

**FIVE-YEAR REVIEW REPORT FOR
SILVER MOUNTAIN MINE SUPERFUND SITE
OKANOGAN COUNTY, WASHINGTON**



Prepared by

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Central Regional Office
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For

**U.S. Environmental Protection Agency
Region 10
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9/20/12

Date

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Acronyms

Applicable or Relevant and Appropriate Requirements (ARARs)
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Contaminants of Concern (COC)
Environmental Protection Agency (EPA)
Explanation of Significant Differences (ESD)
Feasibility Study (FS)
Micrograms per liter (ug/L)
Milligrams per kilogram (mg/kg)
National Contingency Plan (NCP)
National Priority List (NPL)
Record of Decision (ROD)
Remedial Action Objectives (RAOs)
Remedial Investigation and Feasibility Study (RI/FS)
State Superfund Contract (SSC)
Uniform Environmental Covenants Act (UECA)
U.S. Bureau of Land Management (BOM)
Washington State Department of Ecology (Ecology)

Executive Summary

The Silver Mountain Mine Superfund Site (Site) is located in rural Okanogan County, Washington. The Site was listed on the National Priorities List (NPL) in 1986. The Record of Decision (ROD) was issued in 1990 and an Explanation of Significant Differences (ESD) was issued in 1994. The cleanup consisted of consolidating and capping contaminated arsenic- and cyanide-laden materials. Five-Year Reviews are required to be conducted at the Site because site-related contamination remains in-place, below a constructed cap. Since the last Five-Year Review (FYR) conducted in 2007, site inspections were conducted in 2011 and in 2012, the latter to support preparation of the current FYR.

Consistent with the finding of the previous FYR completed in 2007, the remedy is performing as designed, remains protective and the cap remains in excellent condition. No additional remedial actions are required. The Washington State Department of Ecology (Ecology) will remain responsible for enforcing future maintenance activities at the Site. Prior to the next FYR, Ecology and EPA will work with the current property owner to develop and record a new environmental covenant that follows the guidelines of Uniform Environmental Covenants Act. During site inspections, fencing installed by adjacent property owner will be inspected to confirm that it remains in place and undamaged. If the fence is damaged or removed, Ecology will require Site property owner to replace the fence to ensure access to the Site remains controlled.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Silver Mountain Mine		
EPA ID: WAD980722789		
Region: 10	State: WA	City/County: Okanogan County
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: State If "Other Federal Agency" was selected above, enter Agency name: Click here to enter text.		
Author name (Federal or State Project Manager): Jeff Newschwander		
Author affiliation: Washington State Department of Ecology		
Review period: October 2007 – September 2012		
Date of site inspection: 4/12/2012		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/21/2007		
Due date (five years after triggering action date): 9/21/2012		

Five-Year Review Summary Form (continued)

Issues/Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Site-wide	Issue Category: Monitoring Issue: <u>Fence Installed During the Remedial Action No Longer Exists And the Present Site Fence is Owned by an Adjacent Property Owner</u> Recommendation: Inspect existing fence. Fence installed as part of the remedial action should be replaced if adjacent owner's fence fails or is in disrepair			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	State	EPA	June 2015
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Site-wide	Issue Category: Institutional Controls Issue: Update Environmental Covenant Recommendation: Develop and implement a new environmental covenant under the Uniform Environmental Covenant Act.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	EPA/State	EPA	12/31/2012
Sitewide Protectiveness Statement (if applicable)				
<i>For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.</i>				
<i>Protectiveness Determination:</i> Short-term Protective			<i>Addendum Due Date (if applicable):</i> Not applicable	
Protectiveness Statement: The remedy at the Site currently protects human health and the environment. The cap remains in excellent condition and institutional controls remain in-place and effectively protect the remedy. Fencing surrounding the site limits access to the site and exposures to site-related contaminants. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: 1) During site inspections, inspect fencing installed by adjacent property owner and confirm it remains in place and undamaged. If fence is damaged or removed, require Site property owner to replace the fence to ensure access to the Site remains controlled. and 2) Ecology and EPA will work with the current property owner to develop a new environmental covenant that follows the guidelines of UECA. This will be done to resolve some questions about legal ownership of the Site and to ensure long-term protectiveness of the cap and non-usage of groundwater for human consumption.				

I. Introduction

This report summarizes the fourth five-year review of remedial actions implemented by the Environmental Protection Agency (EPA) Region 10 and the Washington State Department of Ecology (Ecology) at the Silver Mountain Mine Superfund Site (Site) in Okanogan County, Washington. This five-year review of remedial actions has been prepared to meet the federal statutory requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) because site-related contaminants still remain at the Site. Ecology is the lead agency for this Site and completed this Five-Year Review in coordination with EPA. This Five-Year Review was conducted pursuant to EPA's statutory obligation under Section 121 of CERCLA.

