

Closure and Reclamation of the Troy Mine

Mine Design, Operations & Closure Conference

May 5, 2016

Doug Stiles, PE

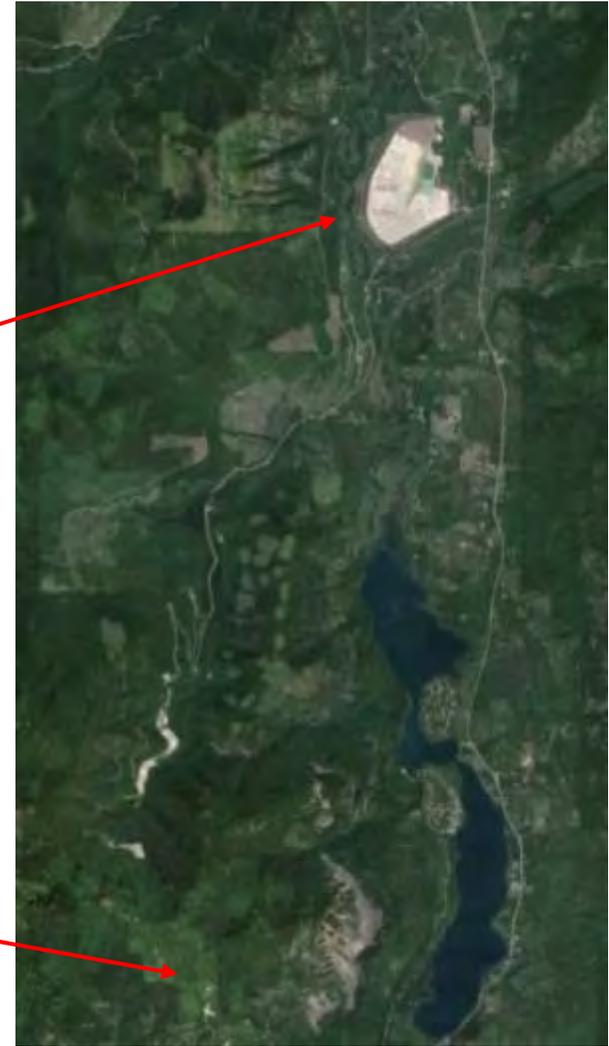
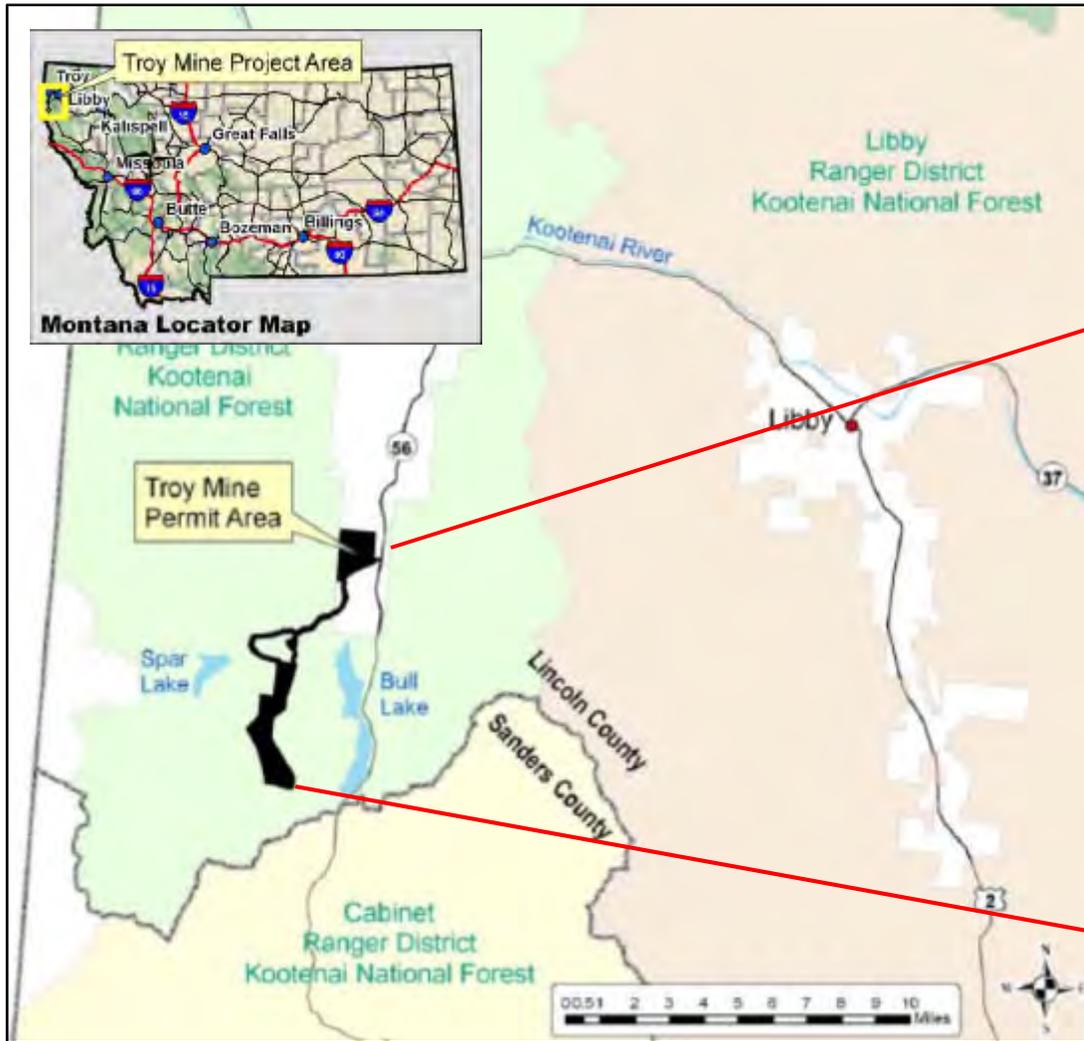


