



CERCLA Removal Action At The Rainy Mine, Washington

by

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Spokane, Washington

*MINE DESIGN, OPERATIONS
& CLOSURE CONFERENCE*
Fairmont Hot Springs, Montana
May 2, 2012



The E W Wells Group LLC

- **Merged With Millennium Science & Engineering, Inc. January 2012**
- **Fifty Employees**
- **Several Offices Throughout The US**
- **Key AML Offices**
 - **Boise**
 - **Spokane**
 - **Salt Lake City**



**Wells-MSE Performed The Reclamation
At the Rainy Mine as a CERCLA Removal
Action Under Our ID/IQ Contract With
Region 6 Of The U.S. Forest Service,
Mount Baker-Snoqualmie
National Forest**



Rainy Mine Location & Info.

- **12 Air Miles Northeast of North Bend, Washington**
- **Snoqualmie River Drainage**
- **Elevation = 1,800 Ft. AMSL**
- **Very Rugged Area**
- **Heavily Vegetated**
- **Adjacent to Quartz Cr. >> Taylor R. >> Middle Fork Snoqualmie R. >> Puget Sound**
- **Annual PPC. = 120 In./Yr. As Rain And Wet Snow**
 - **Can be torrential – 16 in. at the start of field work**
- **Popular Recreation Spot**
 - **Asked not to work weekends**

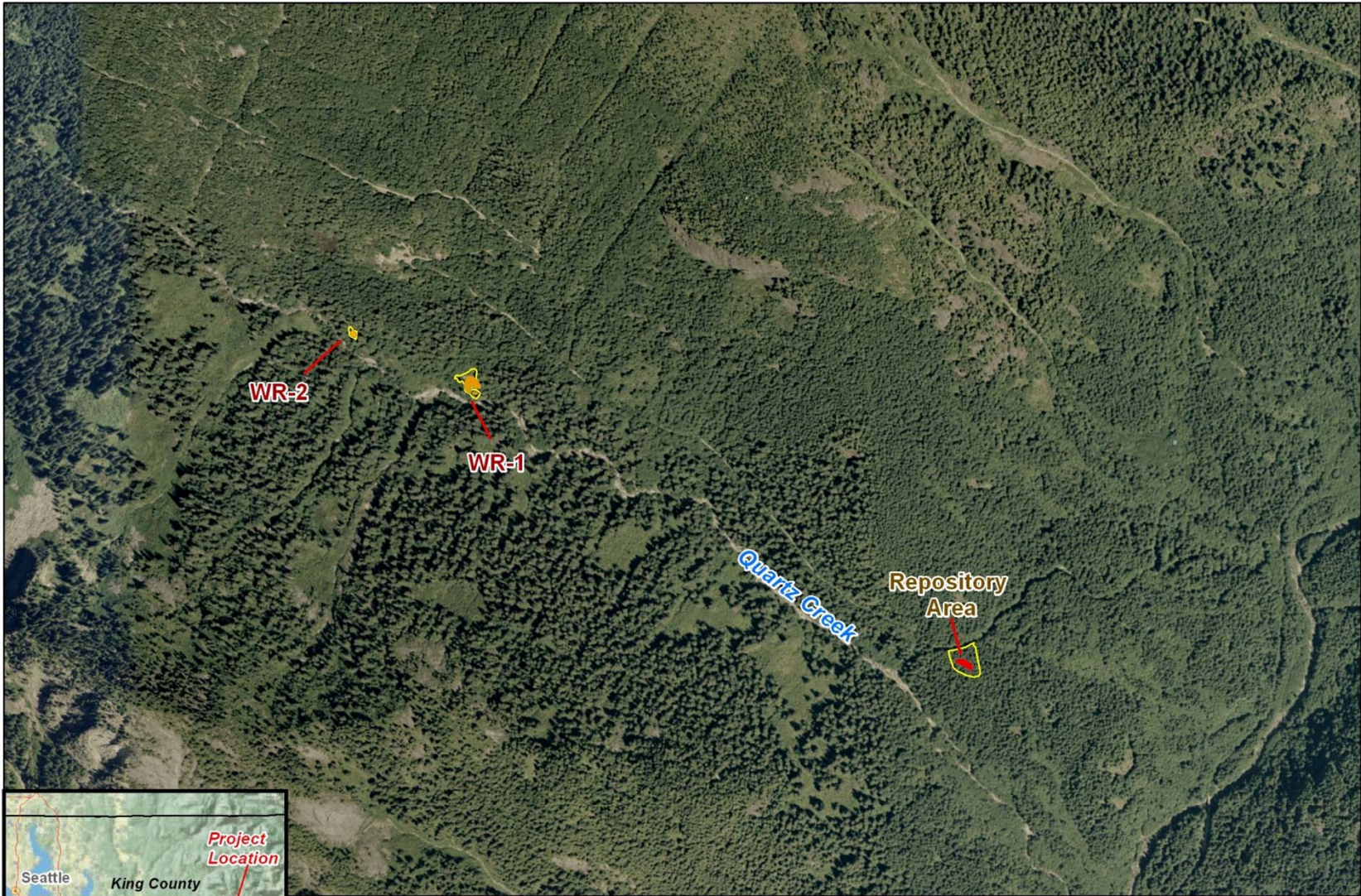
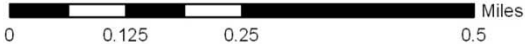


Figure 1: Project Overview
 Rainy Mine Remediation Project; King County, WA



SPATIAL REFERENCE: UTM zone 10 N, NAD 1983. Background layer: 2003 Digital Orthophoto Quadrangle.

