APPENDIX 7-G

DIVERSION ADEQUACY CALCULATIONS

LICENSED PROFESSIONAL ENGINEER
CHARLES REYNOLDS
No. 179670
10/7/04
STATE OF UTAH

RECEIVED
NOV 0 8 2004
DIV. OF OIL, GAS & MINING

9/20/02

Table 7.2-9 Summary of Storm Runoff Calculations for 10 Year 6 Hour Storm (cont)

WATERSHED	CURVE NUMBER CN	TIME OF CONCENTRATION (Hr)	DRAINAGE AREA (Acres)	PEAK DISCHARGE (CFS)
AU-20	76	0.131	20.55	2.37
AU-21	76	0.110	9.45	1.15
AU-22	76	0.086	12.12	1.59
AU-23	76	0.093	5.25	0.64
AU-23A	76	0.033	0.28	0.04
AU-24	76	0.119	13.89	1.66
AU-25	76	0.087	2.27	0.30
AU-26	76	~~0.033~~ 0.020	~~0.63~~ 0.80	~~0.10~~0.05
AU-27	76	0.027	0.2	0.03
AU-28	76	0.039	0.59	0.09
AU-28A	76	0.071	0.99	0.14
AU-29	76	0.025	1.29	0.29
AU-29A	76	0.023	0.55	0.67
AU-30	76	0.029	0.49	0.08
AU-31	76	0.048	2.21	0.32
AU-32	76	0.036	1.84	0.28
AU-33	76	0.040	0.71	0.11
AU-34	76	0.045	1.84	0.27
AU-35	76	0.032	0.2	0.13
AU-36	76	0.031	0.75	0.12
AU-37	76	0.198	139.82	13.64
AU-38	76	0.094	8.97	1.15
AU-39	76	0.048	1.26	0.18
AU-40	76	0.283	197.5	15.96
AU-41	76	0.100	11.59	1.46
AU-42	76	0.002	4.24	0.67

Table 7.2-10 Summary of Diversion Ditch Calculations (cont)

DITCH	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	DEPTH (FT)	TYP SIDE SLOPE H:V	AV. MEASURED SLOPE %	CONTRIBUTING WATERSHED	REQ'D AV. RIP-RAP SIZE (IN.)
D-17U	0	2	0.67	1.5:1	13 Av	AU-1A	Bedrock
D-18U	0	2	0.67	1.5:1	5 Min	AU-1	Soil
D-19U	0	2	0.67	1.5:1	6 Av	AU-2B	Soil
D-20U	0	1.33	0.67	1:1	16 Av	AU-42	Soil
D-21U	0	2	1.0	1:1	13 Av	AU-43	D_{50}=3"
D-22U	0	3	1.0	1.5:1	11 Av	AU-19, AU-25	D_{50}=6"
D-23U	0	1.16	0.58	1:1	19 Av	AU-36	Soil
D-24U	0	1.16	0.58	1:1	14 Av	AU-35	Soil
D-25U	0	1	0.5	1:1	16 Av	AD-17	Soil
D-26U	0	1	0.5	1:1	24 Av	AU-32	Soil
D-27U	0.50	2	0.5	1.5:1	13 Min, 30 Max	AU-31	Soil
D-28U	0	1	0.5	1:1	14 Av	AU-33	Soil
D-29U	0	1.33	0.67	1:1	8 Av	AU-34	Soil
D-30U	0	1.16	0.58	1:1	13 Av	AU-25	Soil
D-31U	0	3	1.0	1.5:1	12 Av	AU-20, AU-26	Bedrock
D-32U	0	1	0.5	1:1	17 Av	AU-30	Soil
D-33U	0	1.16	0.58	1:1	18 Av	AU-29	Soil
D-34U	1	2.74	.58	1.5:1	11 AV	AU-24	Soil
D-35U	0	2.0	1.0	1:1	10 Av	AU-29	Soil
D-36U	0	1.0	0.5	1:1	8 Av	AU-27	Soil
D-37U	0	~~1.0~~ 0.31	~~.5~~ .70.16	1:1	8 Av	AU-26, AU-21	Soil
D-38U	0	1.33	.67	1:1	12 Min, 20 Max	AU-21	D_{50}=3
D-39U	0	1.0	.5	1:1	10 Av	AU-28	Soil

WATERSHED CHARACTERISTICS (Con't)

Undisturbed Areas
and ASCA Areas Not Reporting To Sediment Pond

P = 1.5"

