# FIVE-YEAR REVIEW REPORT

# KENNECOTT NORTH ZONE SUPERFUND SITE

## APPENDIX F: SUMMARY OF RESPONSE ACTIONS BY OPERABLE UNIT

Table 1 Summary of Specific Removal Actions at WWTP and Sludge Ponds, OU8

| Location | Action Taken | Completion Date |
|---|---|---|
| WWTP | Asbestos removed, facility demolished, underlying soils characterized and removed to attain North Zone Removal Action Levels | 2001 |
| Lime Storage Tank | Lime (150 tons) sent to Bingham Canyon Mine for use in reclamation of acidic soils | 2001 |
| Ferric Chloride Tank | Ferric Chloride was neutralized and mixed with soils, then placed in Arthur Step-back Repository | 2001 |
| Pond A | Sludges inside and outside dikes removed, mixed with contaminated soils, dried and placed in Arthur Step-back Repository. Area restored as a wetland (OU22) | 1998 |
| Pond B | Sludges inside removed, mixed with contaminated soils, dried, and placed in Arthur Step-back Repository. The depression of Pond B was left, filled with tailings, covered with top soils and bio-solids and revegetated. Further removal action was performed at the former footprint to remove soils with arsenic above Sites' industrial land use standard. | 1997<br>2011 |
| Pond C | Sludges inside removed, mixed with contaminated soils, dried, and placed in Arthur Step-back Repository. The dike between Pond C and Pond C+ was removed, the depression filled with tailings, covered with top soils and bio-solids and revegetated. | 1998 |
| Pond C+ | See Pond C | 1998 |
| Pond D | The sludges from the Concentrator treatment facilities were removed in the 1980s and sent for recycling. The sludges from the WWTP were removed, mixed with contaminated soils, dried, and placed in the Arthur Step-back Repository. Slag from the dikes was placed on the slag pile (OU22), or disposed in the Arthur Step-back Repository. The area was restored by adding islands, creating gentle slopes, and adding water management diversions structures to convert the area to wetland habitat (OU22). | 2001 |

Table 3 Summary of Specific Removal Actions at Facilities Comprising OU13

| Location | Action Taken | Completion Date |
|---|---|---|
| Smelters and Associated Facilities | | |
| Reverberatory Smelter | Smelter building was demolished, underlying contaminated soils partially removed and stored at the Cherry Bowl facility. Remainder of waste covered under Outokumpu Smelter footprint or covered with soil and capped with asphalt. | 1978 to 1992 |
| Smelter Powerhouse | Asbestos was removed, equipment was salvaged after cleaning, and building was demolished. The concrete foundation was removed, underlying contaminated soils removed to a depth of five feet; area was backfilled and covered with fill. | 1998 |
| Reverb Mixing Chamber | Accessible flue dust was removed. Remaining flue dust was covered in place. Walls of facility hold up an active facility road and thus the Mixing Chamber was not | 1998. |