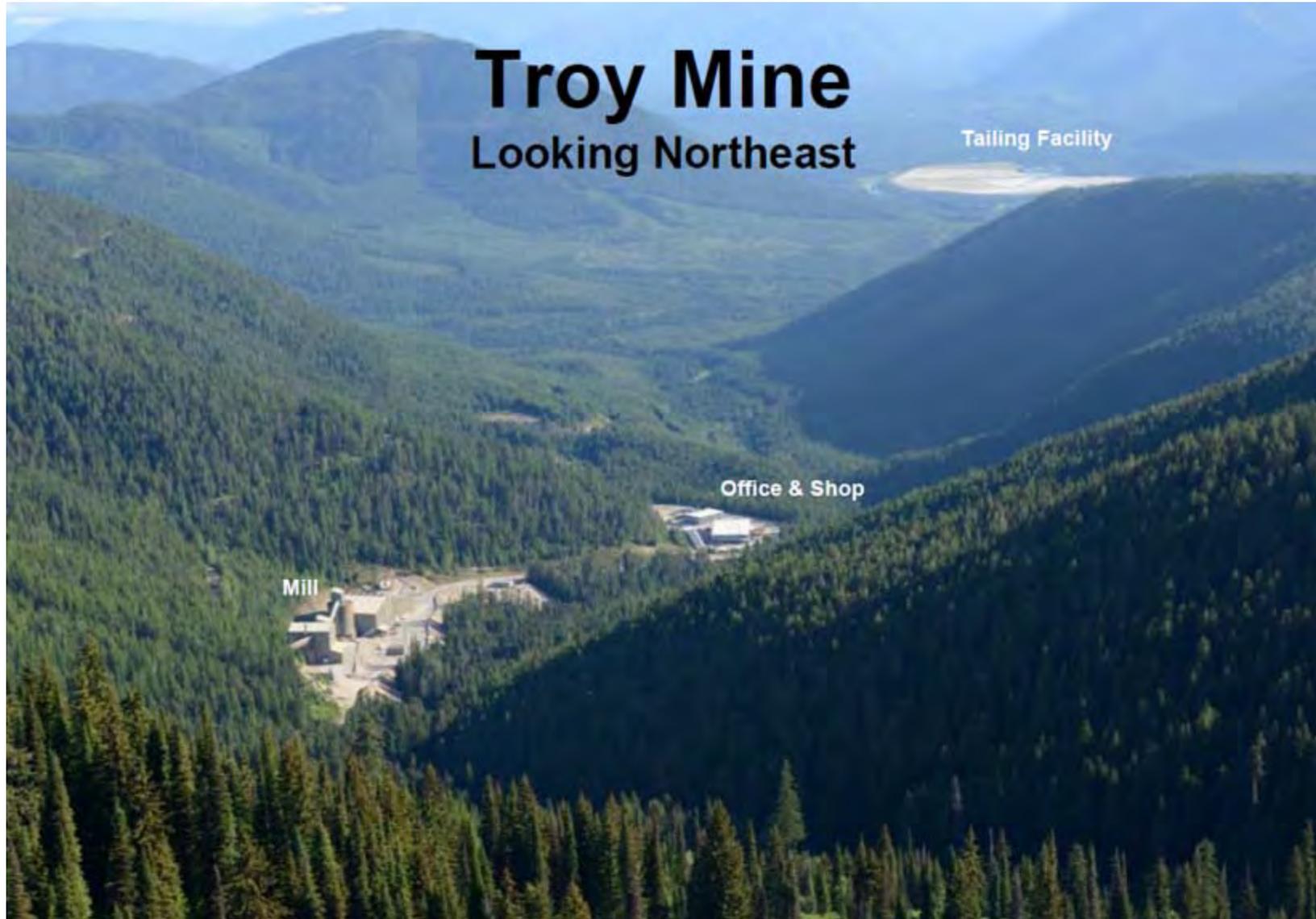
Hecla Mining Company

- Headquartered in Coeur d'Alene, Idaho
- Modern mining technology, mitigation and reclamation
- Long lived assets with a commitment to local hiring and spending



Troy Mine Location





Development Timeline

- ROD issued for development to ASARCO - **1978**
 - ▣ Construction from 1978 - 1981

