TRACKING FORM

I. KEY FEATURES OF PERMITTEE'S AMENDMENT APPLICATION

Permittee	Mine Name	Amendment #	Date Received / Rec'd via
PacifiCorp	Willow Creek	ACT/007/038-97C	2-11-97 USMail

Proposal: Refuse Pile Ditches Design
Description: Revise designs to a triangular shape that will make maintenance simpler as the refuse pile grows upwards

II. AMENDMENT CLASSIFICATION

☐ Major Amendment	Public Notice Required	☐ Yes	☒ No
☒ Minor Amendment	Outside of Permit Area	☐ Yes	☐ No
	Outside of Disturbed Area	☐ Yes	☐ No

III. SUMMARY OF DOGM PROCESSING DATES

		FOLLOWUP REQUIREMENTS		
Reviews Completed	2/13/97 Deficient			
Approved Effective		MRP "After Const" Documents	☐ Yes	☐ No
Disapproved	2/13/97	TA	☐ Yes	☐ No
Mailed		CHIA	☐ Yes	☐ No
Filed MRP - SLO		Responds Within 15 days of Receipt? ☐ Yes ☐ No If no, explain below.		

IV. COORDINATED REVIEWS

EXTERNAL AGENCIES (Mine Specific) (Adverse Comments, If Any, Include in Item V)	COPY SENT	CONTACTED	DOGM REVIEWS/DISCIPLINES		
OSM	☐ Y ☐ N	☐ C ☐ N/A	Generalists ____	☐ Yes	☐ N/A
BLM	☐ Y ☐ N	☐ C ☐ N/A	____ INTERDISCIPLINARY APPROACH		
US Forest Service	☐ Y ☐ N	☐ C ☐ N/A	- Administrative ____	☐ Yes	☐ N/A
US Fish & Wildlife	☐ Y ☐ N	☐ C ☐ N/A	- Biology ____	☐ Yes	☐ N/A
US National Parks	☐ Y ☐ N	☐ C ☐ N/A	- Engineering ____	☐ Yes	☐ N/A
UT Environmental Quality	☐ Y ☐ N	☐ C ☐ N/A	- Geology ____	☐ Yes	☐ N/A
UT Wildlife Resources	☐ Y ☐ N	☐ C ☐ N/A	- Hydrology ____	☐ Yes	☐ N/A
UT State History	☐ Y ☐ N	☐ C ☐ N/A	- Soils ____	☐ Yes	☐ N/A
UT Water Rights	☐ Y ☐ N	☐ C ☐ N/A	- Permitting ____	☐ Yes	☐ N/A
UT SITLA	☐ Y ☐ N	☐ C ☐ N/A	- Other____	☐ Yes	☐ N/A
Other____	☐ Y ☐ N	☐ C ☐ N/A			

V. FOOTNOTES/ADDITIONAL EXPLANATION AS NECESSARY

Reviewed 2/12-13/97 - Deficiency letter of 2/13
Resubmitted 2-26-97
Discussed ~~comparison~~ my plan for comparison of cross-sectional flow areas for CGD-6 + CGD-7 with Sharon Falvey + Steven Johnson, SLC hydros of 2-20-97. They agreed this would be OK with them.
Reviewed new submittal 2-27-97. Compared x-sections
New designs have larger x-sectional areas. Relayed to Steve Johnson on 2/27/97.
Amendment approved 2-27-97. PHH

APPLICATION FOR PERMIT CHANGE

Title of Change: REVISE REFUSE PILE DITCHES CGD6 AND CGD7

Permit Number: ACT/007/038

Mine: WILLOW CREEK MINE

Permittee: CYPRUS PLATEAU MINING

Description, include reason for change and timing required to implement:
REFUSE PILE DITCHES CGD-6 AND CGD-7 ARE CURRENTLY DESIGNED AS TRAPEZOIDAL DITCHES AND ARE IMPRACTICAL TO MAINTAIN. THIS CHANGE IS TO REVISE THE DITCHES TO A TRIANGULAR SHAPE TO ALLOW A MORE WORKABLE CONFIGURATION DURING REFUSE PILE CONSTRUCTION.

☐ Yes	☒ No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease
☐ Yes	☒ No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	☒ No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	☒ No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☒ No	6. Does the permit change require or include public notice publication?
☐ Yes	☒ No	7. Does the permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☒ No	8. Permit change as a result of a Violation? Violation #
☐ Yes	☒ No	9. Permit change as a result of Division Order? D.O. #
☐ Yes	☒ No	10. Permit change as a result of other laws or regulations or policies? Explain:
☐ Yes	☒ No	11. Does the permit change affect the surface landowner or change the post mining land use?
☐ Yes	☒ No	12. Does permit change require or include underground design or mine sequence and timing? (Modification of R2P2?)
☐ Yes	☒ No	13. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	☒ No	14. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☒ No	15. Does permit change require or include soil removal, storage or placement?
☐ Yes	☒ No	16. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☒ No	17. Does permit change require or include construction, modification, or removal of surface facilities?
☒ Yes	☐ No	18. Does permit change require or include water monitoring, sediment or drainage control measures?
☒ Yes	☐ No	19. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	☒ No	20. Does permit change require or include subsidence control or monitoring?
☐ Yes	☒ No	21. Have reclamation costs for bonding been provided for any change in the reclamation plan?
☐ Yes	☒ No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	☒ No	23. Is this coal exploration activity?

☒ Attach 5 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Signed - Name - Position - Date: [signature] SR STAFF Project Engineer 2/8/97

Subscribed and sworn to before me this 8 day of FEB, 1997.