| Location | Action Taken | Completion Date |
|---|---|---|
| Smelters and Associated Facilities | | |
| | demolished. | |
| RR Flue Dust | Accessible flue dust was removed. Remaining flue dust was sealed in place by the capping of both ends of the flue tunnels under the active railroad directly behind the Smelter. | 1993 |
| Noranda Smelter | The building was demolished. Steel was decon'ed before being scrapped. Some equipment was sold. Copper contaminated soils and concentrate found under the building was recycled. Surface soils were removed and the remainder of contaminated soils were covered and capped under Outokumpu Smelter (in part). | 1997 |
| Overhead Flues | Flues were cut into sections then lowered to the ground. Flue sections were capped on both ends and transported to a RCRA landfill. | 1997 |
| Cooling Towers, including: Ecodyne Cooling Tower, Upper Ecodine Cooling Tower, Lily Hoffman Cooling Tower, Trombone Cooling Tower | Asbestos was removed prior to demolition. | 1996 |
| Shot Cooler | Contaminated soils were removed as part of the Noranda Smelter cleanup. | 1997 |
| Old Smelter Soils | Contaminated soils were removed during the Noranda Smelter cleanup action. Large copper nuggets were cut up and removed. The area was reclaimed. | 1997 |
| New Smelter Soils | As part of preparing the ground surface for the Outokumpu Smelter, contaminated soils were removed. Contaminated soils were covered with the foundation of the Outokumpu Smelter. | 1993 |
| Smelter Infrastructure | | |
| East Yard | Contaminated soils were removed to the Arthur Step-back Repository | 2001 |
| RR Yard Soils | No cleanup was performed, the facility is still active as part of the smelting operations. | |
| Pipelines | | |
| Slag Tails Pipeline | No cleanup was performed, no contaminated soils were found and the facility is still active as part of the smelting operations. | |
| Section 17 Pump | A section of the pump house was removed to provide better access, no contaminated soils were exposed. | |
| Process Water Pipeline | Pipeline was abandoned due to failures. | 1999 |
| Weak Acid Pipeline | Southern branch is currently used as part of the process water pipeline. Other sections sampled and no contaminated soils were found. | |
| Weak Acid Lift | A portion of the station was demolished and contaminated | 2001 |

| Location | Action Taken | Completion Date |
|---|---|---|
| Smelters and Associated Facilities | | |
| Station | soils were removed to the Arthur Step-back Repository. Other contaminated soils were covered and remain in place. | |
| Water Management | | |
| Section 21 Reverse Osmosis Plant | The building was demolished but the concrete foundation was left in place to serve as a decontamination pad. | 1996 |
| East and West Process Water Ponds | The West Process Water Pond was constructed on the footprint of the Last Chance Pond. The HDPE liner of the Last Chance Pond required various repairs. | 1997 |
| Japanese Springs (1-2) | No action was taken under the soil removal action at OU13. Refer to response actions at OU22. | |
| Japanese Springs (3-5) | No action was taken under the soil removal action at OU13. Refer to response actions at OU22. | |
| Wooden Flume | Sediments behind the check dam and in/under the flume were removed to the Arthur Step-back Repository. | 2000 |
| Acid Plants | | |
| Acid Plants | Acid Plants 5, 6, 7, and 8 were demolished. Contaminated soils were removed from underneath the plants. The area was graded and paved over and is in use as a concentrate storage pad. | 1998 |
| Acid Plant 7 | Asbestos insulation was removed, sludges from the tanks were removed, tanks were washed, then dismantled. Concrete underneath the plant was removed and contaminated soils were removed on the eastern end to a depth of three to 14 feet and on the western end to a depth of 1.5 to three feet. Remaining contaminated soils were covered in place. | 1997 |
| Acid Plants | | |
| Acid Tank Farm | Tanks were demolished and some contaminated soils were removed. Past spill impacts to groundwater were not addressed. Spill in 1991 was addressed under corrective action under RCRA program overseen by the State of Utah Division of Solid and Hazardous Waste. 2009 spill at loading station is undergoing corrective action per the Groundwater Protection Program of the State of Utah. | 1990s onward |
| Material Management & Smelter Waste Areas | | |
| Thaw Shed | Wastes were removed or recycled. Area was paved and is use to load concentrate for off-site sale. Some contaminated soils and concentrate remains in place under active rail corridors. | 2001 |
| Cherry Bowl | Various intermediate products were sorted, recycled, reprocessed, and contaminated soils were removed. Some contaminated soils remain in place underneath the rail corridors. | 2001. |
| Materials Handling Building | Galbestos was removed. Structures were demolished, construction debris was decontaminated. Contaminated soils were removed. | 1997 |
| Roundhouse | Asbestos was removed and the structure was demolished. | 1997 |
| Row 5 Screening | Structure was demolished; underlying soils were comprised mostly of slag and were left in place. | 1998 |