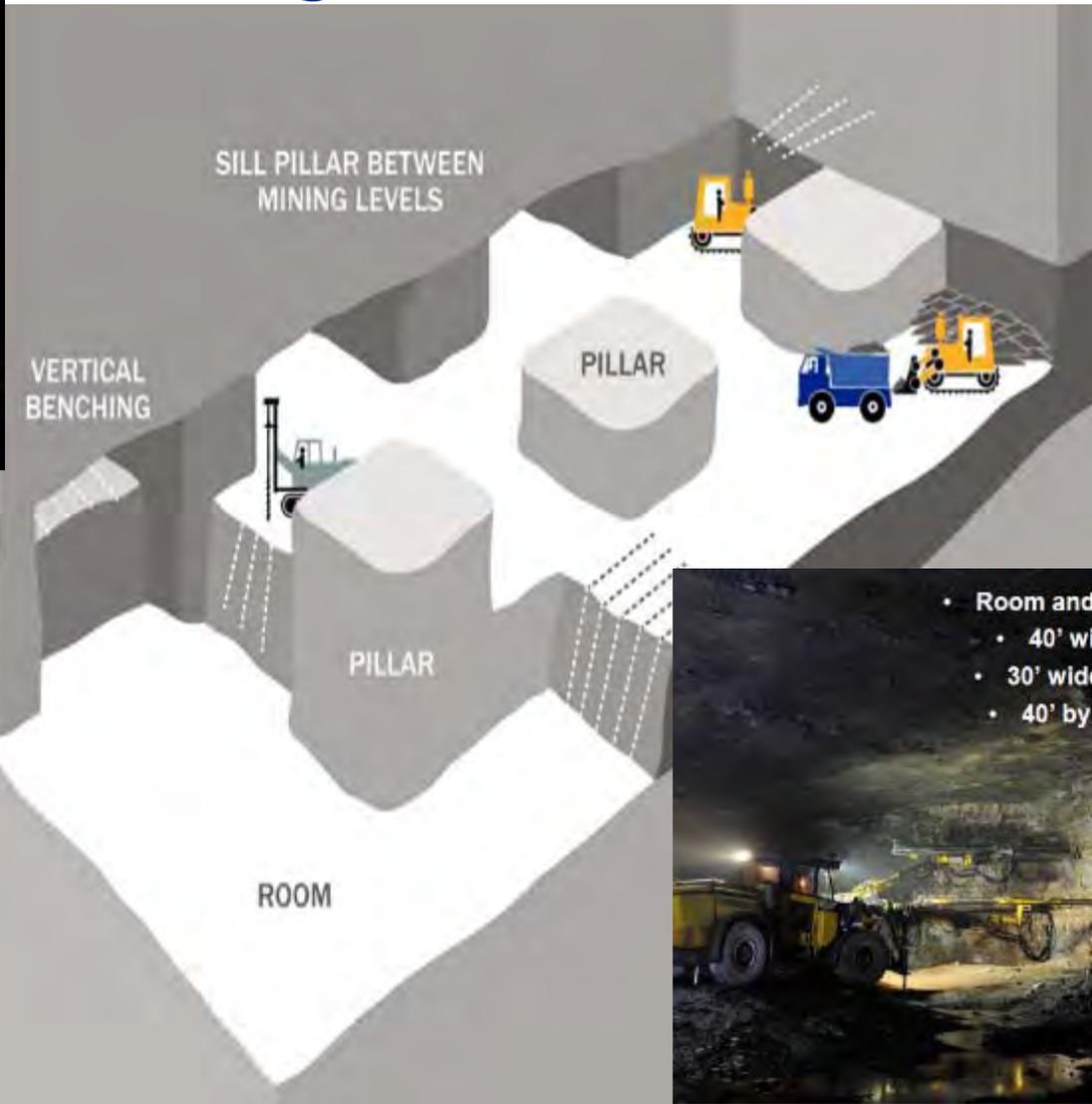
- Operated by ASARCO from **1981 – 1993 @ 8,500 tons/day**
 - ▣ Care and maintenance from 1994 – 2004

- Operated by Revett from **2004 – 2011 @ 4,500 tons/day**
 - ▣ UG collapse **Dec. 2012**; development **2013 - 2014**