Notary Public [signature]

My Commission Expires: 3-7, 1998

Attest: STATE OF UTAH
COUNTY OF CARBON

JOHN C. PAPPAS
NOTARY PUBLIC • STATE of UTAH
1648 EAST CASTLE CIRCLE
PRICE, UTAH 84501
COMM. EXP. 3-7-98

RECEIVED
Received by Oil, Gas & Mining
FEB 11 1997
DIVISION OF OIL
GAS & MINING PRICE UTAH

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change:

REVISE REFUSE PILE DITCHES CGD-6 AND CGD-7

Permit Number: **ACT/007/038**

Mine: WILLOW CREEK MINE

Permittee: CYPRUS PLATEAU MINING

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	REPLACE PAGES 3.4-7 AND 3.4-8 WITH REVISED PAGES 3.4-7, 3.4-8 & 3.4-8a
☐ ADD	☒ REPLACE	☐ REMOVE	REPLACE FIRST PAGE OF APPENDIX 3.4J.
☐ ADD	☒ REPLACE	☐ REMOVE	REPLACE PAGE 49 OF APPENDIX 3.4J.
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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☐ ADD	☐ REPLACE	☐ REMOVE	

RECEIVED
FEB 26 1997
DIVISION OF OIL GAS & MINING PRICE UTAH

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340
(801) 359-3940 (Fax)

February 27, 1997

Ben Grimes, Senior Staff Project Engineer
Cyprus Plateau Mining Corporation
P.O. Drawer PMC
Price, Utah 84501

RE: School House Canyon Refuse Pile Drainage Ditches CGD-6 and CGD-7, Cyprus Plateau Mining Company, Willow Creek Preparation Plant, ACT/007/038-97C, Folder #3, Carbon County, Utah

Dear Mr. Grimes:

The additional information which pertains to the aforementioned amendment as received in this office on February 26, 1997 has been reviewed.

I have compared the cross sectional flow areas for both of the new designs versus the current designs. The triangular shaped ditches both have larger cross sectional flow areas as compared to the current trapezoidal designs, by approximately one square foot each.

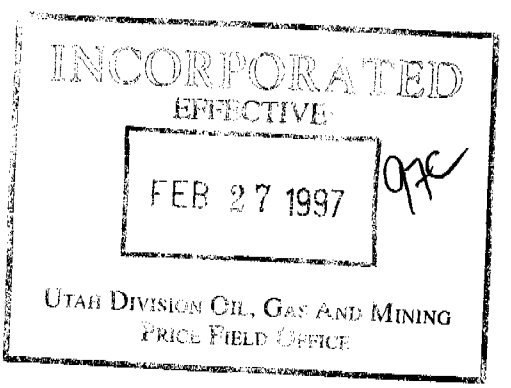
With the exception of the permit numbering on the lower left hand corner of the text, tables, and appendices pages, the February 26, 1997 submittal adequately addresses the concerns I aired on February 13. As you indicated during a previous telephone conversation, although this text is part of the Castle Gate MRP, identical text is now included in Exhibit 19 of the Willow Creek MRP. To change these numbers in this submittal would add further confusion in the future. Amendment 97C is approved, effective February 27, 1997.

Thank you for your expedient response to my concerns.

Sincerely,

Peter Hess
Reclamation Specialist III

sd
enclosures
cc: Ranvir Singh, OSM, Denver
Richard Manus, BLM, Price
Mark Page, Water Rights, Price, w/o enc
Dave Ariotti, DEQ, Price, w/o enc
Bill Bates, DWR, Price, w/o enc
Joe Helfrich, DOGM, SLC
Sharon Falvey, DOGM, SLC, w/o enc
Steve Johnson, DOGM, SLC, w/o enc



School House Canyon - Refuse ~~Site Drainage Control~~ - The drainage control plan for the School House Canyon Refuse Area is divided into three phases: current operation, final operation, and final reclamation. Diversions, culverts and watersheds associated with these phases are shown on Exhibits 3.4-2, 3.4-2C, and 3.4-3, respectively. Peak discharge values were calculated for each diversion for each phase. The maximum peak discharge value was then used to design each diversion channel so that each one would be adequately designed for all three phases of the mine plan. A comparison of peak discharge values, along with the maximum design discharge value for each diversion is presented in Table 3.4-20.

Peak discharge rates used to determine channel capacities and riprap sizing for the refuse area channels were calculated based on the 100-year, 6-hour precipitation event of 2.1 inches, in accordance with R645-301-746-212. The permanent channels are identified by both operational and reclamation labels. Diversion geometries are presented in Table 3.4-21. All necessary hydrologic calculations and design information for the three phases of School House Canyon are included in Appendix 3.4J.

The drainage areas used to calculate peak discharge values for the current operation phase are shown on Exhibit 3.4-2. The areas that extend beyond the borders of 3.4-2 are shown on Exhibit 7-3. Curve numbers for the current operation phase are presented in Appendix 3.4J. The drainage ditches CGD-6 (upper) and CGD-7 (upper) on top of the refuse pile have each been designed to handle all the flow from the top of the pile. These drainage designs will allow for various grading plans on top of the pile while additional refuse is placed on the top. However, in no case will water be allowed to form an impoundment on top of the pile.

As referred to in Appendix 3.4.A, 5.3.4 Outlet, Diversion CGD-5 has been designed and constructed to route flow around the Schoolhouse Refuse Fill as required by state and federal regulations. To minimize adverse impact outside the permit area, the discharge point has been located to route flow into an existing "gully" in Barn Canyon. Discharge at any other point within Barn Canyon would require significant amounts of surface disturbance and increase the likelihood of adverse environmental impacts to Barn Canyon.

The outlet and flowpath will be visually monitored quarterly and after significant precipitation events to evaluate the condition of the Diversion CGD-5, the discharge point and

flow path in Barn Canyon. A professional engineer will establish points of reference at the discharge point and along the flow path in Barn Canyon to evaluate the hydrologic impact to Barn Canyon. Bench marks, cross sections, or other accepted engineering methods will be used to measure, record, and evaluate channel, discharge point, and flowpath conditions. Field observations will be recorded and maintained. If excessive erosion (determined on a case by case basis) occurs, vegetation, riprap, erosion netting or other methods will be implemented to provide channel protection.

Currently, there are two drainage diversions on the edges of the face of the Refuse Pile that are performing adequately, although they are not constructed to meet the design requirements for the final operation and reclamation phases. Since the mine operation is currently (1994) dormant, it is not reasonable to replace these diversions until the Preparation Plant starts processing coal again. Calculations verifying that the upper sections of diversions CGD-7 (lower) and CGD-6 (lower) are adequate to pass the 100-year 6-hour storm given the current Refuse Pile topography are presented in a supplement to Appendix 3.4J. Both of these diversions are grouted to hold the riprap in place and prevent erosion. The upper section of CGD-7 (lower) transitions into the permanent diversion CGD-7 (lower)/CGRD-3A as shown in Figure 3.4-12.

