and the appendices), which describes the affected environment;
- A summary of the Feasibility Study, as supplemented by the supporting documents and additional information and analysis in the DCAP/DEIS and FCAP/FEIS, which provides a detailed evaluation and comparison of alternatives and their significant environmental impacts;
- A discussion of regulatory requirements and land use plans and regulations regarding the proposed alternative cleanup actions;
- A summary and comparison of environmental impacts based on concerns raised during the integrated SEPA/MTCA/GMA scoping process;
- Selection and explanation of the cleanup remedy, based on the above evaluations and applicable criteria;
- Monitoring requirements to assure the effectiveness of the remedy (monitoring and taking corrective action is one component of mitigation);

- Schedule;
- Justification for selection of cleanup actions; and
- References.

Volumes II, III, and IV make up Appendix B of the FCAP/FEIS, the Responsiveness Summary. Volume II includes the main text of the Responsiveness Summary and Attachment B1 to Appendix B. The main text groups similar comments into generalized questions and provides responses to them (this approach provides responses to the extensive comments received on the DCAP/DEIS, per both MTCA and SEPA). Comment numbers are given below the generalized question. Attachment B1 presents Ecology's review of information submitted by Asarco as "New Science" regarding the toxicity of arsenic and lead.

Volume III presents Attachment B2 to Appendix B. Each generalized question is followed by the specific comments which were generalized. Because of the comments as submitted often contained more than one subject area per comment, an individual comment may appear under more than one generalized question. Tables at the beginning of Attachment B2 associate commentor names, comment numbers assigned to comments made by the commentor, and generalized questions. Two tables are presented, one ordered by commentor and one ordered by comment number.

Volume IV presents Attachment B3 to Appendix B. It presents the original comments as received. Each comment was numbered. Tables at the beginning of Attachment B3 associate commentor names, comment numbers assigned to comments made by the commentor, and the page number on Attachment B3 where the original comment can be found. Comments received during the SEPA scoping comment period are included in this Attachment as well.

It is intended that the main text of the Responsiveness Summary in Volume II may be read with Volume III providing a ready reference to the specific language of the comments on which a generalized question is based. The original comments are provided in Volume IV for readers who wish to refer the comments as received.

Ecology has determined under WAC 197-11-430(2) that the above format would improve clear presentation of alternatives and environmental analyses and would reduce unnecessary paperwork and duplication, as encouraged by MTCA and as allowed by the SEPA Rules. The FCAP/FEIS synthesizes and provides the basic information contained in a series of studies and incorporates these supporting documents by reference, as required by the SEPA Rules (WAC 197-11-030(2)(c), 402, and 440(6)).

An environmental impact statement (EIS) is frequently integrated with a Feasibility Study (FS) or Remedial Investigation and Feasibility Study (RI/FS) document. The EIS is

integrated with the Cleanup Action Plan (CAP) in this case because preparation of the FS for the Everett Smelter Site was well underway prior to amendments to SEPA which required such integration. Instead of creating an extra step and delaying the process by revising the FS and then preparing a CAP, the CAP essentially fills the gaps in the FS, and makes the remedy selection. Thus, it was appropriate to integrate the EIS and the CAP. An extensive scoping and public participation process ensured opportunity for early public review of both the decision to integrate the documents and to comment on those documents. To help meet the purposes of the act, the MTCA Cleanup Regulation allows for steps in the MTCA process to be combined where appropriate. Since the FCAP/FEIS integrates both the CAP and the EIS, the final EIS is being issued no later than the final CAP, in accordance with WAC 197-11-262(6).

1.2 Applicability

This Cleanup Action Plan is applicable only to the Upland Area of the Everett Smelter Site. The remedial actions to be taken at this site were developed to arrive at an overall balance of actions which **when taken together** meet the threshold requirements and other requirements of WAC 173-340-360. Cleanup levels, remediation levels[2], and cleanup actions have been developed based on the specifics of the Upland Area of the Everett Smelter Site as an overall remediation process being conducted under Ecology oversight, and should not be considered as setting precedents for other sites outside of the context of the overall remedial actions to be conducted in the Upland Area of the Everett Smelter Site.

1.3 Supporting Documents

Documents used to develop this FCAP/FEIS and which, in addition to this FCAP/FEIS, constitute the environmental investigations and considerations used to develop the proposed cleanup action are:

- **Everett Smelter Site Remedial Investigation (Hydrometrics, 1995a):** This document describes the site history and the nature and extent of contamination within the Upland Area of the site.

- **Everett Smelter Site Feasibility Study (Hydrometrics, 1995b):** This document develops and evaluates the feasibility of alternative proposals to clean up contamination within the Peripheral Area of the site.

[2] A *remediation level* a concentration or location of a hazardous substance in a medium at which a different cleanup technology will be used. A cleanup action that includes remediation levels which is selected in accordance with WAC 173-340-350 and 360 constitutes a cleanup action which is protective of human health and the environment. The concept of remediation levels is further discussed in Section 3.1.2.

- **Agreement between Snohomish Health District and ASARCO Incorporated (Ecology, 1997, Exhibit C):** This agreement specifies the educational program, medical testing, environmental investigations, and soil disposal program to be conducted as part of the Community Protection Measures Program. The soil disposal program is implemented in accordance with Hydrometrics, 1997a (see following bullet).

- **Community Protection Measures Soil Disposal Program, (Hydrometrics, 1997a):** This document describes measures to be taken to dispose of contaminated soil excavated in the course of residential projects which do not require a building permit.

- **Asarco Everett Smelter Site Redevelopment, Land Use Committee, Workshop Notebook (Merritt+Pardini, 1997):** This notebook documents evaluations of potential future land uses of the Former Arsenic Trioxide Processing Area.

- **Initial Residential Soil Sampling Report (Hydrometrics, 1998a):** This document describes the results of a soil sampling program in which samples were collected at selected residential properties to assist in designing a soil sampling program for use during remedial actions.

- **Everett Smelter Study Area Soil Sampling Technical Memorandum (SAIC, 1997):** This report documents results of soil sampling conducted by Ecology's consultant, SAIC, in connection with the initial residential soil sampling effort. (See also Hydrometrics, 1998a)

- **Superstructure Demolition & Debris Disposal Interim Action Report (Hydrometrics, 1998b):** This report documents house demolition activities conducted within the Former Arsenic Trioxide Processing Area in 1997.

- **Comparison of Remediation Alternatives Proposed for the Everett Smelter Site (TWG, 1998a):** This report describes additional development and evaluation of the feasibility of selected alternatives from the Feasibility Study.

- **Estimated Costs for TWG Remedial Alternatives for the Everett Smelter Site (TWG, 1998b):** This report presents estimated costs for the remedial alternatives discussed in the preceding report (TWG, 1998a).

- **Smelter Area Investigation Report (Asarco, 1998a):** This document reports results of additional investigations on the nature and extent of contamination within and near the former smelter plant boundary.

- **Storm Water and Storm Drain Sediment Characterization and Controls Work Plan (Asarco, 1998b):** This document describes work to be done to

investigate the environmental condition of storm water and storm drain sediment.

- **Draft Supplemental Investigation of the Everett Smelter Site Lowland Area (Hydrometrics, 1996a):** This draft document summarizes investigations done prior to July 1996 to evaluate environmental conditions in the Lowland Area.

- **Supplemental Remedial Investigation, Additional Characterization and Monitoring Work Plan for the Lowland Area (Asarco, 1998c):** This document describes work to be done to further characterize environmental conditions in the Lowland Area.

- **Hazards of Short-Term Exposure to Arsenic-Contaminated Soil (DOH, 1999):** This document reviews and evaluates information regarding acute arsenic toxicity and soil exposure to assess the hazards of short-term exposure to arsenic-contaminated soil.

- **Review of Asarco's New Science Submittals Regarding Arsenic and Lead (Ecology, 1999a):** This memorandum describes review of scientific information on the health hazards of arsenic and lead submitted to Ecology by Asarco.

- **Decision Memorandum, Arsenic Concentrations at Depth and Considerations of Acute Toxicity (Ecology, 1999b):** This memorandum describes discussions and meetings held by Ecology staff regarding appropriate concentrations at depth.

- **Draft Overall Sampling and Analysis Plan for the Peripheral Area at the Everett Smelter Site, Everett, Washington (Asarco, 1999b):** This plan describes draft plans for conducting sampling and analysis of soil in the Peripheral Area in order to decide what cleanup actions are necessary.

Most of the data on arsenic (4577 records), lead (4225 records), and cadmium (1244 records) collected during the course of investigations at the site are available in electronic format in a Microsoft Access® database prepared by Asarco named *Evernew4.mdb*. The only data that are known not to be included in this database at the date of issue of this FCAP/FEIS are the data presented in Table 1-13 of the Remedial Investigation report (Hydrometrics, 1995a, p. 1-30), data collected during cleanup of selected properties by Ecology during the Summer of 1999, and data collected in an independent investigation at the Viewcrest Abbey (Kleinfelder, 1999).

The arsenic data in *Evernew4.mdb* were used by Asarco's consultant, McCulley Frick & Gilman, to prepare Exhibits 1 and 2 of this FCAP/FEIS. In addition, the data were sufficient to estimate average and maximum arsenic concentrations in six-inch depth intervals at 565 properties within the Upland Area of the Everett Smelter Site. This was

also done by Asarco's consultant, McCulley Frick & Gilman. These estimates were provided to Ecology in Microsoft Excel® spreadsheet form and used by Ecology in performing the evaluations discussed in Section 6.2.1.1. The Excel files are named *hchisto3c.xls* and *hchisto3b.xls.*

The following documents also contain information regarding portions of the Upland Area of the Everett Smelter Site:

- **Focused Subsurface Investigation, Soil Sampling for Arsenic and Lead, Viewcrest Abbey, 240 Whitehorse Trail, Everett, Washington (Kleinfelder, 1999):** This report discusses independent sampling conducted at the subject property.

- **East Marine View Drive Widening and Legion Memorial Golf Course Improvements Independent Remedial Action Report (Hydrometrics, 1998d):** This report discusses independent cleanup actions taken by the City of Everett at the subject properties.

- **Independent Remedial Action Plan for American Legion Memorial Golf Course (Hydrometrics, 1997c):** This report discusses independent cleanup actions taken by the City of Everett at the subject property.

- **Independent Remedial Action for East Marine View Drive Improvement Project (Hydrometrics, 1996b):** This report discusses independent cleanup actions taken by the City of Everett at the subject property.

- **Arsenic Site Characterization, Denney Youth Center Redevelopment, Everett, Washington (Landau, 1995):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

- **Site-Specific Health and Safety Plan, Demolition and New Construction, Denney Youth Center, Everett, Washington (AGI, 1996):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

- **Final Geologic and Geotechnical Investigation Report (SCDPW, 1996):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

- **Final Report, Air Monitoring and Soil Sampling, Denney Youth Center, Everett, Washington (AGI, 1997):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

- **Cleanup Actions Summary Report, Denney Youth Center, 2801 10th Street, Everett, Washington (AGI, 1998):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

- **Denney Juvenile Justice Center-Supplemental Soil Sampling, Northeast Corner of Cleanup Site, April 19, 1999 (AGI, 1999):** This report discusses independent cleanup actions taken by Snohomish County at the subject property.

1.4 The Cleanup Action Plan and the Cleanup Process

The FCAP/FEIS is one in a series of documents used by Ecology to define remedial actions to be taken and to monitor progress of site investigation and cleanup. These documents and the section of the MTCA Cleanup Regulation requiring them are listed below, followed by paragraphs describing the purpose of each document.

- Remedial Investigation and Feasibility Study, WAC 173-340-350.

- Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement, WAC 173-340-360.

- Integrated Final Cleanup Action Plan and Final Environmental Impact Statement, WAC 173-340-360. ← **THIS DOCUMENT**

- Public Participation Plan, WAC 173-340-600.

- Engineering Design Report, WAC 173-340-400.

- Construction Plans and Specifications, WAC 173-340-400.

- Construction Documentation, WAC 173-340-400.

- Operation and Maintenance Plan, WAC 173-340-400.

- Compliance Monitoring Plans, WAC 173-340-410.

The Remedial Investigation and Feasibility Study presents the results of investigations into the nature and extent of contamination at a site, assesses the risk posed by that contamination, and evaluates the feasibility of alternative methods of cleaning up the site.

The DCAP/DEIS proposes cleanup actions to be conducted at a site and sets forth requirements which the proposed cleanup actions must meet. This document is presented to the public for review and comment.

The FCAP/FEIS selects cleanup actions to be conducted at a site and sets forth requirements which the cleanup actions must meet.

The Public Participation Plan provides a coordinated and effective public involvement process tailored to the public's needs at a site.

The Engineering Design Report and Construction Plans and Specifications provide the necessary technical drawings and specifications to allow a contractor to implement the methods described in the FCAP/FEIS for cleaning up a site. They are reviewed by Ecology to ensure they will provide implementation of the cleanup actions in accordance with the cleanup action plan.

Construction documentation includes as-built drawings and documentation of any changes or modifications that were necessary during the course of implementing the cleanup actions.

The Operation and Maintenance Plan presents technical guidance and regulatory requirements to assure effective operations under both normal and emergency conditions. This plan describes actions that will be taken to operate and maintain any equipment, structures, earthworks, covers, drains, or other remedial measures operating or constructed at a site. In addition, it describes response actions to address residual contamination left on-site, such as actions necessary to remediate soil remaining under buildings and pavement upon site redevelopment.

Compliance Monitoring Plans include: protection monitoring to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of the cleanup actions; performance monitoring to confirm that cleanup actions have attained cleanup standards and other performance standards; and confirmational monitoring to confirm the long-term effectiveness of the cleanup actions.

Chapter 2 - Summary of Remedial Investigation/Feasibility Study

The following summary briefly describes the site history, present site conditions, the results of the remedial investigation (an evaluation of the nature and extent of contamination at the site), and the feasibility study (an assessment of alternative actions which could be taken to address the environmental concerns at the site), public comment on the RI/FS report, additional work performed during a mediation effort, future land use considerations, and SEPA scoping and evaluations. Please refer to the supporting documents listed in Section 1.4 for more detailed information.

2.1 Background

The Everett Smelter Site is located in northeast Everett (Figure 1-2). A lead, gold, and silver smelter operated in this area from 1894 to1912, with an arsenic extraction plant being added in 1898 (Figure 2-1). The smelter was built by the Puget Sound Reduction Company and sold to Federal Smelting and Mining Company in 1903. Later that same year, Federal sold the smelter to ASARCO Incorporated (Asarco). Asarco operated the smelter until 1912, and demolished it between 1912 and 1915. When smelter operations ceased, equipment which could be used at other locations was dismantled and sent off-site. Above-ground structures were demolished with debris being spread in the immediate area of the demolition. Foundations, floors of former smelter structures, and below-ground flues are intact below the surface in many locations on the former smelter property.

The property was sold in various parcels, with the last parcel owned by Asarco being sold in 1936. In the 1930s and 1940s, part of the former smelter plant property was developed into residential properties. The former smelter plant property also contains the highway interchange between East Marine View Drive and State Route 529. This interchange was built in the 1950s.

The Everett Smelter Site includes both the former smelter plant property, which contains residual smelter debris, and the surrounding area which was impacted by air emissions from the smelter stacks. Areas closely adjacent to the former smelter plant boundary may also have been impacted by fugitive emissions from smelter operations. Fugitive emissions include spilled products and waste and air emissions which escaped through means other than stack emissions. In addition, regrading during subsequent development may have moved residual smelter debris beyond the former smelter plant boundary.

The Community Protection Measures boundary (Figure 1-2) currently defines the site. It is the best estimate available from current data of the area contaminated with arsenic and related metals due to smelter operations. Sampling to be conducted during the cleanup actions will provide data to better define the boundary of the Everett Smelter Site.

Figure 2-1: Former Smelter Layout.

2.2 Enforcement History

Ecology discovered the site in October 1990, when Weyerhaeuser Inc. notified Ecology that soil and ground water samples collected near East Marine View Drive contained elevated concentrations of arsenic and lead. In December 1990 Ecology conducted an initial investigation of the site. This investigation included a site visit, historic research, and a review of all available data.

In 1991 Ecology conducted a Site Hazard Assessment which confirmed that contamination from smelter operations was still present in site soils. The Site Hazard Assessment identified arsenic, lead, and cadmium as the contaminants of concern at the site.

Ecology conducted a Pre-Remedial Investigation in 1991 which confirmed the presence of elevated concentrations of arsenic, lead, and cadmium throughout the area. Concentrations of contaminants were found to generally decrease farther from the Former Arsenic Trioxide Processing Area location. The highest contaminant concentrations were found in areas where smelter structures once stood.

In April 1992 Ecology issued Enforcement Order No. DE92TC-N147 (Ecology, 1992a) to Asarco requiring interim actions to reduce the contact of residents with exposed contaminated soil and requiring a Remedial Investigation/Feasibility Study (RI/FS) be conducted. In March 1994 this Order was amended to require additional interim actions in an expanded study area (Ecology, 1994a).

In September 1995 Ecology issued Enforcement Order No. DE95TC-N350 (Ecology, 1995a) to Asarco requiring Asarco to take action to stop the exposure to arsenic of residents, pets, and others who resided at or frequented two properties within the Former Arsenic Trioxide Processing Area. Asarco had previously purchased all the other residences within the Former Arsenic Trioxide Processing Area, and the families had moved to residences off-site. Asarco subsequently purchased these two properties, and the residents moved off-site.

In March 1997 Ecology issued Enforcement Order No. DE97TC-N119 (Ecology, 1997) to Asarco requiring Asarco: to demolish houses within the Former Arsenic Trioxide Processing Area which they now owned; to provide a Community Protection Measures Program; to provide an Expanded Soil Disposal Program; to perform additional soil sampling and analysis; to perform additional investigations in the area of the former smelter; to perform additional investigations into the nature and extent of contamination in the Lowland Area; to characterize the chemical quality of storm water and storm drain sediment and implement best management practices to eliminate, or substantially reduce, the discharge of storm water from the site that exceeded appropriate regulatory limits; to perform a feasibility study regarding cleanup of the Lowland Area; and to work with Ecology in implementing the State Environmental Policy Act process for activities to be

conducted under the Cleanup Action Plan. This order superseded Ecology Enforcement Order No. DE92TC-N147.

In October 1998 Ecology amended Enforcement Order No. DE 97TC-N119 to: (1) extend Asarco's obligation to implement the Community Protection Measures Program required by the order for an additional year (until February 2, 2000) or until such provision is superseded by a similar component in a future enforcement order, whichever occurs first; and (2) specify that Ecology no longer expected Asarco to prepare the draft EIS for the cleanup action.

In April 1999 Ecology issued Enforcement Order No. DE99TC-N356 (Ecology, 1999d) to Asarco requiring Asarco to clean up contaminated soil and dust at the 80 most contaminated homes within the Peripheral Area of the Upland Area of the Everett Smelter Site. Asarco informed Ecology that Asarco would not comply with the order by letter dated April 26, 1999 (Asarco, 1999a).

In June 1999 Asarco submitted the *Draft Overall Sampling and Analysis Plan for the Peripheral Area at the Everett Smelter Site, Everett, Washington* (Asarco, 1999b) required by Enforcement Order No. DE97TC-N119 (Ecology 1997). Ecology returned comments on this plan by letter dated July 7, 1999 (Ecology, 1999e), directing Asarco to incorporate changes discussed in the letter, to submit a final plan by August 6, 1999, and to implement the plan as outlined by a schedule provided in Ecology's letter (Ecology, 1999e). Implementation of this plan is a requirement of Enforcement Order No. DE97TC-N119 (Ecology, 1997, Section IV.4.B). By letter dated July 27, 1999, Asarco informed Ecology that Asarco would not comply with the enforcement order provisions to finalize the plan and implement it (Asarco, 1999d). Hence, Ecology and Asarco did not come to agreement on the overall sampling and analysis plan for the Peripheral Area. Section 7.2.1.1 of the FCAP/FEIS presents Ecology's direction for sampling and analysis in the Peripheral Area.

2.3 Current Land Use and Demographics

The Upland Area of the Everett Smelter Site is zoned for residential, commercial, and recreational use. The Lowland Area is zoned for industrial use. Figure 2-2 shows site zoning and Figure 2-3 shows comprehensive plan land use designations for the area. A residentially-zoned area includes single-family and multi-family residences (including the area managed by the Everett Housing Authority), as well as Legion Memorial Park, Wiggums Hollow Park, Viola Oursler Overlook, the Denney Youth Center, the Senior Center, a child care facility, and the Viewcrest Abbey (a mausoleum). (See also Section 3.3.5 for a discussion of land use in the area of the Upland Area of the Everett Smelter Site.)

Figure 2-2: Site Zoning.

Figure 2-3: Comprehensive Plan Land Use Designations in Project Vicinity.

A commercially-zoned area is located along North Broadway. It includes a variety of retail stores and restaurants, Department of Transportation and Welfare Department offices, and a mobile home park.

The Legion Memorial Golf Course is zoned for recreational use.

Table 2-1 summarizes 1990 Census Data for residents within those portions of the Upland Area of the Everett Smelter Site northwest and southeast of Broadway (See Figure 1-2. Broadway is the main street running from the southwest to the northeast through the site; it is labeled State Route 529 on Figure 2-1). Note that the Everett Smelter Site as a whole is located in an area known as Northeast Everett. The northwest and southwest designations refer to those portions of the site northwest and southwest of Broadway.

Table 2-1: Demographic Parameters for the Upland Area of the Everett Smelter Site.

Parameter	Portion of Site Northwest Of Broadway	Portion of Site Southeast Of Broadway	City of Everett
Median Age	35.6	28.8	31.4
Median Income	$33,972	$18,314	$28,415
White	93.8%	85.5%	Not Available
Asian	2.7%	6.2%	Not Available
Hispanic	2.9%	2.7%	Not Available
Native American	1.2%	2.6%	Not Available
Black	1.3%	1.6%	Not Available
Other	1.1%	1.2%	Not Available

As can be seen from the demographic parameters, residents southeast of Broadway are generally of lower incomes. Homes are older and a high percentage of homes, 66.2%, are rentals. Residents northwest of Broadway have incomes above the City of Everett as a whole, and 67.8 are homeowners.

The Everett Housing Authority currently owns 400 apartments within the site boundary. Residents are all low income. There are 100 one-bedroom apartments housing many seniors and disabled adults; 150 four- and five-bedroom apartments housing families with many children; and 150 two- and three-bedroom apartments, housing families who often have quite a few children.

Many of the residents of the Everett Housing Authority are Vietnamese, Ukrainian, and Iraqi born. Also represented are Laotian, Cambodian, and Hispanic cultures.

In addition, there are two private mobile home parks and other private apartment complexes.

Health advisories and Community Protection Measures information regarding the Everett Smelter Site have been translated into five different languages to accommodate the cultural diversity of the community.

2.4 Remedial Investigation

The Remedial Investigation found that arsenic is the primary determinant of site risks (Hydrometrics, 1995a, p. 5-28). Risks from exposures to lead, cadmium, antimony, mercury, and thallium also exist at the site, but cleanup of arsenic as specified in this FCAP/FEIS is expected to address those risks as well. The following discussion describes the affected environment and focuses on arsenic, with other contaminants being discussed as appropriate.

2.4.1 Soil Contamination

The highest concentrations of contaminants in soil exist on and immediately adjacent to the original smelter property. In most cases, the contaminant concentrations decrease with increased distance from the original smelter property. Within the Former Arsenic Trioxide Processing Area, antimony, mercury, and thallium were found in elevated concentrations. The elevated antimony, mercury, and thallium concentrations are associated with samples containing very high arsenic levels due to the presence of flue dust and/or arsenic trioxide product.

Exhibit 1 shows the average arsenic concentrations within the top 18 inches of soil for the Upland Area of the Everett Smelter Site. It serves as a good indication of the general distribution of contamination. Exhibit 2 shows the maximum concentrations. (Locations at which samples were collected are shown on each map. Property-by-property sampling will provide detailed data needed for cleanup decisions. Although these maps provide a good indication of the general distribution of contamination, variations on a property-specific basis may be expected to occur.)

Figure 2-4 outlines the area impacted by residual smelter material containing flue dust and arsenic trioxide.

The Former Arsenic Trioxide Processing Area contains the highest concentrations of contaminants on-site, which occur at depths up to 15 feet below the current ground surface. Antimony, arsenic, cadmium, lead, mercury, and thallium were identified as contaminants of concern in the Former Arsenic Trioxide Processing Area in the Remedial Investigation report (Hydrometrics, 1995a, page 5-28). The report noted (Page 3-26) that contaminant concentrations within the Former Arsenic Trioxide Processing Area are quite variable. This variability extends to the part of the Peripheral Area within the former smelter plant boundary but outside the Former Arsenic Trioxide Processing Area, and is

Figure 2-4: Estimated Extent of Smelter Residual Containing Arsenic Trioxide or Flue Dust.

due to the presence of residual smelter debris. Smelter debris includes bricks, wood, residual dust in flues leading from the arsenic processing equipment to the old stacks, and spilled or leftover arsenic trioxide product. The highest arsenic concentration measured on-site to date – 727,000 mg/Kg (72% total arsenic) at a depth of one foot in the backyard of the residence at 520 East Marine View Drive – was within the Former Arsenic Trioxide Processing Area and was probably spilled arsenic trioxide product.[3]

Contamination in the Peripheral Area occurs at lower concentrations than in the Former Arsenic Trioxide Processing Area, and within the upper few feet of soil. Samples collected in the portion of the Peripheral Area within and immediately adjacent to the former smelter plant boundary had the highest arsenic concentrations outside of the Former Arsenic Trioxide Processing Area, with concentrations decreasing with increasing distance from the Former Arsenic Trioxide Processing Area.

The Peripheral Area outside the former smelter plant boundary was contaminated through airborne deposition of smelter smokestack emissions, although areas closely adjacent to the former smelter plant boundary may also have been impacted by fugitive emissions from smelter operations. The predominant wind direction is estimated to be along the Snohomish River Valley, and the distribution pattern of contaminants from airborne fallout reflects this by being somewhat elongated in the northwest/southeast direction. Contaminants were originally concentrated at the surface since they were deposited by air-fall. The smelter ceased operations in 1912, and the stacks were demolished in the period 1912-1915. Since then, much of the area has been developed into residential, commercial, and public land uses. Regrading during development has moved and mixed soils contaminated with airborne emissions with other soils, making the pattern of contamination distribution irregular both with depth and lateral location. In some cases, deeper soil horizons have higher levels of contamination than surface soil horizons.

The distance at which contamination in the Peripheral Area decreases below regulatory standards, and hence the final site boundary, was not defined by either the Remedial Investigation study (Hydrometrics, 1995a) or by subsequent studies (Hydrometrics, 1998a; SAIC, 1997; Hydrometrics, 1997c; Hydrometrics, 1998d). The final site boundary will be defined by further sampling during the cleanup process.

2.4.2 Slag

Slag is a by-product of the smelting process. During operation of the smelter, slag was deposited over the hillside as a molten material. Once cooled, slag resembles a hard volcanic rock, much like basalt. Most of the slag remaining on the site is buried below the surface. The slag pile limit as of 1913 is shown on Figure 2-1. Some of the slag pile was likely excavated and used as road ballast, for other fill purposes, and to make rock wool at a plant in the Lowland Area. The remaining portion of the slag pile is either beneath East Marine View Drive or in the Lowland Area.

[3] Pure arsenic trioxide, As_2O_3, is 76% arsenic.

Environmental concerns regarding the remnants of the slag pile and remedial actions necessary to address those concerns will be discussed in the Remedial Investigation and Feasibility Study reports for the Lowland Area (in progress). Slag which was transported for use as fill elsewhere on the Everett Smelter Site will be addressed as it is encountered.

Slag which was transported off the Everett Smelter Site will not be addressed as part of this cleanup action. When such slag is found outside of the Everett Smelter Site, it will be addressed at that time as a separate action.

2.4.3 Surface Water Contamination

Surface water entering storm drains on most of the site is combined with the sanitary sewer and routed to the Everett Wastewater Treatment Plant on Smith Island. Storm water entering storm drains that are not connected to the combined sewer system discharges into the Lowland Area where it infiltrates or flows through ditches to the Snohomish River. Figure 2-5 shows the surface water runoff pattern.

Concentrations of arsenic, lead, and cadmium, which exceed regulatory levels have been detected in runoff from the site. Arsenic concentrations varied over several orders of magnitude between sampling rounds, and higher concentrations were associated with long duration runoff events. Dissolved and total arsenic concentrations were similar, suggesting arsenic is being leached from shallow soils and mobilized in runoff as the soils become saturated during prolonged rainfall events. Cadmium behavior is analogous to arsenic.

In contrast to arsenic and cadmium, lead concentrations appear to correlate with flows rather than storm duration, with the highest total lead concentrations occurring during initial runoff periods. No lead was detected in dissolved form, indicating lead transport in surface water is associated with suspended particles rather than as dissolved lead. (The preceding discussion was taken from Hydrometrics, 1998c, p. 2-1 ff.)

2.4.4 Ground Water Contamination

The Upland Area is underlain by 5 to 10 feet of fill, which is composed of topsoil, silt, sand, gravel, and, on the original smelter property, bricks, slag, and smelter demolition debris. A thick layer of glacial till, composed of compacted sand, silt, and gravel, underlies the fill. Underneath the till are advance outwash deposits, which are composed of sand and gravel. Hydrogeologic conditions at the site are shown on generalized geologic cross sections, Figure 2-6.

Figure 2-5: Surface Water Runoff Pattern.

The till forms a barrier to vertical migration of water from the fill to the advance outwash deposits. Ground water in the fill below the former smelter plant boundary flows laterally eastward toward the Lowland Area.

The underlying advance outwash deposits form a thick (in excess of 300 feet), laterally extensive aquifer system in the northern Everett area. Ground water in the advance outwash deposits in the vicinity of the former smelter plant boundary is unconfined (Hydrometrics, 1995a, p. 3-8). In summary, precipitation falling in the area of the former smelter plant boundary, which is the area in which leaching of arsenic from soil and smelter debris to water would be highest, moves downward through any fill present to the top of the till and moves eastward along the top of the till toward the Lowland Area. Water flowing in the fill and along the fill-till contact is likely present only seasonally.

It is possible ground water with elevated arsenic levels is migrating along the fill-till contact and draining to the Lowland Area, contributing to ground water contamination in that portion of the site. The relationship between ground water beneath the Upland Area and ground water beneath the Lowland Area is a subject of ongoing investigation.

Sampling of water in shallow till in February 1997 found arsenic concentrations of 43 and 25 µg/L in Wells EV-11 and EV-13, respectively. These wells, screened in shallow till at a depth of about 10 feet, are usually dry. (See Hydrometrics, 1997b, for the data; Well locations are shown in Asarco, 1998a, Figure 8-2.)

The Remedial Investigation report concluded that "groundwater in the residential area [the Upland Area] does not appear to have been adversely affected by the presence of soils containing elevated levels of arsenic, cadmium, and lead" (Hydrometrics, 1995a, p. 6-4). However, the report also indicates that Well EV-4B, screened in advance outwash deposits, had arsenic concentrations ranging from 14 to 152 µg/L in four measurements between February and September 1993. One measurement in December 1993 found the arsenic concentration was < 5 µg/L, and one measurement in February 1996 found the arsenic concentration was 160 µg/L. (See Hydrometrics, 1995a – Sheet 3-2. Cross Section A-A' shows the well location and Table 3-22 gives the analytical results for the 1993 measurements; Hydrometrics, 1996, Appendix C, Groundwater Analytical Results – Part 2 gives the 1996 measurement.)

Hence, despite the conclusion in the Remedial Investigation report, sample data indicates impacts to both the Fill/Till and the Advance Outwash hydrogeologic units.

Figure 2-6: Geologic Cross-Sections Through Former Smelter Site.

2.4.5 Chemicals of Concern

The Remedial Investigation identified chemicals of concern in the environmental media at the site using a risk assessment methodology for defining cleanup levels specified in the MTCA Cleanup Regulation, Chapter 173-340 WAC. To summarize, the Remedial Investigation report performed the following analyses for samples from soil, ground water, and surface water, and identified the indicated chemicals of concern:

- In soil, analyses were conducted for antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (Hydrometrics, 1995a, Table 5-1). Antimony, arsenic, cadmium, lead, mercury, and thallium were selected as chemicals of concern for soil. Antimony, mercury, and thallium were found at concentrations exceeding regulatory levels within the former smelter property boundary (which includes a portion of the Peripheral Area and the entire Former Arsenic Trioxide Processing Area), but were not sampled for in the remainder of the Peripheral Area.

- In ground water, analyses were conducted for arsenic, cadmium, copper, lead, and zinc (Hydrometrics, 1995a, Table 5-2). No chemicals of concern were selected for ground water beneath the residential area in the advance outwash aquifer. However, as discussed in Section 2.4.4, arsenic has been detected at elevated concentrations in the advance outwash aquifer in Well 4b, and in shallow till in Wells EV-11 and EV-13. Arsenic and other metals concentrations in ground water will be measured in the Compliance Monitoring Program.

  The Remedial Investigation report noted that ground water in the Lowland Area has elevated arsenic, cadmium, copper, lead, and zinc.

- In surface water, analyses were conducted for arsenic, cadmium, and lead (Hydrometrics, 1995a, Table 5-3). Arsenic, cadmium, and lead were selected as chemicals of concern.

Table 2-2 summarizes the chemicals of concern identified in the Remedial Investigation report (Hydrometrics, 1995a) by environmental medium.

Table 2-2: Chemicals of Concern in Environmental Media.

Soil	Ground Water	Surface Water
Antimony	No chemicals of concern were identified in the RI report, but elevated arsenic concentrations were detected during monitoring.	Arsenic
Arsenic		Cadmium
Cadmium		Lead
Lead		
Mercury		
Thallium		

2.5 Feasibility Study

The Feasibility Study report (Hydrometrics, 1995b) presented alternative cleanup actions which consist of a number of response actions to address site environmental concerns.

Ecology (1995b) did not agree with all of Asarco's analyses and conclusions in the Feasibility Study report[4], stating:

> Ecology does not agree with all of Asarco's analyses and conclusions. In particular Ecology believes Asarco's preferred alternative, Alternative 2, may not meet threshold requirements because it may not meet ARARs.
>
> In addition, the substantial and disproportionate analysis performed by Asarco inappropriately applies methods used in the Sediment Cleanup Standards Users Manual. While the analyses are useful and sufficient to allow Ecology to select a cleanup action, Asarco places an overly mechanistic reliance on methods intended for sediment cleanup to protect benthic fauna whereas the case in point is protection of human health from direct soil exposure in a residential neighborhood. In addition, the analysis is more complex than the input information warrants.

Many of the response actions considered in the Feasibility Study were the same for all alternatives. The alternatives presented three main considerations:

- Selection of arsenic concentrations above which soil will be excavated;
- Placement of excavated soil. Three placement methods are proposed: (1) Consolidation beneath an impermeable cover in the Former Arsenic Trioxide Processing Area, (2) Placement in an On-Site Containment Facility which has an impermeable bottom liner as well as an impermeable cover, and (3) Off-site disposal of all excavated contaminated soils; and

[4] This statement does not imply Ecology agreed with all of Asarco's analyses and conclusions in any other report prepared for this project.

- Proposed treatment method for the most highly-contaminated soil. Proposed treatment methods included: (1) No treatment, (2) In-situ stabilization, (3) Ex-situ stabilization, (4) Off-site disposal in a hazardous waste landfill, (5) Soil washing, and (6) Recycling and metal recovery.

Table 2-3 summarizes the alternatives presented in the Feasibility Study with the exception of Alternative 1. Alternative 1 provided for limited actions including only institutional controls and environmental monitoring. Alternative 1 did not meet threshold requirements for cleanup actions under the law.[5] It was essentially a no action alternative and was included for comparison purposes.

The Feasibility Study ranked the alternatives based on requirements set forth in the MTCA Cleanup Regulation (Hydrometrics, 1995b, Table 4-2). These requirements are discussed further in Section 3.1. Three alternatives tied for the highest rank. All would excavate soil from the Peripheral Area and consolidate it in the Former Arsenic Trioxide Processing Area. Consolidation of the Peripheral Area soils would result in a large mound of contaminated soil with elevation increases within the Former Arsenic Trioxide Processing Area of up to 70 feet. The alternatives differed in how they treat the more highly contaminated soils in the Former Arsenic Trioxide Processing Area. The highest ranking alternatives were:

- Alternative 4 – Ex-situ stabilization/consolidation. In this alternative the most highly contaminated soils in the Former Arsenic Trioxide Processing Area would be excavated and stabilized to physically and/or chemically fix the contaminants to reduce their toxicity and mobility, then placed in the Consolidation Facility with Peripheral Area soils;

- Alternative 6 – In-situ stabilization/consolidation. In this alternative the most highly contaminated soils in the Former Arsenic Trioxide Processing Area would be stabilized in place prior to addition of contaminated soil excavated from the Peripheral Area in the Consolidation Facility; and

- Alternative 9 – Recycling/consolidation. In this alternative the most highly contaminated soils in the Former Arsenic Trioxide Processing Area would be excavated and shipped to a smelting facility prior to placement of contaminated soil excavated from the Peripheral Area in the Consolidation Facility. The Feasibility Study report noted that recycling might require higher arsenic concentrations than exist in sufficient volumes of soil to make shipment to a smelting facility economic (Hydrometrics, 1995b, p. 4-68).

[5] This statement is not intended to imply that all remaining alternatives presented in the Feasibility Study would meet threshold requirements.

The Feasibility Study report performed a series of cost analyses to evaluate the alternatives and the arsenic concentrations above which soil in yards on residential properties should be excavated. The report indicated that the highest cost efficiency was obtained at an action level between 76 and 100 mg/Kg arsenic (Hydrometrics, 1995b, p. 4-167), and indicated Alternative 2, consolidation of soils excavated from the Peripheral Area with no excavation or treatment of the highly contaminated soil within the Former Arsenic Trioxide Processing Area, was the preferred alternative (Hydrometrics, 1995b, p. 4-184).

Table 2-3: Alternative versus Response Action Matrix.

Notes: Numbers at the top correspond to alternative numbers in the Feasibility Study (Hydrometrics, 1995b). The codes in the left column indicate proposed response actions for soil (S), surface water (SW), and ground water (GW). Alternative 1 not shown.

			(cover only)			(cover & bottom liner)							
Alternative®	Consolidation						On-Site Containment Facility (OCF)					Off-Site	
Response Action–	2	6	4	13	7	9	3	5	14	8	10	12	11
S-19: Metals Recycling						X					X		X
S-13: Soil Washing					X					X			
S-18: Subtitle C Landfill				X					X			X	
S-14: Ex-Situ Stabilizat'n			X					X					
S-14: In-Situ Stabilizat'n		X											
No Ttmt of TCLP Soil	X						X						
S-20: Subtitle D Landfill	X	X	X	X	X	X	X	X	X	X	X	X	X
S-16: On-Site Containment Facility							X	X	X	X	X		
S-6: MultiMedia Liner	X	X	X	X	X	X							
S-17: Consol. and Cap	X	X	X	X	X	X							
SW-3: Protective Cap	X	X	X	X	X	X	X	X	X	X	X		
SW-9: Sf Water Diversion	X	X	X	X	X	X	X	X	X	X	X		
SW-5: Divert Run-on	X	X	X	X	X	X	X	X	X	X	X		
GW-4: Intercept'n Trench	X	X	X	X	X	X	X	X	X	X	X		
S-2: Institutional Controls	X	X	X	X	X	X	X	X	X	X	X	X	X
S-7: Revegetation	X	X	X	X	X	X	X	X	X	X	X	X	X
S-8: Grading	X	X	X	X	X	X	X	X	X	X	X	X	X
S-11: Dust Suppression	X	X	X	X	X	X	X	X	X	X	X	X	X
S-12: Excavation	X	X	X	X	X	X	X	X	X	X	X	X	X
SW-1: Institut'nl Controls	X	X	X	X	X	X	X	X	X	X	X	X	X
SW-2: SW Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X
GW-1: GW Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X

	Proposed treatment of soils failing TCLP
	Proposed placement of soil excavated from Peripheral Area
	Common Elements

2.6 Public Comment on the RI/FS

The Remedial Investigation and Feasibility Study reports were submitted for public comment in September 1995. Over 500 comments were received, and Ecology had many discussions with residents of the area and other interested parties. The primary concerns raised are summarized as follows:

- Physical action should be taken on contaminated property, not simply notification that the contamination was there;
- Property values should be protected;
- Deed restrictions should not be put on people's property;
- The cleanup should be timely;
- The cleanup should be lasting;
- Life should be returned to normal;
- Environmental justice issues should be considered in this diverse neighborhood;
- Contaminated soils should be removed from the neighborhood and not be consolidated within the Former Arsenic Trioxide Processing Area; and
- Grade changes of up to 70 feet necessary to construct the proposed Consolidation Facility would create significant slopes adjacent to residential areas. Residents opposed these grade changes because they would degrade the aesthetic quality of the neighborhood.

2.7 Mediation

Subsequent to the public comment period for the Remedial Investigation and Feasibility Study reports, Ecology, Asarco, local governments, and citizen groups[6] entered into mediation to discuss issues regarding cleanup of the Everett Smelter Site. The mediation was an attempt to reach an agreement on cleanup actions at the site to be included in the DCAP/DEIS for the site to be issued by Ecology for public comment. Although agreement was not reached, issues were outlined and thoroughly discussed. The major issues of discussion were:

[6] The mediation participants were: ASARCO Incorporated, the City of Everett, Ecology, the Everett Housing Authority, the Northeast Everett Community Organization, the Northwest Everett Neighborhood Association, Snohomish County, Snohomish Health District, and the Snohomish Public Utilities District.

- What will trigger soil removal and how much soil will be removed?
- What constitutes sufficient containment for soil left on contaminated properties?
- How should a final site boundary be set?
- What remedial actions should be taken within the Former Arsenic Trioxide Processing Area and should an On-Site Containment Facility be constructed?
- What sampling is appropriate to verify that cleanup actions have accomplished their objectives?
- What institutional controls are necessary for contamination remaining on-site?

The mediation participants formed a Technical Work Group (TWG) to develop various scenarios to explore these issues. The scenarios were essentially more detailed developments of two alternatives presented in the Feasibility Study: Alternative 13, Off-Site Disposal and Consolidation, and Alternative 14, Off-Site Disposal with an On-Site Containment Facility. In the context of these alternatives, and throughout this document, off-site disposal means disposal at an appropriately permitted facility somewhere other than the Everett Smelter Site.

It should be noted that the mediation did not discuss the alternatives in terms of alternative numbers, but rather in terms of a Consolidation Facility with off-site disposal of contaminated soil which could not be accommodated in the Consolidation Facility and an On-Site Containment Facility with off-site disposal of contaminated soil which could not be accommodated in the On-Site Containment Facility.

The Consolidation Facility considers excavation of contaminated soil from the Peripheral Area and consolidating it within the Former Arsenic Trioxide Processing Area beneath an impermeable cover. The more highly-contaminated soils within the Former Arsenic Trioxide Processing Area would be disposed of off-site.

The On-Site Containment Facility also considers excavation of contaminated soil from the Peripheral Area and consolidating it within the Former Arsenic Trioxide Processing Area beneath an impermeable cover. The most highly-contaminated material from within the Former Arsenic Trioxide Processing Area would still be sent off-site for disposal. The remainder of the highly-contaminated material from within the Former Arsenic Trioxide Processing Area would be contained within a top- and bottom-lined On-Site Containment Facility constructed within the Former Arsenic Trioxide Processing Area.

Two workbooks (TWG 1998a and b) were produced during the mediation sessions, one comparing the more detailed development of three cleanup scenarios (two based on a Consolidation Facility alternative and one on an On-Site Containment Facility alternative)

and one providing more detailed cost estimates. The scenarios included a wide range of cleanup actions, including a wide range of arsenic concentrations triggering soil excavation, of options for evaluating whether or not cleanup was complete, for remedial actions on the Former Arsenic Trioxide Processing Area, and for institutional controls. The estimated cleanup costs hence also had a wide range: $22 million to $86 million. Scenarios were developed without regard to whether or not they met, did not meet, or exceeded minimum regulatory requirements.

2.8 Future Land Use

Another activity undertaken in response to citizen comment was the formation of a Land Use Task Committee to look into future uses of the Former Arsenic Trioxide Processing Area, once cleanup actions have been completed. This area has been purchased by Asarco and is currently fenced. The future use and aesthetics of this area are important to the neighborhood, as well as to the City of Everett in general.

The Land Use Task Committee evaluated various future uses of the Former Arsenic Trioxide Processing Area. The results of this evaluation are contained in the Asarco Everett Smelter Site Redevelopment report (Merritt+Pardini, 1997). This evaluation examined possible redevelopment scenarios, but did not address the fundamental land use and infrastructure considerations regarding cleanup and future reuse of the area. Consequently, the City of Everett performed a comprehensive analysis of consistency between the cleanup and site reuse options and the City's comprehensive plan and zoning code (See Section 3.3.5), based on scoping comments, the mediation process, and the DCAP/DEIS.

The Land Use Task Committee identified five goals for redevelopment of the Former Arsenic Trioxide Processing Area:

- Clean up and reuse the site;
- New land use be compatible with existing uses;
- Have a positive impact on the neighborhood;
- Encourage economic improvement; and
- Provide public access to views.

The Land Use Committee identified five strategic considerations regarding future development:

- Asarco is not a developer;

- The City of Everett is not interested in maintaining a park on this site;
- The Everett Housing Authority cannot maintain a public park;
- The Port of Everett is preparing the Lowland Area for new industrial use; and
- East Marine View Drive may have increased use.

The committee identified five general directions for alternative use studies and environmental analyses:

- **No action** – The site would not be cleaned up;
- **Clean up only** – The site would be cleaned and fenced. There would be no end use development;
- **Park or Park/Institutional** – Some kind of public use ranging from full development of the site as a park to primary use by a public institution such as a school;
- **Office** – A commercial office development; and
- **Mixed Office and Park** – A division of the site into two parts: One would be a public park, the other a private office development.

The Land Use Committee concluded that there were three preferred directions for further consideration:

- **Passive park with public access and a small scale institutional use to provide security and surveillance** – This idea builds on ideas that the site be developed entirely as a passive park. In this concept nearly all of the property would be publicly accessible, but a small institutional building would be located in the park to provide a more or less continuous use and level of activity and surveillance.

  The design of the cleanup would need to be tailored to the requirements of the park and end use institution. No institutional user was identified, and the City of Everett has indicated that it does not want to take on ownership, maintenance, or operation of a park on this site.

- **An institution, such as community center, school, or church would utilize the entire site** – This concept builds on ideas in which an institutional user would take control of all of the site and use it for a purpose that would involve a combination of buildings and open space. The community prefers that most

buildings and parking occur at the lower part of the site near East Marine View Drive, and that the upper portion of the site, near Hawthorne Street, have a public open space amenity that takes advantage of the view.

To make this option more feasible, the cleanup of the site would need to integrate the requirements of the institutional end user. No end user has been identified.

- **The site would be developed with two office projects and a small view park** – This concept evolved from Land Use Committee discussions regarding ways in which revenues from private office development might be utilized to provide construction, maintenance, and operations of a small public view park at the end of Hawthorne Street. The concept envisions that two graded platforms suitable for future development of office buildings and parking be created on the majority of the site.

  A small part of the Former Arsenic Trioxide Processing Area would be combined with the Hawthorne Street right-of-way and several home sites owned by Asarco to create a view park at the top of the hill.

  This concept might not require early identification of an end user institution, and was favored by the Land Use Committee for that reason. It would, however, require a rezone of the property and resolution of some vehicle access issues. It is likely that the rezone and traffic issues will involve planning that includes a larger area that extends south to Butler Street.

The report of the Land Use Task Committee was presented in a public meeting held on February 23, 1998, combined with a request for comments on a State Environmental Policy Act scoping document.

In the public meeting, some citizens indicated that they wished the area returned to residential use, and this use was included in the SEPA Evaluations, discussed in the next section. A comprehensive land use analysis is included in Section 3.3.5.

2.9 SEPA Scoping

Ecology issued a Determination of Significance and a Request for Comments on the proposed scope of an EIS in February 1998.

WAC 197-11-330 discusses the threshold determination process. The threshold determination does not balance whether the beneficial aspects of a proposal outweigh its adverse impacts, but rather considers whether a proposal has any probable significant adverse environmental impacts. The concept is to identify probable adverse environmental impacts so that their effect can be assessed and potential mitigating measures identified.

Because cleanup of the Upland Area of the Everett Smelter Site will involve construction-type activities in residential urban areas over a number of years, it was determined that there was sufficient potential for adverse impacts to require an EIS.

Once a Determination of Significance is made, WAC 197-11-408 provides that the lead agency (Ecology) is to narrow the scope to the probable significant adverse impacts and reasonable alternatives, including mitigation measures. Ecology met with representatives from the City of Everett and Asarco to identify and develop the environmental issues for analysis. These issues were identified in a SEPA scoping document which was presented for public comment in February and March 1998. Two public meetings were held regarding the SEPA scoping, one on February 23rd and one on March 3rd. Comments received during the scoping meeting were summarized by Asarco and forwarded to Ecology.

The environmental issues identified by the scoping process for analysis are summarized in Section 5.3.

Chapter 3 - Regulatory Requirements

This chapter discusses the regulatory requirements considered in selecting the cleanup actions to be taken in the Upland Area of the Everett Smelter Site. Relevant regulations are listed and the pertinent requirements which were considered when selecting the remedy are summarized. In all cases, if there are any conflicts between the summary and the language of the regulation itself, the language of the regulation shall govern. The applicable statutes and regulations should be consulted for additional detail. If further regulatory requirements are identified, they will be incorporated into cleanup requirements at that time.

3.1 MTCA Requirements

Cleanup of the Upland Area of the Everett Smelter Site is being done under the authority of Chapter 70.105D RCW[7], *Hazardous Waste Cleanup – Model Toxics Control Act*, and its implementing regulation, Chapter 173-340 WAC[8], *The Model Toxics Control Act Cleanup Regulation*. This statute and regulation apply to the site in their entirety and govern all remedial actions at the site.

The most relevant sections of the statute and regulation with regard to this FCAP/FEIS are the following:

- RCW 70.105D.030(1)(b), which states in part that "the department shall give preference to permanent solutions to the maximum extent practicable and shall provide for or require adequate monitoring to ensure the effectiveness of the remedial action";

- RCW 70.105D.030(2), which states, "The department shall immediately implement all provisions of this chapter to the maximum extent practicable … ";

- WAC 173-340-700 through –760, which specify how cleanup standards are to be set for the various environmental media of concern: ground water, surface water, soil, sediment, and air; and

- WAC 173-340-360, which specifies the requirements for cleanup actions and the criteria that are used to evaluate alternatives.

Taken together, the provisions of the statute and the regulation provide strong preference for permanent solutions, set specific cleanup standards for hazardous substances, and

[7] Revised Code of Washington
[8] Washington Administrative Code

provide specific requirements for selecting cleanup actions ("solutions"), including selecting remedies which are permanent to the maximum extent practicable.

3.1.1 Specification of Cleanup Standards

Specification of a cleanup standard for an environmental medium of concern (i.e., soil, ground water, surface water, sediment, or air) requires specification of the following:

- Hazardous substance concentrations that protect human health and the environment. These concentrations are called **cleanup levels**. Indicator hazardous substances[9] may be chosen from among the hazardous substances present at a site to define cleanup requirements.

- The location on the site where cleanup levels must be attained. This location is known as the **point of compliance**.

- Additional regulatory requirements that apply to a cleanup action because of the nature of the hazardous substances, type of action, location of the site, or other circumstances at the site. These requirements include legally applicable requirements promulgated under state or federal law and relevant and appropriate requirements that, while not legally applicable, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site. These "applicable or relevant and appropriate requirements" are usually referred to by the acronym ARARs.