- Revett suspended ops in **January 2015**

- Hecla takes over Revett; announce reclamation **June 2015.**

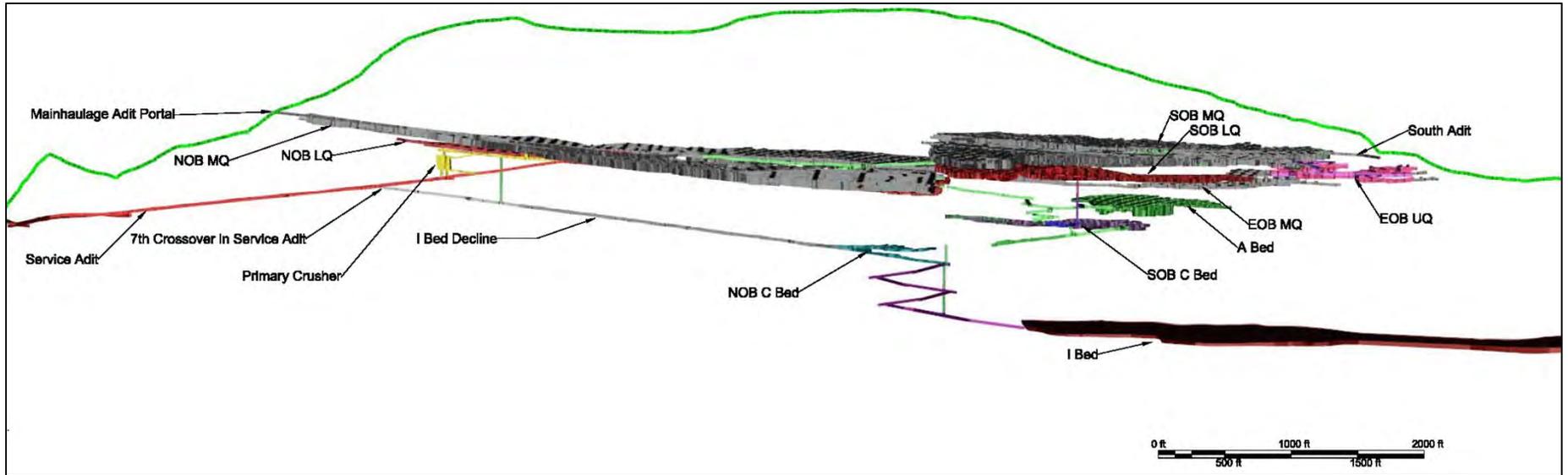
Mining Method



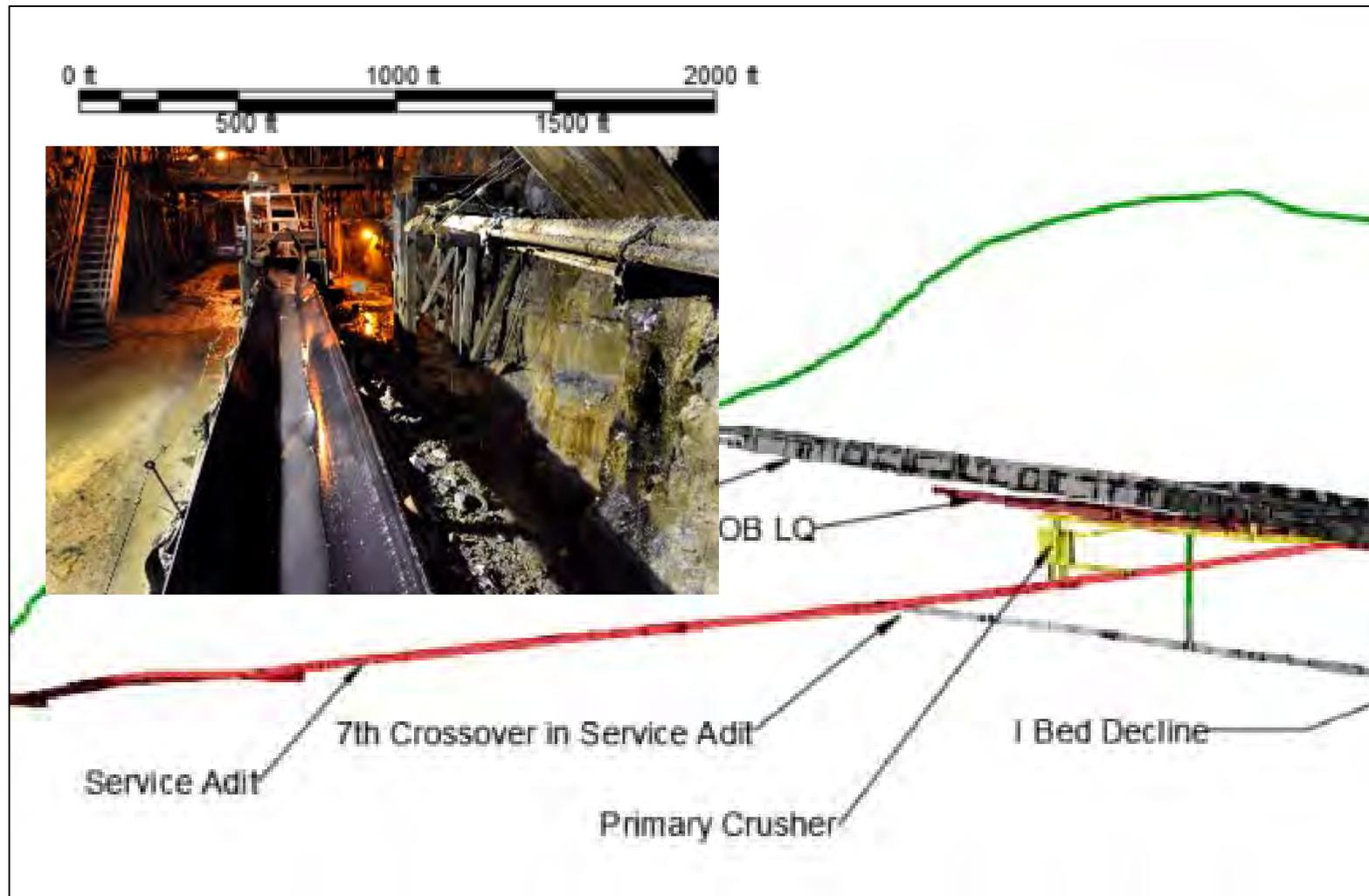
BENCHING OF THICKER PARTS OF THE ORE BODY

- Room and Pillar Method
 - 40' wide drives
 - 30' wide crosscuts
 - 40' by 60' pillars

Mining Area



UG Crushing & Ore Transport



Surface Crushing and Milling



Milling and Floatation



Tailings Transport



Regulatory Setting

- Joint MT DEQ and USFS oversight because...



Closure Plan – Goals

- Re-establish and improve wildlife habitat;
- Protect ground and surface water quality in Fairway, Stanley, and Lake Creeks;
- Protect air quality in the surrounding areas;
- Provide public access to Federal Lands; and
- Protect public health and safety by removing potential hazards.

Closure Plan – Key Details

- The Rec Plan updated in 2010; EIS completed and ROD signed in **2012**.

Key Elements:

1. Mine water management,
2. Tailings Impoundment Closure,
3. Plant site - building removal, regrading, SW control,
4. Ventilation and secondary adit closure.

