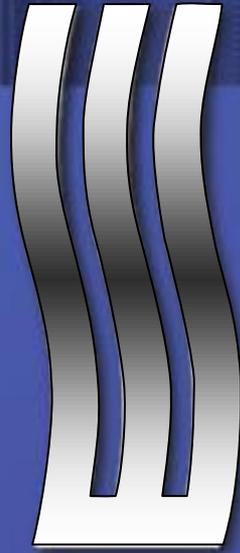


STILLWATER
MINING COMPANY

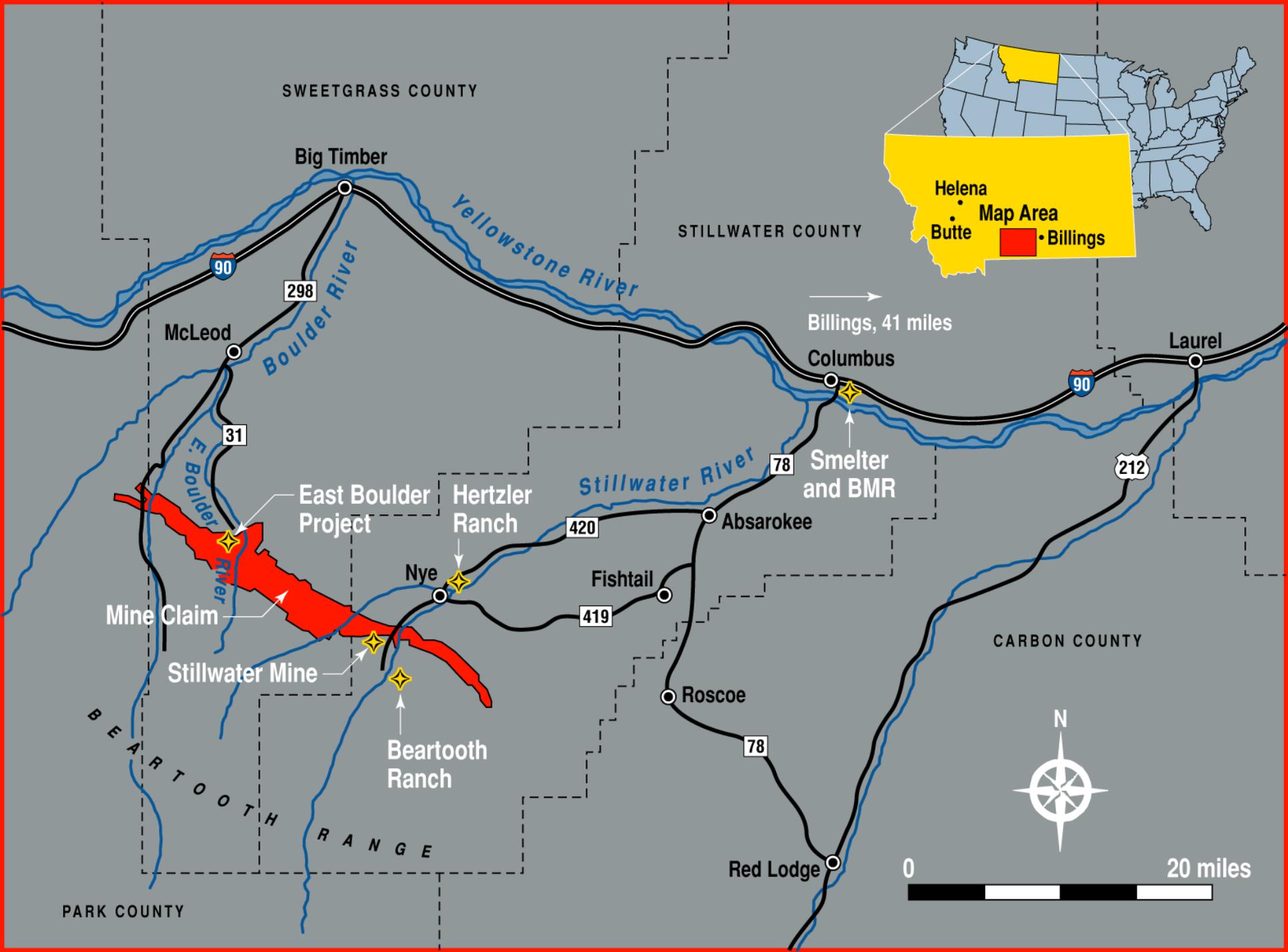


Use of Tunnel Boring Machines in Mine Development at the Stillwater and East Boulder Mines

Tyler Luxner-Project Engineer (Blitz), Stillwater Mine, Nye, MT

Stillwater Mining Company

- ◆ Largest Primary Producer of PGM's in North America
- ◆ Operates 2 UG Mines in Montana
 - Nye mine, started in the late 1980's
 - East Boulder mine, started in the late 1990's
 - Narrow Vein Mining Methods on the Reef