At the time of this Five-Year Review (FYR), full implementation of the Site remedy had been completed and three FYRs have been completed. The Site was deleted from the National Priorities List (NPL) on September 22, 1997. The purpose of this FYR is to evaluate the implementation and performance of the remedy to determine if the remedy remains protective of human health and the environment. The EPA documents that set-forth the selected remedy for the Site include:

- Record of Decision (ROD), Silver Mountain Mine Superfund Site, Okanogan County, Washington, March 27, 1990 and
- Explanation of Significant Differences (ESD) at the Silver Mountain Mine Superfund Site, Okanogan County, Washington, October 12, 1994.

The triggering action for FYRs was the initiation of the remedial action in 1992. This review covers the entire Site, which has been addressed as a single operable unit.

II. Site Chronology

Table 1 - Chronology of Site Events at the Silver Mountain Mine

Event	Date
Initial discovery of problem or contamination	11/1981
Pre-NPL responses	
Preliminary assessment	08/31/1984
HRS package	09/06/1984
Proposal to NPL	10/15/1984
Site inspection	02/27/1985
NPL RP search	05/15/1985
NPL listing	06/10/1986
Removal actions	1982
Remedial Investigation/Feasibility Study complete	03/27/1990
ROD signature	03/27/1990
ROD amendments or ESDs	10/12/1994
Enforcement documents (CD, AOC, Unilateral Administrative Order)	NA
Remedial design start	05/01/1990
Remedial design complete	11/27/1991
Superfund State Contract	01/04/1991
Actual remedial action start	06/15/1991
Construction initiation date	06/29/1992
Construction completion date	11/06/1992
Deed Restrictions Recorded	12/1996
Final Close-out Report	06/1997
Deletion from NPL	09/22/1997
Previous Five-Year Reviews	07/16/1997, 09/23/2002, 9/21/2007

III. Site Background

Site Description and History

The Site is located in Okanogan County, in north-central Washington State, about six miles northwest of the town of Tonasket. A site location map is available as Appendix A. The five-acre Site lies in a north-south running valley known as Horse Springs Coulee and is currently owned by RR Ranch LLC of Loomis, Washington. The area around the Site is generally unpopulated, is semi-arid with scrub vegetation, and is primarily used for cattle grazing.

Underground, hard rock mining for silver and gold began at the Site in 1902. By 1956, the sporadic development of the mine produced about 2000 feet of underground workings and

several tailings piles in a mine dump consisting of waste and mineralized rock. A 400-ton per day mill was constructed in 1952, but was never used. The mill had been removed prior to the Superfund investigations.

From 1980 to 1981, Precious Metals Extraction, Ltd. constructed a cyanide heap leach pile located north of the mill foundation and attempted to extract silver and gold from the previously mined tailings. The heap pile consisted of about 5,300 tons of mineralized rock in a 100-foot by 105-foot by 14-foot pile on top of a 20 thousandths of an inch-thick plastic liner. About 4,400 pounds of sodium cyanide was mixed with water and sprayed on the top of the heap pile. The cyanide-laden solution was then collected in a leachate collection pond located south of the heap pile.

In July 1981, the Site was abandoned without cleanup or treatment of chemicals on the Site. Cyanide solution remained in the leachate collection pond and in the heap pile. Several empty cyanide drums and large containers of carbon also were abandoned on-site.

1) Early Actions, Remedial Investigation/Feasibility Study and Record of Decision

Ecology investigated the Site in November 1981. In 1982, it was determined that an emergency action was necessary and sodium hypochlorite was used to neutralize the cyanide solution. Sodium hypochlorite was applied twice and recirculated through the heap pile and leachate collection pond. Cyanide levels were reduced in the collection pond, but continued to leach in the heap pile, as cyanide was detected in the heap pile in 1989. Because there was no cyanide detected in the soil or heap pile during the Site cleanup in 1992, it appears that some natural degradation occurred.

Ecology recommended the Site for the NPL in 1982. In October 1984, the Site was proposed to be added to the NPL by the EPA. The Site was added to the NPL on June 6, 1986.

Ecology started initial remedial planning activities in 1981. In 1982, Ecology provided reduction of risks at the Site by neutralizing the cyanide solution as mentioned above. In 1985, Ecology removed the drums of hazardous materials left on-site when the Site was abandoned. See Table 1 for a summary of chronological events related to contamination at the Site.

