MONTE CRISTO MINING AREA
CERCLA REMOVAL ACTION

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May 4, 2016

Monte Cristo Mining Area Overview

- ~ 60 Abandoned Gold Mines / Prospects, Transport, and Processing Facilities, Located in North Cascades of WA on USFS-Administered Land
- 40 Miles East of Everett - Heavy Recreational Use (3,500+ annual visitors)
- Complex Land Ownership, USFS / private, platted Townsite
- 1,975 – 5,000 feet amsl
  (Monte Cristo Lake to Headwaters)
- ASARCO Settlement - $5.5M each to Forest Service and Ecology

Monte Cristo Mining Area Overview (Cont.)

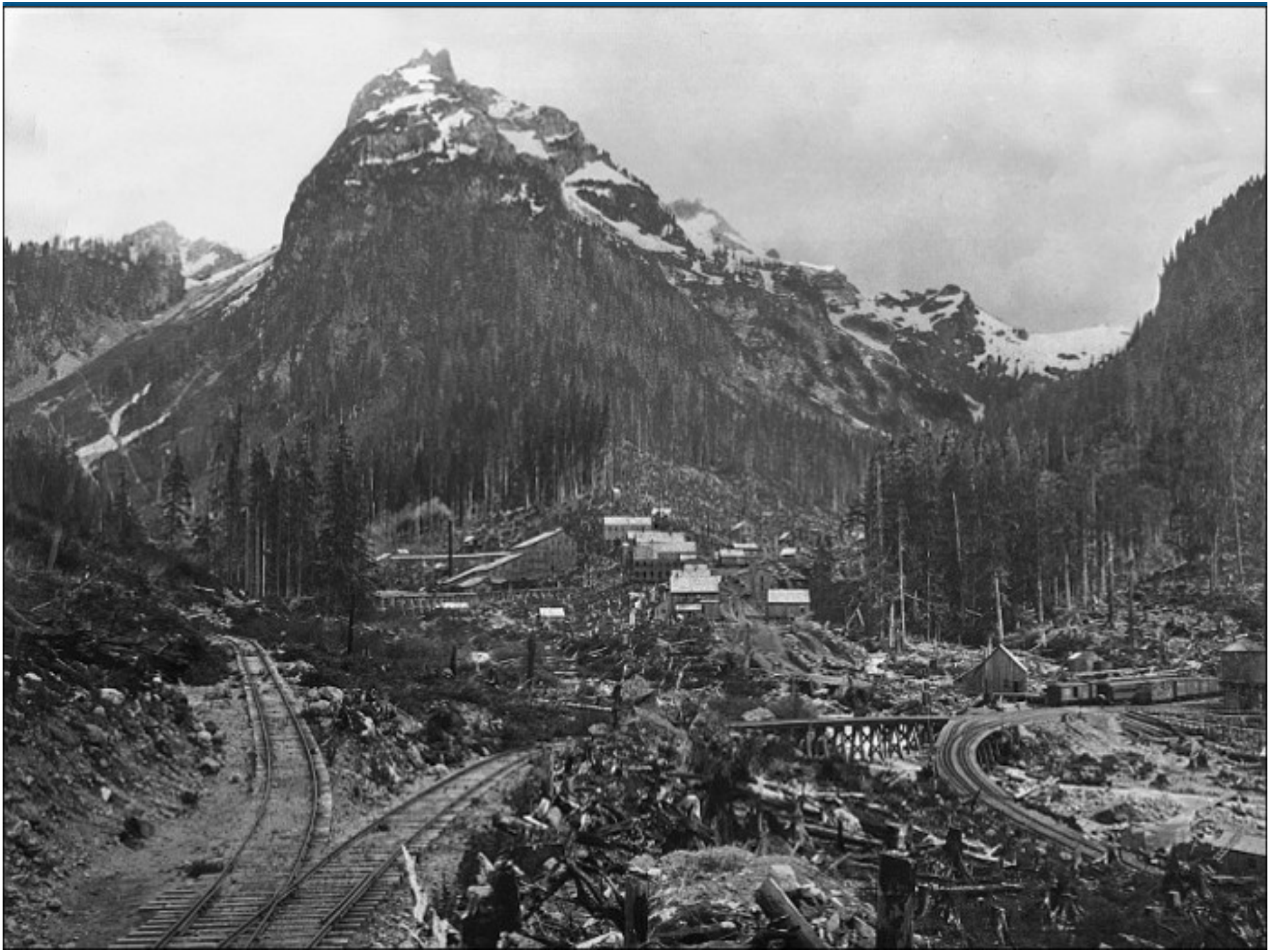
- Setting
  - Remote with Poor Access, Steep Terrain
  - Inventoried Roadless Area / Henry M. Jackson Wilderness
  - Threatened and Endangered Species (Murrelet, Spotted Owl, Bull Trout)
  - Archaeological / Cultural Resources