SWEETGRASS COUNTY

Big Timber

STILLWATER COUNTY

90

298

McLeod

31

East Boulder Project

Hertzler Ranch

420

419

Mine Claim

Stillwater Mine

Nye

Fishtail

419

Billings, 41 miles

Columbus

Smelter and BMR

Absarokee

Fishtail

Roscoe

78

90

212

Laurel

CARBON COUNTY

BEARTOOTH RANGE

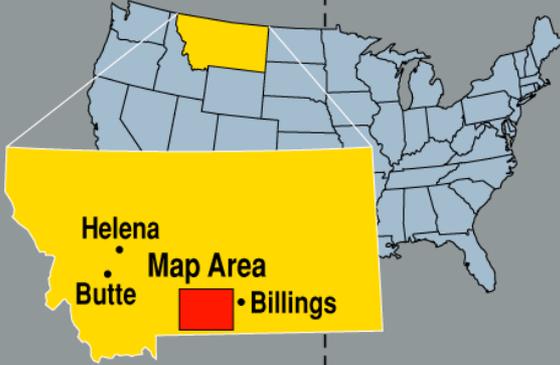
RANGE

PARK COUNTY

Red Lodge

0

20 miles

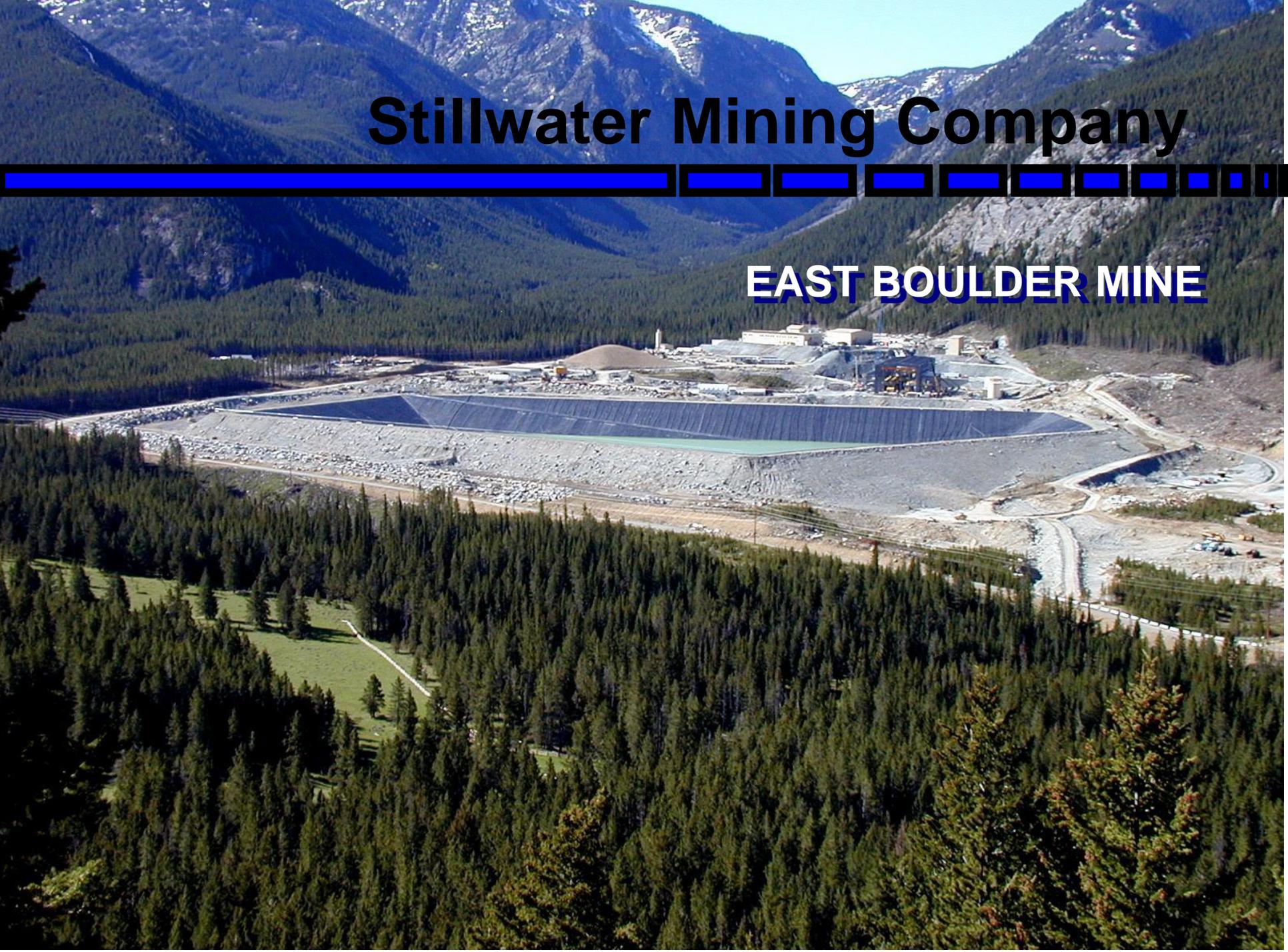


Stillwater Mining Company

STILLWATER MINE

Stillwater Mining Company