The final operation phase incorporates a drainage plan for School House Canyon when the refuse pile reaches its design capacity, at the approximate elevation of 6550 feet. The drainage areas used to calculate the peak discharge values for the final operation phase are shown on Exhibit 3.4-2C. Those watersheds that extend beyond the borders of Exhibit 3.4-2C are shown in their entirety on Exhibit 3.4-2D. Curve numbers for the final operation phase are presented in Appendix 3.4J. Again, drainage ditches CGD-6 (upper) and CGD-7 (upper) have each been designed to accommodate all of the flow from the top of refuse pile. Ditches CGD-6 (lower) and CGD-7 (lower) have likewise been designed to handle all of the flow from the face of the refuse pile, in addition to the flow from the top of the refuse pile and the adjacent watersheds. As the Refuse Pile grows, the drainage diversions on the face of the refuse will be extended after each ten foot vertical increase in pile elevation.

The final reclamation phase is based on the assumption that the refuse pile is full to design capacity, and that the disturbed area has been graded to drain, topsoiled and seeded.

TABLE 3.4-21

SCHOOL HOUSE CANYON REFUSE AREA
DIVERSION SUMMARY BASED ON MAXIMUM PEAK FLOW DESIGN

Refuse Area Channel	Bottom Width (FT)	Side Slopes (H:V)	Depth (FT)	Min. Channel Slope (%)	Max. Channel Slope (%)	Max. Flow Depth (FT)	Freeboard (FT)	Max. Flow Velocity[a] (FPS)	Min. D50 (IN)
CGD-5/CGRD-4	5.0	1:1	2.21	2	20	1.21	1.00	10.62	[b]
CGD-6 (Upper)/CGRD-8	3.0	3:1	2.17	1	1	1.17	1.00	4.02	1[c]
CGD-6 (Lower)/CGRD-9 (Upper)	3.0	3:1	1.85	8	40	0.85	1.00	-	18
CGD-7 (Upper)/CGRD-7	3.0	3:1	2.01	1	1	1.01	1.00	3.72	1[c]
CGD-7 (Lower)/CGRD-3A	5.0	3:1	1.71	13	40	0.71	1.00	-	21
CGRD-9 (Lower)	3.0	3:1	1.55	20	50	0.55	1.00	-	18
CGD-18	3.0	3:1	1.26	17	17	0.26	1.00	7.17	6
CGD-19	4.0	1.75:1	1.75	10	10	0.73	1.02	8.83	7

(a) Maximum flow velocity calculated only for Searcy/U.S. D.O.T. design procedure.
(b) No riprap required. Diversion is excavated into bedrock.
(c) No riprap required during operation phase. See Appendix 3.4J.

TABLE 3.4-22

SCHOOL HOUSE CANYON REFUSE AREA
CHANNEL RIPRAP AND FILTER BLANKET VOLUMES

CHANNEL	RIPRAP D_{50} (IN)	LENGTH (FT)	RIPRAP THICKNESS (IN)	RIPRAP VOLUME (FT^3)	FILTER THICKNESS (IN)	FILTER VOLUME (FT^3)
CGD-5/CGRD-4	None	Diversion is excavated into bedrock				
CGD-6 (Upper)/ CGRD-8	1	1000	6	8350	6	8350
CGD-6 (Lower)/ CGD-9 (Upper)	18	1000	23	28224	11	13524
CGD-7 (Upper)/ CGRD-7	1	1150	6	9028	6	9028
CGD-7 (Lower)/ CGRD-3A	21	1300	26	44572	13	22594
CGRD-9 (Lower)	18	450	23	11059	11	5300
CGD-18	5	Riprap in-place.[a]				
CGD-19	10	Riprap in-place.[a]				
TOTALS				101,233 (7,087 tons)[b]		58,796 (3,822 tons)[c]

[a] CGD-18 and CGD-19 are operational diversions and will be removed at the beginning of the reclamation phase.
[b] Assumes a bulk density of 140 pcf.
[c] Assumes a bulk density of 130 pcf.

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CGD-7(upper)/CGRD-7

Comment: FINAL OPERATION PEAK FLOW DESIGN

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0100 ft/ft
Discharge.....	22.82 cfs

Computed Results:

Depth.....	1.01 ft
Velocity.....	3.72 fps
Flow Area.....	6.13 sf
Flow Top Width...	9.09 ft
Wetted Perimeter.	9.42 ft
Critical Depth...	0.90 ft
Critical Slope...	0.0162 ft/ft
Froude Number....	0.80 (flow is Subcritical)

CGD-7 (UPPER)
CGRD-7

(MINIMUM CHANNEL & RIPRAP SIZING)

SLOPE = 1% < 10% ∴ USE U.S. D.O.T. (MILD SLOPE) RIPRAP DESIGN.
(BASED ON AVERAGE CHANNEL SLOPE)

D = 1.01 FT
V = 3.72 FPS

ASSUME $K = 0.10$ ∴ $\frac{K}{D} = \frac{0.10'}{1.01}$ ∴ $\frac{K}{D} = 0.10$

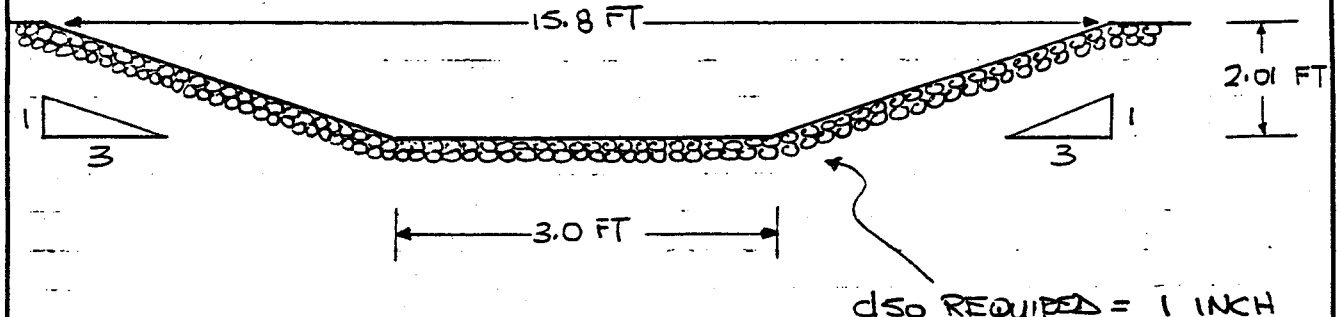
SIDE SLOPES ARE 3:1 FOR THIS CALCULATION

∴ $\frac{V_s}{V} = 0.5$, $V_s = (0.5)(3.72)$, $V_s = 1.86$ FPS.

∴ **d_{50} REQUIRED = 0.10' = 1 INCH RIPRAP.**

CROSS-SECTION:

FILTER BLANKET MATERIAL = 6 INCHES
(LOCATED UNDER RIPRAP).