3.1.2 Selection of Cleanup Actions

Cleanup actions are selected according to the requirement that cleanup actions must meet threshold requirements, the requirement to select cleanup actions which are permanent to the maximum extent practicable, consideration of the restoration time frame, consideration of public concerns, preferences regarding cleanup technologies, and criteria for evaluating the degree to which alternative cleanup actions meet these requirements, considerations, and preferences. The process is set forth in WAC 173-340-360, *Selection of cleanup actions*.

The threshold requirements which any cleanup action must meet to be considered for selection are that the cleanup must:

- Protect human health and the environment,

- Comply with cleanup standards,

[9] **Indicator hazardous substances** means the subset of hazardous substances present at a site selected under WAC 173-340-708 for monitoring and analysis during any phase of remedial action for the purpose of characterizing the site or establishing cleanup requirements for that site. WAC 173-340-200.

- Comply with applicable state and federal laws, and

- Provide for compliance monitoring.

Cleanup action alternatives which are determined to meet the above threshold requirements may then be considered for selection of an overall cleanup action.

Overall cleanup actions typically involve the use of several cleanup technologies or methods at a single site. In selecting an overall cleanup action from alternative choices which meet threshold requirements, the degree to which each alternative meets the following requirements is to be considered:

- Use of permanent solutions to the maximum extent practicable. A permanent solution is one in which cleanup standards can be met without further action being required at the original site or any other site involved with the cleanup action, other than the approved disposal of any residue from preferred treatment technologies. In general, technologies which reuse, recycle, destroy, or detoxify hazardous substances result in permanent solutions if residual hazardous substance concentrations are below cleanup levels established under the MTCA Cleanup Regulation. Containment of hazardous substances and/or institutional controls alone are not permanent solutions.

- Provision for a reasonable restoration time frame. Factors considered when establishing a reasonable restoration time frame include: potential risks posed by the site to human health and the environment; the practicability of achieving a shorter restoration time; current and future use of the site, surrounding areas, and associated resources; availability of alternative water supplies; likely effectiveness and reliability of institutional controls; ability to control and monitor migration of hazardous substances from the site; toxicity of the hazardous substances at the site; and natural processes which reduce concentrations of hazardous substances and have been documented to occur at the site or under similar site conditions.

- Consideration of public concerns raised during the public comment on the DCAP/DEIS.

When considering alternatives, preference is to be given to those which use cleanup technologies which provide greater long-term effectiveness and more permanent reduction of toxicity, mobility, and volume. Technologies which address these issues are considered, in order of descending preference, to be technologies which address hazardous substances in the following manner: (1) reuse or recycle; (2) destroy or detoxify; (3) separate, reduce the volume of, and/or reuse, recycle, destroy, or detoxify; (4) immobilize; (5) dispose of on site or off site at an engineered facility; (6) isolate or contain; and (7) provide institutional controls and monitoring. Institutional controls and monitoring are to

be used to supplement engineering controls and are not to be used as a substitute for cleanup actions that would otherwise be technically possible, WAC 173-340-440(2).

In considering the degree to which alternative cleanup actions use permanent solutions to the maximum extent practicable, the following criteria are to be considered: (1) Overall protectiveness of human health and the environment; (2) Long-term effectiveness; (3) Short-term effectiveness; (4) Permanent reduction of toxicity, mobility, and volume of the hazardous substances; (5) Ability to be implemented; (6) Cleanup costs; and (7) Degree to which community concerns are addressed. Figure 3-1 summarizes remedy selection criteria.

One other important concept should be discussed with regard to specification of cleanup standards and the selection of cleanup actions. This concept is termed remediation level. As discussed above, cleanup actions typically involve a combination of technologies, and often not all contamination is taken off-site. A remediation level is a concentration or location of a hazardous substance in a medium at which a different cleanup technology will be used. There are often multiple remediation levels; e.g., one for removal and treatment/disposal and one for what material may be contained on-site. Remediation levels may be based upon the concentration of a hazardous substance, upon the location of the hazardous substance, and often both. Remediation levels may only be established after all of the requirements for selection of a remedy under WAC 173-340-360 are met. Cleanup actions which incorporate remediation level(s) must still be protective of human health and the environment and permanent to the maximum extent practicable.

Typically, a lower preference, less permanent remedy, such as containment, might be used as the cleanup action to address contaminant concentrations between the cleanup level and a higher remediation level set such that where contaminant concentrations exceed this higher level a more permanent cleanup action, such as removal and off-site disposal, is taken.

When a remediation level is set for a site, it means that cleanup levels will be attained for only a portion of the site and that contamination will be left on-site. Institutional controls are required for any site where contamination remains on-site above cleanup levels.

Cleanup levels and their point of compliance must be set for all sites to develop the cleanup standard; remediation levels and associated locations where the remediation levels must be met may or may not be used at a particular site.

Multiple remediation levels will be set for the Upland Area of the Everett Smelter Site.

3.2 Waste Classification

In considering the various laws and regulations which may be applicable or relevant and appropriate in the Upland Area of the Everett Smelter Site, classification of soil as various

types of solid waste is important. This is dependent upon the arsenic concentration.[10] Soil in the Upland Area of the Everett Smelter Site classifies as follows:

- Waste products and debris from the former Everett Smelter Site are **solid waste** because they are discarded materials which have been abandoned by being disposed of by application to or placement on the land in a manner that constitutes disposal. WAC 173-303-016(3), (4), and (5), and WAC 173-303-040. Further, waste products and debris from the former Everett Smelter Site are nonputrescible industrial waste, demolition waste, problem waste, and discarded commodities, and hence are solid wastes under WAC 173-304-100.

- Pure arsenic trioxide is **extremely hazardous waste** under WAC 173-303-100 (Asarco, 1998a, p. 93).

- Soil failing the Toxicity Characteristic Leaching Procedure (TCLP) test is federally-designated hazardous waste, and hence is **dangerous waste** under WAC 173-303-070(3). Analytical site data indicate the arsenic concentration at which soil fails the TCLP test, resulting in the soil designating as a dangerous waste, is 3,000 mg/Kg (Asarco, 1998a, p. 94).[11]

- Soils containing arsenic concentrations between the cleanup level for soil, (20 mg/Kg), and the dangerous waste concentration (3,000 mg/Kg), are **problem waste** under WAC 173-304-100 if removed during the cleanup.

- Soils containing arsenic concentrations less than the cleanup level (20 mg/Kg) are not regulated by MTCA, the Dangerous Waste Regulations or the Minimum Functional Standards for Solid Waste Handling.

[10] As will be discussed in Chapter 5, arsenic is the indicator chemical upon whose concentration cleanup decisions will be primarily based. Other contaminants at the site will be considered as appropriate.

[11] Soil which passes the TCLP test may be further designated as state-only dangerous waste under Chapter 173-303-100 WAC if the concentration at which it fails a bioassay test conducted according to procedures specified in Chapter 173-303-100 WAC is less than the concentration at which it fails the TCLP test. Bioassay tests indicate the arsenic concentration at which soil classifies as dangerous waste is above 10,000 mg/Kg (Asarco, p. 93). Hence, there is no requirement for designation of state-only dangerous waste at the site.

Figure 3-1: Remedy Selection Criteria.

TCLP results reported in the Remedial Investigation report (Hydrometrics, 1995a, Table 3-11) indicate soil which does not fail the TCLP test for arsenic will not fail for the other metals of concern at the site. However, slag may fail the test for lead even when it does not fail for arsenic. (Three slag sample results presented in the Remedial Investigation report had arsenic concentrations ranging from 410 to 787 mg/Kg. Lead concentrations ranged from 8,501 to 18,800 mg/Kg. All three samples failed the TCLP test for lead but not for arsenic.)

3.3 Applicable, Relevant and Appropriate, and Local Permitting Requirements

The MTCA Cleanup Regulation requires that all cleanup actions comply with applicable state and federal law, and further states that the term 'applicable state and federal laws' shall include legally applicable requirements and those requirements that the department determines … are relevant and appropriate requirements." WAC 173-340-710(1)(a). This section discusses applicable state and federal law, relevant and appropriate requirements, and local permitting requirements which were considered and were of primary importance in selecting cleanup requirements. If other requirements are identified at a later date, they will be applied to the cleanup actions at that time.

MTCA provides an exemption from the procedural requirements of several state laws and from any laws authorizing local government permits or approvals for remedial actions. RCW 70.105D.090. Substantive requirements must be met. The substantive requirements currently known are incorporated into this FCAP/FEIS. If further additional substantive requirements are identified, the necessary steps to incorporate them will be taken. The procedural requirements of the following state laws are exempted:

- 70.94, *Washington Clean Air Act*;
- 70.95, *Solid Waste Management, Reduction, and Recycling*;
- 70.105, *Hazardous Waste Management*;
- 75.20, *Construction Projects in State Waters*;
- 90.48, *Water Pollution Control*; *and*
- 90.58, *Shoreline Management Act of 1971*.

WAC 173-340-710(3) sets forth the criteria that Ecology evaluates when determining whether certain requirements are relevant and appropriate for a cleanup. Those criteria are as follows:

(a) Whether the purpose for which the statute or regulations under which the requirement was created is similar to the purpose of the cleanup action;

(b) Whether the media regulated or affected by the requirement is similar to the media contaminated or affected at the site;

(c) Whether the hazardous substance regulated by the requirement is similar to the hazardous substance found at the site;

(d) Whether the entities or interests affected or protected by the requirement are similar to the entities or interests affected by the site;

(e) Whether the actions or activities regulated by the requirement are similar to the cleanup action contemplated at the site;

(f) Whether any variance, waiver, or exemption to the requirements are available for the circumstances of the site;

(g) Whether the type of place regulated is similar to the site;

(h) Whether the type and size of structure or site regulated is similar to the type and size of structure or site affected by the release or contemplated by the cleanup action; and

(i) Whether any consideration of use or potential use of affected resources in the requirement is similar to the use or potential use of the resources affected by the site or contemplated cleanup action.

The following sections discuss applicable or relevant and appropriate requirements from state, federal, and local laws with regard to the Upland Area of the Everett Smelter Site.

3.3.1 Minimum Functional Standards for Solid Waste Handling

This section discusses selected requirements from the *Minimum Functional Standards for Solid Waste Handling*, Chapter 173-304 WAC, which may be applicable or relevant and appropriate to soil and other material in the Upland Area of the Everett Smelter Site.

One of the alternatives considered would consolidate problem waste from the Peripheral Area in the Former Arsenic Trioxide Processing Area. This consolidation would create a solid waste landfill for problem waste. Accordingly, the *Minimum Functional Standards for Solid Waste Handling*, Chapter 173-304 WAC, were reviewed to determine construction and closure requirements for such a consolidation facility.

WAC 173-304-460 provides minimum functional standards for design of solid waste landfills. WAC 173-304-460(3)(c) provides the following requirements for the liner:

- 3(c)(i) calls for a standard bottom liner design constructed of at least a four foot thick layer of recompacted clay or other material with a permeability of no more than 1 x 10^{-7} cm/sec and sloped no less than 2%;

- 3(c)(ii) provides that an alternative design may be used. The design is to have two liners, an upper liner of at least fifty mils (0.050 inch) thickness made of synthetic material and a lower liner of at least 2-feet thickness of recompacted clay or other material with a permeability of no more than 1 x 10^{-6} cm/sec and sloped no less than 2%; and

- 3(c)(iii) provides that an equivalent design may be used. The design shall use alternative methods, operating practices and locational characteristics which will minimize the migration of solid waste constituents or leachate into the ground or surface water at least as effectively as the liners of 3(c)(i) and 3(c)(ii), above.

WAC 173-304-460(3)(e) provides the following requirements for closure:

- (3)(e)(i) At least two feet of 1 x 10^{-6} cm/sec or lower permeability soil or equivalent shall be placed upon the final lifts … . Artificial liners may replace soil covers provided that a minimum of fifty mils (0.050 inch) thickness is used;

- (3)(e)(ii) The grade of surface slopes shall not be less than 2%, nor the grade of side slopes more than 33%; and

- (3)(e)(iii) Final cover of at least 6-inches of topsoil be placed over the soil cover and seeded with grass, other shallow rooted vegetation or other native vegetation.

WAC 173-304-130(1)(g) indicates locational standards for disposal sites do not apply to problem wastes.

3.3.2 Dangerous Waste Regulations

One of the alternatives considered would contain soils and other materials designating as dangerous waste in an On-Site Containment Facility in the Former Arsenic Trioxide Processing Area. The On-Site Containment Facility would constitute a dangerous waste landfill. Accordingly, the *Dangerous Waste Regulations*, Chapter 173-303 WAC, were reviewed to determine construction and closure requirements for such a containment facility.

Where remedial actions are being conducted at a site under an order or decree through the authorities of MTCA and CERCLA, Ecology's Area of Contamination Policy provides that the movement of dangerous wastes within an area of contamination is not considered

generation as defined by the Dangerous Waste Regulations, and the Dangerous Waste Regulations are not automatically triggered at sites being remediated through either state-conducted remedial actions or through the authorities of MTCA or CERCLA. The Policy further indicates that substantive portions of the Dangerous Waste Regulations should be considered at almost every cleanup site. These include designation (covered above), storage requirements for investigative wastes, treatment standards for on-site treatment, landfill requirements for final disposal of wastes on-site (siting and design requirements), and the state and federal land disposal restrictions.

Storage Requirements: Waste which is excavated on-site may be stored while awaiting final disposition. Storage facilities must meet the substantive requirements for dangerous waste storage and handling in Chapter 173-303 WAC. Once dangerous waste is loaded for transport off-site, it is subject to all requirements of Chapter 173-303 WAC.

Landfill Requirements for Final Disposal of Dangerous Waste On site: There are two considerations regarding landfill requirements of the Dangerous Waste Regulation with respect to the Upland Area of the Everett Smelter Site. These are landfill siting criteria and landfill design requirements.

Siting criteria are contained in WAC 173-303-282. The purpose of the siting criteria is to immediately disqualify proposed dangerous waste facility sites in locations considered unsuitable or inappropriate for the management of dangerous wastes. The most pertinent criteria considered were for elements of the built environment and include the following:

- Land-based facilities must be located such that the dangerous waste management unit boundary is at least five hundred feet from the nearest point of the facility property boundary, WAC 173-303-282(7)(a)(ii);

- The dangerous waste management unit boundary is at least one-quarter mile from residences or public gathering places, WAC 173-303-282(7)(c)(ii). Figure 1-2 shows that a dangerous management unit, which would be sited within the Former Arsenic Trioxide Processing Area, would be immediately adjacent to residences; and

- Dangerous waste landfills are not to be sited in areas where there is less than fifty feet of vertical separation between the lowest point of the dangerous waste management unit and the seasonal high-water level of the uppermost aquifer of beneficial use, WAC 173-303-282(6)(c)(ii)(A)(II). As Cross Section B-B' on Figure 2-6 shows, there is only about 30 feet of separation between the Former Arsenic Trioxide Processing Area and the advance outwash aquifer in the vicinity of EV-3.

State and Federal Land Disposal Restrictions: With regard to the land disposal restrictions, D004 Wastes – Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for arsenic based on the extraction procedure (EP) in SW846

Method 1310 must be treated in a manner such that they do not fail the TCLP test; that is, such that they are no longer dangerous waste.

3.3.3 Other State and Federal Requirements

Several state and federal laws are applicable to cleanup actions at the site, and their requirements must be met. Means of meeting requirements will be developed in the Engineering Design Report if not included in this Cleanup Action Plan. The applicable laws are:

Water discharge requirements: Hazardous substances which are directly or indirectly released or proposed to be released to waters of the state shall be provided with all known, available, and reasonable methods of treatment consistent with the requirements of Chapters 90.48 RCW, *Water Pollution Control Act*, and 90.54 RCW, *Water Resources Act*, and the regulations that implement those statutes. WAC 173-340-710(6)(a).

Air emission requirements: Best available control technologies consistent with the requirements of Chapter 70.94 RCW, *Washington Clean Air Act*, and the regulations that implement this statute shall be applied to releases of hazardous substances to the air resulting from cleanup actions at a site. WAC 173-340-710(6)(a).

Cleanup Standards: WAC 173-340-720 through -760 specify cleanup standards for ground water, surface water, soil, sediment, and air. Cleanup standards are to be at least as stringent as all of the following: applicable state and federal laws, concentrations specified in tables or formulae contained in the relevant sections, or as specified by Ecology to protect human health and the environment. The applicable state and federal laws referred to in Section -720 through –740, which govern the media of concern in the Upland Area of the Everett Smelter Site (ground water, surface water, and soil) are as follows:

- WAC 173-340-720, Ground water cleanup standards
  - Maximum contaminant levels established under the Safe Drinking Water Act and published in 40 CFR 141, as amended;
  - Maximum contaminant level goals for noncarcinogens established under the Safe Drinking Water Act and published in 40 CFR 141, as amended;
  - Secondary maximum contaminant levels established under the Safe Drinking Water Act and published in 40 CFR 143, as amended; and
  - Maximum contaminant levels established by the state board of health and published in Chapter 248-54 WAC, as amended.

- WAC 173-340-730, Surface water cleanup standards
  - All water quality criteria published in the water quality standards for surface waters of the state of Washington, Chapter 173-201 WAC, as amended (this is now Chapter 173-201A WAC); and

  - Water quality criteria based on the protection of aquatic organisms (acute and chronic criteria) and human health published pursuant to Section 304 of the Clean Water Act.

- WAC 173-340-740, Soil cleanup standards, and WAC 173-340-745, Soil cleanup standards for industrial properties, do not cite any specific applicable state or federal laws but do provide that if a concentration for a hazardous substance is established under an applicable state and federal law, the cleanup level shall be at least as stringent as that concentration.

SEPA Rules: Although not specifically referenced in Chapter 173-340 WAC, cleanup actions must comply with the provisions of Chapter 191-11 WAC, *SEPA Rules*. WAC 197-11-250 discusses SEPA-MTCA integration. This FCAP/FEIS integrates the Cleanup Action Plan required by MTCA with the EIS required by SEPA.

Wells: Well construction and abandonment are governed by Chapter 173-160 WAC, *Minimum Standards for Construction and Maintenance of Wells.*

Health and Safety: Health and Safety at the Everett Smelter Site is governed by statutes and regulations implemented by the Washington State Department of Labor & Industry. Applicable laws and regulations will be identified, and plans to comply with them will be discussed in the Engineering Design Report.

3.3.4 Local Permitting Requirements

The City of Everett has advised Ecology that substantive requirements of the City's comprehensive plan and zoning code must be met when siting waste facilities and for site restoration after cleanup. There are also substantive requirements for grading, substantive requirements for controlling drainage at construction sites, and substantive requirements for work in City rights-of-way. The Engineering Design Report will specify means of complying with these requirements.

The Snohomish Health District *Policy Statement Regarding Street Waste Solids Recycling and Disposal* (Snohomish Health District, 1995) provides guidance on disposal and/or street waste solids, which includes storm drain sediment. This policy statement is considered a relevant and appropriate requirement because street waste in the area may have contaminant concentrations exceeding cleanup levels, in which case they are problem waste, and because it is an environmental requirement, criteria, or limitation established by Snohomish Health District pursuant to the delegation of regulation of solid waste to Snohomish Health District by the state under Chapter 70.95 RCW.

The *Policy Statement Regarding Street Waste Solids Recycling and Disposal* divides street waste solids into three classes: Class A, Class B, and dangerous waste. The policy indicates potential end uses for Class A and Class B street waste solids. With regard to the elements of interest in the Upland Area of the Everett Smelter Site, Class A street

waste solids are those whose contaminants do not exceed cleanup levels identified in Table 2, Method A Cleanup Levels – Soil, WAC 173-340-740(2). Class B street waste solids have contaminants exceeding the Method A cleanup levels, but do not designate as dangerous waste under Chapter 173-303 WAC.

If other local permitting requirements are identified, means of complying with the substantive provisions of those requirements will be developed and implemented.

3.3.5 Land Use Analysis

The City of Everett assisted Ecology with land use analysis to evaluate comprehensive plan and zoning considerations related to cleanup and future use of the Upland Area of the Everett Smelter Site. These considerations relate to cleanup and future use of the Former Arsenic Trioxide Processing Area, as this is the area in which houses have been demolished and in which the differences among the Off-Site Disposal, Consolidation Facility, and On-Site Containment Facility alternatives result in pronounced differences in impacts on future land use.

Changes in land use designations are not expected to be necessary for either cleanup or future site use elsewhere in the Upland Area of the Everett Smelter Site because the cleanup plan allows for existing uses.

3.3.5.1 Introduction

The current comprehensive plan and zoning designation for the Former Arsenic Trioxide Processing Area and adjacent area is single-family residential. The City would need to change this designation for the Consolidation Facility and Off-Site Disposal alternatives and for future use of the site for land uses other than single-family residences. No change would be necessary for the Off-Site Disposal alternative, and use of the land for single-family residences could continue.

This analysis focuses on whether the cleanup alternatives for the Former Arsenic Trioxide Processing Area are or can be designed to be consistent with the comprehensive plan and, if so, what land use designation and associated conditions are appropriate.

Three sections of the Everett Municipal Code (EMC) contain criteria for evaluating the needed change in the existing land use designations: the criteria for rezones in EMC 41.160; the general criteria for special property uses in EMC 41.150.C; and the specific criteria for special property uses in EMC 41.150.D.3.

These criteria can be summarized as focusing on whether the proposed uses (i.e., both the cleanup work and future allowable land uses) are compatible with surrounding uses, and whether the likely environmental impacts of the proposed uses are adequately addressed (mitigated), so as to be consistent with the comprehensive plan and promote the long-term public interest.

A change in the comprehensive plan and zoning designation would not be required for one of the action alternatives: Off-Site Disposal. The Off-Site Disposal alternative would allow future single-family residential redevelopment.

The land use analysis considers:

- The consistency of the cleanup alternatives, including Ecology's selected alternative, with existing land use designations and land uses;
- The environmental impacts of cleanup activities, including construction of the Consolidation Facility, and of potential future land uses; and
- Measures needed to ensure land use compatibility and to address adverse environmental impacts of cleanup and site reuse.

Tables 3-1, 3-2, and 3-2 summarize considerations regarding this land use analysis. Figures 3-2, 3-3, and 3-4 show boundaries considered in analyzing the land use implications of cleanup and future reuse alternatives.

Table 3-1: Potential Land Use Designation (please see text for additional discussion).

Comp. Plan Designation	Implementing Zone	Potential Suitability	Comments
1.1 (Single-Family Detached Residential)	R-S (Suburban Residential)	Does not Apply	Concerns about future liability and technical feasibility create a preference for more intensive land uses.
1.2, 1.3 (Single-Family Residential)	R-1, R-2, R-1(A) (Single-Family Low-Med. Density)	Does not Apply	Concerns about future liability and technical feasibility create a preference for more intensive land uses.
1.4, 1.5 (Single-Family and Multi-Family Residential)	R-2(A), R-3(L) (Single-Family and Multi-Family Low Density)	Does not Apply	Concerns about future liability and technical feasibility create a preference for more intensive land uses. This designation does not preserve a broad enough range of future uses.
1.6, 1.7 (Multi-Family Residential)	R-3, R-4 (Multi-Family Med.-High Density)	Maybe	This designation does not preserve a broad enough range of future uses.
1.8 (Multi-Family Residential)	R-5 (Core Residential)	Does not Apply	The site is located in a neighborhood that does not surround the downtown core activity center.
2.0 (Parks)	P Overlay (Parks)	Does not Apply	This is a limited designation and does not preserve a broad enough range of future uses (park use is allowed in other zones).
2.1, 2.2, 2.3, 2.4 (Schools, Hospitals)	Institutional Overlay, (Schools, Hospitals)	Does not Apply	This is a limited designation and does not preserve a broad enough range of future uses (these institutions allowed in other zones).
2.5, 2.6, 2.7, 2.8 (Clinic, Medical and Public Office Use)	C-O Overlay (Clinic & Office Overlay)	Does not Apply	This is a limited designation and does not preserve a broad enough range of future uses (clinics and offices allowed in other zones).
3.1 (Central Business District)	B-3, C-1, B-2, C-2 (Central Business District)	Does not Apply	The site is located in a neighborhood that does not surround the central business district.
4.1 (Neighborhood Business)	B-1 (Neighborhood Shopping)	Maybe	This designation does not preserve a broad enough range of future uses. No similar designation in immediate vicinity.
4.2 (Community Business)	B-2, C-1 (Community Business and Commercial)	Maybe	This designation is not typically used for smaller, community business areas.
4.3 (Office)	B-2(B) (Office)	Does not Apply	This is a limited designation and does not preserve a broad enough range of future uses (offices allowed in other zones).
4.4* (Mixed-Use Commercial and Multi-Family)	C-1, B-2* (Commercial and Community Business)	Applies	This designation preserves the broadest ranges of uses; is most consistent with the surrounding residential and other uses; and continues the nearby mixed use zones.
4.5 (Waterfront Comm'l)	W-C, M-S (Waterfront Comm'l)	Does not Apply	The site is located in an upland area, not on the waterfront.
5.1 (Heavy Industrial)	M-2 (Heavy Manufacturing)	Does not Apply	This use is incompatible with the surrounding residential neighborhoods.
5.2 (Maritime Services)	M-S (Maritime Services)	Does not Apply	The site is located in an upland neighborhood, not on the waterfront.
5.3 (Light Industrial)	C-2, M-M (Heavy Comm'l, Light Industrial)	Does not Apply	This use is incompatible with the surrounding residential neighborhoods.
5.4 (Office & Indus'l Park)	M-1 (Office & Indus'l Park)	Does Not Apply	The site is too small to accommodate this use.
6.1 (Agricultural)	A-1 (Agricultural)	Does not Apply	The site is located in an urban neighborhood, not on agricultural land.

* recommended

Table 3-2: Evaluation Criteria for Siting Consolidation Facility.

Need	Both the zone and surrounding communities would gain health benefits from removing contaminated soils to the Consolidation Facility and productive reuse of a large, vacant area at the northwest gateway to the City.
Public Services	The site is served by public water and sewer services. However, individual building proposals might be conditioned on expansion of capacity.
Traffic	Adequate access would need to be provided for cleanup work (to address impact of heavy truck traffic in neighborhood) and in anticipation of more intensive future reuse. Traffic signals would be needed along East Marine View Drive to facilitate traffic movements, at 5th Street and at Butler Street. Another may be installed at a temporary access between 5th and Butler Streets. Ecology would need to prepare a construction and traffic management plan in consultation with the City.
Access	See Traffic above. Access to the Consolidation Facility would be enhanced by widening East Marine View Drive to 36 feet. On-site circulation would be enhanced by connecting the access points to Pilchuck Path.
Compatibility with Surrounding Area*	The Consolidation Facility would be oriented downgrade toward the manufacturing, commercial and industrial uses across East Marine View Drive to the east. A substantial, sight obscuring landscape buffer would be needed to separate the Former Arsenic Trioxide Processing Area from the adjacent residential community.
Signage	Signs would direct traffic to the access points off East Marine View Drive, in order to limit traffic impacts on the surrounding community. Signs would also warn of any dangers associated with the Consolidation Facility.
Landscape Buffering	See Compatibility. A substantial sight obscuring landscape buffer would separate the Consolidation Facility and commercial/mixed-use redevelopment from surrounding residential land uses.
Mitigation of Impacts*	See Public Services, Traffic, Access, Compatibility, Landscape Buffering above. The final topography would be contoured to avoid blocking eastern residential views.
Consistency with Comp. Plan Policies**	With the above measures, the Consolidation Facility would be consistent with the Comprehensive Plan policies for siting "other" land uses, because it would provide a necessary public health service that would be capped and buffered to mitigate impacts on the surrounding communities.
Regulatory Compliance	The Consolidation Facility would be designed and maintained as a waste handling facility, in compliance with pertinent city ordinances, and state and federal regulations.
Accessibility to Transit	The site would be located adjacent to North Broadway, a transit, HOV, vehicle, pedestrian corridor with vehicular priority, appropriate for mixed-use.
Substantial Relation to Public Health, Safety, or Welfare**	Enabling prompt cleanup actions both in the Former Arsenic Trioxide Processing Area and in the entire Peripheral Area directly improves public health, safety and welfare; preparing the site for productive reuse maintains the City's tax base and restores a currently blighted area.
Best Long Term Interests of Everett Community**	Both the zone and surrounding communities would gain health benefits from removing contaminated soils to the Consolidation Facility and productive reuse of a large, vacant area at the northwest gateway to the City.

* Criteria highlighted in Section 41.150.D.3.b.
** Criteria in Section 41.160.C and D.

Table 3-3: Phasing of Mitigation Measures.

Decision on Cleanup Alternative: (CAP/EIS)	Final Remedial Design of Selected Alternative (RD/RA: Design Engineering Report)	Perform and Complete Cleanup	Site Reuse - Proposed Redevelopment
Ecology agrees to include various plans as part of its final design. Basic parameters of mitigation measures set forth in final CAP/EIS. City acts on change in comprehensive plan and land use designation, possibly entering into agreements with Ecology and Asarco as needed.	Ecology develops or approves the necessary plans, such as: • construction/traffic plan, • landscape buffer plan, • final site restoration plan, • institutional controls, and • monitoring plan for Consolidation Facility.	Ecology or entity performing the cleanup implements the plans.	Property owner or developer applies to City for proposed redevelopment plans or projects. City analyzes proposal, impacts, and mitigation measures through its normal project review process. Proposal must be consistent with and, where not completed, implement prior plans.
Ecology and City each have actions to take.	Plans to be prepared by entity performing the cleanup; to be approved by Ecology, in consultation with the City.	Ecology supervises implementation of cleanup.	City makes local land use decision per applicable zoning, land use code, SEPA review.

Figure 3-2: Everett Zoning and Comprehensive Plan Designations, Former Arsenic Trioxide Processing Area Only.

Figure 3-3: Everett Zoning and Comprehensive Plan Designations, Former Arsenic Trioxide Processing Area and Upland Plateau.

Figure 3-4: Everett Zoning and Comprehensive Plan Designations, Former Arsenic Trioxide Processing Area and Entire R-2 Zone.

3.3.5.2 Site Characteristics

Location: The approximately 6-acre Former Arsenic Trioxide Processing Area extends from East Marine View Drive west to Hawthorne Street. It is located in a single-family residential zone that extends west to Balsam Lane and south just beyond Butler Street. An approximately 6–acre area of single-family residences extends west and south from the Former Arsenic Trioxide Processing Area to Balsam Lane and Butler Street. To date, Asarco has purchased approximately half of the single-family residences in this area, termed the "Adjacent Area."

Topography and drainage: Topography orients the site toward East Marine View Drive. The topography creates grade separation between the Former Arsenic Trioxide Processing Area, North Broadway, and the East Marine View Drive cloverleaf. The site drops approximately 70 feet downgrade from west to east, from Hawthorne Street to East Marine View Drive. The sloping hillside provides views of the Cascade Mountains to the north and east. The drainage pattern also flows downgrade from west to east, toward East Marine View Drive (See Figure 2-5, Surface Water Runoff Pattern).

The 15-20% slope is broken by three plateaus formed by the cross streets, Hawthorne Street, Pilchuck Path and East Marine View Drive, which run from north to south. Any consolidation facility or future site reuse would likely result in a final site grade with two or more plateaus (See Figure 2-6 – Generalized Geologic Cross Sections).

Access: Access streets also orient the site toward East Marine View Drive, a designated arterial. There is no access to the Former Arsenic Trioxide Processing Area from North Broadway. The only access is from East Marine View Drive, via 5th Street in the north (a very sharp turn with poor sight lines) and Butler Street in the south.

None of the existing streets provide adequate access for, or are capable of handling, traffic serving commercial uses or an extended period of substantial construction truck traffic. New or improved access would need to be onto East Marine View Drive, more than 200 feet from the cloverleaf intersection.

Other Infrastructure: Public water and sewer in this area have been sized to serve single-family residences. Capacity may have to be enhanced to support redevelopment. Sewer capacity and fire flows are limited and were sized to meet single-family residential uses.

Boundary of Land Use Change: The site's location, access, topography, and land use (comprehensive plan designation, zoning classification, and potential land uses) suggest three possible boundaries for analyzing the land use implications of cleanup and future reuse alternatives:

1. *Former Arsenic Trioxide Processing Area Only (Figure 3-2):* The boundary could include the 6-acre Former Arsenic Trioxide Processing Area where the

consolidation facility would be constructed, extending from East Marine View Drive to Hawthorne Street.

2. *Former Arsenic Trioxide Processing Area and Upland Plateau (Figure 3-3):* The boundary could include the Former Arsenic Trioxide Processing Area and the adjacent portion of the upland plateau above Hawthorne Street, extending to Balsam Lane and the western zoning boundary. The southeast boundary could either be drawn to the north or the south of lot 528, the last house immediately adjacent to the Former Arsenic Trioxide Processing Area (see small double arrow on Figure 3-3).

3. *Former Arsenic Trioxide Processing Area and Adjacent Area (Figure 3-4):* The boundary could include the Former Arsenic Trioxide Processing Area and the remainder of the adjacent R-2 zone. This would incorporate both the upland plateau above Hawthorne Street and the southern access to the Former Arsenic Trioxide Processing Area from Butler Street. The southern boundary could either be drawn along Butler Street or along the zoning boundary one lot south of Butler Street.

The basis for choosing among these three geographic boundaries is discussed at the conclusion of this analysis.

3.3.5.3 Existing Land Use Designations

Site Zone: The affected area is currently zoned for single-family residential use. It is designated 1.3 under the Everett comprehensive plan, for single-family detached housing uses at medium densities of 10-12 units per acre, and R-2 under the Everett zoning code, for single-family housing at medium densities (see Figure 3-2).

Surrounding Zones: The area is generally surrounded by zones that are designated for higher intensity land use:

- *East:* To the east across East Marine View Drive the surrounding area is characterized by commercial, industrial, and manufacturing uses. It is designated 5.3, under the Everett comprehensive plan, for light industrial use. It is zoned C-2, under the Everett zoning code, for heavy commercial and light industrial use to the northeast, and M-2, for heavy manufacturing use to the southeast.

- *South:* To the south of Butler Street, and just to the west across Balsam Lane, the surrounding area is characterized by higher density multi-family housing. It is designated 1.7, under the Everett comprehensive plan, for multi-family housing at densities of 30-50 units per acre. It is zoned R-4, under the Everett zoning code, for multi-family housing at high densities.

- *West:* Further to the west and extending southwesterly along Broadway into the downtown core, there is a large mixed-use area. This area is designated 4.4, under the Everett comprehensive plan, a mixed-use designation for commercial and multi-family housing. It is zoned B-2, under the Everett zoning code, for community business use.

- *North:* To the north, separated by the North Broadway arterial and grade change, the surrounding area is characterized by lower intensity land uses. This area is designated 1.2, under the Everett comprehensive plan, for single-family detached housing at densities of 5-10 units per acre. It is zoned R-1, under the Everett zoning code, for single-family detached housing at low densities.

3.3.5.4 Future Land Use Classifications and Designations

The land use designation needs to allow for *both* the cleanup remedy and subsequent site reuse:

- *Cleanup Alternatives:* As discussed elsewhere in the FCAP/FEIS, Ecology assessed four cleanup alternatives involving the Former Arsenic Trioxide Processing Area: No Action (using a baseline in evaluating SEPA scoping elements), Off-Site Disposal, a Consolidation Facility, and an On-Site Containment Facility.

- *Site Reuse:* There are no proposed redevelopment projects. In the past, the current owner, Asarco, has stated a preference for uses other than single-family residential use, such as commercial use. City staff is proposing mixed-use, including preserving options for community commercial, recreational, and multi-family use, rather than prescribing a single use.

3.3.5.4.1 Cleanup

Two of the four cleanup alternatives (no action and off-site disposal) would **not need** a land use amendment. These are:

- The no action alternative would be inconsistent with the existing comprehensive plan and zoning designations, because the on-site contamination would not allow future reuse including single-family residences. However, no land use amendment would be required, because no action would be occurring.

- The off-site disposal alternative would be consistent because it would remove contaminated soils and allow single-family residential redevelopment.

The two alternatives that bring soil to this area from the rest of the site and cap the area with an impervious surface – the On-Site Containment Facility and the Consolidation Facility alternatives – are essentially waste landfills. They require a relatively large area (approximately 4-6 acres). These alternatives **need** a land use amendment. The comprehensive plan and zoning code allow consideration of such facilities as follows:

- *"Other Land Uses":* The Everett comprehensive plan provides for siting "other" land uses in most zones. ECP LU-32, 1.10. "Other" land uses include hard-to-site facilities that are not always welcomed by surrounding communities, but are nonetheless necessary to support urban development, such as solid waste handling facilities and sanitary landfills. The comprehensive plan requires that such facilities be sited in locations that can efficiently provide the necessary service while generating the least impacts on the surrounding communities. Therefore, the location must promote land use compatibility and mitigate adverse impacts caused by the siting and operation of such facilities.

- *"Activities Requiring Large Land Areas":* The Everett zoning code also provides for the siting of hard-to-site facilities. EMC 41.150.C and D.3.b. Such facilities are described as "activities requiring large land areas." They are considered "special property uses" and are permitted uses in most zones, subject to type III review and consistency with siting standards.

Section 41.150.C provides 11 siting criteria for siting these facilities (See Table 3-2), which are also referenced in Section 41.150D.3.b. These criteria, like the requirements of the comprehensive plan, are summarized in Section 41.150D.3.b as requiring:

- Mitigation of potential adverse impacts on the environment; and

- Compatibility with surrounding land uses.

In summary, on-site facilities would constitute an "other" land use under the Everett comprehensive plan and an "activity requiring large land area," under the Everett zoning code. In order to be constructed, these facilities would need to be sited and designed to meet the siting standards in Section 41.150 to ensure land use compatibility and mitigation of environmental impacts.

Under the MTCA, cleanups are required to meet substantive standards, although the person implementing the cleanup or Ecology is not required to obtain local permits or adhere to local procedural requirements in performing cleanups. RCW 73.105D.090. Therefore, Ecology would not be required to go through the type III review **process**, but does need to apply the siting **standards** to its choice of remedy.

- As illustrated in Table 3-2, the Consolidation Facility **would meet** these specific siting standards, but **only if** the measures identified below are implemented to ensure compatibility and address adverse impacts.

- The On-Site Containment Facility would **not meet** these standards because of the establishment of a hazardous/dangerous waste (not solid waste) landfill in a largely residential neighborhood. The potential for unacceptable exposure of nearby residents, site users, or public utility workers from future maintenance activities, if needed, would be a significant unavoidable long-term adverse environmental impact that could not be mitigated or made compatible with a residential neighborhood (if material remaining on site were determined to be a dangerous waste, the containment alternative would not appear to meet the standards for distance from facility boundaries and residences). This is one reason why state law contains stringent siting standards for such facilities. This incompatibility is discussed in more detail in Sections 3.3 and 5.4 of the FCAP/FEIS.

3.3.5.4.2 Site Reuse

"Other" land uses and "activities requiring large land areas" are types or classifications of land uses that can be allowed as "special property uses" in various zones. They are not "land use designations."

An area still needs to have a land use designation under the comprehensive plan and zoning code, such as residential, commercial, or industrial. After cleanup, the land use designation determines the types of land uses that can occur within its boundaries.

A significant change in conditions has already occurred in the Former Arsenic Trioxide Processing Area and Adjacent Area. The zoning code provides general criteria for rezones in Section 41.160. Regardless of the type of rezone, these criteria include "consistency with the comprehensive plan; substantial relation to public health, safety and welfare; and promoting the best long-term interests of the Everett community." Thus, the standard for changing the land use designation encompasses and is similar to the siting standards discussed above.

If the Former Arsenic Trioxide Processing Area is not returned to single-family residential use (i.e., the Off-Site Disposal alternative is not selected), the neighborhood will be fundamentally and irrevocably changed in nature. That change would be consistent with a changed land use designation to commercial/mixed use **only if** the measures identified below are implemented to ensure land use compatibility with the surrounding area and address adverse impacts generated by that change.

The following section of this analysis discusses the most significant impacts of cleanup and site reuse. The measures needed to ensure land use compatibility, to address adverse impacts, and to otherwise meet rezoning and siting criteria are also discussed. This

analysis provides a basis for evaluating the most appropriate future land use designation are also discussed.

3.3.5.5 Adverse Impacts and Mitigation of Proposed Cleanup and Site Reuse

Although cleanup and reuse will have benefits, the proposed actions are also likely to have a number of potentially unavoidable significant impacts on the Former Smelter Site and Adjacent Area, including:

- The impacts of implementing the cleanup will last several years and will limit future site reuse options in the long term; and

- The impacts of redevelopment following cleanup include both short-term construction impacts and a long-term change in the character of the area.

Some of these impacts can be meaningfully evaluated now (and have been discussed in more detail in other sections of the FCAP/FEIS), while others will depend on future activities.

- Ecology is selecting its cleanup alternative. A final engineering design for the cleanup is the next stage of the cleanup process. The basic impacts and general parameters for addressing them can be identified now, but more specific plans will be needed before implementation (as provided in the MTCA Cleanup Regulations and proposed mitigation measures under MTCA and SEPA).

- Asarco has not proposed specific redevelopment plans or projects. Therefore, the basic impacts and general parameters for a large area of non-single family use in the neighborhood can be identified now. Some of these can be implemented through MTCA and GMA, but project review (including SEPA environmental review) will need to occur when projects are proposed.

Table 3-3 shows the timing of phasing or mitigation measures with the cleanup and redevelopment process.

3.3.5.5.1 Cleanup

Although cleanup of individual residential yards throughout the site will involve disruption, the scale on each lot will be limited compared with the cleanup actions planned for the Former Arsenic Trioxide Processing Area, where excavation of highly contaminated material followed by on-site landfilling and capping of less contaminated material will take place.

Detailed plans for the removal of the highly contaminated material, construction of the consolidation facility, and capping and final site restoration will be prepared and

documented in an Engineering Design Report. This report will provide the specific design for the selected remedy.

The most significant probable adverse impacts of cleanup are truck traffic and construction impacts (e.g., noise, dust, runoff and erosion) over a prolonged period of time.

Because of the extent of the on-site and residential soil cleanup efforts, the construction work will likely take several years. In addition, a large, vacant treeless area where the smelter was excavated and the Consolidation Facility will be located may remain for several more years, as site redevelopment may not occur immediately. The residential community to the south and west of the Former Smelter Site will need a substantial buffer and separation from these significant unavoidable adverse impacts, which could last for a decade or more.

As noted in existing site characteristics, there is no existing adequate access to the Former Arsenic Trioxide Processing Area for heavy trucks and construction vehicles. The slope is relatively steep, there are no existing detention ponds, and infrastructure was designed for low residential density.

Typically, metals and similar contamination above residential cleanup levels are allowed to remain only on industrial sites, not areas that are bordered on three sides by residential zones. WAC 173-340-140 and 740. Capping and leaving residual contamination on site, as compared with removing all of the contamination, will cause a fundamental change in the ability to use the land and will require restrictions on use in the future.

Another potentially significant adverse impact would be a resulting grade or topography that could preclude effective site reuse and redevelopment.

To mitigate the unavoidable probable significant adverse impacts from cleanup activities, the Engineering Design Report for the Upland Area of the Everett Smelter Site must include:

> **Construction and Traffic Management Plan** – developed in consultation with the City, this plan will need to include:
>
> - Direct, controlled or signalized access to the Former Arsenic Trioxide Processing Area from East Marine View Drive as far from the cloverleaf intersection as possible for safe sight lines;
>
> - Traffic routes or other operational measures or times of operation to avoid conflicts with local and area traffic;

- Provision for widening, rebuilding, and providing fencing for safety and noise reduction if it is not possible to keep truck traffic off Pilchuck Path, Butler or Hawthorne streets; and

- Provision for any utilities or infrastructure needed for constructing the remedy, including erosion control plans, taking into consideration future higher intensity land uses.

Landscape Buffer Plan – developed in consultation with the City, this plan will need to include:

- A sight-obscuring landscape buffer a minimum of 50 feet wide, and wider where necessary (e.g., 100 feet), to obscure views from residential areas into the site. In addition, consideration will be given to preserving distant views, and a viewpoint or overlook in the vicinity of Hawthorne Street. These setbacks are to be taken into account in the footprint and design of a consolidation facility.

- A visual analysis to develop a final buffer design and planting plan that will define the planting to provide sufficient density within a reasonable time frame to obscure views into the Former Arsenic Trioxide Processing Area that meet Type I Visual Screen landscaping type requirements (EMC 35.050.A) on the inner edge of the buffer; restore a residential street character to the southern edge of the Former Arsenic Trioxide Processing Area by integrating Type III Ornamental Effects Landscaping (EMC 35.05.050.C) on the outer edge of the buffer; preserve eastern views of residences in the Adjacent Area; and provide sufficient space for a safe pedestrian "hill-climb" to the viewpoint.

- A planting schedule that can be phased between the planting necessary to buffer the site during the cleanup work, and later plantings to complete the landscaping.

- Provision for suitable soils and irrigation in the buffer area.

- Maintenance of a 25-35 foot landscaped buffer, including supplemental plantings and/or fencing, if needed, along North Broadway.

Final Site Restoration Plan – developed in consultation with the City, this plan will need to include:

- Define the final grade and condition of the site after the cleanup work is completed, in order to assure long-term site stability and no more than two or three plateaus that provide developable building pads for future site reuse.

- Locate and design infrastructure to serve any on-site capping or consolidation facility to serve potential future site reuse to the extent reasonably foreseeable.

The Engineering Design Report and above plans must provide for related infrastructure actions, such as emergency access and street vacations, if any.

The final remedial plans and approvals must include a final program of institutional controls and monitoring, including long-term Operations and Maintenance Plans for the Former Arsenic Trioxide Processing Area, that will allow and encourage site reuse while protecting public health and the environment.

The comprehensive plan states the objectives to:

- **reinforce, maintain, and enhance** the desirable qualities of Everett's neighborhoods (III.B.1.7, LU-18, emphasis added).

- **strongly discourage** the conversion of residential areas to non-residential uses (III.C.1.1.3, LU-19, emphasis added).

Changing the area from single-family residential use will have at least three significant, adverse, irreversible and irretrievable environmental effects:

1. The single-family residential neighborhood which has existed in this location for many decades, with many mature trees and shrubs planted by residents, has been irrevocably altered and will not be restored to its former condition. There will be a loss of neighborhood and conversion from single-family residential area in the Former Arsenic Trioxide Processing Area (approximately one-half of the current R-2 zone) to land uses that require largely impervious or paved surfaces;

2. Future land uses will have increased intensity and impacts (traffic, paving and runoff, utilities, building mass, lights, view impacts) and a different physical character compared with single-family residential land use; and

3. Any future land use will be located on top of an area that will need permanent care to maintain the impervious surface of the cap (to protect against soil and ground water contamination), with limited opportunity for substantial landscaping interior to the site.

The Everett comprehensive plan highlights the economic importance of redeveloping underutilized commercial and industrial properties like the Former Arsenic Trioxide Processing Area (LU-13). It also identifies a need for increased residential housing densities (LU-12). In order to make such policy goals acceptable to the community, the comprehensive plan recognizes that certain design standards must be applied (LU-12). The comprehensive plan also states the following objectives:

- Improve the stability, value, and physical appearance of blighted areas (III.B.1.8, LU-18).

- Encourage well-designed infill development and redevelopment in established residential areas which **protects and enhances neighborhood character** (III.C.1.1.10, LU-20, emphasis added).

- Major commercial development projects within each district should **contribute positively to the character of their surroundings** (Urban Design Policy 6.3.6, UD-9, emphasis added).

- Commercial lands located adjacent to streets designated as "gateway corridors" **shall** be developed in a manner which **improves the appearance** of the arterial corridor in accordance with the Urban Design and Historic Preservation element, or other approved urban design plans for the street(s) upon which the property is located. (III.C.12.2.9, LU-21, emphasis added).

As noted above, the rezone criteria in Section 41.160 require consistency with the comprehensive plan.

Given the location of the Former Arsenic Trioxide Processing Area, with two sides bordering two major arterials at the north gateway to the City (East Marine View Drive and North Broadway), the significant unavoidable adverse environmental impacts above, including the permanent loss of single-family residential uses, need to be addressed by Asarco or subsequent property owners/developers in a manner consistent with comprehensive plan policies and rezone criteria as follows:

- Orient the Former Arsenic Trioxide Processing Area toward East Marine View Drive, functionally in terms of access and visually in terms of similar land uses (commercial and industrial). Street trees and landscape setbacks can be relatively narrow (in the range of 25 feet) for bordering gateway arterials;

- Provide a substantial separation and sight-obscuring landscape buffer between the building pads in the Former Arsenic Trioxide Processing Area for future commercial/mixed use and the adjacent residential neighborhood to the south and provide an overlook/viewpoint on the plateau near the current Hawthorne Street (which might be vacated); and

- Provide the necessary infrastructure to serve redevelopment when proposed. As a major improved arterial, East Marine View Drive is likely to have the capacity to serve mixed use/commercial land uses, subject to local transportation improvements for site access and circulation and fair share participation in system-wide improvements under the City's traffic mitigation ordinance. Utility upgrades would be needed to serve future redevelopment if

infrastructure installed in connection with the cleanup work, including on-site storm water retention and water quality, is not sufficient to serve the site reuse.

Because future redevelopment is not known, this would provide an envelope that would encourage site reuse by providing wide flexibility on the interior of the area, while ensuring compatibility with the character of the adjacent neighborhood (see comprehensive plan preferred residential streetscape, UD-2, for a good example of residential character).

The City routinely requires landscape screening and buffers as a primary method in rezones for mitigating traffic, aesthetic impacts and diminished views from increased densities, intensities of development, and achieving compatibility between different land uses in adjacent zones. Recent buffers for rezones have ranged from 75 to 200 feet between residential and business land uses. Because of the size of the Former Arsenic Trioxide Processing Area, the desire to preserve future building sites, and the ability to provide a functional buffer that is on a streetscape scale, the lower end of this range would be used on the south side of the area.

These measures would be similar to and could build upon the measures for addressing impacts and land use compatibility of the cleanup work. Future redevelopment would need to complete buffer plantings not installed at the time of the cleanup action, as well as provide adequate site access and infrastructure based on specific proposed uses evaluated through the project review (including SEPA) process when proposed.

As noted above, the significant environmental impacts relate to land use and infrastructure (transportation and public services/utilities). Impacts relating to earth really affect either land use (building sites) or transportation (from excavation or fill). The FCAP/FEIS analysis does not indicate substantial differences among the alternatives in terms of air, water, plants and animals, natural resource, or environmental health impacts (other than the no action alternative).

The above approaches and the types of land use options proposed or preserved for the future (see next section of this analysis) are similar to the types of uses and viewpoint opportunities discussed by Land Use Task Committee of the mediation effort and the Merritt+Pardini report, described in Section 2.8 of the FCAP/FEIS (Merritt+Pardini, 1997).

3.3.5.6 Screening and Analysis of Alternative Land Use Designations

This section discusses potential land use designations for the Former Arsenic Trioxide Processing Area and/or Adjacent Area and analyzes their compatibility with remaining residential uses in the Adjacent Area. Potential future land use designations, which include all of the categories in the City's existing comprehensive plan (first column) and zoning code (second column) for the area are summarized in Table 3-1. Most of these designations have attributes that do not apply to the area in question. They are either:

- precluded by the location (e.g., downtown, waterfront, agricultural lands);
- incompatible with land use designations for the surrounding areas (e.g., industrial);
- too narrow in the range of uses allowed (e.g., parks, clinics and offices); and
- inconsistent with the proposed cleanup plan (e.g., single-family residential).