Overview of the MCMA

- Located in NW Washington, near/in HMJ Wilderness

Early History of Mining District

- 1889 – First discovery and early claims.
- 1891 – Rockefeller buys majority interest.
- 1892 / 1893 – Wagon Road / Railway completed to Monte Cristo.
- 1894 – United Concentration Company completes Mill.
- 1894 to 1906 – Period of Most Significant Mining, Ore Production ~300,000 tons.
- 1903 – ASARCO purchases Everett Smelter / Monte Cristo interests.
- 1907 – Main Production ends at Monte Cristo.



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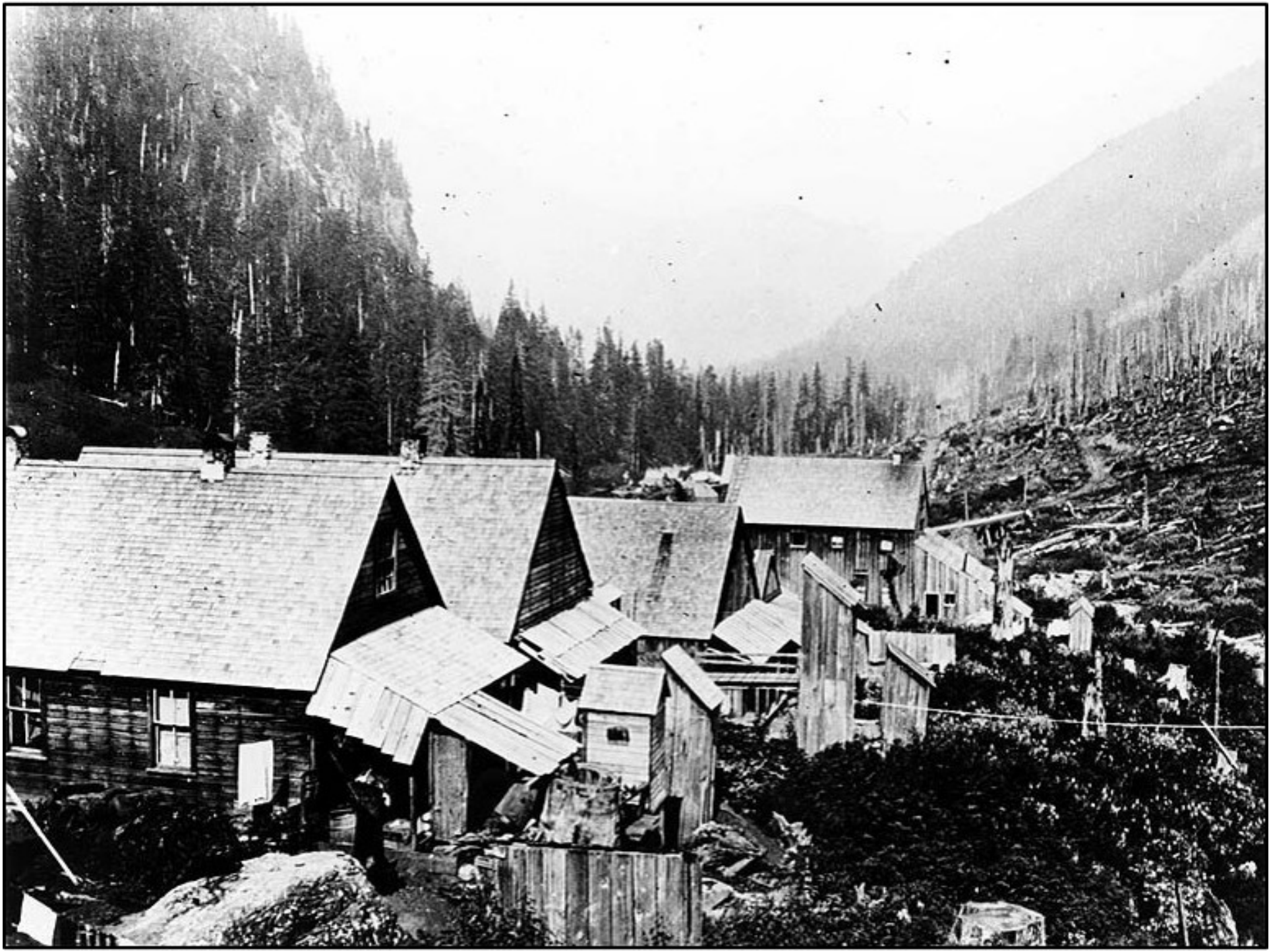