WATER FLOW DEPTH = 1.01 FT.
FREEBOARD = 1.00 FT.
TOTAL DEPTH = 2.01 FT.
SLOPE => AVG. = 0.01 FT/FT.
$n = 0.030$.

* HOWEVER, RIPRAP SHOULD BE PLACED TO A DEPTH OF 6 INCHES.

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CGD-6(upper)/CGRD-8

Comment: CURRENT OPERATION PEAK FLOW DESIGN

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0100 ft/ft
Discharge.....	30.40 cfs

Computed Results:

Depth.....	1.17 ft
Velocity.....	4.02 fps
Flow Area.....	7.57 sf
Flow Top Width...	9.99 ft
Wetted Perimeter.	10.37 ft
Critical Depth...	1.05 ft
Critical Slope...	0.0156 ft/ft
Froude Number....	0.81 (flow is Subcritical)

Open Channel Flow Module, Version 3.2 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

CGD-6 (UPPER)
CGRD-8 (MINIMUM CHANNEL & RIPRAP SIZE)

SLOPE = 1.3 4.7 8.2 50 U.S. D.O.T. (MILD SLOPE) RIPRAP DESIGN.
D = 1.17 FT (BASED ON AVERAGE CHANNEL SLOPE)
V = 4.02 FPS

ASSUME $K = 0.10'$ $\therefore \frac{K}{D} = \frac{0.10'}{1.17'}$ $\therefore \frac{K}{D} = 0.085$

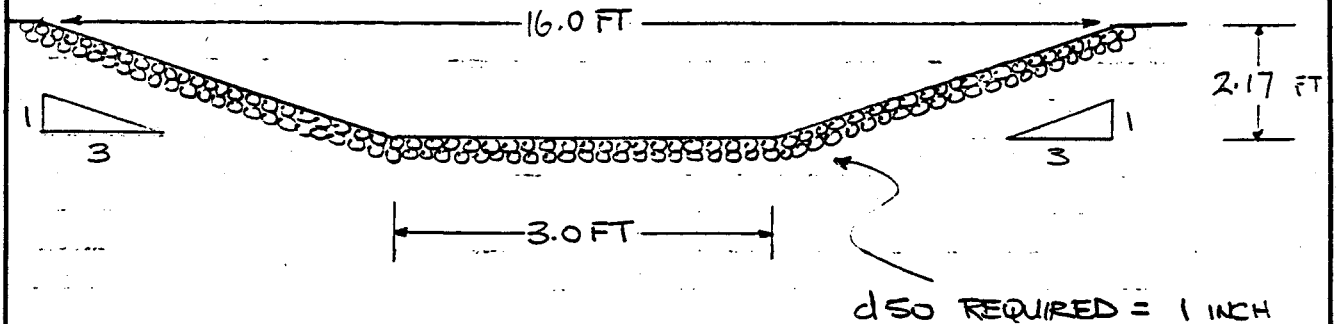
SIDE SLOPES ARE 3H:1V FOR THIS CALCULATION

$\therefore \frac{V_s}{V} = 0.5$, $V_s = (0.50)(4.02)$, $V_s = 2.00$ FPS

$\therefore$ **d50 REQUIRED = 0.10' = 1 INCH RIPRAP**

CROSS-SECTION:

FILTER BLANKET MATERIAL = 6 INCHES
(LOCATED UNDER RIPRAP).



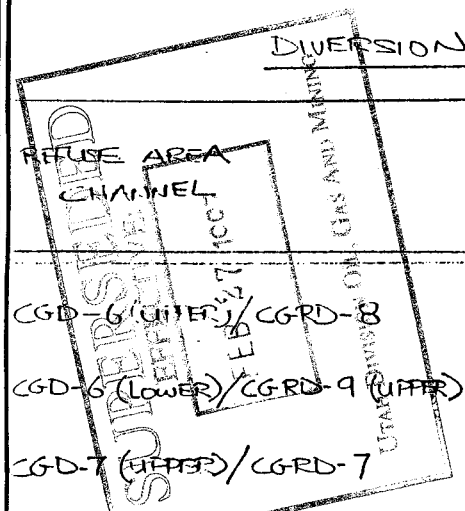
WATER FLOW DEPTH = 1.17 FT
FREEBOARD = 1.00 FT.
TOTAL DEPTH = 2.17 FT.
SLOPE ⇒ AVG. = 0.010 FT/FT.
$\eta = 0.030$.

* HOWEVER RIPRAP SHOULD BE PLACED TO A DEPTH OF 6 INCHES.

PROJECT 1C-150-13 PAGE 63 OF
COMPUTED TJC DATE 11-7-92
CHECKED [illegible] DATE 12/14/92

CASTLE GATE
SCHOOL HOUSE REFUSE AREA

DIVERSION SUMMARY BASED ON MAXIMUM PEAK FLOW DESIGN '



REFUSE AREA CHANNEL	BOTTOM WIDTH (FT)	SIDE SLOPES (H:V)	DEPTH (FT)	MIN CHANNEL SLOPE (%)	MAX CHANNEL SLOPE (%)	MAX. FLOW DEPTH (FT).	FREEBOARD (FT)	MAX. FLOW VELOCITY (FPS) '	MIN. D_{50} (in)
CGD-6 (UPPER)/CGRD-8	3.0	3:1	2.17	1	1	1.17	1.00	4.02	1
CGD-6 (LOWER)/CGRD-9 (UPPER)	3.0	3:1	1.85	8	40	0.85	1.00	—	18
CGD-7 (UPPER)/CGRD-7	3.0	3:1	2.01	1	1	1.01	1.00	3.72	1
CGD-7 (LOWER)/CGRD-3A	5.0	3:1	1.71	13	40	0.71	1.00	—	21
CGRD-9 (LOWER)	3.0	3:1	1.55	20	50	0.55	1.00	—	18
CGD-18	3.0	3:1	1.26	17	17	0.26	1.00	7.17	5
CGD-19	4.0	1.75:1	1.65	17	17	0.65	1.00	10.2	10

' MAXIMUM FLOW VELOCITY CALCULATED ONLY FOR U.S. DOT DESIGN PROCEDURE.