In 1988, EPA started the Remedial Investigation and Feasibility Study (RI/FS) by contracting with the U.S. Bureau of Mines (BOM). BOM conducted the site investigation which obtained the data necessary to determine the nature and extent of contamination. The physical and chemical characteristics of the Site were evaluated by field mapping and analysis of site materials. The hydrogeologic investigation incorporated four monitoring wells, three off-site water supply wells, and two on-site surface seeps. Thirty-four samples from the heap leach pile and mine dump material, twenty samples of nearby soils, and three rounds of water samples from the seven wells and the two surface water seeps were collected and analyzed.

The investigation identified and evaluated the following three potential sources of contaminants identified at the Site:

- The heap leach pile.
- The unprocessed rock.
- The mine drainage water.

Potential exposure pathways for contaminants were identified as:

- On-site soils.
- On-site surface water.
- On-site ground water in a shallow aquifer.
- Off-site ground water in the region.

The baseline risk assessment identified arsenic and cyanide as the primary contaminants of concern. Arsenic is a component of the native rock in the area. The concentration of arsenic in the soil is related to the amount of arsenic in the native rock and whether it is oxidized in the native rock. Excavation and exposure of arsenic-containing rock and soil through the mining process will often result in the conversion of arsenic to an oxidized state. The oxidized arsenic is more soluble which in turn can increase the concentration in the soils from all of the mined materials, the heap pile, and the mine dump. The highest arsenic levels found during the RI/FS were in the mined material (1,080 milligrams per kilogram (mg/kg)) and in mine drainage water sampled from the stock water tank (95 micrograms per liter (ug/l)).

Cyanide was brought to the Site by Precious Metals Extraction, Ltd., and spread on the prepared heap of previously mined materials. Cyanide concentrations in the heap pile were reduced during the 1982 removal action taken by Ecology. Cyanide concentrations in the leachate pond were measured at levels as high as 1,100 mg/l prior to the Ecology actions, and only a low concentration (about 1 mg/l) was measured in the leachate pond after the Ecology removal. Cyanide concentrations in soil samples prior to the removal ranged between 50 and 480 mg/kg total cyanide. During the RI/FS investigation in 1989, the cyanide concentration in the heap samples was measured at 173 mg/kg.

Both arsenic and cyanide were found above background levels in the perched shallow aquifer just at the edge of the heap pile during the RI/FS. Concentrations of arsenic were 14 ug/l and cyanide was 122 ug/l in the on-site monitoring wells. Due to the low yield, or low hydraulic conductivity, in the aquifer under the Site and diversion of the surface seeps away from the Site, natural attenuation was expected to result in a gradual decrease in these groundwater values.

Although elevated levels of arsenic were found in the mine drainage, it was anticipated that blocking the mine entrance would divert surface water runoff and eliminate this exposure route. As part of a subsequent risk assessment conducted to support the issuance of the ESD, the mine drainage was determined to pose no ecological threat.

The Feasibility Study screened twenty-three methods of cleaning up the Site. From this list, eight alternatives were developed and evaluated against the nine criteria listed in the National Contingency Plan (NCP).

Three primary contamination sources were identified in the ROD. First, arsenic and cyanide were found in the heap leach pile of mined material and in the trench remaining from the abandoned cyanide heap leaching operation. Second, west of the heap pile was a larger pile of unprocessed rock from which the material was taken for the heap leaching operation. The rock contained high levels of arsenic. Third, mine drainage water from the mine entrance (adit or portal) contained high levels of arsenic. This drainage water was piped from within the adit to a cattle watering trough adjacent to the leachate collection pond. Water from the trough overflowed and ponded on the Site.

IV. Remedial Actions

On March 27, 1990, the ROD was signed by EPA which included the following remedial action objectives (RAOs):

- Prevent human and environmental exposure to contaminants of concern (COCs) in soils above protective levels.
- Prevent migration of COCs in soils off-site or to groundwater.
- Determine whether COCs are present in groundwater above protective levels, and if so the extent of the contamination. (Note that an ESD later documented that the last RAO was unnecessary and was eliminated – See Section II. of this document.)

The ROD required implementation of the following cleanup actions:

- Consolidation of the arsenic and cyanide contaminated soil and mined rock.
- Leach heap, mine dump and soil cleanup standards were established for arsenic (200 mg/kg) and cyanide (95 mg/kg).
- Construction of a soil/clay cap over the consolidated soil and rock.
- Closure of the mine entrance to divert the flow of mine drainage away from the Site and for safety reasons.
- Fence the Site to protect the cap.
- Place deed restrictions on the property to prevent future disturbance and to make future owners aware of the Site.
- Installation of a new well in the Horse Springs Coulee aquifer to provide an alternate stock water supply.
- Installation of new ground water monitoring wells.

The March 1990 ROD was followed in October 1994 by an ESD to address conditions which were not predicted when the ROD was developed. This is discussed in greater detail below.