| Location | Action Taken | Completion Date |
|---|---|---|
| Smelters and Associated Facilities | | |
| Slag Mill Thickener | Structure was demolished; arsenic impacted soils in the footprint were removed. | 1996 |
| Standby Fuel Station | Facility was demolished and soils contaminated with petroleum hydrocarbons were removed. Footprint is now underneath the Outokumpu Smelter. | 1990 |
| Black Rock Tailings Pond | Contaminated soils were covered in place with fill and reclaimed. | 1984 |
| Smelter Slag | Slag has been used as railroad ballast by Union Pacific (and Kennecott) and as a drainage blanket in the construction of the North Tailings Impoundment (OU15). It has been used as fill elsewhere on the Sites. Slag has been found in sections of the Garfield Wetlands (OU22). Though high in arsenic, the slag has been determined to not be leachable. | Slag continues to be recycled by Kennecott |
| Last Chance Pond | Contaminated sediments were removed and recycled. The West Process Water Pond was constructed on the footprint. | 1994 |
| Flue Dust Disposal Area | Flue dusts were removed and sent to a RCRA landfill/ | 1998 |
| RR Crossing Spill | Spilled material was excavated and removed to the Arthur Step-back Repository. | 2000 |
| Material Management & Smelter Waste Areas | | |
| Smelter Landfills in Kessler Canyon | Most of lower landfill wastes removed to Arthur Step-back Repository with the remainder left in place under cover. The Upper Landfill (concrete monofill wastes) was left in place since there were no-detected hazardous wastes. | 2001 |
| Smelter Parking Lot | Spilled concentrated was picked up and recycled. Routinely the parking lot is swept to address fugitive dusts. | |

Table 4 Summary of Specific Response Actions by Kennecott at Facilities Comprising OU14

| Location | Action Taken | Completion Date |
|---|---|---|
| Refineries, Precious Metals Plant(s), Associated Facilities, Garfield Townsite | | |
| Old Precious Metals Plant | Building was demolished and some of the concrete was recycled to recover precious metals. | 1996 |
| Old Precious Metals Plant Footprint | 4,200 cubic yards of soils containing gold was recovered and delivered to the Barney's Canyon Mine operations for gold recovery, 500 cubic yards was sent to the Smelter (OU13) to recover silver, 2,530 cubic yards of soil was excavated and disposed of in the Arthur Step-back Repository (OU15). Remaining waste (16,400 cubic yards) was capped with clay under a 6-inch gravel drainage blanket and 18 inches of soil which was revegetated. | 1997 |
| New Refinery Soils | The new refinery footprint was originally used as a storage area for contaminated soils excavated from underneath the Old Refinery. The contaminated soils were either recycled or disposed of in the Arthur Step-back Repository (OU15) prior to construction of the new precious metals refinery (Hydromet Plant). | 1997 |
| Electrolyte Purification Building | The building was demolished and the contaminated soils which underlay the building were disposed of in the Arthur Step-back Repository (OU15). | 1996 |

