Kennecott and the Environment
Working to Cleanup and Protect
Presentation to the Stakeholder Forum
January 12, 2005

Kennecott Operable Units

*OU1 – Bingham Creek
*OU2 – South Zone Groundwater
*OU3 – Butterfield Creek
*OU4 – Large Bingham Reservoir
*OU5 – ARCO Tailings
*OU6 – Lark
*OU7 – South Jordan Evaporation Ponds
OU8 – Waste Water Treatment Plant Sludge Ponds
OU9 – Magna Soils
*OU10 – Copperton Soils
*OU11 – Bingham Canyon
*OU12 – Eastside Collection System
OU13 – Smelter and Acid Plants
OU14 – Refinery
OU15 – Magna Tailings Pond
*OU16 – Bingham Creek Underflow
*OU17 – Bastian Area
*OU18 – Acid Mine Drainage
OU19 – Smelter Fallout
*OU20 – Pine Canyon
OU21 – Cobalt Ponds
OU22 – Great Salt Lake and Wetlands
OU23 – North Zone Groundwater
*OU24 – Precipitation Plant

* South Zone Sites

Historical Mining Practice – What Lead to Observable Impacts

- Historical waste rock and tailings, disposal practices
  - Placement near/in creeks
  - Steep surface dumps
- Uncontrolled releases of acid mine drainage from the waste rock dumps, tunnel adits, and tailing impoundments to surface water or ground water
- Spills (process water, tailings slurry, releases of waste rock, etc.)
- Leaking retention ponds
- Non-regulated air emissions
- Inappropriate use of mine runoff water and other collected waters
- Non-regulated discharge of operational waters

With the Onset of Environmental Regulations Mining Practices Begin to Change

- Discharges to state water bodies begin to be regulated, by permit, under the Utah Pollution Discharge Elimination System.
  - Program was incorporated as part of the Water Quality act, which was enacted by Utah Legislature in 1991.
- With the advent of the air quality program, fugitive dust and production standards began to apply at Barney's Canyon and Bingham Canyon Mine for the concentrator, smelter, power plant, laboratory, and tailings disposal operations.
  - Air quality standards and protection program were incorporated as part of the Air Conservation Act, which was enacted by the Utah Legislature in 1991.
- The Utah Groundwater Protection Program placed monitoring and source control measures requirements. Leaking retention ponds begin to be redesigned and constructed to better match protective standards, under CERCLA Administrative Orders on Consent.
  - The Utah Water Quality Board promulgated into rule the program, in 1989.
- Spill prevention and corrective actions are further addressed by the adoption of regulatory controls within the Utah Solid and Hazardous Waste program, within the federal RCRA Act, and the Superfund program under CERCLA.
  - Congress enacted the Resource Conservation and Recovery Act in 1976. The act was subsequently amended in 1984, Hazardous and Solid Waste Amendments (HSWA).
  - The Utah Division of Solid and Hazardous Wastes has been authorized (via application) to regulate (from cradle to grave) wastes under RCRA since 1984.
  - Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act was enacted by Congress in 1980 and reauthorized it in 1986 via SARA (Superfund Amendments and Reauthorization Act).

Changes by Company Management

- To increase profitability and to enhance its management of environmental concerns, Kennecott redesigned its mining, smelting, and refining operations.
- The new direction was also intended to comply with the standards and restrictions placed upon operations by new environmental regulations.
- The new operational tools facilitated responses to environmental concerns under voluntary cooperation.

CERCLA Leads to Investigations and Cleanups

- In 1986, the Utah Department of Health files a complaint against Kennecott in Federal Court seeking damages under the Natural Resource Damage (NRD) provision of CERCLA. Suit is for damages to ground water in the Southwest portion of the valley. The NRD settled in 1995.
- EPA opens site-wide remediation Consent Decree negotiations in 1991.
- In 1992, EPA, Kennecott, and DEQ begin to use Technical Review Committees (TRC) – each for the North and South Zones - to assist with issues surrounding the investigation of environmental impacts and evaluation of remedial designs.
- EPA proposes the Kennecott South Zone and North Zone to the National Priorities List (NPL) in 1994.

1995 Memorandum of Understanding (MOU) Requires:

- The completion of the Remedial Investigation and Feasibility Study (RI/FS) on the South Zone ground water problems;
- Completion of the removal action on the Wastewater Treatment Plant Sludge Ponds and soils associated with the smelter and refinery complexes;
- Completion of the South Jordan Evaporation Ponds cleanup;
- Beginning the RI/FS on the North Zone groundwater problem, after the completion of the ecological and human health risk assessments;
- The completion of the groundwater source control measures and their continued use at the Bingham Canyon Mine waste rock dumps and other Kennecott facilities;
- Completion of various environmental assessments of historic onsite facilities and their associated wastes and, if necessary, the cleanup for these wastes; and
- Completion of defined ecological risk assessment studies.