Based on the alternatives screening analysis and potential suitability of each land use designation summarized in Table 3-1, the candidate designations would be:

- *Multi-family:* – 1.6 and 1.7, under the Everett comprehensive plan, for multi-family housing at 20-29 and 30-50 units per acre, which correspond to R-3 and R-4 zones, under the Everett zoning code, for multi-family housing at medium and high densities.
- *Mixed-Use Residential/Commercial:* – 4.1 and 4.2, under the Everett comprehensive plan, for neighborhood and community business, which correspond to B-1, B-2 and C-1 zones, under the Everett zoning code, for neighborhood shopping, community business and commercial uses, including multi-family use; or 4.4, under the Everett comprehensive plan, for mixed-use commercial and multi-family residential areas, which corresponds to C-1 and B-2 zones, under the Everett zoning code, for general commercial and community business uses.

Analysis and Rationale for Proposed Designation (Mixed-Use: Commercial/ Community Business): Of the possible land use designations, the mixed-use comprehensive plan designation, 4.4, and companion zoning designation, B-2, appears to be the most appropriate. If the measures to ensure compatibility and address environmental impacts are incorporated into a decision to change the existing single-family designation, the 4.4/B-2 designations would, among other things:

- be consistent with the cleanup alternative, which is planned to have a substantial area of impervious surface on top of soils with elevated arsenic levels remaining on site;
- allow the siting of the Consolidation Facility, as a special property use (an other land use and activity requiring a large land area) with the mitigation measures identified above;
- allow existing single-family residential uses to continue;

- preserve the broadest range of future land uses (flexibility is important because no specific site plans or redevelopment plans have been proposed);

- use the same land use designation as is used just one block to the south/west of the area;

- be compatible with the surrounding zones, with the mitigation measures identified above;

- be oriented toward East Marine View Drive because of access and adjacent zoning, thereby minimizing conflicts with the adjacent residential neighborhood;

- allow multi-family residential uses that would be compatible with the surrounding medium density housing across Butler Street to the south and across Balsam Lane to the west; and

- allow general commercial and community business uses that would be consistent with commercial and community business uses farther to the west.

3.3.5.7 Land Use Options Preserved and Precluded by Recommended Action

Ecology's selected cleanup alternative would limit future use of the Consolidation Facility footprint largely to paved uses or uses that would not involve the potential for frequent disturbance of a cap. This will preclude continued single-family residential use, as well as uses functionally similar to single-family residential uses, such as halfway houses and detoxification centers, within the boundaries of the zone change.

Incompatible uses could be restricted by ordinance, institutional controls, or deed restriction. Development standards could also be affected through a development agreement, performance rezone, or with a planned development overlay. The appropriate mechanism(s) would be developed by the City and Ecology with input from affected property owners and the public.

The following summarizes the land uses preserved or precluded under these designations:

Preserved: The recommended land use designation would preserve the following future land uses:

- recreational and open space uses, such as parks;
- multi-family housing;
- retail and commercial uses;
- offices, including dental and medical offices and clinics; and
- educational facilities, churches, small institutions and public facilities.

Specific site plans or redevelopment plans that are proposed for the site would be required to include measures to address impacts on the surrounding neighborhoods, such as landscape buffering and traffic access plans to limit access to surrounding residential streets. Specific plans could also be conditioned on the development of additional infrastructure, including sewer capacity improvements, storm water detention facilities and building designs appropriate for fire flow requirements of 225 gallons per minute.

Precluded: The recommended land use designation would prohibit the following future land uses that would be less desirable under Ecology's selected cleanup alternative because they are typically accompanied by associated activities (i.e., gardening, activities that are unsuitable for paved surfaces, activities that are independent of enforceable institutional controls, and activities that raise concerns about future liability):

- single-family housing;
- halfway houses and detoxification centers that are functionally similar to single-family housing; and
- uses that are not compatible adjacent to residential zones per the zoning code.

3.3.5.8 Geographic Scope of Land Use Change

The geographic scope of the comprehensive plan and zoning designation change could reflect any one of the three boundaries discussed above (see Figures 3-2 through 3-4). Selecting a new comprehensive plan or zoning boundary inside the existing comprehensive plan or zoning boundary would have the effect of dividing the existing site zone into two smaller zones.

1. *Former Arsenic Trioxide Processing Area Only (Figure 3-2)*: Drawing the new boundary directly around the Former Arsenic Trioxide Processing Area (minimum area for the Consolidation Facility) would minimize the area available for redevelopment with more intensive land uses and thereby leave the adjacent area a single-family residential community. However, this 6-acre site may be limiting both in terms of the Consolidation Facility as well as future land uses.

2. *Former Arsenic Trioxide Processing Area and Upland Plateau (Figure 3-3)*: Drawing the new boundary to include the upland plateau would provide greater flexibility for the design of the Consolidation Facility; eliminate the need for as wide a landscape buffer on the west site of the site (because of the depth of the adjacent lots and proximity of North Broadway); provide a larger redevelopment building site with attractive views; and incorporate the residential area where views could be most adversely affected by both the Consolidation Facility and future redevelopment. If the upland plateau were not included in the rezone, future commercial building heights lower on the

slope could be limited because of potential residential view blockage. Future street vacation of Hawthorne Street could provide public benefits by providing additional land for these purposes.

3. *Former Arsenic Trioxide Processing Area and Adjacent Area (Figure 3-4)*: Drawing the boundary to include the entire Adjacent Area would incorporate the whole area that is likely to be affected by the potentially unavoidable significant impacts discussed above. It would accelerate a transition to mixed use that might otherwise occur over time, given current land ownership patterns in the area.

3.3.5.9 Land Use Actions Needed to Provide for Cleanup and Reuse

The following describes the proposed changes in existing land use designations to ensure consistency with the comprehensive plan and to enable cleanup and reuse in the Former Arsenic Trioxide Processing Area. Table 3-3 describes the processes and schedule for implementing these actions. Section 6 of the FCAP/FEIS discusses land use actions for the remainder of the site, which as noted above, are consistent with the existing comprehensive plan and zoning code land use designations.

1. The boundaries of the land use change should be at least the area described above as the Former Arsenic Trioxide Processing Area and upland plateau as shown on Figure 3-3. The City could choose to include the entire Adjacent Area within the boundaries as shown on Figure 3-4.

2. The existing comprehensive plan land use designation should be changed to 4.4 (mixed use commercial and multi-family residential housing). This designation should be implemented with B-2 zoning (community business) under the Everett zoning code.

3. The following uses expressly should not be permitted in the zone: single-family housing (except for existing single-family residences), halfway houses and detoxification centers, and uses that are not allowed adjacent to residential zones. City staff will consult with Ecology and develop appropriate implementing mechanisms prior to final Planning Commission and Council action and associated public review.

4. A sight-obscuring landscape buffer shall be designed and implemented as discussed in Section 3.3.5.5.1. The specifics of a sight-obscuring landscape buffer would be defined in the landscape plan in Ecology's Engineering Design Report.

5. The following plans will be provided to the City for review and consultation prior to constructing any Consolidation Facility in the Former Arsenic Trioxide Processing Area: (a) a construction and traffic management plan (including new and adequate access to minimize effects in the Adjacent Area); (b) a final

landscape buffer plan (including a visual analysis to define effective screening while preserving eastern views from existing residences to the extent practicable and an initial planting schedule); (c) a final site restoration plan (including approximate final grade); and (d) a final program of institutional controls and monitoring (including long-term containment controls and O&M).

Chapter 4 - Cleanup Standards and Indicator Substances

4.1 Cleanup Standards for Chemicals of Concern

4.1.1 Method for Setting Cleanup Levels

The MTCA Cleanup Regulation provides three basic methods for establishing cleanup levels. These are Method A, B, and C. Method A provides tables which may be used for routine cleanup actions. Method B is the standard method, and may be used at all sites. Method C is a conditional method for use at sites subject to specified uses. WAC 173-340-706(1).

Method B will be used for the Upland Area of the Everett Smelter Site. It provides for establishing cleanup levels using applicable state and federal laws or risk equations specified in WAC 173-340-720 through WAC 173-340-760. WAC 173-340-700(4)(d) provides that the cleanup level shall be set at the natural background concentration for any compound for which the natural background concentration is greater than the cleanup level established under Methods A, B, or C.

The application of Method B to establish cleanup levels for soil, ground water, and surface water will be discussed below. Standards for storm drain sediment entering the City of Everett sewer system will also be discussed.

Asarco requested that Ecology consider material submitted by Asarco as new scientific information pursuant to WAC 173-340-702(6) and that, based on this material, Ecology establish cleanup levels for arsenic and lead for the Upland Area Everett Smelter Site different than those determined under Method A or B of WAC 173-340-740. Ecology's review of this material did not indicate a change in the soil arsenic cleanup level was warranted, but did indicate that setting soil lead cleanup levels at residential sites could be based on the Integrated Exposure Uptake Biokinetic (IEUBK) model.[12] Refer to Appendix B, GQ 4.1 for a discussion of Asarco's submittals and Ecology's review and response.

Table 4-1 summarizes various regulatory standards considered in selecting cleanup levels for the Upland Area of the Everett Smelter Site. Chosen cleanup levels are shown in bold.

[12] The IEUBK model, developed by the Environmental Protection Agency, is designed to model exposure from lead in air, water, soil, dust, diet, and paint and other sources with pharmacokinetic modeling to predict blood lead levels in children 6 months to 7 years old. The emphasis of the IEUBK model is estimating risks from childhood lead exposure to soil and household dust that might be encountered at cleanup sites. The Science Advisory Board has endorsed the use of the IEUBK model at another site in Washington State.

Table 4-1: Cleanup Levels Considered for the Upland Area of the Everett Smelter Site

Bold shows cleanup levels selected

	As	Pb	Cd	Sb	Hg	Tl	Units
Soil, Natural Background	**20**	17	1	NA	0.07	NA	mg/Kg
Soil, Lead from IEUBK Model		**353**					mg/Kg
Soil, WAC 173-340-740(3)(a)(ii)	0.67	NC	**80**	**32**	**24**	**5.6**	mg/Kg
GW, Natural Background	5	NC	NC	NC	NC	NC	µg/L
GW, WAC 173-340-720(3)(a)(ii)	0.0583	NC	8	6.4	4.8	1.12	µg/L
GW, MCL	50	15	5	**6**	2	2	µg/L
GW, MCLG for Noncarcinogens	NC	0	5	6	2	0.5	µg/L
GW, based on Surface Water	**190.0**	**$SW_{chronic}$**	**$SW_{chronic}$**	NC	**0.012**	NC	µg/L
SW, WAC 173-340-730(3)(a)(ii)	0.0982	NC	20.3	NC	NA	1.56	µg/L
SW, WAC 173-201A, Freshwater Acute	**360.0**	**See §4.1.4**	**See §4.1.4**	NC	**2.4**	NC	µg/L
SW, WAC 173-201A, Freshwtr. Chronic	**190.0**	**See §4.1.4**	**See §4.1.4**	NC	**0.012**	NC	µg/L
SW, WAC 173-201A, Marine Chronic	36	5.8	8	NC	0.025	NC	µg/L
SW, Salt Water Continuous	36	8.5	9.3	NC	0.025	NC	µg/L
SW, Consumption of organisms only	0.14	NC	NC	4,300	0.15	6.3	µg/L
SW, Puget Sound Background Dissolved	1.1	0.02	0.06	0.08	0.0005	0.01	µg/L
SW, Puget Sound Background, Total	1.1	0.02	0.07	0.08	0.0008	0.01	µg/L
Storm Drain Sediment	**20**	**250**	**2**	**32**	**1**	**5.6**	mg/Kg

NA = Not Available, NC = No Criteria, GW = Ground Water, SW = Surface Water, WAC 173-340 – xxx citations are cleanup levels derived from risk equations in the MTCA Cleanup Regulation, MCL = Maximum Contaminant Limit, MCLG = Maximum Contaminant Limit Goal, SW, Puget Sound Background values are upper 90th percentile values for data presented by Crecelius, 1998.

Note: The natural background concentration of arsenic in soil of 20 mg/Kg is an upper bound estimate. It was the best available estimate when the regulation was adopted in 1991. Ecology and the United States Geological Survey have since performed additional studies of natural background concentrations of metals in Washington State (Ecology, 1994b). These studies found the 90th percentile for natural background concentrations in Washington State is 7 mg/Kg. The 7 mg/Kg concentration is a more appropriate estimate of the natural background arsenic concentration in soil pursuant to methods described in MTCA Statistical Guidance (Ecology, 1992b) and is particularly appropriate for use as a cleanup level by entities performing independent cleanups where there will be no order or decree between the independent entity and Ecology. In such cases, entities performing independent cleanups may choose to use the 90th percentile estimate of 7 mg/Kg to ensure that in the likely event that the Method A natural background estimate for arsenic in soil is revised downward in any future revisions of the MTCA Cleanup Regulation, the independent cleanup will meet the revised regulation. Ecology will use the arsenic concentration of 20 mg/Kg, the upper bound estimate of natural background arsenic concentrations in Washington State as stated in the current regulation to set the cleanup level for arsenic in soil in the Upland Area of the Everett Smelter Site. This use does not imply that natural background concentrations of soil in the Upland Area of the Everett Smelter Site are as high as 20 mg/Kg.

4.1.2 Soil

Soil cleanup standards, which include both cleanup levels and points of compliance, are established in accordance with WAC 173-340-740. Method B soil cleanup levels for properties are established for residential land use unless it can be demonstrated that the property does not serve as a current residential area; the property does not have the potential to serve as a future residential area[13]; and appropriate use restrictions are implemented.

Method B soil cleanup levels are also used for child care facilities and schools.

[13] WAC 173-340-740(1)(a)(ii) indicates this evaluation is to be based on the consideration of zoning, statutory and regulatory restrictions, comprehensive plans, historical use, adjacent land uses, and other relevant factors.

Commercial property soil cleanup levels may be used for industrial land uses not qualifying under WAC 173-340-745.[14] (There are no industrial properties in the Upland Area of the Everett Smelter Site which qualify under WAC 173-340-745.) For commercial land uses, the presumption is that soil cleanup levels shall be established in accordance with residential areas unless it can be clearly demonstrated that this is inappropriate. To make such a demonstration, a property must: be zoned or otherwise designated for industrial/commercial use; be currently used for industrial/commercial purposes or have a history of use for industrial/commercial purposes; have properties adjacent to and in the general vicinity designated for industrial/commercial purposes; and be expected to be used for industrial/commercial purposes for the foreseeable future.[15] If cleanup levels for commercial properties are not set in accordance with residential use, the cleanup levels are to be set as close as practicable to levels set for residential use.

In the Upland Area of the Everett Smelter Site, commercial land uses – the community business zone along Broadway, Figure 2-2 – are adjacent to and in the general vicinity of residential land use, not industrial commercial land use. In addition, it is practicable to establish soil cleanup levels in the community business zone in accordance with residential use, as any cleanup actions at these properties would be the same as for residential properties.

For nonresidential land uses, such as recreational or agricultural uses, soil cleanup levels are to be established on a case-by-case basis. There are no agricultural areas within the Upland Area of the Everett Smelter Site. Recreational areas include city parks and the Legion Memorial Golf Course. Since these areas are all adjacent to or in the general vicinity of residential areas, and since cleanup to residential standards is practicable, cleanup levels have been established in accordance with residential use.

Ecology expects that cleanup of soils to the cleanup levels specified below will be protective of ground water as well as soil ingestion. This will be verified by compliance monitoring.

Cleanup levels are not set lower than natural background values.

[14] The definition of industrial properties qualifying under WAC 173-340-745 is that such properties are or have been characterized by, or are to be committed to, traditional industrial uses and are either zoned for industrial use by a city or county conducting land use planning under the Growth Management Act or zoned for industrial use and adjacent to properties currently used or designated for industrial use for counties not planning under the Growth Management Act and cities within them. (See also the definition of industrial properties in WAC 173-340-200.)

[15] WAC 173-340-740(1)(c)(i)(C) indicates this evaluation is to be based on consideration of site zoning, statutory or regulatory restrictions, comprehensive plans, adjacent land use, and other relevant factors.

The **soil cleanup levels** established for the Upland Area of the Everett Smelter Site are as follows:

- **Arsenic:** The cleanup level will be **20 mg/Kg**, the background soil arsenic concentrations in the state of Washington specified in WAC 173-340-740, Table 2, footnote a. The risk-based concentration is below background levels of arsenic in soils in the state of Washington.

- **Lead:** The IEUBK concentration of **353 mg/Kg** will be used as the cleanup level.

- **Cadmium:** The cleanup level will be **80 mg/Kg**.

- **Antimony:** The cleanup level for residential areas will be **32 mg/Kg**.

- **Mercury:** The cleanup level for residential areas will be **24 mg/Kg**.

- **Thallium:** The cleanup level for residential areas will be **5.6 mg/Kg**.

The point of compliance is the point or points where the soil cleanup levels must be attained. For soil cleanup levels based on human exposure via direct contact, the point of compliance is established in soils throughout the site from the ground surface to fifteen feet below the ground surface. Ecology recognizes that cleanup actions involving containment of hazardous substances will typically not meet the soil cleanup levels throughout the site to a depth of fifteen feet. In these cases, the cleanup action may be determined to comply with cleanup standards provided that: a compliance monitoring program ensures the long-term integrity of the containment system; the cleanup action does not rely primarily on on-site disposal, isolation, or containment if it is practicable to reuse, destroy, or detoxify the hazardous substances; and long-term monitoring and institutional controls are implemented until residual hazardous substance concentrations no longer exceed site cleanup levels. WAC 173-340-740(6)(c) and (d).

4.1.3 Ground Water

Ground water cleanup standards, which include both cleanup levels and points of compliance, are established in accordance with WAC 173-340-720. Ground water cleanup levels are 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 for most sites drinking water is the beneficial use requiring the highest quality of ground water, and that exposure to hazardous substances via ingestion of drinking water and other domestic uses represents the reasonable maximum exposure. Ground water cleanup is to be conducted consistent with this use unless it can be demonstrated that the ground water is not a potential future source of

drinking water because it is present in insufficient quantity, is not potable, or cannot be recovered. WAC 173-340-720(1)(a).

At the Everett Smelter Site ground water occurs beneath the Upland Area of the site in fill overlying relatively impermeable till[16] and in the advance outwash (See Figure 2-6). Water in the fill is limited in quantity and percolates downward to the top of the till, then laterally toward the Lowland Area. In both instances, water ultimately discharges through surface water drainage ditches or infiltrates and discharges via ground water through sediments in the Lowland Area. The relationship between ground water in the Upland Area and ground water in the Lowland Area is currently being investigated (Asarco, 1998c).

Ground water in the Fill/Till is not present in sufficient quantity to serve as a drinking water supply. Water in the Advance Outwash aquifer is not currently used as a drinking water supply, and the City of Everett has indicated it has no plans to use ground water beneath the Everett Smelter Site in the future. The City requires residents to connect to City water and sewer systems (Mark Soine, personal communication, November 7, 1998).

Cleanup levels for ground water have been established to protect surface water according to Chapter 173-201A WAC. Hence, ground water cleanup levels for both the Fill/Till and the Advance Outwash Aquifer are the same as specified in Section 4.1.4 for surface water.

The point of compliance is the point, or points, where the cleanup levels must be attained. For ground water the point of compliance is throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site. Where hazardous substances remain on-site, a conditional point of compliance may be set. A conditional point of compliance is to be as close as practicable to the source of hazardous substances and is not to exceed the property boundary. Where a conditional point of compliance is proposed, the person responsible for undertaking the cleanup action is to demonstrate that all practicable methods of treatment are to be utilized in the site cleanup.

The point of compliance for ground water shall be a conditional point of compliance located at any receiving surface water body in the Upland Area (such as ditches, springs, or other surface water flows) and at the Upland Area boundary, where ground water flows into the Lowland Area.

Note that ground water from the Lowland Area ultimately discharges to the Snohomish River. The Snohomish River in this area is considered marine because tidal influences extend well up the river from the reach adjacent to the site. Being marine, the river water is not drinkable at this point. When cleanup actions are selected for the Lowland Area, the application of marine surface criteria to ground water discharging to the Snohomish River will be considered. Ground water may enter the Lowland Area at a concentration

[16] Compacted glacial deposits.

appropriate for protection of the freshwater wetlands in the Lowland Area. However, it is anticipated that selected cleanup actions for the Lowland Area will set cleanup levels for ground water flowing from the Lowland Area into the Snohomish River to protect the river.

4.1.4 Surface Water

Surface water cleanup standards, which include both cleanup levels and points of compliance, are established in accordance with WAC 173-340-730. Surface water cleanup levels are 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. The classification and the highest beneficial use of a surface water body is determined in accordance with Chapter 173-201A WAC.

Most surface water in the Upland Area flows through the storm water sewer system to the Everett Wastewater Treatment Plant, and thence to the Snohomish River. It is anticipated that the highest beneficial use of this water is to provide water for biota in the Upland Area on its path to the Treatment Plant.

Some surface water in the Upland Area flows directly to freshwater wetlands in the Lowland Area and ultimately to the Snohomish River. It is anticipated that the highest beneficial use of this water is to provide water for biota in the Upland Area on its path to the wetlands and to biota in the wetlands.

Surface water which enters the City of Everett's storm water sewer system and flows to the City's treatment plant must meet the requirements of City Pretreatment Ordinance No. 2034-95, as amended. The applicable surface water cleanup levels are as follows:

- **Arsenic:** 500 µg/L
- **Lead:** 1890 µg/L
- **Antimony:** No Criteria
- **Cadmium:** 240 µg/L
- **Mercury:** 100 µg/L
- **Thallium:** No Criteria

Note it is also a violation of the City's ordinance regulating dischargers to the City's storm water sewer system for a discharge to cause interference with the City's treatment plant or collection system or for pass-through of materials that cause a violation of the City's National Pollutant Discharge Elimination System permit or causes a violation of any state or local standard.

If the City of Everett lowers pretreatment standards for the storm water sewer system in the future, then those lower standards must be met. Additional remediation by the discharger to the City storm water sewer system may be required. This requirement is the

same as would be applied to any facility discharging to the storm water sewer system upon lowering of pretreatment standards.

Cleanup levels for surface water in the Upland Area of the Everett Smelter Site which flows to the freshwater wetlands in the Lowland Area or otherwise does not enter the City of Everett's storm water sewer system and flow to the City's treatment plant are set to protect biota in the Upland Area on the water's path to the wetlands and to protect the biota dependent upon the wetlands.

Standards established in WAC 173-201A-040 will be used as cleanup levels for water draining from the Upland Area to the freshwater wetlands. There are extensive footnotes to the table listing the freshwater and acute water quality standards, which are given below with the same letter designation as in the regulation. Some standards depend upon the hardness of the water. Appropriate times and locations to obtain data to evaluate compliance with the acute and chronic standards will be evaluated during development of compliance monitoring plans. The applicable cleanup levels are as follows:

	Acute	Chronic	
• **Arsenic:**	360.0c	190.0d	µg/L
• **Lead** dd**:**	q,c	r,d	µg/L
• **Cadmium** dd**:**	i,c	j,d	µg/L
• **Mercury** s, ff**:**	2.4c	0.012d	µg/L

c. A 1-hour average concentration not to be exceeded more than once every three years on the average.

d. A 4-day average concentration not to be exceeded more than once every three years on average.

i. $\leq(0.865)(e^{(1.28[\ln(\text{hardness})] - 3.828)})$

j. $\leq(0.865)(e^{(0.7852[\ln(\text{hardness})] - 3.490)})$

q. $\leq(0.687)(e^{(1.273[\ln(\text{hardness})] - 1.460)})$

r. $\leq(0.687)(e^{(1.273[\ln(\text{hardness})] - 4.705)})$

s. If the four-day average chronic concentration is exceeded more than once in a three-year period, the edible portion of the consumed species should be analyzed. Said edible tissue concentrations shall not be allowed to exceed 1.0 mg/Kg of methylmercury.

dd. These ambient criteria are based on the dissolved fraction (for cyanide criteria using the weak and dissociable method) of the metal. The

department shall apply the criteria as total recoverable values to calculate effluent limits unless data is made available to the department clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is made available to the department clearly demonstrating the effective use of the water effects ration approach established by USEPA, as generally guided by the procedures in USEPA *Water Quality Standards Handbook*, December 1998e, as supplemented or replaced. Information which is used to develop effluent limits based on applying metals partitioning studies or the water effects ration approach shall be identified in the permit fact sheet developed pursuant to WAC 173-220-060 or 173-226-110, as appropriate, and shall be made available for the public comment period required pursuant to WAC 173-220-050 or 173-226-130(3), as appropriate.

ff. These criteria are based on the total-recoverable fraction of the metal.

In case of any discrepancy between the above and WAC 173-201A-040, the regulation will govern.

WAC 173-201A-020 defines hardness as "a measure of the calcium and magnesium salts present in water. For purposes of this chapter, hardness is measured in milligrams per liter and expressed as calcium carbonate ($CaCO_3$)." In the equations given in notes "i," "j," "q," and "r" above, entry of the hardness of the water in mg/L in the equation will yield a maximum allowable concentration for lead and cadmium in µg/L.

There are no standards for antimony or thallium. Note, however, WAC 173-201A-040 provides that toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health as determined by the department.

The point of compliance is the point or points where the surface water cleanup levels must be met. WAC 173-340-730(6)(a) states that for surface water, "The point of compliance shall be the point or points at which hazardous substances are released to surfaces waters of the state unless the department has authorized a dilution zone[17] in accordance with WAC 173-201-035." Surface water is defined in WAC 173-340-200 as, "lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the state of Washington or under the jurisdiction of the state of Washington."

In the Upland Area, hazardous substances are released when dissolved or entrained from the soil as water flows over or through the contaminated soil, which occurs throughout

[17] No dilution zone has been authorized.

the site. Hence, the point of compliance for surface water is throughout the site. The quality of water draining to the City of Everett's storm sewer system will be evaluated by comparison with the requirements of City Pretreatment Ordinance No. 2034-95, as amended, given above. The quality of water draining directly to the freshwater wetlands will be evaluated by comparison with the cleanup levels specified in WAC 173-201A-040, also given above.

It is anticipated that in practice the Compliance Monitoring Plan will locate most surface water monitoring locations at storm sewer points of entry and at points representative of surface water crossing the Upland Area boundary and flowing directly to the freshwater wetlands in the Lowland Area. However, the point of compliance is set such that identification of potential water quality problems anywhere in the Upland Area of the Everett Smelter Site may be evaluated by sampling the water at the location of concern and comparing the quality of the water with the cleanup levels given above.

4.1.5 Storm Drain Sediment

Sediment in the usual sense of sediment in rivers, lakes, and marine waters does not exist in the Upland Area of the site. However, sediment accumulates in storm drains. The Snohomish Health District does not formally regulate street waste solids,[18] which includes storm drain sediment, but has a policy statement on recycling and disposal of street waste solids (Snohomish Health District, 1995). As discussed in Section 3.3.4, the Snohomish Health District's *Policy Statement Regarding Street Waste Solids Recycling and Disposal* divides street waste solids into three classes: Class A, Class B, and dangerous waste. The policy indicates potential end uses for Class A and Class B street waste solids. With regard to the elements of interest in the Upland Area of the Everett Smelter Site, Class A street waste solids are those whose contaminants do not exceed cleanup levels identified in Table 2, Method A Cleanup Levels – Soil, WAC 173-340-740(2). Class B street waste solids have contaminants exceeding the Method A cleanup levels, but do not designate as dangerous waste under Chapter 173-303 WAC.

Cleanup levels for storm drain sediments have been set at Method A cleanup levels or, for antimony and thallium which are not listed in the Method A table, at Method B values. Hence, the applicable cleanup levels for storm drain sediments are as follows:

- **Arsenic:** 20 mg/Kg
- **Lead:** 250 mg/Kg
- **Cadmium:** 2 mg/Kg
- **Antimony:** 32 mg/Kg
- **Mercury:** 1 mg/Kg
- **Thallium:** 5.6 mg/Kg

[18] Solids collected during the cleaning of storm sewers, streets, or drainage ditches.

The point of compliance is the point or points where the storm drain cleanup levels must be met. The point of compliance will be each cleanout point and at any point where sediment discharges from the storm sewer system.

Ecology recognizes that the storm drain sediment cleanup levels for cadmium, lead, and mercury, established in accordance with the Snohomish Health District policy, are lower than the cleanup levels established for residential soils in the Upland Area of the Everett Smelter Site. The differential is based on the method for selecting the cleanup levels. While the Snohomish Health District standards were established in accordance with Method A, the soil cleanup levels were established in accordance with Method B. The flexibility afforded by the MTCA Cleanup Regulation under Method B permitted Ecology to increase cleanup levels for residential soils as follows: cadmium, from 2 to 80 mg/Kg; lead, from 250 to 353 mg/Kg; and mercury from 1 to 24 mg/Kg. To meet the stricter substantive requirements of a local governmental agency, however, Ecology has established storm drain sediment cleanup standards in accordance with the Snohomish Health District's *Policy Statement Regarding Street Waste Solids Recycling and Disposal*.

If the Snohomish Health District subsequently revises its policy or otherwise reaches agreements with the City of Everett or others who generate street waste solids, the concentrations set in the revised policy or other agreement may be used when approved.

4.2 Selection of Indicator Hazardous Substances

The MTCA Cleanup Regulation defines indicator hazardous substances as "the subset of hazardous substances present at a site selected under WAC 173-340-708 for monitoring and analysis during any phase of remedial action for the purpose of characterizing the site or establishing cleanup requirements for that site," WAC 173-340-200. WAC 173-340-708 provides the following:

> (2) Selection of indicator hazardous substances.
> (a) 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.
> (b) If the department considers this approach appropriate for a particular site, the factors evaluated when eliminating individual hazardous substances from further consideration shall include:
> (i) The toxicological characteristics of the hazardous substance that influence its ability to adversely affect human health or the environment relative to the concentration of the hazardous substance at the site;

(ii) The chemical and physical characteristics of the hazardous substance which govern its tendency to persist in the environment;
(iii) The chemical and physical characteristics of the hazardous substance which govern its tendency to move into and through environmental media;
(iv) The natural background concentrations of the hazardous substance;
(v) The thoroughness of testing for the hazardous substance at the site;
(vi) The frequency that the hazardous substance has been detected at the site; and
(vii) Degradation by-products of the hazardous substance.

As noted above, the Remedial Investigation report identified six chemicals of concern at the Everett Smelter Site (Hydrometrics, 1995a, page 5-28): arsenic, lead, cadmium, mercury, antimony, and thallium. The purpose of this chapter is to identify indicator hazardous substances from the list of chemicals of concern that will be used to define remedial actions at the site.

The occurrence of lead and cadmium with arsenic have been evaluated using soil data collected to date, as shown on Figures 4-1 and 4-2. The cleanup levels for lead (353 mg/Kg) and cadmium (80 mg/Kg) are exceeded only occasionally when the cleanup level for arsenic (20 mg/Kg) is not.

Data for antimony, mercury, and thallium are sparse, but indicate these elements will also be addressed by addressing arsenic. (See Hydrometrics, 1995a, Tables 3-11 and 5-1 and MFG, 1998). Forty-two analyses for mercury did not find any exceedances of the cleanup level when arsenic was below the cleanup level. Figure 4-3 summarizes mercury measurements.

Only four analyses of antimony and three of thallium were available, with arsenic concentrations ranging from 350,000 mg/Kg to 727,000 mg/Kg. These were samples obtained within the Former Arsenic Trioxide Processing Area; the high arsenic concentrations indicate the samples contain either flue dust or spilled product. The measured concentrations are shown in Table 4-2. A linear proportioning using the most conservative concentration combinations (low arsenic and high antimony or thallium) indicates the antimony and thallium concentrations corresponding to the arsenic cleanup level of 20 mg/Kg are well below the antimony and thallium cleanup levels of 32 and 5.6 mg/Kg, respectively:

For antimony: $(20/350{,}000)(15{,}000) = 0.86 << 32$
For thallium: $(20/350{,}000)(200) = 0.01 << 5.6$

Figure 4-1: Occurrence of Lead Concentrations in Soil with Arsenic Concentrations in Soil.

Figure 4-2: Occurrence of Cadmium Concentrations in Soil with Arsenic Concentrations in Soil.

Figure 4-3: Occurrence of Mercury Concentrations in Soil with Arsenic Concentrations in Soil.

Table 4-2: Antimony and Thallium Analyses

Source	Arsenic (mg/Kg)	Antimony (mg/Kg)	Thallium (mg/Kg)
MFG, 1998, II	510,000	1,700	15
MFG, 1998, II	350,000	15,000	200
RI, Table 3-11	727,000	3,100	
RI, Table 5-1	727,000	15,000	200

Based on these observations, Ecology believes that addressing risk posed by arsenic in soil will also address risks posed by other metals in soil at the site. Arsenic will be the indicator chemical used to select the cleanup actions for soil and define how it will be implemented. Cleanup of arsenic in soil is expected to result in cleanup of the other chemicals of concern in soil.

Note that for soil cleanup actions required in the Upland Area of the Everett Smelter Site, the term "indicator chemical" is not being used in the strict sense that the other chemicals of concern contribute only a small percentage of the overall threat to human health and the environment at the site, as discussed in WAC 173-340-708. Rather, it is being used in the more restricted sense of selecting a hazardous substance present in the Upland Area of the Everett Smelter Site (arsenic) which is suitable for monitoring for the purpose of establishing cleanup requirements for the soil at the site. Lead in soil contributes to the overall threat to human health in both the Peripheral Area and the Former Arsenic Trioxide Processing Area. Cadmium, antimony, mercury, and thallium also contribute to the threat to human health and the environment from the more highly contaminated soils, flue dust, and other highly contaminated materials which exist within the Former Arsenic Trioxide Processing Area.

With respect to ground water and surface water, data regarding the correlation of arsenic, lead, cadmium, antimony, mercury, and thallium are not yet sufficient to eliminate them from consideration, and all six metals will be included in compliance monitoring for ground water and surface water, at least in the initial monitoring rounds.

Chapter 5 - Selection of Remedy

5.1 Introduction

Selection of cleanup actions is a risk management decision. The decision is made by evaluating proposed cleanup alternatives with reference to the set of criteria set forth in the MTCA Cleanup Regulation (Figure 3-1). The decision process involves making qualitative judgments using quantitative evaluations while ensuring that mandatory requirements from statute and rule are met. This chapter and the next discuss the selection and implementation of the remedy for the Upland Area of the Everett Smelter Site.

Threshold requirements and the MTCA preference for permanence must be met at all sites. Threshold requirements are that the remedy shall protect human health and the environment, shall comply with cleanup standards, shall comply with applicable state and federal laws, and shall provide for compliance monitoring. Further, cleanup actions are to use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns.

With particular regard to the Upland Area of the Everett Smelter Site:

- WAC 173-340-740(1)(a) specifies that "treatment, removal, and/or containment measures shall be implemented for those soils with hazardous substance concentrations which exceed soil cleanup levels based on [the residential use exposure scenario]."

- WAC 173-340-210(7) states: "'Shall' means the provision is mandatory."

- WAC 173-340-360(8)(b) states: "Long-term monitoring and institutional controls shall be required if on-site disposal, isolation, or containment is the selected cleanup action for a site or a portion of a site. Such measures shall be required until residual hazardous substance concentrations no longer exceed site cleanup levels…."

- WAC 173-340-210(2) states: "The terms 'applicable,' 'appropriate,' relevant,' 'unless otherwise directed by the department' and similar terms implying discretion mean as determined by [Ecology], with the burden of proof on other persons to demonstrate the requirements are or are not necessary."

The Everett Smelter Site Feasibility Study (Hydrometrics, 1995b) developed information regarding potential methods of site cleanup, assembled fourteen different alternatives for cleaning up the site from these methods, and evaluated the degree to which each alternative met MTCA requirements. While Ecology was not in complete agreement with the evaluation of the alternatives, Ecology did find that the Feasibility Study contained

sufficient information to begin the selection of remedy process. This information has been supplemented with additional information and analysis in supporting documents prepared subsequent to the Feasibility Study (See Section 1.3), in the DCAP/DEIS, and in this FCAP/FEIS.

All alternatives presented in the Feasibility Study except Alternative 1, Limited Action, considered excavation of contaminated soil at a variety of arsenic concentrations which ranged from 7 mg/Kg to 1,000 mg/Kg.

Feasibility Study Alternative 2, Consolidation with no treatment of dangerous waste, was presented as Asarco's preferred alternative in the Feasibility Study. It involved simply covering the highly contaminated soil, flue dust, smelter debris, intact flues, and residual arsenic trioxide product remaining in the Former Arsenic Trioxide Processing Area with less contaminated soil excavated from the Peripheral Area beneath an impermeable composite cover liner system. Excess Peripheral Area soil which could not be placed within the Former Arsenic Trioxide Processing Area due to volume limitations was to be sent to a landfill permitted to accept problem waste. The alternative required grade changes of up to 70 feet to construct the Consolidation Facility within the Former Arsenic Trioxide Processing Area.

5.2 Considerations Based on Stakeholder Discussions

Comments received during the public comment period made it clear that the public was opposed to the construction of a consolidation facility with the proposed grade changes. In addition, the public opposed leaving highly contaminated soils and other smelter residuals within the residential neighborhood. Asarco recognized these concerns and in August 1996 made a proposal to Ecology which involved taking all dangerous waste off site, excavating less-contaminated soil from the Peripheral Area and consolidating it on-site within the Former Arsenic Trioxide Processing Area beneath an impermeable cover with a minimal change in grade. Less-contaminated Peripheral Area soil which could not be accommodated within the volume-capacity of the on-site containment facility would be sent off-site to a facility permitted to accept problem waste. The Former Arsenic Trioxide Processing Area was to be developed in whatever manner the public wanted, except that Asarco stated that they would not agree to residential use. Permanent community protection measures were to be put into place. In this proposal, Asarco indicated accessible soil (i.e., not beneath buildings, pavement, etc.) in the Peripheral Area with arsenic concentrations in excess of 100 mg/Kg would be excavated and sent to the Consolidation Facility or off site. Soils containing arsenic concentrations between 20 mg/Kg and 100 mg/Kg would be addressed by institutional controls only.

In October 1997 Asarco, the City of Everett, Ecology, the Everett Housing Authority, the Northeast Everett Community Organization, the Northwest Everett Neighborhood Association, Snohomish County, the Snohomish Public Utility District, and the Snohomish Health District began a mediation process. The goal of the mediation was to discuss site

remediation and assess whether agreement could be reached in mediation on cleanup actions that Ecology would propose in the DCAP/DEIS for the site.

By the time this mediation began, discussions among all the stakeholders had reached the conclusion that some contaminated soils were likely to remain on-site beneath buildings and pavement which would have to be managed in the long-term, and that complete excavation and removal of all contaminated soils from the site was not a practicable solution. Hence, mediation focused on the alternatives involving a Consolidation Facility and the alternatives involving an On-Site Containment Facility.[19] Off-site disposal of all excavated accessible soil was judged to be impracticable. Discussion with Asarco indicated further investigation which they conducted of the various stabilization, soil washing, and metals recycling options for addressing the dangerous waste were not viable (Asarco, 1998d and e).

As developed in mediation, the alternatives were:

- A **Consolidation Facility** for some Peripheral Area soil with off-site disposal of excess soil from the Peripheral Area which would not fit in the Consolidation Facility and off-site disposal of the highly-contaminated soil in the Former Arsenic Trioxide Processing Area that classifies as dangerous waste; and

- An **On-Site Containment Facility** for the highly-contaminated soil in the Former Arsenic Trioxide Processing Area that classifies as dangerous waste with arsenic concentrations between 3,000 and 20,000 mg/Kg and sending dangerous waste with arsenic concentrations greater than 20,000 mg/Kg off-site. As with the Consolidation Facility alternative, an associated Consolidation Facility would accept soil from the Peripheral Area to the degree possible and send the remainder off-site.

(The Former Arsenic Trioxide Processing Area has an area of about six acres. In the On-Site Containment Facility alternative, about two acres would be taken up by the On-Site Containment Facility, with the remaining four acres available for the Consolidation Facility. In the Consolidation Facility alternative, the entire six acres would be used for the Consolidation Facility.)

The difference between the Consolidation Facility and the On-Site Containment Facility is that the Consolidation Facility (retained in both alternatives) has only an impermeable cover and accepts only problem waste soils, whereas the On-Site Containment Facility has

[19] It should be noted that the mediation did not discuss site cleanup in terms of alternative numbers (i.e., Alternative 13 and Alternative 14) as presented in the Feasibility Study. However, the cleanup options discussed in mediation focused on consolidation versus on-site containment with off-site disposal of excess waste and no treatments of dangerous waste. These options were, hence, extensions of Feasibility Study Alternatives 13 and 14.

an impermeable bottom liner as well as an impermeable top cover and accepts only dangerous waste.

The stakeholders involved in the mediation process were not able to come to agreement. Although there seemed to be mutual agreement among the stakeholders that the Consolidation Facility and On-Site Containment Facility alternatives contained the necessary components for site cleanup, agreement regarding what soil should be removed, agreement on whether or not there would be an On-Site Containment Facility, and agreement on a number of other aspects of the cleanup could not be reached.

One product of the mediation process was a further development of the Consolidation Facility and On-Site Containment Facility alternatives by a Technical Work Group formed by the mediation participants. The Technical Work Group was comprised of technical representatives of Asarco, Ecology, citizen groups, and local governments. This work is presented in the documents *Comparison of Remediation Alternatives Proposed for the Everett Smelter Site* (TWG, 1998a) and *Estimated Costs for TWG Remedial Alternatives for the Everett Smelter Site* (TWG, 1998b). These documents represent a significant extension of analyses presented in the Feasibility Study.

5.3 Considerations Based on SEPA Evaluations

This section presents a summary of the evaluation of the elements which were identified for analysis during SEPA scoping. The detailed evaluation is presented in Appendix A, which describes the alternatives as formulated for SEPA analysis, likely environmental impacts of the alternatives, and measures to mitigate adverse impacts.

Fourteen environmental elements were identified during the SEPA scoping process. The elements identified and a summary of the evaluations are described in the following paragraphs. Mitigating measures for each of the environmental elements will be considered during development of the Engineering Design Report and other project documents and incorporated in as appropriate.

Earth: The Off-Site Disposal alternative would not require a change in grade within the Former Arsenic Trioxide Processing Area. Construction of either a Consolidation Facility or an On-Site Containment Facility would result in an increase in grade of the area, which could impact views. Impacts can be mitigated by limiting the increase in grade. (Developing an appropriate final grade for the area will be considered in the Final Site Restoration Plan as discussed in Section 3.3.5.)

Air Quality: Air quality impacts from the proposed cleanup activities mainly occur from combustive emissions due to the operation of equipment used in the cleanup. Fugitive dust emissions would also occur. There is little difference in total impact on air quality among the alternatives. The primary mitigating measures are to implement Best Available Control Technologies to control dust.

Surface Water: Surface water impacts could result from exposure of contaminated soils to increased levels of leaching and to erosion and the subsequent entrainment of contaminated sediment. Contaminated soil could also be released onto residential streets and thence into the storm water system as a result of transport on dump trucks or adherence to excavating equipment. There is little difference in the impacts among the alternatives. These impacts may be mitigated by limiting exposure of contaminated soils to direct rainfall by operating during the drier part of the year and by implementing sedimentation control measures.

Ground Water: Significant short-term impacts to ground water, either positive or negative, are unlikely because of the slow rate of ground water movement. In the long term, removal of contaminated soil would reduce the potential for future leaching and infiltration of contaminants to ground water. Placing contaminated soils in either the Consolidation Facility or On-Site Containment Facility would present greater risks than removing them completely from the site as would be done by the Off-Site Disposal alternative. Otherwise, risks among the alternatives are similar. No mitigating measures are necessary beyond the normal requirements to be included in the Consolidation Facility and the On-Site Containment Facility designs to guard against ground water contamination from the landfilled materials (impermeable cap, bottom liners, upgradient ground water interception trench, monitoring, etc.).

Environmental Health: Playing, gardening, eating home-grown vegetables, and home maintenance or remodeling may result in long-term exposure of community residents to arsenic in contaminated soil. Short-term exposures may occur to landscape workers, workers doing maintenance and repairs under houses, and workers engaged in remodeling, demolishing, or building houses. Remediation activities have the potential to expose both community residents and remediation workers to arsenic in contaminated soil. The primary difference among the alternatives is the arsenic concentration of soil in the Former Arsenic Trioxide Processing Area to which people could potentially be exposed. The Off-Site Disposal alternative would remove all contaminated accessible soils, which is most protective. The Consolidation Facility alternative would leave soils with arsenic concentrations of up to 3,000 mg/Kg, which protects most people, but which may not be fully protective of a sensitive individual if containment is breached. The On-Site Containment Facility alternative would leave soils with arsenic concentrations of up to 20,000 mg/Kg, which has the potential to cause permanent and potentially lethal health effects in exposed individuals if containment is breached. (See also the discussion in Section 5.4.) Short-term exposures to remediation workers and to residents during remediation may be mitigated by using protective clothing and best available control technology to minimize dust generation. After remediation, the potential short-term exposures of residents to residual contamination may be minimized by institutional controls (See Section 6.7).

Land Use: See Section 3.3.5.

Housing: There would be no change in housing availability in the Peripheral Area for any of the alternatives considered. Within the Former Arsenic Trioxide Processing Area, the Off-Site Disposal alternative would enable the Former Arsenic Trioxide Processing Area to be returned to single-family dwelling use. The On-Site Containment Facility alternative would preclude use of the Former Arsenic Trioxide Processing Area for housing due to the high concentrations of arsenic contained therein. The Consolidation Facility alternative would allow multi-family residential use within the Former Arsenic Trioxide Processing Area. None of the alternatives would have a significant impact on overall housing availability in Everett. The Off-Site Disposal alternative would return the area to its original character of single-family dwellings. Multi-family use under the Consolidation Facility alternative has the potential to provide more housing than existed when the area was used for single-family dwellings. The On-Site Containment Facility alternative would result in a small, long-term net loss of housing supply of Everett.

Aesthetics, Light, and Glare: The primary impacts of the alternatives are to the aesthetics of the area. All have similar impacts within the Peripheral Area: short-term aesthetic impacts due to construction and long-term improvements to the aesthetics of areas that will benefit by the landscaping accompanying remediation. The Off-Site Disposal alternative would improve the aesthetics of the Former Arsenic Trioxide Processing Area the most, whereas, the On-Site Containment Facility and Consolidation Facility alternatives would increase the elevation of the Former Arsenic Trioxide Processing Area and result in a change in the character of the land use. Since vacant property tends to attract undesirable uses, the most effective long-term mitigating measures for the Former Arsenic Trioxide Processing Area are to return the area to productive use. Until that occurs, site lighting, low growing vegetation, security patrols, and attractive fencing may be used to mitigate the attraction of undesirable uses. Note that in Section 3.3.5 the use of a landscape buffer is discussed to isolate the Former Arsenic Trioxide Processing Area from surrounding residential areas. However, the site is oriented toward East Marine View Drive, and views of the site from this thoroughfare could mitigate the occurrence of undesirable uses.

Parks and Recreation: Remediation of parks within the Upland Area of the Everett Smelter Site would be the same for the Off-Site Disposal, Consolidation Facility, and On-Site Containment Facility alternatives. Hence, there is no difference among the cleanup alternatives regarding parks. Adverse impacts of cleanup actions include short-term loss of use to the area undergoing cleanup and potential loss of mature vegetation during cleanup. The positive impact of cleanup is the long-term reduction of the potential for public contact with contaminated soil. Mitigation measures for adverse impacts include replacement/replanting of any plant adversely affected by cleanup activities, either during cleanup or due to a long-term decline due to cleanup activities. Placing permeable geofabric mats covered with mulch over the root zone of established trees and shrubs may be considered as an alternative to excavation, depending upon soil arsenic concentrations.

Cleanup activities in parks could be timed to minimize the amount of time public use of the property is restricted.

Transportation: All of the cleanup alternatives involve transporting contaminated soil to disposal areas and clean backfill to the area being cleaned up. The Off-Site Disposal alternative would require the most soil transport, and hence have the most impacts; the On-Site Containment Facility alternative would transport the least soil, and hence have the least impacts. The Consolidation Facility alternative has impacts between the two, but closer to the On-Site Containment Facility alternative.

The primary component is haulage of contaminated soil to landfills in eastern Washington and eastern Oregon and haulage of clean backfill to replace the excavated contaminated soil. Specific accident data for the haul routes are not available. Statistical predictions using generic traffic accident data indicate no fatal accidents are expected for any of the cleanup options (statistical predictions of fatal accidents are less than 1 for all alternatives). Statistical predictions of nonfatal accident rates are 11 for the Off-Site Disposal alternative and 6 for both the On-Site Containment Facility alternative and the Consolidation Facility alternative.

Most of the mileage in hauling the contaminated soil is for hauling problem waste soil to the Roosevelt Landfill in eastern Washington and for hauling dangerous waste soil to the hazardous waste landfill at Arlington in eastern Oregon. With respect to hauling problem waste to Roosevelt Landfill, it may be sent by train rather than truck. The company that handles trash disposal for the region maintains a rail load-out facility in the Lowland Area just southeast of the Former Arsenic Trioxide Processing Area and sends two or three trainloads of trash to Roosevelt per day. Problem waste soil may be sent by these regularly scheduled, dedicated trains with no increase in train traffic. Dangerous waste excavated from the Former Arsenic Trioxide Processing Area could also be sent from this load-out facility, but additional permitting of the facility would be required. Alternatively, the dangerous waste could be loaded onto rail at an existing load-out facility in Seattle.

Transportation impacts may be mitigated by using the rail haulage option. This option was used in Ecology's Summer 1999 cleanup. Other mitigating measures include optimizing traffic flow for local haulage prior to trucks reaching Interstate 5, appropriate use of traffic lights and traffic control personnel, and specific worker training. As discussed in Section 3.3.5, a Construction and Traffic Management Plan will be developed as part of the Engineering Design Report for the project. This plan will include measures to mitigate traffic impacts.

Noise: Noise impacts result primarily from excavating and backfilling activities and associated truck traffic, with excavation the single loudest phase of construction. Impacts among the alternatives are similar. Mitigation measures include ensuring that mufflers on equipment are in good condition, operating near the elementary school in the area when school is not in session, and placement of temporary noise barriers if necessary.

Public Services and Facilities: Impacts are similar among alternatives. Temporary revisions to traffic signals may be required. Water, power, and telephone service will be needed by cleanup operations; the additional demand is expected to be well within the capabilities of the current systems. The On-Site Containment Facility alternative and the

Consolidation Facility alternative would both have a ground water interception trench. Water collected in this trench would add an insignificant amount of water to the storm sewer system. The manner in which the Former Arsenic Trioxide Processing Area is redeveloped may impact the tax collections for the City of Everett.

Maintenance: Newly planted sod and landscaping within the Peripheral Area will require regular fertilizer and watering during the first year. After that, maintenance should be as for normal lawns. The primary difference among the alternatives is that the On-Site Containment Facility alternative and the Consolidation Facility alternative would require maintenance and monitoring not required by the Off-Site Disposal alternative. Engineering design of permanent features will include ease-of-maintenance considerations.

Other Governmental Services or Utilities: The primary impacts of all alternatives will be due to the institutional controls required to manage residual contamination left behind. There is little or no difference among the alternatives. It is expected that the City of Everett, the Snohomish Health District, and Ecology will all have continuing responsibilities regarding the site. These responsibilities will impose financial and administrative burdens on the respective organizations. Identification of an adequate and stable funding source to support the responsibilities would mitigate these impacts.

5.4 Selection of Cleanup Action Alternative

Selecting between the Consolidation Facility alternative and the On-Site Containment Facility alternative requires deciding whether or not to allow an On-Site Containment Facility for dangerous waste within the Former Arsenic Trioxide Processing Area. Ecology has given this careful consideration both in terms of threshold requirements and in terms of other requirements.

There are four threshold requirements: to protect human health and the environment; to comply with cleanup standards; to comply with applicable state and federal laws; and to provide for compliance monitoring. The first and third are of primary importance in the decision of whether or not to allow an On-Site Containment Facility within the Former Arsenic Trioxide Processing Area. The On-Site Containment Facility would place soils with high levels of arsenic contamination within a residential area of a city with a population which is increasing and expected to increase for the foreseeable future. The placed soils would retain their toxicity indefinitely.

