ADDENDUM 6 TO APPENDIX VI-3

DESIGN AND CALCULATION DATA FOR DITCH 31

August 2, 2006

The following addendum contains the modifications to the drainage strategy for the Mining and Reclamation Plan. This addendum includes the calculation sheets associated with the design of Ditch 31. Ditch 31 will collect drainage from portions of Watersheds 30 and 31 as part of the reclamation plan for a portion of the refuse pile area. Ditch 31 will be remain following final reclamation activities for the site.

FILE IN: Expandable 08212006
Refer to Record No. 0162
in C0070013, 2006, Incoming
for additional information

AUG 2 1 2006

Historically, Bermed Channel 31 has been designed for the 10 year-6 hour event and only for the flow from Watershed 30. However, both Watersheds 30 and 31 provide flow to this structure. Additionally, as this structure is to remain as a permanent diversion, the channel should be designed for the 100 year- 6 hour event. Therefore, the attached calculations provide the peak flows for Watersheds 30 and 31 for the 100 year-6 hour event. Also, the design calculations for channel sizing are based on the total flow from both watersheds. Riprap has been sized to this increased flow velocity.

Based on these calculations, the proposed channel modifications, should be able to convey the flow events that are occurring within the channel.

Hydrologic Design
Triangular Hydrograph Calculations using

SCSHYDRO Program

Watershed I.D.:
Watershed 31 - Horse Canyon Permit Area

INPUT SUMMARY

STORM :	WATERSHED :
Dist.= SCS Type II	Area = 9.30 acres
Depth = 1.90 inches	CN = 75.00
Duration = 6.0 hrs	Time conc.= 0.11 hrs

OUTPUT SUMMARY

Runoff depth:	0.333 inches
Initial abstr:	0.667 inches
Peak flow:	7.49 cfs (0.799 iph)
at time:	3.065 hrs

Hydrologic Design
Triangular Hydrograph Calculations using

SCSHYDRO Program

Watershed I.D.:
Watershed 30 - Horse Canyon Permit Area

INPUT SUMMARY

STORM :	WATERSHED :
Dist.= SCS Type II	Area = 13.00 acres
Depth = 1.90 inches	CN = 82.00
Duration = 6.0 hrs	Time conc.= 0.30 hrs

OUTPUT SUMMARY

Runoff depth:	0.584 inches
Initial abstr:	0.439 inches
Peak flow:	11.82 cfs (0.902 iph)
at time:	3.200 hrs

FLOW DEPTH DETERMINATION

Worksheet for Trapezoidal Channel

Project Description

Worksheet	Bermed Channel # 31 - Min Slope
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve for	Channel Depth

Input Data

Manning's Coefficient	0.025	
Slope	0.045	ft/ft
Left Side Slope	2.00	H:V
Right Side Slope	2.00	H:V
Bottom Width	5	ft
Discharge	19.3	cfs

Results

Depth	0.5	ft	Freeboard=0.5 ft
Channel Depth	1.0	ft	
Flow Area	2.83	ft^2	
Wetted Perimeter	7.13	ft	
Top Width	6.90	ft	
Critical Depth	0.45	ft	
Velocity	6.81	ft/sec	D_{50}=0.75 ft
Velocity Head	0.72	ft	
Specific Energy	1.20	ft	
Froude Number	1.88		
Flow Type	Super-critical		

