Response to AM02I Technical Analysis Dated May 25, 2004

This document outlines the responses to the summary of outstanding deficiencies contained in the Technical Analysis dated May 25,2004. The responses to the deficiencies are identified by the regulatory reference contained in the TA document. This response is designed to assist the reviewer in identifying the revisions that have been made to address the deficiencies.

GENERAL CONTENTS

Permit Application Format and Content

R645-301-121
Corrected the misspelled word in the table index (Page 3-52)
Corrected the editorial errors listed as a result of incorporating missing information.
Chapter 3 Tables are in numerical order.
Page numbers in the table of contents were corrected.
Changed chapter 9 references to chapter 3 (Page 3-17)
Sampling method equation was corrected (Pages 3-6,7).
Removed table 3-2.1 (Page 3-47).
Removed the copy of the USDA letter from Appendix 3A.
Changed the incorrect reference in the Environmental Resource Information (Page 3-17).
Corrected Table 3-7 to reflect the correct table number (Page 3-47).

R645-301-121.200
Appendix 7-L will be added as soon as DOGM sends us a copy of it.
Because of the fact that the Water Rights can change, instead of providing a hard copy that can become outdated, we will be referring to the Water Rights Webpage.

R645-301-121.200
Added max slope to Page 7G-132, and put Pages 7G-151and 7G-178 in sequence.
Removed Blank page. (Page 7G-135)
Corrected inconsistency for culverts 7C-U and 7C-D (Page 7G-101).
Showed calculations for drainage AD-20 on Page 7G-20.
Corrected the Peak Flow and T results and Added input values for Time of Concentration and Watershed Area for WS-27 on page 7H-15.
Correctly numbered the pages that follow page 7H-47.
Corrected the calculated results for RC-RD21 on page 7H-114.

R645-301-121.200
Included the electronic version of Plate 6-6.

R645-301-121.200
Provided the latest versions of Plates 7-1B and 7-1E.

R645-301-130
Moved the reporting of Technical Data information from R645-301-120 to R645-301-130 (Page 1-14).

R645-301-122
Added References (page 7-85).

R645-301-130
Moved the reporting of Technical Data information from R645-301-120 to R645-301-130 (Page 1-14).

R645-301-140.142
Included information that verifies that the requirements have been met (Page 1-14).

R645-301-150.142
Included information that verifies that the requirements of R645-301-130 and 140 have been met (Page 1-14).

R645-301-542.200
Page 5-40 was changed as discussed in the Telephone Conversation on 4/27/04.

R645-301-624.320 and 624.330
The updated samples have been included (page 6C-29).

R645-301-731.311
The updated samples have been included (page 6C-29).

In combination with the seed, the following rates of tackifier will be utilized:

Table 3-8 Suggested Rations of Tack to Fiber

slope angle (deg)	slope ratio (rise:run)	percent lbs. slope	Tack per ton fiber	ratio tack to fiber
14	1 : 4	25	60(min)*	1 : 30
26	1 : 2	50	80	1 : 25
33	1 : 11/2	66	100	1 : 20
45	1 : 1	100	120	1 : 16
57	11/2 : 1	150	140	1 : 14
64	2 : 1	200	160(min)	1 : 12

* 60 pounds is suggested as a minimum to insure excellent stabilization; however, in many conditions 40 pounds of Tack per acre has given excellent results on a 1:4 or less slope. (Rates of Tack were developed with respect to velocity and erosive power of water which is proportional to the square root of the slope.) An empirical factor was determined from laboratory and field studies to arrive at the min Tack fiber ratio. Thus, 60 pounds of Tack per ton of fiber is about min for slopes up to 20 pct and the empirical factor is determined as 60 divided 20 pct = For a 100 pct slope (1:1 or 45 degrees) the ratio of Tack to fiber is calculated as: (100 pct) (12) = 120 pounds. Tackifier to be used for Hydroseeding and Hydromulching to Serve as Mulch or Soil Binder.

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CHAPTER 3 BIOLOGY

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CHAPTER 3 BIOLOGY

R645-301-322 Fish and Wildlife Information

The information in Appendices 3-I, 3-J, 3-K, and 3-L was developed to address Division of Oil, Gas and Mining requirements in conjunction with recommendations by the Division of Wildlife Resources.

FISH AND WILDLIFE RESOURCES

SCOPE

The purpose of this report is to inventory the wildlife resources in the Bear Canyon Mine permit Area and to evaluate the impact of the operation of the mine on those resources. The study includes birds, amphibians, reptiles, and mammals. Analysis entailed a review of the applicable literature, consultation with the relevant agencies, field analysis, and impact evaluation. Input and recommendations from the Utah Division of Wildlife Resources (UDWR) can be found in Appendixes 3-I and 3-J.