Watershed	CN	Area (Ac.)	Slope y (%)	Hyd. length l (ft.)	$S=\frac{1000}{CN}-10$	$L=\frac{l^{.8}(s+1)^{.7}}{1900Y^{.5}}$	T=1.67L Time of Conc (hr)
AU-23	76	4.97	52.2	1,122	3.16	0.054	0.091
AU-23A	76	0.28	46.9	307	3.16	0.020	0.033
AU-24	76	13.89	59.5	1,708	3.16	0.072	0.119
AU-25	76	2.27	46.1	980	3.16	0.052	0.087
AU-26	76	~~0.63~~	~~50.6~~	~~310~~	3.16	~~0.020~~	~~0.033~~
		0.80	37.0	18,631		0.611	0.020
AU-27	76	0.2	33.6	190	3.16	0.016	0.027
AU-28	76	0.59	43.6	344	3.16	0.023	0.039
AU-28A	76	0.99	31.4	598	3.16	0.042	0.071
AU-29	76	1.29	40.1	190	3.16	0.015	0.025
AU-29A	76	0.55	53.4	200	3.16	0.014	0.023
AU-30	76	0.49	49.5	265	3.16	0.018	0.029
AU-31	76	2.21	63.6	570	3.16	0.029	0.048
AU-32	76	1.84	81.2	460	3.16	0.021	0.036
AU-33	76	0.71	64.3	460	3.16	0.024	0.040
AU-34	76	1.84	71.0	560	3.16	0.027	0.045
AU-35	76	0.2	56.6	320	3.16	0.019	0.032
AU-36	76	0.75	56.3	310	3.16	0.019	0.031
AU-37	76	139.82	60.3	3,250	3.16	0.119	0.198
AU-38	76	8.97	75.3	1,480	3.16	0.057	0.094
AU-39	76	1.26	75.1	630	3.16	0.029	0.048
AU-40	76	197.5	62.8	5,210	3.16	0.169	0.283
AU-41	76	11.59	62.3	1,420	3.16	0.060	0.100
AU-42	76	4.24	46.1	10	3.16	0.001	0.002
AU-43	76	13.7	71.2	1,440	3.16	0.057	0.095
Bear Creek	76	1,728	58.1	12,800	3.16	0.362	0.604

PEAK

HYDROGRAPH GENERATION PROGRAM

INPUT SUMMARY FOR W.S.: AU-26

STORM:	WATERSHED:
Distribution = SCS Type 'B'	Curve Number = 76
Precip. Depth = 1.50 in	Time of Conc. = ~~0.033~~ hr 0.020
Duration = 6.00 hr	Area = ~~0.63~~ ac 0.80

OUTPUT SUMMARY

Runoff depth = 0.1873 in

Initial Abstraction = 0.6316 in

Peak Flow = ~~0.10~~ cfs 0.05 (~~0.1516~~ iph)0.0660

At T = ~~2.50~~ hrs 2.88

INPUT SUMMARY FOR W.S.: AU-27

STORM:	WATERSHED:
Distribution = SCS Type 'B'	Curve Number = 76
Precip. Depth = 1.50 in	Time of Conc. = 0.027 hr
Duration = 6.00 hr	Area = 0.20 ac

OUTPUT SUMMARY

Runoff depth = 0.1873 in

Initial Abstraction = 0.6316 in

Peak Flow = 0.03 cfs (0.1541 iph)

At T = 2.51 hrs

DITCH	CHANNEL SLOPE %	CONTRIBUTING WATERSHED	PEAK Q (cfs)	BANK AND BOTTOM DESC.	MANNING'S $\eta^{(a)}$
D-23U	19 Av	AU-36	.12	soil	0.03
D-24U	14 Av	AU-35	.13	soil	0.03
D-25U	16 Av	AD-17	.16	soil	0.03
D-26U	24 Av	AU-32	.28	soil	0.03
D-27U	13 Min, 30 Max	AU-31	.32	soil	0.03
D-28U	14 Av	AU-33	.11	soil	0.03
D-29U	8 Av	AU-34	.27	soil	0.03
D-30U	13 Av	AU-25	.30	soil	0.03
D-31U	12 Av	AU-20, AU-26	2.47	bedrock	0.03
D-32U	17 Av	AU-30	.08	soil	0.03
D-33U	18 Av	AU-29	.20	soil	0.03
D-34U	11 Av	AU-24	1.66	soil	0.03
D-35U	10 Av	AU-29	0.29	soil	0.03
D-36U	8 Av	AU-27	0.03	soil	0.03
D-37U	8 Av	AU-26	~~0.10~~ 0.05	soil	0.03
D-38U	12 Min, 20 Max	AU-21	1.15	D_{50}=3"	0.03
D-39U	10 Av	AU-28	0.09	soil	0.03
D-40U	9 Av	AU-28A, C-39U	2.41	D_{50}=3"	0.03
D-41U	15 Av	AU-22, AU-23A, C-40U	2.27	D_{50}=4"	0.03
D-42U	36 Av, 63 Max	AU-23A	0.04	soil	0.03
D-43U	20 Min, 45 Max	AU-23	0.64	D_{50}=5"	0.03