MSE

Millennium Science & Engineering, Inc.
 A division of EW Wells Group LLC
 1555 Shoreline Dr., Ste. 150
 Boise, ID 83702 USA
 Phone: (208) 345-8292

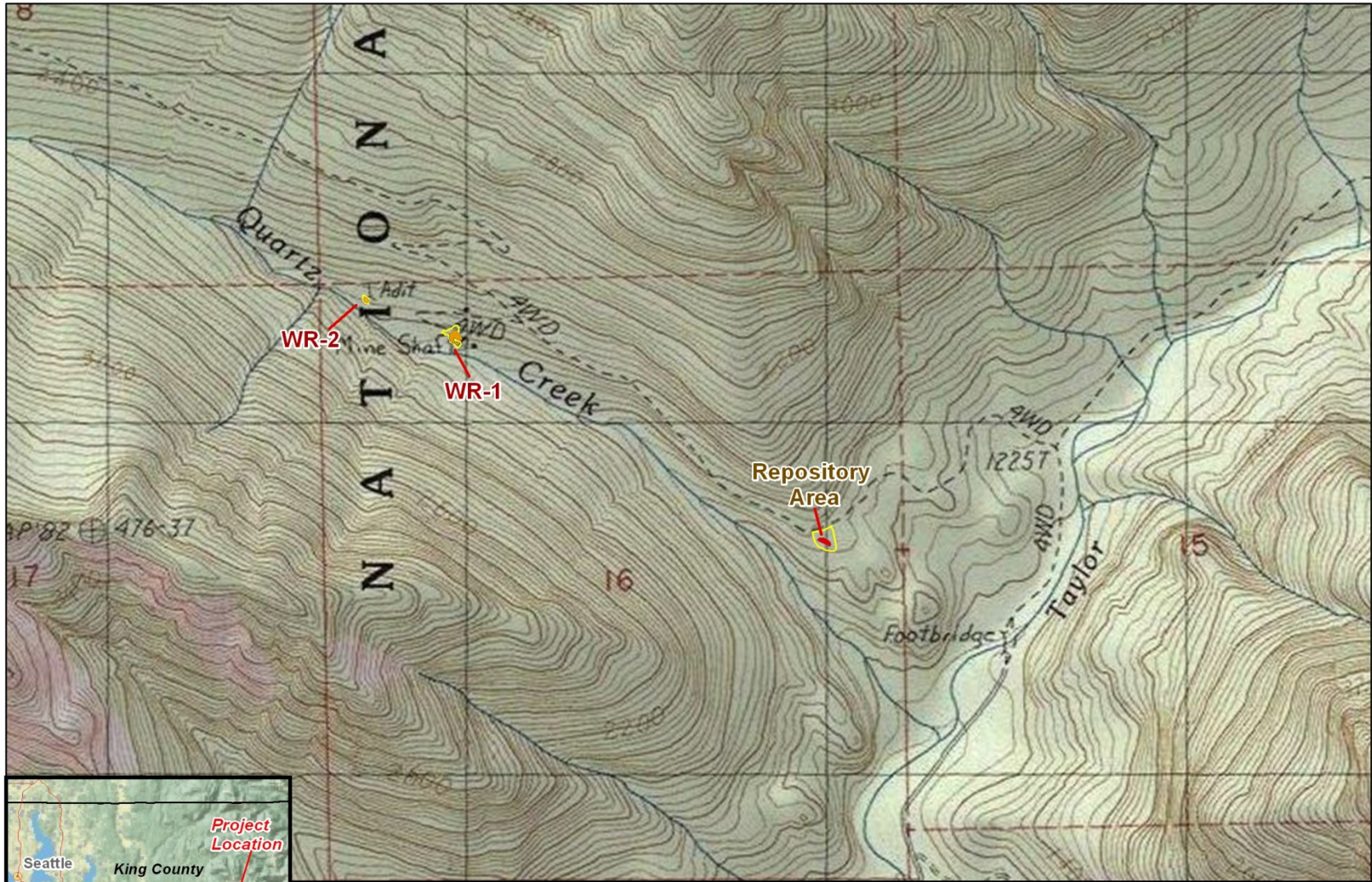


Figure 1: Project Overview
 Rainy Mine Remediation Project; King County, WA

0 0.25 0.5 1 Miles

SPATIAL REFERENCE: UTM zone 10 N, NAD 1983. Background layer: USGS 24K topographic map.