In sum, this study uncovers min impact on wildlife from continued operation of the mine. Since the Bear Canyon Mine has been worked intermittently since 1896, the ecosystem has already stabilized to some degree with mining.

Tree Density and Basal Area Estimation

A total count of all trees within the reference area was done.

Additional Reference Areas

Similar methodologies were used in measuring the Shower House Pad Reference Area, the Tank Seam Access Road Reference Area, and the Wild Horse Ridge Reference Area. The exact methodologies are described in Appendix 3-C (Shower House Pad), Appendix 3-A (Tank Seam Access Road) and Appendix 3-F (Wild Horse Ridge). All of these surveys were conducted by Patrick Collins.

EXISTING RESOURCE

SCS Productivity Estimates

Productivity estimates and range condition for the reference were obtained from the local SCS Range Conservationist. (See Appendix 3-B.)

Sampling Methodology

Plant Cover: 38-50 m transects; using a ten point frame at every 10 m interval.

Shrub Density: 24-1 x 50 meter transects, counting all shrubs rooted within the sampling area.

Formula for Sample Adequacy:

$$\frac{s\ t}{(0.1)\ (x)} = \frac{s2\ t2}{[(0.1)\ (x)]\ 2} = \text{Number of Samples needed (n)}$$

R645-301-340 Reclamation Plan

R645-301-341 Revegetation

The following procedures are designed to revegetate and control erosion. They should satisfy the commitments made by Co-Op towards post mining land use while also satisfying State and Federal regulations. A proposed revegetation schedule is given in Table 3-5.

The operator will submit a detailed revegetation plan in the last Five-Year Permit renewal prior to reclamation. The plan will include detailed map(s) of sufficient scale to show exact areas and methods of revegetation (i.e., drill seeding, terraces, netting, etc..) based on the best available technology and final mine site conditions. The operator will notify the division two weeks prior to all seeding work (interim or permanent), to allow the Division to be on site when the work is done.

The actual ground involved in reclamation procedures is identified in R645-301-240, and Table 1-4. The actual procedures involve a four phase program; (1) backfilling and grading, (2) prepare a site which will be stable enough for a period of time to allow vegetation to become established, (3) seed and mulch the entire area to supplement revegetation and control run-off until stabilization is complete, and (4) plant seedlings to further stabilize the soil and to provide necessary wildlife, hydrological and aesthetic commitments as detailed in mine reclamation permit.

R645-301-322 Fish and Wildlife Information

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R645-301-340 Reclamation Plan

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The CHIA will be added as soon as DOGM finishes it.

All Water Rights can be accessed from the Utah Water Rights web page at www.waterrights.Utah.gov. Included in this Appendix is pertinent information that cannot be accessed from the Water Rights web page.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-10D
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.033	
Slope	0.070 000	ft/ft
Left Side Slope	0.67	V : H
Right Side Slope	0.67	V : H
Bottom Width	1.00	ft
Discharge	1.03	cfs

Results		
Depth	0.22	ft
Flow Area	0.3	ft²
Wetted Perimeter	1.79	ft
Top Width	1.65	ft
Critical Depth	0.28	ft
Critical Slope	0.029819	ft/ft
Velocity	3.55	ft/s
Velocity Head	0.20	ft
Specific Energy	0.41	ft
Froude Number	1.49	
Flow Type	Supercritical	

Use Minimum Depth = 8 ft Velocity < 6 fps	Minimum Freeboard = 0.45 ft Use D_{50} = 4"

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-5U (Max Slope)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.130000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	0.00	ft
Discharge	0.13	cfs

Results		
Depth	0.20	ft
Flow Area	4.2e-2	ft²
Wetted Perimeter	0.58	ft
Top Width	0.41	ft
Critical Depth	0.25	ft
Critical Slope	0.041434	ft/ft
Velocity	3.10	ft/s
Velocity Head	0.15	ft
Specific Energy	0.35	ft
Froude Number	1.71	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-19U
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.060000	ft/ft
Left Side Slope	0.67	V : H
Right Side Slope	0.67	V : H
Bottom Width	0.00	ft
Discharge	0.50	cfs

Results		
Depth	0.32	ft
Flow Area	0.2	ft²
Wetted Perimeter	1.17	ft
Top Width	0.97	ft
Critical Depth	0.37	ft
Critical Slope	0.029420	ft/ft
Velocity	3.19	ft/s
Velocity Head	0.16	ft
Specific Energy	0.48	ft
Froude Number	1.40	
Flow Type	Supercritical	

Use Minimum Depth = 0.67 ft	Minimum Freeboard = 0.34 ft
Velocity < 5 fps	No riprap required