REVISED 4/93

EARTHFAX ENGINEERING, INC.
ENGINEERS / SCIENTISTS

PROJECT UC-150-13 PAGE 64 OF
COMPUTED TJC DATE 10-a-92
CHECKED wdm DATE 12/14/92

EARTHFAX ENGINEERING, INC.
ENGINEERS / SCIENTISTS

CASTLE GATE
SCHOOL HOUSE REFUSE AREA
PERMANENT CHANNEL RIPRAP VOLUMES

CHANNEL	THICKNESS (FT)	WIDTH * (FT)	LENGTH (FT)	VOLUME (FT^3)	WEIGHT ** (TONS)	D_{50} (in).
CGD-6 (UPPER)/ CGRD-8	0.5	16.7	1000	8350	585	1
CGD-6 (LOWER)/ CGRD-9 (UPPER)	1.92	14.7	1000	28,224	1976	18
CGD-7 (UPPER)/ CGRD-7	0.5	15.7	1150	9028	632	1
CGD-7 (LOWER)/ CGRD-3A	2.17	15.8	1300	44,572	3120	21
CGRD-9 (LOWER)	1.92	12.8	450	11,059	774	18
TOTAL				101,233 FT^3	7087 TONS	

* WIDTH MEASURED ALONG THE SURFACE OF THE CHANNEL, THIS WIDTH IS USED TO CALCULATE RIPRAP SURFACE AREA.

** WEIGHT IS BASED ON AN IN-PLACE BULK DENSITY OF 140 PCF.

PROJECT UC-150-13 PAGE 65 OF
COMPUTED TJC DATE 11-3-92
CHECKED [illegible] DATE 12/4/92

EARTHFAX ENGINEERING, INC.
ENGINEERS / SCIENTISTS

CASTLE GATE
SCHOOL HOUSE CANYON REFUSE AREA
FILTER BLANKET MATERIAL VOLUME.

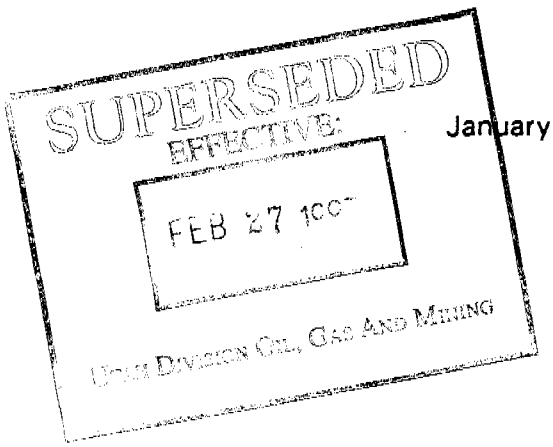
CHANNELS	THICKNESS (FT.)	WIDTH (FT)	LENGTH (FT.)	VOLUME (FT^3)	WEIGHT * (TONS)
CGD-6 (UPPER)/ CGRD-8	0.5	16.7	1000	8350	543
CGD-6 (LOWER)/ CGRD-9 (UPPER)	0.92	14.7	1000	13524	879
CGD-7 (UPPER)/ CGRD-7	0.5	15.7	1150	9028	587
CGD-7 (LOWER)/ CGRD-3A	1.1	15.8	1300	22594	1469
CGRD-9 (LOWER)	0.92	12.8	450	5300	344
TOTAL				58,796 FT^3	3,822 TONS

* WEIGHT IS BASED ON AN IN-PLACE BULK DENSITY OF 130 PCF.

CASTLEGATE AREA
SCHOOL HOUSE CANYON REFUSE AREA

DIVERSION CULVERT CALCULATIONS

Chapter 3, Section 3.4
Castle Gate Mine
Preparation Plant

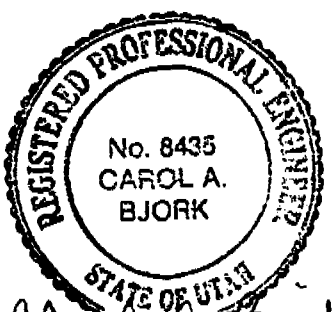


January 1995

SUPPLEMENT TO

APPENDIX 3.4J

DRAINAGE CONTROL DESIGN CALCULATIONS
FOR SCHOOL HOUSE CANYON REFUSE SITE DIVERSION STRUCTURES -
CURRENT OPERATION, FINAL OPERATION, AND RECLAMATION PHASES



Carol A. Bjork
1/17/95

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340
(801) 359-3940 (Fax)

Post-it® Fax Note 7671

To Ben Grimes	From Pete Hess
Co./Dept. Engg.	Co. PFO - DOGM
Phone #	Phone #
Fax #	Fax #

Date 2/13/97 # of pages ▶ 2

February 13, 1997

Ben Grimes, Senior Staff Project Engineer
Cyprus Plateau Mining Corporation
PO Drawer PMC
Price, Utah 84501

RE: Letter of Deficiency, School House Canyon Refuse Pile Drainage Ditches CGD-6 and CGD-7, Willow Creek Preparation Plant, ACT/007/038-97C, Folder #2, Carbon County, Utah

Dear Mr: Grimes:

I have reviewed the above submittal, which has been designated as **ACT/007/038-97C**. There are several deficiencies which need to be addressed prior to approval. These are as follows:

1) although the original ditch designs come from the Castle Gate MRP, the new text and designs are now considered to be within the Willow Creek MRP. Hence, the numbering in the lower left hand corner on pages 3.4-7, 3.4-8, 3.4-73, and 3.4-74 should be changed to reflect 007/038.

2) the designs are not P.E. certified, as is required by R645-301-512.140 and R645-301-712.

3) the design/cross section on page 47 for CGD-7 (upper), CGRD-7 is computed from a "Final operation peak flow" quantity (100 year 6 hour) storms of 22.82cfs. I assume this quantity is the same for the "current operation peak flow", but I'm not a hydrologist. Page 49, which is the design for CGD-6 (upper), CGRD-8, is computed from a "current operation peak flow". If the flow quantities for the final operation and current operation phases for the pile are the same, then the designs should be the same. The wording should reflect "current operation design" for both ditches; otherwise, we're right back in the same nightmare that we're trying to clear up.

4) Exhibit 3.4-2C, as referred to on page 3.4-8, shows the "Final Operational Drainage Pattern and Diversion Ditches, specifically CGD-6 and 7. A similar drawing showing the ditch locations should be shown for "current operations" of the pile. I think the drawing (or perhaps the text) should have a note to the effect that the "ditch locations will vary as determined by the equipment operator and the elevation of the pile, but will be as close as practicable to the Canyon's slopes. Short, straight ditches will be cut, rather than trying to maintain the serpentine configuration of the Canyon walls. Also, you may want to include text relating to how the ditches will be maintained during the topsoil removal process.

Thank you for your attention to these matters.