The Dangerous Waste Regulation provides criteria for siting such a dangerous waste landfill. As noted in Chapter 4 of this document, the most pertinent siting criteria are that:

- Land-based facilities must be located such that the dangerous waste management unit boundary is at least five hundred feet from the nearest point of the facility property boundary, and

- The dangerous waste management unit boundary [must be] at least one-quarter mile from residences or public gathering places.

The proposed site of the On-Site Containment Facility meets none of these requirements, and proposes to consolidate solid waste which designates as hazardous waste under federal law. This waste proposed for disposal in the On-Site Containment Facility is not covered by the exemption of RCW 70.105.035[20], because it designates under federal law. Additional considerations are that both RCW 70.105.035 and Ecology's Area of Contamination Policy expressly provide that the department retains the ability to determine that any substantive requirement of the Dangerous Waste Regulations are relevant and appropriate requirements. Ecology has determined that landfilling of dangerous waste within the Former Arsenic Trioxide Processing Area is neither sufficiently protective of human health and the environment nor compliant with applicable or relevant and appropriate provisions of the Dangerous Waste Regulations regarding siting requirements for landfills containing federally-designated hazardous waste.

This determination is based upon evaluation of criteria in WAC 173-340-710(3), specifically:

(a) Whether the purpose for which the statute or regulations under which the requirement was created is similar to the purpose of the cleanup action. *The Dangerous Waste Regulations requirements for landfilling were created expressly to address the type of hazard presented by landfilling soil with arsenic concentrations at levels which cause it to be designated as dangerous waste in an On-Site Containment Facility.*

(b) Whether the media regulated or affected by the requirement is similar to the media contaminated or affected at the site. *Soil contaminated with arsenic at dangerous waste levels is exactly the type of toxic material regulated by the Dangerous Waste Regulations.*

(c) Whether the hazardous substance regulated by the requirement is similar to the hazardous substance found at the site. *Arsenic is specifically included in the Dangerous Waste Regulations as a regulated hazardous substance.*

(d) Whether the entities or interests affected or protected by the requirement are similar to the entities or interests affected by the site. *Residences and public gathering places are specifically included in the Dangerous Waste Regulations, with minimum distances of a dangerous waste landfill from residences and public gathering places specified.*

[20] Hazardous Waste Management – Solid Wastes – Conditionally exempt from chapter. Note also that this exemption applies only to waste generated pursuant to a consent decree.

(e) Whether the actions or activities regulated by the requirement are similar to the cleanup action contemplated at the site. *Construction of a dangerous waste landfill in the Upland Area of the Everett Smelter site is exactly the type of action or activity regulated by the Dangerous Waste Regulations.*

(f) Whether any variance, waiver, or exemptions to the requirements are available for the circumstances of the site. *Exemptions under the Area of Containment policy expressly provide that Ecology retains the ability to determine that any substantive requirement of the Dangerous Waste Regulations are relevant and appropriate. In considering the substantive requirements of the Dangerous Waste Regulations, Ecology kept in mind that (1) the purpose of the siting criteria is to immediately disqualify proposed dangerous waste facility sites in locations considered unsuitable or inappropriate for the management of dangerous wastes and (2) compliance with siting criteria does not imply that a given project at a given location poses an acceptable level of risk, nor does it commit the department to the issuance of a dangerous waste permit. In other words, even if a site meets the siting criteria, the department is not committed to allowing the project to proceed. At the Upland Area of the Everett Smelter Site, the proposed site does not meet the siting criteria and, in fact, fails to the meet the siting criteria by a wide margin. Specifically, minimum distance requirements for separation of the On-Site Containment Facility from the Former Arsenic Trioxide Processing Area property boundary and from residences or public gathering places are not met or even close to being met.*

(g) Whether the type of place regulated is similar to the site. *The site of a dangerous waste landfill – the type of place regulated – is exactly the type of site which would result from construction of an On-Site Containment Facility – a dangerous waste landfill – in the Upland Area of the Everett Smelter Site.*

(h) Whether the type and size of structure or site regulated is similar to the type and size of structure or site affected by the release or contemplated by the cleanup action. *There is no minimum size of dangerous waste landfills below which the landfill would be unregulated. Hence, the size of the proposed On-Site Containment Facility is the size regulated by the Dangerous Waste Regulations.*

(i) Whether any consideration or use or potential use of affected resources in the requirement is similar to the use or potential use of the resources affected by the site or contemplated cleanup action. *The use of a site as an On-Site Containment Facility is exactly the type of use regulated by the Dangerous Waste Regulations.*

Moreover, the land use analysis (Section 3.3.5) concluded that an On-Site Containment Facility is not substantively consistent with the City of Everett's comprehensive plan and zoning codes.

In addition, review of arsenic toxicity (DOH, 1999) indicates that material with arsenic concentrations between 1,500 and 5,000 mg/Kg may cause permanent or even lethal health effects in sensitive individuals. The dangerous waste concentration of 3,000 mg/Kg is in the mid-point of this range. The department had determined that leaving arsenic concentrations greater than 3,000 mg/Kg within a densely populated area is not protective of human health and the environment because any breach of containment would expose material that could be an immediate threat to health. This hazard would remain for the indefinite future because the toxicity of the arsenic-contaminated soil will persist for the indefinite future.

Hence, construction of a Consolidation Facility within the Former Arsenic Trioxide Processing Area for on-site disposal of the least contaminated problem waste from the Peripheral Area with off-site disposal of excess problem waste soil from the Peripheral Area which cannot be accommodated by the Consolidation Facility is the alternative selected for implementation of remedial actions at the site. It will be implemented as a containment remedy for problem waste. Waste with arsenic concentrations in excess of 3,000 mg/Kg will be excavated from the Former Arsenic Trioxide Processing Area and sent off site for disposal at a properly permitted facility.

Implementation of the Consolidation Facility remedy includes specifying what is considered sufficient containment; this is discussed in the next chapter.

Chapter 6 - Implementation of Selected Remedy

6.1 Overall Cleanup Strategy

Cleanup of soil contamination is the primary concern in the Upland Area of the Everett Smelter Site. Contamination of ground water, surface water, and storm drain sediment in the Upland Area is expected to be addressed by removal of contaminated soil. Monitoring will be done and other measures taken as necessary to ensure contamination is reduced and remains below cleanup levels, remediation levels, and other performance standards as appropriate.

The MTCA Cleanup Regulation requires that, for land to be returned to unrestricted use, soil cleanup levels be based on human exposure via direct contact with a point of compliance established in the soils throughout the site from the ground surface to fifteen feet below the ground surface. This represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of site development activities. WAC 173-340-740(6)(c). However, Ecology recognizes that cleanup actions may be selected which involve containment of hazardous substances on site, in which case the soil cleanup levels will typically not be met throughout the site from the ground surface to fifteen feet below the ground surface. In these cases, the cleanup action may be determined to comply with cleanup standards, WAC 173-340-740(6)(d), provided the Compliance Monitoring Program is designed to ensure the long-term integrity of the containment system, and long-term monitoring and institutional controls are continued until residual hazardous substance concentrations no longer exceed site cleanup levels. WAC 173-340-360(8).

The overall approach in the Upland Area of the Everett Smelter Site will be to excavate near-surface contaminated soils which are accessible (i.e., not under buildings, pavements, or other permanent structures), contain underlying contaminated accessible soils with clean soil, and develop institutional controls for the site that will ensure proper long-term management of the residual contamination left on-site.

The location of the point of compliance for soil at a depth of fifteen feet is designed to prevent direct contact with near-surface contamination and to prevent redistribution of deeper contamination at the surface as additional development activities take place on the site which disturbs deeper soils. In developing the combination of soil removal, containment, and institutional control actions to be taken in the Upland Area of the Everett Smelter Site, Ecology considered that the combination of such actions should provide a degree of assurance that direct contact with near-surface soils and redistribution of contamination at the surface will not occur and that is comparable to excavation to a depth of fifteen feet combined with future unrestricted land use.

6.2 Soil Cleanup Actions in the Peripheral Area

The **cleanup standard** in the Peripheral Area will use arsenic as the indicator chemical. The arsenic **cleanup level** is 20 mg/Kg. All soil which exceeds the cleanup level will be addressed by at least a **containment remedy**. Accessible soil will be addressed by a combination of removal and containment.

6.2.1 Areas Not Covered by Permanent Structures or Paving

Soil not covered by permanent structures or paving is accessible to direct contact. If arsenic concentrations exceed the cleanup level of 20 mg/Kg, the soil must be removed and/or contained.

6.2.1.1 Development of the Soil Removal and Containment Remedy

Again, in developing the combination of soil removal, containment, and institutional control actions to be taken in the Upland Area of the Everett Smelter Site, Ecology considered that the combination of such actions should provide a degree of assurance that direct contact and redistribution of contamination at the surface as additional development activities take place on the site will not occur, which is comparable to the degree of assurance attained by excavation of contaminated soil to a depth of fifteen feet combined with future unrestricted land use. For areas not covered by permanent structures or paving, the overall approach will be to excavate near-surface contaminated soils, contain underlying contaminated soils with clean soil, and develop institutional controls for the site that will ensure proper long-term management of the residual contamination left on site.

In evaluating what constitutes sufficient removal and containment, Ecology considered several key factors, including the following:

- The regulatory requirement to meet cleanup standards in residential areas by "removal and/or containment measures." (Threshold requirements to protect human health and the environment and to comply with cleanup standards, WAC 173-340-360(2), and the requirement that residential soils be treated, removed, and/or contained, WAC 173-340-740(1)(a).)

- The need to have a containment barrier of sufficient thickness in residential yards to protect against penetration and resulting direct contact with underlying soils. (Threshold requirement to protect human health and the environment, WAC 173-340-360(2), and the regulatory definition of containment, WAC 173-340-200.)

- The regulatory requirement to protect against carcinogenic risks imposed by direct contact with soil above cleanup levels based on the average (mean) soil concentration, WAC 173-340-740(7)(c)(iv)(B).

- The need to protect against acute toxic effects due to "hot-spots" (large variations from the mean value). (Threshold requirement to protect human health and the environment, WAC 173-340-360(2), and requirement to consider large variations relative to the mean during compliance monitoring, WAC 173-340-740(7)(c)(iv)(B).)

- The statutory and regulatory requirement to give preference to cleanup actions which are permanent to the maximum extent practicable. RCW 70.105D.030(1)(b) and WAC 173-340-360(3)(a). In the Upland Area of the Everett Smelter Site, one example of a permanent solution would be removing all accessible contaminated material within 15 feet of the surface from the neighborhood to an off-site facility sited, designed, and permitted to accept such waste.

- The requirement to perform long-term monitoring and have institutional controls where on-site disposal, isolation, or containment is part of the selected cleanup action. WAC 173-340-360(8)(b).

- It should be noted that the regulations identify a hierarchy for permanent actions. WAC 173-340-360(4)(a). On that hierarchy, on-site or off-site disposal (i.e., removal) are identified as more permanent than containment and institutional controls. WAC 173-340-360(4)(a)(v), (vi), and (vii). It should also be noted that containment and institutional controls alone are not permanent solutions. WAC 173-340-360(5)(c).

- The regulatory flexibility to consider cleanup costs when selecting cleanup remedies, and the regulatory instruction that "[a] cleanup action shall not be considered practicable if the incremental cost of the cleanup action is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action." WAC 173-340-360(5)(d)(vi). It should be noted at this point that the cleanup technologies being employed in the selected cleanup action – on-site and off-site disposal, containment, and institutional controls – are the least permanent of the cleanup technologies considered when selecting from among the alternatives proposed as potential cleanup actions. That is, in selecting the Consolidation Facility alternative, the department has already given great consideration to cost by selecting cleanup technologies which are among the least permanent of available cleanup technologies. Evaluations discussed below will further refine the application of the removal and containment actions to choose remediation levels at depth to minimize removal of contaminated soil and hence balance cost with achieving a cleanup which is permanent to the maximum extent practicable.

- The recognition that the contaminants in question – arsenic with associated lead and other metals – are persistent in the environment. Contamination left

> in the neighborhood will retain its toxicity for millennia. Further, it is expected that the City of Everett will remain an urban center for millennia. Generations of people will use the area for their homes and raise their children there. The cleanup selected must be protective over the long-term, not just for a few years.

To evaluate the hazard of contaminated soil to exposed populations in the Upland Area of the Everett Smelter Site, Ecology considered the likelihood of exposure, which depends on the location of the contaminated soil and the types of activities that occur on the contaminated property. Table 6-1 shows a range of activities which typically occur in residential areas and their estimated depth of disturbance, as identified by citizens during the mediation.

Table 6-1: Citizen Identified Activities

Activity	Estimated Depth
Soil mixing by biologic activity (earthworms, moles, ants, etc.)	12”(?)
Mowing, raking, sweeping	6”
Kids/Pets digging	12”
Gardening	18”
Tree planting	24”
Re-sodding	6”
Irrigation system installation	12”+
Paving/install sidewalk	12”
General landscaping	24”
Deck foundation	24”
Fence posts	30”
Tank removal	60”
Utility poles	to 108”

In developing the containment remedy, Ecology considered how best to protect against carcinogenic health threats, recontamination of surface soils by contaminated soils left below the containment barrier, achieving permanence to the maximum extent practicable by balancing the incremental degree of protection achieved by removing and/or containing soil with the incremental cost of doing so, and protecting against acute health threats if the containment barrier is breached due to failure of institutional controls.

Cost is directly related to the volume of soil removed.

With respect to carcinogenic health threats, WAC 173-340-740 specifies the reasonable maximum exposure scenario is for children ingesting soil. The arsenic concentration of soil which children regularly contact must be below the cleanup level of 20 mg/Kg. Since exposure occurs over the long-term as children play in various parts of their yard, the 20

mg/Kg cleanup level is based on the average arsenic concentration within the area of concern.

Hence, soil with average arsenic concentrations exceeding 20 mg/Kg at and near the surface must be removed and/or contained. Soils or other material used for containment must not contain hazardous substances in concentrations which exceed the substance's cleanup level.

To prevent direct contact of near-surface soil and penetration to underlying contaminated soil, and thereby to protect public health, removal of near-surface soil and placement of a containment barrier of sufficient thickness is required. To meet the threshold requirements in the Upland Area of the Everett Smelter Site, Ecology has determined that removal and replacement with a containment barrier of at least the top 12 inches of soil is necessary. Within that first foot of soil, citizens have identified the following residential uses: digging by children and pets, gardening (often at lower depths), and soil mixing by biological activity. In light of the nature of these activities, Ecology has no confidence that institutional controls will adequately prevent exposure to elevated concentrations of contaminants in the top 12 inches of soil. Ecology's determination is in accord with the Responsiveness Summary for the MTCA Cleanup Regulation, which anticipated that containment actions would involve thicknesses similar to the two to three feet minimum requirements typically specified for landfills (Ecology, 1991, Chapter XIX, Issue 13, p. 245). A one-foot cover thickness is the minimum requirement for an inert waste landfill. WAC 173-304-461(6).

Note that because removal of soil with average arsenic concentrations exceeding the cleanup level of 20 mg/Kg and placement of the containment barrier serves to meet the threshold requirements, analysis of the incremental costs of removal of contaminated soil and placement of the containment barrier did not occur. As discussed in Section 3.1.2, such cost balancing may only be considered after threshold requirements are met.

Ecology is also concerned about acute threats to health based upon short-term exposure to a child who has a one-day exposure to arsenic-contaminated soil excavated from depth in the event the containment barrier is breached and institutional controls for handling the contaminated soil are not followed. Acute threats to health may take the form of transient illness such as vomiting and diarrhea, or permanent health effects, such as organ damage or death.

Exposure of children may most commonly occur when a child plays in a dirt pile, say with a toy bulldozer, excavated from beneath the containment barrier for a small homeowner project. It is anticipated that it is most likely the depth of excavation would be 24 inches or less. Exposure could also occur if a child plays in a dirt pile excavated from below 24 inches for a larger-scale project; since larger-scale projects are less frequent, this type of exposure is considered less likely.

Ecology, 1999b, reports ranges of arsenic concentrations which are considered protective against transient effects based on a reasonable maximum exposure of a child and of permanent effects based on a maximally exposed child (Table 6-2). Reasonable maximum exposure estimates are considered appropriate for transient effects, given that the containment barrier and institutional controls will reduce the risk of exposure. Consideration of a maximally exposed individual is appropriate for permanent health effects. Ecology has determined that leaving soil on site which could cause permanent organ damage or death is unacceptable, and that the chance of this occurring should be very low.

The ranges, as well as best estimates of a protective arsenic concentration were developed by the Washington State Department of Health (DOH, 1999).

Table 6-2: Estimate of Range of Soil Arsenic Concentrations (mg/Kg) Which are Protective Against Acute Health Effects in Children.

Health Effect	More Protective	Best Estimate	Less Protective
Transient	23	37	92
Permanent	14	162	770

The low estimate for permanent health effects is less than that for the transient health effects because it is assumed a maximally exposed individual ingests a great deal more soil than the reasonable maximum individual's exposure used in the transient estimate.

The cleanup level for all depths up to fifteen feet below the ground surface is an average soil arsenic concentration of 20 mg/Kg throughout the site. In addition, a maximum arsenic concentration of twice the cleanup level, or 40 mg/Kg, is used in compliance monitoring as an additional performance standard to ensure that there are not large variations from the average arsenic concentration of 20 mg/Kg. WAC 173-340-740(7)(c)(iv)(B) and (7)(e)(ii); see Section 7.2.1 for additional discussion.

Below a depth of 12 inches, Ecology will address carcinogenic health threats and recontamination concerns by setting remediation levels below a depth of 12 inches based on average arsenic concentrations. Acute health threats below a depth of 12 inches will be addressed by setting remediation levels below a depth of 12 inches based on maximum arsenic concentrations. Remediation levels below a depth of 12 inches will balance the degree of protectiveness with the cost to achieve that protectiveness.

In order to evaluate appropriate remediation levels based on average and maximum soil arsenic concentrations below a depth of 12 inches, Ecology used information provided by Asarco which estimated soil arsenic concentrations at 6-inch depth intervals. Soil arsenic concentration data from various depths have been collected during the course of investigations. Exhibits 1 and 2 summarize the average and maximum arsenic concentrations measured in soil to a depth of 18 inches. Asarco used this data and data from depths below 18 inches to estimate the average and maximum arsenic concentrations at properties within the site. There is sufficient data to estimate arsenic concentration

versus depth in 6-inch intervals to a depth of 48 inches for 565 of the 595 residential properties within the site.[21]

The statutory and regulatory preference for permanent solutions requires that as much arsenic contamination be removed as possible while balancing costs such that the incremental cost of soil removal is not disproportionate to the incremental reduction in risk. In addition, removal of as much contamination as possible minimizes the chances for recontamination of the surface when contamination is excavated from depth in the event the containment barrier is breached and institutional controls for handling the contaminated soil are not followed. The concentration versus depth estimates were used to estimate the relative amount of soil which would have to be removed due to an exceedance of an average or a maximum arsenic concentration for 6-inch depth intervals to a depth of 48 inches. The results are shown on Figures 6-1 through 6-5. As noted above, Ecology also considered the potential for recontamination and the acute toxicity of arsenic in selecting remediation levels below 12 inches based on the average and maximum concentrations. Using this information, Ecology evaluated at what point the incremental cost of soil removal becomes disproportionate to the incremental reduction in risk.

Based on the foregoing considerations, Ecology has set remediation levels based on average and maximum soil arsenic concentrations as follows:

For the 0-6 and 6-12 inch depth intervals, the cleanup level is 20 mg/Kg, based on the average arsenic concentration for these depth intervals. A performance standard based on the maximum soil arsenic concentrations is set at 40 mg/Kg for the 0-6 and 6-12 inch depth intervals. This maximum value is based on a provision in Ecology's default compliance monitoring requirements which was designed to ensure large variations from the average do not occur. (See Section 7.2.1 for additional discussion.) No remediation levels are set. Accessible soil within these depth intervals whose average arsenic concentration exceeds 20 mg/Kg or whose maximum arsenic concentration exceeds 40 mg/Kg must be removed.

For the 12-18 and 18-24 inch depth intervals, Ecology selected 60 mg/Kg and 150 mg/Kg as the remediation levels based on the average and maximum arsenic concentrations, respectively. These remediation levels are based on several considerations:

- These depth intervals are immediately beneath the required containment thickness of 12 inches, where institutional controls are least likely to be effective in controlling the behavior of residents in their own yard. Ecology believes that, over time, soil excavation from these depth intervals is likely for

[21] Estimated average and maximum arsenic concentrations at each of the 565 properties were provided by Asarco for each depth interval in Excel spread sheets *hchisto3c.xls* and *hchisto3b.xls*. The spreadsheets did not associate the data with a particular property. The average accessible soil area on a property is 7,400 square feet. There are 137 cubic yards of soil within a 6-inch thickness which is 7,400 feet square.

small homeowner projects. Such soil could re-contaminate the surface to arsenic concentrations exceeding the cleanup level. Remediation levels should be as low as is practicable to reduce the risk of this occurring.

- The statutory and regulatory preferences for permanent solutions requires that as much arsenic contamination be removed as possible while balancing costs such that incremental cost is not disproportionate to incremental risk reduction. As Figures 6-1 and 6-2 show, less than 15% of the soil volume within a given depth interval has average arsenic concentrations exceeding 60 mg/Kg, with soil volume increasing rapidly as average concentrations decline below 60 mg/Kg. Hence, the incremental cost of removing soil in the 12-18 and 18-24 inch depth intervals only becomes disproportionate to incremental reduction in risk at average concentrations below 60 mg/Kg.

- Note that the 60 mg/Kg remediation level based on average arsenic concentration is within the Department of Health's range of protective arsenic concentrations with respect to transient effects, although somewhat above Department of Health's Best Estimate (See Table 6-2). Thus, most children are expected to be protected against transient health effects if soil from the 12-18 and 18-24 inch depth intervals is ingested.

- A remediation level based on the maximum soil arsenic concentrations is set at 150 mg/Kg for the 12-18 and 18-24 inch depth intervals. This maximum soil arsenic concentration is based on cost balancing and on selecting a maximum arsenic concentration within the low portion of the range which is considered protective against permanent health effects at these depth intervals immediately beneath the containment barrier. As Figures 6-1 and 6-2 show, less than 15% of the soil volume within each of these two depth intervals is estimated to have a maximum arsenic concentration exceeding 150 mg/Kg, with soil volume increasing rapidly as maximum arsenic concentrations decline below 150 mg/Kg. The maximum arsenic concentration of 150 mg/Kg is approximately equal to the Department of Health's Best Estimate of the arsenic concentration protective against acute health effects (See Table 6-2).

Figure 6-1: Percent of Soil Volume Exceeding Arsenic Concentrations, 12-18 Inch Depth Interval.

Figure 6-2: Percent of Soil Volume Exceeding Arsenic Concentrations, 18-24 Inch Depth Interval.

Figure 6-3: Percent of Soil Volume Exceeding Arsenic Concentrations, 24-30 Inch Depth Interval.

Figure 6-4: Percent of Soil Volume Exceeding Arsenic Concentrations, 30-36 Inch Depth Interval.

Figure 6-5: Percent of Soil Volume Exceeding Arsenic Concentrations, 42-48 Inch Depth Interval.

For intervals below 24 inches, Ecology selected 150 mg/Kg and 500 mg/Kg as the remediation levels based on the average and maximum arsenic concentrations, respectively. These remediation levels are based on several considerations:

- These depth intervals are increasingly less likely to be excavated during small homeowner projects in which institutional controls to prevent direct contact and redistribution at the surface are not followed. Therefore, higher average soil arsenic concentrations do not present as great a risk for depth intervals below 24 inches as for those above 24 inches, because contact with this deeper soil is less likely.

- The statutory and regulatory preference for permanent solutions requires that as much arsenic contamination be removed as possible while balancing costs such that incremental cost is not disproportionate to incremental risk reduction. As Figures 6-3 through 6-5 show, less than 3% of the soil volume within a given depth interval has average arsenic concentrations exceeding 150 mg/Kg, with soil volume increasing rapidly as average concentrations decline below 150 mg/Kg. Hence, the incremental cost of removing soil in the depth intervals below 24 inches only becomes disproportionate to incremental reduction in risk at the concentration levels below 150 mg/Kg.

- Note that the 150 mg/Kg remediation level based on average arsenic concentration is outside the range of protective arsenic concentrations with respect to transient effects. Thus, there is some additional risk of transient health effects if children ingest soil from depth intervals below 24 inches if institutional controls fail, compared to ingestion of soil from the 12-24 inch depth interval. The likelihood of children ingesting soil below 24 inches is less than for ingesting soil above 24 inches.

- A remediation level based on the maximum soil arsenic concentrations is set at 500 mg/Kg for the depth intervals below 24 inches. This maximum soil arsenic concentration is based on selecting a maximum arsenic concentration within the range which is considered protective against permanent health effects at these depth intervals and cost balancing. Since these depth intervals are not immediately beneath the containment barrier, disturbance is less likely and a maximum arsenic concentration higher in the range which is considered protective against permanent health effects is considered acceptable. As Figures 6-3 through 6-5 show, less than 3% of the soil volume within each of the depth intervals below 24 inches is estimated to have a maximum arsenic concentration exceeding 500 mg/Kg, with soil volume increasing as maximum arsenic concentrations decline below 500 mg/Kg.

Note that for the 42-48 inch depth interval the average and maximum curves are indistinguishable. This is because at many locations there was only a single sample within

this depth interval. There was sufficient data to estimate the relation between arsenic concentration and soil volume for only 253 properties in the 42-48 inch depth interval.

Note also that data were insufficient to develop meaningful soil volume versus concentration curves for the 36-42 inch depth interval, there being only 24 properties for which arsenic concentrations could be estimated. There was only a single sample within the 36-42 inch depth interval at each location. Of the 24 properties, three property estimates were less than 150 mg/Kg, with the least being 46; four were between 150 and 500; three were between 500 and 1,000; seven were between 1,000 and 2,500; six were between 2,500 and 5,000; and one was greater than 5,000, being 5,424.

Figure 6-6 compares the reduction in soil volume in each depth interval which results from using a removal and containment remedy and cost balancing to ensure costs remain proportionate to risk reduction. A more permanent cleanup of all accessible soils exceeding the cleanup level to a depth of 48" for the properties used in the estimate would require excavation of about 321 thousand cubic yards of soil. The less permanent containment remedy selected is estimated to require excavation of about 145 thousand cubic yards of material, or about half as much. These volume estimates are based only on the data developed for the 565 homes for which arsenic concentrations with depth were associated with individual properties, not on the entire site.

The removal and containment remedy, when coupled with the institutional controls and other cleanup actions specified in this Cleanup Action Plan, is considered permanent to the maximum extent practicable.

Figure 6-7 summarizes the foregoing concerns and arsenic cleanup level, remediation levels, and other performance standards for soil in the Peripheral Area. Note that the level of concern for the various factors is **qualitative**.

6.2.1.2 Implementation of Remedy

All contaminated soil not covered by permanent structures and asphalt or concrete paving will be considered accessible soil. Except as provided below, all accessible soil in the 0-6 and 6-12 inch depth intervals with arsenic concentrations above the cleanup level of 20 mg/Kg (average) and the associated performance standard of 40 mg/Kg (maximum) will be excavated. For depth intervals below 12 inches, and except as provided below, all soil with arsenic concentrations above the average and maximum remediation levels will be excavated and disposed of at the Consolidation Facility or off-site. A permanent marker material (durable, permeable geofabric or gravel) shall be placed at the bottom of the excavation if sampling indicates the underlying soil has an average arsenic concentration above the cleanup level of 20 mg/Kg or a maximum arsenic concentration exceeding 40 mg/Kg.

Figure 6-6: Relative Soil Volumes (based on 565 properties).

Figure 6-7: Selecting Remediation Levels in the Upland Area of the Everett Smelter Site.

Existing houses, detached garages, and similar buildings will be considered permanent structures. Sheet metal garden storage sheds, children's "forts" or "playhouses," and similar structures will not be considered permanent. Property-specific decisions will be made by Ecology, in consultation with the property owner, regarding whether a structure is permanent or not. As a general guidance, if a structure has a concrete foundation poured into the soil, it is probably permanent. If a structure can be readily moved, it is probably not permanent.

Existing asphalt or concrete pavement will be inspected visually to assess whether it will provide containment for a period of at least five years. If not, it will be repaired or removed and replaced. Replacement pavement must meet relevant standards. Property-specific decisions will be made by Ecology regarding whether a pavement is permanent or not. Any contaminated soil removed to maintain an appropriate grade or for other reasons during pavement repair or removal and replacement must be disposed of properly. (Remaining pavement will be inspected during 5-year periodic reviews.)

Property-specific decisions shall be made regarding remediation in the vicinity of underground utilities (sewer, water, electric, cable, telephone, gas, oil lines, oil and septic tanks). If underground utilities are within the top 12 inches of soil, they will be replaced if necessary to remediate the top 12 inches of soil.

If contaminated soil exists below the depth which can be excavated without shoring or imperiling the integrity of a structure, pavement, or slope, the contamination will be addressed on a case-by-case basis at the direction of Ecology. Property-specific plans shall address remediating contaminated soils which cannot be excavated to a sufficient depth due to such concerns, as well as other property-specific concerns such as steep slopes which cannot be readily worked.

Excavations will be backfilled with clean soil and landscaping installed to prevent erosion. The landscaping shall be consistent with City of Everett landscaping and zoning codes. Clean soil backfill shall have no concentrations of any hazardous substance exceeding the greater of MTCA Method A concentrations, MTCA Method B concentrations, or concentrations set for the Upland Area of the Everett Smelter Site, and shall come from a source approved by Ecology. A plan will be developed for identifying sources of clean soil. The plan will include a quality control program to sample soils being brought onto the site to ensure the soil does not contain any hazardous substances at concentrations exceeding the greater of MTCA Method A concentrations, MTCA Method B concentrations, or concentrations set for the Upland Area of the Everett Smelter Site. The backfill will have suitable drainage characteristics for residential yards such that water drains freely. The top 6 inches will be topsoil suitable for growing lawns and gardens. The engineering design plan will include appropriate United States Department of Agriculture and Unified Soil Classification System specifications for backfill.

Ecology will consider proposals to pave unpaved right-of-ways, driveways, gravel parking areas, and other roadways without soil removal, so long as unacceptable grade changes do

not occur. Concrete and asphalt paving shall conform to standards appropriate for the service for which it is intended, including any standards set by the City of Everett. Otherwise, such areas will be excavated. The excavation will be backfilled with clean material and surfaced in a manner which meets relevant standards. Acceptance by Ecology and the property owner of such proposals is required.

Property-specific cleanup plans will be developed in consultation with individual property owners and Ecology. Provisions will be made to address large trees and shrubs where excavation cannot be accomplished without damaging the roots. If appropriate on a property-specific basis, provisions may include containment without excavation or by other methods acceptable to the property owner and Ecology, so long as the final arsenic concentration with depth profile at the completion of cleanup is as shown on Figure 6-7. Provisions will be made to remove and replant, replace, and otherwise address plants of special concern to the property owner.

Existing decks shall remain in place and excavation will be done beneath and around the decks unless the existing deck impedes soil removal. If existing decks impede soil removal, the deck may remain in place if it is enclosed to prevent access by animals beneath the deck. Closure shall be sufficient to prevent entry by rats, in a manner consistent with standard rat-proofing techniques for buildings as approved by Ecology and the Snohomish Health District. If a homeowner desires soil beneath a deck to be remediated, however, the soil shall be remediated if the homeowner removes the deck to allow access. The homeowner shall be responsible for replacing the deck if the homeowner chooses to remove it.

Debris piles and other similar impediments to soil remediation will be moved and soil exceeding remediation levels removed and replaced.

Existing gardens will be excavated to a depth of 18 inches if arsenic concentrations exceed an average of 20mg/Kg or a maximum of 40 mg/Kg in the 12-18 inch depth interval (as well as in the 0-6 and 6-12 inch depth intervals) rather than the 60/150 mg/Kg average/maximum remediation levels which apply to the 12-18 inch depth interval in the remainder of the accessible soils.

Accessible slag will be removed if encountered.

Dust suppression measures will be utilized during property remediation.

At the conclusion of remediation of a property, the resident will be provided the opportunity to have their carpets shampooed and air ducts cleaned. (Implementation note: It is envisioned that carpet cleaning and duct vacuuming services will be contracted for this work and the resident provided vouchers valid for some time period. It will then be the residents' responsibility to arrange for the cleaning, if they so choose, within that time period and to coordinate with the cleaning contractor.)

Any variations from the above requirements shall require Ecology approval. Records will be kept regarding all sampling data and remedial actions on a property-by-property basis (See Section 6.7, Institutional Controls, for further information).

Institutional controls will provide for maintenance of the containment barrier of clean soil and any remedial actions for trees and prize plants and will provide that redevelopment of the site or other construction work will, when completed, leave accessible soils with the required contaminant concentration profile. Institutional controls will use zoning overlays, placing notices in local zoning or building department records or state lands records, public notices, permitting overlays, and educational mailings.

This cleanup action for accessible soils in residential areas has been selected based on the following primary considerations of long-term protection of human health and the environment, using an alternative which is "permanent to the maximum extent practicable," and consideration of public concerns:

- Within residential areas containing hazardous substances in soil, long-term protection of human health requires that the soil must be treated, removed, and/or contained. WAC 173-340-740(1)(a). Treatment is impracticable for soil with the range of arsenic concentrations in the Peripheral Area. Containment alone would require placing clean fill on residential property in such a manner as to raise the grade of the accessible area above the grade of the house. Raising the grade would limit the use of the property. Moreover, such a remedy is less permanent than a combination of removal and containment as it does not remove **any** contamination from the active environment. Leaving soil containing arsenic contamination above the cleanup level uncontained in a residential area does not meet threshold requirements for selection of cleanup actions because it is not protective of human health and the environment and does not meet cleanup standards.

- Excavation of soil exceeding the specified remediation levels is based on citizen input on depths of common activities (see Table 6-1) and the Ecology expectation that, where a soil cover is utilized, a minimum cover thickness of 12 inches is necessary to provide a sufficient barrier between homeowners and contaminated soil. It is expected that residents will interact with the top foot of soil regularly due to gardening, children playing, dogs digging, and small homeowner projects.

- Excavation of more highly contaminated soil beneath the 12-inch depth will address toxicity concerns such as short-term exposure to a child playing in an excavated dirt pile for a project not complying with institutional controls. In no case should arsenic concentrations be left within the Peripheral Area that could cause death or other permanent health effects.

- Excavation of more highly contaminated soil beneath the 12-inch depth will address the goal of preventing recontamination of surface soils due to mixing with soil brought from greater depths by site activities over the years.

- It is anticipated that excavation of soil containing arsenic above the cleanup level to a depth of 12 inches will address critical community concerns regarding health effects of living on a contaminated property and property resale values. The level of compliance monitoring to be performed, the degree of protection achieved by excavating soil to a depth of 12 inches with arsenic over the cleanup level and removal of more highly-contaminated soil at depth, and the availability of documentation regarding the actions taken may improve property resale value.

6.2.2 Areas Covered by Permanent Structures or Paving

Institutional controls will be used to address areas covered by permanent structures, asphalt or concrete paving, and areas not remediated due to property-specific issues such as trees or prize plants.

Institutional controls will provide that redevelopment of the site or other construction work will, when completed, leave accessible soils with the required contaminant concentration profile. This will be done using incorporation of necessary requirements into building permit requirements, zoning overlays, placing notices in local zoning or building department records or state lands records, public notices, permitting overlays, and educational mailings. A database of all relevant data and cleanup actions, steps to take for maintenance, and required health and safety measures during property redevelopment will be maintained.

The cleanup actions for areas covered by permanent structures, asphalt or concrete paving, and areas not remediated due to property-specific issues such as trees or prize plants has been selected based on the primary considerations of long-term protection, "permanence to the maximum extent practicable," and public concerns:

- The short-term effectiveness and cost effectiveness of removing permanent structures and asphalt or concrete paving at a time other than property redevelopment is extremely low. It would be very disruptive to residents, as would removal of trees or prize plants. Costs of rebuilding structures and replacing pavement which would normally occur over a period of many years would be incurred over a short time period. Trees would take years to regrow and prize plants are irreplaceable in terms of gardener sentiment.

- Such disruption of residents would likely cause unacceptable community concern.

6.2.3 Maintenance Areas Not Normally Occupied

It is important to protect the health of people who enter maintenance areas not regularly occupied, such as crawl spaces and utility access, where arsenic-contaminated soil and dust may be present. Such entry may occur on an infrequent, short-term basis, such as when a property owner or service person enters the area for a brief inspection or repair. Longer term entry may occur if extensive repairs are required, such as replacement of floor joists. In addition, pets and other animals entering such areas may be exposed to arsenic-contaminated soil and dust and could spread contamination to yards and inside houses.

The **cleanup standard** for maintenance areas not normally occupied shall be a **cleanup level** of 20 mg/Kg arsenic, based on the average concentration, for dust, soil, and other solid waste which humans or animals may contact and a **point of compliance** throughout the area. The allowable maximum concentration will be 40 mg/Kg. All maintenance areas not normally occupied which exceed this cleanup standard must be addressed by having institutional controls which advise people of the hazards of entry and provide information on appropriate protective measures to take upon entry. In addition, all maintenance areas not normally occupied must be sealed to prevent entry of animals. Animals should be prevented from entry by a barrier sufficient to prevent entry by rats.

A **remediation level** of 200 mg/Kg arsenic in soil and dust has been set as the maximum arsenic concentration allowable for short-term entry for brief inspections and repair without personal protective equipment[22] (Ecology, 1999b). All maintenance areas not normally occupied containing soil or dust exceeding this level will have the soil contained or removed in some manner, such as by placement of a durable plastic barrier and/or application of materials to the soil surface which will prevent dust generation during work activities.

Maintenance areas not normally occupied will be thoroughly cleaned of dust unless site-specific studies demonstrate that dust does not pose a hazard to exposed individuals during activities which will occur in the maintenance areas not normally occupied.

Procedures to address maintenance areas not normally occupied on a site-specific basis will be developed in the Engineering Design Report. The primary concern is to protect individuals who may enter maintenance areas not normally occupied during inspection, maintenance, or repair activities. In addressing this concern it shall be kept in mind that individuals who work in the area may enter several maintenance areas not normally occupied over time.

[22] Personal protective equipment requirements will be developed by Ecology in consultation with the Snohomish Health District and the Department of Labor and Industries during development of the Institutional Control Program.

Institutional controls will include community protection measures to inform property owners of protection measures to take prior to entry into maintenance areas not normally occupied. An outreach program to the business community will advise employers of the need to consider proper employee protection when working in the Upland Area of the Everett Smelter Site. In addition, all entrances to maintenance areas not normally occupied shall be secured by the property owners with a lock and a warning placard affixed. All affected property owners will be supplied with half-face respirators with dust cartridges and tyvek coveralls to keep on hand for entry of the maintenance areas not normally occupied on short notice. Property owners will be re-supplied on an as-needed basis.

The cleanup action for maintenance areas not normally occupied has been selected based on the following primary considerations of protectiveness and permanence to the maximum extent practicable:

- Excavation and replacement of soil in crawl-spaces beneath structures would be costly and time consuming.

- Such areas are entered infrequently, mostly by adults, and are amenable to containment without removal.

- Institutional controls will be more effective for maintenance areas not normally occupied than for outside spaces in residential areas, and may be used for maintenance areas not normally occupied where soil and dust arsenic concentrations are below 200 mg/Kg.

6.2.4 Independent Cleanup Sites in the Upland Area of the Everett Smelter Site

Properties in the Upland Area of the Everett Smelter Site may be addressed by independent cleanups. Ecology will review cleanup reports for independent cleanups which are submitted under Ecology's Voluntary Cleanup Program. To date, reports on independent cleanups within the Upland Area of the Everett Smelter Site have been submitted under Ecology's Voluntary Cleanup Program by Snohomish County and the City of Everett.

Snohomish County has submitted cleanup reports (AGI, 1999, 1998, 1997, and 1996; SCDPW, 1996; and Landau, 1995) to Ecology's Voluntary Cleanup Program regarding independent cleanup actions conducted during renovation work at the Denney Youth Center. Ecology has reviewed these reports and issued a No Further Action Letter (Ecology, 1999f).

The City of Everett has submitted cleanup reports (Hydrometrics, 1998d and 1997c) to Ecology's Voluntary Cleanup Program regarding independent cleanup actions conducted during renovation of the Legion Memorial Golf Course. The Legion Memorial Golf Course is designated, zoned, historically and currently used, and restricted by existing

covenants for use as a golf course and is not available for future unrestricted land use (in contrast to the residential, commercial, open park, or other land uses in the Upland Area). These reports are currently in review.

The City of Everett has submitted cleanup reports (Hydrometrics, 1998d and 1996b) to Ecology's Voluntary Cleanup Program regarding independent cleanup actions conducted during improvements and widening of East Marine View Drive. These reports are currently in review.

6.3 Soil Cleanup Actions in the Former Arsenic Trioxide Processing Area

The **cleanup standard** for the Former Arsenic Trioxide Processing Area shall be a **cleanup level** of 20 mg/Kg arsenic, based on average arsenic concentrations, a performance standard based on maximum arsenic concentrations of 40 mg/Kg, and a **point of compliance** throughout the area to a depth of fifteen (15) feet. All soil which exceeds the cleanup level and performance standard within the point of compliance shall be addressed by cleanup actions. Cleanup decisions will be based on arsenic concentration, and the description of cleanup actions below uses arsenic as the indicator chemical. Performance monitoring will check that the other chemicals of concern are being addressed appropriately.

The cleanup actions for this area of the site include the mitigation measures summarized on Table 3-3 and described above in Sections 3.3.5.5 and 3.3.5.9.

Flue dust, arsenic trioxide, and any other material with arsenic concentrations exceeding 3,000 mg/Kg shall be excavated and sent to an off-site facility permitted to accept such waste.

All identifiable smelter debris, housing foundation material, road and driveway material, utility pipes, rubbish, vegetation and wood debris, and other non-soil material shall be excavated and sent to an off-site facility permitted to accept such waste.

Initial excavation will include all material within the area shown of Figure 2-4. Upon completion of that excavation, and any additional excavation deemed necessary, samples will be collected and analyzed according to the Performance Monitoring Plan described in Section 7.2.1.1.

Excavated waste may be stored while awaiting final disposition. The Engineering Design Report, a required report in the remediation process, shall identify plans for storage, including amounts of material anticipated to be stored and anticipated length of storage time. The report shall provide that storage facilities meet the substantive requirements for dangerous waste storage and handling in Chapter 173-303 WAC. In addition, once

dangerous waste is loaded for transport off-site it is subject to all requirements of Chapter 173-303 WAC.

A Consolidation Facility is to be constructed in the Former Arsenic Trioxide Processing Area after excavation of the smelter debris, flue dust, arsenic trioxide product, and other material with arsenic concentrations exceeding 3,000 mg/Kg. Contaminated soil from the Peripheral Area with arsenic concentrations less than 3,000 mg/Kg may be consolidated and contained within the Consolidation Facility.

Cleanup in the Peripheral Area shall be staged so that lower concentration problem waste from properties farthest from the Former Arsenic Trioxide Processing Area will be brought to the Former Arsenic Trioxide Processing Area for consolidation. Upon closure, the upper four feet of the Consolidation Facility (including the cover) shall have an arsenic concentration profile such that arsenic concentrations with depth do not exceed the cleanup level, remediation levels, and other performance standards specified in Figure 6-7. (As discussed in Chapter 8, Schedule for Implementation, cleanup will occur in several portions of the site simultaneously. Initial cleanup in the Peripheral Area will involve the most contaminated areas nearest the Former Arsenic Trioxide Processing Area while the Consolidation Facility is being prepared. When the Consolidation Facility is ready to accept waste, cleanup of homes farthest from the Former Arsenic Trioxide Processing Area will start, with cleanup of homes nearest the Former Arsenic Trioxide Processing Area continuing.)

A cover which meets the minimum standards of Chapter 173-304 WAC, *Minimum Functional Standards for Solid Waste Handling*, shall be placed upon the problem waste upon closure of the Consolidation Facility and joined with the bottom liner to create a solid waste cell. To mitigate the effect on views of properties up-slope, the finished grade, including cover, shall not exceed the elevation of the final grade in the vicinity of the current location of Hawthorne Street, (which the City of Everett advises Ecology may be vacated in the future). The final grade will be established by the Final Site Restoration Plan in the Engineering Design Report. (See Section 3.3.5.5.)

Upon closure of the facility, surface water run-on will be prevented, the site will be graded to promote run-off of precipitation falling on the site, and a ground water interception trench keyed into the till shall be constructed upgradient from the facility. The till will function as the bottom liner. Further requirements to address the common elements listed in Table 2-2 will be addressed in the Engineering Design Report. Those requirements will include testing of the till to ensure it will function properly as a bottom liner per the requirements of Chapter 173-304 WAC. If testing shows that the till does not have sufficiently low permeability, installation of a low permeability bottom liner (such as clay or a geomembrane) shall be required. As noted above, the cover will be joined with the till (or clay or geomembrane bottom liner) in such a manner as to create a fully encapsulated solid waste cell with appropriate drainage appurtenances.

Approval of Consolidation Facility design, including closure and operations and maintenance requirements, is required prior to Consolidation Facility construction. Ecology will provide the opportunity for the Snohomish Health District and the City of Everett to comment on the Consolidation Facility design and closure and operations and maintenance requirements prior to approval by Ecology.

Final grading of the Consolidation Facility must incorporate considerations for future use, as discussed in Section 3.3.5. Final grading specifications will be included in the Final Site Restoration Plan discussed in Section 3.3.5.

If no use has a planned construction start date within one year of closure, the site will be left in a condition and maintained in a manner which meets the approval of Ecology. Ecology shall consult with interested parties, including the Community Advisory Committee established as part of the Institutional Control Program, prior to giving such approval.

Granite monuments shall be placed at each corner of the Consolidation Facility area with a record of its former use and a reference of where to get further information. The monuments will be placed at locations where they will be likely to be seen by future users of the land within the Former Arsenic Trioxide Processing Area.

The cleanup actions for the Former Arsenic Trioxide Processing Area have been selected based on the following primary considerations:

- The Former Arsenic Trioxide Processing Area contains highly-contaminated soil and other material from arsenic processing operations. Long-term effectiveness and protection of future generations can only be accomplished by removing the most highly contaminated soil (arsenic concentrations > 3,000 mg/Kg) to an off-site facility designed for the acceptance and long-term management of such waste. It is inappropriate to leave high levels of contamination in an urban neighborhood which, if exposed, could constitute an immediate threat to health.

- The Consolidation Facility will be sited in what is currently a residential neighborhood, and will be adjacent to a residential neighborhood after the proposed land use changes are made. While short-term effectiveness dictates that problem waste from the Peripheral Area be consolidated to the degree possible within the Former Arsenic Trioxide Processing Area, long-term effectiveness dictates that problem waste with the lowest level of contamination be the waste brought to the Consolidation Facility.

- Containment actions and institutional controls are the least permanent cleanup actions which can be taken. In allowing containment and institutional controls to address the lesser contaminated material and requiring the more contaminated materials to be sent off-site, Ecology is striking a balance

between short-term effectiveness and cost and long-term effectiveness in protecting future generations.

- The Former Arsenic Trioxide Processing Area that was sold by Asarco to developers for use as a residential neighborhood, has been developed as a residential neighborhood for over fifty years, and is a vital urban neighborhood within the City of Everett. It is unacceptable to have this area removed from the City's usable land base.

6.4 Ground Water Protection Measures

The **cleanup standard** for ground water is specified in Section 4.1.3.

Ground water contamination is expected to be addressed by cleanup of contaminated soil. Performance and confirmational monitoring will ensure surface water is being protected.

Contingency plans will be developed so that remediation measures may be implemented in a timely manner if compliance monitoring detects ground water contamination.

6.5 Surface Water Protection Measures

The **cleanup standard** for surface water is specified in Section 4.1.4.

Surface water contamination is expected to be addressed by cleanup of contaminated soil. In addition, best management practices will be implemented as appropriate. Performance and confirmational monitoring will ensure surface water is being protected.

Contingency plans will be developed to implement remediation measures if compliance monitoring detects surface water contamination.

6.6 Storm Drain Sediment

The **cleanup standard** for storm drain sediment is specified in Section 4.1.5.

Storm drain sediment will be sampled beginning with cleanout points and points where sediment discharges into the storm sewer system nearest the Former Arsenic Trioxide Processing Area, then moving outward. Sediment will be classified as Class A, Class B, or dangerous waste according to the *Policy Statement Regarding Street Waste Solids*. Generators of Class A storm drain sediments (and other street waste solids) will be responsible for disposing or recycling them in accordance with the Snohomish Health District policy. Storm drain sediment (and other street waste solids) which do not classify as Class A based on arsenic, lead, cadmium, antimony, mercury, or thallium concentrations will be eligible for disposal in either the Small Quantity Soil Disposal

Program (See Section 6.7.5) or the Large Project Soil Disposal and Management Program (See Section 6.7.6), whichever is most appropriate.

6.7 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 site. Such measures are required to assure both the continued protection of human health and the environment and the integrity of the cleanup action whenever residual concentrations of hazardous substances exceeding cleanup levels are left on-site, if conditional points of compliance have been established at a site, or when Ecology determines such controls are required. Institutional controls shall not be used as a substitute for cleanup actions that would otherwise be technically possible. WAC 173-340-440(1) and (2).

Institutional controls include both physical measures and legal and administrative mechanisms. Physical measures, such as fences and signs, advise humans to limit activities that may interfere with the cleanup action or result in exposure to hazardous substances at the site. WAC 173-340-440(3)(a).

Legal and administrative mechanisms advise humans to limit site use or activities and to take measures to ensure that any physical measures are maintained over time. Examples of limits on site use activities include restricting the use of a property for industrial or commercial purposes or other specified land uses or placing restrictions on activities such as disturbing a cap or using the ground water. Examples of maintenance activities include inspection and repair of monitoring wells, treatment systems, caps, or ground water barrier systems. WAC 173-340-440(3)(b).

Institutional controls are a critical component of the cleanup action plan in the Upland Area of the Everett Smelter Site. Residual contamination will be left at depth beneath the ground surface and in relatively inaccessible areas (e.g., beneath permanent structures and pavement) on the site. Both physical controls and legal and administrative mechanisms will be used to ensure, to the degree possible, that current and future citizens of Everett do not come into contact with residual contamination. Physical controls will largely apply to the Former Arsenic Trioxide Processing Area, where a fence and signs (monuments) will advise people to stay out of the area until it is redeveloped and will assist in maintaining a memory of the site history. Legal and administrative mechanisms will address maintaining covers (permanent structures, pavement, clean soil) or, if disturbed, that contaminated material is managed appropriately.

The legal and administrative components of the institutional controls program are discussed below. Physical measures were discussed in the previous sections. A plan will be developed which implements the components in an integrated manner.

The following institutional controls must remain in effect so long as residual hazardous substance concentrations exceed **cleanup levels**. WAC 173-340-360(8)(b). Note that any soil for which sampling indicates the arsenic concentration exceeds 20 mg/Kg based on an average value and 40 mg/Kg based on a maximum value exceeds the arsenic **cleanup level**.

The City of Everett and Snohomish Health District play a strong role in the development and implementation of many of the institutional control components. Ecology will work with the City and with the Snohomish Health District to develop a Memorandum of Understanding regarding the agencies respective roles and responsibilities for implementation of the Institutional Control Program, with a goal of having a Memorandum of Understanding among the three agencies in place within 180 days of issuance of this FCAP/FEIS.

