Kennecott North End Facilities with Ground Water Discharge Permits

UGW350008 Smelter

UGW350011 Tailings Impoundment

UGW350015 North Concentrator



SMELTER UGW350008



Tailings Impoundment UGW350011



Tailings Impoundment

Permitted disposal waste streams: (what goes in....)

- 1) Copper Tailings from the Copperton Concentrator;
- 2) Slag Tailings from the slag concentrator at the Smelter;
- 3) Power plant ash slurry;
- 4) Smelter process waters;
- 5) Wastewater effluent slurry from the Hydrometallurgical Plant at the Smelter;
- 6) Mine leach water and meteoric contact water that have been treated in the tailings pipeline;
- Wastewater effluent from the Reverse Osmosis treatment of sulfate contaminated waters;
- 8) Neutralization of acid-mine contaminated waters;
- Barneys Canyon pit dewatering and heap leach pad draindown waters;
- 10) Construction, maintenance and lunchroom trash;
- 11) Treated effluent from the sewage treatment plant; and
- 12) Other inflows that are approved by the Executive Secretary for this permit.

What comes out:

Water from the tailings slurry after sediments have settled out.

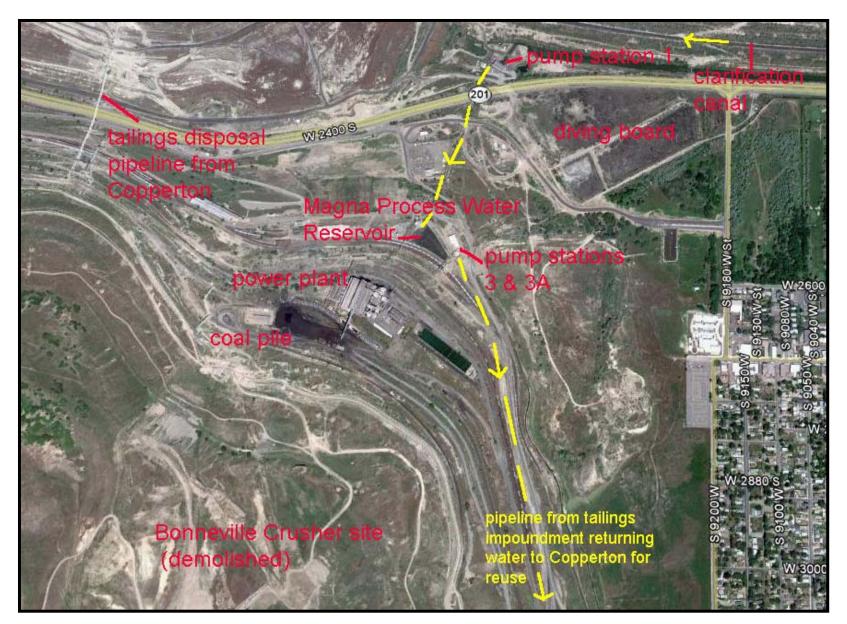
The water is collected via gravity into the toe drain, and is pumped to the clarification canal for additional de-silting, then to pump station #1.

From pump station #1 it is sent to the Magna Reservoir and on to Copperton for reuse.

Or

Discharged to the Great Salt Lake through UPDES outfalls if permit limits are met

