APPENDIX B
Tables from EIS

Table B- 1. Summary of the Open Pit Backfilling Alternative, 1997 FEIS[1]

Type of Potential Impact	Open Pit Backfilling Alternative
Topography	Reduction in depth of pits and heights of dumps compared to not backfilling. Would re-establish maximum useable topography.
Mineral Resources	Future development improbable due to backfilling.
Constructed Facilities-Potential Failures	Slope failure potential reduced compared to not backfilling due to diminished size of waste dumps.
Water Supply	No impact to water supply.
Water Use	Complete pit backfilling and diversion would preserve 1777 acre feet per year surface flow going down Lisbon Canyon.
Water Quality	Backfilling would expose waste rock to both potential acid and alkaline generation (in pockets) in pits and pile vicinities; reduced quantity waste rock exposed to these effects on the surface would be favorable, as would covering of potentially acid or alkaline materials exposed in pit walls, and eliminating evapoconcentration effects. *Unknown impact from utilizing waste material on-site for backfill material. Could adversely impact adjacent groundwater units.*
Acid Generation Potential	Backfilling would cover some potential acid or alkaline generating lithology, and decrease the amount of similar types of waste rock exposed in the surface dumps*; However replacement of this rock in pits may produce acid or alkaline water quality, potentially impacting adjacent groundwater units.*
Other Geochemical Issues – Alkaline Conditions and Related Effects.	Same as above.
Disturbance	Initial disturbance same as for not backfilling, but under the complete backfilling scenario, all 1103 acres of disturbance would be reclaimed. Under partial backfilling some dumps would remain on surface, and 231 acres of pits would remain un-reclaimed.
Soil Quantity for Reclamation	Less cover soil material required for dumps reclamation but about 402,000 additional cu yards of material required for pit reclamation, necessitating additional disturbance to obtain this material in project vicinity or elsewhere.
Erosion Control and Reclamation effectiveness	Pit backfilling would reduce slope angles and erosion potential on pit walls and waste rock piles.
Disturbance of Pinyon Juniper, Grassland-Rangeland, and Sagebrush Communities.	Same as not backfilling except 1100 acres reclaimed with complete backfilling alternative. Partial backfilling would result in no reclamation along pit walls, backfilled areas could be re-vegetated.
Habitat Effects from Disturbance	Similar to not backfilling, except 110 acres reclaimed with complete backfilling scenario.
Wildlife	Same as not backfilling except exposure to abandoned pit lakes would not occur.
Project Closure Effects	No net loss of habitat if pits completely backfilled and reclaimed.
T&E Species	Same as not backfilling
Disturbance of Grazing Lands	Same as not backfilling

Animal Unit Months (AUM)	Similar to not backfilling; partial backfilling assumes no future grazing use on pit floor and assumes temporary loss of 71.6 AUMs during mining, full reclamation and no loss of AUMs in long term.
Final Reclamation	Same as above.
Economics and Employment	Backfilling could decrease economic employment effects due to the mine being scaled back as backfilling costs cut into profitability.
Housing	Similar to not backfilling with smaller mine and shorter project life, demand for housing would also be smaller and shorter in duration.
Local Facilities and Services	Effects on local infrastructure could be shortened; schedule and mine size would be scaled back.
Social Setting	Same as not backfilling.
Local Mine-Induced Traffic	Impacts similar to not backfilling but reduced in time to local road network due to backfilling activity limiting mine size.
Mine Operations Traffic	Increase in internal mine truck trips to backfill pits; no increase in haul trips anticipated across Lisbon Valley Road Intersection.
Accidents	Similar to not backfilling although shortened mine life, duration of accident risk would be reduced.
Road Maintenance	Less wear on county roads due to reduced scale of project, decreasing road maintenance costs to County.
Transportation	Duration may be reduced, due to reduced scale of project. Acid material trips reduced accordingly, fuel trips would increase due to backfilling by truck.
Storage and Use	Similar to not backfilling, shortened mine life, reduced duration risk of spills.
Generated Wastes during Operations	Same as above
Impacts to Culturally Significant Site under NRHP Criteria	Same as not backfilling
Collection/Vandalism	Same as not backfilling
Impacts to Significant Paleontological Resources	Same as not backfilling
Visual Contrasts during Project Operations	Same as not backfilling
Residual Visual Effects after Reclamation and Re-vegetation	Long-term effects less than not backfilling due to decreased height and extent of waste piles, and partially or fully backfilled pits presenting less visual impacts.
Land Use Changes	Use changes shorter in duration due to a reduction in mine life. Complete backfilling would return 231 acres to potential use.
Property Ownership Changes	Same as above
Compliance with National Ambient Air Quality Standards (NAAQS)	Not capable of being modeled with existing methodology; additional particulate emissions would occur from “double handling” of waste rock.
Increments of Air Contaminants Exceeding Background Levels	Same as above
Noise Level Impacts in Immediate Project Vicinity	Noise from project operations same as not backfilling except for a reduced project life.
Noise Level Impacts to Potential Area Residents	Same as above
Displacement of Recreational Activities	No different from not backfilling except impacts occur for a shorter duration due to a reduced project life.
Property Access	Same as above.