6.7.1 Deed Covenants

Covenants shall be placed in the deed of all properties within the Former Arsenic Trioxide Processing Area. The covenants shall provide for continuing operations, maintenance, and monitoring of the Consolidation Facility, including all accessories added by the current and all future property owners. The covenants will prohibit any wells, trenches, or other excavation of any type from penetrating the till unit overlying the advance outwash aquifer or being installed in any way which could lead to potential interconnections between the advance outwash aquifer and the overlying Fill/Till and Consolidation Facility waste material. The covenants shall require that any construction in the Former Arsenic Trioxide Processing Area be conducted in accordance with appropriate health and safety requirements and that, upon construction completion, the integrity of the Consolidation Facility will not have been compromised and water will not enter the Consolidation Facility. The covenants will prohibit single-family residential use of the property, will incorporate any land use restrictions or mitigation measures as needed to implement comprehensive plan and zoning amendments, and will include any other restrictions identified as necessary to ensure the long-term integrity of the cleanup actions.

In addition, covenants will be placed in the deed of all properties within the Peripheral Area owned by an Ecology-named Potentially Liable Person. These covenants will provide notice of environmental conditions at the property and indicate remediation measures which must be taken upon property redevelopment.

The covenants shall run with the deed in perpetuity. Removal of the covenants shall require approval by Ecology or its successor agency.

6.7.2 Permit Overlay

Permit applications for projects within the Community Protection Measures boundary shall be reviewed to evaluate whether planned activities will be conducted in a manner which will protect human health and the environment during the activity and whether, at

the completion of the activity, human health and the environment will remain protected in accordance with cleanup requirements. This will require adoption of rules, regulations, or ordinances with enforcement power with respect to permit requirements to ensure protection of human health and the environment.

Guidance will be developed for permit applicants indicating acceptable means of identifying and handling contaminated soils during the implementation of a project.

The Institutional Controls Program will define the appropriate permits or certifications, and the agencies responsible for processing those permits or certifications.

Permits or certifications will specify information to be gathered during site redevelopment for input into the site database, and permittees will be required to submit such information to the appropriate agency.

Redevelopment of properties will require sampling upon completion to ensure the soil contamination profile does not exceed standards set forth in this cleanup action plan. Sampling results and other required information must be submitted to Ecology and the Snohomish Heath District in a format suitable for inclusion into the site database (see next section).

6.7.3 Database and Web Page

A web page for the Everett Smelter Site will be designed and set up for Internet access. The web page will give general information regarding the site, including a map of site boundaries and relevant health and safety information. The web page will include a means of accessing a database which will provide property-specific information on environmental conditions.

The database will contain sampling data, remediation activities, and other pertinent information. The database will be property-specific and all properties within the database shall be listed by at least tax identification number and street address. All sample data will include state plane coordinates of the sample location. Sample location elevations will be included, as appropriate. Sample data for all media will be included (soil, surface water, ground water, sediment, and air).

The database will include an explanation of property conditions which may be used to fulfill the requirements for disclosure in real estate transactions required by Northwest Multiple Listing Service Form 17, Item 7F, which asks, “Are there any substances, materials, or products that may be an environmental hazard such as, but not limited to, asbestos, formaldehyde, radon gas, lead-based paint, fuel or chemical storage tanks, and contaminated soil or water on the subject property?” The material in the database will include only information related to contamination related to the Everett Smelter. The property owner will remain responsible for assembling information to fulfill disclosure requirements for conditions not related to contamination caused by the Everett Smelter.

The database will be kept electronically using a relational database, Geographic Information System (GIS), or other application as determined by Ecology. The public will be able to access and query this database by street address, tax identification number, and state plane coordinates (to identify properties within a rectangle) using the Internet.

The database shall be updated as information on property redevelopment occurs.

Computer hardware and software shall be updated regularly to maintain compatibility with the current state of the practice in database and web page technology.

It is anticipated that the database will be developed, maintained, and operated by the Snohomish Health District.

6.7.4 Worker Protection Program

A Worker Protection Program will be established to inform employers of health and safety protective measures which their employees must take when working in the Upland Area of the Everett Smelter Site. The Program will include a study of worker exposure due to typical work activities conducted in different areas of the Upland Area of the Everett Smelter Site before, during, and after remedial activities. This study will be used to develop guidance which may be distributed to employers which indicates what protective measures their workers should take when performing activities on the site.

Informing the public of the need for workers to take precautions and the availability of the guidance will be part of the public education program.

6.7.5 Small Quantity Soil Disposal Program

A small quantity soil disposal program ("barrel program") will be instituted to provide for disposal of contaminated soil excavated during small projects, such as installation of fence posts, excavation for foundation stones for small storage buildings, landscaping, emergency road and utility work, small road and utility work, and other public projects. The program will be available year-round. It will be available for all projects not eligible for the Large Project Soil Disposal and Management Program. In addition to soil, the program shall include other materials, including slag, storm drain sediment and other street waste solids which do not classify as Class A (See Section 4.1.5), vegetation, building materials, and any other debris or material that exceeds MTCA cleanup levels for the smelter contaminants of concern.

The Small Quantity Soil Disposal Program will be available to all persons, organizations, and governments excavating soil or otherwise generating material from within the Upland Area of the Everett Smelter Site which is contaminated by the smelter contaminants of concern. If it is clearly demonstrated to Ecology's satisfaction by the organization responsible for implementing the Program that the contamination is not related to smelter

operations, however, the material containing that contamination will not be eligible for the Program.

6.7.6 Large Project Soil Disposal and Management Program

A Large Quantity Soil Disposal and Management Program will be instituted for the long-term management of all soil with residual contamination not covered by the Small Quantity Soil Disposal Program. The primary difference between the Small Quantity Soil Disposal Program and the Large Project Soil Disposal Program is that whereas the small quantity program will be available upon short time notice, the large quantity program will require coordination in advance, and may involve managing all or some portion of the remaining contaminated soil on the property.

This program will be triggered by application for project permits under the Permit Overlay component of the institutional controls. However, it will also be available for any projects, whether they require permits or not, which are sufficiently large that minimal advance notice requirements and the soil handling techniques of the small quantity program are inappropriate.

In addition to soil, the program shall include other materials, including slag, storm drain sediment and other street waste solids which do not classify as Class A (See Section 4.1.5), vegetation, building materials, and any other debris or material that exceeds MTCA cleanup levels for the smelter contaminants of concern.

The Large Project Soil Disposal and Management Program will be available to all persons, organizations, and governments excavating soil or otherwise generating material from within the Upland Area of the Everett Smelter Site which is contaminated by the smelter contaminants of concern. If it is clearly demonstrated to Ecology's satisfaction by the organization responsible for implementing the Program that the contamination is not related to smelter operations, however, the material containing that contamination will not be eligible for the Program.

Taken together, the Small Quantity Soil Disposal Program and the Large Project Soil Disposal and Management Program must provide comprehensive management of all soil and other materials excavated or otherwise generated within the Upland Area of the Everett Smelter Site containing smelter-related contamination. All contaminated soil and other material must be addressed by one or the other of the programs.

6.7.7 Public Education Program

A program will be implemented to educate citizens living on and using the Upland Area of the Everett Smelter Site regarding the site history, environmental conditions, and precautions necessary when conducting various activities on the site. (No precautions or changes in behavior should be necessary for routine, daily activities, including working within near surface soils.)

This program will provide for continuing reminders (in the form of surveys or a property inspection form) to citizens living and working on the site. Informational mailings will be conducted twice a year for properties awaiting cleanup and once a year for properties which have been cleaned up. The mailings will remind people that residual contamination exists on site, and will include information on where to find additional information. Property owners will be reminded of the legal requirement to disclose contamination on their property and directed to the database for information to meet this requirement. Property owners and/or tenants who may conduct work themselves shall also be reminded of needed precautions.

6.7.8 Exposure Testing Program

Currently, exposure testing is provided to all individuals residing within the Upland Area of the Everett Smelter Site, as well as nonresidents whose activities may involve unusual exposure to soils, the opportunity to have their urine tested for arsenic twice a year and blood tested for lead once a year, or as otherwise determined by a Consulting Physician, without charge. If the results of urine or blood testing of any individual indicate elevated levels of arsenic or lead, certain free follow-up services are also to be provided.

The exposure testing program currently in place will continue until the cleanup is completed.

After the cleanup is complete, exposure testing will be available to measure urinary arsenic and/or blood lead in individuals who are exposed to soils with elevated concentrations of metals. Exposure testing will be done by the individual's personal physician, and will be paid for if exposure to contaminated soils can be demonstrated. The funding for testing will be provided when evidence of exposure has been found by the Snohomish Health District. Follow-up work with individuals whose tests indicate exposure, including intervention activities where warranted, will also be funded. Should intervention be required, activities may include an environmental investigation, individualized educational efforts, follow-up medical monitoring, and environmental abatement, if necessary.

6.7.9 Environmental Investigations

A program will be developed for conducting environmental investigations to respond to situations where soil-management practices at properties in the Upland Area of the Everett Smelter Site may be creating a risk of exposure. The environmental investigation process will be conducted when there are potential public health implications as determined by Ecology or the Snohomish Health District.

Environmental investigations may also be conducted to respond to findings of slag beyond the site boundaries which is believed to have originated from the Everett Smelter.

6.7.10 Effectiveness Evaluation

An evaluation of the effectiveness of the institutional controls shall be performed as part of the confirmational monitoring program. The evaluation shall include:

- Evaluation of whether the range of institutional controls is sufficient to prohibit activities on the site that may interfere with the cleanup actions, operation and maintenance, monitoring or other measures necessary to assure the integrity of the cleanup actions and continued protection of human health and the environment.

- Evaluation of whether the prohibitions are actually working; that is, that the activities prohibited are not occurring.

- Other appropriate evaluations as identified.

Qualitative and quantitative criteria shall be developed to measure the effectiveness of the program. Techniques used may include, but are not limited to, individual interviews, telephone polls, mail surveys, and re-sampling of selected remediated properties to identify whether the goals of each component of the Institutional Control Program are being met. The effectiveness evaluation is to provide reliable monitoring data that people using the Upland Area of the Everett Smelter Site are aware of site conditions and are engaging in behaviors that: (1) make it unlikely people will come into contact with contaminated soil or water remaining on or under the site; and (2) make it unlikely that contaminated soil or water left on or under the site will be released to the environment in locations beyond those designated for the contaminated soil and water to remain.

Re-sampling of selected remediated properties is to be performed during periodic reviews conducted pursuant to WAC 173-340-420 to evaluate whether recontamination is occurring as a result of property use or redevelopment over time.

A minimum of 20 properties which have been remediated will be selected and resampled during the periodic reviews using the same sampling methodology as used to evaluate whether remediation was necessary or not (See Section 7.2). If more than two properties indicate contamination above allowable levels, it will be concluded that additional remedial measures may need to be taken on a site-wide basis. If only one or two properties fail, additional remedial measures may need to be taken at those specific properties. Contingency plans developed as required in Section 6.7.13 will address the nature of the decisions to be made, the process for making them, and the actions to be taken.

(A failure rate of 2 properties out of 20 is a 10% failure rate. The program described above indicates a 90% confidence in the effectiveness of the institutional controls is desired. This allows both for less than 100% effectiveness in the institutional controls and for failure of properties due to failure of the initial sampling to identify a contaminated property.)

6.7.11 Community Advisory Committee Program

A Community Advisory Committee will be set up which can assess the degree to which site cleanup addresses the needs of the citizens of Everett. This committee will participate in further developing the Institutional Control Program; review results of periodic reviews, including evaluations of institutional control effectiveness; and make recommendations for additional measures needed to serve the Everett Smelter Site community.

It is anticipated the Community Advisory Committee will be comprised of representatives of local government, community groups, potentially liable persons, and Ecology. Those who participated in the mediation effort will be contacted by Ecology to ascertain if they wish to participate in the committee's initial efforts. These organizations are ASARCO Incorporated, City of Everett, Ecology, Everett Housing Authority, Northeast Everett Community Organization, Northwest Everett Neighborhood Association, Snohomish County, and Snohomish Health District. Participation by any other interested organizations will be considered by Ecology.

6.7.12 Dispute Resolution Program

A dispute resolution program will be developed by the Community Advisory Committee to resolve disputes which may arise involving interested parties to the cleanup. Resolution of any disputes will first be attempted using this dispute resolution program. If this is not successful, Ecology will resolve the dispute.

6.7.13 Contingency Plans

Contingency plans shall be developed to address measures to take if the Effectiveness Evaluation shows components of the Institutional Controls Program are not working.

6.7.14 Financial Assurances

Financial assurances that funding mechanisms are in place to assure continued funds are available for operations, maintenance, and implementation of institutional controls will be implemented. Financial assurances may be fulfilled by setting aside money (a trust fund, for example), having a third party guarantee funding (a trust credit, surety bond, or letter of guarantee, for example), or a financial test of self-insurance.

If a financial test of self-insurance is used, tests must be conducted annually and at any other time Ecology so requests. Ecology is to be notified of the results of the test annually, on the date of the Consent Decree, Agreed Order, or Enforcement Order implementing the cleanup action, or, if the test has been conducted at Ecology request, within 60 days of the request. Contingency plans must provide for setting aside money or having a reliable third party guarantee funding within 30 days of Ecology notification that the PLP has failed the financial test of self-insurance.

Chapter 7 - Compliance Monitoring

Compliance monitoring provides quality control for cleanup actions. It is comprised of three types of monitoring: (1) Protection monitoring to confirm that human health and the environment are adequately protected during implementation of cleanup actions; (2) Performance monitoring to confirm that the cleanup action has attained cleanup standards and other performance standards; and (3) Confirmational monitoring to confirm the long-term effectiveness of the cleanup action once cleanup standards and other performance standards have been attained. (See WAC 173-340-420.)

All compliance monitoring data will be entered into a relational database or Geographic Information System (GIS) database designed for ease of use in answering inquiries regarding environmental conditions within the Upland Area of the Everett Smelter Site for any environmental medium[23] of concern. All previously collected data for all environmental media will be incorporated into this database as well.

7.1 Protection Monitoring

A Health and Safety Plan conforming to all applicable regulations will be developed and implemented for all work conducted as required by this FCAP/FEIS.

7.2 Performance Monitoring

Detailed performance monitoring plans will be developed in accord with WAC 173-340-820, WAC 173-340-830, and any other appropriate regulation or standard. These plans will implement the performance monitoring specifications discussed below. The plans will include procedures for adjusting the Performance Monitoring Program as more information is gained about the site.

7.2.1 Soil

The MTCA Cleanup Regulation discusses compliance monitoring for soil in WAC 173-340-740(7). For soil with arsenic concentrations above levels giving rise to chronic or carcinogenic concerns, the mean soil concentration is to be used to evaluate compliance unless there are large variations in hazardous substance concentrations relative to the mean or a large percentage of concentrations are below the detection limit. The regulation implements these requirements by stating that an appropriate statistical evaluation of whether cleanup standards have been met uses a three-part test for sampling data: (1) the upper 95% confidence limit on the mean must be less than the cleanup level; (2) no single sample concentration may be greater than twice the cleanup level; and (3) less than 10% of the sample concentrations may exceed the cleanup level.

[23] i.e., soil, ground water, surface water, storm drain sediment.

Other statistical methods may be used if approved by Ecology.

In the Upland Area of the Everett Smelter Site other statistical methods will be used. In the Peripheral Area the number of individual decisions for cleanup will be very large due to the need to make decisions on several hundred properties for multiple depth levels. Statistically, there is always a chance of making an incorrect decision on cleanup – cleaning up a property which already meets standards or failing to clean up a property which does not meet standards. The upper 95% confidence limit test on the mean favors ensuring cleaning up contaminated properties. Because there are many tests to be made, the chances of cleaning up a large number of uncontaminated properties due to chance variations in the samples collected is relatively high when using the upper 95% confidence limit on the mean as the test. To reduce the chances of cleaning up uncontaminated properties it would be necessary to collect and analyze a very large number of samples from each "decision unit." A decision unit is the area on which a decision is being made – say the front yard or back yard of a property.

The number of samples required to reduce the chances of cleaning up an uncontaminated property to acceptable levels is so large as to be impracticable. Hence, an alternate decision rule will be adopted in the Peripheral Area which is based on the arithmetic mean calculated from sample data, not an upper 95% confidence limit on that mean. Within the 0-6 and 6-12 inch depth intervals, a maximum arsenic concentration of 40 mg/Kg is set as another performance standard to be consistent with default statistical rules, to protect against carcinogenic risk by localized activities, and to avoid recontamination by dispersal of soil with elevated arsenic over the immediate ground surface by homeowner activity (See Section 6.2.1). The 10% rule will not be used because ten discrete samples would have to be collected per "decision unit," and a single exceedance would result in failure; this would obviate the two-times rule. The 10% rule is more appropriate when the number of samples per decision unit exceeds ten.

For depth intervals below 12 inches, performance standards based on maximum allowable arsenic concentrations will limit the chances of leaving localized "hot-spots" of arsenic contamination in an area which, on average, is below the remediation level based on average arsenic concentration being tested.

Performance monitoring for the Former Arsenic Trioxide Processing Area ground water and surface water uses methods more similar to that outlined in the MTCA Cleanup Regulation.

7.2.1.1 Peripheral Area

Performance monitoring will evaluate whether soil arsenic concentrations meet the cleanup level, remediation levels, and other performance standards for each property in the Peripheral Area. In addition, monitoring will be performed to better define the site boundary. The sampling to be performed in the Peripheral Area is discussed below for various current property uses.

Sampling will be more detailed at properties closer to the Former Arsenic Trioxide Processing Area and less detailed at properties farther away. The Upland Area of the Everett Smelter Site has been divided into three zones, shown on Figure 7-1, with the most detailed sampling in Zone A and the least detailed in Zone C. The overall sampling and decision approach is shown on Table 7-1 and discussed in the following sections.

This Peripheral Area sampling plan has been developed after discussions with Asarco (See Asarco, 1999b, 1999c, and 1999d; and Ecology, 1999c and 1999e).

Table 7-1: Residential Properties – Sampling Approach and Decision Rules

Zone A		Zone B		Zone C	
Decision Unit Size (ft^2)	**Number of Sampling Locations Per Decision Unit**	**Decision Unit Size (ft^2)**	**Number of Sampling Locations Per Decision Unit**	**Decision Unit Size (ft^2)**	**Number of Sampling Locations Per Decision Unit**
Less than 1,125	5	Less than 1,125	5	Less than 4,000	5
1,125 to 2,250	Add 1 per 225 ft^2	1,125 to 1,800	Add 1 per 225 ft^2	Greater than 4,000	Add 1 per 500 ft^2
2,250 to 4,000	10	1,800 to 4,000	8		
Greater than 4,000	Add 1 per 400 ft^2	Greater than 4,000	Add 1 per 500 ft^2		
Composite sampling, 6-inch depth intervals to 48 inches		Composite sampling, 6-inch depth intervals to 36 inches		Composite sampling, 6-inch depth intervals to 24 inches	
1. If arsenic concentration in any composite sample is greater than the cleanup level, property is identified as part of the site.					
2. If arsenic concentration is above the cleanup level in the 0-6 or 6-12 inch depth intervals or above the applicable remediation level in depth intervals below 12 inches, property is identified as requiring soil removal to identified depth.					
3. If composite results indicate potential for hot spots, conduct discrete sampling.					
4. If arsenic concentration in any discrete sample is above the maximum allowable concentration at a given depth, remove soil to depth of exceedance.					

In the sampling program that follows, composite samples may be collected at properties first and then, if required, discrete samples may be collected later to further define remediation requirements. Notification of the sampling results and whether or not remediation is required at a property will be returned to the property owner within three months of collection of the first sample at the property unless discrete sampling is required at the property. If discrete sampling is required, the property owner will be notified of this within three months of collection of the first sample at the property.

Figure 7-1: Upland Area Soil Sampling Zones.

Discrete samples shall be collected, and the owner notified of these further sampling results and whether or not remediation is required within six months of collection of the first sample at the property.

If remediation is required, the nature of the remediation and an estimated time window in which the remediation will occur shall be included with the notification. If additional samples must be collected during remediation to further define the extent of remediation, the property owner will be notified of this also.

If remediation is not required, the property owner will be so notified.

If remediation is required based on composite sampling, and additional discrete sampling is required to further define remediation requirements, it will be allowable to wait to collect the discrete samples until remediation is occurring at the property.

7.2.1.1.1 Residential Properties

Sampling will be performed at all residential properties within the current site boundary. Residential properties include single and multi-family residences. In addition a child care facility, senior center and two trailer parks will be included in the residential sampling program. Some residential properties will also be sampled outside the current site boundary, as part of the site boundary study. The primary method of sampling will be composite sampling with discrete sampling utilized where necessary to evaluate whether isolated areas exist which exceed maximum allowable values shown on Table 6-7.

If sample data exists on a particular property, that data shall be reviewed prior to sampling the property and incorporated as appropriate.

Sampling Locations: The Peripheral Area has been divided into three zones (see Figure 7-1) with more detailed sampling closest to the former smelter location and less detailed sampling further out (Table 7-1). Typically, each residential property will be divided into 2 decision units. These will usually consist of front yard and back yard decision units, although property-specific factors will be considered, including ground slope and potential grading/cut and fill activities which may have occurred during construction. For example, in sampling to support 1999 remediation activities Ecology found that houses in the Medora Way area did not face up slope or down slope, but rather faced sideways in the hill. In these cases instead of front and back yards, up slope and down slope decision units were considered to be appropriate because of the likelihood that soil was excavated from the up slope portion of the lot and filled onto the down slope portion during lot development.

In each decision unit soil samples will be collected from areas of accessible soil at a minimum of 5 locations, with the number of locations increasing with the size of the decision unit, as shown in Table 7-1. Samples will not be collected from beneath permanent structures, including paving.

Adjacent right-of-ways will be included as part of the residential sampling, as appropriate, to be determined on a case-by-case basis. In addition, crawl spaces and other maintenance areas not normally occupied will be sampled by compositing four discrete samples collected from the 0 – to 2 – inch depth interval.

This same overall sampling scheme will be followed at the child care facility, senior center and two trailer parks, which are all located in Zone C. This residential sampling will be performed as described in Table 7-1 with decision units established based on site features. In general, the size of decision units will be 4,000 ft^2, but may be up to a maximum of 6,000 ft^2 depending on the physical layout. At the trailer parks, decision units will be laid out in the areas between the trailers. In relatively large open areas, decision units of approximately 4,000 ft^2 area will be laid out in logical fashion based on the site features. The majority of the child care center is covered by parking lot or building. Relatively small areas of accessible soil are present in the north portion of the facility. At the senior center, the majority of accessible soil is present in relatively large open areas. These will be sampled based on decision units of approximately 4,000 ft^2 to a maximum of 6,000 ft^2.

Sampling Depth and Sample Preparation: Samples will be collected to maximum depths of 48 inches in Zone A, 36 inches in Zone B, and 24 inches in Zone C. Samples will be collected in 6-inch increments to the maximum depth. Within each decision unit individual samples from each depth interval will be composited. This will result in 8 composite samples per decision unit in Zone A, 6 composite samples per decision unit in Zone B, and 4 composite samples per decision unit in Zone C.

If a dense zone is encountered, a reasonable effort will be made to obtain samples at and below the zone to the required depth, but if refusal is encountered then sampling will cease at the depth of refusal. In such case, Ecology will be informed and the need to obtain additional samples at depth will be evaluated once sample results for the decision unit are available. "Refusal" is defined as failure to advance a split spoon 6 inches with 50 blows or less of a 140 lb. hammer falling 30 inches, to advance a hand auger with considerable effort, or to dig a pit with considerable effort.

Once results of composite samples are available, decisions will be made on which depth intervals at which residential properties in Zones A and B will require further discrete sampling to evaluate the presence of hot spots. A sample interval will be identified as requiring discrete sampling if the arsenic concentration in the composite is below the remediation level for soil removal, but at a level which indicates the potential for hot spots to be present. If remediation is not required based upon composite sampling results, discrete analysis will be performed when:

$$As_{comp} > \frac{\left[RL_{\max} + (7 \ \ mg/Kg)(n-1)\right]}{n}$$

where As_{comp} is the arsenic concentration in the composite sample; *n* is the number of discrete samples which originally were collected and composited; RL_{max} is the maximum arsenic concentration remediation level for a given depth interval; and *7 mg/Kg* is an assumed arsenic concentration for *n*-1 out of the *n* samples collected.[24]

Analyses: All soil samples collected from residential yards will be analyzed for arsenic by techniques approved by Ecology and having a method detection limit equal to or less than 18 mg/Kg for arsenic. However, if As_{comp} is less than the method detection limit of the analytical technique being used, the composite sample shall be re-analyzed by a method having a method detection limit less than As_{comp}.

7.2.1.1.2 Commercial Properties

There are a variety of commercial properties at the site, including a commercial area west of the fenced area on either side of North Broadway, a power substation, and various individual locations in the south portion of the site. Typically the majority of commercial areas are covered by parking lots and buildings with relatively small open grassed or garden areas installed as landscaping. All of the commercial properties within the current site boundary will be sampled.

If sample data exists on a particular property, that data shall be reviewed prior to sampling the property and incorporated as appropriate.

Sampling Locations: Sampling performed in commercial areas will be based on the same procedure as for residential properties as shown in Table 7-1. Because accessible soil in commercial areas is typically associated with open grassed or landscaped areas, decision units will tend to be larger than in residential areas. However, consistent with sampling to be performed under the residential program at the child care facility, senior center, and the two trailer parks, sampling of relatively large open areas will be performed using decision units of 4,000 ft^2 to a maximum of 6,000 ft^2.

Adjacent right-of-ways will be included in commercial decision units as appropriate, determined on a case-by-case basis. In addition, crawl spaces and other maintenance areas not normally occupied will be sampled by compositing four discrete samples collected from the 0 – to 2 – inch depth interval.

Sampling Depth and Sample Preparation: Sampling depths and sample preparation for commercial properties in each zone will be the same as for residential properties, as described in Section 7.2.1.1.1.

[24] The equation calculates the arsenic concentration in a composite sample which would result from a single sample at the maximum remediation level and all other samples having assumed average arsenic concentration of 7 mg/Kg, the upper 90th percentile for natural background soil arsenic in the Puget Sound Region (Ecology, 1994b, p. 1).

Analyses: All soil samples collected from commercial properties will be analyzed for arsenic by techniques approved by Ecology and having a method detection limit equal to or less than 18 mg/Kg for arsenic. However, if As_{comp} is less than the method detection limit of the analytical technique being used, the composite sample shall be re-analyzed by a method having a method detection limit less than As_{comp}.

7.2.1.1.3 Public Areas

There are a variety of public areas in the Upland Area of the Everett Smelter Site, including Legion Memorial Park, Wiggums Hollow Park, the Legion Memorial Golf Course, the Denney Youth Center, and the Viewcrest Abbey (a mausoleum) on Whitehorse Trail. Sampling will be performed under this plan in all public areas within the current site boundary.

If sample data exists on a particular property, that data shall be reviewed prior to sampling the property and incorporated as appropriate.

Sampling Locations: Public areas typically consist of relatively large open grassed areas. The Viewcrest Abbey is located in Zones A and B and all other public areas are located in Zone C. Because accessible soil in public areas is typically associated with open grassed or landscaped areas which have not undergone development activities as heterogeneous as residential and commercial areas, decision units will tend to be larger than in residential areas.

Sampling at the Viewcrest Abbey will be performed using the same procedure for Zone B residential properties (see Table 7-1). However, for the public areas in Zone C, sampling will be performed using 10,000 ft^2 decision units. In each decision unit, individual samples from 6 locations will be composited for each depth interval. If larger decision units are required, an additional individual sampling location will be added for each 1,000 ft^2.

Adjacent right-of-ways will be included in public area decision units as appropriate to be determined on a case-by-case basis. In addition, crawl spaces and other maintenance areas not normally occupied will be sampled by compositing four discrete samples collected from the 0-2 inch depth interval.

Sampling Depth and Sample Preparation: Sampling depths and sample preparation for public areas in each zone will be the same as for residential properties, as described in Section 7.2.1.1.1 (the Viewcrest Abbey will be sampled per Zone B requirements).

Analyses: All soil samples collected from public areas will be analyzed for arsenic by techniques approved by Ecology and having a method detection limit equal to or less than 18 mg/Kg for arsenic. However, if As_{comp} is less than the method detection limit of the analytical technique being used, the composite sample shall be re-analyzed by a method having a method detection limit less than As_{comp}.

7.2.1.1.4 Right-of-Ways

Most of the right-of-way sampling will be performed as part of the residential, commercial, and public area sampling as described above. However, right-of-ways which are not proximate to residential, commercial, or public areas will require separate sampling (See Asarco, 1999c, Figure 3-1 for identification of these areas).

If sample data exists in a particular right-of-way, that data shall be reviewed prior to sampling the right-of-way and incorporated as appropriate.

Sampling Locations: Sampling performed in right-of-ways will be based on the same procedure as for residential properties as shown in Table 7-1. Consistent with that approach, sampling of right-of-ways will be performed using decision units of 4,000 to 6,000 ft^2. In addition, crawl spaces and other maintenance areas not normally occupied will be sampled by compositing four discrete samples collected from the 0-2 inch depth interval.

Sampling Depth and Sample Preparation: Sampling depths and sample preparation in right-or-ways in each zone will be the same as for residential properties, as described in Section 7.2.1.1.1.

Analyses: All soil samples collected from right-or-ways will be analyzed for arsenic by techniques approved by Ecology and having a method detection limit equal to or less than 18 mg/Kg for arsenic. However, if As_{comp} is less than the method detection limit of the analytical technique being used, the composite sample shall be re-analyzed by a method having a method detection limit less than As_{comp}.

7.2.1.1.5 Undeveloped Areas

There are a few undeveloped areas at the site, primarily in the southwest area. All undeveloped areas will be sampled.

If sample data exists in a particular undeveloped area, that data shall be reviewed prior to sampling the property and incorporated as appropriate.

Sampling Locations: Because undeveloped areas have not been subjected to grading, arsenic concentrations in soils are not expected to vary with area as much as on developed land. Hence, fewer samples are considered to be needed to evaluate average arsenic concentrations. For undeveloped areas, decision units will be established in areas not exceeding 20,000 ft^2. Samples will be collected from five locations per decision unit and composited for each depth interval. In addition, crawl spaces and other maintenance areas not normally occupied will be sampled by compositing four discrete samples collected from the 0-2 inch depth interval.

Sampling Depth and Type: Because undeveloped land is anticipated to have had less surface mixing than developed land, samples will be collected within the 0-2 inch and 2-6 inch depth intervals rather than a 0-6 inch depth interval. Samples will also be collected in the 6-12 inch and the 12-18 inch depth intervals. A single composite sample will be generated for each of the four depth intervals per decision unit (i.e., four composite samples per decision unit).

Analyses: All soil samples collected from undeveloped areas will be analyzed for arsenic by techniques approved by Ecology and having a method detection limit equal to or less than 18 mg/Kg for arsenic. However, if As_{comp} is less than the method detection limit of the analytical technique being used, the composite sample shall be re-analyzed by a method having a method detection limit less than As_{comp}.

7.2.1.1.6 Boundary Sampling

As discussed in Section 2.2, a site boundary relative to the 20 mg/Kg arsenic cleanup level will be established using the previously described residential sampling methodology. Concerns about early establishment of a site boundary will be addressed by the sequencing and schedule of each component of the overall program (see Section 7.2.1.1.7). This approach will result in a definitive site boundary at the earliest time and at the least expense. The boundary will be defined as a line bounded by at least a two-property width of uncontaminated properties on the side farthest from the historic plant boundary. Figure 7-2 shows a conceptual example of the boundary definition procedure. Note that a clean property is required to define a corner of the boundary. The boundary is anticipated to follow the centerline of streets.

Sampling Locations: Sampling to determine the site boundary will be performed at residential properties just inside and outside the current site boundary (See Asarco, 1999c, Figure 3-1). Sampling will be performed per the residential approach described in Section 7.2.1.1.1. Composite samples will be generated for each of the depth intervals (0-6, 6-12, 12-18 and 18-24 inches) for each decision unit. The arsenic concentrations in the composites will be compared to the cleanup level to determine if the property should be included within the site boundary. Sampling outside the current site boundary will begin at the boundary and proceed outward. The data set will continually be evaluated to determine if the site boundary has been established.

7.2.1.1.7 Overall Sequencing of Sampling Efforts

As discussed previously, there are two primary goals for the overall sampling program in the Peripheral Area: (1) to provide data sufficient to design soil removal actions; and (2) to establish a site boundary.

Figure 7-2: Conceptual Sketch of Boundary Identification.

To meet the goals of the program, the sampling will be conducted in the following general sequence:

- Sample remaining residential properties in Zone A, if any;

- Sample residential properties in Zone B; concurrent with this initiate boundary sampling and continue until complete;

- Sample remaining residential properties in Zone C; concurrent with this initiate sampling of commercial, public, right-of-way, and undeveloped properties, beginning in Zone A and generally moving systematically through Zone C.

7.2.1.2 Former Arsenic Trioxide Processing Area

After excavation of the material outlined in Figure 2-4, the limits of the excavation will be inspected for identifiable smelter debris, housing foundation material, road and driveway material, utility pipes, rubbish, vegetation and wood debris, and other non-soil material. This material will be excavated.

Next, borings will be advanced to a depth of three feet beyond the limits of the excavation and samples collected in six-inch intervals. Borings will be located at a frequency of one per 400 square feet using a scheme which randomizes boring locations in an appropriate manner.

Each sample will be analyzed for arsenic with an analytical method having a method detection limit no greater than 18 mg/Kg arsenic.

At least 30 samples with a range of arsenic concentrations shall be analyzed for antimony and thallium. The method detection limits for these metals are to be no greater than their respective cleanup levels, and analytical methods with detection limits which achieve detection of the metals will be used if readily available. Results of these analyses will be correlated with arsenic concentrations to provide an estimate of concentrations of these metals remaining on site. This correlation will be evaluated to ensure that cleanup of arsenic is adequately addressing antimony and thallium, and to document what remains behind in association with the arsenic. Data to correlate arsenic with lead, cadmium, and mercury, presented on Figures 4-1 through 4-3, are considered sufficient.

No single sample may exceed 3,000 mg/Kg arsenic. In case of exceedance, the excavation will be deepened within the area outlined by a line connecting surrounding locations for which all samples are less than 3,000 mg/Kg arsenic. After excavation, six additional borings will be advanced to a depth of three feet beneath the new limit of excavation, re-sampled, and re-analyzed.

In addition, the upper 95% confidence limit will be calculated for each group of six adjacent borings. If the upper 95% confidence limit exceeds 3,000 mg/Kg, the entire area

outlined by adjacent clean locations will be excavated. After excavation, six additional borings will be advanced to a depth of three feet beneath the new limit of excavation, re-sampled, and re-analyzed. This requirement addresses the chance of missing contamination exceeding 3,000 mg/Kg if, by chance, all sampling locations miss areas exceeding 3,000 mg/Kg.

This sampling and analysis method has been selected to ensure there is a high likelihood of excavating all material with an arsenic concentration exceeding 3,000 mg/Kg.

7.2.1.3 Imported Soil

Quality control of soil being brought in to use as clean backfill will be necessary. Detailed specifications for this soil and quality control sampling to ensure that these specifications are met will be developed as part of the Engineering Design Report. Functional requirements for backfill are that it contains no concentrations of any hazardous substance exceeding the greater of MTCA Method A concentrations, MTCA Method B concentrations, or concentrations set for the Upland Area of the Everett Smelter Site, and that it have engineering, drainage, and agricultural characteristics suitable for its intended use. The quality control plan is anticipated to incorporate specifications for chemical quality, compaction after placement, permeability after placement, growing characteristics, and other specifications as identified. The quality control plan shall provide for analyzing all granular backfill obtained from natural, in-situ sources (i.e., a sand and gravel pit) for priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc). Analyses shall be performed at the rate of one analysis per 1,000 cubic yards on backfill to be delivered to the site. Samples collected for analysis shall be representative of the volume of soil being sampled. Backfill is to be stockpiled, several samples collected from the stockpile, and the samples composited for analysis. Exceedance of the respective MTCA cleanup level for any priority pollutant metal shall result in the rejection of the granular backfill for use at the site.

Backfill shall be obtained only from a natural, in-situ source with no evidence of contamination.

Topsoil is anticipated to be obtained from commercial sources which manufacture the topsoil from a variety of feedstocks. It shall be analyzed for priority pollutant metals, PCBs, organochlorine pesticides, semivolatile organic compounds, volatile organic compounds, and cyanide. Analyses shall be performed at the rate of one analysis per 1,000 cubic yards of topsoil to be delivered to the site. Samples collected for analysis shall be representative of the volume of soil being sampled. Several samples are to be collected from the proposed topsoil source and the samples composited for analysis. Exceedance of the respective MTCA cleanup level for any of the analytical parameters shall result in rejection of the topsoil for use at the site.

Sources of both backfill and topsoil must be approved by Ecology. In making such approval, Ecology shall consider the consistency over time of source material as documented by the proposed supplier. If source material does not appear sufficiently consistent over time for quality control analyses performed at the rate of one analysis per 1,000 cubic yards of material to be adequately representative of the material, more frequent analyses may be required or the source may be rejected.

It is noted that Ecology was able to readily obtain backfill and topsoil which met the above quality control requirements during Ecology's Summer 1999 cleanup of the most contaminated homes. Indeed, Ecology identified several sources of backfill and topsoil of appropriate quality, and only one source – a topsoil – was rejected.

7.2.2 Surface Water

A Performance Monitoring Plan to sample surface water will be developed. The purpose of the plan will be to evaluate whether soil cleanup actions taken at the site have adequately addressed surface water contamination or whether additional actions are needed. Surface water will be sampled at appropriate locations throughout the Upland Area of the Everett Smelter Site to ensure that cleanup standards are being met including, but not limited to, locations representative of surface water flowing to wetlands in the Lowland Area and locations representative of surface water flowing to the City of Everett's storm water sewer system.

As discussed in Section 4.1.4, it is anticipated that the Compliance Monitoring Plan will locate monitoring points at storm sewer points of entry and at points representative of surface water crossing the Upland Area boundary and flowing directly to the freshwater wetlands in the Lowland Area. However, the point of compliance has been set such that identification of water quality problems anywhere in the Upland Area of the Everett Smelter Site may be evaluated by comparison with the cleanup levels given above.

The quality of any water discharged from the ground water interception trench or the leachate collection trench at the Consolidation Facility will be monitored to ensure the quality is within limits acceptable for the City of Everett's sewer system. If the water is not of adequate quality, treatment or other appropriate measures will be taken to ensure the water quality is acceptable at the point of discharge.

The monitoring program will obtain data sufficient to evaluate compliance with surface water cleanup standards pursuant to WAC 173-340-730(7) and as approved by Ecology. Chemical analyses will include arsenic, lead, cadmium, antimony, mercury, and thallium. Analytical techniques will be used which minimize the number of nondetects. Analytical method detection limits shall be as low as possible unless analytical methods with higher detection limits will result in detection of the target analyte. Note that Ecology may require modifications to standard analytical methods to provide lower quantitation limits. (WAC 173-340-830(2)(f)). Where there is more than one method with a practical quantitation limit less than the cleanup level, considerations in selecting a particular

method include considerations relating to quality assurance. The requirement to detect the metals, even if present in concentrations below the cleanup level, is a consideration relating to quality assurance – having quantified concentrations rather than a detection limit will enable statistical evaluation of data as required by WAC 173-340-730(7).

If monitoring indicates that surface water impacts are occurring, contingency plans (See Section 7.4) to remediate the impacts will be implemented. Such remediation may include erosion control, additional soil removal and replacement, using all practicable methods of treatment of surface water, use of institutional controls, and other appropriate measures.

7.2.3 Ground Water

A Performance Monitoring Plan to sample ground water will be developed. The purpose of the plan will be to evaluate whether soil cleanup actions taken at the site have adequately addressed ground water contamination or whether additional actions are needed.

The ground water Performance Monitoring Plan will include installation of at least three sampling locations at the Fill/Till contact and at least three sampling locations in the advance outwash aquifer downgradient from the Consolidation Facility. The sampling locations will be monitored to see if any water is present and, if so, to evaluate its quality.

In addition, sampling locations will be installed in the Peripheral Area to verify that ground water is not impacted by contamination remaining on site. Three sampling locations will be sited initially, one each on the north, west, and east sides of the Former Arsenic Trioxide Processing Area within Zone B (Figure 7-1 shows Zone B). Wells will be completed at the Fill/Till contact and in the advance outwash aquifer. If monitoring of these wells finds hazardous substances above cleanup levels, additional monitoring wells will be installed to evaluate the nature and extent of the contamination.

The monitoring program will obtain data sufficient to evaluate compliance with ground water cleanup standards pursuant to WAC 173-340-720(8) and as approved by Ecology. Chemical analyses will include arsenic, lead, cadmium, antimony, mercury, and thallium. Analytical techniques will be used which minimize the number of nondetects. Analytical method detection limits shall be as low as possible unless analytical methods with higher detection limits will result in detection of the target analyte. Note that Ecology may require modifications to standard analytical methods to provide lower quantitation limits. (WAC 173-340-830(2)(f)). Where there is more than one method with a practical quantitation limit less than the cleanup level, considerations in selecting a particular method include considerations relating to quality assurance. The requirement to detect the metals, even if present in concentrations below the cleanup level, is a consideration relating to quality assurance – having quantified concentrations rather than a detection limit will enable statistical evaluation of data as required by WAC 173-340-720(6).

If monitoring indicates that ground water impacts are occurring, contingency plans (See Section 7.4) to remediate the impacts will be implemented. Such remediation may include additional soil removal and replacement; using all practicable methods of treatment of ground water, either in the subsurface or where it emerges as surface water; use of institutional controls; and other appropriate measures.

7.2.4 Storm Drain Sediment

A Performance Monitoring Plan to sample storm drain sediment will be developed. The purpose of the plan will be to evaluate whether cleanup actions taken at the site have adequately addressed storm drain sediment contamination or whether additional actions are needed.

The monitoring program will obtain data sufficient to evaluate compliance with soil cleanup standards pursuant to WAC 173-340-740(7) and as approved by Ecology. Chemical analyses will include arsenic, lead, cadmium, antimony, mercury, and thallium. Analytical techniques will be used which minimize the number of nondetects. Analytical method detection limits shall be as low as possible unless analytical methods with higher detection limits will result in detection of the target analyte. Note that Ecology may require modifications to standard analytical methods to provide lower quantitation limits. WAC 173-340-830(2)(f). Where there is more than one method with a practical quantitation limit less than the cleanup level, considerations in selecting a particular method include considerations relating to quality assurance. The requirement to detect the metals, even if present in concentrations below the cleanup level, is a consideration relating to quality assurance – having quantified concentrations rather than a detection limit will enable statistical evaluation of data as required by WAC 173-340-740(7).

If monitoring indicates that storm drain sediment impacts are occurring, contingency plans (See Section 7.4) to remediate the impacts will be implemented. Such remediation may include erosion control, additional soil removal and replacement, use of institutional controls, and other appropriate measures.

7.3 Confirmational Monitoring

Detailed confirmational monitoring plans will be developed in accord with WAC 173-340-810, WAC 173-340-820, WAC 173-340-830, and any other appropriate regulations and standards. The purpose of these plans will be to confirm the long-term effectiveness of the cleanup action with respect to soil, ground water, surface water, and storm drain sediment once performance monitoring indicates cleanup standards and other performance standards have been attained.

Confirmational monitoring will:

- Evaluate soil quality over time by re-sampling selected properties during 5-year periodic reviews of the cleanup action (See Section 6.7.10);

- Evaluate surface water quality over time at selected sampling points;
- Evaluate ground water quality over time at selected sampling points;
- Evaluate storm drain sediment quality over time at selected sampling points;
- Evaluate the effectiveness of institutional controls (See Section 6.7.10); and
- Perform any other evaluations identified by Ecology as necessary to confirm the long-term effectiveness of the cleanup action.

Site monitoring is to continue so long as hazardous substances remaining on site exceed **cleanup levels**. The cleanup levels are those identified in Chapter 4, Cleanup Standards and Indicator Substances, and are not to be confused with the remediation levels discussed in Chapter 6, Implementation of Remedy. Hazardous substances (arsenic, lead, cadmium, antimony, mercury, and thallium) which remain on site in concentrations above cleanup levels, even though the concentrations are below a remediation level, must be monitored to ensure containment continues to adequately protect human health and the environment.

7.4 Development of Contingency Plans

Contingency plans will be developed which discuss actions to be taken if Protection Monitoring, Performance Monitoring, or Confirmational Monitoring identifies environmental conditions which are out of compliance.

Chapter 8 - Schedule and Required Documentation

8.1 Sequencing

A detailed schedule will be developed as part of the Engineering Design Report. The cleanup will proceed as outlined below.

The pace of future work depends upon funding available to the state and the degree of Asarco cooperation. Development of an Engineering Design Report containing detailed engineering plans for the cleanup is anticipated to begin in the Summer of 2000. Sampling of all properties within the Community Protection Measures boundary will be begun if possible.

As discussed in Section 6.7, Ecology will work with the City and with the Snohomish Health District to develop a Memorandum of Understanding regarding the agencies' respective roles and responsibilities for implementation of the Institutional Control Program, with a goal of having a Memorandum of Understanding among the three agencies in place within 180 days of issuance of this FCAP/FEIS.

Beyond this initial work, cleanup will continue outward from the Former Arsenic Trioxide Processing Area, the entire area within the Community Protection Measures boundary will be sampled, the Former Arsenic Trioxide Processing Area will be cleaned up, and the Consolidation Facility will be constructed.

Once the Consolidation Facility is constructed, cleanup of the least contaminated homes will be begun so that the least contaminated soil on site will be placed in the Consolidation Facility. Cleanup moving outward from the Former Arsenic Trioxide Processing Area will continue, with that soil being sent off site. The Consolidation Facility can hold only a portion of the contaminated soil in the Peripheral Area. It is Ecology's intent and a requirement of this cleanup action plan that work be sequenced so that soils in the Peripheral Area farthest from the Former Arsenic Trioxide Processing Area and with the lowest concentrations of contaminants requiring remediation be placed within the Consolidation Facility.

The Consolidation Facility will be closed when it is full. Cleanup will continue until all properties within the Upland Area are addressed.

Once cleanup is complete, the site will be monitored and institutional controls will be administered so long as hazardous substance concentrations on site remain above cleanup levels.

8.2 Restoration Time Frame

It is anticipated that it will take approximately seven years to clean up contamination within the Upland Area of the Everett Smelter Site if cleanup occurs in a coordinated manner. The first year is expected to have less physical cleanup than succeeding years due to the necessity to mobilize and due to startup considerations. The Community Advisory Committee will be convened and the Institutional Control Program will be developed. Compliance monitoring programs, including contingency plans of actions to take if monitoring indicates cleanup actions are not achieving their goal, will be developed and implemented.

Most of the physical cleanup is anticipated to occur in the second through sixth years. The Institutional Controls and Compliance Monitoring Programs will be refined.

The seventh year will complete physical cleanup activities and demobilization of equipment from the site.

Institutional controls will continue so long as contamination remains on site in excess of cleanup levels.

8.3 Required Documentation

The MTCA Cleanup Regulation requires specific documentation in connection with site cleanup. A summary description of these documents is given below as well as the regulatory provision which requires it. Detail regarding what the document is to contain is given in the regulatory provisions.

- **Engineering Design Report, WAC 173-340-400(4)(a):** This report includes sufficient information for the development and review of construction plans and specifications. It documents the engineering concepts and design criteria used for design of the cleanup action. Specific items to be included in the Engineering Design Report for the Upland Area of the Everett Smelter Site are specified in this FCAP/FEIS (See Sections 3.3.4, 3.3.5, 6.2.3, 6.3, 7.2.1.3, and 8.1). Table 3-3 provides sequencing requirements for mitigation of cleanup actions in the Former Arsenic Trioxide Processing Area which must be included in the Engineering Design Report.

- **Construction Plans and Specifications, WAC 173-340-400(4)(b):** These plans and specifications provide sufficient detail for the cleanup actions to be implemented. These plans include a Compliance Monitoring Plan prepared under WAC 173-340-410 describing monitoring to be performed during construction and a Sampling and Analysis Plan meeting the requirements of WAC 173-340-820 (see below).

- **Operation and Maintenance Plan, WAC 173-340-400(4)(c):** The operation and maintenance plan provides technical guidance and regulatory requirements to assure effective operations under both normal and emergency conditions.

- **Construction Documentation, WAC 173-340-400(7)(b):** Detailed records must be kept of all aspects of the work performed, including construction techniques and materials used, items installed, and measurements performed. At the completion of construction, as-built drawings and a report documenting all aspects of construction are to be prepared. The report is to contain an opinion from the professional engineer supervising any construction work that the cleanup action has been constructed in substantial compliance with the plans and specifications and related documents.

- **Compliance Monitoring Plans, WAC 173-340-410:** Sampling and Analysis Plans for compliance monitoring must be developed. These Plans, and all other plans involving sampling and analysis must meet the requirements of WAC 173-340-820. Analytical procedures used must meet the requirements of WAC 173-340-830.

- **Periodic Reviews, WAC 173-340-420:** Periodic reviews must be conducted no less frequently than every five years after the initiation of cleanup actions since hazardous substances will remain in the Upland Area of the Everett Smelter Site at concentrations which exceed Method A or Method B cleanup levels. These reviews are conducted to assure that human health and the environment are being protected. These reviews shall include evaluations of the effectiveness of the cleanup as developed by the Community Advisory Committee.

Other documentation to address site-specific needs will be required as appropriate.

All reports, plans, specifications, and similar information submitted to Ecology must meet the general submittal requirements specified in WAC 173-340-840.

Chapter 9 - Justification for Selection of Cleanup Actions

The Everett Smelter Site is a quintessential cleanup site: a long-abandoned and forgotten industrial plant which left behind persistent toxic and carcinogenic substances, most notably arsenic and lead, which has been developed into an urban area with residential, business, and recreational use. Addressing contaminated sites such as the Everett Smelter Site is the reason cleanup laws were promulgated.

Developing a Cleanup Action Plan requires balancing the short-term disruption and high cost for cleanup with the long-term effects of residual contamination on human health and economic development in an urban setting which will be home to generations for the indefinite future. Below are the principle concepts that were considered to reach the selected cleanup actions for the Upland Area of the Everett Smelter Site:

- Threshold requirements and the MTCA preference for permanence must be met at all sites. Threshold requirements are that the remedy shall protect human health and the environment, shall comply with cleanup standards, shall comply with applicable state and federal laws, and shall provide for compliance monitoring. Further, cleanup actions are to use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns.

- The decision to use a combination of removal, containment, and institutional controls and to leave contamination in an urban neighborhood involved the balancing of short-term effectiveness and cost versus long-term effectiveness and permanence. Ecology has selected, from among remedial alternatives, a remedy which reduces short-term cost and disruption while removing contamination from areas in the neighborhood where people are most likely to come into contact with it. Both the physical location of contamination remaining on site and institutional controls ensure that contact with the remaining contamination is unlikely.

- The highest concentrations of contaminants must be removed from the neighborhood due to the level of uncertainty about site use over the millennia because arsenic toxicity will not decline with time.

- Institutional controls are a major part of this cleanup and must be strong, enforceable, and lasting for the cleanup action to have any comparability to complete removal of contamination to depths of 15 feet.

- Future redevelopment must provide the same level of protection as existed on properties cleaned up prior to redevelopment.

- Sampling in the Peripheral Area will be based on a straight arithmetic average rather than on the UCL_{95} of the mean to reduce the chance of cleaning up clean properties.

Figure 9-1 is a conceptual sketch of conditions at the Everett Smelter Site before and after cleanup.

Figure 9-1: Conceptual Sketch of Conditions at the Everett Smelter Site Before and After Cleanup.