Mines / Facilities

Near Features (As Cleanup Level = 284 mg/kg)

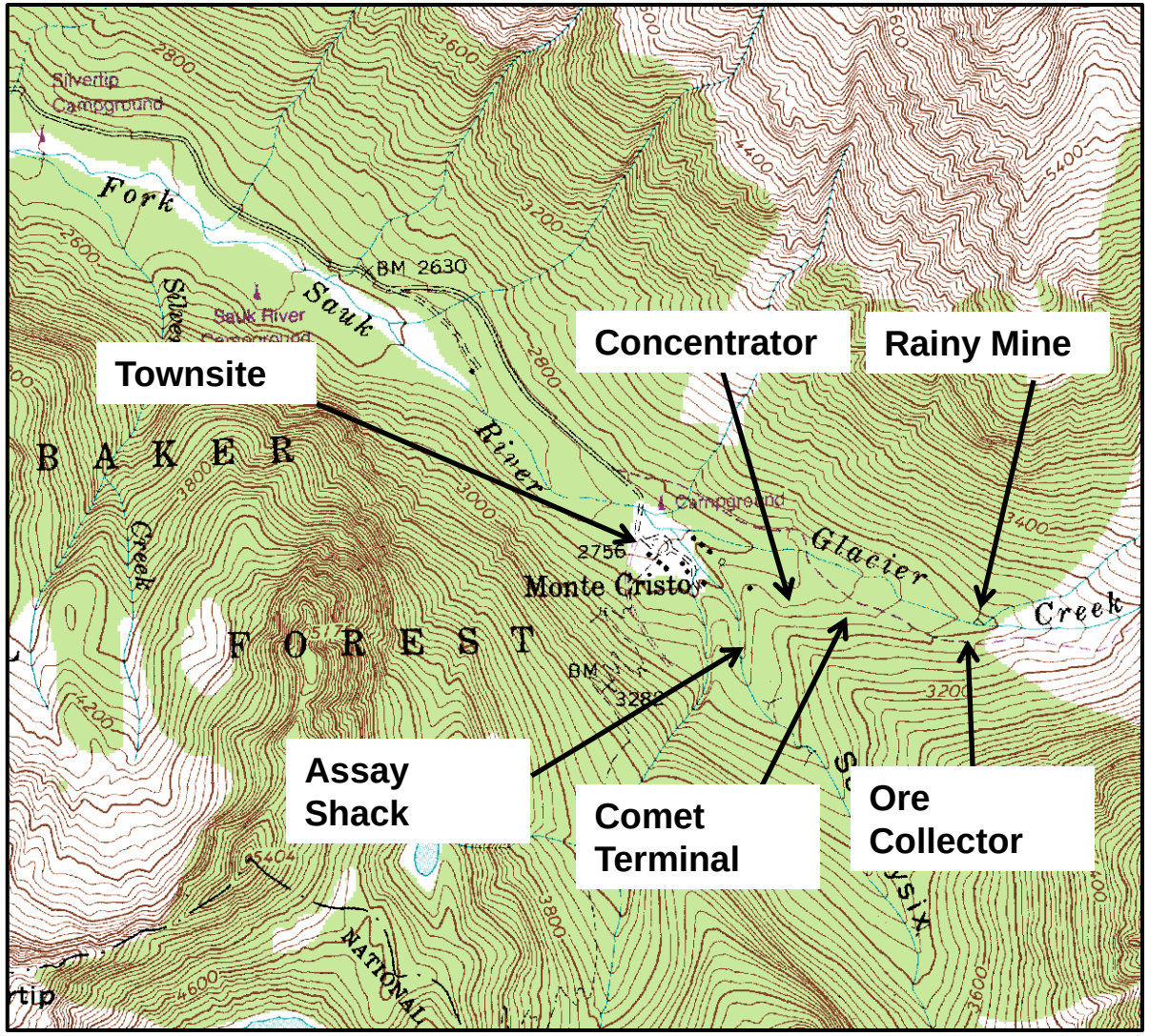
- Rainy Mine
- Concentrator
- Ore Collector
- Comet Terminal / Haulage Ways
- Assay Shack