(a) Based on tables from Barfield et al (1981) and the equation $\eta = .0395(D_{50})^{1/6}$;(D in ft)
(b) Peak Q for misc. road drainage assumed to be 1.0 cfs based on similar disturbed areas.
(c) See table 7.2-10 for summary of diversion ditch calculations.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-37U
Flow Element	Triangular Char
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Slope	080000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Discharge	0.05	cfs

Results		
Depth	0.16	ft
Flow Area	2.5e-2	ft²
Wetted Perim	0.44	ft
Top Width	0.31	ft
Critical Depth	0.17	ft
Critical Slope	0.047065	ft/ft
Velocity	2.04	ft/s
Velocity Head	0.06	ft
Specific Energ	0.22	ft
Froude Numb	1.28	
Flow Type	Supercritical	

Use Minimum Depth = ~~0.5~~ ft 0.25 ⇒ Minimum Freeboard = ~~0.30~~ ft 0.14
Velocity < 5 fps ⇒ No rip-rap required

Cross Section	Cut Vol. (Cu Yds)	Topsoil. (Cu Yds)	Fill Vol. (Cu Yds)	Excess (Cu Yds)	Amount Hauled	Avg Haul Dist.(Ft.)	Cum. Vol. (Cu Yds)
1	~~830~~ 840	~36	~~139~~ 149	655 cut	161	450	-655
2	431	~28	550	147 fill	-0-	-0-	-508
3	52	~30	319	297 fill	-0-	-0-	-211
4	35	~30	161	156 fill	-0-	-0-	-55
Totals	1,348	~124	1,169		161	450	

TS-17 Constructions Description

Construction will begin at the hunting cabin turnoff, 300 ft from the pad site. Topsoil will be removed from the projected cut areas (Table 3P-2) and placed in the WHR Tank Seam Topsoil Stockpile located inside the bend of the corner. Material will then be removed from the road cuts and compacted around the outside of the two switchbacks located inside the area in order to allow them to be widened. As the cut progresses up the road, topsoil will be removed prior to the road cut being made and placed in the storage pile. Cuts will be made starting at the lower end of the access road and proceed up to and through the Tank Seam Portal Pad. Most of the material will be hauled approximately 300 ft. and placed at the turn intersected by the hunting cabin road. The rest of the material will be hauled no more than 700 ft. to the turn above the Blind Canyon Seam Pad. A retaining wall (shown on Plate 2-4G) will be built below the turn intersected by the hunting cabin road in order to maintain the maximum allowed slope on the soil below the turn. Cross-sections are shown in attachment A.

Table 8.9-1 Reclamation Area Summary					
MARK[1]	DESCRIPTION	Total ac.[1,2,3]	Re-contour acres[1&3]	Pre-1977 acres[2]	New acres
TS-1	Ball Park Topsoil Pile	1.27	0.0	-0-	1.27
TS-2	Lower Haul Road	1.6	0.0	1.6	-0-
TS-3	Sed Pond B & Scale Office Pad	2.60	1.41	1.23	1.37
TS-4	Sed Pond A	0.75	0.75	-0-	0.75
TS-5	Main Pad Area	12.32	9.41	8.89	3.43
TS-6	Portal Access Road	3.25	3.25	0.02	3.23
TS-7	Blind Canyon Seam Portal Area	1.81	1.81	0.51	1.30
TS-8	Upper Storage Pad	0.87	0.83	-0-	0.87
TS-9	Shower House Pad	1.83	1.83	-0-	1.83
TS-10	Tank Seam Access Road	2.91	2.91	-0-	2.91
TS-11	Tank Seam Portal Pad	0.66	0.59	-0-	0.66
TS-12	Wild Horse Ridge Access Road	3.26	0.22	-0-	3.26
TS-13	Conveyor belt Access/Topsoil Stockpile	1.50	1.14	-0-	1.50
TS-14	Upper Conveyor belt Access Road	.96	0.66	-0-	0.96
TS-15	WHR Blind Canyon Seam Portal Area	1.58	1.58	-0-	1.58
TS-16	WHR T. S. Lower Portal Access Road	0.90~~0.89~~	0.0	-0-	0.90~~0.76~~
TS-17	WHR T.S. Upper Access Road and Pad	2.22	1.74	-0-	2.22
TOTAL		40.28	28.13	12.25	27.90

Notes:

1. See Plates 8-5.
2. See Plates 2-4.
3. The total acres represent acreage which will be reclaimed. Some of the acres will not require re-contouring or regrading during reclamation. The "Re-contour acres" represent the total acres which will require regrading. The "Total acres" shown will be reclaimed in accordance with the reclamation plan.