Chapter 10 - References

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Appendix A

EVALUATION OF SEPA SCOPING ELEMENTS

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List of Acronyms and Abbreviations

BACT	Best Available Control Technology
CPM	Community Protection Measures
dB	decibels
dBA	A-weighted sound level, decibels
DW	dangerous waste
Ecology	Washington State Department of Ecology
EMC	Everett Municipal Code
FCAP/FEIS	Integrated Final Cleanup Action Plan and Final Environmental Impact Statement
gpm	gallons per minute
HW	hazardous waste
L_{dn}	Day/Night average sound Level, decibels
L_{eq}	acoustical energy-Equivalent sound/noise Level, decibels
MTCA	Model Toxics Control Act
WDOH	Washington State Department of Health
OCF	On-Site Containment Facility
ppm	parts per million
PSAPCA	Puget Sound Air Pollution Control Agency
PW	problem waste
RCRA	Resource Conservation and Recovery Act
SAIC	Science Applications International Corporation
SEPA	State Environmental Policy Act
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

A1.0 Introduction

Section 2.9 of the main text describes the scoping process that was conducted to identify a set of elements of the potentially affected environment that should be evaluated for environmental impacts pertinent to the State Environmental Policy Act (SEPA). This Appendix was prepared to provide qualitative and quantitative analyses of the impacts of alternative cleanup actions relative to these SEPA Scoping Elements. The analyses are intended for use in comparing the impacts of the alternative actions considered for site cleanup discussed in Chapter 5 of the main text (*Selection of Remedy*). The analyses also identify mitigating measures to reduce those impacts.

As discussed in Chapter 5, three basic alternatives were considered for addressing contamination within the Everett Smelter Site. As described in Chapter 2, the Feasibility Study included evaluation of the various actions that compose these three basic alternatives (see Table 2-3 of the main text and the accompanying discussion). In addition, a No Action Alternative was used in this Appendix as a baseline against which to evaluate the SEPA Scoping Elements. The alternatives evaluated in this Appendix are:

- ***Alternative A—No Action:*** This alternative includes no actions of any kind. It is included as a baseline for comparison, as required by SEPA regulations.

- ***Alternative B—Off-Site Disposal:*** This alternative features removal of all accessible soils that exceed soil remediation levels, with all excavated soil disposed off site at appropriate, permitted landfills. All excavated soils would be replaced by clean fill and topsoil and revegetated to restore landscape conditions. The non-excavated (inaccessible) contaminated soils would be managed by containment and institutional controls.

- ***Alternative C—On-Site Containment Facility***: This alternative would remove soils from the Peripheral Area the same as in Alternative B, but would also include an On-Site Containment Facility (OCF) located within the Former Arsenic Trioxide Processing Area. Soils designated as dangerous or hazardous waste would be placed in the OCF, except that extremely contaminated soils and smelter residuals would be disposed off site. The OCF would have an impermeable cover and bottom liners that meet design standards for dangerous waste (RCRA Subtitle C) facilities. The OCF would occupy only part of the Former Arsenic Trioxide Processing Area, with the least contaminated soils excavated from the Peripheral Area consolidated beneath an impermeable cap in the remaining available portion of the area. Grade changes at the Former Arsenic Trioxide Processing Area of up to 70 feet were proposed in the Feasibility Study. In this evaluation, it has been assumed that the maximum grade change would be limited to no more than 4 feet increased elevation. Excess volumes of excavated soil that could not be accommodated at the Former Arsenic Trioxide Processing Area would be disposed off site.

- ***Alternative D—Consolidation Facility:*** This alternative would be the same as Alternative C, except that it would not include an On-Site Containment Facility. Instead, all soils with arsenic concentrations exceeding 3,000 mg/Kg would be disposed off site at an appropriate, permitted landfill. The least contaminated soils from the Peripheral Area would be consolidated and placed under a cap in the Former Arsenic Trioxide Processing Area, the same as in Alternative C, with a maximum grade increase of 4 feet.

In each of these alternatives, the soil remediation levels are concentrations in soil that would be protective of human health and the environment when contained and combined with appropriate institutional controls designed to prevent undue exposures to those contaminated soils that would not be removed. There are two conditions for which contaminated soil would not be removed: (1) contaminated soils are presently covered by pavement, structures, or large plants that make the soils inaccessible unless the property were redeveloped, and (2) contaminated soils are at depth below the ground where exposure is less likely and more readily preventable by institutional controls.

Four transport options were considered for inclusion in the SEPA evaluations: hauling by dump trucks, using mechanical conveyors, barging, and shipping by rail. Barging was ruled out because barging companies are not willing to accept the liabilities associated with a potential spill that could occur in transporting the contaminated soil in Puget Sound, and because of the potential environmental impacts and cleanup difficulties that could occur from such a spill. There is also a lack of suitable loading and off-loading facilities for barging. Conveyors were considered as an option to dump trucks for moving excavated material from individual neighborhoods to a centralized location where the material would be loaded for transport off site. Conveyors were not retained because of implementation difficulties such as the need to continually relocate the conveyors from one neighborhood to another, the potential dust hazard, disruption of neighborhoods that would result from having conveyors strung through the community, and the need to provide security and safety measures to prevent injury to local citizens, especially children who may be attracted to the novelty of such equipment and desire to play on the conveyors during weekends or evenings when they are not in use. Trucking was retained as the most practical means for transporting material within the Community Protection Measures (CPM) area, and also as a viable alternative for hauling material off site. Since rail lines are present in the lowlands just east of the former smelter site, rail shipment was retained as an option to dump trucks for transporting excavated material off site. A rail loading facility currently exists in this area for shipping municipal solid waste to the landfill in Roosevelt, Washington.

A2.0 Development of Assumptions

In order to perform a comparative evaluation of the proposed alternatives, a number of assumptions had to be made regarding how each might be implemented, and estimates of excavated soil volumes associated with each alternative had to be made. The assumptions and estimates were made in order to perform comparative evaluations of the SEPA Scoping Elements and should not be construed as final design criteria. Although differences from these assumptions may occur during design and implementation, such differences are not anticipated to have a significant effect on the comparative evaluations among the alternatives.

A2.1 Assumptions

The No Action alternative is a baseline for comparison purposes and requires no identification of assumptions. The site would remain in its existing condition. Table A2-1 summarizes the assumptions made for the three action alternatives.

A2.2 Volume Estimates

For purposes of impacts assessment, the volumes of soil that would be excavated and transported to and from the site were estimated for Alternatives B, C, and D (the Off-Site Disposal alternative, the On-Site Containment Facility alternative, and the Consolidation Facility alternative). The volume estimates were made for three separate soil removal areas within the CPM boundary. The soil removal areas are illustrated in Figure A2-1. The lowland portion of the CPM area (east of the former smelter location) was not included because it will be addressed in a separate cleanup action plan. The estimated volumes for Alternatives B, C, and D are listed in Tables A2-2, A2-3, and A2-4, respectively.

The estimates of excavated soil given in the tables were derived from volumes estimated in prior studies (Asarco, 1998a; SAIC, 1996). These studies used available soil data for the Former Arsenic Trioxide Processing Area and the Peripheral Area in the form of iso-concentration contour maps showing arsenic concentrations in soil at specific depths below ground surface. A computer-aided design and drafting program was then used to interface these contour maps with a detailed map showing buildings and paved areas, in order to calculate the surface area of accessible soils within each contour as a function of depth. This information was combined with the soil remediation levels for each alternative, which are also a function of depth, to calculate the estimated volumes that would be excavated from the various soil removal areas shown in Figure A2-1. The volumes listed in Tables A2-2, A2-3, and A2-4 are for soil presently in place (i.e., they do not include an allowance for the swell in volume that occurs when soils are excavated).

Table A2-1: Assumptions of Alternatives Evaluated for Environmental Impacts.

Figure A2-1: Soil Removal Areas for Volume Estimates.

Table A2-2: Estimated Volumes of Excavated Material for Alternative B (Off-Site Disposal).

Soil Removal Area		Volume (cu yd) and Destination Code by Waste Category *	
		HW/DW (>3,000 ppm)	PW (>20 ppm)
1	Peripheral Areas West of Broadway	<1,000 A	70,000 R
2	Peripheral Areas East of Broadway	3,000 A	92,000 R
3	Former Arsenic Trioxide Processing Area	25,000 A	73,000 R
	Total (All Areas)	29,000	235,000

Notes: 1. The volumes listed here are derived from estimates in Asarco's October 1998 smelter area study and SAIC's December 1996 soil volume study.

2. See text (Section A2.2) for estimated volumes of material imported for backfill at the Former Arsenic Trioxide Processing Area.

PW = problem waste
HW/DW = federal (RCRA) hazardous waste/state dangerous waste
***** Destination Codes are:
A = Arlington (or other off-site Subtitle C landfill)
C = Under cap (on site at Former Arsenic Trioxide Processing Area)
F = OCF (on site at Former Arsenic Trioxide Processing Area)
N = not excavated
P = via on-site stockpile (at Former Arsenic Trioxide Processing Area)
R = Roosevelt (or other off-site Subtitle D landfill permitted to accept PW)

Table A2-3: Estimated Volumes of Excavated Material for Alternative C (On-Site Containment Facility).

Soil Removal Area		Volume (cu yd) and Destination Code by Waste Category *			
		HW/DW		PW	
		High Concentration (>20,000 ppm)	Moderate Concentration (3,000 ppm to 20,000 ppm)	High Concentration (100 ppm to 3,000 ppm)	Moderate Concentration (< 100 ppm)
1	Peripheral Areas West of Broadway	0	<1,000 P/F	38,000 R	32,000 C/R
2	Peripheral Areas East of Broadway	0	3,000 P/F	31,000 R	61,000 R
3	Former Arsenic Trioxide Processing Area	15,000 A	10,000 P/F	70,000 C/N	3,000 C/N
	Total (All Areas)	15,000	14,000	139,000	96,000

* See notes and destination codes for Table A2-2.

Table A2-4: Estimated Volumes of Excavated Material for Alternative D (Consolidation Facility).

Soil Removal Area		Volume (cu yd) and Destination Code by Waste Category *			
		HW/DW		PW	
		High Concentration (>20,000 ppm)	Moderate Concentration (3,000 ppm to 20,000 ppm)	High Concentration (100 ppm to 3,000 ppm)	Moderate Concentration (< 100 ppm)
1	Peripheral Areas West of Broadway	0	<1,000 A	38,000 R	32,000 C/R
2	Peripheral Areas East of Broadway	0	3,000 A	31,000 R	61,000 C/R
3	Former Arsenic Trioxide Processing Area	15,000 A	10,000 A	70,000 C/N	3,000 C/N
	Total (All Areas)	15,000	14,000	139,000	96,000

* See notes and destination codes for Table A2-2.

Additional soil data have been gathered in the CPM area since the iso-concentration contours were developed. These data are not reflected in the volume estimates. Also, additional soil data are expected to be obtained during cleanup of the CPM area, which would refine the contours and determine the actual volumes to be excavated. Hence, it should be recognized that the estimates presented herein are only approximate and actual volumes are expected to vary. However, the differences between the estimated and actual volumes are not expected to be so great that the evaluations of comparative impacts would be significantly changed.

For clean soil imported to the site for backfilling the Peripheral Area, the estimated backfill volumes are the same as the estimated excavation volumes given in Tables A2-2, A2-3, and A2-4 (again not accounting for volume changes upon excavation or compaction).

The estimated volumes of material to be transported into the Former Arsenic Trioxide Processing Area are as follows:

- ***Alternative B (Off-Site Disposal).*** The backfill volume would be equal to the volume excavated from the Former Arsenic Trioxide Processing Area for off-site disposal. Clean backfill material would be imported from off site.

- ***Alternative C (On-Site Containment Facility).*** Assuming 6 acres would be capped by the impermeable cover, the OCF would occupy 2 acres, and the consolidation area for soils imported from the Peripheral Area would occupy 3.5 acres, the imported backfill volumes are estimated to be:
  - Approximately 3,000 cubic yards of clean gravel for a 1-foot thick leachate collection layer for the bottom liner of the OCF.

- Approximately 4,000 cubic yards of dangerous waste soil (<20,000 ppm arsenic) from the Peripheral Area that would be placed in the OCF.
- Approximately 20,000 cubic yards of clean soil and topsoil for a 2-feet thick upper soil layer for the impermeable cover.
- Approximately 29,000 cubic yards of problem waste soil from the Peripheral Area that would be placed under the impermeable cover in the consolidation area. This volume accounts for the assumed grade change and the volume of highly contaminated dangerous waste soils that would be removed from the Former Arsenic Trioxide Processing Area for disposal off site in this alternative.

- ***Alternative D (Consolidation Facility).*** Assuming 6 acres would be capped by the impermeable cover and the consolidation area for soils imported from the Peripheral Area would occupy 5.5 acres, the imported backfill volumes are estimated to be:
  - Approximately 20,000 cubic yards of clean soil and topsoil for a 2 feet thick upper soil layer for the impermeable cover.
  - Approximately 42,000 cubic yards of problem waste soil from the Peripheral Area that would be placed under the impermeable cover. This volume is higher than that in the On-Site Containment Facility alternative because of the additional space under the cover that would be created in the Consolidation Facility alternative by removing *all* dangerous waste soils from the consolidation area for disposal off site rather than just a portion of them.

A3.0 Affected Environment, Significant Impacts, and Mitigation Measures

A3.1 Earth

This section addresses the topographical changes that would be expected for each of the cleanup alternatives within the Former Arsenic Trioxide Processing Area of the Everett Smelter Site. A review of existing topographic features of the area and the expected impacts for each alternative are included. Finally, mitigation measures for minimizing or eliminating topographic impacts are discussed.

This section specifically addresses changes in topography in the Former Arsenic Trioxide Processing Area portion of the Upland Area resulting from implementation of the On-Site Containment Facility alternative and Consolidation Facility alternative. Topographic impacts have been evaluated based on the placement of soil volumes in the Former Arsenic Trioxide Processing Area that were calculated using the assumptions described in Section A2.

In the Peripheral Area, excavations to remove contaminated soil will be backfilled to the original grade unless grade changes are requested by the property owner and agreed to by the other appropriate parties to the cleanup implementation.

Potential topographic impacts are based on the assumption that, after cleanup, the final grade of the Former Arsenic Trioxide Processing Area would be designed to satisfy cleanup requirements, meet applicable seismic design requirements, meet regulatory requirements for runon and runoff (flood) controls, and accept potential future development. An evaluation of future land use is included in Section A3.6.

A number of related environmental impacts are discussed in other parts of this document. Soil hauling impacts are evaluated in *Section A3.10 Transportation*. Impacts from contaminated soil and dust originating from construction activities are discussed in *Section A3.5 Environmental Health.* Beneficial impacts associated with the removal of contaminated soil are also considered in the environmental health section.

A3.1.1 Affected Environment

This section describes the existing topographic conditions of the Former Arsenic Trioxide Processing Area, which is located within the Upland Area of the Everett Smelter Site. Figure 1-2 in the main text shows the location of the Former Arsenic Trioxide Processing Area in relation to nearby residences and streets (see Exhibit 1 for locations of streets or features discussed herein). Note that the fence constructed by Asarco for site security currently runs along both sides of the streets (Pilchuck Path, 5th Street, and Pilchuck Alley) in the area. This allows the continued use of the streets while restricting access to exposed (non-paved) soil. Even though these thoroughfares are currently located outside

the existing fenced area, they are still considered to be part of the Former Arsenic Trioxide Processing Area.

The topography in the Former Arsenic Trioxide Processing Area generally consists of a progressive series of three terraces (Figure A3-1). The plateaus occur between the streets running in a north-south direction within the Former Arsenic Trioxide Processing Area. The highest plateau is located along the western boundary (at Hawthorne Street) and the lowest plateau is located along the eastern boundary (at Marine View Drive). The highest elevation, located at the northwest corner of the Former Arsenic Trioxide Processing Area, is approximately 130 feet above mean sea level. The lowest elevation, at the southeast corner, is approximately 60 feet above mean sea level.

Homes situated just west and south of the Former Arsenic Trioxide Processing Area (e.g., those on Hawthorne and Pilchuck Path) have views of the Snohomish River and the Cascade Range to the north and east.

A3.1.2 Environmental Impacts and Mitigation

This section describes the topographic impacts expected as a result of implementation of each of the alternatives described previously. None of the alternatives would result in a decrease in grade. Implementing the On-Site Containment Facility alternative or the Consolidation Facility alternative would impact the topography of the Former Arsenic Trioxide Processing Area the most. These alternatives would lead to moderate increases in grade within the 6-acre Former Arsenic Trioxide Processing Area. The primary impact of the proposed topographic changes would be changes to the view-shed of these residences, mainly northward and eastward.

A3.1.2.1 No Action

If the No Action alternative were selected, no changes in topography would occur.

A3.1.2.2 Off-Site Disposal Alternative

If the Off-Site Disposal alternative were selected, the Former Arsenic Trioxide Processing Area would not be used for on-site containment or placement of dangerous waste or problem waste soils. The topographic changes associated with this alternative would be minimal, because the clean fill imported to the site would be graded to match the existing site conditions as much as possible.

A3.1.2.3 On-Site Containment Facility Alternative

This alternative would have topographic impacts. It would involve placement of dangerous waste soil and problem waste soil imported from the Peripheral Area in the Former Arsenic Trioxide Processing Area as well as clean fill imported to construct the cover.

Figure A3-1: Former Arsenic Trioxide Processing Area—Existing Topography.

The elevation gain expected for the OCF and the consolidated soil area, after completion of all the soil transfer activities and construction of the cover, would be approximately 4 feet above the existing grade. This is an estimated average change in grade. The soil grade change may vary somewhat depending on the location within the Former Arsenic Trioxide Processing Area. For example, the elevation change along the north boundary may need to be minimal due to the existing steep embankment next to Broadway. Likewise, the soil elevation gain for some of the area between Pilchuck Path and the alleyway may be somewhat higher if the existing slope were changed to a finished grade that is relatively level.

The primary environmental impact associated with raising the overall grade of the OCF and consolidated soil facility areas is that the view-shed from residences located to the west and south of the Former Arsenic Trioxide Processing Area could be impeded. Because of the present downward slope from Hawthorne Street to Pilchuck Path, the grade could be raised somewhat more than 4 feet in the downhill area east of Hawthorne Street without significant view-shed impacts.

A3.1.2.4 Consolidation Facility Alternative

The topographical impacts of this alternative are would be the same as those for the On-Site Containment Facility alternative because the elevation change and cover configuration would be the same in both alternatives.

A3.1.2.5 Mitigating Measures

Mitigating measures are not applicable to the No Action and Off-Site Disposal alternatives because no significant topographic impacts are associated with them.

To mitigate view-shed impacts resulting from the two on-site disposal alternatives, the construction design should have a minimal grade change (i.e., 2 foot or less increase in grade) along the east side of Hawthorne Street to minimize the view-shed impacts from the west. Because the site terrain quickly drops off as one moves east from Hawthorne Street, the 4-foot depth of fill would be reached further into the site without causing additional impacts to the view-shed of nearby residences. The view from Hawthorne Street (looking east) overlooks the valley below and the Snohomish River beyond. The western side of the soil cover could be gently tapered to keep the maximum soil height above the Hawthorne Street plateau at less than 2 feet.

A3.2 Air Quality

A3.2.1 Affected Environment

Snohomish County is presently in attainment of all state and national ambient air quality standards. However, the western portion of the county that includes the project site is part of the Central Puget Sound Region that was historically in nonattainment of the national ambient air quality standards for carbon monoxide and ozone. The main sources

of emissions that contributed to elevated levels of these pollutants were on-road vehicles. Due to a reduction in emissions caused by national emission standards for new vehicles and a state vehicle emissions testing program, the region has attained both state and federal ambient standards since 1991. The Puget Sound Clean Air Agency, formerly the Puget Sound Air Pollution Control Agency (PSAPCA), developed *Ozone and Carbon Monoxide Maintenance Plans* to outline how they would ensure attainment of the national ambient standards for these compounds in the region. EPA approved these plans in November 1996 and redesignated the Central Puget Sound Region from nonattainment to attainment of the carbon monoxide and ozone national ambient air quality standards. Consequently, the region is now considered a maintenance area for these two pollutants.

In 1994, the air quality monitoring station maintained by the Puget Sound Clean Air Agency in Everett recorded an exceedance of the state 1-hour sulfur dioxide standard. This exceedance was mainly due to emissions from a paper company located in the Port of Everett. No other exceedances of any sulfur dioxide standard have occurred in the region since 1988.

A3.2.2 Regional Climate

Climate is important to air quality, because weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. The climate of the project region is maritime, characterized by mild summers and winters, small diurnal ranges in temperature, considerable cloudiness, and abundant rainfall during much of the year. Due to its location in the mid-latitude, the region experiences a high frequency of polar storm systems. These storms are the strongest and most common during the winter months. During the summer, the storm track weakens and shifts to the north, but storm systems can still bring cloudiness and light rain to the region. Since the majority of storms move into the region from the northern Pacific Ocean, a large percentage of precipitation falls first in the Olympic Mountains, to the west of Everett. This creates a rain shadow to the east and lessens the amount of precipitation that would otherwise fall within the project region. This effect is counteracted somewhat by Everett lying within the Puget Sound "convergence zone," where weather systems entering the Sound from north and south of the Olympic Range converge, producing greater precipitation than in areas to the north and south of Everett. The presence of the Pacific Ocean and Puget Sound waters help to moderate temperatures in the region. The Cascade Mountains to the east often shield the region from the effects of cold continental air masses during winter months.

A3.2.2.1 Precipitation

The annual average precipitation at Everett is 37 inches (National Weather Service, 1997). The highest monthly precipitation occurs in December, at an average rate of 5.2 inches. In July, the lowest amount of monthly precipitation occurs, with an average of 1.22 inches. Snow occurs in Everett at an annual average rate of 5.8 inches.

A3.2.2.2 Temperature

The annual average temperature in Everett is 51°F. Daily mean high and low temperatures for January are 45°F and 33°F, respectively. Daily mean high and low temperatures for August are 73°F and 53°F, respectively.

A3.2.2.3 Prevailing Winds

Winds recorded at the Puget Sound Clean Air Agency air quality monitoring station in Everett describe the wind conditions at the site (PSAPCA, 1997a). Winds in the area are dominated by two main conditions: (1) west-to-northwest sea breezes and (2) east-to-southeast land breezes. The Snoqualmie River Valley to the east and south of the project site helps to move local winds along its northwest-to-southeast orientation. During the warmer months of the year, the onshore sea breeze system prevails; during the wintertime, land breezes and storm winds from the southeast are more common.

A3.2.3 Applicable Regulations and Standards

The following is a summary of the air quality regulations that would apply to each project alternative.

The Puget Sound Clean Air Agency is responsible for regulating stationary sources of air pollution in Kitsap, Pierce, King, and Snohomish counties. Since project emission sources would be either mobile or fugitive in nature, they would not require Puget Sound Clean Air Agency air permits. However, the following is a summary of Puget Sound Clean Air Agency rules that would apply to the project activities.

- ***Regulation I, Section 9.15, Fugitive Dust Emission Standard.*** This rule prohibits emissions of fugitive dust unless they are controlled with best available control technologies. Some of the control measures include: (1) use of wetting agents in active areas that generate visible dust; (2) use of covers, wetting agents, or sealed load containers to prevent materials from escaping out of truckloads while on public roads; (3) cleaning techniques to prevent vehicles from tracking soil/particulate matter onto public roads; (4) stabilizing storage piles; (5) use of water sprays during material handling and transfer operations, such as those performed by a loader; and (6) surfacing dirt roads with gravel or pavement. The project design would include these types of control technologies to minimize fugitive dust emissions from all project activities.

- ***Central Puget Sound Region Redesignation Request and Maintenance Plan for the National Ambient Ozone Standard (PSAPCA, 1995).*** The Puget Sound Clean Air Agency developed this *Ozone Maintenance Plan* to outline how they would document and continue attainment of the national ambient air quality standards for ozone in the region through the year 2010. To accomplish this goal, the agency will: (1) maintain volatile organic carbons and nitrogen oxides control measures outlined in the existing Ozone State

Implementation Plan (SIP) that in the past have been used to attain the ozone standard; and (2) periodically review assumptions and control measures identified in the *Ozone Maintenance Plan*. To be consistent with the *Ozone Maintenance Plan*, a project must comply with its emission growth factors and applicable control measures.

- ***Central Puget Sound Region Redesignation Request and Maintenance Plan for the National Ambient Carbon Monoxide Standard (PSAPCA, 1997b).*** This *Carbon Monoxide Maintenance Plan* is a continuation of the carbon monoxide attainment process that began with the Washington Carbon Monoxide SIP that was approved by EPA in February 1983. This plan describes how the Puget Sound Clean Air Agency would continue to attain the national ambient air quality standards for carbon monoxide in the region through the year 2010. The *Carbon Monoxide Maintenance Plan* retains control measures outlined in the existing carbon monoxide SIP, but eliminates the wintertime oxygenated gasoline program. Additionally, the Puget Sound Clean Air Agency periodically reviews assumptions and control measures identified in the plan. To be consistent with the *Carbon Monoxide Maintenance Plan*, a project must comply with its emission growth factors and applicable control measures.

A3.2.4 Environmental Impacts and Mitigation

The following sections discuss site-specific air quality impacts that would occur from each proposed cleanup alternative. Emission inventories were estimated for each cleanup activity, based on likely scenarios of equipment usage and the duration of each alternative. Emission factors used to calculate equipment emissions were obtained from special studies on mobile sources (USEPA, 1991, 1993, and 1997; California Air Resources Board, 1997) and fugitive dust (USEPA, 1992). Emissions from excavation and hauling equipment would occur at the Former Arsenic Trioxide processing Area, in the Peripheral Area, and along the haul routes. Only emissions that would occur within the Central Puget Sound Region Air Basin (Snohomish, King, and Pierce Counties) were considered in the analysis. Attachment A1 presents estimates of equipment usage and resulting emissions for each cleanup alternative.

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Impacts would be considered significant if project emissions increase ambient pollutant levels from below to above a national or state ambient air quality standard. The Puget Sound Clean Air Agency has not established criteria for assessing the significance of air quality impacts for SEPA purposes. However, Puget Sound Clean Air Agency Regulation I, Section 1.07 defines a source as “major” if annual emissions exceed 100 tons per year of a regulated pollutant, 10 tons per year of a hazardous air pollutant, or 25 tons per year of combined hazardous air pollutants. For purposes of this air quality analysis, project emissions would be considered potentially significant if they exceed these thresholds. This is a conservative approach, as the project includes both stationary and mobile emission sources, whereas these thresholds only apply to stationary sources.

A3.2.4.1 No Action Alternative

Since no cleanup activities would occur from the No Action alternative, short-term air quality impacts from excavation and hauling would not occur. Emissions and associated air quality impacts would remain unchanged from existing conditions. In the long term, however, no site cleanup would mean that there would be no reduction in public exposure to hazardous air pollutants from fugitive dust, which would occur under the other alternatives.

A3.2.4.2 Off-Site Disposal Alternative

Air quality impacts from the proposed cleanup activities would mainly occur from combustive emissions due to the operation of mobile construction equipment such as excavators, loaders, and dump trucks. Fugitive dust emissions[1] would also occur during ground-disturbing activities, soil handling, and soil transport. However, since the proposed action (1) includes rigorous measures to control fugitive dust emissions and (2) would have to comply with the Puget Sound Clean Air Agency Fugitive Dust Emission Standards, emissions of PM_{10} and hazardous air pollutants from project fugitive dust sources are expected to be minimal.

1 in Attachment A1 presents the daily emissions that would occur from the Off-Site Disposal alternative cleanup activities. These data show that the main source of combustive emissions would occur from dump trucks that transport contaminated soils between (1) the residential area, the Former Arsenic Trioxide Processing Area/truck loadout site, and the proposed rail loading facility and (2) the remote off-site locations. The main source of fugitive dust emissions (PM_{10}) from this alternative would occur from road dust as dump trucks traverse public-owned paved roads in proximity to the project sites. The source of this dust is assumed to be locally generated and not from the project cleanup sites. However, these roads occur within the region historically impacted by the smelter. Consequently, fugitive road dust probably contains hazardous air pollutants that originated from the smelter and these emissions may represent the greatest health impact to the public from the alternative.

Total emissions from the Off-Site Disposal alternative cleanup activities summed over the duration of the project would be:

- 8.5 tons of volatile organic compounds,
- 38.9 tons of carbon monoxide,
- 108 tons of nitrogen oxides,
- 5.6 tons of sulfur dioxide, and
- 22.9 tons of PM_{10} (Table 8 in Attachment A1).

While total emissions of nitrogen oxides would exceed 100 tons slightly, the proposed remediation activities would occur over more than 1 year. Therefore, emissions would

[1] PM_{10} and its toxic constituents. (PM_{10} indicates particulate matter less than 10 microns in size.)

not exceed the annual major source thresholds and would not be considered significant. Since most emission sources would be mobile and intermittent in nature, their resulting pollutant impacts would not be large enough in a localized area to cause an exceedance of any ambient air quality standard. Consequently, cleanup activities under this alternative would produce insignificant air quality impacts within the project region. Additionally, completion of the cleanup activities would reduce the future exposure of the public to hazardous air pollutants from fugitive dust, which would be a net air quality benefit. Air quality impacts from the alternative would be temporary and would cease at the end of cleanup activities.

In the long term, soil remediation would greatly reduce the potential for fugitive dust in the site vicinity to contain hazardous air pollutants, thus reducing public health risks.

A3.2.4.3 On-Site Containment Facility Alternative

Air quality impacts from the On-Site Containment Facility alternative cleanup activities would be similar to impacts discussed above for the Off-Site Disposal alternative. Table 6 in Attachment A1 presents the daily emissions that would occur from the On-Site Containment Facility alternative cleanup activities. These data show that emissions from the alternative would be slightly less than those estimated to occur from the Off-Site Disposal alternative. This result is a function of less excavation and off-site soil transport proposed for the alternative, versus Off-Site Disposal. The main source of fugitive dust emissions from the alternative would also occur from road dust as dump trucks traverse public-owned paved roads in proximity to the project sites. As discussed for the Off-Site Disposal alternative above, fugitive road dust probably contains hazardous air pollutants that originated from the smelter, and these emissions may represent the greatest health impact to the public from the alternative.

Total emissions from the On-Site Containment Facility alternative cleanup activities summed over the duration of the project would be:

- 6.9 tons of volatile organic compounds,
- 30.1 tons of carbon monoxide,
- 78.0 tons of nitrogen oxides,
- 4.5 tons of sulfur dioxide, and
- 19.8 tons of PM_{10} (Table 9 in Attachment A1).

These total emissions would not exceed the annual major source thresholds and would be considered not significant. In addition, remediation activities and the resulting emissions would occur over more than 1 year. Since most emission sources would be mobile and intermittent in nature, their resulting pollutant impacts would not be large enough in a localized area to cause an exceedance of any ambient air quality standard. Consequently, cleanup activities under this alternative would produce insignificant air quality impacts within the project region. Additionally, completion of the cleanup activities would reduce the future exposure of the public to hazardous air pollutants from fugitive dust, which would be a net air quality benefit. Air quality impacts from the alternative would be temporary and would cease at the end of cleanup activities.

In the long term, soil remediation would greatly reduce the potential for fugitive dust in the site vicinity to contain hazardous air pollutants, thus reducing public health risks.

A3.2.4.4 Consolidation Facility Alternative

Air quality impacts from the Consolidation Facility alternative cleanup activities would be similar to impacts discussed above for Off-Site Disposal and On-Site Containment Facility. Table 7 in Attachment A1 presents the daily emissions that would occur from the Consolidation Facility alternative cleanup activities. These data show that emissions from the alternative would fall in-between those estimated to occur from the other two cleanup alternatives. This result is a function of the amount of excavation and off-site soil transport proposed for the alternative, versus the other alternatives. The main source of fugitive dust emissions from the alternative would also occur from road dust as dump trucks traverse public-owned paved roads in proximity to the project sites. As discussed for Off-Site Disposal above, fugitive road dust probably contains hazardous air pollutants that originated from the smelter and these emissions may represent the greatest health impact to the public from the alternative.

Total emissions from cleanup activities under this alternative summed over the duration of the project would be:

- 6.4 tons of volatile organic compounds,
- 28.4 tons of carbon monoxide,
- 73.8 tons of nitrogen oxides,
- 4.2 tons of sulfur dioxide, and
- 18.0 tons of PM_{10} (Table 10 in Attachment A1).

These emissions would not exceed the annual major source thresholds and would be considered not significant. In addition, remediation activities and the resulting emissions would occur over more than 1 year. Since most emission sources would be mobile and intermittent in nature, their resulting pollutant impacts would not be large enough in a localized area to cause an exceedance of any ambient air quality standard. Consequently, cleanup activities under this alternative would produce insignificant air quality impacts within the project region. Additionally, completion of the cleanup activities would reduce the future exposure of the public to hazardous air pollutants from fugitive dust, which would be a net air quality benefit. Air quality impacts from the alternative would be temporary and would cease at the end of cleanup activities.

In the long term, soil remediation would greatly reduce the potential for fugitive dust in the site vicinity to contain hazardous air pollutants, thus reducing public health risks.

A3.2.4.5 Mitigating Measures

Air quality impacts from each project alternative would be insignificant and no mitigating measures would be required. However, as part of the project design and to comply with the requirements of the Puget Sound Clean Air Agency Fugitive Dust Emission Standards, the following Best Available Control Technologies (BACT) should be

implemented to minimize fugitive dust emissions from soil handling and transport sources under each alternative:

(1) Wetting agents in active areas that generate visible dust.

(2) Covers, wetting agents, or sealed load containers to prevent materials from escaping from haul trucks while on public roads.

(3) Cleaning techniques, such as wheel washers, to prevent vehicles from tracking soil/particulate matter onto public roads.

(4) Stabilization of storage piles with the use of water sprays, chemical stabilizers, or enclosures, such as tarps or buildings.

(5) Water spraying or enclosure of material handling and transfer points, such as those employing a loader.

(6) Surface dirt roads with gravel or pavement.

(7) Immediate cleanup of particulate matter inadvertently deposited on public roads.

A3.3 Surface Water

A3.3.1 Affected Environment

The area within the upland CPM boundary—including the Former Arsenic Trioxide Processing Area, Soil Removal Areas 1 and 2 (Figure A2-1), and the Legion Memorial Golf Course—occupies a northwest-southeast trending ridge (Figure A3-2). The crest of this ridge reaches maximum elevations of 140 to 160 feet above mean sea level immediately northwest of the Former Arsenic Trioxide Processing Area on the northwest side of Broadway. The northeast flank of the ridge slopes down to the upland CPM boundary along Walnut Street and East Marine View Drive (approximately 60 to 80 feet above mean sea level) and, from there, slopes very steeply down to the Lowland Area along the Snohomish River (elevations generally less than 10 feet above mean sea level). The southwest flank of the ridge slopes gently down to a topographic trough that parallels the ridge. The trough is bisected by a saddle at Broadway Avenue (approximately 80 feet above mean sea level). To the northwest of the saddle, the bottom of the trough slopes gently toward Port Gardner; to the southeast of the saddle, the bottom of the trough slopes toward the Lowland Area along the Snohomish River.

Figure A3-2: Site Topography.

Prior to development of the Upland Area, surface water drainage would have followed natural stream channels. Precipitation falling on the northeast side of the ridge would have drained directly to the Snohomish River. Precipitation falling on the southwest side of the ridge would have drained to the topographic trough; water entering the southeastern half of the trough would have drained to the Snohomish River; water entering the northwest half of the trough would have drained to Port Gardner. In addition, small ponds or wetlands may have once occupied closed depressions, such as the one northwest of Broadway between Legion Drive and Winton Avenue.

At present, however, there are no significant permanent surface water features within the upland CPM boundary because of drainage modifications that were implemented as part of development. Now, during rain events, most precipitation flows overland as sheetflow, collects in roadside ditches or curbs, flows to inlets and catchbasins, and enters an engineered storm drain system.

Information collected during the Remedial Investigation on storm water drainage within and adjacent to the footprint of the former smelter site has been assembled in the *Storm Water and Storm Drain Sediment Characterization and Controls Work Plan* (Hydrometrics, 1998). The description of the affected environment that follows, including data presented in Table A3-1, is drawn from Hydrometrics (1998).

Figure A3-3 shows the area covered by the Hydrometrics (1998) work plan (the "study area"). The work plan divided the study area into five sub areas, as follows: Sub-area I, the Former Arsenic Trioxide Processing Area; Sub-area II, the residential area south of the former smelter site; Sub-area III, the SR 529 cloverleaf/interchange (i.e., the interchange of North Broadway with E. Marine View Drive); Sub-area IV, the residential area north of SR 529; and Sub-area V, the Lowland Area. (Sub-area V, the Lowland Area, is not part of the cleanup activities addressed in this Appendix.) Runoff from Sub-area II and most of Sub-areas I and IV enters the City of Everett combined sanitary sewer/storm water system where it is conveyed to a publicly-owned treatment works, the Everett Wastewater Treatment Plant, approximately 2 miles to the south. Runoff from Sub-area III, the extreme north part of Sub-area I, and possibly a small portion of Sub-area IV drains to a storm water system that discharges to the Lowland Area and, eventually, the Snohomish River. The work plan (Hydrometrics, 1998) describes the storm water drainage patterns in Sub-areas I through IV as follows:

- **Sub-area I.** Storm water generally runs off the residential lots towards the east, following the slope of the hillside until it encounters north-south roads such as Hawthorne Street, Pilchuck Path, and East Marine View Drive. These roads divert runoff to the south, where it discharges to the City of Everett combined sanitary sewer/storm water system through roadside catch basins. The northernmost portion of this Sub-area, however, drains towards 5th Street where it discharges to the southern end of the cloverleaf/interchange area. Water then flows either north or south on East Marine View Drive, depending on the location. Water that flows to the south discharges to catch basins connected to the sewer/storm water system.

Table A3-1: Summary of Surface Water and Storm Water Quality Data.

Runoff in:	Discharging to:	Maximum Detected Concentration in Storm Water (mg/L)		
		Arsenic	Cadmium	Lead
Sub-area I	Everett Wastewater Treatment Plant	**12,000**	60	35
Sub-area I	Lowland/ Snohomish River	**5,800**	**250**	**150**
Sub-area II	Everett Wastewater Treatment Plant	54	not detected (<5)	116
Sub-area III	Lowland/ Snohomish River	no data	no data	no data
Sub-area IV	Everett Wastewater Treatment Plant & Lowland/ Snohomish River	no data	no data	no data
Sub-area V	Snohomish River	**3,300**	**13**	**467**
Balance of area within upland CPM boundary	Everett Wastewater Treatment Plant	no data	no data	no data
Regulatory Criteria		**Value (mg/L)**		
Everett Wastewater Treatment Plant Influent limits		500	240	1,890
Washington Surface Water Quality Criteria (marine chronic)		36	8	5.8
MTCA Method B (human ingestion of seafood)		0.0982	20.3	no value

MTCA = State of Washington Model Toxics Control Act.

Sources of data used in table: Hydrometrics (1998); Asarco (1998b).

Water that flows to the north discharges to the SR 529 overpass drainage system (Sub-area III).The outfall for the SR 529 overpass drainage system is believed to be in the lowland. Except for this, there appears to be no direct runoff from Sub-area I to the adjacent lowlands. Because of the hillside topography, the area is well drained and there is no ponding of surface water and few puddles following storm events.

- **Sub-area II.** Storm water in Sub-area II generally runs off towards the east following the slope of the hillside, until it encounters north-south roads such as Hawthorne Street, Pilchuck Path, and East Marine View Drive. Drainage on Hawthorne Street is to the south where water is collected in a series of catch basins at the intersection of Hawthorne and Butler Streets.

Figure A3-3: Storm Water Characterization Areas.

Pilchuck Place and East Marine View Drive are graded to drain to catch basins in the middle of the block. All of the catch basins in this area discharge to the sewer/storm water system. There is no direct runoff from Sub-area II to the adjacent lowlands.

- **Sub-area III.** Storm water in Sub-area III flows toward the overpass. The drainage area limits are not well defined and storm water runoff may be received from portions of Sub-areas I and IV. Storm water generally runs off the landscaped grassy areas onto the roads. Storm water is collected in roadside catch basins. Some uncontrolled runoff to the lowlands occurs in the northbound lane of SR 529 where water is diverted to the central median and then to the lowland beneath the northbound overpass. Precise discharge points from the overpass drainage system have not been established. There is some evidence that these catch basins discharge via a culvert to a sand infiltration bed in the lowlands.

- **Sub-area IV.** Storm water generally runs off the residential lots in this area towards the east until it encounters Whitehorse Trail and Bridgeway. These roads divert runoff to the sewer/storm water system through roadside catch basins with some perimeter areas draining to catch basins on SR 529 and the adjacent cloverleaf/interchange area.

The storm water from the area within the upland CPM boundary but outside of the storm water study area also enters an engineered storm drain system where it is conveyed to the Everett Wastewater Treatment Plant.

A limited amount of storm-water contamination data was collected during the Remedial Investigation. Data from the area within and near the footprint of the former smelter are presented in the storm water work plan (Hydrometrics, 1998) and are summarized in Table A3-1. The maximum arsenic concentration was detected in runoff from Sub-area I, the Former Arsenic Trioxide Processing Area, at 12,000 µg/L. Cadmium and lead concentrations from this sub-area were also elevated, having maximum detections of 250 µg/L and 150 µg/L, respectively. Sub-area I contains the most highly contaminated soils on the site (average of several thousand mg/Kg arsenic). The maximum arsenic concentration detected in runoff from Sub-area II, the residential area south of the former smelter site, was 54 µg/L. Lead concentrations from this Sub-area were also elevated, with a maximum detection of 116 µg/L. Sub-area II soils contain relatively low levels of contamination (average of several hundred mg/Kg arsenic). Runoff samples from Sub-areas III and IV, which contain soils with intermediate levels of contamination (average of a few thousand mg/Kg arsenic), were not collected during the Remedial Investigation. Similarly, no runoff samples from the rest of the area within the upland CPM boundary, which contain relatively low levels of contamination (average of several hundred mg/Kg arsenic), were collected during the Remedial Investigation.

A3.3.2 Environmental Impacts and Mitigation

A3.3.2.1 No Action Alternative

Environmental impacts to surface water under this alternative would likely be the same as or similar to impacts that currently exist. At present, some of the storm water that runs off the upland part of the site to the lowlands occasionally exceeds regulatory values for arsenic, cadmium, and lead (Table A3-1). Surface water in the lowlands also exceeds regulatory criteria for these metals. Since these regulatory values are based on adverse effects to humans or aquatic organisms, exceedance of them suggests that some negative environmental impacts to human health or aquatic organisms may be occurring. Although it is not clear what the relationship is between the elevated levels of metals entering the storm drains and the elevated surface water levels observed in the lowland (the storm water work plan implies they may be related more to discharge of contaminated ground water from the site), it seems likely that there are negative environmental impacts to lowland surface water, and possibly the Snohomish River, from runoff originating within the upland portion of the site. Under the No Action alternative, these negative environmental impacts would be expected to continue.

Current data also indicate that some of the storm water from the site that enters the combined sewer/storm water system at times exceeds the treatment plant influent limit for arsenic (Table A3-1). Because this water is treated at the Everett Wastewater Treatment Plant and the Everett Wastewater Treatment Plant is in compliance with its discharge limits, these storm water exceedances would not be expected to have a significant environmental impact on the surface water bodies into which they eventually discharge, such as the Snohomish River. However, these influent exceedances may have an adverse impact on the operation of the Everett Wastewater Treatment Plant; these impacts are addressed elsewhere as part of the discussion on public utilities.

A3.3.2.2 Off-Site Disposal Alternative

In the short term, soil excavation and removal within the upland CPM boundary during cleanup could expose contaminated soils to increased levels of *in situ* contaminant leaching and physical erosion and entrainment of sediment onto which contaminants are adsorbed. These processes could increase contaminant transport into the storm drain system and result in increased contaminant transport to surface water in the lowlands and the Snohomish River.

Transport of soil via dump trucks or its adherence to excavating equipment within the upland CPM boundary could result in release of contaminated soil onto residential streets and from there into the storm water system. This could also result in increased contaminant transport to the lowlands and Snohomish River.

In the long term, the removal of contaminated soil within the upland CPM boundary, replacement with clean soil, and restoration of vegetation in the soil removal areas is expected to result in a decrease of contaminant transport to the storm water system, the Lowland Area, and the Snohomish River over present conditions.

A3.3.2.3 On-Site Containment Facility Alternative

The short-term impacts to surface water of this alternative would be similar to those described above for the Off-Site Disposal alternative. However, it is expected that potential construction impacts might be of a slightly greater magnitude because this alternative involves construction of an on-site containment facility for dangerous waste soils and a cap for consolidated problem waste soils, in addition to the soil removal actions of the Off-Site Disposal alternative.

In the long term, the removal of contaminated soil within the upland CPM boundary, replacement with clean soil, and restoration of vegetation in the soil removal areas is expected to result in a decrease of contaminant transport to the storm water system, the Lowland Area, and the Snohomish River over present conditions. There would also be no expected negative long-term environmental impacts to surface water associated with the presence of the on-site containment and consolidation facilities, assuming that the impermeable caps are intact and properly maintained. The presence of dangerous and problem wastes within the on-site containment and consolidation facilities, however, could lead to negative impacts to surface water should the impermeable caps ever fail (e.g., due to long-term human activity or a natural disaster such as an earthquake or flood). Should this occur, high concentrations of contaminants from the exposed problem waste and very high concentrations of contaminants from the exposed dangerous waste could be transported to surface water. All else being equal, impacts from failure of the consolidation facility would be less than those from failure of the containment facility because of the much lower contaminant concentrations in the former.

A3.3.2.4 Consolidation Facility Alternative

The short-term impacts to surface water of this alternative would be similar to those described above for the On-Site Containment Facility alternative. However, compared to the On-Site Containment Facility alternative, this alternative would have no need for dangerous-waste or problem-waste stockpiles and their associated potential contaminant leaching and erosion impacts.

In the long term, the removal of contaminated soil within the upland CPM boundary, replacement with clean soil, and restoration of vegetation in the soil removal areas is expected to result in a decrease of contaminant transport to the storm water system, the Lowland Area, and the Snohomish River over present conditions. There would also be no expected negative long-term environmental impacts to surface water associated with the presence of the consolidation facility, assuming that the impermeable cap is intact and properly maintained. The presence of problem waste within the consolidation facility, however, could lead to negative impacts to surface water should the impermeable cap ever fail (e.g., due to long-term human activity or a natural disaster such as an earthquake or flood). If this occurred, high concentrations of contaminants from the exposed problem waste could be transported to surface water. All else being equal, impacts from failure of the consolidation facility in this alternative would be less than those from failure of the containment facility in the prior alternative because of the much lower contaminant concentrations in the consolidation facility.

A3.3.2.5 Mitigating Measures

The short-term environmental impacts due to cleanup activities (soil removal/ replacement, construction of on-site facilities) may arise from two basic processes: the chemical leaching of contaminants from soil and erosion/entrainment of soil onto which contaminants are adsorbed. Limiting leaching by rainfall through exposed contaminated soils can mitigate for impacts from the former process. This can be accomplished by performing excavation activities in the drier, summer months. Implementing sedimentation control measures such as the best management practices described in the storm water work plan (Hydrometrics, 1998) can mitigate impacts from the erosion and entrainment of soil onto which contaminants are adsorbed. These practices include:

- Seeding of stripped areas,
- Use of mulching and matting,
- Covering areas with plastic sheeting,
- Preserving natural vegetation,
- Implementing dust control measures,
- Construction of interceptor dikes and swales,
- Protecting storm drain inlets with filters or impounding areas,
- Washing and steam-cleaning vehicles and excavation equipment before leaving the site,
- Removing contaminated sediment from catchbasins, and
- Monitoring to demonstrate effectiveness of these sediment control practices.

Long-term impacts due to potential failure of the impermeable caps of the on-site containment and consolidation facilities can be mitigated through proper design and the use of institutional controls that require proper long-term maintenance, monitoring, and timely repair.

A3.4 Ground Water

A3.4.1 Affected Environment

Information on the hydrogeology and ground water at the site is contained in the Remedial Investigation (Hydrometrics, 1995a), the Feasibility Study (Hydrometrics, 1995b), and the Supplemental Lowland Study (Hydrometrics, 1996). The description of the affected environment that follows is drawn from these three reports.

The Upland Area is underlain by glacial till, composed of compacted sand, silt, and gravel. Till thickness is thought to range from less than 10 to greater than 50 feet. Advance outwash deposits that are composed of sand and gravel and are over 300 feet thick underlie the till. In much of the area near the former smelter the till is overlain by 5 to 10 feet of fill, which is composed of topsoil, silt, sand, gravel, and—on the original smelter property—bricks, slag, and smelter demolition debris.

To the east, the till and outwash deposits terminate laterally beneath the steep slope leading down to the lowlands of the Snohomish River floodplain. Alluvial sediments (sands and silts), slag, and fill lie unconformably against the till and outwash units (see Figure 2-6 in the main text). To the west, it is thought that the till and outwash deposits continue more or less horizontally beyond the CPM boundary.

Beneath the Upland Area, ground water in useable quantities occurs only in the outwash deposits. These deposits form a thick, laterally extensive aquifer system in the northern Everett area. In the vicinity of the former smelter, ground water in the advance outwash is unconfined with the water table lying below the till-outwash contact (Hydrometrics, 1995). Ground water in the outwash aquifer beneath the site is thought to flow eastward toward the Snohomish River lowlands. Perched water-bearing zones occur sporadically in the fill and the weathered upper few feet of the till. The deeper, unweathered till is reported to contain no ground water and is thought to limit downward migration of water to the advance outwash deposits. Beneath the Lowland Area east of the smelter area, ground water occurs in the fill and in the coarser-grained alluvial units. The hydrologic relationships between the upland and lowland units is not well known; however, it is possible that perched ground water from the upland fill/weathered till and advance outwash units discharge, in places, directly into the adjacent lowland units.

The Remedial Investigation (Hydrometrics, 1995a) and the Supplemental Lowland Study (Hydrometrics, 1996) suggested that ground water in the outwash aquifer beneath much of the upland CPM boundary is unimpacted by smelter operations because the overlying unweathered till limits downward migration of water and contaminants. However, results from monitoring well EV-4B, one of only two wells installed in the outwash aquifer, have indicated the presence of arsenic in concentrations well in excess of background concentrations. These data suggest that smelter operations have impacted the outwash aquifer, at least in this location. It is unclear from these results whether the outwash aquifer is contaminated farther upgradient beneath the Former Arsenic Trioxide Processing Area.

Arsenic contaminant plumes have been identified in ground water in the alluvial sediments beneath the Lowland Area. The source of this contamination is not clear. Potential sources include migration of ground water from the upland units (e.g., the water-bearing zones in the fill/weathered till or the outwash aquifer) or migration from sources within the lowland itself (e.g., the slag pile east of the former smelter facility).

A3.4.2 Environmental Impacts and Mitigation

A3.4.2.1 No Action Alternative

As discussed in the prior subsection, existing information is not clear regarding whether or not the contamination in the Upland Area is impacting ground water and migrating to the Lowland Area from the Upland Area. Because the No Action alternative would not physically alter conditions in the Upland Area, any existing migration processes would continue. Hence, the No Action alternative would have no impact on contamination that

may be occurring or migrating in the ground water due to arsenic contamination in the Upland Area.

A3.4.2.2 Off-Site Disposal Alternative

It is unlikely that cleanup activities would have significant impacts (positive or negative) on ground water beneath the site in the short term because of the slow rate of ground water movement. There may be physical disruptions of the fill/weathered till water-bearing zones caused by excavating into them during soil removal; however, it is unlikely that any significant impacts would arise from these disruptions because of the very limited ground water flux in these zones.

In the long term, this alternative would remove much of the contaminated soil from the upland CPM area and all of the most highly-contaminated soil from the Former Arsenic Trioxide Processing Area. This would significantly reduce the potential for future leaching and infiltration of contaminants to water-bearing zones of the fill/weathered till and to the outwash aquifer.