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Project History

**Abbreviated Preliminary Assessment Performed By
USFS - 2003**

**Site Inspection Performed By
Cascade Earth Sciences – 2005**

**Engineering Evaluation / Cost Assessment Performed By
MSE – 2008**

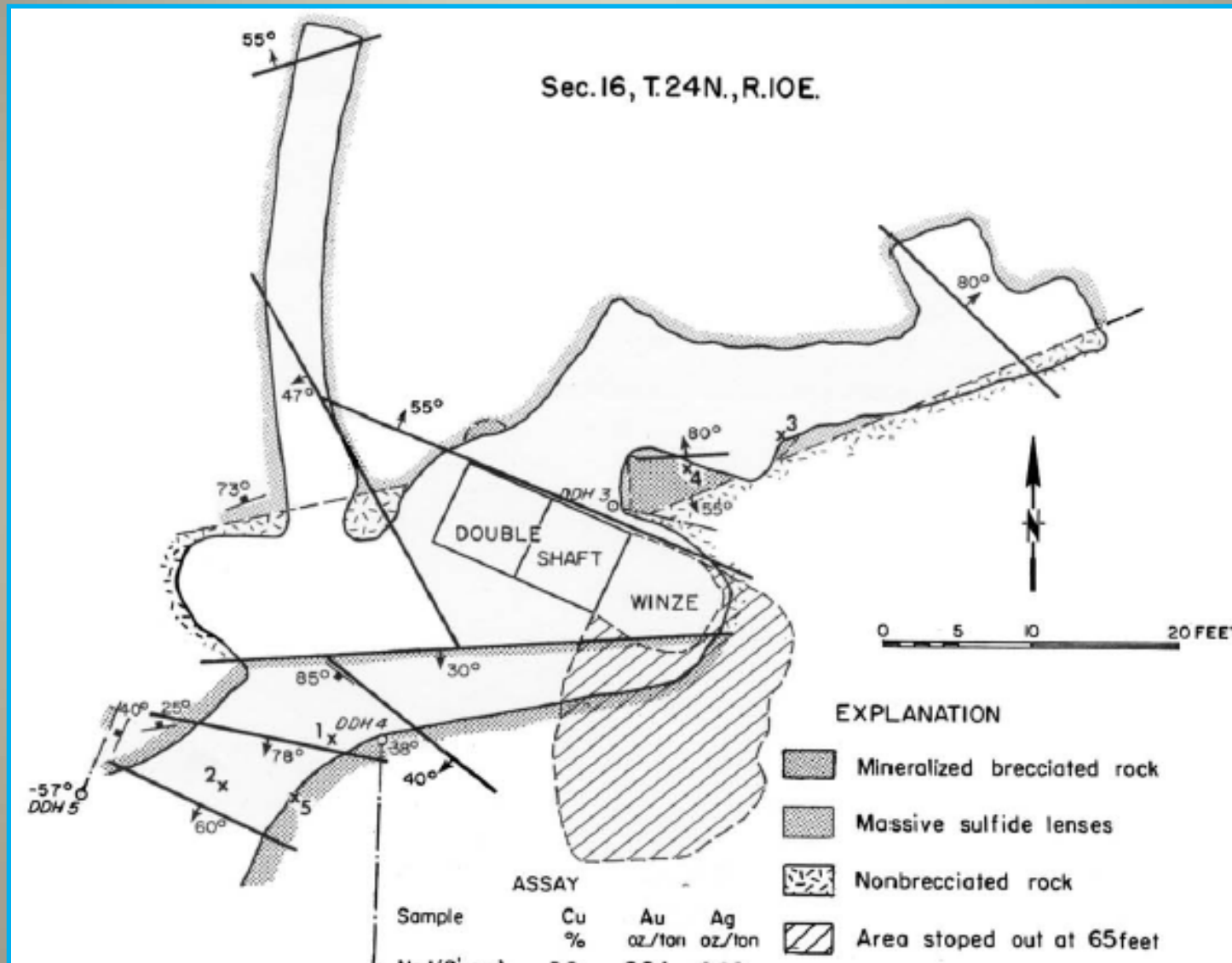
Removal Action Performed By MSE - 2012