NOTES:

[1]Data from the Administrative Record of the 1997 Final Environmental Impact Statement Lisbon Valley Copper Project

(BLM, 1997a).

Table B- 2. Groundwater Level Monitoring Location and Frequency.

I. Water Levels Measured for Discharge Permit UGW37005	
Well / Piezometer ID	**Water Level Measurement Frequency**
SLV-2	Quarterly
SLV-3	Quarterly (dry[1])
94MW2	Quarterly (dry[2])
94MW4	Quarterly[3]
MW96-7A	Quarterly
MW96-7B	Quarterly
MW97-8	Quarterly (dry[4])
MW97-9	Quarterly
MW97-11	Quarterly
MW97-13	Quarterly
MW05-14	Quarterly (dry[4])
MW06-15	Quarterly
II. Water Levels Measured for Mine Operations	
Well / Piezometer ID	**Water Level Measurement Frequency**
PW-2	Monthly
PW-3	Monthly
PW-5	Monthly
PW-6	Monthly
PW-7	Monthly
98R4	Monthly
98R8	Monthly
4R44	Monthly
PW-8	Quarterly[6]
PW-9	Annually[5]
PW-10	Annually[5]
PW-11	Monthly
PW-12	Monthly

NOTES:

(1) Well SLV-3 went dry in April 2006, as a result of planned dewatering of the Centennial Pit
(2) Well 94MW2 went dry between October 2005 and March 2006 as a result of pumping from wells PW-5 and PW-6 for water supply.
(3) Well 94MW4 typically contains insufficient water for sampling.
(4) Wells MW97-8 and MW05-14 have been dry since drilled.
(5) Pumping wells PW-9 and PW-10 would be monitored at least annually while no mine pumping is occurring in the area.
(6) Access to PW-8 is limited by sounder tube diameter and depth; Water level monitoring may not be possible in some quarters.

APPENDIX B: Tables from EIS
Centennial Pit Backfilling Mine Plan Modification
for the Lisbon Valley Copper Mine, San Juan County, Utah
DOI-BLM-UT-Y010-2014-0018EA

Table B- 3. Lisbon Valley Mine Groundwater Comprehensive Analytical Suite.