EAST BOULDER MINE





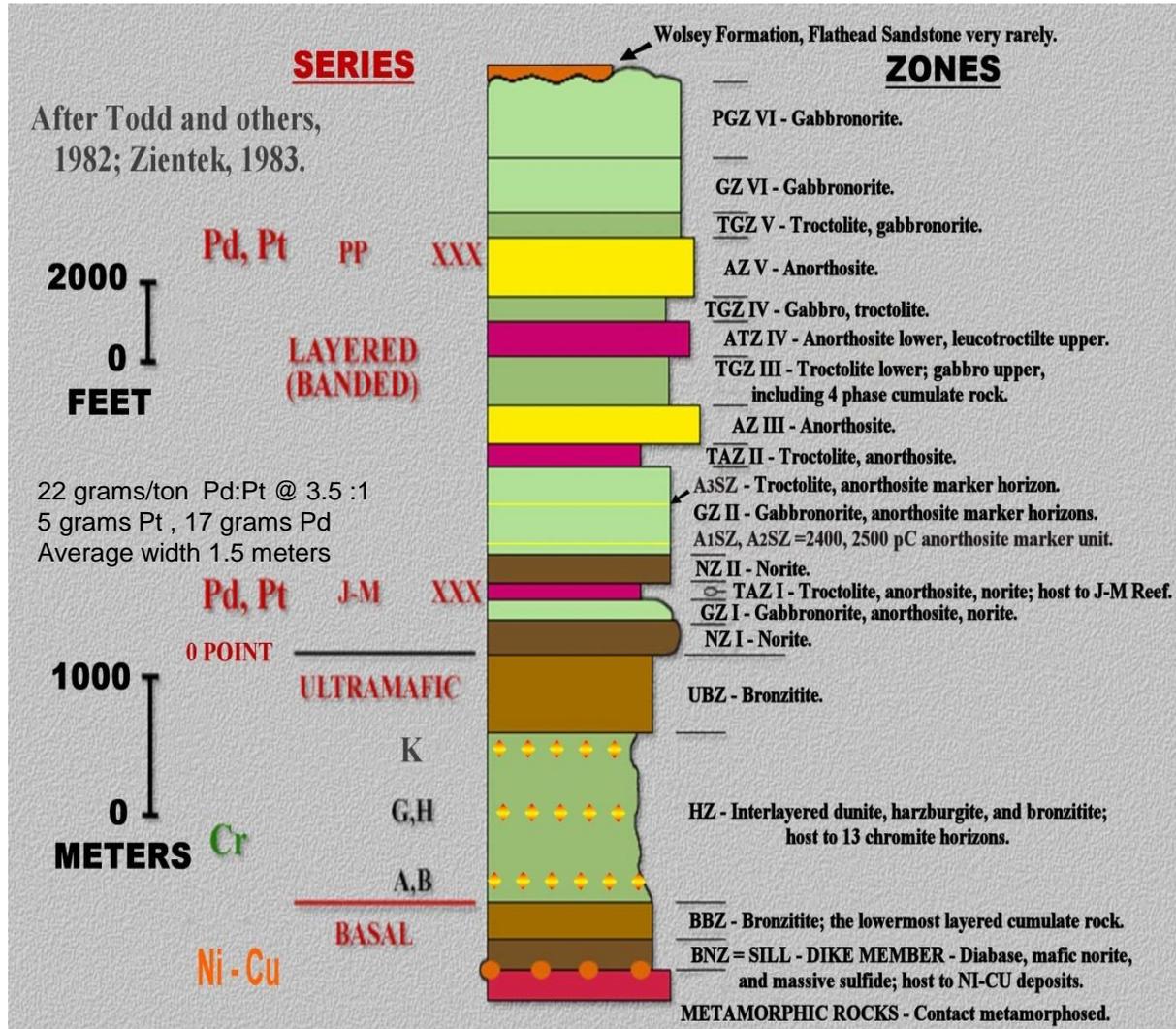
Stillwater Mining Company; Environmental Overview

- 
- ✓ A cornerstone of our Operations
 - Integration within the Operation
 - Open-Door Policy
 - ✓ Sensitive Environment
 - Stillwater River
 - <2 miles from Wilderness Area
 - <50 miles from Yellowstone National Park
 - Wildlife Habitat
 - ✓ Open and Honest Communication
 - ✓ Partnership
 - Forest Service
 - State of Montana
 - Public – “Our Neighbors”