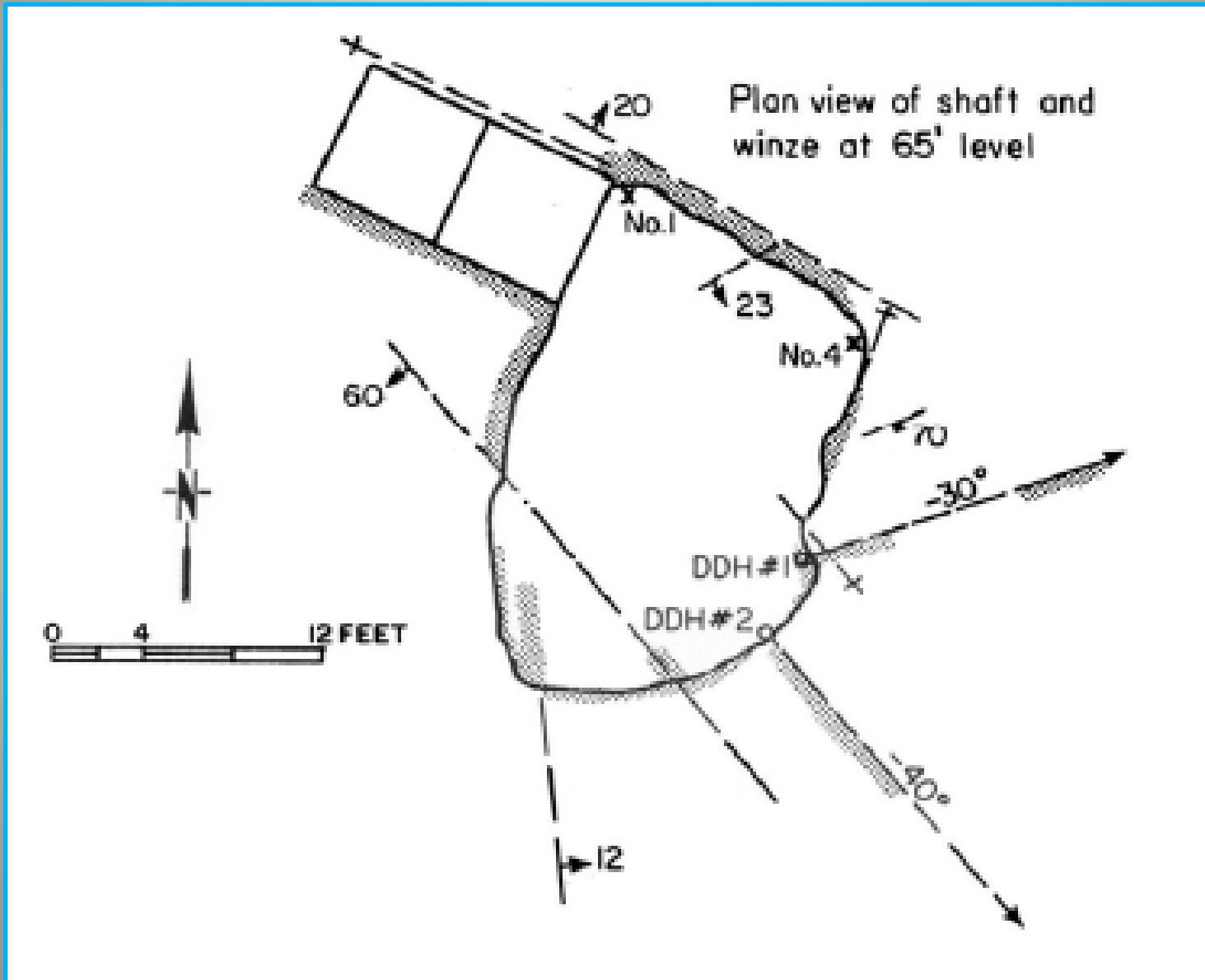
History & Description

- **Mineralized breccia pipes (background implications)**
- **Initial claims - 1946**
- **50 tpd flotation mill - 1951**
- **353 tons Cu, Ag, Au ore produced 1951-1957**
- **2 Adits (100 ft. long)**
- **1 Shaft (116 ft. deep, 2 compartment)**
- **2 Levels**