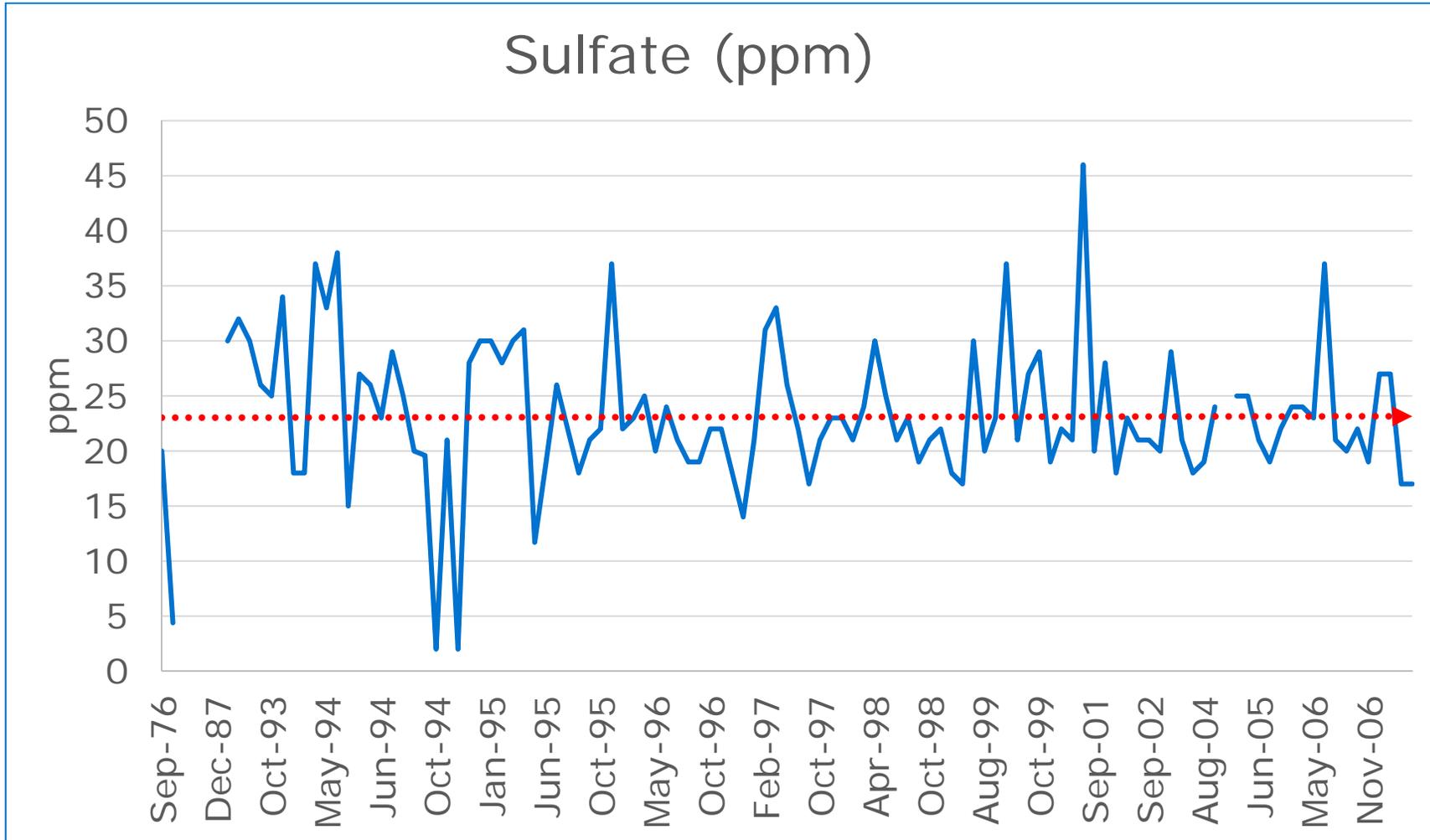
Mine Water Management

*Construction of a **wastewater treatment system was considered but eliminated.** Water quality studies were done on the attenuation of metals in mine water at the decant ponds. **These studies showed that the natural attenuation process is sufficient and that active water treatment would not be necessary.***

2012 Troy Revised Reclamation Plan EIS and ROD

OK...so whats the plan??

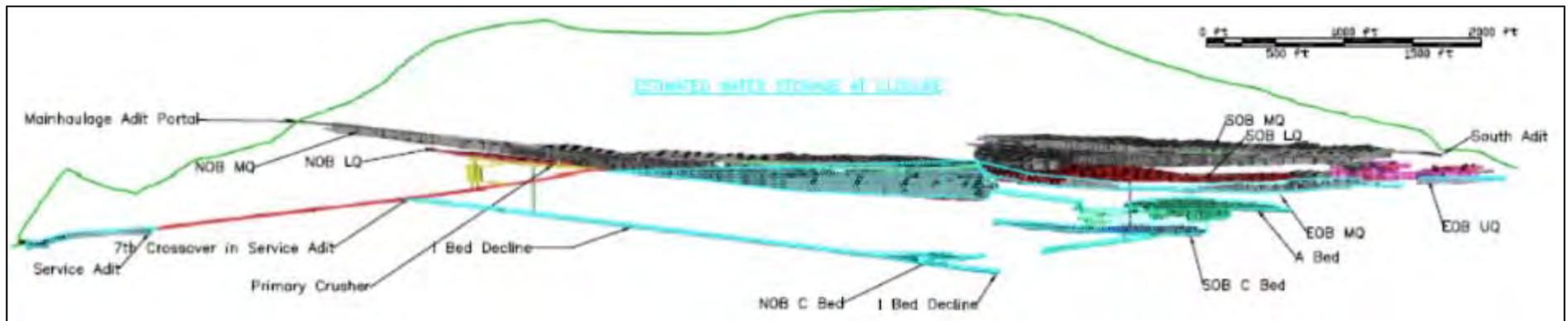
Mine Water Quality



Mine Water Quality

Average Mine Water Quality Data During Shutdown (00' – 04')

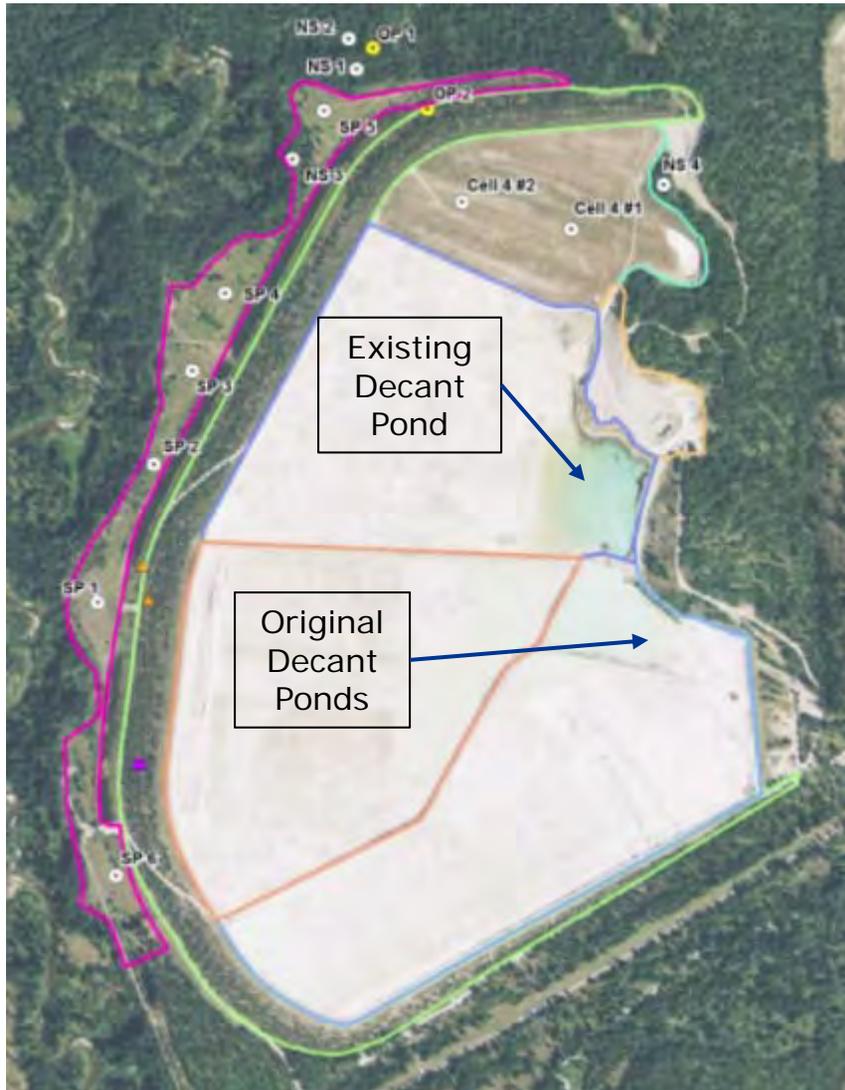
pH	SO4 (ppm)	Hardness (ppm)	Diss Cu (ppm)	Diss As (ppm)
7.3	23	78.8	0.076	0.003 (ND)