Remote Features (As Cleanup Level = 659 mg/kg)

- Pride of the Woods Mine
- Justice Mine
- Mystery Mine

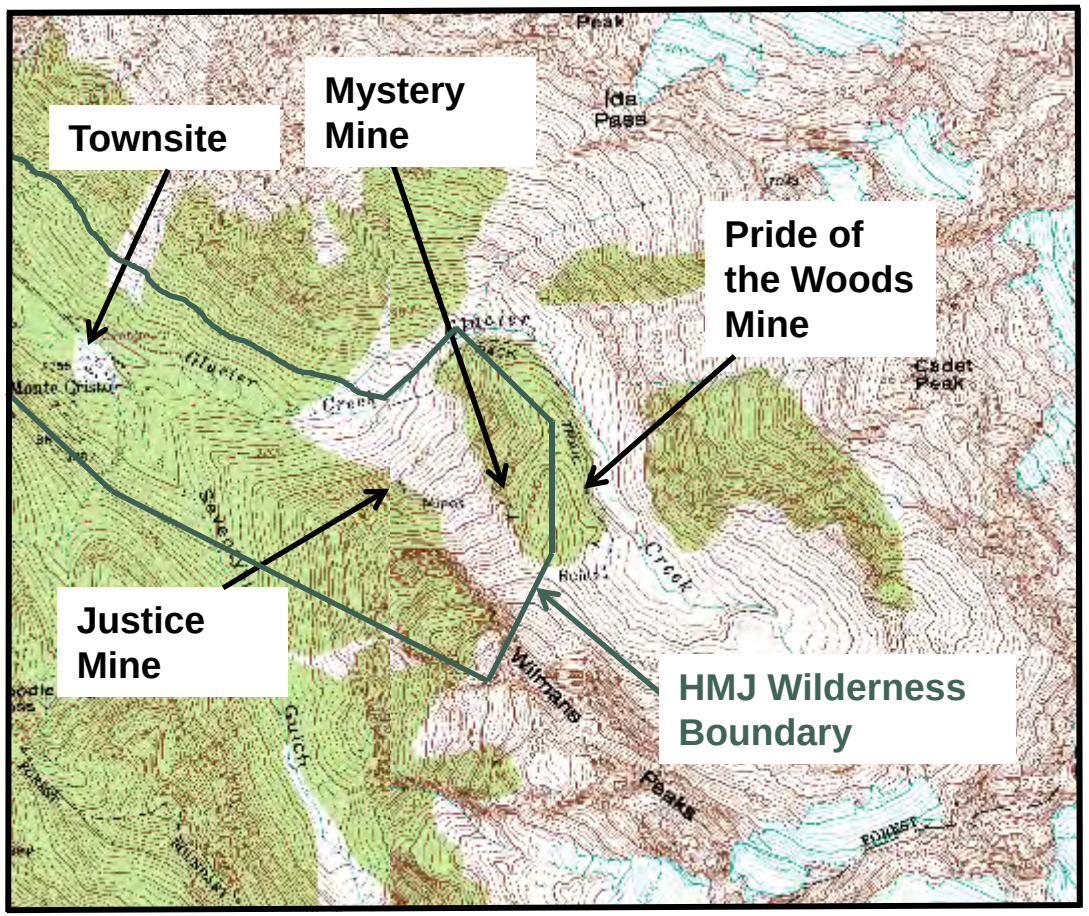
Near Features

- Rainy Mine
- Ore Collector
- Concentrator
- Assay Shack
- Comet Terminal / Haulage Ways