A3.4.2.3 On-Site Containment Facility Alternative

It is unlikely that activities related to the excavation and transport of contaminated soils or the construction of containment or consolidation facilities would have significant impacts on ground water beneath the site in the short term. There may be physical disruptions of the fill/weathered till water-bearing zones caused by excavating into them during soil removal or construction of containment and consolidation facilities; however, it is unlikely that any significant impacts would arise from these disruptions because of the very limited ground water flux in these zones.

In the long term, this alternative would remove much of the contaminated soil from within the Peripheral Area and would isolate the most contaminated soil from leaching and infiltration within the containment and consolidation facilities. The long-term impact of this alternative would be to significantly decrease any movement of site-related contaminants to the ground water. Similarly, there would be no expected negative long-term environmental impacts to ground water associated with the presence of the on-site containment and consolidation facilities, assuming that the impermeable caps (on the containment and consolidation facilities) and liner (on the containment facility) remain intact and properly maintained. The presence of dangerous and problem wastes within the on-site containment and consolidation facilities, however, could lead to negative impacts to ground water should the impermeable caps/liner ever fail (e.g., due to long-term human activity or a natural disaster such as an earthquake or flood). Should these conditions occur, moderate concentrations of contaminants from the exposed problem waste, and very high concentrations of contaminants from the exposed dangerous waste could potentially be transported to ground water. All else being equal, impacts from failure of the consolidation facility would be less than those from failure of the containment facility because of the much lower contaminant concentrations in the former.

A3.4.2.4 Consolidation Facility Alternative

It is unlikely that activities related to the excavation and transport of contaminated soils or the construction of the consolidation facility would have significant impacts on ground water beneath the site in the short term. There may be physical disruptions of the fill/weathered till water-bearing zones caused by excavating into them during soil removal or construction of the consolidation facility; however, as described in the previous subsection, it is unlikely that any significant impacts would arise from these disruptions.

In the long term, this alternative would remove the most contaminated soil from within the upland CPM boundary and would remove some of the lower concentration contaminated soil and isolate much of the rest from leaching and infiltration within the consolidation facility. The long-term impact of this alternative would be to significantly decrease any movement of site-related contaminants to the ground water. Similarly, there would be no expected negative long-term environmental impacts to ground water associated with the presence of the consolidation facility, assuming that the impermeable cap remains intact and properly maintained. The presence of problem waste within the consolidation facility, however, could lead to negative impacts to ground water should the impermeable cap ever fail (e.g., due to long-term human activity or a natural disaster such as an earthquake or flood). Should these conditions occur, contaminants from the exposed problem waste could potentially be transported to ground water. All else being equal, impacts from failure of the consolidation facility in this alternative would be less than those from failure of the containment facility in the previous alternative because of the much lower contaminant concentrations in the consolidation facility.

A3.4.2.5 Mitigating Measures

The short-term impacts to ground water of all alternatives are expected to be minimal. Long-term impacts of all alternatives (except no action) are generally expected to be positive and, therefore, require no mitigation. Impacts due to potential failure of the impermeable cap of the on-site consolidation facility could be mitigated through proper design and the use of institutional controls that require proper long-term maintenance, monitoring, and timely repair.

A3.5 Environmental Health

A3.5.1 Affected Environment

The Upland Area of the Everett Smelter Site consists of residential, commercial, and recreational areas. Residential use of the site includes single- and multiple-family housing units and two mobile home parks. A Senior Center, the Denney Youth Center, a child care facility, the Legion Memorial Golf Course, Viewcrest Abbey, and several parks (Legion Memorial Park, Wiggums Hollow Park, Viola Oursler Overlook) are located within the Upland Area. Uncontrolled access is available to the abbey grounds

and to forested areas within the parks. A commercial area, including a variety of retail stores, restaurants, and government offices, is located along North Broadway.

The population with the greatest potential for long-term exposure to site-related contaminants is community residents. Approximately 595 residential units are located within the CPM boundary; residents of these units may be exposed to site-related contaminants. Residents within the CPM boundary, particularly children, may ingest or come in direct contact with contaminants in backyard soils, outdoor air particulates, and house dust. Activities that may result in exposure to contaminants include gardening, eating produce grown in contaminated soil, playing outdoors (primarily children), and home maintenance or remodeling. In addition, contaminants may be brought into the home by pets and other animals that come in contact with contaminated soil. Sensitive subpopulations may include children, people who are unable to detoxify arsenic, and the elderly. Long-term residents who grew up in the community would have the highest cumulative exposure. In addition, certain subpopulations of Everett may have increased exposure to soil because of cultural practices or increased vegetable gardening or because they are unable to read health advisories.

Other potentially exposed populations include workers involved in remediation activities (such as excavation and soil removal) and non-remediation workers such as landscapers (who may directly contact contaminated soil), maintenance workers who may frequent crawl spaces under residences, and construction workers involved in remodeling, demolishing, or building houses. These exposures, however, are likely to be short-term.

Ground water in the area of the site is not currently being used for drinking water or other purposes. Given the readily available supply of municipal water, this situation is unlikely to change in the near future. Most surface water enters the storm water runoff system or is released to the Snohomish River; exposures to contaminants in surface water may result for people who use the river for recreational purposes.

A3.5.2 Environmental Impacts and Mitigation

Two types of human health impacts could occur:

- Short-term (acute or sub-chronic) exposures to both remediation and non-remediation workers; potential exposure pathways include incidental ingestion of soil, dermal contact with contaminants in soil, inhalation of fugitive dust, and inhalation of emissions from construction vehicles (remediation workers).

- Long-term (chronic) residual exposures to community residents following remediation. (It should be noted that acute exposures to contaminant hot spots by community residents could also occur under some of the remediation alternatives.)

Incidental ingestion and dermal contact with contaminants in soil by workers may occur during remediation activities (e.g., excavation of contaminated soil, cleaning of equipment, removal of utility lines) and during non-remediation activities (maintenance,

landscaping, inspections, and remodeling/construction). Although construction vehicles may produce large amounts of fugitive dust under certain circumstances, appropriate mitigating measures reduce or eliminate production of fugitive dust. Inhalation of diesel emissions from construction vehicles may also occur; although short-term health effects from inhalation of vehicle emissions may occur (e.g., headaches, dizziness), information on toxic effects of short-term exposures is not readily available and potential human health risks have not been quantified.

Primary residential exposures may include incidental ingestion of and dermal contact with contaminants remaining in soil, inhalation of fugitive dust, and contact with and inhalation of house dust. Ingestion of soil (which may include slag or demolition debris) or house dust is the primary route of exposure to contaminants in soil. Children are more likely to ingest soil during outdoor play and may ingest dust during indoor activities because they generally have more frequent hand-to-mouth actions. Adults may ingest small amounts of soil during gardening, while caring for pets, by eating or smoking with dirty hands, or by dust deposited on food. Indoor dust may contain chemicals from outdoor soil due to resuspension of outdoor dust and airborne transport indoors, or by tracking the soil indoors on the feet of people or pets. Ingestion of homegrown vegetables that take up chemicals in soil may present an additional exposure source for some residents, particularly for chemicals such as cadmium which have been reported to be taken up in crops to a greater extent than other chemicals.

A3.5.2.1 No Action Alternative

Under this alternative, no short-term health impacts to remediation workers would occur. Potentially significant short-term exposures to non-remediation workers (landscapers, construction workers, utility workers) could occur, however, particularly within the Former Arsenic Trioxide Processing Area. In addition, unacceptable human health risks to community residents (particularly children) would remain.

A3.5.2.2 Off-Site Disposal Alternative

Under this alternative, short-term risks to construction workers involved in excavation and transport of contaminated soil could occur. With appropriate mitigating measures, however, these potential risks can be minimized. Future risks to community residents and non-remediation workers would be significantly reduced because accessible contaminated soil would be excavated and clean fill material placed on the site to a depth of 1 to 4 feet, thereby eliminating contact with near-surface contamination and minimizing the redistribution of deeper contamination. Assuming institutional controls are put in place to prevent or control excavation by residents to depths at which contaminants remain, long-term risks to human health would be reduced to acceptable levels.

A3.5.2.3 On-Site Containment Facility Alternative

Under this alternative, potential health impacts to workers would be similar to those for the Off-Site Disposal alternative described above. Mitigating measures would minimize short-term risks to both remediation and non-remediation workers.

However, construction of an on-site containment facility for dangerous waste within the fenced area would leave arsenic in the neighborhood at concentrations that could cause permanent and potentially lethal health effects if people were exposed to the material. Although the on-site containment facility would be required to meet RCRA Subtitle C requirements, it is possible that long-term human activity or a natural disaster (such as an earthquake or flood) could expose highly toxic material. The Washington State Department of Health (WDOH) recently evaluated the hazards of short-term exposure to arsenic-contaminated soil (WDOH, 1999). They evaluated a scenario involving atypical exposure of a child to relatively inaccessible areas of arsenic-contaminated soil. Based on best estimate exposure assumptions (i.e., body weight of 13 kg, soil ingestion rate of 20 g/day, bioavailability of 40%, and a lethal dose of 1 mg arsenic/kg body weight), this study concluded that acute exposure to a soil arsenic concentration of 1,625 ppm could cause a child's death. Since the on-site containment facility would contain soils with 3,000 to 20,000 ppm arsenic, acute exposure under the conditions described in the WDOH report (possibly as a result of long-term human activity or natural disaster) would likely result in permanent and potentially lethal health effects. While it is recognized that this scenario has a low likelihood of occurrence, the potential consequences are unacceptable.

A3.5.2.4 Consolidation Facility Alternative

Under this alternative, potential human health impacts to workers would also be similar to the Off-Site Disposal alternative. Instituting appropriate mitigating measures would minimize short-term risks to remediation and non-remediation workers.

All dangerous waste would be removed from the site, and consolidation and capping would prevent human contact with problem waste under normal circumstances. Arsenic concentrations would be sufficiently low to make lethal or permanent health effects unlikely upon a single contact event, even if failure of the cap were to occur, although the most sensitive subpopulations may not be fully protected (e.g., a chemically-sensitive child who ingests a large amount of contaminated soil after breach of containment).

A3.5.2.5 Mitigating Measures

Measures to mitigate short-term exposures to remediation workers include the use of protective clothing and wetting of the area under construction, thereby reducing or eliminating production of fugitive dust. If the soil is wet, fugitive dust is unlikely to pose a significant health risk to workers.

Measures to mitigate short-term exposures to non-remediation workers include the use of protective clothing, geofabric or other marker material to indicate the depth to which

remediation has occurred, and permit and other institutional requirements such as warning signs in crawl spaces and basements.

Measures to mitigate exposures to community residents include placement of a marker material at the depth to which remediation has occurred to minimize the redistribution of deeper contaminants, implementation of contaminated soil disposal programs for use by homeowners involved in small projects such as fence installation and landscaping, and other institutional controls that would minimize excavation by residents to depths at which contaminants remain.

A3.6 Land Use

A3.6.1 Affected Environment

A3.6.1.1 Existing Land Uses

Existing land uses at the project site and surrounding area are shown in Figure A3-4 (see Figures 2-2 and 2-3 in the main text for site zoning and comprehensive plan land use designations). The predominant land use within the CPM boundary is residential, both single family and multiple family. Prior to discovery of site contamination, the area now referred to as the Former Arsenic Trioxide Processing Area was residential in nature, but this area has since been fenced off and the houses within it removed (although foundations remain). The area immediately surrounding the Former Arsenic Trioxide Processing Area supports single-family residential use, as does the area across Broadway (to the northwest and west from the Former Arsenic Trioxide Processing Area). Areas of multi-family residential use occur within the Peripheral Area, primarily south and southwest of the Former Arsenic Trioxide Processing Area. A large multi-family facility operated by the Everett Housing Authority is located in the southwest corner of the Peripheral Area. The Peripheral Area also includes two trailer parks. Other land uses within the Peripheral Area include public use areas such as schools, a senior center, and child care and youth centers; recreational areas (parks); and commercial areas primarily located along Broadway southwest of the Former Arsenic Trioxide Processing Area. The Legion Memorial Golf Course occupies about half of the portion of the Peripheral Area north of Broadway.

Outside the Peripheral Area, land uses are: industrial to the east along the Snohomish River; residential, commercial, public use, and maritime services (Port of Everett) to the west; and residential and commercial (including the Everett central business district) to the south.

Land use in the project site vicinity has been adversely impacted by contamination from smelter operations. The Former Arsenic Trioxide Processing Area no longer supports residential use, and the soil contamination within the Peripheral Area is incompatible with existing residential, recreational, public, and other uses in those areas.

Figure A3-4: Land Use in the Project Site Vicinity.

A3.6.1.2 Land Use Designations

Land use designations for the project site are contained in the City of Everett Growth Management Comprehensive Plan Land Use Map (Ordinance 2021-94, January 1995) (Figure 2-3 of the main text). The designations contained in this map are essentially compatible with existing land uses as described above, with the exception of the Former Arsenic Trioxide Processing Area. The Former Arsenic Trioxide Processing Area is still zoned as single family residential.

A3.6.2 Environmental Impacts and Mitigation

A3.6.2.1 No Action Alternative

With this alternative, the present adverse impacts of the site on land use would continue. The Former Arsenic Trioxide Processing Area would remain undevelopable and in conflict with surrounding residential use and with the single family residential designation for the Former Arsenic Trioxide Processing Area itself. The existing conflicts between soil contamination and residential, recreational and public use would continue within the Peripheral Area.

A3.6.2.2 Off-Site Disposal Alternative

This alternative would have a beneficial impact on existing land-use conditions. In the Former Arsenic Trioxide Processing Area, all accessible soil contaminated above remediation levels would be removed and replaced with clean fill. This action would result in a surface layer of clean soil that meets the cleanup level. This would make the site suitable for any land use, including single family residential, which is its current zoning and is consistent with the surrounding residential use.

In the Peripheral Area, soils contaminated above the remediation level would be removed from the accessible portions of all properties up to a depth of approximately 4 feet, and then replaced with clean fill. This would result in a surface layer of clean soil that meets the cleanup level. This, together with institutional controls, would remove the existing incompatibility in this area between soil contamination and various land uses, particularly residential use. These changes would represent significant improvements in land-use conditions in both the Former Arsenic Trioxide Processing Area and the Peripheral Area.

A3.6.2.3 On-Site Containment Facility Alternative

This alternative would improve land-use conditions at the Former Arsenic Trioxide Processing Area somewhat. Within the Former Arsenic Trioxide Processing Area, soils classified as dangerous waste and as problem waste (contaminant levels exceeding the remediation levels) would be contained within an on-site containment facility (OCF) meeting the requirements for a hazardous/dangerous waste landfill, including engineered bottom liner and cap, and with at least 2 feet of clean fill in the surface portion of the cap. The clean surface layer would reduce public health risk (see Section A3.5) and reduce the incompatibility of the site with surrounding residential use. However, the site would still

be incompatible with surrounding residential use and could not be developed for residential use. The presence of the waste landfill would require a change in the present land-use designation and zoning (which is single family residential) for the Former Arsenic Trioxide Processing Area. The location of the OCF within a residential area would conflict with the siting criteria of the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). This alternative would also be inconsistent with the City of Everett's siting standards for hard-to-site facilities (EMC 41.150.C), because of the establishment of a hazardous/dangerous waste (not solid waste) landfill in a largely residential neighborhood. This is an adverse land-use impact. With changes to the City's Comprehensive Plan and Zoning Code, it is possible that the site could be developed for park, commercial, office, or institutional use. However, the incompatibility with the surrounding residential uses would remain. See Section 3.3.5 of the main text for a more detailed discussion of land-use issues for the site.

In the Peripheral Area, contaminated soil would be remediated identically to the Off-Site Disposal alternative. Therefore, existing conflicts between soil contamination and land use in the Peripheral Area would be removed in the same way as for the Off-Site Disposal alternative. This would be a significant beneficial impact.

A3.6.2.4 Consolidation Facility Alternative

This alternative would have a beneficial impact on existing land-use conditions. Within the Former Arsenic Trioxide Processing Area, soils classified as dangerous waste would be removed and remaining soil contaminated above the cleanup level (as well as the least-contaminated soil from the Peripheral Area) would be consolidated in the Former Arsenic Trioxide Processing Area and capped in compliance with Washington State Minimum Functional Standards for Solid Waste Handling (Chapter 173-304 WAC). The surface of the cap would include clean fill to a depth of 2 feet. This would reduce public health risk and reduce the incompatibility of the site with surrounding residential use to a greater extent than the On-Site Containment Facility alternative, because no dangerous waste would be left on site. The Former Arsenic Trioxide Processing Area would not be suitable for single-family residential use, and the present land-use designation and zoning (single-family residential) for the site would have to be changed. Unlike the containment alternative, however, the consolidation alternative would be consistent with the City's siting standards for hard-to-site facilities (EMC 41.150.C). With appropriate changes to the City's Comprehensive Plan and Zoning Code, the site might be developable for multi-family residences, if adequate institutional controls could be assured to provide less potential for exposure to contamination remaining on site. Park, commercial, office, or institutional use of the site might also be possible with changes to the Comprehensive Plan and Zoning Code. All of these possible reuses would require adequate institutional controls and site buffers. Any development of the site would have to be approved by Ecology. See Section 3.3.5 of the main text for a more detailed discussion of land-use issues for the site.

In the Peripheral Area, contaminated soil would be remediated in the same way as under the Off-Site Disposal alternative. Therefore, the existing incompatibility in this area

between soil contamination and various land uses would be removed in the same manner as under the Off-Site Disposal alternative. This would be a significant beneficial impact.

A3.6.2.5 Mitigating Measures

Under each action alternative, the proposed institutional controls are expected to minimize conflicts between the smelter site and surrounding land uses, and between soil contamination and residential use in the Peripheral Area, in the long term. Compatibility of the Former Arsenic Trioxide Processing Area with the surrounding residential use would be maximized by development of the site for residential use. This could occur under the Off-Site Disposal alternative, and possibly under the Consolidation Facility alternative (multi-family residential use), if adequate institutional controls could be assured.

A3.7 Housing

A3.7.1 Affected Environment

Within the Everett city limits there are approximately 35,400 residential units; 17,600 of these are single family units and 17,800 are multi-family units (apartments and duplexes). Approximately 595 residential units lie with the CPM boundary. Twenty-four (24) single family units have been removed from within the Former Arsenic Trioxide Processing Area.

While it is difficult to quantify the effect of the smelter site on property values, it is generally agreed that the presence of the site (and knowledge of its existence) has had an adverse effect on values in the site area. This effect has probably been greater in the immediate vicinity of the site than in the more peripheral areas within the CPM boundary (Jonnett, 1998).

A3.7.2 Environmental Impacts and Mitigation

A3.7.2.1 No Action Alternative

With this alternative, the Former Arsenic Trioxide Processing Area would not be redeveloped, and the housing that has been lost at the site would not be replaced. This would have a small negative effect on the housing supply in Everett. The existing conflict between soil contamination and residential use in the surrounding area would continue, as discussed in Section A3.6.

A3.7.2.2 Off-Site Disposal Alternative

Under this alternative, the site could be developed for single family residential use (the current designation) following remediation. This would have a beneficial but insignificant impact on the Everett housing supply. Redevelopment of the site would be the topic of a separate SEPA review.

Remediation of the site under this alternative would be expected to result in increased property values within the CPM boundary, compared with existing conditions. Quantifying this increase is speculative at this time, but the effect would likely be greatest in the immediate vicinity of the Former Arsenic Trioxide Processing Area.

A3.7.2.3 On-Site Containment Facility Alternative

Following remediation under this alternative, the site could not be developed for residential use, and the housing that has been lost at the site would not be replaced. This would have a very small negative impact on the Everett housing supply. Redevelopment of the site would be the topic of a separate SEPA review.

Remediation of the site under this alternative would be expected to result in increased property values within the CPM boundary, compared with existing conditions. Quantifying this increase is speculative at this time, although it would probably be less than for the Off-Site Disposal alternative, because contaminated soil would be left on site (contained) under this alternative.

A3.7.2.4 Consolidation Facility Alternative

Under this alternative, the site may be developable for multi-family residential use following remediation, if adequate institutional controls could be assured, and the necessary Comprehensive Plan and Zoning Code changes made (see Section 3.3.5 of the main text). This would have a beneficial but insignificant impact on the Everett housing supply. It is not certain at present that multi-family residential use would be possible. Redevelopment of the site would be the topic of a separate SEPA review.

Remediation of the site under this alternative would be expected to result in increased property values within the CPM boundary, compared with existing conditions. Quantifying this increase is speculative at this time, although it would probably be less than for the Off-Site Disposal alternative, because contaminated soil would be left on site (consolidated/capped) under this alternative.

A3.7.2.5 Mitigating Measures

The impact of the loss of housing that has occurred at the Former Arsenic Trioxide Processing Area could be reversed if the site could be developed for residential use, under the Off-Site Disposal alternative and possibly the Containment Facility alternative (multi-family only). The feasibility of multi-family residential development would be enhanced through development of institutional controls to minimize the likelihood of exposure of residents to contaminated soil.

A3.8 Aesthetics, Light and Glare

A3.8.1 Affected Environment

Existing land use at the project site and surrounding area is shown in Figure A3-4. The predominant land use is residential, both single family and multiple family. Broadway bisects the project site in a roughly northeast/southwest direction. Land use adjacent to Broadway in the southern portion of the project area is commercial, while the northern portion is mixed residential and commercial.

Single family residential housing east of Broadway is typically of older construction, e.g., more than 30 years old. The City of Everett Growth Management Comprehensive Plan Land Use Map designates these properties as single-family detached, 10-12 dwellings per gross acre. These homes are usually single story, less than 1,500 square feet, and sit on small lots. Garages, if they exist, are generally single-car detached. The homes are closely spaced. Landscaping is non-uniform, with older, established trees, shrubs, and yards. Views from the homes are, in most cases, of the neighborhood surroundings. Some homes situated on the eastern portion of the project site, on both sides of Marine View Drive, have views of the Snohomish River and the Cascade Range.

West of Broadway, homes surrounding the golf course are newer and larger and sit on larger lots. The City of Everett Growth Management Comprehensive Plan Land Use Map designates these properties as single-family detached, 5-10 dwellings per gross acre. Single family homes in this portion of the project area have been built within the past 25 years, are two-story, split-level or ramblers, approach 2,000 square feet, and generally have attached two-car garages. The homes are more widely spaced. Landscaping is younger, but better maintained and more uniform. Views from homes here include neighborhood surroundings and some views of Legion Park and the golf course. Some homes are located on the west side of Alverson Boulevard and these have unimpeded views of the Everett waterfront, Puget Sound, and Whidbey Island.

Multi-family residences only occur east of Broadway. Unpaved areas are typically covered with lawns, but these housing complexes do not usually have other landscaping. These residences are typically located in areas with views of only the surrounding neighborhood.

Single family residences were built in the Former Arsenic Trioxide Processing Area after the process facilities were demolished, and the area is still zoned for single-family residential use at 10-12 dwellings per gross acre. As part of the smelter area investigation, these homes were torn down and only the foundations remain in place behind chain link fencing. Some of the original landscaping is still extant. The Former Arsenic Trioxide Processing Area includes some of the best view property in the project site. Homes sited here had views of the Snohomish River and the Cascade Range. As the time to site redevelopment increases, there is a potential for undesirable land uses (vagrants, vandalism, etc.). Implementation of any of the alternatives should start at the

Former Arsenic Trioxide Processing Area so redevelopment, and new land uses, could minimize these undesirable land uses.

Three parks are also included in the project area. Wiggums Hollow and Legion Memorial Park are large, open parks with recreational amenities. The Viola Oursler Overlook is basically a small parking lot with some benches and landscaping with a viewpoint looking north and east over the Snohomish River.

Lighting in the project area includes brightly-lit streets and businesses in the Broadway commercial area, street lighting on the primary arterials in the neighborhoods, and residential house lighting. Legion Memorial Park has some area lighting near the parking lots and picnic areas, but the balance of the park is unlit.

A3.8.2 Environmental Impacts and Mitigation

A3.8.2.1 No Action Alternative

The No Action alternative would have no positive or negative impacts to the existing aesthetics of the CPM area and the Former Arsenic Trioxide Processing Area. Foundations of demolished houses and the fencing around the Former Arsenic Trioxide Processing Area would remain in place.

A3.8.2.2 Off-Site Disposal Alternative

The most significant short-term aesthetic impact would be the disruption of existing yards during the residential soil removal and backfilling operations. Cross fencing would have to be removed. Moveable structures would have to be temporarily relocated. Sidewalks and driveways may be inadvertently or unavoidably damaged during construction. There is a high probability of severing a water, sewer or power line during the excavation process. Many pieces of construction equipment (dump trucks, backhoes, and dozers) would be in the neighborhoods exposing and moving bare dirt. Each homesite would be adversely impacted by construction-related activities. Once the clean soil is placed, the landscaping and lawns would be replanted and other structures replaced as necessary.

The long-term impacts of this disruption would be insignificant in the areas west of Broadway. Because the homes are spaced farther apart, the excavation process would be simpler. Major trees and shrubs could be worked around. The replanting project would return the surrounding neighborhood to a condition similar to pre-construction conditions.

East of Broadway, the soil removal and replacement program would have a positive impact. The replanted landscaping would bring the neighborhood to an overall condition improved over the present situation.

Lighting or glare in the project area would be adversely impacted only if construction were permitted at night. Bright construction lighting in neighborhoods would not be consistent with the low-light nature of the existing house lighting.

This alternative would have a beneficial impact on aesthetics within the Former Arsenic Trioxide Processing Area. The existing house foundations would be removed and replaced with clean soil, thus allowing the area to return to residential use. The alternative would include grading and revegetation to prevent erosion. Residential construction plans and any resulting landscaping that may occur after remediation as redevelopment actions are not part of the remedial plans being evaluated in this analysis. Since on-site soils would meet remediation levels, no security fencing or site lighting measures would be required. It is expected that redevelopment at the Former Arsenic Trioxide Processing Area could occur very quickly, depending upon the desires of the current property owner, since this is good view property in the City of Everett. Constructing this alternative would not impede views from houses at or near the Former Arsenic Trioxide Processing Area.

A3.8.2.3 On-Site Containment Facility Alternative

This alternative would also have a beneficial impact on aesthetics within the Former Arsenic Trioxide Processing Area. The visual appearance at the surface would be improved, as the existing house foundations would be removed and replaced with clean soil. The alternative would include grading and revegetation to prevent erosion.

However, since contaminated soils would be left on-site in the OCF, redevelopment of the Former Arsenic Trioxide Processing Area is not expected to occur as readily as for the Off-Site Disposal alternative. The site elevation would average approximately 4 feet higher than present grade. This increased elevation would change the nature of the existing views for residents situated west and south of the Former Arsenic Trioxide Processing Area. This elevation change may also slightly impede the territorial views afforded these same residents. Unless and until redevelopment occurs, the site would remain secure behind gated and locked fencing. The site landscaping would have to be maintained until the site was redeveloped.

Impacts for this alternative to the Peripheral Area (beyond the Former Arsenic Trioxide Processing Area) would be the same as those for the Off-Site Disposal alternative.

A3.8.2.4 Consolidation Facility Alternative

Impacts for this alternative would be the same as those for the On-Site Containment Facility alternative. The site elevation at the Former Arsenic Trioxide Processing Area would be approximately 4 feet higher than present grade. This increased elevation would change the nature of the existing views for residents situated west and south of the Former Arsenic Trioxide Processing Area. This elevation change may also slightly impede the territorial views afforded these same residents. This alternative differs from the On-Site Containment Facility alternative in that dangerous wastes would not be left on site. Since only problem wastes would be consolidated on site, the Former Arsenic Trioxide Processing Area may be more desirable for redevelopment than it would be for the On-Site Containment Facility alternative. This may cause redevelopment to occur sooner than it would for the On-Site Containment Facility alternative.

A3.8.2.5 Mitigating Measures

There are no effective mitigating measures for the short-term, construction-related, aesthetic impacts other than limiting construction to week days and normal day-time working hours.

Vacant property tends to attract undesirable uses. Site lighting and low growing vegetation would allow security personnel to better patrol and disperse unwanted uses. Any site lighting should be screened from surrounding homes to reduce undesirable glare.

A3.9 Parks and Recreation

A3.9.1 Affected Environment

There are three parks located within the CPM boundary: Wiggums Hollow Park, Viola Oursler Overlook, and Legion Memorial Park. Wiggums Hollow Park is a small, 5-acre property that primarily serves the residents of the surrounding neighborhoods. It is situated along Pine Street between 10th and 11th Streets (see Figure A3-5). The park has an asphalt parking lot with space for approximately 12 cars located at the northwest end. Evergreen trees provide a vegetation buffer between the parking area and the remainder of the park. Recreation areas include two playground areas with outdated play equipment, a baseball/softball field, and a basketball court. The majority of the park is grassy open space.

Viola Oursler Overlook occupies 1.8 acres along East Marine View Drive just south of Butler Street. The overlook provides access to the view of the Snohomish River valley. The park includes an asphalt parking area for four cars, a terrace area paved with red bricks, several benches, and small areas of landscaping. There is minimal exposed soil at this location. It was constructed after discovery of the Everett Smelter Site.

Legion Memorial Park is classified as a regional facility and serves as the City of Everett's main recreational area for the northern end of the city. Legion Memorial Park and the Legion Memorial Golf Course encompass 142 acres with the majority of acreage consumed by the golf course. The golf course has recently undergone a major renovation and independent cleanup action. The City of Everett has submitted an independent cleanup action report for Ecology review under Ecology's Voluntary Cleanup Program. It is currently in review to assess the adequacy of the cleanup actions.

Figure A3-5: Parks Located within the CPM Boundary.

Although the data that were analyzed in Section A2.2 do not indicate contamination exceeding the cleanup level is present in Legion Memorial Park, the park is nonetheless included in the CPM area. Additional sampling to be conducted in conjunction with the remedial action would be used to further characterize contamination in this area. A large parking lot runs down the center of the park; however, the majority of the space within the park is unpaved. Recreational spaces within the park include a newly constructed children's play area, picnic areas, baseball/softball fields, open spaces, scenic overlooks, a community meeting hall, and an arboretum. The City of Everett's horticultural offices and greenhouses and Cascade High School's landscaping facilities are located within the boundaries of Legion Memorial Park. The park is characterized by numerous plantings of mature trees and shrubs.

A3.9.2 Environmental Impacts and Mitigation

A3.9.2.1 No Action Alternative

The No Action alternative would not result in any changes to existing conditions at the parks. There would be no construction activities in conjunction with this alternative; therefore, there would be no short-term impacts to the parks. The No Action alternative would not reduce the long-term impacts resulting from continued potential exposure to contaminated soils. Because of the varied recreational uses currently supported by the parks, the public has the potential to come into contact with contamination above the cleanup/remediation levels established by Ecology in a number of ways. Current contact scenarios include children playing within the parks, adult and youth volunteers planting and maintaining landscaping, and city crews performing maintenance activities.

A3.9.2.2 Off-Site Disposal, On-Site Containment Facility, and Consolidation Facility Alternatives

Under the action alternatives, soil with arsenic concentrations exceeding remediation levels would be removed to a depth up to 4 feet. Because the remedial actions at the parks would be identical regardless of the action alternative implemented, the impacts to the parks associated with these three alternatives would also be identical.

There would be adverse short-term impacts on the City of Everett parks located within the CPM area during remediation activities. The significant impacts to the parks due to remediation include temporary loss of public spaces and the potential loss of mature plants. Public access would be restricted to the parks during the period required to excavate and remove contaminated soil as well as the time period required to allow vegetation to become re-established.

Remediation activities could also result in the loss of mature vegetation. Although remediation measures may include hand excavation around the roots of trees, certain species of trees and shrubs are acutely susceptible to root zone disturbances. Large trees such as cedars may slowly decline over several years as a result of excavation within their drip lines. Legion Memorial Park is a well-established area with mature shrubs and numerous mature trees of various species. The quality of the parks is expected to be

adversely affected by the loss of large established trees and shrubs. Although vegetation can be replanted, it would take decades for the new plants to reach sizes similar to current plants. In addition, the slow decline of vegetation could cause concerns of public safety and additional financial strain on the city parks department. As 100-foot cedar trees decline, branches may become hazards to people walking beneath the tree's canopy.

The primary long-term impact to the parks and recreation facilities within the CPM area would be beneficial. The remediation would eliminate any potential public contact of soils with concentrations of arsenic and other metals above the cleanup/remediation levels determined by Ecology.

A3.9.2.3 Mitigating Measures

Mitigation would include replacement/replanting of any plant adversely affected during the excavation activities. In addition, a fund could be established to assist in monitoring, pruning, removing, and replacing plants that decline over a period of time. Although these mitigating measures would assist in minimizing the financial impacts of the remediation efforts, the remediation is expected to adversely alter the aesthetics of the current parks. Site specific remediation plans for the parks would require review and approval by the City of Everett Parks Department. In addition, the City of Everett Parks Department may require oversight by an arborist or horticulturist when construction is required around sensitive plantings.

Mitigation for large established trees and shrubs could include the option of not excavating in the root area but rather placing permeable geofabric mats and covering the fabric with a thin layer of mulch or bark. An educational program would need to be established to ensure that the City of Everett Parks employees responsible for maintenance in these areas are aware of the remaining contamination and the proper procedures for minimizing potential exposures. Institutional controls would be required to maintain these barriers.

Other mitigating measures could include remediation of park property as early in the construction season as possible to minimize the amount of time public use of the property would be restricted. Reseeding and revegetation would best be accomplished during the spring when the weather is warm enough to allow for seed germination, but not so hot as to stress newly planted vegetation. In addition, sod could be used to quickly establish vegetation in critical areas such as ball fields to minimize the amount of time access would need to be restricted.

A3.10 Transportation

A3.10.1 Affected Environment

Broadway Avenue and Marine View Drive serve as the primary transportation routes in the CPM area. The remainder of the roads in the CPM area are secondary streets primarily serving residential neighborhoods.

Broadway serves as the primary north/south route passing through the City of Everett and continues northward to Marysville as State Route 529 (see Exhibit 1 for locations of streets and roads discussed herein). The portion of Broadway passing through the CPM area is a four-lane arterial road, with a stoplight located at 8th Street and another at Tower Street. The intersection of Broadway and Marine View Drive is a cloverleaf overpass structure located within the footprint of the former smelter (Broadway overpass). The current speed limit on Broadway is 40 miles/hour. The average daily traffic volume on Broadway in the vicinity of the CPM area is not available from City of Everett studies. Accident rates for Broadway or other arterials within the CPM boundary are also not available.

Marine View Drive is a U-shaped arterial road separating the Upland Area from the Lowland Area along the eastern and northern portions of the CPM area. Marine View Drive provides southbound access to Interstate Highway 5 (I-5) immediately south of the CPM area. It is a two-lane arterial between I-5 and Broadway, and becomes a four-lane arterial on the northwest side of the Broadway overpass. There are two stoplights on Marine View Drive within the CPM boundary: one located at 12th Street and the second immediately northwest of the Broadway overpass. There is also a flashing traffic signal on Marine View Drive located immediately southeast of the Broadway overpass. The speed limit on Marine View Drive is 30 miles/hour in the vicinity of I-5, increasing to 35 miles per hour in the vicinity of Broadway.

A3.10.2 Environmental Impacts and Mitigation

A3.10.2.1 No Action Alternative

The No Action alternative would not result in any additional traffic within or beyond the CPM area; therefore this alternative would result in no impacts due to transportation.

A3.10.2.2 Off-Site Disposal Alternative

This subsection discusses construction-related transportation impacts assuming all on-site and off-site hauling is by truck. The rail haul option is discussed in Section A3.10.2.5.

Because of the narrow residential streets in much of the CPM area, it is assumed that dump trucks with a 10-cubic yard capacity would be used to transport soil from the excavation sites to a central stockpile/load-out area. The load-out area would be located across Marine View Drive in the Lowland Area. This area would be used to transfer the excavated soil into truck-trailer combination loads of approximately 20 cubic yards for long-haul transport to the disposal facilities. To evaluate the transportation impacts, the following assumptions have been developed:

- Trucks would use the most direct route from the excavation site to arterial roads (Broadway and Marine View Drive).

- Trucks would not pass through neighborhoods outside of the CPM area except to transport soil off site.

- All trucks originating from the neighborhoods would be directed to the load-out facility to allow soil to be aggregated into larger loads.

- The typical on-site haul would consist of a short haul on residential side streets and a longer haul on either Broadway or East Marine View Drive (Figure A3-6).

- Access to the Former Arsenic Trioxide Processing Area would be via the ramp from northbound Broadway to East Marine View Drive that connects to 5th Street.

- The off-site haul route from the stockpile area would be along East Marine View Drive to I-5.

The primary transportation impacts include increased traffic, potential for accidents, fugitive dust, noise, and air emissions from the trucks. Noise and air impacts are discussed in separate sections of this Appendix.

Contaminated Soil Transport

Under this alternative, 29,000 cubic yards of dangerous waste soil would be hauled to a Subtitle C landfill, assumed to be in Arlington, Oregon (Table A3-2). Also, 235,000 cubic yards of problem waste soil would be hauled to a Subtitle D landfill, assumed to be in Roosevelt, Washington. The dangerous waste soils would originate primarily from within the Former Arsenic Trioxide Processing Area, with only 4,000 cubic yards being excavated from properties outside this area. Of the problem waste soil, 73,000 cubic yards would originate from the Former Arsenic Trioxide Processing Area; the rest would originate from the residential neighborhoods east and west of Broadway. Construction activities in the Former Arsenic Trioxide Processing Area (i.e., excavating and backfilling 98,000 cubic yards of soil) are estimated to take approximately 70 days to complete.

Based on volume estimates, an average of 300 cubic yards of soil would be removed from each residence. The average home would require five to seven days to complete (clear, excavate, backfill, replant, and demobilize). Assuming soil would be transported from the neighborhoods in trucks with a 10-cubic yard capacity, this would require 30 truckloads of soil to be moved within approximately 20 working hours, or 1 truck every 40 minutes. Assuming five work areas simultaneously undergoing remediation, a truckload of soil would be leaving the CPM area and arriving at the load-out facility every 8 minutes. Approximately 130 homes would be cleaned up each construction season. This work would take approximately five years to complete assuming construction occurs from May through October each year. Because the CPM covers over 400 acres, the homesites undergoing cleanup at any one time would be far apart. Thus, in a particular localized neighborhood, it would appear as if only 1 truck every 40 minutes were operating.

Figure A3-6: Typical Haul Routes.

Table A3-2: Disposal Destinations and Estimated Volumes of Excavated Materials.

Alternative	Disposal Destination	Origin Area	Criteria (ppm arsenic)	Volume (cubic yards)
Off-Site Disposal	Arlington	All Areas	>3,000	29,000
	Roosevelt	All Areas	20 - 3,000	235,000
On-Site Containment	Arlington	Fenced Area*	>20,000	15,000
	On-Site Containment Facility	Fenced Area	3,000 - 20,000	10,000 (1)
		Peripheral Areas	3,000 - 20,000	4,000
	On-Site Consolidation Facility	Fenced Area*	< 3,000	Left in place (2)
		West of Broadway	<100	29,000
	Roosevelt	East of Broadway	<3,000	92,000
		West of Broadway	<3,000	41,000
Consolidation	Arlington	All Areas	>3,000	29,000
	On-Site Consolidation Facility	Fenced Area*	< 3,000	Left in place (2)
		East of Broadway	<100	10,000
		West of Broadway	<100	32,000
	Roosevelt	East of Broadway	<3,000	82,000
		West of Broadway	<3,000	38,000

* Former Arsenic Trioxide Processing Area.

Note 1: This material would be stockpiled within the Former Arsenic Trioxide Processing Area, then put into the OCF.

Note 2: An estimated 73,000 cubic yards in the Former Arsenic Trioxide Processing Area has arsenic concentrations < 3,000 mg/Kg

It was assumed that soil classified as dangerous waste would be transported to Arlington, Oregon for disposal in a Subtitle C landfill. Arlington, Oregon is located approximately 337 miles southeast of Everett along the Washington/Oregon border in north central Oregon (Figure A3-7). Egress from the stockpile area is 1.5 miles south along East Marine View Drive to I-5. The planned route would be I-5 south to Oregon and then I-84 east to the landfill site. Once on I-5, the entire route from Everett to Arlington is over four-lane interstate highways. The route segments and mileage are listed in Table A3-3. Approximately 1,450 truck trips at 20 cubic yards per trip would be required to transport the dangerous waste to Arlington.

It was assumed that all soil classified as problem waste would be transported to Roosevelt, Washington for disposal in a Subtitle D landfill. Roosevelt, Washington is located approximately 339 miles southeast of Everett along the Washington/Oregon border in close proximity to the Arlington landfill. With the exception of 34 miles of two-lane paved roads, the route to Roosevelt is also four-lane interstate highway.

Figure A3-7: Transportation Routes to Roosevelt, Washington and Arlington, Oregon for Off-Site Disposal.

Table A3-3: Mileage to Disposal Facility.

Origin / Destination	Route Segment	Mileage
Everett to Roosevelt	I-5 South	200
	I-84 East	105
	US-97 East	2
	SR-14 East	32
	Total	**339**
Everett to Arlington	I-5 South	200
	I-84 East	137
	Total	**337**
Backfill from Mount Vernon	I-5 South	28
	SR-529 South	3
	Total	**31**

Approximately 11,750 truck trips at 20 cubic yards per trip would be required to transport the problem waste soil to Roosevelt.

The portion of Marine View Drive that would be used as the access route to I-5 for off-site transport is a two-lane arterial through mainly residential neighborhoods. Assuming the excavation schedule previously described, a 20-cubic yard capacity truck would traverse this section of Marine View Drive on its way to the off-site disposal facilities every 8 minutes. The impacts due to transportation for this portion of the off-site transportation route are similar to those described for local transportation.

For evaluation purposes, it was assumed that these truck trips would occur over a five-year period, with construction occurring six months per year and 20 days per month. This would result in 22 additional trucks per day on I-5. Given the normal volume of traffic (133,000 vehicles/day in 1996 on I-5 in the vicinity of the site) on the four-lane interstate highways that comprise the routes to Arlington and Roosevelt, the additional vehicles created by the remedial action are not expected to significantly impact traffic flow. There is a potential impact from the off-site haul from accidental spills and traffic accidents.

Based on 1996 accident rates from the Washington State Department of Transportation, statistically this alternative is expected to result in 11 accidents during off-site transport of contaminated soil. Statistically, less than one fatal accident is expected to occur during implementation of this alternative. Accident rates for the Broadway and Marine View Drive routes are not available; potential accidents along these routes are not included in the total projected count.

Clean Backfill Transport

To fill the excavation at the Former Arsenic Trioxide Processing Area, 98,000 cubic yards of clean soil would be required. Each residential property would require 300 cubic yards of clean soil for backfill, totaling another 166,000 cubic yards over the assumed five-year construction period.

Following excavation activities at the Former Arsenic Trioxide Processing Area and individual residences, the excavations would be backfilled with clean soil. A typical residence would require 2 days to complete backfill operations, resulting in 1 truckload of clean soil delivered to a residence every 32 minutes, or a total of 30 truckloads per residence.

For evaluation purposes, it was assumed that an adequate supply of backfill would be available from nearby Skagit County. The backfill would be transported via trucks with a 20-cubic yard capacity to a central stockpile area located in the vicinity of the train load-out facility. The transportation route between Mount Vernon and the CPM area includes 28 miles on a four- to six-lane interstate highway (I-5) and 3 miles on a four-lane arterial (State Route 529). Transport of the estimated 264,000 cubic yards of material needed for backfill would require approximately 13,200 truckloads of clean soil to traverse this route over the life of the remediation project. Based on the Washington State Department of Transportation statistics, there is a potential for 0.8 accidents while hauling this backfill material to the stockpile area over the assumed five-year project duration. Statistically, less than 1 fatal accident is statistically projected to occur during hauling of backfill material.

A3.10.2.3 On-Site Containment Facility Alternative

This subsection discusses construction-related transportation impacts assuming all on-site and off-site hauling is by truck. The rail haul option is discussed in Section A3.10.2.5.

Contaminated Soil Transport

Under this alternative, 15,000 cubic yards of dangerous waste would be excavated from the Former Arsenic Trioxide Processing Area and hauled to the stockpile area for transport to off-site disposal at Arlington. Also, 4,000 cubic yards of dangerous waste soil would be brought into the Former Arsenic Trioxide Processing Area from the Peripheral Area for placement into the OCF. In addition, 29,000 cubic yards of problem waste soil would be brought into the Former Arsenic Trioxide Processing Area from the Peripheral Area for placement under the consolidation cap. In the neighborhoods, an additional 133,000 cubic yards of problem waste soil would be excavated and transferred to the stockpile area for transport to Roosevelt.

The significant traffic difference between this alternative and the previous alternative is the quantity of soil requiring off-site disposal. Construction of an OCF and capped consolidation area within the Former Arsenic Trioxide Processing Area would require

only 168,000 cubic yards of soil to be transported long distance to the disposal sites, as compared to 264,000 cubic yards of soil in the Off-Site Disposal alternative.

Excavation activities within the CPM area would be conducted in the same manner as described for the Off-Site Disposal alternative. The soil excavated from the individual residences would be transported to the stockpile/load-out area via 10-cubic yard capacity trucks. Once at the load-out area, soil would be transferred into larger 20-cubic yard trucks for transport to the off-site disposal facility. Soil transported to the Former Arsenic Trioxide Processing Area would be timed so its incorporation into the OCF/consolidation area would not require stockpiling.

As presented in Table A3-2, the disposal location of the excavated soil would depend on the origin of the soil and its arsenic concentration. All soil with an arsenic concentration exceeding 20,000 ppm would be transported to Arlington for off-site disposal; based on current volume estimates, very little soil volume is expected to exceed this concentration in areas outside of the Former Arsenic Trioxide Processing Area. Soil from all areas within the CPM area with arsenic concentrations between 3,000 and 20,000 ppm would be incorporated into the OCF.

Due to the reduced volume of soil requiring off-site transport, the number of accidents statistically projected to occur is reduced to 6 for this alternative. Of these, less than 1 fatal accident is projected to occur. Accident rates are not available for Broadway and Marine View Drive; potential accidents along these routes are not included in the total projected count.

Clean Backfill Transport

To construct the on-site containment and consolidation facilities at the Former Arsenic Trioxide Processing Area, clean imported gravel, fill soil, and topsoil would be required for drainage layers and final cover material. This would require import of 23,000 cubic yards of clean materials to the stockpile area and then to the Former Arsenic Trioxide Processing Area. Backfill requirements in the neighborhoods would be similar to those discussed for the Off-Site Disposal alternative. The total backfill material quantity is estimated to be 189,000 cubic yards. The number of accidents that are projected to occur in hauling backfill material is 0.6, based on Washington State Department of Transportation (WSDOT) accident statistics. Statistically, less than 1 fatal accident is statistically projected to occur during hauling of backfill material.

A3.10.2.4 Consolidation Facility Alternative

This subsection discusses construction-related transportation impacts assuming all on-site and off-site hauling is by truck. The rail haul option is discussed in Section A3.10.2.5.

Contaminated Soil Transport

The consolidation facility in this alternative would accommodate approximately the same volume of contaminated soil at the Former Arsenic Trioxide Processing Area as the OCF

alternative. However, since only problem waste would be accommodated in the consolidation facility, this alternative would result in a greater percentage of the soil transported off site being dangerous waste. Under this alternative, 29,000 cubic yards of dangerous waste would be transported to the stockpile area for long-hauling to Arlington. Also, 119,000 cubic yards of problem waste would be transported to the stockpile area for long-hauling to Roosevelt. In addition, 42,000 cubic yards of problem waste would be moved from the surrounding neighborhoods and placed under the cap of the consolidation facility in the Former Arsenic Trioxide Processing Area.

The environmental impacts resulting from the transportation requirements for this alternative would be nearly identical to the impacts described for the On-Site Containment Facility alternative. The total volume of soil hauled over the freeway systems from Everett to the destination landfills would be identical to that hauled in the On-Site Containment Facility alternative. The difference in the two alternatives would be the variation in soil arsenic concentration in hauled soil. In this alternative, 14,000 more cubic yards of dangerous waste would be hauled than in the On-Site Containment Facility alternative. This could produce temporary impacts from potential accidents involving dangerous waste. These accidents or spills would be potentially more environmentally damaging than a spill of problem waste. Spills of dangerous waste would be readily cleaned up using standard dirt moving equipment and there would be no long lasting impacts.

Based on the soil volumes requiring off-site transport, 6 accidents are projected to occur for this alternative. Of these, five accidents would occur for trucks hauling problem waste and one for trucks hauling dangerous waste. Less than 1 fatal accident is projected to occur during this alternative. Accident rates are not available for Broadway and Marine View Drive; potential accidents along these routes are not included in the total. Statistically, less than 1 fatal accident is statistically projected to occur during hauling of backfill material.

Clean Backfill Transport

Construction of the consolidation facility at the Former Arsenic Trioxide Processing Area would involve importing 20,000 cubic yards of clean fill, gravel, and topsoil to the stockpile area and then to the Former Arsenic Trioxide Processing Area. Backfill requirements in the Peripheral Area neighborhoods would be similar to those discussed for the Off-Site Disposal alternative. The total backfill material quantity is estimated to be 186,000 cubic yards. The number of accidents that are projected to occur in hauling backfill material is 0.5, based on WSDOT statistics.

A3.10.2.5 Rail Haul Option

Off-site transportation of the excavated materials by trains and railcars appears to be an attractive option due to the close proximity to the site of an existing railcar load-out facility. The company that handles the trash disposal for the region maintains a rail load-out facility in the lowland CPM area just southeast of the Former Arsenic Trioxide Processing Area. Currently, trash is hauled to the load-out facility by truck, loaded onto

railcars, and transported to the company's landfill in Roosevelt, WA. The load-out facility is currently permitted to handle problem waste. Additional permitting would be required to allow the facility to handle excavated material designated as dangerous waste. Alternatively, this material could be loaded onto rail at an existing load-out facility located in Seattle, which is operated by a different company that handles dangerous waste material for transport to the landfill in Arlington, Oregon.

The load-out facility in Everett currently sends two trainloads of trash to the Roosevelt landfill facility each day, except during the peak season when there are three trainloads per day. These trains are dedicated to hauling of waste material to the landfill (i.e., no other cargo). The rail route parallels the route assumed for the truck hauling option. The capacity of each trainload is 7,000 to 9,000 tons (approximately 8,000 tons per trip). The actual trash loads are less than capacity, so there is some excess capacity available each day within the existing train trips that could accommodate hauling of excavated material from the cleanup actions.

For the cleanup actions in the Peripheral Area, the rate of soil excavation would be the same for all three of the action alternatives. The excavation rate for the Peripheral Area is estimated to be about 300 tons per homesite excavated in two to three days, with up to five homesites being excavated concurrently by five different crews working in five different cleanup areas at once. This would generate soil for rail transport at a maximum rate of 500 to 750 tons/day, which is only about three to five percent of the daily trainload capacity already going to the landfill (i.e., 16,000 tons/day in two trips). This percentage would represent an insignificant increase in the existing rail traffic, and could be readily added to the existing trainloads without causing any additional train trips (Thompson, 1999). Because no new train trips would be generated due to remediation of the Peripheral Area, the use of rail for hauling the soil to the landfill would not result in any significant transportation impact or additional risk due to rail traffic accidents.