| Location | Action Taken | Completion Date |
|---|---|---|
| Refineries, Precious Metals Plant(s), Associated Facilities, Garfield Townsite | | |
| Lead Shop | The interior of the building was cleaned and the building is now in use as a shop and lunchroom for the refinery personnel. | 1997 |
| Oil Storage | Tanks and piping were removed and sold for scrap. The footprint was re-graded; no removal of contaminated soils was required. | 1997 |
| Boiler Building | The building was demolished. The soils in the footprint were not contaminated. | 1995 |
| Assay Lab | The hoods and duct work of the building were cleaned and the building was demolished. | 1995 |
| Refinery Evaporations Ponds | In 1972, 830 tons of sediment were excavated and sent to the Smelter (OU13) for metals recovery. In 1982, the pond was again cleaned out with materials (unknown volume) recycled. In 1997, 400 cubic yards were removed from the top two to three feet of the pond and disposed of in the Arthur Step-back Repository (OU15). Remaining wastes (100,000 cubic yards) were capped in the same manner as the Old Precious Metals Plant footprint. | 1997 |
| East Rail Yard | There was no removal of soils. The area was re-graded and revegetated. | 1996 |
| Electrolyte Pipeline | There was no contaminated found in the pipeline corridor. | 2001 |
| West Laydown Yard | Most of the contaminated soils were removed and disposed of in the Arthur Step-back Repository (OU15). The remainder of contaminated soils were capped in the yard. | 1997 |
| Kessler Spring Dump | The contaminated soils were excavated and disposed of in the Arthur Step-back Repository (OU15). | 1995 |
| R1-R2 Containment Area | Soils contaminated with petroleum were removed to ECDC facility outside of Price, Utah. | 1995(?) |
| Bosh Pond | Inaccessible (site was covered with asphalt), no action was taken. | |
| Santa Fe Basin | Demolished in 1998 | 1998 |
| Refinery Stormwater Canal | The contaminated sediments were excavated and disposed of in the Arthur Step-back Repository (OU15). | 2002 |
| Garfield Townsite | No action was taken because then land use action levels were not exceeded. Some revegetation was done. Recently Kennecott removed soils with elevated arsenic and lead (in excess of the Sites' industrial land use action levels and unrestricted land use action levels) during the construction of the new MAP facility. | 1996 & 2010 - 2012 |

Table 5 Summary of Specific Response Actions by Kennecott at Facilities Comprising OU15

| Location | Action Taken | Completion Date |
|---|---|---|
| Subpart 1: Milling Facilities and Associated Infrastructure | | |
| Magna Mill (North Concentrator) – Grinding & Crushing Portion | Removal of asbestos and demolition of older facilities including warehouse, machine shop, boiler shop, carpenter shop, lumber shop, old flotation building. | 1990 |

| Location | Action Taken | Completion Date |
|---|---|---|
| Subpart 1: Milling Facilities and Associated Infrastructure | | |
| Magna Mill - portions as of 2001 | Removal of facility that was in operation till 2001. Characterization of soils underneath footprint, removal of some soils, re-grading and placement of soil cover, revegetation. | 2007-2009 |
| Arthur Mill - Moly-oxide unit | Removal of asbestos, PCBs, industrial wastes, demolition of building. | 1991 |
| Magna Mill - Railroad Slope | Soils removed, remaining contamination capped with 18 inches of clean fill, two terraced benches were created to reduce erosion. | July 1996 |
| Magna Mill - Concentrate Loading Area | Soils removed except at concrete pad and a strip along southern boundary due to presence of the main Concentrate Slurry Pipeline. Capped with 18 inches of clean fill. | Sept. 1999 |
| Magna Mill - East Debris Site | Contaminated soils removed. Site re-graded. | March, 1996 |
| Arthur Mill (Boston Consolidated Mill) | Removal of Asbestos, removal of industrial waste, removal of RCRA hazardous waste, demolition of facilities. | 1991 |
| Arthur Mill (Boston Consolidated Mill) – portions as of 2006 | Arthur Administration Building, Carpenter's Shop, Machine Shop, Paint Shop and Lumber Storage Building were demolished. | 2006 |
| Bonneville Crusher Facility | Removal of asbestos exterior paneling; Demolition of buildings and related infrastructure (conveyors, administration buildings, maintenance shops); contaminated soils removal, consolidating and re-grading other soils, post removal sampling. | 2007 to 2009 |
| Subpart 2: Mill Waste Ponds, Piles, Pipelines | | |
| Magna Process Water Pond | 2011 facility underwent reconstruction, characterization report is pending. | 2011 |
| Diving Board Tailings | Spills cleaned up by excavation and removal as they occurred. Still operational waste management area. | Various times as spills have taken place. |
| Tailings Slurry Pipelines | Spills cleaned up by excavation and removal as they occurred. Still operational conveyance lines. | Various times as spills have taken place. Most recent, 2013. |
| Concentrate Slurry Pipeline | Spills cleaned up by excavation and removal as they occurred. Still operational conveyance lines. | Several in 1992. Most recent, ____. |
| Magna Flume (Magna Mill) | Spills cleaned up by excavation and removal as they occurred, when operational. Demolished and surrounding soils not covered by asphalt were characterized and partially removed during removal of the Magna Mill. | Various times. Demo/Cleanup 2007 – 2009 (report pending) |