Stillwater Complex Stratigraphic Column

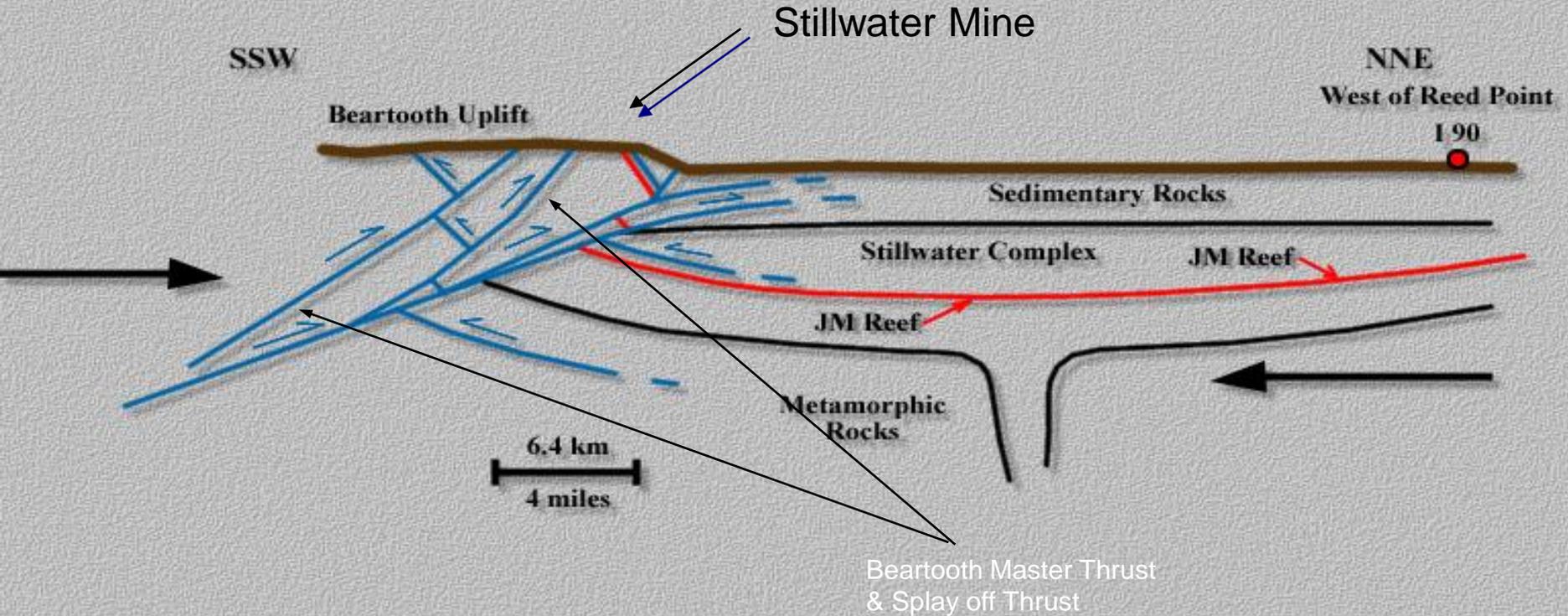




Beartooth Mountains Uplift

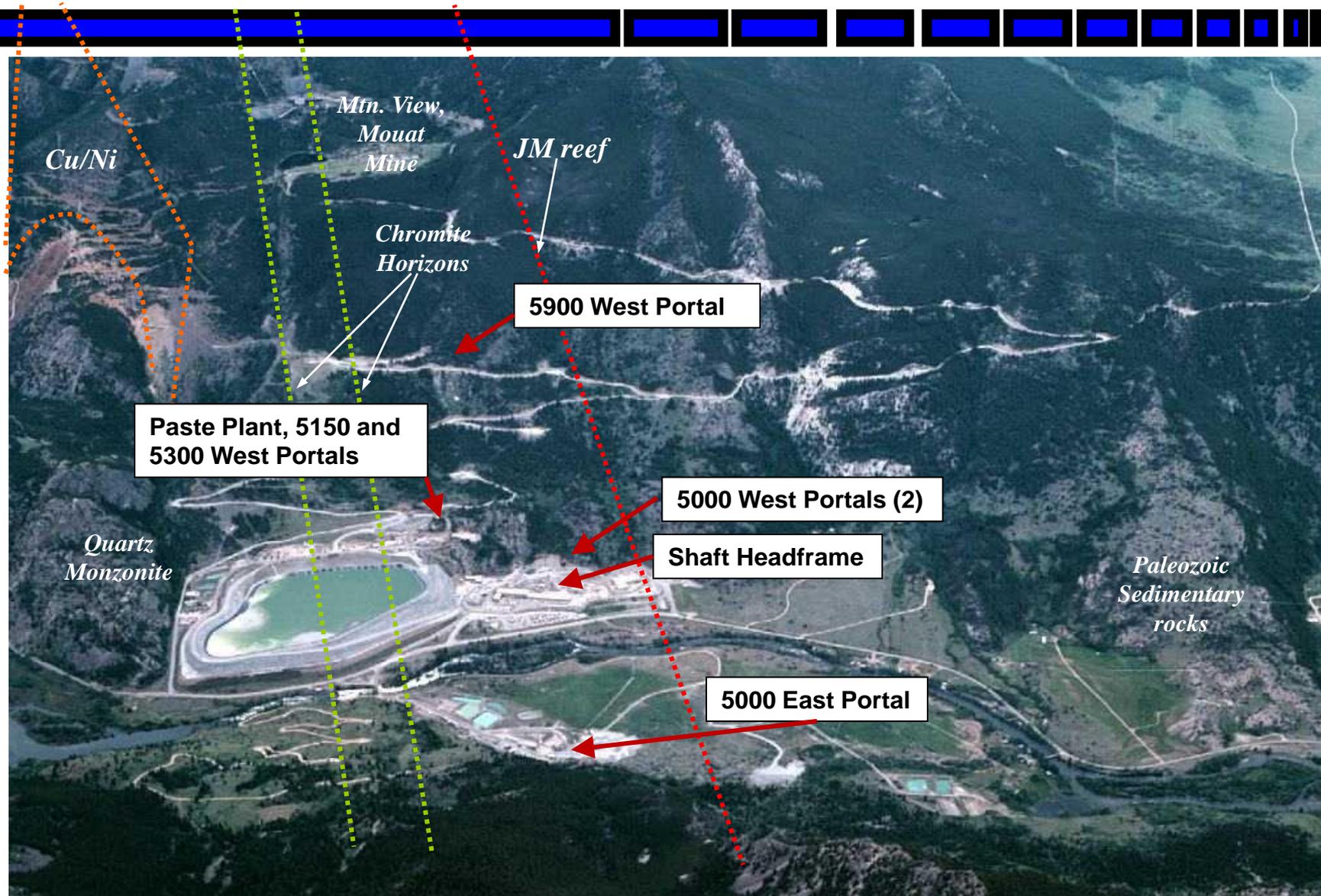


7500W Cross Section



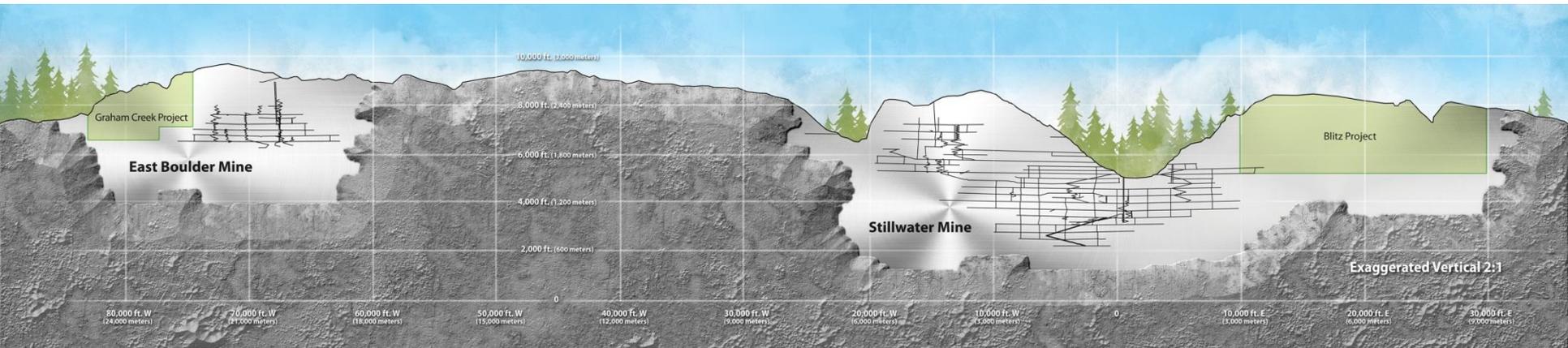


Tilted Stillwater Complex Exposed in the Valley



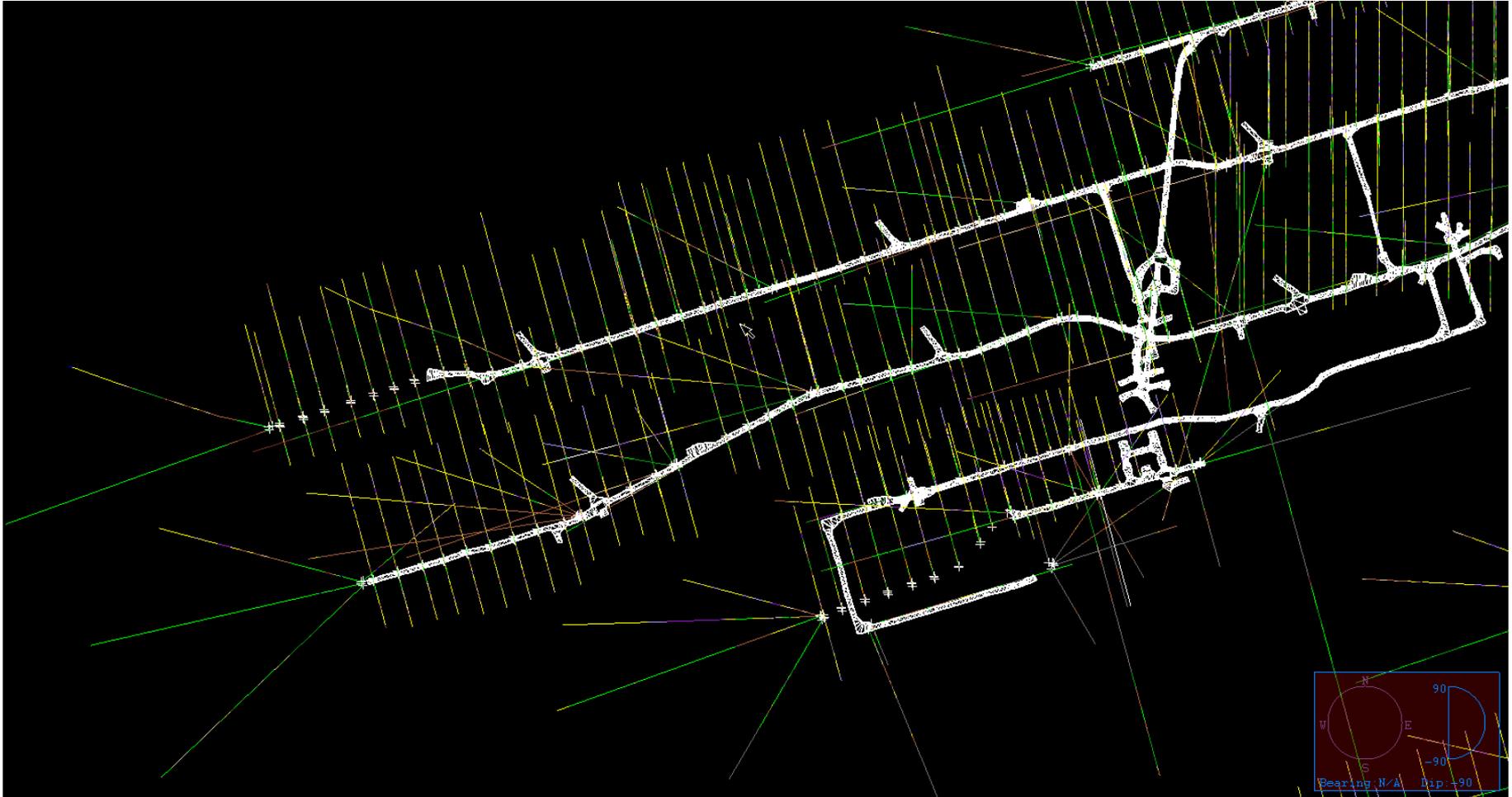


J-M Reef: 28-Mile Long Strike Length





Stillwater Mine Orebody Delineation





Why TBM ? Justification

Rationale for TBM Compared to Conventional

- Higher advance rate
 - Generally, straight advances greater than 4,000 ft long
- Schedule Advantage
- Ground support- natural arch and no blast damage
- Ventilation
- Uses different skill set then conventional Drill/Blast, reduces manpower conflict
- “Pre-Built” Rail Haulage



Stillwater Mining Company TBM Development

- Stillwater Mine- 1988 to 1991
 - Jarvka 13 ‘ diameter
 - » 26,430 feet on 4 levels
 - Future: 2012 Blitz Project Robbins 18’ diameter
 - East Boulder Mine – 1998 to 2000
 - CTS and Robbins 15’ diameter
 - » 37,492 feet- twin access tunnels
 - Current: 2011 Graham Creek
- Total SMC TBM Development > 12 miles**