Sincerely,

Peter Hess
Reclamation Specialist III

sd
cc: Joe Helfrich, DOGM, SLC

Applied Geotechnical Engineering Consultants, Inc.

February 7, 1997

Cyprus Plateau Mining Corporation
P.O. Drawer PMC
Price, Utah 84501

Attention: Ben Grimes
fax: 637-2247

Subject: Subsurface Exploration
School House Canyon Refuse Pile Stability
Willow Creek Mine Site
Price, Utah
Project No. 973006

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested by the Department of Natural Resources; Division of Oil, Gas and Mining, to provide information requested in R645-201-200 "Notice of Intention to Conduct Minor Coal Exploration". This information is being requested even though the exploration is not for coal. Our response to the questions listed are indicated below:

1. Applicant: Cyprus-Plateau Mining Corporation

2. Representative: Applied Geotechnical Engineering Consultants, Inc.
7109 South 185 West, Suite A
Midvale, Utah 84047
(801) 566-6399
James E. Nordquist, P.E.

3. Time Period:
Begin: Within one week of permit issuance
Duration: One to two weeks

4. Description of Method:

We proposed to drill two borings in the refuse pile and one boring in the dike, down slope from the refuse pile. Additional borings will be drilled in areas proposed for ponds.

The exploration will be conducted by using a CME 750 all-terrain drill. The auger used in drilling is approximately 8 inches in diameter with an interior hollow stem approximately 3½ inches in diameter.

As the auger is advanced, the cuttings are brought to the surface. Samples for testing are obtained by lowering a spoon sampler in the hollow portion of the auger and by either pushing or pounding the sampler into the material below the auger.

Once the desired depth has been reached, perforated pipe is lowered to the bottom of the hole through the hollow portion of the auger. The auger is then removed while leaving the pipe in the hole.

As the auger is being removed, we anticipate that the material will cave into the hole, filling the annular space between the pipe and the outside portion of the augured hole. If the hole is open after removing the auger, the hole will be filled with cuttings or sand. The ground surface around the exploration will be smoothed by hand.

If you have any further questions, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

James E. Nordquist, P.E.

JEN/cs
cc: Peter Hess (DOGM)
Marv Allen (HA&L)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CGD-7(upper)/CGRD-7

Comment: FINAL OPERATION PEAK FLOW DESIGN

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0100 ft/ft
Discharge.....	22.82 cfs

Computed Results:

Depth.....	1.01 ft
Velocity.....	3.72 fps
Flow Area.....	6.13 sf
Flow Top Width...	9.09 ft
Wetted Perimeter.	9.42 ft
Critical Depth...	0.90 ft
Critical Slope...	0.0162 ft/ft
Froude Number....	0.80 (flow is Subcritical)

CGD-7 (UPPER)
CGRD-7

(MINIMUM CHANNEL & RIPRAP SIZING)

SLOPE = 1% < 10%, SO USE U.S. D.O.T. (MILD SLOPE) RIPRAP DESIGN.
D = 1.01 FT (BASED ON AVERAGE CHANNEL SLOPE)
V = 3.72 FPS

ASSUME $K = 0.10'$ $\therefore \frac{K}{D} = \frac{0.10'}{1.01}$ $\therefore \frac{K}{D} = 0.10$

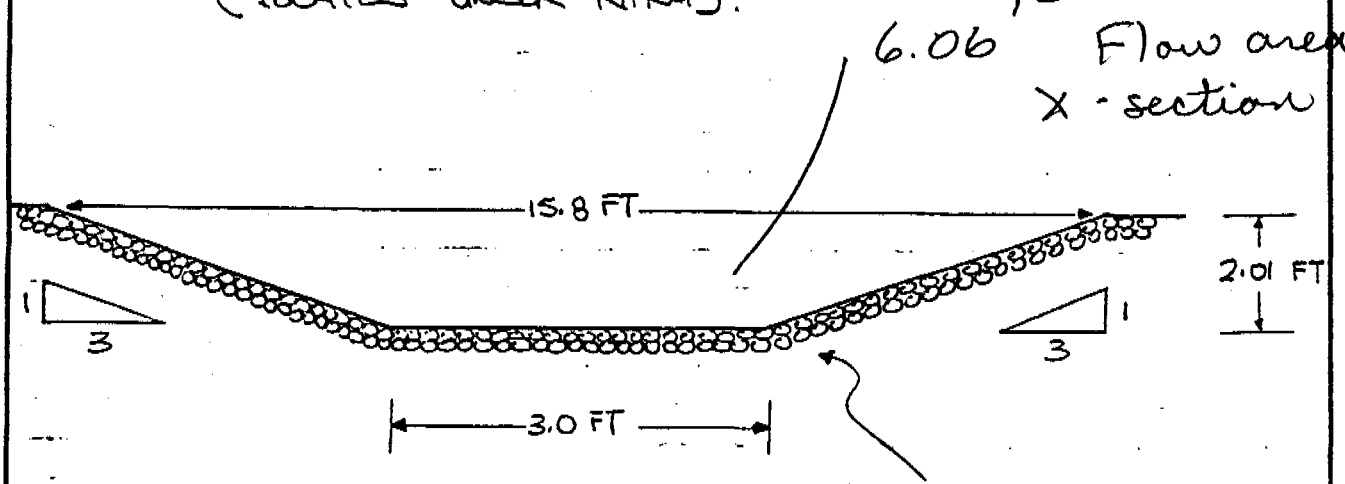
SIDE SLOPES ARE 3H:1V FOR THIS CALCULATION

$\therefore \frac{V_s}{V} = 0.5$, $V_s = (0.5)(3.72)$, $V_s = 1.86$ FPS.

$\therefore$ **d_{50} REQUIRED = 0.10' = 1 INCH RIPRAP.**

CROSS-SECTION:

FILTER BLANKET MATERIAL = 6 INCHES
(LOCATED UNDER RIPRAP).



WATER FLOW DEPTH = 1.01 FT.
FREEBOARD = 1.00 FT.
TOTAL DEPTH = 2.01 FT.
SLOPE => AVG. = 0.01 FT/FT.
$n = 0.030$.

* HOWEVER, RIPRAP SHOULD BE PLACED TO A DEPTH OF 5 INCHES.