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	DITCH D-11D (Max Slope)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	9.999 000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	0.00	ft
Discharge	0.25	cfs

Results		
Depth	0.12	ft
Flow Area	1.5e-2	ft²
Wetted Perimeter	0.35	ft
Top Width	0.25	ft
Critical Depth	0.33	ft
Critical Slope	0.051688	ft/ft
Velocity	16.58	ft/s
Velocity Head	4.27	ft
Specific Energy	4.40	ft
Froude Number	11.80	
Flow Type	Supercritical	

Worksheet
Worksheet for Circular Channel

Culvert C-7D

Abandoned in Place

PEAK
HYDROGRAPH GENERATION PROGRAM

INPUT SUMMARY FOR W.S.: AD-20

STORM:	WATERSHED:
Distribution = SCS Type 'B'	Curve Number = 90
Precip. Depth = 1.50 in	Time of Conc. = 0.019 hr
Duration = 6.00 hr	Area = 0.47 ac

OUTPUT SUMMARY

Runoff depth = 0.6835 in
Initial Abstraction = 0.2222 in
Peak Flow = 0.32 cfs (0.6743 iph)
At T = 2.50 hrs

PEAK
HYDROGRAPH GENERATION PROGRAM

INPUT SUMMARY FOR WATERSHED: WS-26

STORM:	WATERSHED:
Distribution = SCS Type II	Curve Number = 76
Precip. Depth = 2.20 in	Time of Conc. = 0.283 hr
Duration = 6.00 hr	Area =197.50 acres

OUTPUT SUMMARY

Runoff depth = 0.5205 in
Initial Abstraction = 0.6316 in
Peak Flow = 153.36 cfs (0.7701 iph)
At T = 3.32 hrs

INPUT SUMMARY FOR WATERSHED: WS-27

STORM:	WATERSHED:
Distribution = SCS Type II	Curve Number = 76
Precip. Depth = 1.50 in	Time of Conc. = 0.119hr
Duration = 6.00 hr	Area = 13.9 acres

OUTPUT SUMMARY

Runoff depth =0.1873 in
Initial Abstraction = 0.6316 in
Peak Flow = 4.95 cfs (0.3534 iph)
At T =3.21 hrs

INPUT SUMMARY FOR WATERSHED: BEAR CANYON*

STORM:	WATERSHED:
Distribution = SCS Type II	Curve Number = 76
Precip. Depth = 2.20 in	Time of Conc. = 0.604 hr
Duration = 6.00 hr	Area =1,728.00 acres

OUTPUT SUMMARY

Runoff depth = 0.5205 in
Initial Abstraction = 0.6316 in
Peak Flow = 776.76 cfs (0.4458 iph)
At T = 3.62 hrs

*Watershed Characteristics for Bear Creek taken from Appendix 7-G.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	RC-RD21 (max)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.260000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	0.50	ft
Discharge	2.30	cfs

Results		
Depth	0.36	ft
Flow Area	0.3	ft²
Wetted Perimeter	1.51	ft
Top Width	1.22	ft
Critical Depth	0.60	ft
Critical Slope	0.034493	ft/ft
Velocity	7.48	ft/s
Velocity Head	0.87	ft
Specific Energy	1.23	ft
Froude Number	2.62	
Flow Type	Supercritical	

Project Description	
Worksheet	RC-RD21 (min)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Slope	0.070000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	0.00	ft
Discharge	2.30	cfs

Results		
Depth	0.68	ft
Flow Area	0.5	ft²
Wetted Perimeter	1.91	ft
Top Width	1.35	ft
Critical Depth	0.80	ft
Critical Slope	0.028248	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.40	ft
Specific Energy	1.07	ft
Froude Number	1.53	
Flow Type	Supercritical	

Use Minimum Depth = 1.0 ft	Minimum Freeboard = 0.40 ft
Velocity < 5 fps	Use D_{50} = 3"
At Steep Slope 26%	Use D_{50} = 5"

R645-301-120 Permit Application Format and Contents

R645-301-130 Reporting of Technical Data

All technical data submitted is accompanied by the names of persons or organizations that collected and analyzed the data along with the dates it was collected and analyzed and the methods used.

131.000 No Response Necessary

132.000 No Response Necessary

R645-301-140 Maps and Plans

All maps of the permit area are at a scale of 1:6,000 or larger. All maps of adjacent area are at a scale of 1:24,000 or larger and clearly show the lands and waters. All maps include the types of information set forth U.S.G.S. 1:24,000 scale series. All maps distinguish which phase of operation it is showing, and which areas mining and reclamation has occurred.

R645-301-150 Completeness

All information required under R645-301 will be included.