In Lieu of Listing, MOU Allows Cooperative Work to Begin

- Kennecott continues to address concerns both EPA and the State have on probable impacts from both historical and current mining operations.
- Under the oversight of DEQ, Kennecott begins to assess and characterize historic and currently operational sites listed by EPA Region VIII on the environmental onsite assessments (EOA) list.
- As a subproject, KUCC assists DEQ to characterize the environmental offsite assessments sites (primarily surface water drainages).
- As warranted by the characterization data, remedial action at some sites begins under the oversight of EPA and DEQ.

Remedial Work Completed by Kennecott

- **Bingham Creek**
  - Under separate orders, Kennecott performed cleanup activities to remove lead and arsenic contaminated soils and sediments from the channel of Bingham Creek (Phase II, 1993) and residential properties of West Jordan and South Jordan (Phase I 1993).
  - In 1998, the two phases of the Bingham Creek cleanup performed by Kennecott culminated in the removal of 1,122,000 cubic yards of material. It is disposed of in the Bluewater Repository.

Remedial Work Completed by Kennecott (cont.)

- **Small and Large Bingham Reservoirs**
  - In 1990 and 1991 the original Small and Large Bingham Reservoirs were taken out of service. A June 1992 order was issued under which Kennecott performed the removal action.
  - The new reservoirs came on line around 1994. They are regulated under a state groundwater protection permit.
  - Under this removal project, 2,660,000 cubic yards of contaminated material removed and disposed of in the Bluewater Repository.
- **Butterfield Creek and Mine, Herriman**
  - From 1994 to 1998, Kennecott characterized and remediated sediments and soils associated with Butterfield Creek and Mine and assisted in the removal of soils from 85 residential properties in the City of Herriman from 1994 to 1998.
  - The materials were disposed of in the Bluewater Repository.
  - Kennecott also worked cooperatively with EPA and DEQ with the characterization of the developable properties located in Herriman. Kennecott provided assistance to the community during the development of the selected remedy (2001 Record of Decision or ROD).
- **Surface contamination near Bingham Canyon**
  - Under a 1993 order, Kennecott worked with ARCO to remediate surface contamination produced by non-Kennecott mines in Bingham Canyon (located immediately down gradient of the Large Bingham Reservoir). This work was completed from 1993 to 1997.
  - The materials consolidated under this project were capped in the ARCO Tailings Impoundment, located directly east of the current Large Bingham Reservoir on Kennecott property.
- **Lark Area**
  - Surface contamination produced by mines and mills near the former town of Lark were remediated. Some material was disposed of in repositories located behind the Eastside Collection System (ESCS), including the Bluewater Repository, while other material was capped onsite. The work was completed in 1994.
  - The scope of the cleanup was expanded to include some nearby historical facilities. In 1998, an order was issued to cover the previous cleanup work and the additional work pursued by Kennecott.
- **South Jordan Evaporation Ponds**
  - In 1991, Kennecott ceased to operate its mine waste and storm water evaporation ponds located in South Jordan. Under a 1994 order, Kennecott performed a removal action onsite to address the contaminants of concern.
  - The waste rock dikes at the site were removed and disposed of at the main waste rock dumps of the Bingham Mine. Sludges and gypsum sludges with a high concentration of lead and arsenic were removed and disposed of in the Bluewater Repository. Sludges with a low concentration of lead and arsenic were consolidated onsite then capped with topsoil and revegetated.
  - Kennecott voluntarily selected lower remedial goals for lead and arsenic contaminated soils.
  - Approximately 3.1 million cubic yards of sludges were cleaned up. An estimate of the volume of waste rock was not performed.
- **North Zone Facilities**
  - Under a 1996 order, Kennecott agreed to address the characterization and remediation of North Zone facilities using the North Facilities Soils Work Plan (NFSWP), developed by Kennecott and approved by EPA.
  - Kennecott has demolished retired facilities, characterized the footprint of historic facilities, characterized currently operating facilities, and cleaned up soils at various facilities.

Remedial Work Completed by Kennecott (cont.)