1) Remedial Construction Activities

EPA contracted with Roy F. Weston (Weston) to design and construct the remedy as set forth in the ROD. The design was completed in late 1990, and a soil hauling subcontract was awarded on September 30, 1991. During December 1991 and January 1992, top soil for the cover over the cap was blended onsite and stockpiled. On April 3, 1992, Weston awarded the subcontract for consolidation, capping, and fencing the Site. The following construction work was completed during the summer of 1992:

- Mobilization and initial clay stockpiling (cap material) started - June 29, 1992.
- Consolidation of mined material completed - July 31, 1992.
- Closure of the mine entrance completed - August 11, 1992.
- Cap and cover completed - August 12, 1992.
- Site fenced - August 15, 1992.
- Site hydroseeded - November 6, 1992.

The four monitoring wells that were placed on the Site during the RI/FS were not damaged during the construction of the cap, even though it was anticipated that at least two wells would have to be abandoned to consolidate the mined materials and construct the cap. Therefore, no new monitoring wells were constructed. The four existing wells were considered sufficient to provide long-term monitoring.

The consolidation action removed contaminated mine dumps from four areas around the Site and consolidated them in a single location. The Site consolidation met the ROD performance goals for arsenic in exposed soils remaining at the Site. Cyanide was not detected in any of the soil samples collected at the Site.

During the remedial action, two background samples were taken from the soils sloughing off the hillside and onto the Site during the remedial action. One of the samples indicated relatively high arsenic concentrations. The project managers believed that some native soils had higher arsenic concentrations than the cleanup levels on-site and it appeared that there was a distinct difference between the soil samples taken from the valley floor and site soils. The Site is located at the intersection of the valley floor where the heap leach pile was located and the mine portal which was excavated into the side of the mountain.

One of the past actions that occurred at the Site was the construction of an aqueduct across the Site along the edge of the valley. Rock rubble from the aqueduct construction was dumped over the edge of the cut and in several places commingled with the mine waste in the mine dumps. The project managers determined that visual observation was an adequate method of distinguishing between the two types of waste material (size, fracturing, and color). Where the two different activities commingled the rock, all the material was consolidated under the cap.

Following construction activities, surface water continued to enter the Site at a slow rate from a new seep coming from the blocked mine entrance. This flow was diverted away from the capped landfill area towards an area off-site and infiltrates into the ground before reaching the Site fence.

The installation of the groundwater monitoring wells and stock water supply well, as dictated by the ROD, was attempted. These remedial construction activities did not come to completion because the two test wells that were drilled did not locate water prior to hitting bedrock. The well locations were selected using the best available information. The resolution of this unforeseen development is further discussed in the “Explanation of Significant Differences” section below.

2) Explanation of Significant Differences

In October 1994, EPA completed an ESD to describe changes in the remedial action due to unforeseen conditions encountered at the Site during implementation of the ROD. Changes found in the conditions at the Site required EPA to modify the remedial actions that were described in the March 27, 1990 ROD. These changes were made as a result of new information about the groundwater in proximity to the Site. The EPA made the following two changes to the selected remedy:

- To allow the stock water tank to be reestablished using the mine drainage; and
- To eliminate the requirement for groundwater monitoring.

The ROD stated that an alternate water supply would be provided to replace the mine drainage as stock water source, assuming that the Horse Springs Coulee aquifer was a reasonable source in terms of quantity, quality, and depth of water. Two attempts were made to locate a groundwater source to replace the mine drainage as a water supply for livestock. Neither of the attempts was productive and water was not found despite drilling locations that were determined to be prime locations. Since stock water is critical to the usefulness of the land and water resources are very limited in the vicinity of the Site, the evaluation of other sources necessarily focused on whether the mine drainage could still be used. Although the baseline risk assessment qualitatively noted an “enhanced” ecological risk from the stock tank, updated risk assessment calculations showed that no significant risk concerns arise from the use of mine drainage as drinking water for livestock. By allowing the mine drainage to be used as a source of stock water, (e.g., by reestablishing the stock tank), the property owner was provided with a stock water supply, consistent with the intent of the ROD.

The ROD stated that monitoring the groundwater to assure that it does not become contaminated would occur. Three wells were installed in October 1988 and fourth well in June 1989. Although the wells were protected during construction in 1991 and 1992, they were damaged and discovered to be inoperable in August 1993. It was not determined how the wells were damaged, though vandalism and structural failure were considered. Following review of the monitoring well status, depths, and considering the lack of useable groundwater near the Site, it was determined that the Site conditions did not warrant reestablishment of a groundwater monitoring network for the Site. After consultation with Ecology, EPA determined that cleanup actions diminished the threats to the groundwater aquifer; the shallow groundwater aquifer was not found above the bedrock formation at the Site where water was previously thought to be located; and monitoring wells constructed during site studies were damaged beyond use. Hence, the remedy was modified to not require groundwater monitoring at the Site.