FLOW DEPTH DETERMINATION

Worksheet for Trapezoidal Channel

Project Description

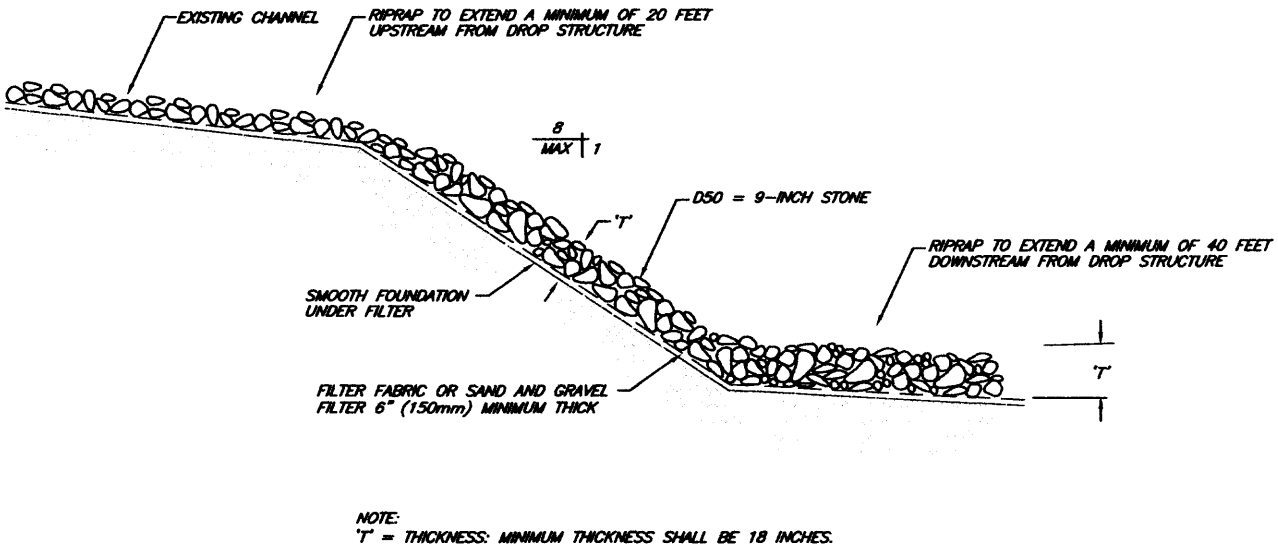
Worksheet	Bermed Channel # 31 - Max. Slope
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve for	Channel Depth

Input Data

Manning's Coefficient	0.037	
Slope	0.125	ft/ft
Left Side Slope	2.00	H:V
Right Side Slope	2.00	H:V
Bottom Width	5	ft
Discharge	19.3	cfs

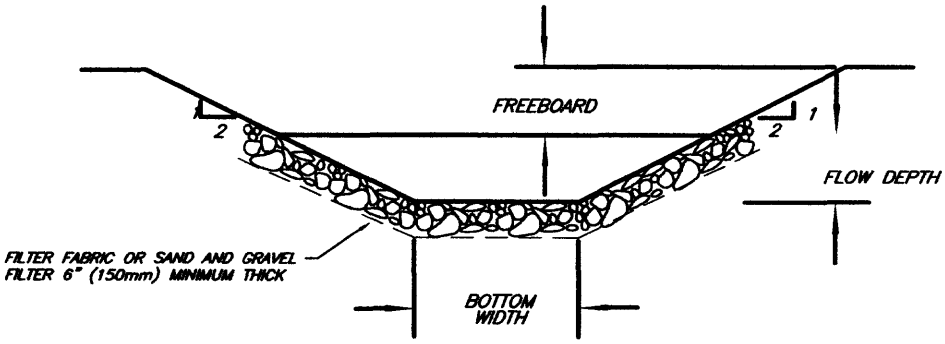
Results

Depth	0.44	ft	Freeboard=0.56 ft
Channel Depth	1.0	ft	
Flow Area	2.62	ft^2	
Wetted Perimeter	6.99	ft	
Top Width	6.78	ft	
Critical Depth	0.45	ft	
Velocity	7.31	ft/sec	D_{50}=0.75 ft
Velocity Head	0.85	ft	
Specific Energy	1.29	ft	
Froude Number	2.09		
Flow Type	Super-critical		



NOTE:
'T' = THICKNESS: MINIMUM THICKNESS SHALL BE 18 INCHES.

TYPICAL SECTION



TYPICAL TRAPEZOIDAL CHANNEL SECTION

NOT TO SCALE

0' NTS

FIGURE 1. TYPICAL DROP STRUCTURE DETAIL

Table 6.5.1-2
Mining and Reclamation Plan Diversions and Channel Configurations

Ditch side slope (hor:ver) = 2:1 Berm Side Slope (hor:ver) = 1.5:1 Mannings n = 0.025