Remote Features

- Pride of the Woods Mine
- Justice Mine
- Mystery Mine

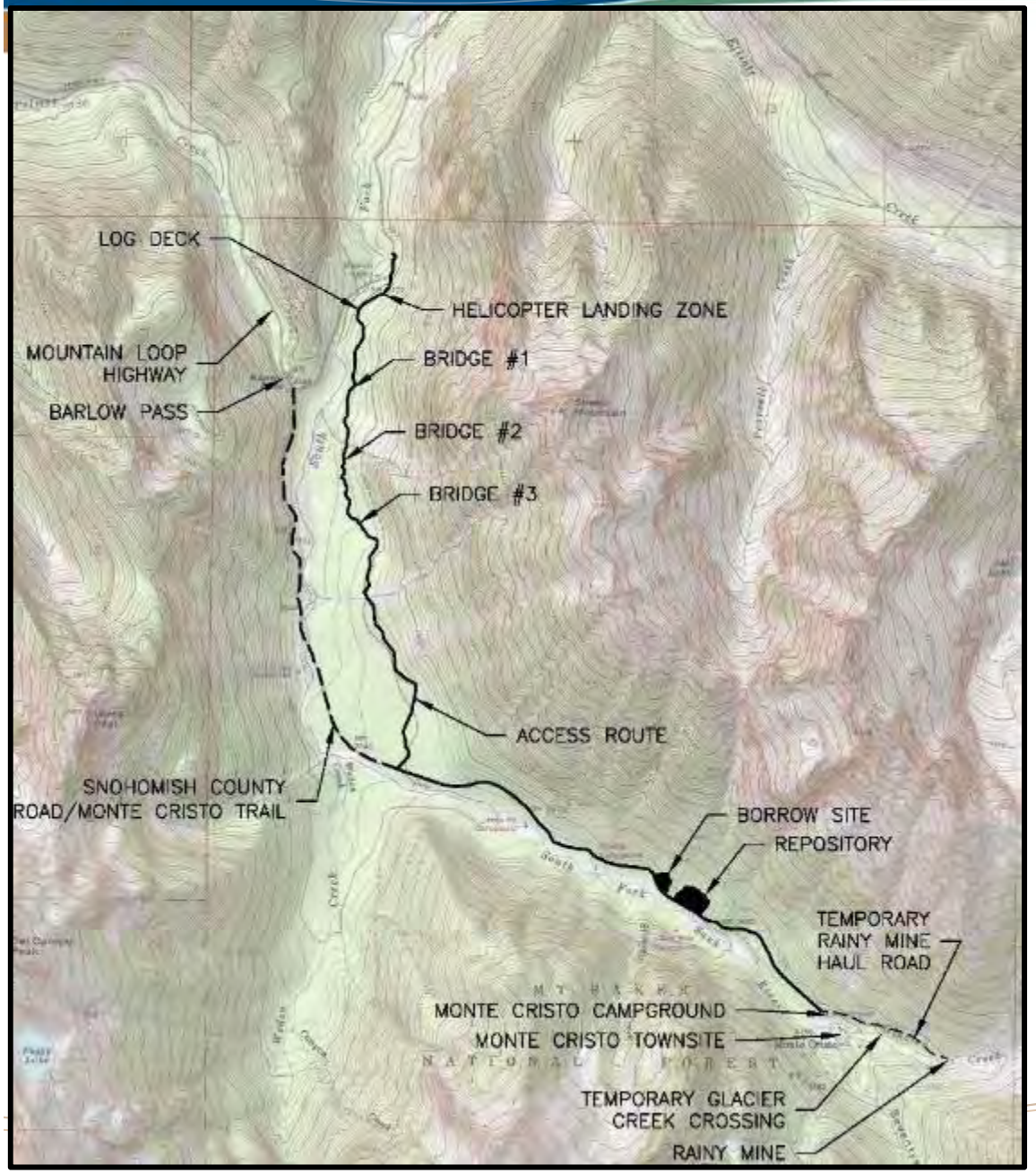


Final Removal Action Alternative

- Access Route Development / Improvements and Log Stringer Bridges (2012-2014)
- New ~ 2,900-Foot Haul Route to the Rainy Mine
- Temporary Access Bridge Across Glacier Creek
  - In Water Work Window - September 15
- Construct ~ 1.15-acre Permanent Onsite Repository
  - Repository Logging / Haul / Decking for USFS Timber Sale
  - Consolidation of Waste Rock and Tailings
  - Multi-Layer Cover, 60-mil HDPE Liner, Drainage Geotextile, and 3-foot Soil Cap

Final Removal Action Alternative (Cont.)

- Transport ~ 2,000 cy of Waste Rock from the Pride the of the Woods Mine via Heavy-Lift Helicopter
- Justice and Mystery Mine #3 Adit Diversions
- Biological Opinion (Murrelet and Bull Trout)
  - Noise Monitoring – 92 dB
  - Diurnal Work Window
  - Continuous Turbidity Monitoring Upstream and Downstream of Glacier Creek Crossing
- Full-Time Archaeological Oversight



Access Route 2012-2014

- Snohomish County Bridge / Road Washed Out (2008)
- 1.6 Miles of New Access Route from the Mountain Loop Highway
- 1.1 Miles of Upgrades to the Former Python Logging Road

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Access Route

- Three new Log Stringer Bridges to Span Tributaries

- 80,000-Pound Load Capacity
- Douglas Fir Stringers
- AYC Decking

Design/Construction Challenges

- Weather Conditions (Rain / Snow, Drought, Fire)
  - ~ 140 Inches of Precipitation
- Construction Window (June – early October)