References

AeroVironment, Inc., 1977, Assemblage of data on air quality in central and southern Utah and assessing the impact of coal development in this region on the air quality: Pasadena, CA., Final Report.

Barfield, B.J., R.C. Warner, and C.T. Haan. 1981. Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press. Stillwater, Oklahoma.

Chow, V.T. 1959. Open Channel Hydraulics. McGraw-Hill Book Company. New York City, New York.

Environmental Protection Agency 1976, Erosion and Sediment Control, EPA 625/3-76-007, p. 44

Hawkins, R.H. and K.A. Marshall. 1979. Storm Hydrograph Program. Final Report to the Utah Division of Oil, Gas and Mining. Utah State University. Logan, Utah.

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Jeppson, R.W., Ashcroft, G.L., Huber, A.L., Skogerboe, G.V., and Bagley, J.M., 1968 Hydrologi Atlas of Utah, Utah Water Research Laboratory and State of Utah Department of Natural Resources, PRWG35-1 Utah State University, Logan, Utah

Israelsen, C.E., J.E. Fletcher, F.W. Haws, and E.K. Israelson. 1984. Erosion and Sedimentation in Utah: A Guide for Control. Utah Water Research Laboratory. Logan, Utah.

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-Frequency Atlas of the Western United States. Volume VI-Utah. National Oceanic and Atmospheric Administration. National Weather Service. Silver Spring, Maryland.

U.S. Department of Transportation. 1977. Hydraulic Charts for the Selection of Highway Culverts. Hydraulic Engineering Circular No. 5. Federal Highway Administration. Washington, D.C.

U.S. Department of Transportation. 1978. Use of Riprap for Bank Protection. Hydraulic Engineering Circular No. 11. Federal Highway Administration. Washington, D.C.

U.S. Soil Conservation Service. 1968. Hydraulics of Broad-Crested Spillways. Technical Release No. 39. U.S. Government Printing Office. Washington, D.C.

U.S. Soil Conservation Service. 1972. National Engineering Handbook, Section 4: Hydrology. U.S. Government Printing Office. Washington, D.C.

b. Solid waste generated in the facilities removal will be collected and disposed of as identified in R645-301-541.300. See Appendix 5-D for toxic materials and handling.

In disturbed areas which contain coal fines from current operations and are not proposed to be regraded, and it is determined the coal fines are detrimental to the growth of vegetation, the coal fines will be removed to pre-mining levels. Methods of removal will consist of either vacuuming (if justified by large quantities), or by washing down the area by high-pressure water hoses. The wash down procedure is particularly effective on rock and rocky slopes. All other extraneous debris from the operations will also be removed from the areas. Disposal of all materials will be as described in R645-301-529.

It should be noted that the existence of small to moderate amounts of coal fines has not been established as detrimental to either soils or vegetation; therefore, amounts less than the 50 pct figure cited above will not be removed.

c. A backhoe and dozer will work in conjunction to remove the outer edge of the recontoured operational benches and compact it against the cut slopes. This will be accomplished by the backhoe reaching over the edge of the bank approx 20 ft. and pulling the material back. The dozer will then push and compact this material from the cut slope outward to reach a bench slope of approx 1v:3h for drainage purposes and a maximum of 1v:2h on slopes outside of drainage areas. Culverts will be removed by excavating the material over the culvert, extracting the pipe, and backfilling the area.

Client Project ID: Bear Canyon Mine

Date Received: 09/30/02

Set #0103S00365

		Very Fine Sand	Sand	Silt	Clay	Texture	CO3	Matter	PE
		%	%	%	%		%	%	meq/L
0103S00365	RFM-1 Floor	18.9	74.0	18.0	8.0	SANDY LOAM			
0103S00366	RFM-1 Coal								
0103S00367	RFM-1 Roof					SANDY LOAM	66.9	0.2	1.40
				14.0	10.0	SANDY LOAM	12.8	1.1	0.80

Abbreviations used in acid base accounting: T.S = Total Sulfur, AB= Acid Base, ANP= Acid Neutralization Potential

Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Client Project ID: [illegible]

Date Received: 03/30/02

Set #0103S00365

Sample ID		TOC	Total Sulfur	Neutral Pot.	Boron PE	Nitrate	Phosphorus	Selenium
					ppm	meq/L	mg/kg	ppm
0103S00365	RFM-1 Floor	0.1	<0.01	470	[illegible]	[illegible]		
0103S00366	RFM-1 Coal	[illegible]	[illegible]			[illegible]	[illegible]	<0.02
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	0.92	1.70	<0.02
		[illegible]	0.29	127	0.86	0.69	3.60	<0.02

[illegible] water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, [illegible] Neutralization Potential

[illegible] Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

[illegible] by: ______________________