ITEM	FLOW RATE (CFS)	SLOPE (FT/FT)	FLOW DEPTH (FT)	CRIT. DEPTH (FT)	FLOW VEL. (FPS)	RIP-RAP D50 (FT)	RIP-RAP THICK. (FT)	RIP-RAP DIST. (FT)	DESIGN HEIGHT (FT)	BOTTOM WIDTH (FT)	FREE BOARD (FT)
Ditch #9	1.2	0.017	0.3	0.3	2.6	NA	NA	NA	1	1	0.7
Ditch #8	13.5	0.001 to 0.05	1.4	1.0	17.5	1.0	1.5	75	2.5	1	1.1
Ditch #7	5.0	0.001 to 0.03	0.9	0.6	4.8	NA	NA	NA	2	1	1.1
Ditch #7a	101.9	0.15	1.2	2.3	18.7	1	1.5	101	2.5	2	1.3
Ditch #5	0.8	0.001 to 0.013	0.4	0.2	2.1	NA	NA	NA	1	1	0.6
Ditch #37	32.5	0.38 to 0.62	0.7	1.5	24	1	1.5	53	2	1	1.3
Ditch #36	1.7	0.125 to 0.3	0.2	0.4	8.1	NA	NA	NA	1	1	0.8
Ditch #35	10.9	0.001	1.3	0.9	2.5	NA	NA	NA	2.5	1	1.3
Ditch #33	6.9	0.067 to 0.333	0.5	0.7	12.6	1	1.5	14	1	1	0.5
Ditch #3	2.3	0.003	0.6	0.4	1.7	NA	NA	NA	1.5	1	0.9
Ditch #3a	1.2	0.04	0.2	0.3	3.5	NA	NA	NA	1	1	0.8
Ditch #27	340.0	0.10 to 0.15	3.5	4.5	16.6	2.0	4	200	4.45	0	1.0
Ditch #25*	5.2	0.11	1.2	0.6	7.8	NA	NA	NA	1.5	1	0.4
Ditch #25a	2.3	0.02 to 0.8	0.6	0.6	5.0	NA	NA	NA	1.0	0	0.03
Ditch #23	6.4	0.001 to 0.2	1.0	0.7	10.2	NA	NA	NA	2	1	1.0
Ditch #21	30.9	0.016 to 0.04	1.4	1.6	8.5	0.5	1	100	2	1	0.6
Ditch #20	72.7	0.027 to 0.2	1.6	2.0	19.0	1.0	1.5	125	2.5	2	0.9
Ditch #19*	42.8	0.004 to 0.4	1.9	1.5	21.2	1.0	1.5	110	2.5	2	0.6
Ditch #19a	2.5	0.01 to 0.5	0.7	0.6	8.2	1.0	2.0	25	1.0	0	0.3
Ditch #19b	2.5	0.025 to 0.05	0.6	0.6	4.3	NA	NA	NA	1	0	0.4
Ditch #18	72.7	0.4 to 0.7	0.8	2.0	29.9	1.0	1.5	320	1.5	2	0.7
Ditch #16	72.7	0.006 to 0.042	2.4	2.2	10.7	1.0	1.5	350	3	1	0.6
Ditch #14	28.5	0.09 to 0.14	0.9	1.4	13.3	1	1.5	394	2	1	1.1
Ditch #13	28.5	0.001 to 0.13	1.9	1.4	12.9	1.0	1.5	40	2.5	1	0.6
Ditch #11	20.4	0.04	0.9	1.2	8.0	0.5	1	105	1.5	1	0.6
Ditch #1	1.8	0.01	0.4	0.4	2.4	NA	NA	NA	1	1	0.6
Ditch #31	19.3	0.04 to 0.125	0.5	0.4	7.1	0.75	1.5	200	1	5	0.5
Berm #6	1.2	0.04 to 0.4	0.3	0.4	7.9	NA	NA	NA	2	NA	1.7
Berm #4	13.6	0.014 to 0.05	0.5	0.3	4.3	NA	NA	NA	2	NA	1.5
Berm #34	1.0	0.03 to 0.16	0.4	0.4	5.8	NA	NA	NA	2	NA	1.7
Berm #30	5.1	0.009 to 0.062	0.6	0.5	4.9	NA	NA	NA	2	NA	1.4
Berm #29	1.6	0.051 to 0.16	0.1	0.1	3.3	NA	NA	NA	2	NA	1.9
Berm #28	0.7	0.03 to 0.1	0.04	0.04	1.7	NA	NA	NA	2	NA	1.96
Berm #26	2.0	0.017 to 0.13	0.1	0.2	3.3	NA	NA	NA	2	NA	1.9
Berm #24	10.9	0.031 to 0.05	0.4	0.5	5.9	NA	NA	NA	2	NA	1.6
Berm #22	1.5	0.012 to 0.02	0.4	0.4	2.7	NA	NA	NA	2	NA	1.6
Berm #2	4.3	0.0016 to 0.3	0.9	0.7	10.4	NA	NA	NA	2	NA	1.1
Berm #14	28.5	0.09	0.4	0.7	9.0	NA	NA	NA	2	NA	1.6
Berm #12	0.3	0.001	0.3	0.2	0.9	NA	NA	NA	2	NA	1.7
Berm W34	0.3	0.02 to 0.08	0.2	0.2	3.2	NA	NA	NA	2	NA	1.8
Berm W33	0.4	0.026	0.2	0.2	1.9	NA	NA	NA	2	NA	1.8

* Ditches 19 and 25 will be relocated to 19a and 25a during final reclamation. Ditch 19b will be removed during final reclamation.