Mining Montana

Brett Davidheiser
Stillwater Mining Company
East Boulder
Platinum Group Metals (PGMs)
Palladium – Clean Air

Stillwater produces 7% of world demand for Palladium
Regional Setting of the Stillwater Complex

- 2.7 Billion-Year-Old Intrusion
- Layering Develops Through Slow Cooling, Crystallization, and Other Processes
- Complex Subsequently Tilted and Eroded to Present Surface
Beartooth Mountains Uplift: Sequence 1

Beartooth Mountains Uplift: Sequence 2
**J-M Reef Mineralogy**

- **Major Minerals**
  - Plagioclase Feldspar (Labradorite)
  - Orthopyroxene (bronzite)
  - Clinopyroxene (augite)
  - Olivine (serpenitized with magnetite)

- **Minor Minerals**
  - Sulfides
  - Chromite
J-M Reef Rock Types

- **NORITE** - plagioclase and bronzite cumulate
- **GABBRO-NORITE** - plagioclase, augite, and bronzite cumulate
- **TROCTOLITE** - plagioclase and olivine cumulate
- **DUNITE** - olivine cumulate
- **ANORTHOSITE** - plagioclase cumulate

![Image of J-M Reef Rock Type](image_url)
Sulfide Minerals

- Most abundant sulfide minerals:
  - Pyrrhotite Fe_{(1-x)}S
  - Chalcopyrite CuFeS_2
  - Pentlandite (Fe,Ni)_9S_8
- Pentlandite hosts about 80% of the palladium
- Pd/Pt ratio approx. 3:1
  - Recovered byproducts include gold, rhodium, silver, copper, and nickel
A Day in the Life of a Grade Control Geo

Grade Control

• Face Mark-ups
  – Ore zone
  – Shape
  – Location

• Sampling
  – Channel Samples
  – Muck Samples

• Mapping/Documentation
6 month Pt/Pd Prices
One Year Pt/Pd price
Brett Davidheiser
Geologist

Bdavidheiser@stillwatermining.com