Mine Sites
Inspections &
Water Quality Concerns

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Mining Overview

- Permitting
- Types of Mines in R9
  - Hard rock/metal
  - Coal
  - Sand & Gravel
  - Abandoned/inactive
  - Suction Dredging
- Mining Processes
- Typical pollutants of concern
- Inspecting under Clean Water Act
Permitting

- NEPA for new Mines
- NPDES – Discharge to Surface Waters
  - Individual Permit
  - Stormwater General permit
  - Dewatering
- Groundwater Protection
  - WDR (California)
  - NEV (Nevada)
  - APP (Arizona)
- Abandoned
Hard Rock Mines

- Gold, Copper, Lead, Zinc, Silver, Molybdenum, Lithium
- R9 Tribal - Tohono O'dham

Open Pit Mineral Extraction

Permitting
- Zero Discharge

Concerns:
- Acid mine drainage
- Groundwater / Pit interface
- GW Permits

- Ore $\rightarrow$ Processed
- Waste Rock $\rightarrow$ disposed
Hard Rock / Ore Processing

- Ore Crushing
- Mineral Extraction Process
- Tailings waste product

Permitting
- Zero Discharge requirement
- Process Water Recycling / Tailings

Inspection Concerns:
- Spills, Process controls, (cyanide, acids)
Hard Rock / Ore Processing
Hard Rock Ore Processing / Tailings

Permitting
- Zero discharge requirement
- Groundwater Permit

Inspection Concerns
- Spills, process controls
Waste Rock / Overburden

Inspection Concerns

- Stormwater Controls
- Spills
- Outfall Sampling
- Seeps
Ore Processing / Heap Leach

- Cyanide
- Acid (sulfuric)
- Metals leaching

Permitting
- Zero discharge
- Groundwater Permit
- Closure

Inspection Concerns
- Spills, process controls
Abandoned Mines

- Adits
- Tailings

Water Quality Concerns
- Acid Mine Drainage
- Low pH
- Suspended solids
- Dissolved Metals
- Sulfates

Permitting / Inspection
Acid Mine Drainage

Simplified Equation for Pyrite Oxidation

\[ \text{FeS}_2 + \text{O}_2 + \text{H}_2\text{O} \rightarrow \text{Fe}^{2+} + \text{SO}_4^{2-} + \text{H}^+ \]
Coal Mines

• R9 Tribal – Navajo, Hopi

• Permitting:
  • Individual NPDES
  • SMCRA

• Concerns
  • Sediment
  • Alkaline conditions
  • Reclamation
Coal Mine Reclamation

- Inspection Concerns
  - Sediment
  - Erosion / SEDCAD
  - Seeps
  - Reclamation
  - Monitoring
Sand and Gravel Mines

- R9 Tribal: White Mountain Apache, Pyramid Lake Paiute, Salt River Pima-Maricopa

Permitting: Individual or Stormwater NPDES

Inspection Concerns
- Sediment, spills
- Dewatering - impacts
- Metals - arsenic, selenium
Suction Dredging/Placer Mining

Water Quality Concerns

- Turbidity
- Mercury suspension

Permitting:
Suction Dredging suspended in CA (Aug 6, 2009) – ongoing litigation
  CA Fish and Wildlife Per

Inspection Concerns
Questions

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Resource:
• EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska, EPA 2003