Parameter	Units	Method	Utah Groundwater Quality Standards	Utah Primary Drinking Standards	Secondary Drinking Water Standards
Dissolved Aluminum	mg/L	EPA 200.7			0.5-0.2
Dissolved Antimony	mg/L	EPA 200.8	0.006	0.006	
Dissolved Arsenic	mg/L	EPA 200.8	0.05	0.010	
Dissolved Barium	mg/L	EPA 200.7	2.0	2.0	
Dissolved Beryllium	mg/L	EPA 200.8	0.004	0.004	
Dissolved Cadmium	mg/L	EPA 200.8	0.005	0.005	
Dissolved Calcium	mg/L	EPA 200.7			
Dissolved Chromium	mg/L	EPA 200.8	0.1	0.1	
Dissolved Copper	mg/L	EPA 200.7	1.3	1.3	1.0
Dissolved Iron	mg/L	EPA 200.7			0.3
Dissolved Lead	mg/L	EPA 200.8	0.015	0.015	
Dissolved Magnesium	mg/L	EPA 200.7			
Dissolved Manganese	mg/L	EPA 200.7			0.05
Dissolved Mercury	mg/L	EPA 245.1	0.002	0.002	
Dissolved Molybdenum	mg/L	EPA 200.7			
Dissolved Nickel	mg/L	EPA 200.7			
Dissolved Potassium	mg/L	EPA 200.7			
Dissolved Selenium	mg/L	SM 3114B	0.05	0.05	
Dissolved Silica	mg/L	EPA 200.7			
Dissolved Silver	mg/L	EPA 200.8	0.1		0.1
Dissolved Sodium	mg/L	EPA 200.7			
Dissolved Thallium	mg/L	EPA 200.8	0.002	0.002	
Dissolved Vanadium	mg/L	EPA 200.7			
Dissolved Zinc	mg/L	EPA 200.7	5.0		5.0
Ammonia as NH_3-N	mg/L	EPA 350.1			
Nitrate as NO_3-N	mg/L	EPA 353.2	10	10	
Nitrite as NO_2-N	mg/L	EPA 354.1	1.0	1.0	
NO_3-N + NO_2-N	mg/L	EPA 353.2	10.0	10.0	
Chloride	mg/L	SM 4500 Cl-E			250
Fluoride	mg/L	SM 4500 F-C	4.0	4.0	2.0
Sulfate	mg/L	SM 4500 SO4-D		1,000	250
Phosphorus	mg/L	EPA 365.1			
pH	units	SM 4500 H+B			6.50-8.5
Conductivity	µmhos/cm	SM 2510B			
Hardness as $CaCO_3$	mg/L	SM 2340B			
TSS	mg/L	SM 2540D			
TDS	mg/L	SM 2540C		2,000	500
Alkalinity as $CaCO_3$, total	mg/L	SM 2320B			
Uranium (total)	mg/L	EPA 200.8	0.03	0.03	
Gross Alpha	pCi/L	EPA 9310	15 pCi/L (1)	15 pCi/L (1)	
Gross Beta	pCi/L	EPA 9310	8 pCi/L (2)	8 pCi/L (2)	

NOTES:

(1) Excludes activity due to uranium.

(2) Standards of 4 mrem/year converted to 8 pCi/L, based on the assumption that all activity is due to Strontium-90 and considers a 90-kg man consuming 2 liters of untreated groundwater per day. US EPA action level is 50 pCi/L.

(3) Phosphorus was added to the analytical suite in May 2012.