- Remote Access / Logistics / Communications

Design / Construction Challenges (Cont.)

- Steep Slopes / Difficult Terrain
- Inventoried Roadless Area – Int. Secretary Approval
- ESA-Listed Species
  (Noise, Turbidity, In-Water Work Window)
- Archaeological / Cultural Resources
- Federally Designated Wilderness – Minimum Requirements Analysis / Approval from USFS Chief

2015 Removal Action Summary

- Design-Build Contract Structure
  - CES – Prime Contractor
  - Palm Construction – Main Subcontractor
  - Columbia Helicopters – Main Helicopter Subcontractor
  - Archaeological, Survey, Geotechnical, Liner / Leak Locator, Secondary Helicopter Subcontractor
- Continuous Work Schedule, CES and Subs
- Demobilization – October 24, 2015

Remote Camp – Facilities / Lodging

- Facilities
  - Running Water
  - Showers/Laundry
  - Temp Septic System

- 7 Day / Week Operation
  - Full-Time Cook
  - Satellite Phone / Internet
  - USFS Radio

Temporary Glacier Creek Crossing

- Access to the Ore Collector, Comet Terminal, Assay Shack and Concentrator
- Removal by September 15 (Fish Window)

Weather Station

- Continuous Turbidity Log 300 Feet Downstream of Bridge and Upstream from Rainy Mine (Background)
- Rain Gage, Temperature, Wind, Humidity, 7+ Inches of Rain Recorded over Labor Day Weekend
- Real Time Data for Tarp Deployment at Repository and Local Fire Managers

Haul Routes

Ore Collector, Comet, Assay Shack

Rainy Mine

Helicopter Service Area

- ~ 3.6 Aerial Miles Northwest of the Monte Cristo Townsite
- Onsite Fuel, Secondary Containment
- Full-Time Watchmen

Helicopter Service Area (Cont.)