Responsibilities for Remedy Implementation and Long-Term Operations and Maintenance

On January 4, 1991, EPA and Ecology entered into a Superfund State Contract (SSC) to provide the State of Washington matching funds for cleanup of the Site. The construction estimate was \$750,000 at that time. It was agreed in the SSC that EPA would implement the cleanup and pay 90 percent of the costs and that Ecology would pay the required 10 percent. Ecology also agreed to take over the operation and maintenance of the Site once the vegetative cover was established. The SSC has been amended once to increase the total cost to \$1 million with the State's share still remaining at 10 percent.

EPA implemented the remedy in 1992 and oversaw operations and maintenance until July 10, 1997, at which time, Ecology agreed to accept long-term operations and maintenance.

V. Progress since the Last Five-Year Review

This is the fourth FYR; the first FYR was completed by EPA Region 10 in July 1997; the second FYR was completed by Ecology in April 2002; the third FYR was completed by Ecology in September 2007. The third FYR in 2007 concluded the remedy was complete and protective of human health and the environment. That review did include the recommendations/follow-up action identified in Table 2.

Table 2 - Recommendations/Follow-up Actions from 2007 Five Year Review

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Completion Date
Conduct Annual Inspections.	Ecology's Central Regional Office	EPA Region 10	September 2011, April 2012
Monitor Fence. EPA fence should be replaced if adjacent owner's fence fails or is in disrepair.	Ecology's Central Regional Office	EPA Region 10	September 2011, April 2012
Consider and investigate conducting a title search for the Site.	Ecology with support from EPA Region 10	EPA Region 10	April 2008 (title search completed)
Consider and investigate establishment of a new deed under the Uniform Environmental Covenant Act.	Ecology with support from EPA Region 10	EPA Region 10	Not Completed

The title search completed in 2008 revealed some confusing, ambiguous information related to property ownership of the Site. In summary, the title search revealed a description of the property that included a clause that appears to exclude the footprint of the Site from the remainder of the tax parcel. This raised some questions about whether the Site is owned by the current owner of the tax parcel or if the owner of the parcel at the time the Site was listed on the NPL still retains ownership of the Site. Ownership and responsibility for the Site will be clarified

with the development of a new environmental covenant for the Site, developed under the Uniform Environmental Covenant Act (see Section VII of this report).

VI. Five-Year Review Process

1) Administrative Components:

The Silver Mountain Mine FYR was conducted by Jeff Newschwander of the Washington Department of Ecology. Mr. Kent Clark, a representative of the current landowner (RR Ranch LLC) was contacted and interviewed following the Site inspection. Jason Shira, currently employed by Ecology, was contacted and interviewed concerning the previous Site inspection and FYR.

2) Community Involvement:

A legal advertisement was placed in three local newspapers that are published in communities near the Site; Methow Valley News, Omak-Okanogan County Chronicle, and Oroville Gazette. This notice was also published in Ecology's Site Register, and included a public comment period that lasted from April 23 through May 23, 2012. No comments were received during the public comment period. Additionally, the current landowner was notified of our intent to conduct a five-year review at Silver Mountain Mine. No other community involvement was deemed necessary for this remote Site.

3) Document Review:

This FYR consisted of a review of relevant documents in the Ecology's Central Regional Offices file including background and historical data, correspondence from 1982 to the present, remedial investigation, feasibility study, record of decision, remedial action report, explanation of significant differences, operations and maintenance plan, and first and second FYRs. The Okanogan County Auditor's Office was contacted by Ecology in April 2012 to verify that the deed restriction was recorded. The deed restriction is Okanogan County document number 847844 and located in Volume 150, Pages 0191 & 0192.

4) Data Review:

Ecology reviewed the previous FYR, along with the annual inspection report from 2011. Water samples were collected from seepage from the mine adit during the inspection in September 2011 and during the site visit for this review in April 2012. Samples were collected per the Operations and Maintenance (O&M) Plan and delivered to Cascade Analytical Laboratory in Wenatchee, Washington for analysis. Laboratory results of the samples detected total arsenic concentrations of 89.1 ug/L in 2011 and 86.0 ug/L in 2012. These concentrations are consistent with historical data from the mine seep and indicate that arsenic concentrations are neither increasing nor decreasing. Table 3 presents arsenic levels measured in water samples taken from the mine seep since 1994.

Table 3 - Arsenic Concentrations in Mine Seep Water Samples

Date	Mine Seep Arsenic Concentration (ug/L)
7/7/1994	46
8/23/1994	93.6
7/25/2005	67
9/27/2011	89.1
4/12/2012	86.8

The upper confidence limit for this data is 95.4 ug/L, which is below the acceptable level of 200 µg/l for agricultural use including stock watering identified in the ESD.