Table B- 4. Burro Canyon Aquifer and N Aquifer Water Quality near Centennial Pit

Parameter	Burro Canyon Aquifer					N-Aquifer				
	Count	%NDs	Averagee	Median	Maximum	Count	%NDs	Averagee	Median	Maximum
Dissolved Metals (mg/L)										
Aluminum	142	71%	0.062	0.025	1.1	78	68%	0.044	0.015	0.52
Antimony	139	74%	0.0019	0.001	0.02	78	64%	0.0018	0.001	0.01
Arsenic	142	50%	0.004	0.0025	0.1	78	28%	0.0418	0.0048	0.746
Barium	142	11%	0.055	0.013	0.93	78	0%	0.2	0.09	1.29
Beryllium	142	96%	0.0006	0.0005	0.0083	78	94%	0.0003	0.0005	0.0025
Cadmium	142	61%	0.0034	0.0005	0.0377	78	87%	0.0006	0.0003	0.013
Calcium	142	0%	334.1	323	560	78	0%	30.7	26.7	96.2
Chromium	142	60%	0.003	0.003	0.025	78	53%	0.004	0.003	0.0805
Copper	142	71%	0.043	0.005	0.38	78	83%	0.006	0.005	0.02
Iron	142	5%	3.1	1.3	28	78	21%	0.93	0.16	15.7
Lead	139	63%	0.0025	0.002	0.014	78	78%	0.0017	0.0011	0.01
Magnesium	142	0%	126.5	105.5	269	78	0%	14.7	13.3	26.3
Manganese	142	2%	0.9	0.76	2.6	78	9%	0.35	0.09	5.4
Mercury	142	89%	0.0002	0.0001	0.0028	78	86%	0.0003	0.0001	0.0106
Molybdenum	141	66%	0.02	0.01	0.06	78	40%	0.04	0.01	0.28
Nickel	142	46%	0.015	0.01	0.09	78	56%	0.504	0.005	17.3
Potassium	142	0%	15.35	14.7	22.4	78	0%	6.85	6.8	11.3
Selenium	139	71%	0.003	0.001	0.032	78	82%	0.002	0.001	0.03
Silicon	142	3%	7.1	6.1	14.9	78	1%	9.3	9.1	18.1
Silver	142	89%	0.03	0.0003	0.51	78	87%	0.04	0.0003	0.5
Sodium	142	0%	90.9	74.4	228	78	0%	143.1	144.5	325
Thallium	139	78%	0.0007	0.0005	0.012	78	92%	0.0005	0.0003	0.009
Vanadium	142	92%	0.006	0.005	0.05	78	92%	0.004	0.005	0.014
Zinc	142	13%	0.513	0.21	8.01	78	29%	0.526	0.02	20.8
Total Metals (mg/L)										
Uranium	122	0%	0.092	0.021	0.996	77	27%	0.005	0.001	0.053
Major Water Quality Parameters (mg/L, except where noted otherwise)										
Chloride	142	0%	40	21	118	78	0%	50	12	310
Fluoride	142	8%	0.4	0.4	0.8	78	1%	0.7	0.7	1.3
Sulfate	142	0%	1111	1030	2030	78	0%	130	136	443
pH (s.u.)	142	0%	7.2	7.1	8.3	78	0%	7.8	7.9	8.8
Conductivity (µmhos/cm)	142	0%	2428	2260	3860	78	0%	911	846	1630
Hardness as $CaCO_3$	142	0%	1395	1235	2510	78	0%	136	117	282
TSS	142	3%	838	357	17960	78	0%	406	210	2370
TDS	142	0%	2142	1936	3760	78	1%	564	552	1080
Alkalinity as $CaCO_3$	142	0%	457	446	1726	78	0%	278	266	433
Bicarbonate, total	139	0%	456	439	1725	78	0%	273	262	433
Bicarbonate, diss.	87	0%	412	407	575	50	0%	272	255	430
Carbonate	130	94%	1.1	1	10	78	60%	6.7	1	70.4
Hydroxide	130	96%	0.9	1	2.5	78	94%	1	1	2.5
Ammonia as N	142	27%	0.3	0.2	1.4	78	31%	0.2	0.2	1.7
Nitrate as N	141	57%	0.1	0.1	1.7	78	51%	0.6	0.1	40
Nitrite as N	139	71%	0.007	0.005	0.05	78	77%	0.011	0.005	0.094
NO_3+NO_2 as N	141	57%	0.1	0.1	1.7	78	49%	0.6	0.1	40

NOTES:

Burro Canyon aquifer water quality represented by wells SVL-1A, SVL-3, MW-2A, and MW96-7A.

N-aquifer water quality represented by MW96-7B, MW97-9, and MW-97-11.

%NDs = percentage of non-detects in the dataset; non-detects replaced with 1/2 detection limit for average and median calculations.

Data Source: Arcadis (2014).