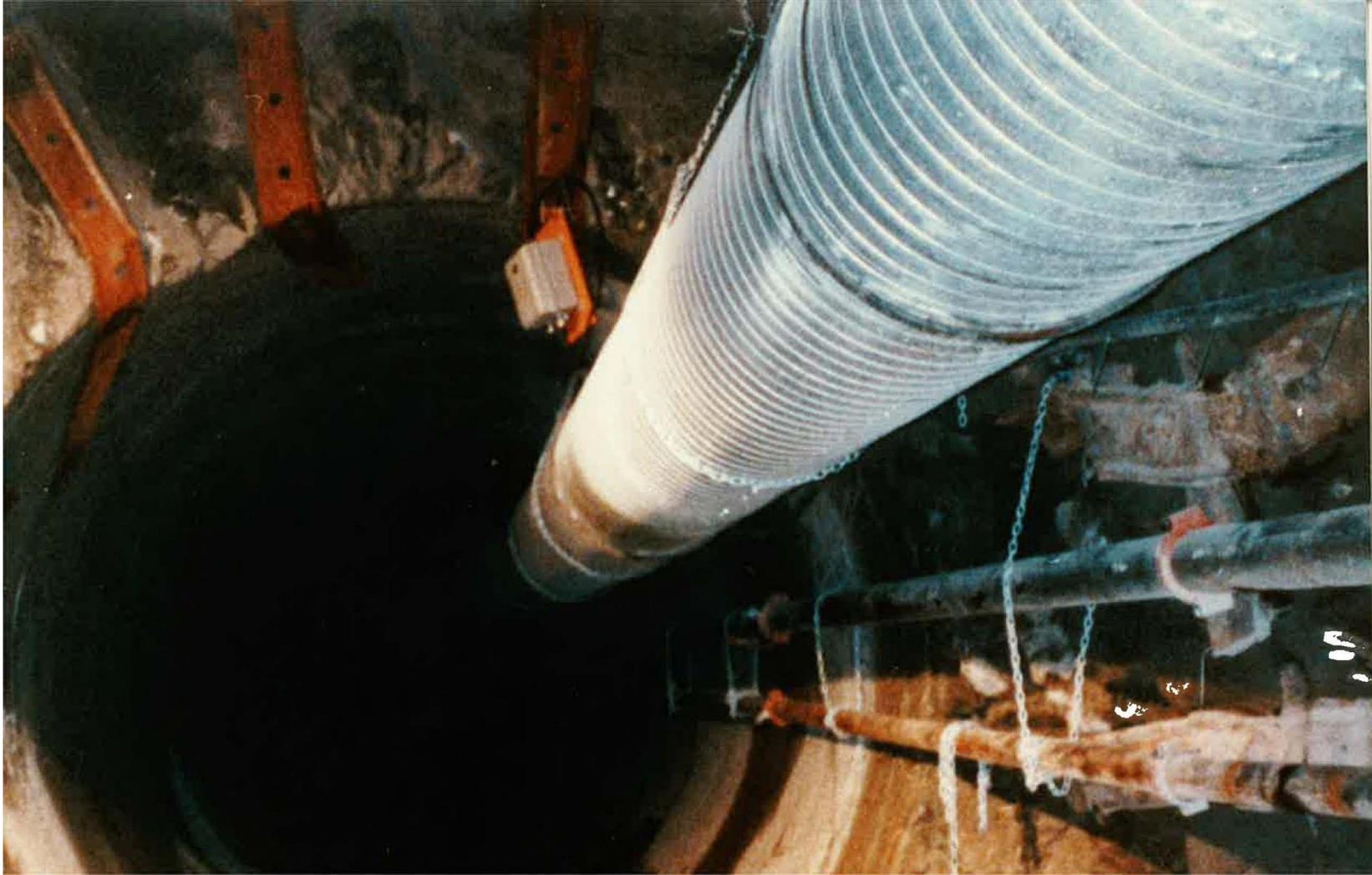


Jarvka Machine





5000E TBM Drive





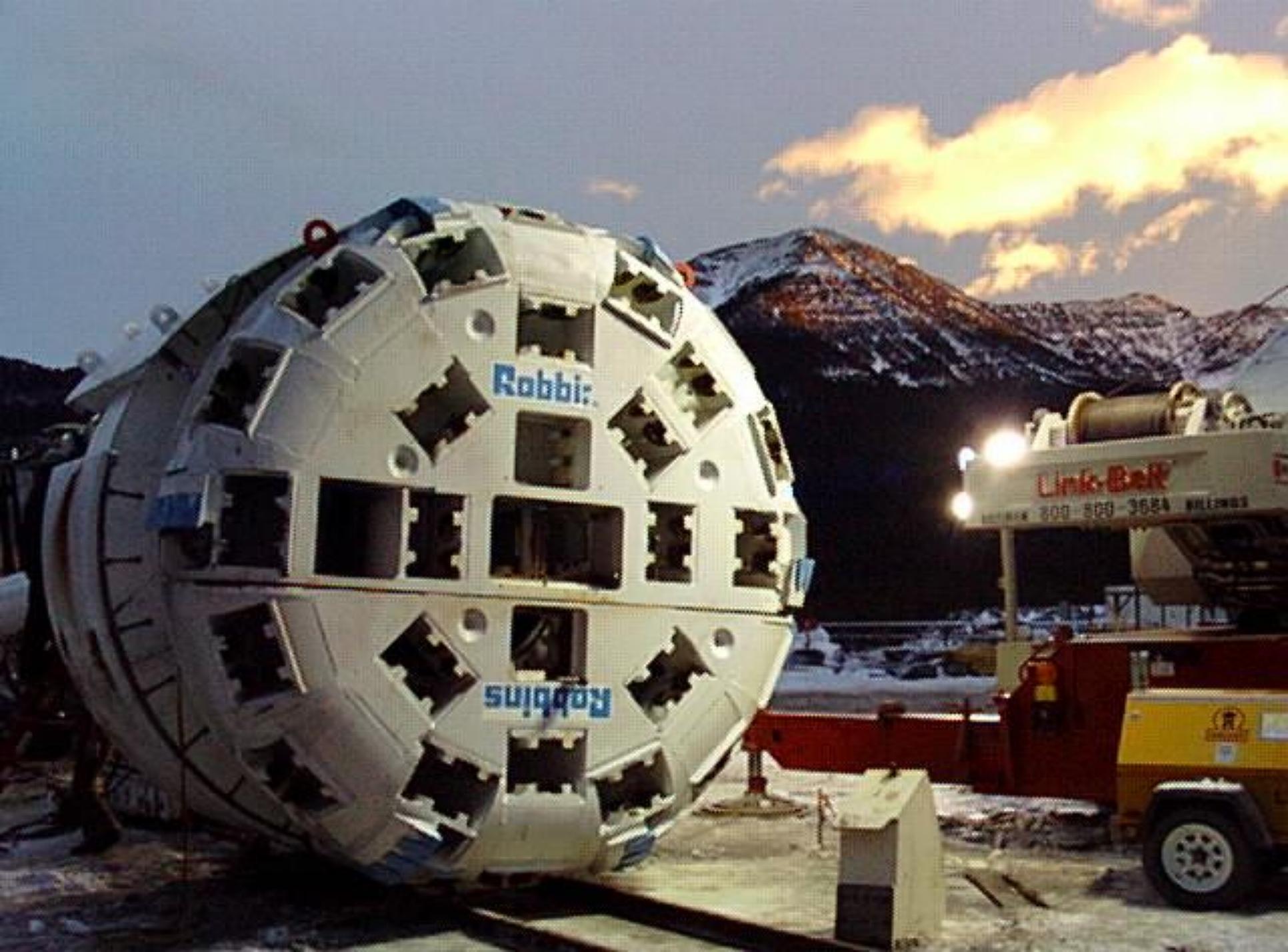


SPECIALTY SERVICES
CONSTRUCTION & TUNNELING SERVICES

STILLWATER MINING COMPANY
MILBURN, NEW MEXICO

EAST BOULDER PROJECT

SPECIALTY SERVICES









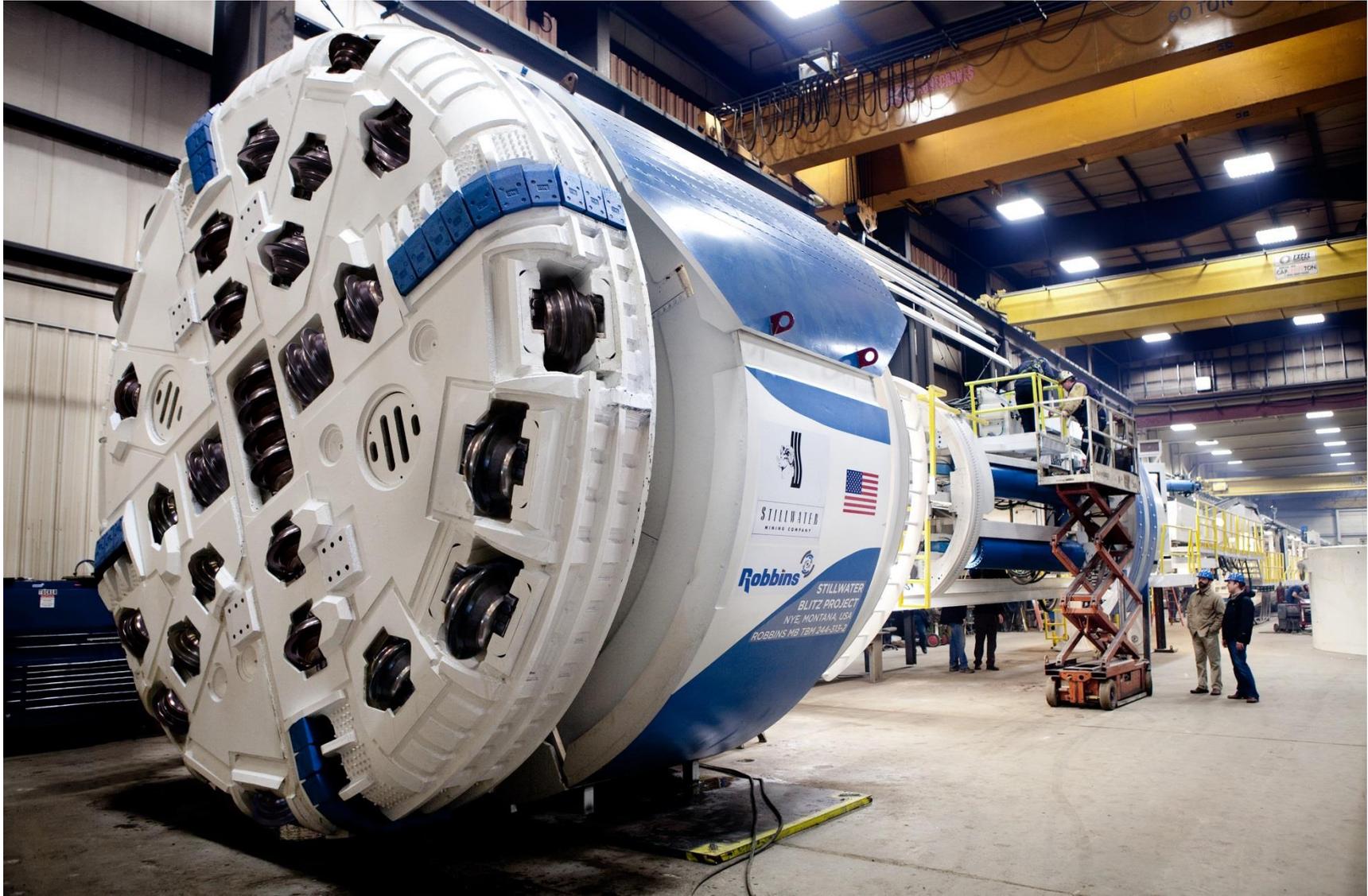


Blitz Project

- Announced in 2010
- Develop 2 miles of the JM Reef East of the Stillwater Mine
- New Development- 5 year project
 - New substation, loci shop, and water system upgrades at the Stillwater Mine site to support Blitz Development
 - Benbow 6,000 foot Decline cross- cut access , 4 miles East of the Stillwater Mine
 - » Ventilation Access
 - 5000E TBM Drive -22,500 feet of Haulage tunnel-18'
 - 5600E conventional Drive connected to TBM tunnel below with raise bore rock passes and ventilation holes