Shaft 116 Level



Shaft 65 Level

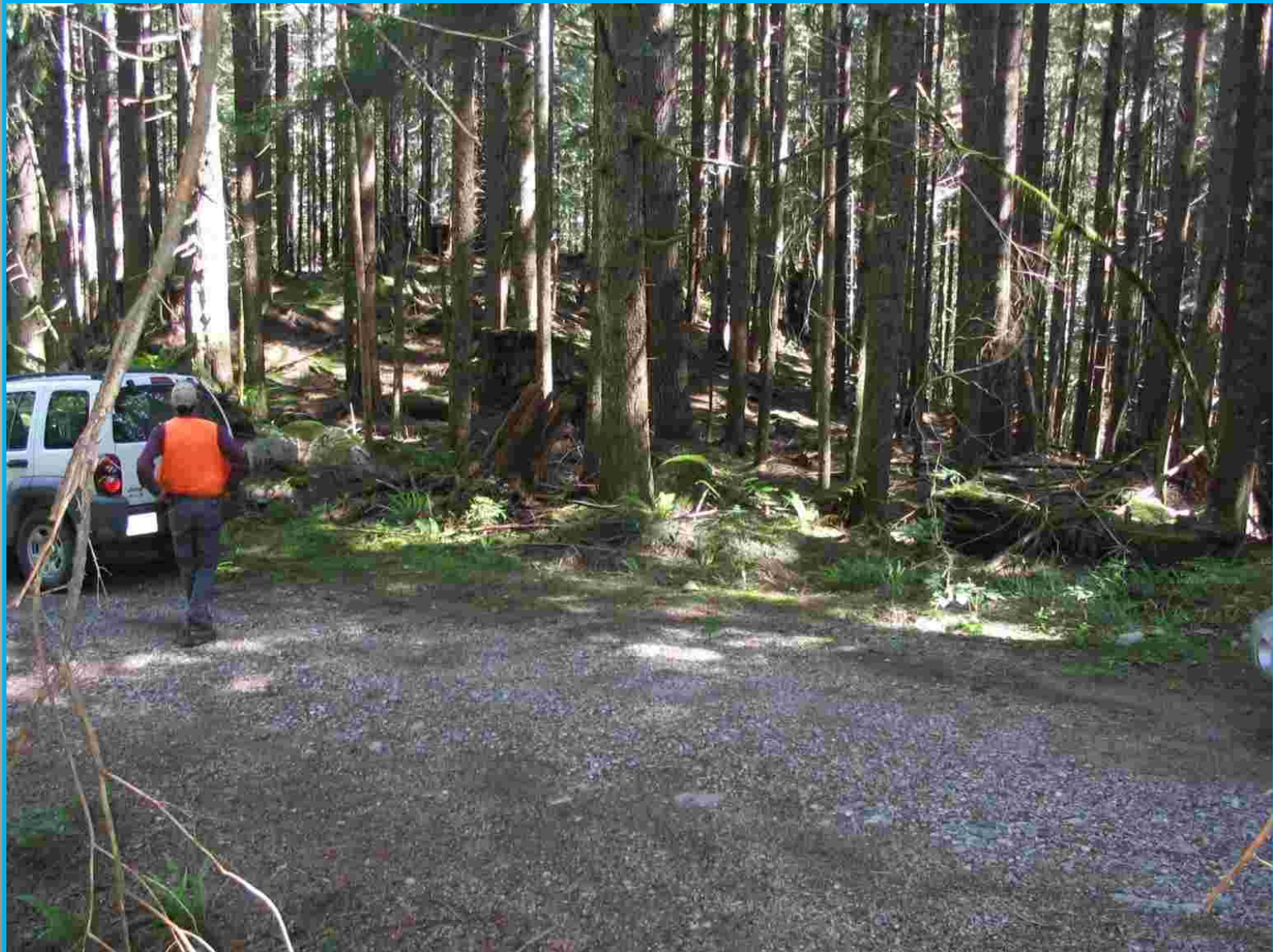




Pre-RA Access Condition



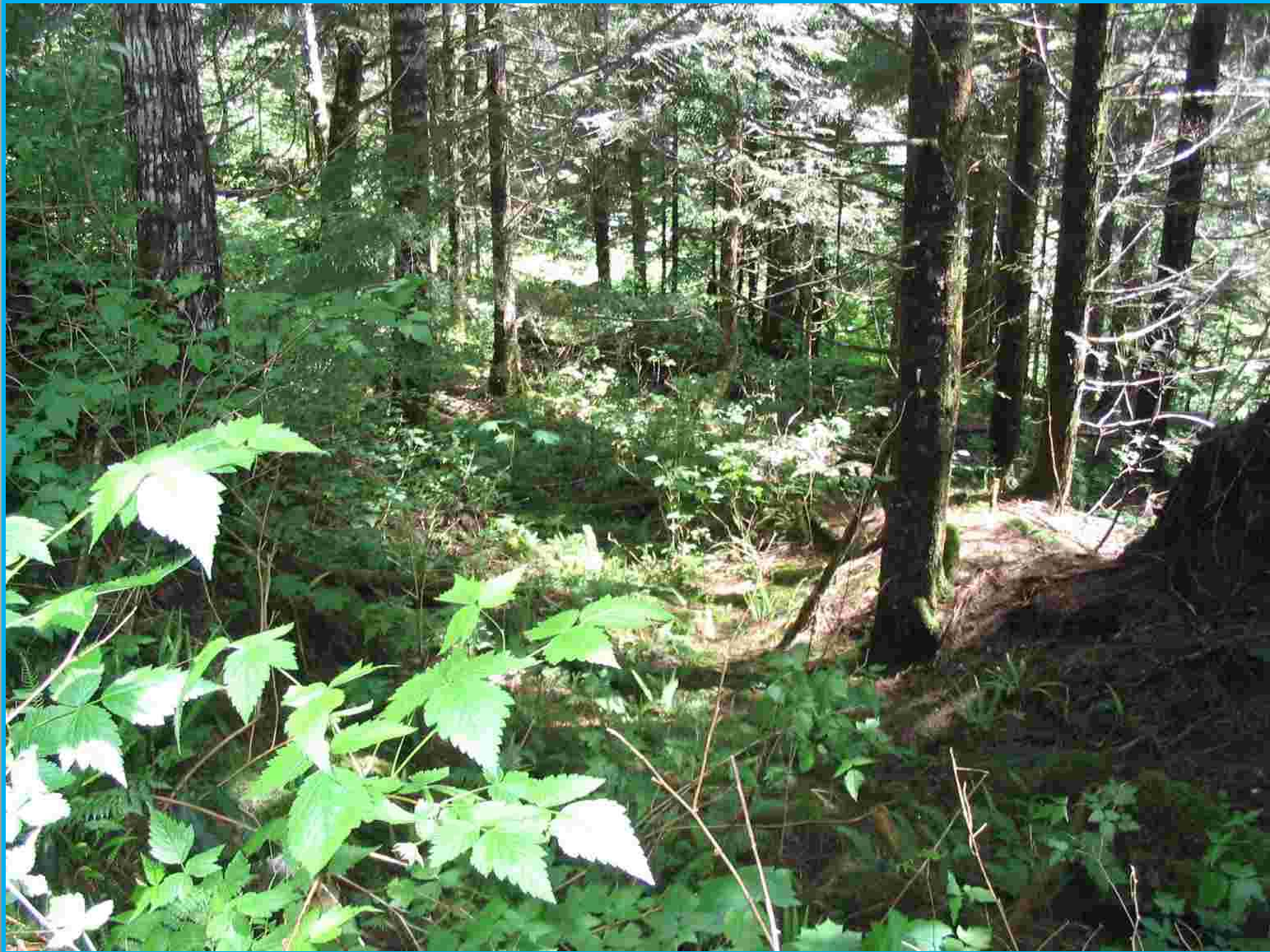
Repository Site



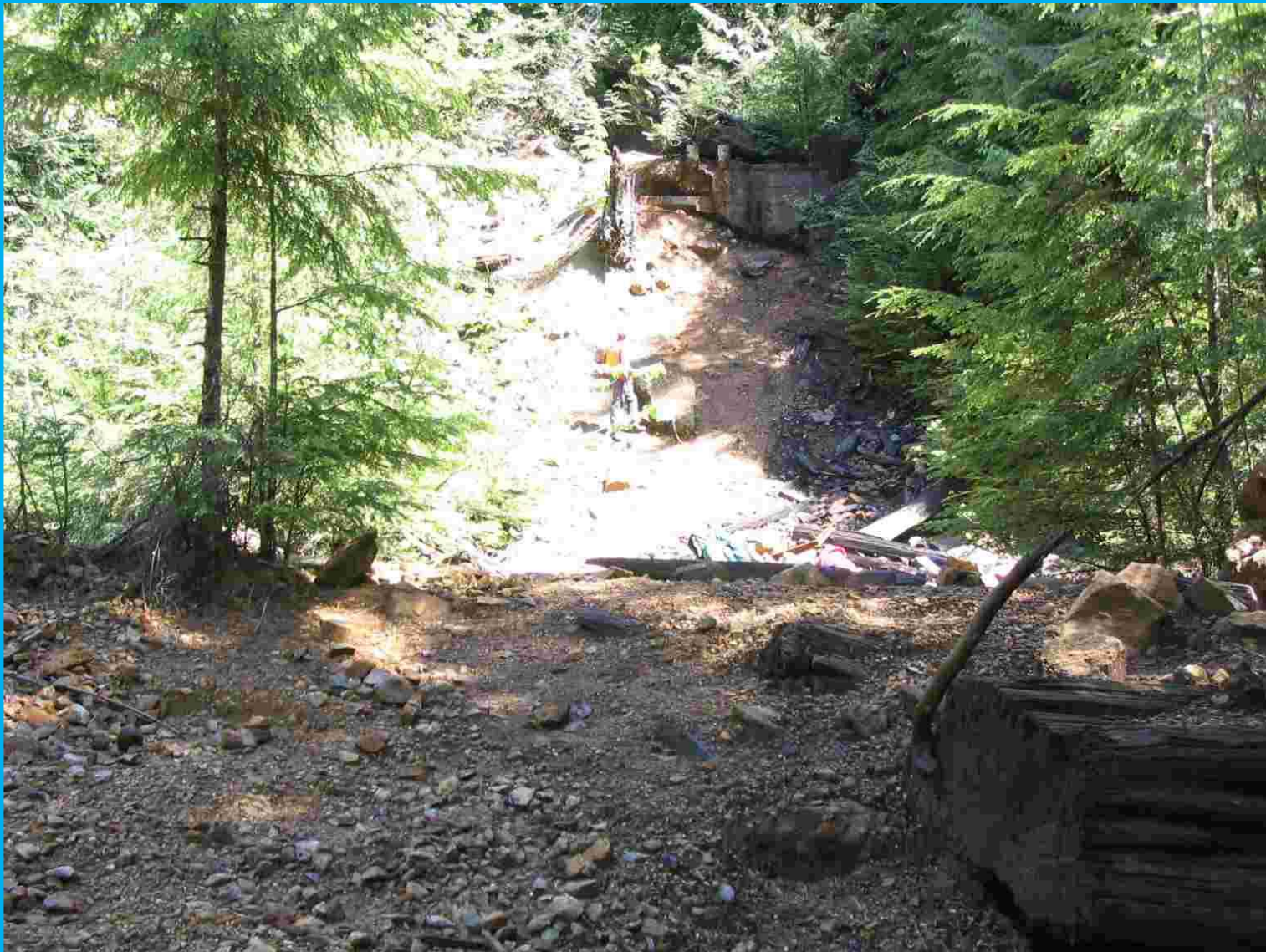
Repository - Downhill



Spur Road



WR-1 Shaft Area



WR-2 Access Road



WR-2 Adit





Wasterock Seep Quality

pH = 4.3 su

As = 0.058 mg/L

Cu = 2.02 mg/L

Fe = 0.058 mg/L

Pb = <0.001 mg/L

Se = <0.002 mg/L

Zn = 0.060 mg/L



Wasterock Quality

Paste pH = 3.1 su

As = 15,800 mg/kg

Cu = 1,970 mg/kg

Fe = 100,000 mg/kg

Pb = 80 mg/kg

Se = 10 mg/kg

Zn = 100 mg/kg



Basic Approach

- 1. Improve Access**
- 2. Log Repository**
- 3. Remove And Shred Stumps**
- 4. Excavate Repository**
- 5. Fill Spur Road Ravine**
- 6. Improve Spur Road Access**
- 7. Fill Shaft With Wasterock**
- 8. Remaining Wasterock To Repository**
- 9. Cap Repository**
- 10. Reclaim**

Lower Access Road



Mulch Maker



Makin' Mulch



Repository Pit



Spur Road & Ravine





E. WELLS
GROUP

MSE

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Ravine Fill Complete



10.02.2011 10:33

Shaft Filling





Design Changes

- Anticipated waste volume was 2,000 cy
- A burned, crushed, and covered mill structure was discovered during excavation that added an additional 700 cy
- The shaft was expected to hold 200 cy, but held 1,200 cy
- 1,800 cy was taken to the repository
- WR-2 was expected to be 25 cy, but was actually 250 cy
- Excavation at WR-2 was terminated after calculating a new “local” background



Repository Groundwater

- Water in the repository pit was clearly identified as groundwater, not precipitation
- A drainline was installed to intercept the groundwater
- The effluent was piped to an infiltration basin filled with coarse rock
- The basin was covered with geotech fabric, then soil and moss