Pipeline Route



LT Mine Water Management



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Tailings Impoundment Closure

- 303 surface acres; 45 acres side slope currently reclaimed



Tailings Impoundment Closure

- Some regrade....



Tailings Impoundment Closure

- Then cover with 18" of cover soil...amend and reveg.



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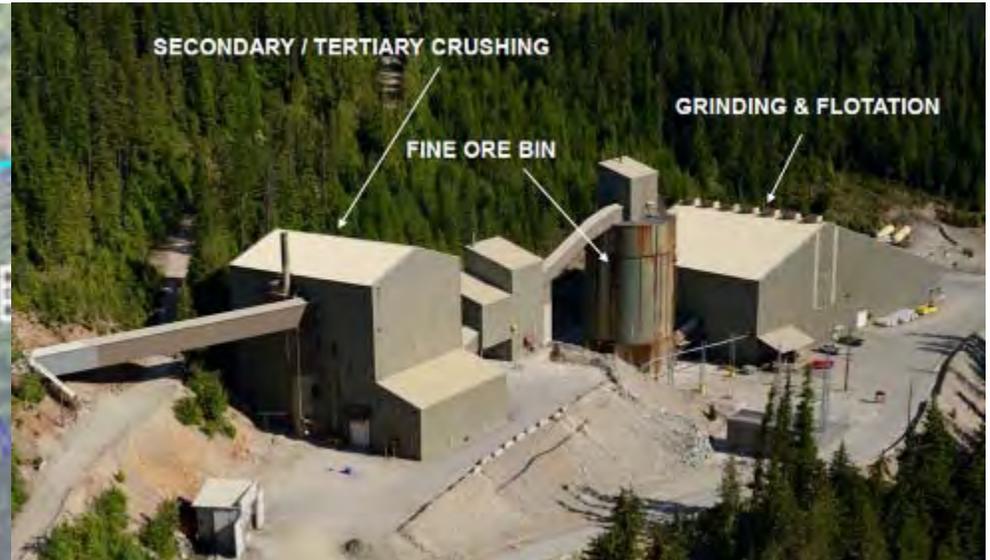
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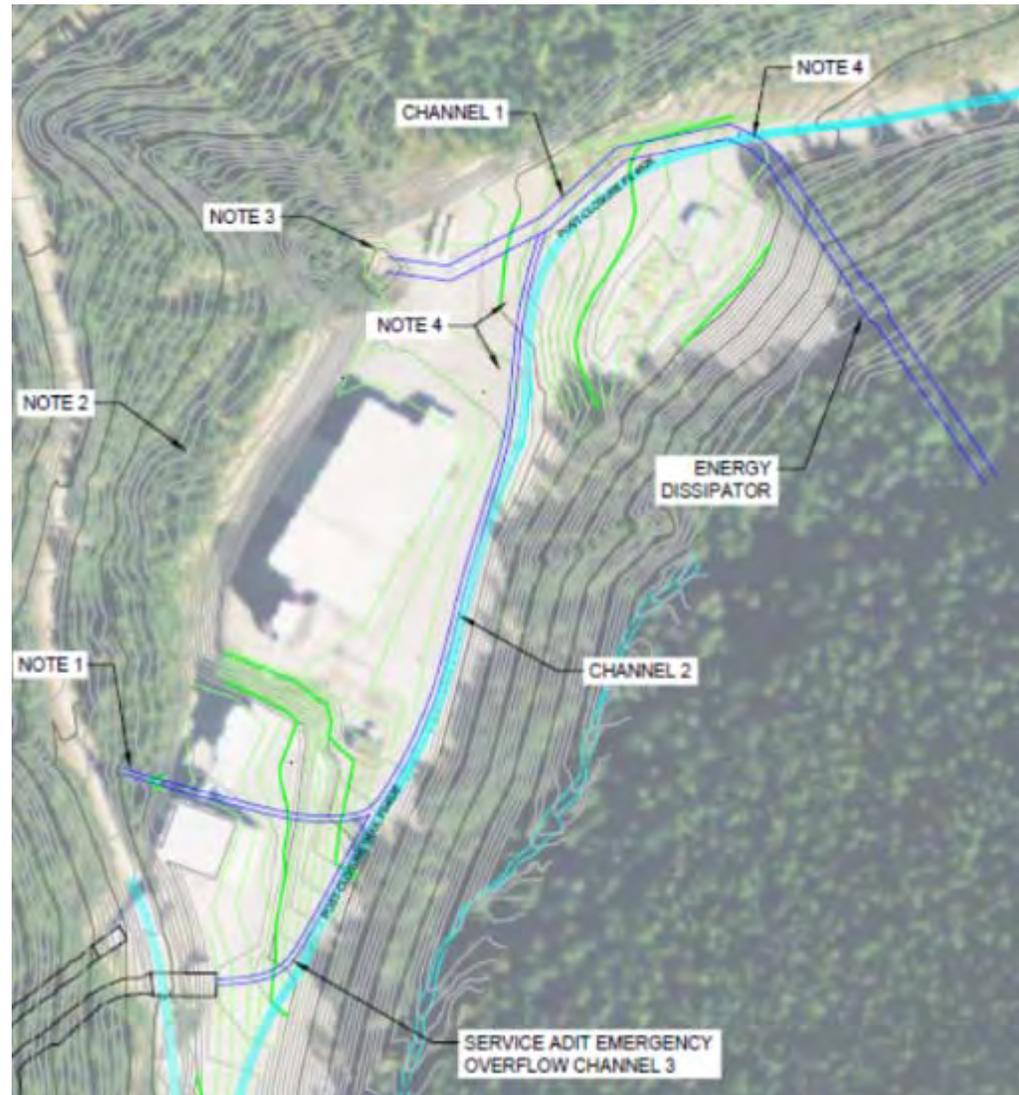
Plant Site Closure