- **North Zone Facilities (cont.)**
  - Contaminated soils, construction debris, and other miscellaneous materials have been disposed of in the Arthur Step Back Repository. Approximately 1,313,514 cubic yards of contaminated soil and sludges have been placed in the repository.
- **Environmental Onsite Assessment Sites**
  - By Winter/Spring 2005 the sites will have been addressed or assigned to an appropriate regulatory program or mechanism for final remedial efforts.

Remedial Work Has Included Source Controls

- Source control measures were installed to prevent the further migration of surface and subsurface contamination.
- **South Zone**
  - Pursuant to the NRD Settlement and the remedial guidance developed by the TRC, Kennecott completed the construction of the Eastside Collection System (ESCS) in 1996.
  - The system is a series of 27 cutoff walls, toe drains, and associated piping. It was installed to prevent the further uncontrolled release of acid mine drainage and infiltrated meteoric water from the Bingham Mine waste rock dumps.
- **North Zone**
  - For some facilities (like the historic Precious Metals building) elevated concentrations of the contaminants of concern were found below the prescribed removal depth. To prevent further migration, source control caps were constructed.
  - As the result of the Remedial Investigation for the North Zone groundwater plumes and per an agreement reached between Kennecott and EPA, spring water is collected as it daylights in the Garfield Wetlands. This has been ongoing since the late 1990s.

Facilities Schedule for Demolition and Characterization, over the Short-term

- Bonneville Crusher and Concentrator — Spring/Summer 2005
- Copperton Precipitation Plant (some infrastructure) — Spring/Summer 2005

CERCLA Enforcement Activities

- A number of Operable Units (OUs) will have selected remedies documented in two Remedial Design Consent Decrees.
- **South Zone**
  - The Kennecott Utah Copper Corporation - Final Design for Remedial Action at South Facilities Groundwater (December 2002) documents the selected remedial design for the acid core of Zone A (OU#2).
  - The selected remedy will be enforced under a Consent Decree currently being negotiated.
- **North Zone**
  - The North Facilities Remedial Design Work Plan will document the selected remedial design for the facilities listed in the 2002 ROD.
  - The selected remedies will be enforced in a separate Consent Decree soon to be negotiated.

Remaining Work

- **South Jordan Evaporation Ponds**
  - Continue to haul native soils, sludges, mixed soils, and topsoil from the consolidation area of the South Jordan Evaporation Ponds.
  - Work is performed pursuant to the Operation and Maintenance plan of the Jan. 15, 2003 RDCD for the site.

Remaining Work (cont.)

- **SWJV Groundwater project**
  - Operate and maintain the acid core extraction wells, meeting reported quantities (400 gpm – NRD), to prevent the further migration of the acid core and to facilitate its reduction.
  - Pump and treat, using reverse osmosis, sulfate water from the Zone A plume providing 3500 ac-ft a year from the contaminated aquifer.
  - Operate and maintain the extraction (barrier) wells in the sulfate portion of Zone A to prevent the further migration of water with elevated concentrations of sulfate (1500 ppm or higher).
  - Operate and maintain the tailings pipeline circuit to receive RO concentrate and acidic core water. Material will be deposed of in the North Expansion. Impoundment. Work includes monitoring the tailings slurry's neutralization potential and adding lime, when necessary.
  - Develop a disposal plan dealing with the RO concentrate and the extracted acidic core waters, post mine closure.
  - Maintain monitoring network to periodically assess effectiveness of the selected remedies.
- **North Zone**
  - Maintain groundwater-monitoring network to assess effectiveness of the selected remedies.
  - Assure attainment of the selected remedial goal of 10 ppm or less for selenium in invertebrate tissues for the Garfield Wetlands. Use monitoring to assess levels annually.
  - Assess effectiveness of selected groundwater remedies periodically, and at mine closure.
- **Both Zones**
  - Continue to address the demolition, characterization and remediation of facilities as they are retired.
  - Maintain operating facilities, continue to comply with applicable State and Federal environmental regulations, and perform corrective action measures when necessary.
  - Operate and maintain source control measures.
  - For remedies performed under CERCLA where waste material is still left behind, assist during the performance of required Five-year Reviews.

Outreach and Assistance on Public Projects

- To assist third party water rights holders in the area of the Zone A and B plumes of the South Zone, Kennecott has developed a plan to assess and address potential impacts to water quality and (for Zone A only) water quantity impacts.
- Kennecott has been assisting with the development of numerical water quality standards for the Great Salt Lake. It is a member of the Great Salt Lake Numerical Water Quality Standards - Steering Committee and Science Panel.
- Kennecott will continue to participate as a member of this Stakeholder Forum.

For Assistance or Further Information

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