For the cleanup actions in the Former Arsenic Trioxide Processing Area, the rate of soil excavation would be somewhat greater than that for the Peripheral Area, and would vary for each alternative. The excavation rate would be the highest for the Off-Site Disposal alternative, which is estimated to be approximately 98,000 cubic yards (see Table A2-2) excavated over 50 days (see Table 1 in Attachment A1). Assuming a density for loose excavated soil of about 75 pounds per cubic foot, this alternative would generate soil for hauling at a rate of approximately 2,000 tons/day, or about 13 percent of the current daily trainload capacity. This percentage may or may not be able to fit within the existing train trips, so new train trips might be generated. At most, the increased number of train trips would be in proportion with the increased tonnage, or about 13 additional trips (based on 13 percent times 2 trips per day times 50 days duration for excavation). Based on a haul distance of 680 miles per round trip and a statistical accident rate of about four accidents per million train miles (Federal Railroad Administration 1999), the number of potential accidents projected for this increased train traffic is estimated to be about 0.035 for this alternative. Since this projection is far less than 1 potential accident for the entire project, the impacts of the rail option for this alternative are not significant. The number of additional train trips due to cleanup actions in the Former Arsenic Trioxide Processing Area would be less for the On-Site Containment Facility and Consolidation Facility

alternatives than for the Off-Site Disposal alternative because the volume of excavated soil would be considerably less (i.e., 15,000 cubic yards for the containment alternative and 25,000 cubic yards for the consolidation alternative). Therefore, the impacts of the rail option for these two alternatives would also be not significant.

The discussions in the previous subsections indicate an expected accident rate of six to eleven accidents, depending on the alternative, if the truck hauling option were used for contaminated material transport. Therefore, the truck hauling option is expected to have somewhat greater traffic impacts than the rail haul option.

A3.10.2.6 Mitigating Measures

The type of waste being hauled would affect the potential impacts due to a spill of the arsenic-contaminated soil. Arsenic-contaminated soil is not readily ignitable or explosive and does not migrate quickly through the soil. Impacts could occur to surface soils, storm drains, receptors for air emissions, receptors for direct contact with the waste, and control, cleanup, and medical response services and their personnel. Having a well-established emergency response plan and professionals trained in plan implementation could mitigate impacts due to spills. Emergency response measures would include installation of temporary barriers and covers to minimize contaminant mobility due to precipitation or wind, site access restrictions to prevent direct contact with the waste by the public, and reporting procedures to alert appropriate emergency response teams and regulatory agencies.

Because impacts due to traffic are projected to be less for rail transport than for truck hauling to off-site landfills, the rail option should be utilized as much as practicable in order to mitigate hauling impacts. The impacts to local traffic in the project area could be mitigated by measures that would optimize traffic flow throughout the CPM area. Flaggers could be placed at critical intersections to keep traffic flowing and minimize potential accidents. The primary point of ingress and egress to the Former Arsenic Trioxide Processing Area is from East Marine View Drive and onto 5th Street. This route would tend to limit the traffic in neighborhoods. Work could be staged so empty trucks do not drive through neighborhoods. Liners could be used so trucks could carry clean backfill material on the return trip from transporting contaminated soil to the stockpile/load-out facility. This would reduce the amount of truck traffic by one half. Mitigation could also include varying the number of work areas. One truck would be entering and leaving every 40 minutes per work area—not a lot of traffic. Five work areas would have 1 truck entering and leaving the stockpile area every 8 minutes—still not a lot of traffic. Work areas could be staged to avoid accumulation of traffic in a localized area (i.e., the number of work areas could be spread throughout the CPM area so no one work area results in much local traffic).

A3.11 Noise

A3.11.1 Affected Environment

A3.11.1.1 Background Information on Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness.* Pitch is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1 of Attachment A2.

There are several methods of characterizing sound. The most commonly used is the *A-weighted sound level* or *dBA.* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2 of Attachment A2. Because sound levels can vary markedly over a short period, a method for describing either the average character of the sound or the statistical behavior of the variations must be used. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night—because excessive noise interferes with the ability to sleep—24-hour descriptors have been

developed that incorporate artificial noise penalties added to quiet-time noise events. The *Day/Night Average Sound Level, or L_{dn},* is a measure of the cumulative noise exposure in a community, with a 10 dB addition to nocturnal (10:00 P.M. to 7:00 A.M.) noise levels. Additional information regarding noise effects is presented in Attachment A2.

A3.11.1.2 Regulatory Background

Noise is regulated in the City of Everett in accordance with its Noise Control Ordinance. The ordinance identifies maximum permissible levels in different districts of the city. The CPM is located within District 1, which has a maximum long-term permissible noise level of 55 dB. The ordinance also specifies that noise from temporary construction sites is exempt or partially exempt from the provisions of the ordinance with some exceptions. In District 1, noise is not exempt from the provisions of the ordinance between the hours of 10 P.M. and 7 A.M. on weekdays and 6 P.M. and 8 A.M. on Saturdays, Sundays, and state recognized holidays. Since all construction activities would occur during daytime hours on weekdays, the project would be consistent with the requirements of the City of Everett's Noise Control Ordinance.

A3.11.1.3 Existing Noise Setting

The project area is primarily residential, although other noise-sensitive uses include a school, a senior center, and child and youth care centers.

Vehicular traffic is the primary source of noise in the project area. The CPM is bisected by North Broadway Avenue, which is a four-lane arterial road that serves as the primary north/south route passing through the City of Everett. Marine View Drive is the other primary roadway in the area. It is a two-lane arterial south of its intersection with North Broadway Avenue and a four-lane arterial north of the intersection. It is heavily used by trucks since it is the primary access route to the Port of Everett, which is west of the project site, and it also provides access to the intermodal transfer facility at the railyard that is located just east of the project area. Noise also is generated by rail traffic east of the project area, although to a lesser extent since the railroad tracks are several hundred feet below the project area, and the intervening topography serves to attenuate much of the noise (except for those homes closest to Marine View Drive).

Table A3-5 describes typical average noise levels in different types of urban environments. The noise experienced by residential and other noise-sensitive receptors in the project vicinity varies according to their distance from the roadway and the number of intervening residences. (Noise typically is attenuated, or reduced, 6 dB for every doubling of distance. In addition, one intervening row of houses reduces noise about 5 dB; additional rows reduce noise by about 10 dB.)

Ambient noise levels at the areas closest to North Broadway Avenue and Marine View Drive are expected to be comparable to those described above under "noisy urban residential." Those residences in Area 2 (Figure A2-1) that are farthest from these

Table A3-5: Typical Day-Night Noise Levels in Urban Areas in the United States.

Description	Typical Range of Ldn, dB	Average Ldn, dB
Quiet suburban residential	48-52	50
Normal suburban residential	53-57	55
Urban residential	58-62	60
Noisy urban residential	63-67	65
Very noisy urban residential	68-72	70

Source: U.S. Environmental Protection Agency 1974.

roadways likely experience noise that is comparable to that described under "normal suburban residential." Uses nearest the golf course and farthest from major roads probably experience noise characteristic of a "quiet suburban residential" neighborhood.

A3.11.2 Environmental Impacts

A3.11.2.1 No Action Alternative

This alternative would have no impact on the noise environment.

A3.11.2.2 Off-Site Disposal Alternative

Noise impacts would result primarily from excavating and backfilling activities as well as from increased truck traffic. To a much smaller extent, noise would result from revegetation activities and replacement of structures such as fences and sheds. Under this alternative, all excavated soils and smelter residuals would be transported off site by truck and ultimately transferred to a disposal facility by either truck or rail. Clean material also would be brought in by truck.

Typical overall hourly average noise levels produced at 50 feet from construction sites are shown for different phases of construction in Table A3-6. Noise associated with ground clearing and excavation is the most applicable to the proposed project.

Excavation would be the single loudest phase of construction. Assuming that excavation generated a maximum L_{eq} of 89 dBA, noise would exceed 60 dBA (the point at which construction noise could affect activity or speech communication outdoors and sleep indoors) at residential or other noise-sensitive receptors with a direct line-of-sight of the activity for a distance of 1,300 feet. Given the building density in the project area, noise would be attenuated by intervening structures at many locations. Nonetheless, noise would be perceived as very loud while construction occurred within the yards of individual residences or facilities or while construction equipment operated elsewhere in

Table A3-6: Noise Levels for Construction Phases.

Phase	Typical Ranges of Energy Equivalent Noise Levels at Construction Sites (Leq in dBA)							
	Domestic Housing		***Office Building, Hotel, Hospital, School, Public Works***		***Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station***		***Public Works Roads & Highways, Sewers, and Trenches***	
	I	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	74	89	74	84	84

I = All pertinent equipment present at site.

II = Minimum required equipment present at site.

Source: USEPA, Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

the same neighborhood. Given that construction activities would last between five and seven days at individual residences, noise exposure in excess of 60 dBA at individual locations would last for several weeks, and could last up to several months in some cases. At the Former Arsenic Trioxide Processing Area, construction activities would last for one season, or six months. Since this is a single location, noise impacts at the residences closest to the site would last for a longer time than in other areas. Since the impact would be short-term and construction would be limited to daytime hours on weekdays only, the impact on residences and recreational areas and facilities is not considered significant.

Impacts to the area's schools (an elementary school and a preschool) would be significant, however, since noise generated by construction activities within or near the school yards would be sufficient to impede conversation within the classrooms or disrupt sleep, in the case of the preschool. (As described in Attachment A2, the thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Typical structural attenuation is 12-17 dBA with the windows open. With closed windows in good condition, the noise attenuation factor is about 20 dBA for an older structure and 25 dBA for a newer building. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed.)

In residential neighborhoods, 10-cubic yard trucks would be used to remove contaminated soil and bring in clean soil. Assuming that all trucks used the same route (a worst-case scenario), the trucks would generate approximately 62 dBA. This noise would not be distinguishable from the overall construction noise in areas where

remediation activities were underway. Noise would be more perceptible along the local streets that serve as primary access routes for larger areas (e.g., 12th Street and 9th Street), but impacts along these routes would not be significant given the limited amount of time noise exposure would occur (most areas would not experience increased truck noise for more than one construction season) and the fact that trucks would only be used during the daytime on weekdays. The heaviest truck use would be along Marine View Drive since all trucks would use this road for approaching the load-out facility. Additionally, if trucking to the disposal sites were the selected option, trucks would use this road to access I-5, as well. Noise from these trips would generate about 62-63 dBA, which would not be distinguishable from the noise generated by existing trucks and other vehicular traffic. Impacts along I-5 and at the disposal sites would be negligible. If rail were used to dispose of the contaminated material, noise levels would not differ substantively.

A3.11.2.3 On-Site Containment Facility Alternative

Under this alternative, less material would have to be transported off site from the Former Arsenic Trioxide Processing Area than under the Off-Site Disposal alternative. This would reduce the number of truck trips needed, thus eliminating some noise sources, primarily along Marine View Drive. Overall, noise impacts would not differ substantively from the Off-Site Disposal alternative, however.

A3.11.2.4 Consolidation Facility Alternative

Impacts would be comparable to those described under the On-Site Containment Facility alternative.

A3.11.2.5 Mitigation Measures

One of the most essential elements in ensuring that noise impacts do not reach a level of significance is requiring that construction occur during daytime hours and on weekdays. In addition, the following mitigation measures should be implemented:

- All internal combustion engine-driven equipment should be equipped with mufflers that are in good condition.

- Construction in the immediate vicinity of the elementary school should be scheduled to occur during the summer months, when school is not in session.

- Preschool students should be relocated to another facility when construction equipment operating at the school or in the immediate vicinity would result in interior noise levels in excess of 45 dBA (the school should be able to function with its windows closed during the brief period when construction activities occur near the school; alternatively, a temporary noise barrier could be placed between the school and the construction activities).

Ecology or its designee should identify a Disturbance Coordinator with detailed knowledge of the construction activities and an authority to act regarding disturbances. This person's name and phone number should be provided to nearby residents. The Disturbance Coordinator would be responsible for determining the cause of any complaints and implementing measures to resolve the issue. The Disturbance Coordinator's responsibility would include ongoing monitoring of project compliance with required mitigation measures, identification of additional mitigation measures warranted to mitigate disturbances where possible, and the implementation of constructive actions as necessary to minimize construction disturbances at adjoining sensitive receptors.

A3.12 Public Services and Facilities

A3.12.1 Affected Environment

The City of Everett provides public works and police services to the residents, businesses, and government offices in the project area. This includes water, sewer, garbage, road maintenance, parks and recreation, and police and fire protection. These services are supported in part through property tax assessments and sales taxes. Any changes in property value assessments would have a direct impact on the money available for providing these services. Power is provided by the Snohomish County Public Utilities District.

The majority of storm water runoff from the Former Arsenic Trioxide Processing Area and areas within the CPM boundary enter the City of Everett's combined storm water/sanitary sewer system and are routed to the sanitary treatment plant prior to discharge to receiving water. The Storm Water and Storm Drain Sediment Characterization and Controls Work Plan (Hydrometrics, 1998) reports the results of studies conducted on this system. Some runoff from the Former Arsenic Trioxide Processing Area discharges to the lowlands underneath the Broadway overpass. Storm water and sediment leaving the CPM area during high rainfall events have exhibited contaminant concentrations that exceed the influent limits established by the sanitary treatment plant (see Section A3.3).

A3.12.2 Environmental Impacts and Mitigation

During construction there would be a need for City services in addition to what is currently being provided. The construction project would need water for dust suppression and street sweeping. Power and telephone would be needed for construction field offices. However, the utility demands would likely be less than what had been required for the houses within the Former Arsenic Trioxide Processing Area which have been demolished.

Temporary revisions to traffic signals or patterns may be required to accommodate dump truck travel in the neighborhoods and the Former Arsenic Trioxide Processing Area.

Soil removal and backfilling operations would expose substantially more contaminated soil to rainfall events. These construction activities would increase the potential for contaminated storm water and sediments to enter the sewer system.

In the long term, removal of contaminated soils in the project area would have a positive impact on the City's sanitary treatment plant by reducing the contaminant load carried by storm water originating within the CPM boundary.

The On-Site Containment Facility alternative includes a leachate collection system and an upgradient ground water interceptor trench. Collected ground water is not expected to be very contaminated and will not be a large quantity, so discharge via the storm sewer system to the City's sanitary treatment plant would likely be feasible. The Feasibility Study (Hydrometrics, 1995) estimated ground water flux in the Former Arsenic Trioxide Processing Area to be 0.6 gpm/1000 linear feet, which equates to approximately 0.3 gpm (158,000 gallons per year) for ground water collected by the trench (i.e., the trench would be about 500 feet long). This represents a new water source for the sanitary treatment plant, albeit insignificant compared to plant capacity. The Feasibility Study also estimated a leachate generation rate of 0.7 gpm without a cap over the contained soils and 1×10^{-5} gpm with a cap. Leachate collected would be periodically pumped out for treatment and disposal. The Consolidation Facility alternative includes only the ground water interceptor trench, which would result in a less significant impact.

Redevelopment of the Former Arsenic Trioxide Processing Area as residential would require services similar to those that were provided to the homes now demolished. No new or additional services would be needed.

The ability of the City to provide adequate public services or utilities is dependent on property tax income. The CPM area represents less than 5% of the total residences in the City. If property values (and property taxes assessed) were to drop because of an increased awareness of the contamination, then the City's tax revenues would decrease. If, on the other hand, property values increased because the public's perception of the properties changed after removal of contamination, then tax revenues would increase.

There are no mitigating measures for these impacts.

A3.13 Maintenance

A3.13.1 Affected Environment

Existing conditions in the Former Arsenic Trioxide Processing Area require continuous maintenance to prevent exposure of contaminated soil. The Former Arsenic Trioxide Processing Area contains debris and soil with the highest levels of contamination. The area is fenced to prevent access and the area is covered with grass, home foundations, and paved streets.

A3.13.2 Environmental Impacts and Mitigation

Removing contaminated soils within the CPM area would eliminate the need for continuous maintenance of ground cover to prevent erosion and generation of dust during dry weather. However, revegetation would be required to prevent soil erosion. Because clean soils would be present for at least the top 2 feet, only actions that would require deeper excavation would need to be monitored and controlled. This is discussed in the "Other Governmental Services" as one of the institutional controls.

In the residential neighborhoods, the newly planted sod and landscaping plants will require regular fertilizer and watering to ensure good root growth.

A3.13.2.1 Off-Site Disposal Alternative

Under this alternative, smelter debris, dangerous waste, and problem waste would be removed from the Former Arsenic Trioxide Processing Area and hauled for off-site disposal. The site would be remediated to conditions suitable for residential use. There would be no need for continued maintenance of the soil cover or fencing that now exists. The site would be revegetated to prevent soil erosion.

A3.13.2.2 On-Site Containment Facility Alternative

Under this alternative, dangerous waste would be placed in a two-acre lined and capped containment unit. The bottom liner would be constructed as a double liner with a leak detection system in between. A leachate collection system would be installed to gather any leachate generated in the waste pile and transfer it to an off-site treatment facility. The top cover design would incorporate impervious layers and 2 feet of clean soil at the surface. All of these systems would require routine inspection and maintenance.

This alternative would also include a four-acre capped area for problem waste. This cap incorporates an impervious layer and 2 feet of clean soil at the surface. The applicable regulations require the cover system to be inspected monthly for erosion problems and uneven settlement.

To prevent ground water from travelling through the waste under the capped area, an upgradient ground water interceptor trench would be included in the alternative. This trench would include piping and a holding tank for any collected ground water. The ground water would be analyzed to determine if it meets influent limits set by the City of Everett's sanitary treatment plant. If the water quality were suitable, the collected water could be discharged via the City sewer system to the sanitary treatment plant; otherwise it could be trucked to an off-site treatment facility on an as-needed basis. This system would also need routine inspection and maintenance.

A3.13.2.3 Consolidation Facility Alternative

This alternative would include a six-acre capped area for problem waste similar to the one described in the prior subsection. Construction and maintenance requirements for

this alternative are similar to the On-Site Containment Facility alternative except there would be no bottom liner or leachate collection system to maintain.

A3.13.2.4 Mitigating Measures

Engineering design of the permanent features will include ease-of-maintenance considerations.

A3.14 Other Governmental Services or Utilities

A3.14.1 Affected Environment

As described earlier, contamination would still be present in soil in all areas within the CPM following cleanup actions in all of the alternatives. In the accessible areas, contamination would likely be left behind at many properties in subsurface soils because the remediation levels developed for soil removal are higher than the cleanup levels for those soils that are deeper than 1 foot below the surface. Contamination would also be left behind in the inaccessible areas, e.g., underneath homes and paved areas. State cleanup regulations require that, where contamination is left on site, sufficient controls be put in place that are protective of human health and the environment.

Section 6.7 of the main text describes institutional controls that are to be implemented to protect human health and the environment from exposure to those contaminants that remain in the soil. The institutional controls would be virtually the same for all of the action alternatives. The following subsections discuss the institutional controls, grouped according to the impacted agency.

A3.14.2 Environmental Impacts and Mitigation

A3.14.2.1 City of Everett

The City of Everett Public Works Department reviews development plans and issues permits for construction. Future construction projects within the CPM area could expose contaminated soil either through excavation to depths where contaminants were not removed or by removing structures or pavement making the soil accessible.

A permit application received for proposed construction within the CPM boundary would be reviewed to evaluate whether planned activities have the potential for exposing contaminants. This review would potentially trigger several actions. If contaminated soil would be exposed, the developer or proponent would be required to participate in the soil disposal program. After construction, the site would be sampled and the resulting data included in the site database.

Impacts to the City of Everett include the administrative costs to establish the permit review process and incremental labor costs to implement the program.

A3.14.2.2 Snohomish Health District

The Snohomish Health District provides a wide range of programs for protecting and promoting public health. Many of these are Environmental Health Division programs, including permitting and inspection of establishments serving food to the public, on-site septic systems, public swimming pools, and solid waste disposal facilities. Response is provided to complaints about garbage accumulations, failing septic systems, vermin and other potential public health risks. Licensed child care facilities are provided voluntary inspections. Environmental health education of the public and persons serving the public is a priority in each of these programs.

The Snohomish Health District has responsibility for assessing the overall health status of the County's population; this results in regular publication of reports and health data analyses by the Health Statistics and Assessment Program. Other Community Health Division activities focus largely on promoting the health of children and families with children. This is done through home visits to pregnant and parenting women, through parenting education, and through coordination of services for children with special health care needs and children needing early childhood education and assistance.

Cleanup of the Everett Smelter Site would add several new tasks to those already performed by the Health District. These are listed and described below:

- ***Environmental Chemistry Database.*** A database of sampling data, remediation activities, and other pertinent site data would be developed and maintained by the District.

- ***Worker Protection Program.*** A worker protection program would be established to inform employers of health and safety protective measures that their employees must take when working within the CPM.

- ***Citizen Education Program.*** A program would be implemented to educate citizens living within the CPM regarding site history, environmental conditions, and precautions necessary when conducting various activities around their homes. This program would consist of regular mailings to all of the residents to remind them of the site conditions, legal requirements for disclosure when selling their property, worker protection, and who to contact for various types of problems.

- ***Medical Testing Program.*** Another program that would be managed by the Health District is a medical testing program to verify that cleanup measures taken at the site are protective of human health. Testing would be provided to individuals residing in the CPM and nonresidents whose activities may involve unusual exposure to soils. The program would include the opportunity for these individuals to have urine arsenic and blood lead tested twice per year without charge.

- ***Environmental Investigation Program.*** As another measure to maintain a level of protection for City of Everett residents, the Health district would develop and execute an environmental investigation program. This program would respond to situations where potential or reported exposures have occurred, would collect soil and exposure data, and would make necessary recommendations for corrective actions.

The impacts of these programs on the Snohomish Health District would be both financial and administrative. Additional staff would be needed to administer all of the programs. Additional funds would be needed to purchase and maintain the computer hardware and software; to train health district staff on the database operation; to acquire the protective equipment for the worker protection program; to establish and maintain the training program; and to maintain the ongoing public education, medical testing, and environmental investigation.

A3.14.2.3 Washington State Department of Ecology

Ecology has the primary responsibility for site cleanup and long-term care. Ecology is the lead agency for assuring that all actions are completed and agreed-to programs continued.

These programs constitute a site-specific financial burden on the Department of Ecology. Additional staff would likely be needed to meet the demands of the Everett Smelter Site cleanup and long-term care programs.

A3.14.3 Alternatives Analysis

The institutional controls described above would be imposed in the Peripheral Area without regard to the selected cleanup alternative. Considering the entire CPM area, the Off-Site Disposal alternative would have a smaller impact on government services than the OCF or Consolidation Facility alternatives. Since no contamination would remain on site in the Former Arsenic Trioxide Processing Area if the Off-Site Disposal alternative were selected, there would be no need to monitor the effectiveness of the controls in that area. For other alternatives, contaminants would remain at the Former Arsenic Trioxide Processing Area and the monitoring and institutional controls described would be applicable.

A3.14.4 Mitigating Measures

It is expected that the City of Everett, the Snohomish Health District, and Ecology will all have continuing responsibilities regarding the site. These responsibilities will impose financial and administrative burdens on the respective organizations. Identification of an adequate and stable funding source to support the responsibilities will mitigate these impacts.

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Everett Smelter Site
Integrated Final Cleanup Action Plan and Final Environment Impact Statement

Appendix A
Evaluation of SEPA Scoping Elements

Attachment A1

Air Emissions Calculation Tables

Table 1. Emission Source Data Associated with the Everett Smelter Off-Site Disposal Alternative.

Site/Equipment Type	*HorsePower (Hp)*	*Load Factor*	*# Active*	*Hp-Hrs*	*Hours/ Day*	*Hp-Hrs/ Day*	*Total Days (1)*	*Total Hp-Hrs*
Residential Area								
Excavator - 2 cubic feet bucket	16	0.50	1	8	8	64	298	19,072
Backhoe Loader - 1 cubic yard	84	0.50	5	210	8	1,680	536	900,480
Loader - 1 cubic yard	62	0.50	5	155	8	1,240	536	664,640
Dump Truck - 10 cu yds Backfill from Loadout (2)	NA	NA	3	NA	70	NA	238	49,800
Fugitive Dust - Disturbed Ground (4)	NA	NA	0.5	NA	NA	NA	536	268
Fugitive Dust - Soil Handling (5)	NA	NA	712	NA	NA	NA	536	381,800
Truck Loadout								
Loader - 2 cu yds	110	0.50	1	55	8	440	536	235,840
Water Truck	300	0.50	1	150	8	1,200	536	643,200
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	3	NA	56	NA	298	49,800
Dump Truck - 20 cu yds to Offsite (Res Area Source) (2)	NA	NA	154	NA	28	NA	298	1,278,200
Dump Truck - 20 cu yds Backfill from Mt. V for ResA (2)	NA	NA	70	NA	35	NA	238	581,000
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	536	536
Fugitive Dust - Soil Handling (5)	NA	NA	1,425	NA	NA	NA	536	763,600
FATPA								
Excavator - 2 cubic yard bucket	128	0.50	2	128	8	1024	50	51,200
Bulldozer - D6	140	0.50	2	140	8	1120	50	56,000
Water Truck	300	0.50	1	150	8	1,200	70	84,000
Dump Truck - 20 cu yds FATPA to Offsite (2)	NA	NA	154	NA	98	NA	50	754,600
Dump Truck - 20 cu yds Backfill from Mt. Vernon (2)	NA	NA	70	NA	75	NA	65	343,000
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	70	70
Fugitive Dust - Soil Handling (5)	NA	NA	4,830	NA	NA	NA	70	338,100
Rail Loading Site - Rabanco								
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	4	NA	56	NA	298	66,400
Dump Truck - 20 cu yds from FATPA (2)	NA	NA	1	NA	98	NA	50	4,900
Road Haul Locomotive - Idle (3)	3,600	0.06	4	864	2.0	1,728	33	57,024
Road Haul Locomotive - Notch 5 (3)	3,600	0.52	4	7,488	6.2	46,426	33	1,532,045
Fugitive Dust - Soil Handling (5)	NA	NA	1,019	NA	NA	NA	298	303,600

Notes: (1) Total days peripheral area = 5 homes completed/week, 595 homes/5 homes/week = 119 weeks * 4.5 days/week = 536 days. Excavation days = 119 weeks/2.5 days/week = 298 days. Backfilling days = 119 weeks/2 days/week = 238 days.
Total days FATPA = 50 days to excavate, 65 days to backfill, and 70 consecutive days to complete.

(2) Number Active equal to miles/round trip, Hours/Day are the daily trips, and Annual Hp-Hrs equal to annual miles. Mileage for trips to Arlington/ Roosevelt only include those that would occur within the Central Puget Sound Region Airbasin (CPSRA) (Snohomish, King, and Pierce Counties).

(3) Hours per Day are the hours per round trip and based on mileage within the CPSRA. Total Days are the total number of trips. Round trip miles assumed to be 154 and average train speed of 25 miles per hour. Average train capacity is 8000 tons.

(4) Number Active is average acres disturbed/day, and Annual Hp-Hrs is total acre-days disturbed.

(5) Number Active is average tons of soil handled/day and Annual Hp-Hrs is total tons (1 cubic yard of soil = 1.15 tons).

Table 2. Emission Source Data Associated with the Everett Smelter On-Site Containment Alternative.

Site/Equipment Type	*HorsePower (Hp)*	*Load Factor*	*# Active*	*Hp-Hrs*	*Hours/ Day*	*Hp-Hrs/ Day*	*Total Days (1)*	*Total Hp-Hrs*
Residential Area								
Excavator - 2 cubic feet bucket	16	0.50	1	8	8	64	298	19,072
Backhoe Loader - 1 cubic yard	84	0.50	5	210	8	1,680	536	900,480
Loader - 1 cubic yard	62	0.50	5	155	8	1,240	536	664,640
Dump Truck - 10 cu yds Backfill from Loadout (2)	NA	NA	3	NA	70	NA	238	49,800
Fugitive Dust - Disturbed Ground (4)	NA	NA	0.5	NA	NA	NA	536	268
Fugitive Dust - Soil Handling (5)	NA	NA	712	NA	NA	NA	536	381,800
Truck Loadout								
Loader - 2 cu yds	110	0.50	1	55	8	440	477	209,880
Water Truck	300	0.50	1	150	8	1,200	477	572,400
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	3	NA	56	NA	239	39,940
Dump Truck - 20 cu yds to Offsite (Res Area Source) (2)	NA	NA	154	NA	28	NA	239	1,025,134
Dump Truck - 20 cu yds Backfill from Mt. V for ResA (2)	NA	NA	70	NA	35	NA	238	581,000
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	477	477
Fugitive Dust - Soil Handling (5)	NA	NA	1,442	NA	NA	NA	477	687,700
FATPA								
Excavator - 2 cubic yard bucket	128	0.50	1	64	8	512	25	12,800
Bulldozer - D6	140	0.50	2	140	8	1120	140	156,800
Water Truck	300	0.50	1	150	8	1,200	165	198,000
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	3	NA	56	NA	59	9,860
Dump Truck - 20 cu yds FATPA to Offsite (2)	NA	NA	154	NA	50	NA	15	115,500
Dump Truck - 20 cu yds Backfill from Mt. Vernon (2)	NA	NA	70	NA	33	NA	35	80,500
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	165	165
Fugitive Dust - Soil Handling (5)	NA	NA	739	NA	NA	NA	165	121,900
Rail Loading Site - Rabanco								
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	4	NA	56	NA	239	53,254
Dump Truck - 20 cu yds from FATPA (2)	NA	NA	1	NA	50	NA	15	750
Road Haul Locomotive - Idle (3)	3,600	0.06	4	864	2.0	1,728	19	31,968
Road Haul Locomotive - Notch 5 (3)	3,600	0.52	4	7,488	6.2	46,426	19	858,874
Fugitive Dust - Soil Handling (5)	NA	NA	712	NA	NA	NA	239	170,200

Notes: (1) Total days peripheral area = 5 homes completed/week, 595 homes/5 homes/week = 119 weeks * 4.5 days/week = 536 days. Excavation days = 119 weeks/2.5 days/week = 298 days. Backfilling days = 119 weeks/2 days/week = 238 days.
Total days FATPA = 25 days to excavate, 110 days to backfill into OCF, and 30 days to place cap, for a total of 165 days.

(2) Number Active equal to miles/round trip, Hours/Day are the daily trips, and Annual Hp-Hrs equal to annual miles. Mileage for trips to Arlington/ Roosevelt only include those that would occur within the Central Puget Sound Region Airbasin (CPSRA) (Snohomish, King, and Pierce Counties).

(3) Hours per Day are the hours per round trip and based on mileage within the CPSRA. Total Days are the total number of trips. Round trip miles assumed to be 154 and average train speed of 25 miles per hour. Average train capacity is 8000 tons.

(4) Number Active is average acres disturbed/day, and Annual Hp-Hrs is total acre-days disturbed.

(5) Number Active is average tons of soil handled/day and Annual Hp-Hrs is total tons (1 cubic yard of soil = 1.15 tons).

Table 3. Emission Source Data Associated with the Everett Smelter Consolidation Alternative.

Site/Equipment Type	*HorsePower (Hp)*	*Load Factor*	*# Active*	*Hp-Hrs*	*Hours/ Day*	*Hp-Hrs/ Day*	*Total Days (1)*	*Total Hp-Hrs*
Residential Area								
Excavator - 2 cubic feet bucket	16	0.50	1	8	8	64	291	18,624
Backhoe Loader - 1 cubic yard	84	0.50	5	210	8	1,680	523	878,640
Loader - 1 cubic yard	62	0.50	5	155	8	1,240	523	648,520
Dump Truck - 10 cu yds Backfill from Loadout (2)	NA	NA	3	NA	70	NA	232	48,545
Fugitive Dust - Disturbed Ground (4)	NA	NA	0.5	NA	NA	NA	523	262
Fugitive Dust - Soil Handling (5)	NA	NA	712	NA	NA	NA	523	372,600
Truck Loadout								
Loader - 2 cu yds	110	0.50	1	55	8	440	447	196,680
Water Truck	300	0.50	1	150	8	1,200	447	536,400
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	3	NA	56	NA	215	35,930
Dump Truck - 20 cu yds to Offsite (Res Area Source) (2)	NA	NA	154	NA	28	NA	215	922,191
Dump Truck - 20 cu yds Backfill from Mt. V for ResA (2)	NA	NA	70	NA	35	NA	232	566,353
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	447	447
Fugitive Dust - Soil Handling (5)	NA	NA	1,451	NA	NA	NA	447	648,600
FATPA								
Excavator - 2 cubic yard bucket	128	0.50	1	64	8	512	25	12,800
Bulldozer - D6	140	0.50	1	70	8	560	86	48,160
Water Truck	300	0.50	1	150	8	1,200	111	133,200
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	3	NA	56	NA	75	12,534
Dump Truck - 20 cu yds FATPA to Offsite (2)	NA	NA	154	NA	50	NA	25	192,500
Dump Truck - 20 cu yds Backfill from Mt. Vernon (2)	NA	NA	70	NA	12	NA	86	70,000
Fugitive Dust - Disturbed Ground (4)	NA	NA	1	NA	NA	NA	111	111
Fugitive Dust - Soil Handling (5)	NA	NA	1,160	NA	NA	NA	111	128,800
Rail Loading Site - Rabanco								
Dump Truck - 10 cu yds from Res Area (2)	NA	NA	4	NA	56	NA	215	47,906
Dump Truck - 20 cu yds from FATPA (2)	NA	NA	1	NA	50	NA	25	1,250
Road Haul Locomotive - Idle (3)	3,600	0.06	4	864	2.0	1,728	18	31,320
Road Haul Locomotive - Notch 5 (3)	3,600	0.52	4	7,488	6.2	46,426	18	841,464
Fugitive Dust - Soil Handling (5)	NA	NA	776	NA	NA	NA	215	166,750

Notes: (1) Total days peripheral area = 162,000 cy/166,000 cy * 536 = 523 days. Excavation days = 162,000 cy/166,000 cy * 298 = 291 days. Backfilling days = 162,000/166,000 * 238 days = 232 days.

Total days FATPA = 25 days to excavate, 86 days to backfill, for a total of 111 days to complete.

(2) Number Active equal to miles/round trip, Hours/Day are the daily trips, and Annual Hp-Hrs equal to annual miles. Mileage for trips to Arlington/ Roosevelt only include those that would occur within the Central Puget Sound Region Airbasin (CPSRA) (Snohomish, King, and Pierce Counties).

(3) Hours per Day are the hours per round trip and based on mileage within the CPSRA. Total Days are the total number of trips. Round trip miles assumed to be 154 and average train speed of 25 miles per hour. Average train capacity is 8000 tons.

(4) Number Active is average acres disturbed/day, and Annual Hp-Hrs is total acre-days disturbed.

(5) Number Active is average tons of soil handled/day and Annual Hp-Hrs is total tons (1 cubic yard of soil = 1.15 tons).

Table 4. Emission Factors for Sources Associated with the Everett Smelter Project.

Equipment Type	*Fuel Type*	*(Grams per Hp-Hr)*							
		TOC	*ROC*	*CO*	*NOx*	*SO2*	*PM*	*PM10*	*Source*
Backhoe	D	1.53	1.47	6.80	10.10	0.85	1.05	1.01	(1)
Dozer	D	1.46	1.41	4.80	10.30	0.93	1.11	1.07	(1)
Excavator	D	0.91	0.88	5.20	10.75	0.93	1.44	1.38	(1)
Loader	D	1.06	1.03	4.80	10.30	0.86	1.29	1.24	(1)
Water Truck	D	1.08	1.05	2.80	9.60	0.89	0.80	0.77	(1)
Dump Trucks - 25 Miles per Hour	D	2.03	1.95	9.84	12.64	0.56	0.75	0.72	(2)
Dump Trucks - 55 Miles per Hour	D	1.12	1.08	6.23	16.46	0.56	0.75	0.72	(2)
Locomotive Engines - Year 2000	D	0.52	0.50	1.32	13.16	0.67	0.33	0.32	(3)
Fugitive Dust - Disturbed Ground	--	-	--	--	--	--	22.00	11.00	(4)
Fugitive Dust - Soil Handling	--	--	--	--	--	--	0.00004	0.00002	(5)
Fugitive Dust - Paved Road Dust	--	--	--	--	--	--	0.21	0.11	(6)

Source: (1) Non-Road Engine and Vehicle Emission Study Report (EPA 1991).

(2) TOC, CO, and NOx from MOBILE5a for the year 2000 (EPA 1993). SOx and PM from EMFAC7G (ARB 1997). Units in grams per mile.

(3) Emission factors reflect implementation of EPA NOx emission standard for locomotives in future years (EPA 1997).

(4) Fugitive Dust Background Document/Tech. Information Document for Best Available Control Measures (EPA 1992). Units in pounds per acre-day and reduced 90% to reflect the use of water application to reduce emissions.

(5) Units in pounds per ton of soil handled and reduced 90% to reflect the use of water application to reduce emissions (EPA 1992).

(6) Units in pounds per vehicle mile travelled emissions (EPA 1992).

Table 5. Daily Emissions Associated with the Everett Smelter Off-Site Disposal Alternative.

	Pounds per Day						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.1	0.1	0.7	1.5	0.1	0.2	0.2
Backhoe Loader - 1 cubic yard	5.7	5.5	25.2	37.4	3.1	3.9	3.7
Loader - 1 cubic yard	2.9	2.8	13.1	28.1	2.3	3.5	3.4
Dump Truck - 10 cu yds Backfill from Loadout	0.9	0.9	4.5	5.8	0.3	0.3	0.3
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	11.0	5.5
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	43.9	22.0
Truck Loadout							
Loader - 2 cu yds	1.0	1.0	4.7	10.0	0.8	1.3	1.2
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 10 cu yds from Res Area	0.7	0.7	3.6	4.7	0.2	0.3	0.3
Dump Truck - 20 cu yds to Offsite (Res Area Source)	10.6	10.2	58.9	155.5	5.3	7.1	6.8
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	6.0	5.8	33.5	88.5	3.0	4.0	3.9
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	11.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	61.4	30.7
FATPA							
Excavator - 2 cubic yard bucket	2.1	2.0	11.7	24.2	2.1	3.2	3.1
Bulldozer - D6	3.6	3.5	11.8	25.4	2.3	2.7	2.6
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 20 cu yds FATPA to Offsite	37.2	35.7	207.1	547.2	18.6	24.9	23.9
Dump Truck - 20 cu yds Backfill from Mt. Vernon	13.0	12.5	72.4	191.3	6.5	8.7	8.4
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	11.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	72.8	36.4
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	1.0	1.0	4.8	6.2	0.3	0.4	0.4
Dump Truck - 20 cu yds from FATPA	0.2	0.2	1.3	3.6	0.1	0.2	0.2
Road Haul Locomotive - Idle	2.0	1.9	5.0	50.1	2.6	1.3	1.2
Road Haul Locomotive - Notch 5	53.2	51.0	135.0	1,345.7	68.5	33.7	32.4
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	88.0	44.0
Total Daily Emissions - Pounds	**146**	**140**	**608**	**2,576**	**121**	**421**	**257**

Table 6. Daily Emissions Associated with the Everett Smelter On-Site Containment Alternative.

	Pounds per Day						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.1	0.1	0.7	1.5	0.1	0.2	0.2
Backhoe Loader - 1 cubic yard	5.7	5.5	25.2	37.4	3.1	3.9	3.7
Loader - 1 cubic yard	2.9	2.8	13.1	28.1	2.3	3.5	3.4
Dump Truck - 10 cu yds Backfill from Loadout	0.9	0.9	4.5	5.8	0.3	0.3	0.3
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	11.0	5.5
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	43.9	22.0
Truck Loadout							
Loader - 2 cu yds	1.0	1.0	4.7	10.0	0.8	1.3	1.2
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 10 cu yds from Res Area	0.7	0.7	3.6	4.7	0.2	0.3	0.3
Dump Truck - 20 cu yds to Offsite (Res Area Source)	10.6	10.2	58.9	155.5	5.3	7.1	6.8
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	6.0	5.8	33.5	88.5	3.0	4.0	3.9
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	11.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	61.4	30.7
FATPA							
Excavator - 2 cubic yard bucket	1.0	1.0	5.9	12.1	1.0	1.6	1.6
Bulldozer - D6	3.6	3.5	11.8	25.4	2.3	2.7	2.6
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 10 cu yds from Res Area	0.7	0.7	3.6	4.7	0.2	0.3	0.3
Dump Truck - 20 cu yds FATPA to Offsite	19.0	18.2	105.7	279.2	9.5	12.7	12.2
Dump Truck - 20 cu yds Backfill from Mt. Vernon	5.7	5.4	31.6	83.4	2.8	3.8	3.6
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	11.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	69.9	34.9
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	1.0	1.0	4.8	6.2	0.3	0.4	0.4
Dump Truck - 20 cu yds from FATPA	0.1	0.1	0.7	1.8	0.1	0.1	0.1
Road Haul Locomotive - Idle	2.0	1.9	5.0	50.1	2.6	1.3	1.2
Road Haul Locomotive - Notch 5	53.2	51.0	135.0	1,345.7	68.5	33.7	32.4
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	67.8	33.9
Total Daily Emissions - Pounds	**120**	**115**	**463**	**2,191**	**107**	**380**	**227**

Table 7. Daily Emissions Associated with the Everett Smelter Consolidation Alternative.

	Pounds per Day						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.1	0.1	0.7	1.5	0.1	0.2	0.2
Backhoe Loader - 1 cubic yard	5.7	5.5	25.2	37.4	3.1	3.9	3.7
Loader - 1 cubic yard	2.9	2.8	13.1	28.1	2.3	3.5	3.4
Dump Truck - 10 cu yds Backfill from Loadout	0.9	0.9	4.5	5.8	0.3	0.3	0.3
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	11.0	5.5
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	43.9	22.0
Truck Loadout							
Loader - 2 cu yds	1.0	1.0	4.7	10.0	0.8	1.3	1.2
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 10 cu yds from Res Area	0.7	0.7	3.6	4.7	0.2	0.3	0.3
Dump Truck - 20 cu yds to Offsite (Res Area Source)	10.6	10.2	58.9	155.5	5.3	7.1	6.8
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	6.0	5.8	33.5	88.5	3.0	4.0	3.9
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	11.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	61.4	30.7
FATPA							
Excavator - 2 cubic yard bucket	1.0	1.0	5.9	12.1	1.0	1.6	1.6
Bulldozer - D6	1.8	1.7	5.9	12.7	1.1	1.4	1.3
Water Truck	2.9	2.8	7.4	25.4	2.4	2.1	2.0
Dump Truck - 10 cu yds from Res Area	0.7	0.7	3.6	4.7	0.2	0.3	0.3
Dump Truck - 20 cu yds FATPA to Offsite	19.0	18.2	105.7	279.2	9.5	12.7	12.2
Dump Truck - 20 cu yds Backfill from Mt. Vernon	2.0	1.9	11.2	29.5	1.0	1.3	1.3
Fugitive Dust - Disturbed Ground	0.0	0.0	0.0	0.0	0.0	22.0	0.0
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	61.0	30.5
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	1.0	1.0	4.8	6.2	0.3	0.4	0.4
Dump Truck - 20 cu yds from FATPA	0.1	0.1	0.7	1.8	0.1	0.1	0.1
Road Haul Locomotive - Idle	2.0	1.9	5.0	50.1	2.6	1.3	1.2
Road Haul Locomotive - Notch 5	53.2	51.0	135.0	1,345.7	68.5	33.7	32.4
Fugitive Dust - Soil Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road Dust - Local Mileage Only	0.0	0.0	0.0	0.0	0.0	67.8	33.9
Total Daily Emissions - Pounds	**115**	**110**	**437**	**2,124**	**104**	**367**	**208**

Table 8. Total Emissions Associated with the Everett Smelter Off-Site Disposal Alternative.

	Total Tons						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.02	0.02	0.11	0.23	0.02	0.03	0.03
Backhoe Loader - 1 cubic yard	1.52	1.46	6.74	10.02	0.84	1.04	1.00
Loader - 1 cubic yard	0.78	0.75	3.51	7.54	0.63	0.94	0.91
Dump Truck - 10 cu yds Backfill from Loadout	0.11	0.11	0.54	0.69	0.03	0.04	0.04
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	2.95	1.47
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	5.23	2.61
Truck Loadout							
Loader - 2 cu yds	0.28	0.27	1.25	2.68	0.22	0.34	0.32
Water Truck	0.77	0.74	1.98	6.80	0.63	0.57	0.54
Dump Truck - 10 cu yds from Res Area	0.11	0.11	0.54	0.69	0.03	0.04	0.04
Dump Truck - 20 cu yds to Offsite (Res Area Source)	1.58	1.51	8.77	23.17	0.79	1.06	1.01
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	0.72	0.69	3.99	10.53	0.36	0.48	0.46
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	5.90	2.95
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	8.72	4.36
FATPA							
Excavator - 2 cubic yard bucket	0.05	0.05	0.29	0.61	0.05	0.08	0.08
Bulldozer - D6	0.09	0.09	0.30	0.64	0.06	0.07	0.07
Water Truck	0.10	0.10	0.26	0.89	0.08	0.07	0.07
Dump Truck - 20 cu yds FATPA to Offsite	0.93	0.89	5.18	13.68	0.47	0.62	0.60
Dump Truck - 20 cu yds Backfill from Mt. Vernon	0.42	0.41	2.35	6.22	0.21	0.28	0.27
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	0.77	0.39
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	2.06	1.03
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	0.15	0.14	0.72	0.92	0.04	0.05	0.05
Dump Truck - 20 cu yds from FATPA	0.01	0.01	0.03	0.09	0.00	0.00	0.00
Road Haul Locomotive - Idle	0.03	0.03	0.08	0.83	0.04	0.02	0.02
Road Haul Locomotive - Notch 5	0.88	0.84	2.23	22.20	1.13	0.56	0.53
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	8.00	4.00
Total Emissions - Tons	**8.53**	**8.21**	**38.87**	**108.42**	**5.64**	**39.95**	**22.88**

Table 9. Total Emissions Associated with the Everett Smelter On-Site Containment Alternative.

	Total Tons						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.02	0.02	0.11	0.23	0.02	0.03	0.03
Backhoe Loader - 1 cubic yard	1.52	1.46	6.74	10.02	0.84	1.04	1.00
Loader - 1 cubic yard	0.78	0.75	3.51	7.54	0.63	0.94	0.91
Dump Truck - 10 cu yds Backfill from Loadout	0.11	0.11	0.54	0.69	0.03	0.04	0.04
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	2.95	1.47
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	5.23	2.61
Truck Loadout							
Loader - 2 cu yds	0.25	0.24	1.11	2.38	0.20	0.30	0.29
Water Truck	0.68	0.66	1.77	6.05	0.56	0.50	0.48
Dump Truck - 10 cu yds from Res Area	0.09	0.09	0.43	0.56	0.02	0.03	0.03
Dump Truck - 20 cu yds to Offsite (Res Area Source)	1.26	1.21	7.03	18.58	0.63	0.85	0.81
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	0.72	0.69	3.99	10.53	0.36	0.48	0.46
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	5.25	2.62
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	7.33	3.67
FATPA							
Excavator - 2 cubic yard bucket	0.01	0.01	0.07	0.15	0.01	0.02	0.02
Bulldozer - D6	0.25	0.24	0.83	1.78	0.16	0.19	0.18
Water Truck	0.24	0.23	0.61	2.09	0.19	0.17	0.17
Dump Truck - 10 cu yds from Res Area	0.02	0.02	0.11	0.14	0.01	0.01	0.01
Dump Truck - 20 cu yds FATPA to Offsite	0.14	0.14	0.79	2.09	0.07	0.10	0.09
Dump Truck - 20 cu yds Backfill from Mt. Vernon	0.10	0.10	0.55	1.46	0.05	0.07	0.06
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	1.82	0.91
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	1.43	0.72
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	0.12	0.11	0.58	0.74	0.03	0.04	0.04
Dump Truck - 20 cu yds from FATPA	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Road Haul Locomotive - Idle	0.02	0.02	0.05	0.46	0.02	0.01	0.01
Road Haul Locomotive - Notch 5	0.49	0.47	1.25	12.45	0.63	0.31	0.30
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	5.75	2.87
Total Emissions - Tons	**6.81**	**6.56**	**30.08**	**77.96**	**4.48**	**34.93**	**19.83**

Table 10. Total Emissions Associated with the Everett Smelter on-Site Consolidation Alternative.

	Total Tons						
Site/Equipment Type	**TOC**	**ROC**	**CO**	**NOx**	**SO2**	**PM**	**PM10**
Residential Area							
Excavator - 2 cubic feet bucket	0.02	0.02	0.11	0.22	0.02	0.03	0.03
Backhoe Loader - 1 cubic yard	1.48	1.43	6.58	9.77	0.82	1.02	0.98
Loader - 1 cubic yard	0.76	0.73	3.43	7.36	0.61	0.92	0.88
Dump Truck - 10 cu yds Backfill from Loadout	0.11	0.10	0.53	0.68	0.03	0.04	0.04
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	2.88	1.44
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	5.10	2.55
Truck Loadout							
Loader - 2 cu yds	0.23	0.22	1.04	2.23	0.19	0.28	0.27
Water Truck	0.64	0.62	1.65	5.67	0.53	0.47	0.45
Dump Truck - 10 cu yds from Res Area	0.08	0.08	0.39	0.50	0.02	0.03	0.03
Dump Truck - 20 cu yds to Offsite (Res Area Source)	1.14	1.09	6.33	16.72	0.57	0.76	0.73
Dump Truck - 20 cu yds Backfill from Mt. V for ResA	0.70	0.67	3.89	10.27	0.35	0.47	0.45
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	4.92	2.46
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	6.73	3.36
FATPA							
Excavator - 2 cubic yard bucket	0.01	0.01	0.07	0.15	0.01	0.02	0.02
Bulldozer - D6	0.08	0.07	0.25	0.55	0.05	0.06	0.06
Water Truck	0.16	0.15	0.41	1.41	0.13	0.12	0.11
Dump Truck - 10 cu yds from Res Area	0.03	0.03	0.14	0.17	0.01	0.01	0.01
Dump Truck - 20 cu yds FATPA to Offsite	0.24	0.23	1.32	3.49	0.12	0.16	0.15
Dump Truck - 20 cu yds Backfill from Mt. Vernon	0.09	0.08	0.48	1.27	0.04	0.06	0.06
Fugitive Dust - Disturbed Ground	0.00	0.00	0.00	0.00	0.00	1.22	0.00
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	1.79	0.89
Rail Loading Site - Rabanco							
Dump Truck - 10 cu yds from Res Area	0.11	0.10	0.52	0.67	0.03	0.04	0.04
Dump Truck - 20 cu yds from FATPA	0.00	0.00	0.01	0.02	0.00	0.00	0.00
Road Haul Locomotive - Idle	0.02	0.02	0.05	0.45	0.02	0.01	0.01
Road Haul Locomotive - Notch 5	0.48	0.46	1.22	12.20	0.62	0.31	0.29
Fugitive Dust - Soil Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Dust - Local Mileage Only	0.00	0.00	0.00	0.00	0.00	5.29	2.65
Total Emissions - Tons	**6.36**	**6.12**	**28.41**	**73.79**	**4.17**	**32.75**	**17.97**

Everett Smelter Site
Integrated Final Cleanup Action Plan and Final Environment Impact Statement

Appendix A
Evaluation of SEPA Scoping Elements

Attachment A2

Noise Supporting Data

A2-1.0 Effects Of Noise

A2-1.1 Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

A2-1.2 Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. To achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

A2-1.3 Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise

and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 55 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately 2 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. There is, therefore, an increase of about 1 percent per dBA between an L_{dn} of 60-70 dBA. Between an L_{dn} of 70-80 dBA, each decibel increase increases by about 2 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 10 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 2 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 3 percent increase in the percentage of the population highly annoyed.

Table 1: Definitions of Acoustical Terms.

Term	*Definitions*
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1 percent, 10 percent, 50 percent, and 90 percent of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 P.M. and 7:00 A.M.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 2: Typical Sound Levels Measured in the Environment and Industry.

At a Given Distance from Noise Source	*A-Weighted Sound Level in Decibels*	*Noise Environments*	*Subjective Impression*
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Pile Driver (50')	100		Very Loud
Ambulance Siren (100')			
	90	Boiler Room	
Freight Cars (50')		Printing Press Plant	
Pneumatic Drill (50')	80	In Kitchen With Garbage Disposal Running	
Freeway (100')			
	70		Moderately Loud
Vacuum Cleaner (10')	60	Data Processing Center	
		Department Store	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')			
	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		