Blitz Project- TBM





Blitz Project-TBM Chamber

- New 5000E TBM Chamber with the Cutterhead and Grippers





Blitz Project-TBM Assembly





Blitz Project





Blitz Project

- 36 inch gauge rail installed on advance
- Rail haulage level ready when drive is complete
- Permanent Sumps Installed, 5,000 spacing, on advance
- Transformer cutouts on advance





Challenging Geology

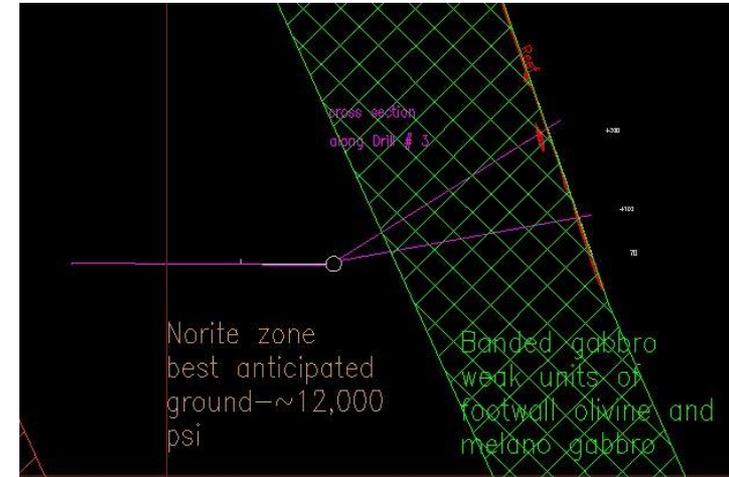
- TBM drive 400 ft south of Reef in competent Norite
 - Three Right Lateral Offsetting Faults
 - Offsets expected up to 400 feet
 - Poor Ground Conditions, Be Prepared
- Diamond Drill on Advance
 - Establish Reef position information
 - Collect geotechnical information on ground ahead as well as information for 5600E conventional drive
 - Check for local ground water
 - Resource information



Blitz Project-Diamond Drilling

Diamond Drill every 500 ft of advance

- 3 Drills on the Machine
 - » Drill 1 50 ft back from the face
 - » Drill 2 110 ft back from the face
 - » Drill 3 on the 8th trailing deck
- Drill 3600 ft every probe stop
- Drill through Casing/ Valves to handle Water
- Have 7 days to complete each program





Blitz Project-Diamond Drilling



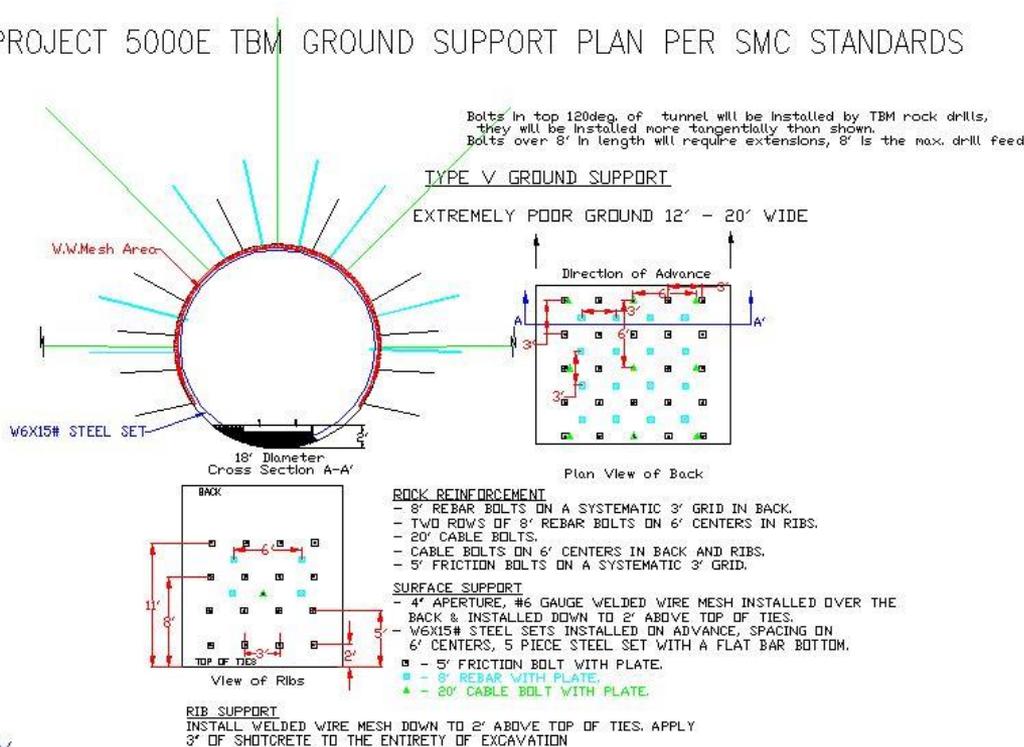


Blitz Project-Ground Support

Methodical Ground Support Plan

- 5 different ground support types
- Based upon on SMC History

BLITZ PROJECT 5000E TBM GROUND SUPPORT PLAN PER SMC STANDARDS



Fault Ground Support

- 20 ft cable bolts
- Fiber Shotcrete
- Grout ring for water
- W6 x15# steel sets on 6 ft spacing
- McNalley Support System



Graham Creek Project

- 6,000 feet of FWL drive west of the East Boulder Mine
- Accesses Graham Creek Ventilation raise, alimak raise to surface, intake capacity
- Could to drilled proven reserve
- Crews then go to man the Blitz Project at the Stillwater Mine



Questions?