Drain Tile Installation



HDPE Installation





Completed Repository Surface Water Diversion Trench





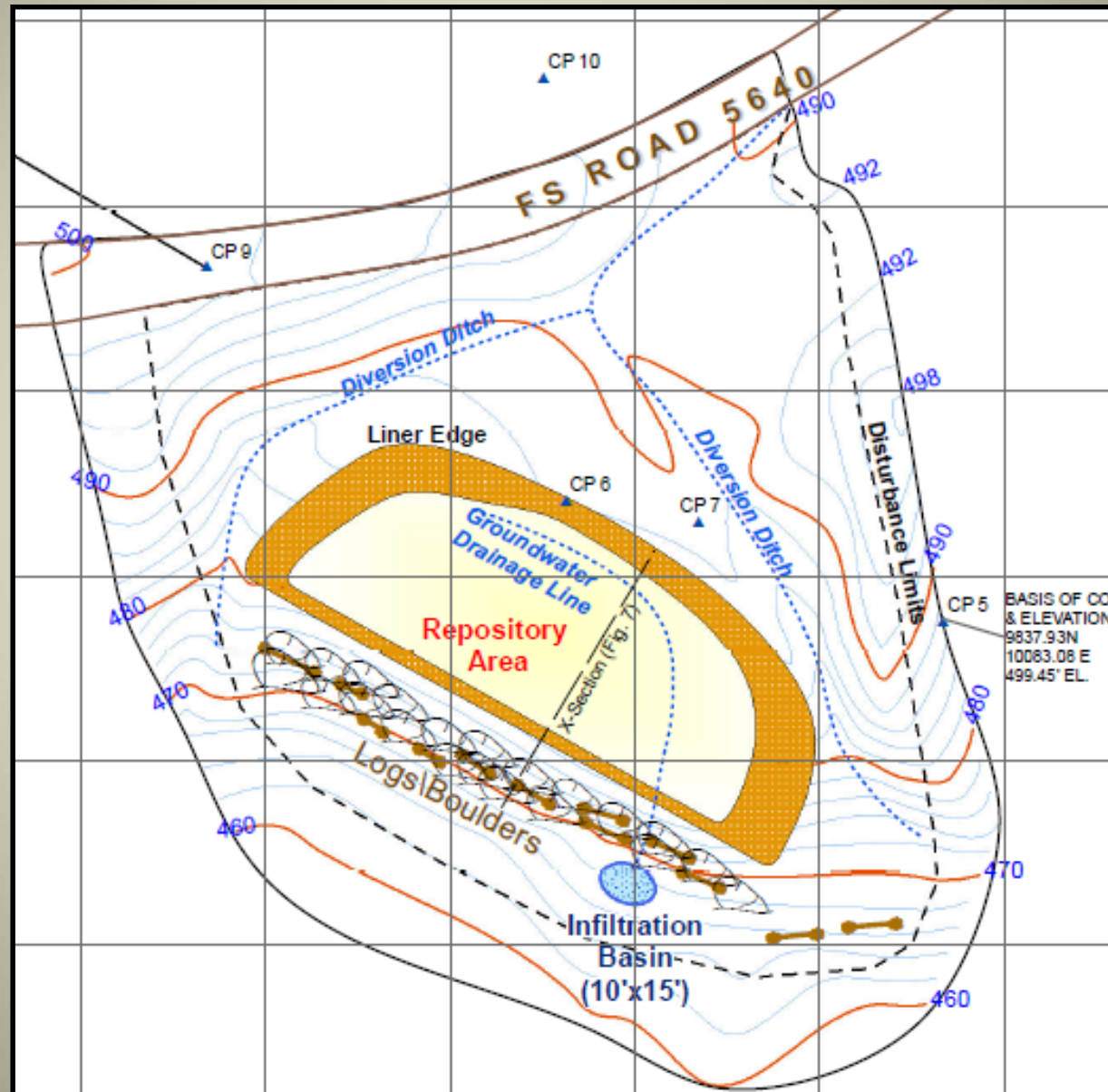
Completed Repository Lower Berm



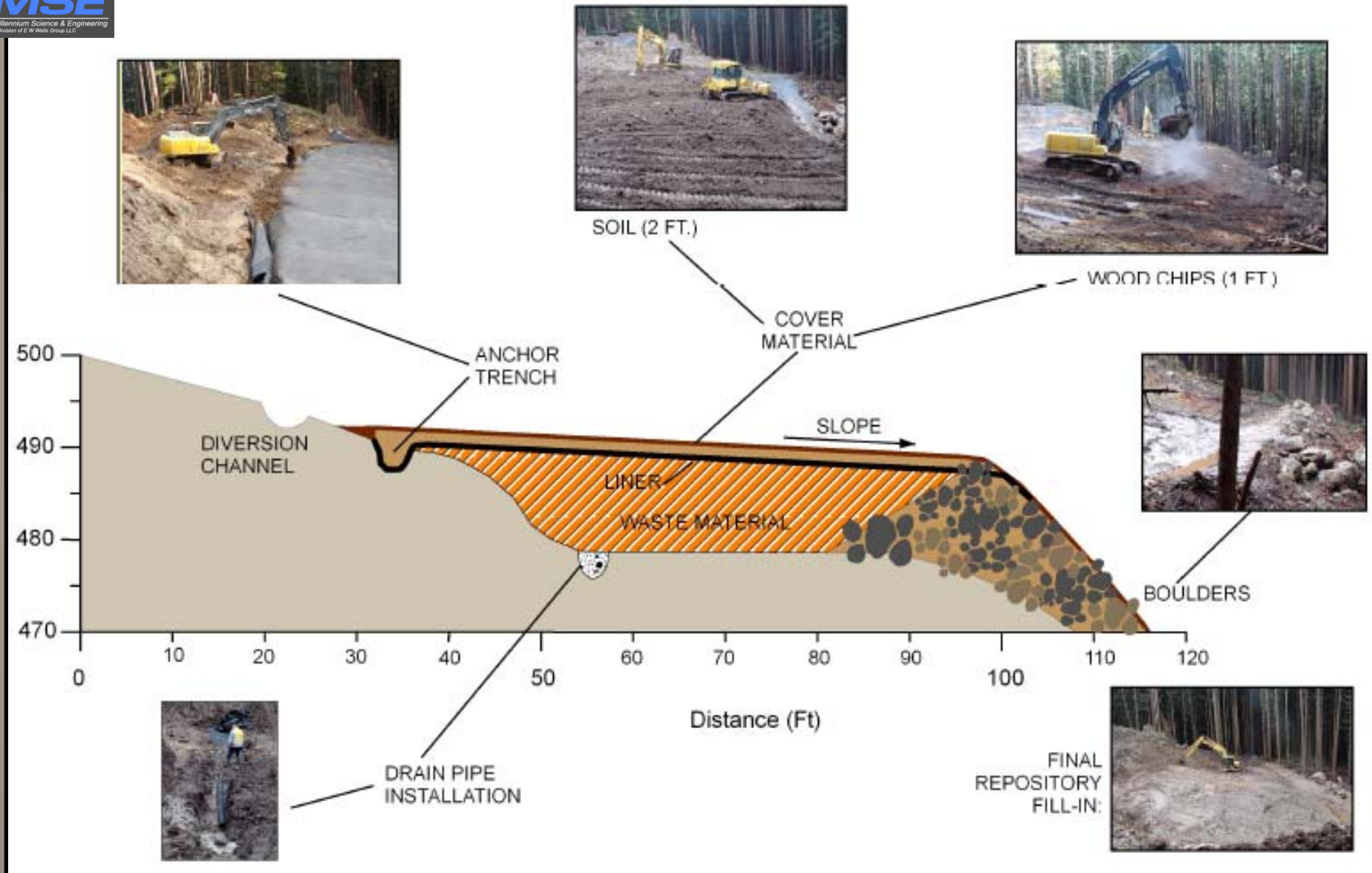
Completed Repository “The Salmonberry Orchard”



Repository Plan View



Repository X-Section



Reclaimed Shaft Area – WR-1





Reclaimed Spur Road (Main Access Left Open)





Orr Excavating, Inc Baker, Oregon