Flow rates from the seep were not measured during any of the sampling events and no mass contaminant movement into the soil column is known at this time. It is not clear if flow rates from the mine seep vary from season to season or year to year. Overall concentrations remain below acceptable exposure levels, as explained in the ESD.

5) Site Inspection:

On April 12, 2012, Jeff Newschwander (Ecology) conducted a site inspection of the Silver Mountain Mine. The site inspection included all elements of the Silver Mountain Mine Maintenance Checklist as developed in December 1994 and amended July 1997 and November 2011. See attached completed checklist and site inspection pictures. The cap continues to maintain moderate grass cover. There is evidence of invasive grasses on the cap, but no rooted plants that could penetrate or alter the cap were found. The fence installed as part of the remedial action is gone, except for the fence posts; however, a newer fence surrounding the property prevents general access to the Site. The newer fence containing a gate still provides for controlled access of cattle to the watering hole near the mine adit. Access to the watering hole by cattle was evident; however, there was little evidence that cattle routinely frequented the cap. One water sample was collected from the mine seepage, as discussed above in the Data Review section. There are two water wells located approximately one mile to the southeast of the Site. One is for domestic use and one is for livestock watering. Both are completed to a depth of approximately 400 feet and are unlikely to be impacted by perched groundwater at the Site, based on sampling of downgradient wells during the RI (where no elevated levels of site-related contaminants were found).

6) Interviews:

The Okanogan County Auditor's office was contacted to determine the current status of institutional controls at the Site. The deed restrictions were found, and it was determined that they are still active and no other instruments had been recorded affecting the enforceability of the covenant.

The current landowner was contacted and interviewed to clarify elements of this report. The landowner stated that the Site is currently used for horse pasture. Cattle grazing is limited at the

Site due to the lack of sufficient water supply. The mine drainage output is not sufficient to sustain a significant number of cattle. Cattle may graze the Site for up to one-month per year during the winter and spring when water is ponded and available at the Site. The landowner does not visit the Site routinely.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy is functioning as intended by the decision documents. The remedy continues to be protective of human health and the environment, and it continues to prevent exposure to contaminated soils at the Site. The final remedy allows wildlife and livestock access to Site surface waters where concentrations of arsenic were determined to be acceptable for stock watering and human consumption of those livestock. Institutional controls in the form of deed restrictions prevent human consumption of groundwater by prohibiting groundwater use and the installation of groundwater wells. Based on the 2012 site inspection, the cap remains in excellent condition and no new uses of surface or groundwater in the vicinity of the Site has occurred. Although the Site fence is no longer in place, a newer adjacent landowner-owned fence in excellent condition surrounds and restricts access to the Site. However, since the adjacent property owner has no obligation to retain or maintain the fence, access control at the Site could be compromised should the existing fence be damaged or removed.

The deed restrictions appear to be working, as the current landowner knows and understands the purpose of the restrictions. In April 2012, Jeff Newschwander confirmed with the Okanogan County Auditor's Office that the deed restrictions are in place. As noted above, the document is registered as Okanogan Document Number 847844 and is located in Volume 150, Pages 0191-0192. In 2007, a copy of the deed restrictions were included in EPA's Institutional Controls Tracking System. The restrictions do not, however, include features such as enforceability provided by the UECA covenants required under current state law. There is also some uncertainty about ownership of the Site, based on the results of a title search conducted in 2008.

Annual site inspections did not occur in 2008, 2009 or 2010. While the failure to inspect and correct deficiencies annually could permit Site deficiencies to go unnoticed for an extended length of time, the cap remains in excellent condition. Consequently, it has been determined that site inspection frequency can be reduced to twice every five years without reducing the protectiveness of the remedy.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Changes in Standards and TBCs

There were no changes to standards, ARARs or TBCs during this FYR period.

Changes in Exposure Pathways, Toxicity, and other Contaminant Characteristics

The exposure assumptions used to develop the human health and ecological risk assessments remain valid. There has been no change in the toxicity factors for the contaminants of concern. The assumptions in the analysis are considered reasonable in developing risk-based cleanup levels.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no new information to call into question the protectiveness of the remedy.

Technical Assessment Summary: Based on Ecology's review and investigation of the Site, the remedy is functioning as intended by the decision documents. The cap remains in excellent condition, existing fencing restricts access to the Site, and institutional controls remain in-place and effectively protect the remedy and control exposures to site-related contaminants. However, the fence belongs to an adjacent landowner and if damaged or removed, could allow for unrestricted access. Additionally, there is some uncertainty about Site ownership and the existing deed restrictions do not include the enforceability provisions of newer UECA covenants. Physical hazards do remain on this remote Site, specifically, steep drop-offs and pits from the mill's foundation walls and interior pits. Cellular phone service is available in the area.