| Location | Action Taken | Completion Date |
|---|---|---|
| Subpart 1: Milling Facilities and Associated Infrastructure | | |
| South Tailings Impoundment | Permanent disposal facilities for historic mill tailings. Currently being reclaimed under DOGM permit. Interstitial water is being drained; biosolids have been added in locations to facilitate revegetation efforts. | Ongoing via oversight from Utah Division of Oil, Gas and Mining and Division of Water Quality (GWPP & UPDES) |
| Subpart 2: Mill Waste Ponds, Piles, Pipelines | | |
| Arthur Step-back Repository | CERLCA CAMU for soils with elevated metals. Eastern portion permanently closed, western portion temporarily closed. Full repository lined on bottom and sides with double HDPE liner with leak detection. | Western portion re-opened periodically as removal action takes place at other operable units at Kennecott. |
| Tailings Pond Landfill | Historical landfills buried by tailings in South Tailings Impoundment. Current landfills permitted by Salt Lake County and are buried by active tailings disposal operations in the North Tailings Impoundment. | See both South and North Tailings Impoundments. |
| Ragtown & Snaketown | Both town sites were subsumed by Magna Tailings Facility. Wastes (if any existed) were buried under tailings. | See both South and North Tailings Impoundments. |
| Historic Roads | Historic roads that crossed thru the footprint of the Magna Tailings Facility (both South and North Tailings Impoundments) were subsumed by the two impoundments. Wastes (if any existed) were buried by tailings. | See both South and North Tailings Impoundments. |
| Riter | Historic rail station with a few house constructed around it, was subsumed in part by the South Tailings Impoundment and the North Tailings Impoundment. Wastes (if any existed) were buried under tailings. | 1918 & 1996 |
| North Tailings Impoundment | Active tailings disposal facility for mill tailings and other permitted wastes. Regulated under State of Utah Permits. | Permits issued: Division of Air Quality, Division of Water Quality (GWPP & UPDES), Division of Oil, Gas, and Mining (reclamation) |
| Historic Rail Routes | As the South and North Tailings Impoundments have been constructed, historic rail corridors crossing the areas for both have been relocated. Wastes (i.e. slag) were buried by tailings when left in place. | See both South and North Tailings Impoundment. |

| Location | Action Taken | Completion Date |
|---|---|---|
| Subpart 2: Mill Waste Ponds, Piles, Pipelines | | |
| Chevron Fertilizer Plant | Petroleum tainted soils were excavated and sent to a land farm on site. Building asbestos was bagged and disposed of off-site. PCB transformers were removed and disposed. Containerized waste were disposed, buildings were dismantled (mercury vapor lamps, light ballasts, lead-based paint and waste oil were disposed). | The gypstack wastes, land farm petroleum contaminated soils and building construction debris are buried in place under the North Tailings Impoundment. Cleanups were done per provisions of CWA 404 permit. |
| Morton Salt Plant | Building was demolished, underground storage tank was removed. Some salt from evaporation ponds were found to dissolve in the decant waters of the North Tailings Impoundment; petroleum contaminated soils were spread out to volatilize the oil, these and the rest of the waste were buried under the North Tailings Impoundment. | See North Tailings Impoundment. Cleanups were done per provisions of CWA 404 permit. |