- Located within Murrelet Habitat – Subject to Noise Restrictions and Diurnal Work Window
- Operated near the End of Murrelet Nesting Season (September 5-15)
- Used Avalanche Chute Glide Path

Waste Material Excavation / Placement

- Design Estimate was 17,300 bcy of Waste Rock and Tailings
  - Includes 12 cy of Dangerous Waste: Hauled Offsite to Arlington
- Risk Assessment Cleanup Goals
  - Near Features - 284 mg/kg Total Arsenic
  - Remote Features – 659 mg/kg Total Arsenic
- In-Field Screening with XRF
- Final Quantity ~ 14,350 cy

Ore Collector

- Located on Glacier Basin Trail
- Fine and Coarse Spilled Ore
  - As = 29,551 ppm (Avg)

Ore Collector – Removal

Ore Collector – Final

Comet Terminal

- Ruins/spillage piles
- Located on Glacier Basin Trail
- Ore stockpiles/spillage piles (As up to 10%)

Comet Terminal - Removal

Comet Terminal - Final

Assay Shack

- Ruins Present
- Significant Archaeological Features
  - As = 36,400 ppm (Avg)

Assay Shack - Removal

Assay Shack - Final

Concentrator/ Mill

- Tailings / Concentrates
  - As = 21,400 ppm (Avg)
  - 12 cy of Dangerous Waste
  - Discharge to Glacier Creek