VIII. Issues

Issues raised as part of the evaluation are discussed below and presented in Table 4.

- 1) Fence Installed During the Remedial Action No Longer Exists - The fence installed as part of the remedial action is gone, except for the fence posts; a newer fence surrounding the property (owned by an adjacent neighbor) prevents general access to the Site. The newer fence, containing a gate, still provides for controlled access of cattle to the watering hole near the mine adit. Access control at the Site would be compromised should the existing fence be damaged or removed.
- 2) Update Environmental Covenant - The current deed restrictions are in-place, are understood and adhered to by the current property owner, and remain effective and protective. Long-term effectiveness of the remedy would be improved by replacing the deed restrictions with an environmental covenant developed pursuant to the Unified Environmental Covenant Act (UECA). There is also confusing information related to the legal description and ownership of Site.

Table 4 - Issues

Issue	Currently Affects Protectiveness?	Affects Future Protectiveness?
Fence Installed During the Remedial Action No Longer Exists and the Present Site Fence is Owned by an Adjacent Property Owner	N	Y
Update Environmental Covenant	N	Y

IX. Recommendations and Follow-up Actions

As part of this five-year review, two recommendations are being identified in Table 5 below to improve the long-term remedy performance or protectiveness in alignment with the Remedial Action Objectives and performance standards of the Site. Further, conducting inspections and maintenance of the cap according to an established schedule will ensure continued protection of human health and the environment at this Site. As part of these inspections, Ecology will verify that the neighbor's fence remains in place to help protect the cap and the institutional controls remain in effect. In the event that the neighbor's fence is damaged or removed, resulting in unrestricted access to the site, Ecology will ensure that the fence that was originally installed as part of the remedial action will be re-installed.

The UECA was adopted by the State of Washington in 2007. During this review, it was determined that the current deed restrictions on the property are understood by the current owner and remain effective in protecting against unacceptable exposures to site-related contaminants. It is recommended, however, that a new environmental covenant that follows the guidelines of UECA be developed and recorded. This new covenant would resolve current property ownership uncertainties (see Section IV) and help ensure long-term protectiveness of the cap and restrictions on the use of groundwater for human consumption. A new, updated environmental covenant would also allow Ecology and EPA to more effectively enforce the restrictions and bind successive owners.

Table 5 – Recommendations and Follow-up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
					Current	Future
Fence Installed During the Remedial Action No Longer Exists and the Present Site Fence is Owned by an Adjacent Property Owner	During site inspections, inspect fencing installed by adjacent property owner and confirm it remains in place and undamaged. If fence is damaged or removed, require Site property owner to replace the fence to ensure access to the Site remains controlled.	Ecology's Central Regional Office	EPA Region 10	Site inspection June 2015	N	Y
Update Environmental Covenant	Develop and implement a new environmental covenant under the Uniform Environmental Covenant Act.	Ecology with support from EPA Region 10	EPA Region 10	December 31, 2012	N	Y

A continuing issue that does not necessarily affect the protectiveness of the remedy is that Ecology's inspections have not occurred each year as required in the O&M plan. Following the 2007 FYR, inspections were conducted in 2011 and 2012 (as part of this review). However, the lack of annual inspections in 2008, 2009 and 2010 has not resulted in a less protective remedy and the cap remains in excellent condition. The continued excellent condition of the cap and lack of potential threats to the protectiveness of the remedy have indicated that a reduced site inspection frequency is warranted. Consequently, EPA and Ecology have agreed to modify the inspection frequency to two inspections during each five year review cycle; one occurring approximately midway between FYRs and the second occurring during the year that the FYR is conducted.

X. Protectiveness Statement

The remedy at the Site currently protects human health and the environment. The cap remains in excellent condition and institutional controls remain in-place and effectively protect the remedy. Fencing surrounding the Site limits access to the Site and exposures to site-related contaminants.

However, in order to ensure the remedy remains protective in the long-term, the following actions need to be taken:

1. During site inspections, inspect fencing installed by adjacent property owner and confirm it remains in place and undamaged. If fence is damaged or removed, require Site property owner to replace or repair the fence to ensure access to the Site remains controlled.
2. Ecology and EPA will work with the current property owner to develop a new environmental covenant that follows the guidelines of UECA. This will be done to resolve some questions about legal ownership of the Site and to ensure long-term protectiveness of the cap and restrictions on the use of groundwater for human consumption.