NORTH CONCENTRATOR UGW350015



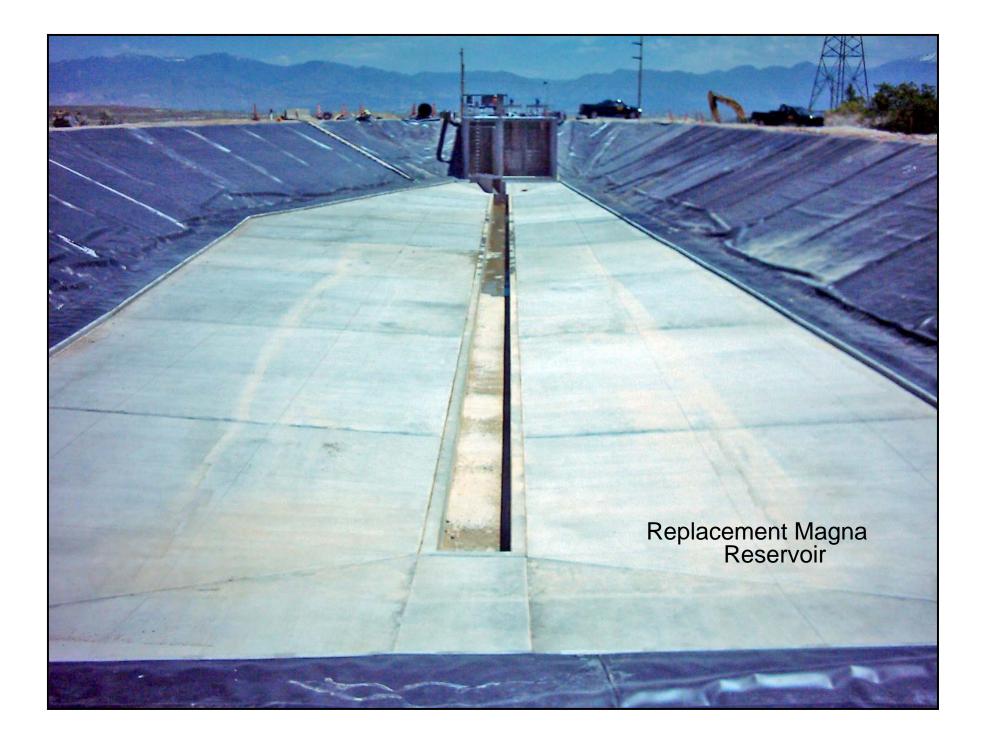
July 2011 modifications to UGW350015

- Kennecott is replacing the concrete Magna Reservoir (circa 1904) with two new reservoirs with upgraded technology: dual HDPE liners with leak detection components
- Add a description of the Best Available Technology (BAT) of the new Magna Reservoirs to the permit: Appendix B Magna Reservoir Leak Detection and Water Quality Sampling Plan
- Add compliance limits for boron to the list of parameters monitored by groundwater sampling. Boron detection in groundwater could provide an indication of power plant process water releases.



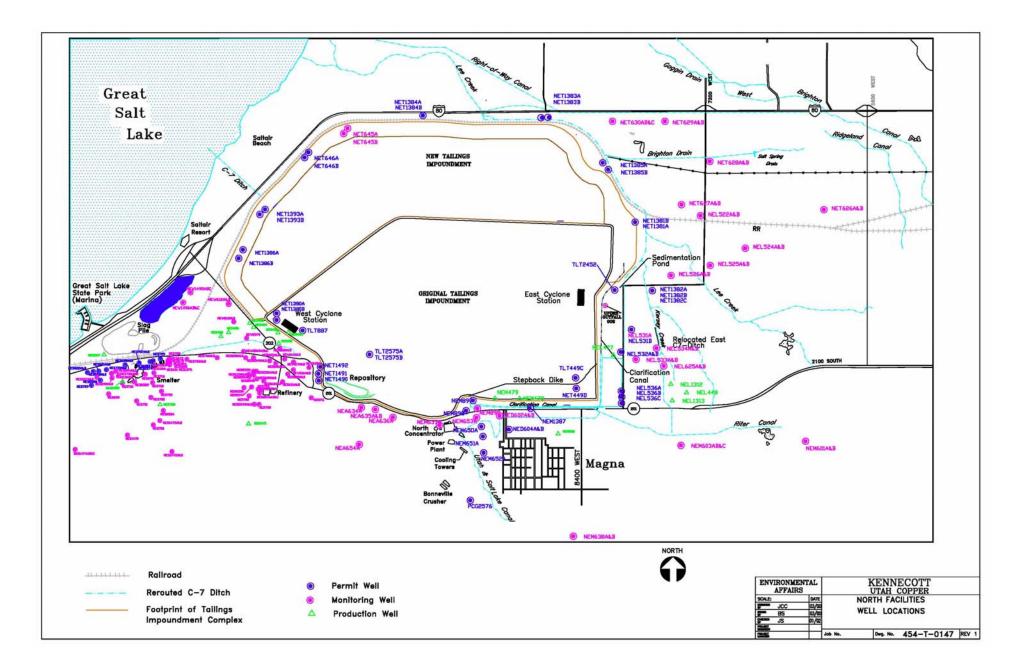
Old Magna Reservoir Built in 1904





Groundwater Monitoring Parameters (typical for North End permits)

- TDS
- Chloride
- Sulfate
- Dissolved Metals (As, Ba, Cd, Cr, Cu, Pb, Se, Zn)
- Major ions
- Field parameters (pH, conductivity, temperature)
- For Tailings Waste stream inflows
- Synthetic Precipitation Leaching Procedure (SPLP EPA SW846 Method 1312) and total metals analysis
- Acid-base accounting to determine acidification potential of exposed tailings surfaces
- Toe ditch water prior to discharge or reuse



Where are the hot spots?





CDGeneralized Groundwater Contamination Limits for Selenium Arsenic and Sulfate Individual

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Generalized Limits of OU23 Groundwater Contamination in Bedrock, Principal, and