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CGD-6(upper)/CGRD-8

Comment: CURRENT OPERATION PEAK FLOW DESIGN

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0100 ft/ft
Discharge.....	30.40 cfs

Computed Results:

Depth.....	1.17 ft
Velocity.....	4.02 fps
Flow Area.....	7.57 sf
Flow Top Width...	9.99 ft
Wetted Perimeter.	10.37 ft
Critical Depth...	1.05 ft
Critical Slope...	0.0156 ft/ft
Froude Number....	0.81 (flow is Subcritical)

CGD-6 (UPPER)
CGRD-8

(MINIMUM CHANNEL & RIPRAP SIZE)

SLOPE = 1% < 10%, SO USE U.S. D.O.T. (MILD SLOPE) RIPRAP DESIGN.
D = 1.17 FT (BASED ON AVERAGE CHANNEL SLOPE)
V = 4.02 FPS

ASSUME $K = 0.10'$ $\therefore \frac{K}{D} = \frac{0.10'}{1.17'}$ $\therefore \frac{K}{D} = 0.085$

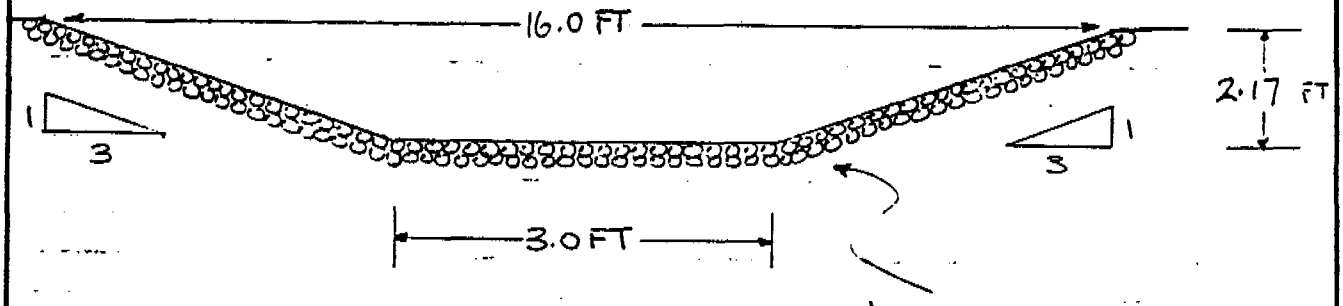
SIDE SLOPES ARE 3H:1V FOR THIS CALCULATION

$\therefore \frac{V_s}{V} = 0.5$, $V_s = (0.50)(4.02)$, $V_s = 2.00$ FPS

$\therefore$ **d50 REQUIRED = 0.10' = 1 INCH RIPRAP**

CROSS-SECTION:

FILTER BLANKET MATERIAL = 6 INCHES (LOCATED UNDER RIPRAP).

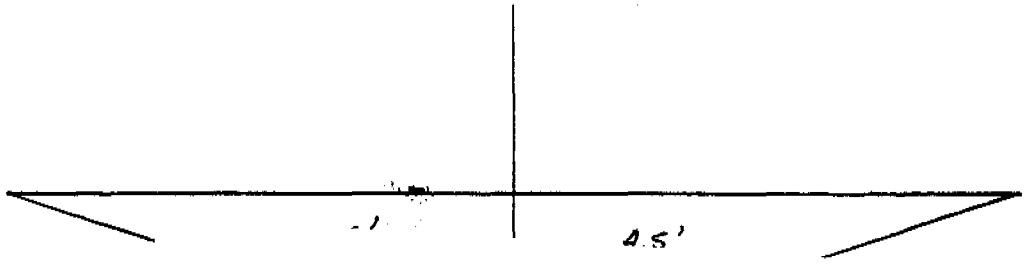


WATER FLOW DEPTH = 1.17 FT
FREEBOARD = 1.00 FT.
TOTAL DEPTH = 2.17 FT.
SLOPE ⇒ AVG. = 0.010 FT/FT.
$n = 0.030$.

* HOWEVER RIPRAP SHOULD BE PLACED TO A DEPTH OF 6 INCHES.

CGD-7 upper Scale 1" = 3'

Original Design



This is a complete Finalized Submittal

Total at 1

= 2 Compare X-sections of old design to new design —

= 2 CGD-6 (upper)

$A_O = 7.6167'^2$

$A_N = 8.699'^2$

= 6.

CGD-7 (upper)

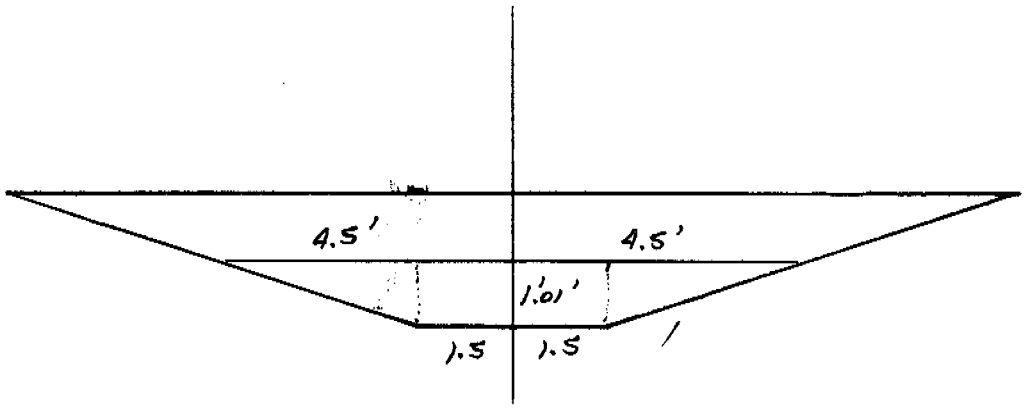
$A_O = 6.06'^2$

$A_N = 6.9575'^2$

$\frac{1}{2}(3' \times 1.01')$

CGD-7 upper Scale 1" = 3'

Original Design



Total X-sectional area of flow at 1.01' Flow depth

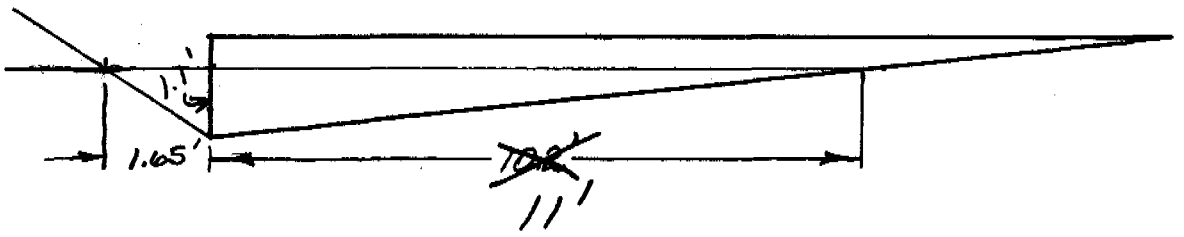
$= 2 \times [(1.01')\,1.5'] + 2 \times \frac{1}{2}(3' \times 1.01')$

