GROUNDWATER MODELING REPORT FOR
KENNECOTT UTAH COPPER CORPORATION
SOUTH FACILITIES
GROUNDWATER PLUME
SOUTHWESTERN JORDAN VALLEY, UTAH

REVISED FLOW AND TRANSPORT MODEL SOUTHWESTERN JORDAN VALLEY, UTAH

ADDENDUM

JUNE 11, 2004

KENNECOTT UTAH COPPER CORPORATION

As part of additional studies related to a Remedial Investigation and Feasibility Study (RI/FS) of groundwater in the southwestern Jordan Valley (KUCC 1998), Kennecott Utah Copper Corporation (KUCC) has continued optimization of its groundwater flow and transport model while investigating remedial strategies for the Bingham Creek groundwater plume. This includes continuation of the updating of model parameters and data in order to allow KUCC to more accurately analyze groundwater flow and contaminant migration. This addendum outlines KUCC's modeling for remedial strategies since the August 2003 revision to the *Revised Flow and Transport Model*, included as Appendix D of the Joint Proposal.

KUCC previously made improvements to the original flow and transport model used in the RI/FS investigations, including incorporation of a head-dependent (general head) boundary along the western edge of the model that replaced the constant flux boundary used in the original model. Also, the eastern model boundary was expanded from the Jordan River east to the base of the Wasatch Mountains. Updated field data were also incorporated into the current flow and transport model, and is ongoing.

KUCC's current expanded sub-regional model of the southwestern Jordan Valley is bounded by the Oquirrh and Traverse mountains on the west and south and by the Wasatch Mountains and approximately 6000 South Street on the east and north. The model contains a grid of 94 rows and 136 columns, with variably sized cells and eight vertical layers.

The model incorporates recharge to the principal and shallow unconfined aquifers from the following sources:

- ✓ precipitation
- ✓ bedrock aquifer
- ✓ irrigation canals
- ✓ irrigated fields, lawns and gardens
- ✓ stream and channel fill
- ✓ reservoirs and evaporation ponds.

Discharge sources include extraction from wells, evapotranspiration and head-dependent boundaries.

KUCC previously recalibrated the expanded model for steady and transient states in the same manner as in the RI/FS study. The steady state simulated hydrologic conditions in 1965. The transient state simulated the period 1966-1998, and included annual stress periods. Calibration variables were adjusted within reasonable ranges, as determined from data collected from the RI/FS and other work. The calibration process was considered successful when a reasonable match was made between observed and modeled conditions for the years being simulated.

The calibrated model closely matched observed water-level declines, estimated flow exchange to the Jordan River, computed flows through the northern and eastern boundaries, sulfate concentrations and vertical hydraulic gradients throughout the modeled area. It is therefore considered to be a useful tool for predicting flow and contaminant transport for the SWJV.

Further updates since the August 2003 revision to the *Revised Flow and Transport Model* include updating the model flow data with most recent data (2003-2004) for water levels, flow field information and sulfate concentrations via well sampling in the region.

Many potential remedial responses have been investigated with the updated flow and transport model since the publication of the RI/FS and Final Design. The basis of the proposed remedial strategy continues to involve increased extraction between the region of the acid extraction well ECG1146 and the sulfate extraction wells B2G1193 (formerly known as the K60 well) and B2G1200 (formerly known as the K109 well). Since the August 2003 revision to the *Revised Flow and Transport Model*, included as Appendix D of the Joint Proposal, KUCC has installed a second acid well approximately 4,800 feet downgradient (east) of acid well ECG1146. This is the B2G1201 acid well and is sometimes referred to as KUCC acid well #2 (ECG1146 being acid well #1).

Investigatory model-predicted scenarios incorporated best recent pumping projections for West Jordan and Riverton. These continue to include West Jordan total municipal pumping of 2500 gallons per minute (gpm) from four production wells (W420, W361, W363 and W387) while Riverton municipal pumping is now projected to continue along the lines of their recent pumping history of approximately 2670 gpm (reduced from previous estimates of about 3500 gpm). West Jordan and Riverton municipal wells had been changed in the model to more closely resemble seasonal pumping by incorporating extraction over a six-month period for each year and off for the other six-months, and the model continues to reflect this pumping technique.

The following table outlines modeled KUCC extraction rates for the proposed scenario from which Figures 6.3A & B were derived.

Table 1. Modeled extraction rates for KUCC wells in Figures 6.3A & B.

Well	Modeled Extraction	
	GPM	AFY
B2G1193 BFG1200 BCG1147	1200 1200 500	1935 1935 800
Total Barrier Wells:	**2900**	**4670**
ECG1146 B2G1201	625 625	1005 1005
Total Acid Wells:	**1250**	**2010**
Total Extraction:	**4150**	**6680**