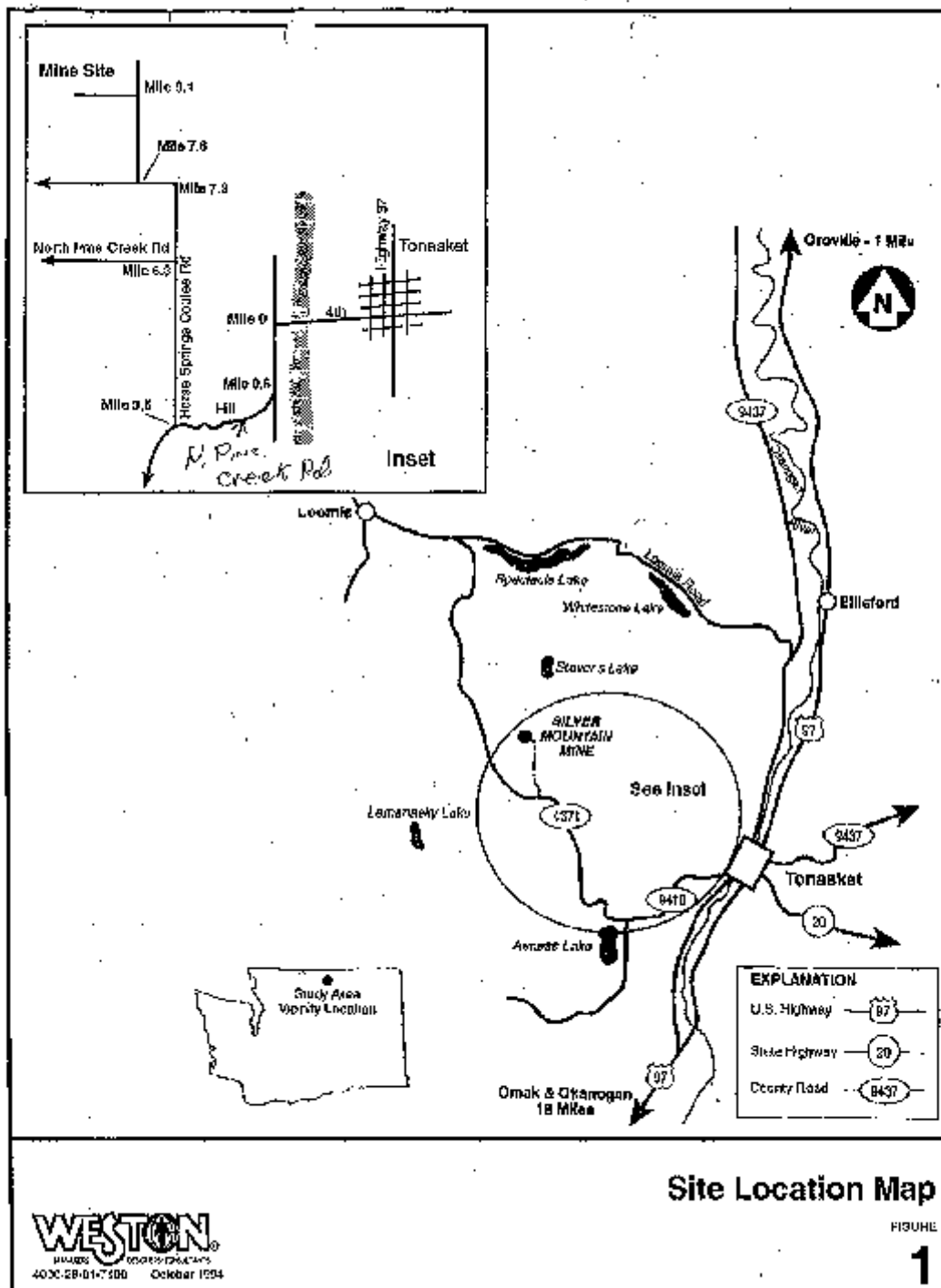
XI. Next Five-Year Review

CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require a FYR of all sites with hazardous substances, pollutants or contaminants remain on-site above levels that allow for unrestricted use and unlimited exposure for human and environmental receptors. The cleanup of the Site utilized containment of the hazardous substances as the method to reduce the risk and is, therefore, subject to these review requirements.

The FYR process will be used to ensure that the cap is still intact and blocking exposure pathways for human health and the environment. As noted in the ESD discussion above, groundwater monitoring will not be conducted. The next (fifth) FYR is due in 2017, five-years from the date that this fourth FYR is signed.

Appendix A

Site Location Map



Appendix B

Deed Restrictions

Appendix C

Silver Mountain Mine Five-Year Review Site Inspection Checklist

Appendix D

Silver Mountain Mine Maintenance Requirements and Checklist

Appendix E

Site Photographs

Appendix F

Laboratory Results