Upper Concentrator - Removal

Upper Concentrator - Removal

Upper Concentrator - Removal

Upper Concentrator - Removal

Upper Concentrator - Final

Lower Concentrator

Lower Concentrator – Dangerous Waste

Lower Concentrator - Removal

Lower Concentrator – Drainage Removal

Lower Concentrator - Final

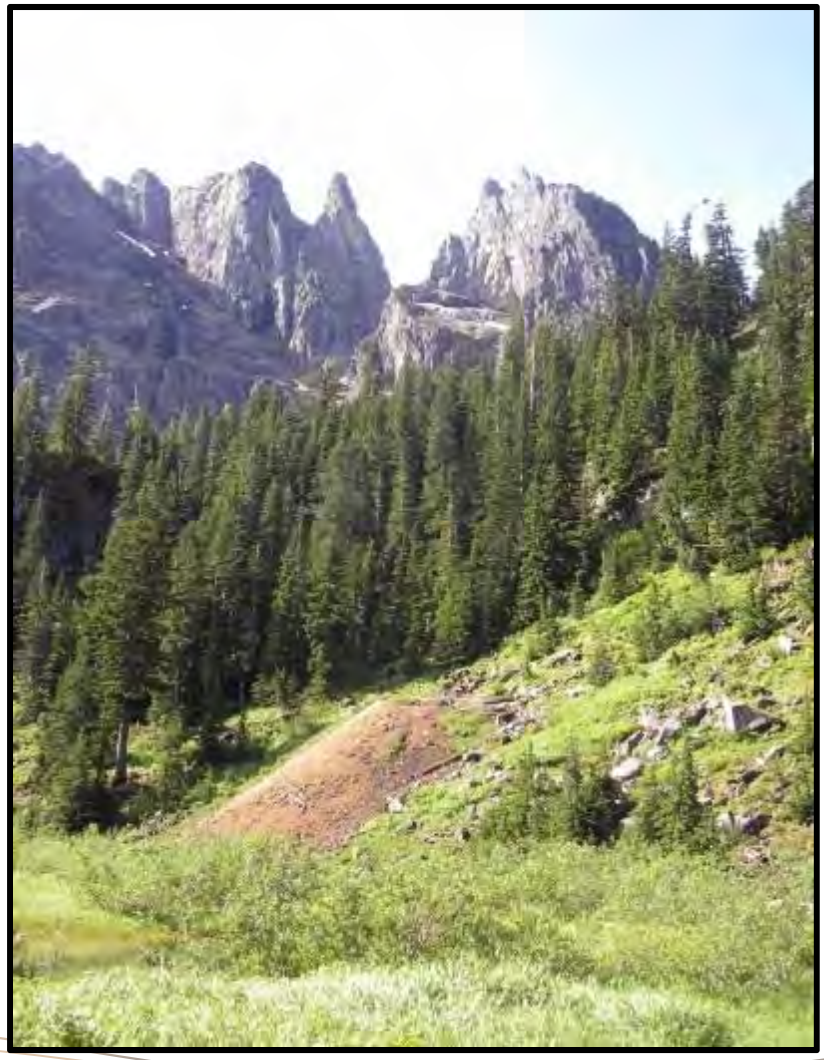
Rainy Mine

- Adit with Seep and Covered Shaft
  - As = 40,455 ppm (Avg)
- Eroding Waste Rock Dump Adjacent to Glacier Creek

Rainy Mine - Removal

Rainy Mine - Final

Pride of the Woods Mine



- 1 Collapsed Adit
- Located within HMJ Wilderness
  - As = 16,640 ppm (Avg)
  - Toe of Waste Rock in Glacier Creek
- Seep at Toe of Waste Rock
  - Up to 4,060 ppb (As)

Pride of the Woods Mine - Removal

- Columbia Vertol 107 – 10,000 lb Lift Capacity
- Self-Dumping Bins (2.2 cy Capacity)
- Three Mini Excavators Flown to the Top of the Pile
- 887 Round Trips from POW to Drop Zone at the Rainy Mine

Pride of the Woods Mine - Removal

Pride of the Woods Mine - Removal

Pride of the Woods Mine - Removal

Pride of the Woods Mine - Removal

Pride of the Woods Mine - Final

Mystery Mine

- Adit #3 Diversion
  - <40 gpm / 3,300 ppb (As)
- Seep Below Waste Rock
  - <4.5 gpm / 1,100 ppb (As)

Mystery Mine Diversion

Mystery Mine Diversion

Mystery Mine Diversion

Justice Mine

- Main Adit Diversion
  - 90 gpm & 712 ppb (As)

- Seep Below Waste Rock at Glacier Creek Trail
  - 1.35 gpm & 261 ppb (As)

Justice Mine Diversion

Justice Mine Diversion

Justice Mine Diversion

Justice Mine Diversion

Onsite Repository

- Slope Varies from 2.5:1 (Bottom) to 10:1 (Top)
- Waste Rock Consolidated with Tailings
- Lime (Calcium Carbonate) Additions to Provide Neutralization and Drying Capacity
- Covered with Tarps During Rain Events
- 12-Foot Wide Terrace Drain to Divert Water Away from the Face of the Slope

Onsite Repository (Cont.)

Repository Cover (Multi-Layer)

- Cover Soil Generated and Screened Onsite – Top Three Feet
- 200-300 mil Geocomposite Drainage Geotextile
- 60-mil HDPE Membrane; 6 Vents
- 12-oz Nonwoven Geotextile
- Six-Inch Buffer of Screened Topsoil
- Waste Rock / Tailings – Bottom

Repository - Logging

2.47-acre Patch Cut

Log Deck / Timber Sale

Repository – Subgrade Preparation

Repository – Waste Rock Placement

Repository – Tarp Deployment

Repository – Liner Placement

Repository – Liner Placement

Repository – Leak Test

Repository – Drainage Geotextile

Repository – Final Grade / Cover

Repository – Monitoring Wells

Summary

- Primary Construction Completed Within One Field Season
- Field Changes Made with Continuous Oversight & Communication
- No Health / Safety Concerns
- Long-term O&M Inspections & Monitoring Through 2019
- Cost - $4.7M Capital


QUESTIONS?