Plant Site Closure



Plant Site Closure - SW



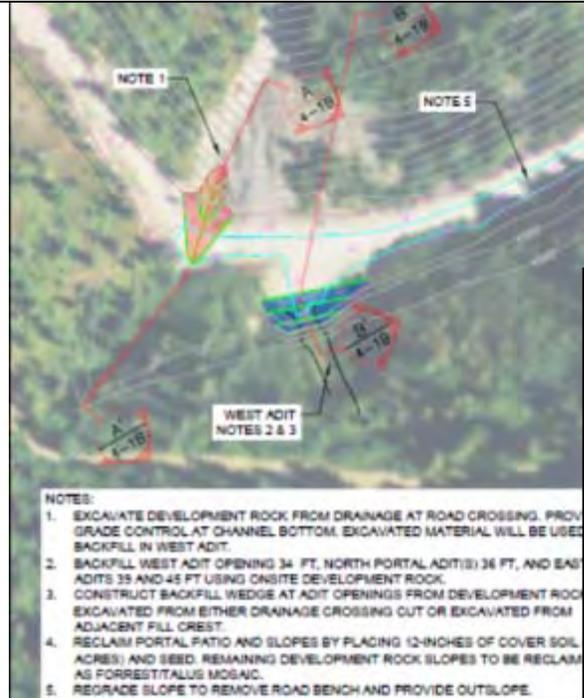
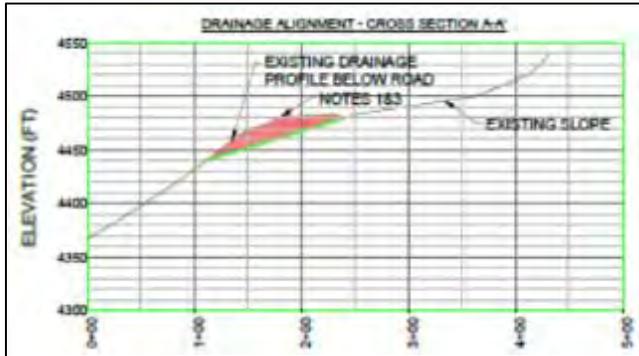
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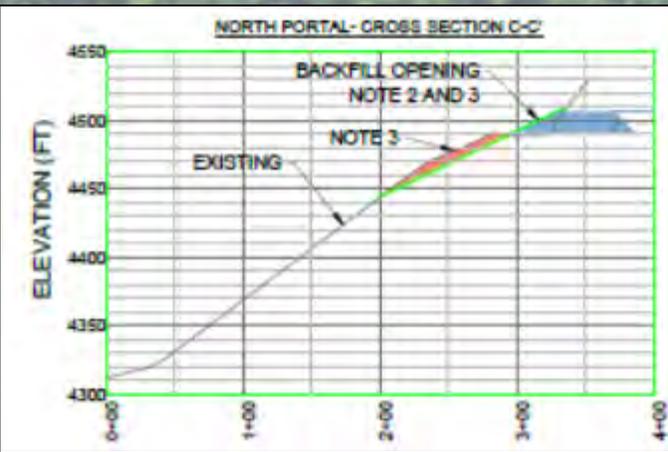
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Adit Closure – North Portal Area



- NOTES:**
1. EXCAVATE DEVELOPMENT ROCK FROM DRAINAGE AT ROAD CROSSING. PROVIDE GRADE CONTROL AT CHANNEL BOTTOM. EXCAVATED MATERIAL WILL BE USED FOR BACKFILL IN WEST ADIT.
 2. BACKFILL WEST ADIT OPENING 34 FT, NORTH PORTAL ADIT(S) 36 FT, AND EAST ADITS 35 AND 45 FT USING ON-SITE DEVELOPMENT ROCK.
 3. CONSTRUCT BACKFILL WEDGE AT ADIT OPENINGS FROM DEVELOPMENT ROCK EXCAVATED FROM EITHER DRAINAGE CROSSING OUT OR EXCAVATED FROM ADJACENT FILL CREST.
 4. RECLAIM PORTAL PATIO AND SLOPES BY PLACING 12-INCHES OF COVER SOIL (NOTE 4) AND SEED. REMAINING DEVELOPMENT ROCK SLOPES TO BE RECLAIMED AS FORREST/TALUS MORGANIC.
 5. REGRADE SLOPE TO REMOVE ROAD BENCH AND PROVIDE OUTSLOPE.

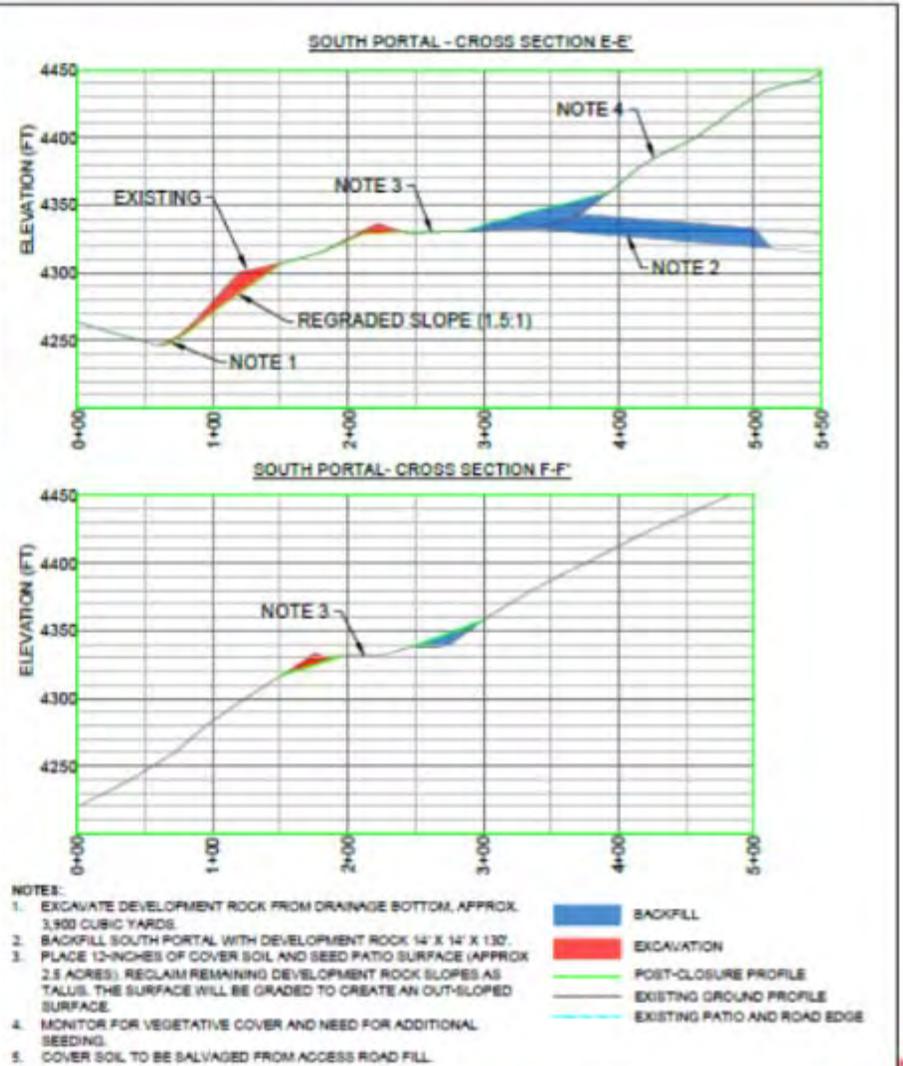
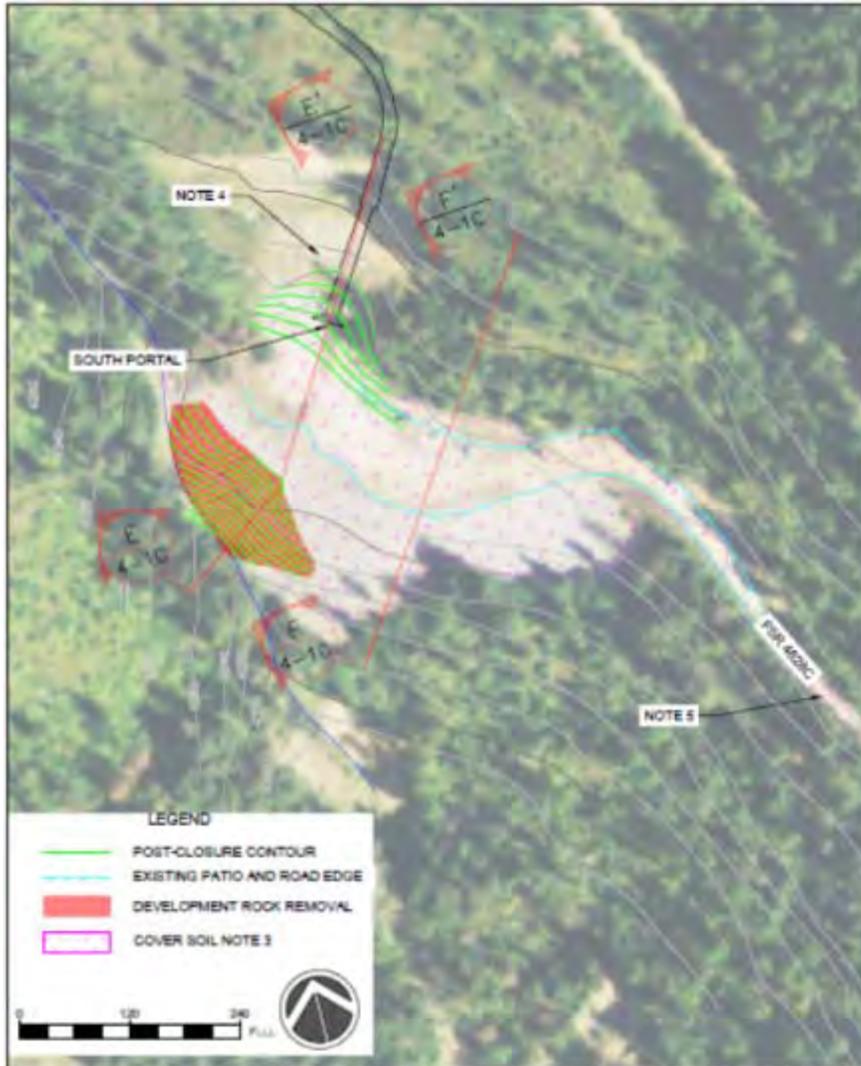


KC HARVEY
CONSULTING ENGINEERS
200 S. 10TH ST., SPOKANE, MT 59202

NO.	DESCRIPTION	DATE	BY	CHECKED

FIGURE 4-1A
NORTH PORTAL AREA
TROY MINE, INC.
LINCOLN COUNTY, MONTANA

Adit Closure – South Portal Area



KC HARVEY 2700 S. GARDNER ROAD, BUTTE, MONTANA 59701 TEL: 406/329-2200 FAX: 406/329-2201	DATE: 11/20/13	PROJECT NO: 13000000	PROJECT NAME: ADIT CLOSURE	SCALE: AS SHOWN	REVISION: 1	BY: JH	CHECKED: JH	DATE: 11/20/13	PROJECT: SOUTH PORTAL AREA	FIGURE: 4-1C
	TROY MINE, INC. LINCOLN COUNTY, MONTANA									

Long Term Monitoring

- Surface and ground waters; subsidence; vegetation