$= 2(1.515'^2) + 3.03'^2$

$= 3.03'^2 + 3.03'^2$

$= \underline{6.06'^2} = A_{OLD} = A_O$

CGD-7 (upper)
New design submitted 2/11/97
Scale 1" = 3'



$$\frac{1}{1.10'} = \frac{10}{x}$$

$x = 10(1.10) = 11'$

$$\text{Area} = \tfrac{1}{2}[(1.65)(1.1)] + \tfrac{1}{2}[(11)(1.1)]$$

$$\text{Area} = .9075'^2 + 6.05'^2$$

$$A_{NEW} = 6.9575'^2$$

$A_N > A_O$

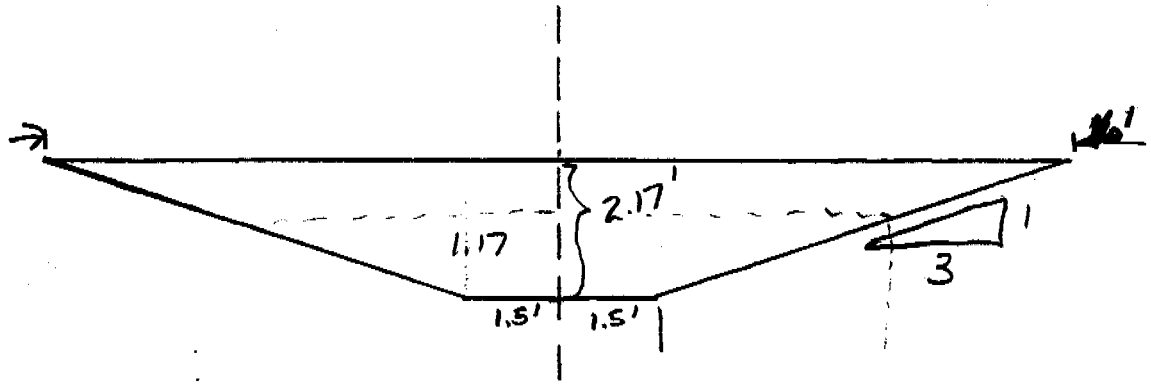
$A_N = 6.9575'^2$

$A_O = 6.06'^2$

$\Delta A = .8975'^2$

CGD-6 (upper) Original Design

Scale: 1" = 3'

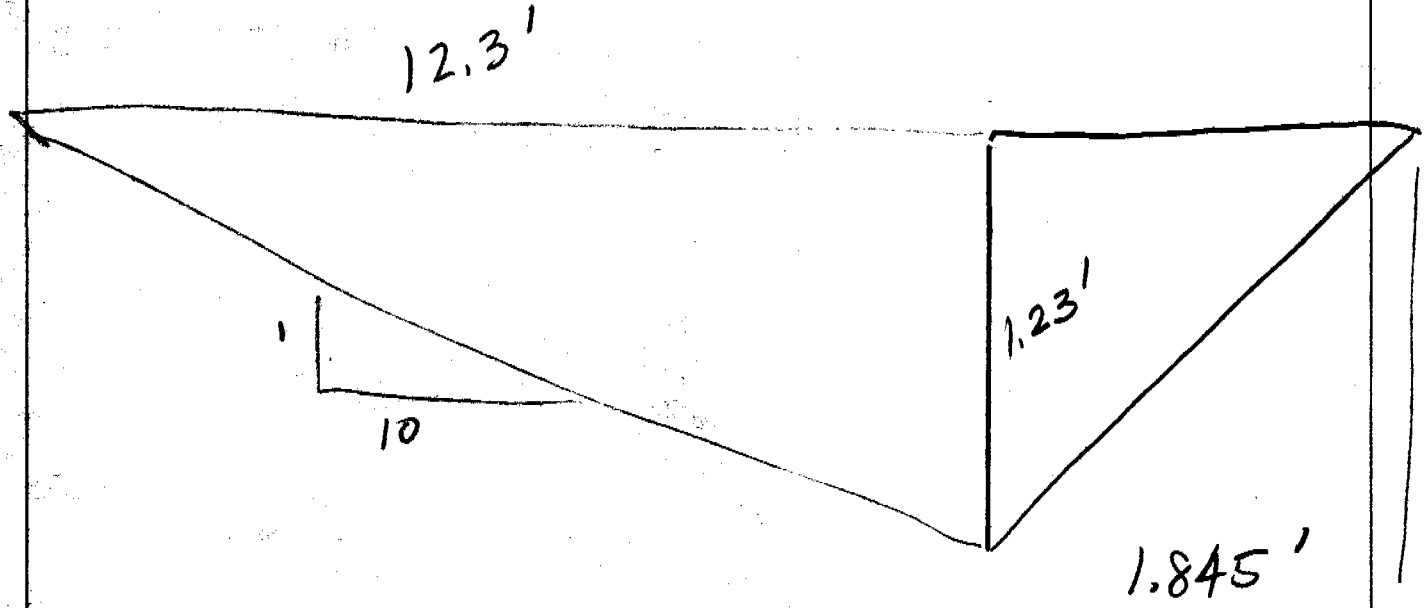


Water Depth = 1.17'

Total X-Sectional Flow Area =

$$= \left[(3')\,1.17'\right] + \left(1.17'\right)\left[(3)(1.17')\right]$$

$$= 3.51'^2 + 4.1067'^2 = \underline{7.6167'^2} = \underline{A_o}$$



Total Area =

$7.5645'^2 + 1.134675'$

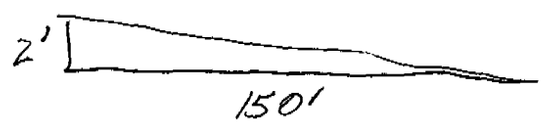
$A_N = 8.699175'^2$

$A_N > A_O$

$\Delta A = 1.082475'^2$

Need drawing to show ditch lines for CGD-6 + CGD-7 ~~as~~ during operation phase (drawing needs note to show that ditches may not be against columnin on Canyon side) but location will be ~~not for exactly~~ determined by motor grader operator. CGD-6 + 7 will be as close to Canyon sides as practicable but will not follow serpentine canyon walls.

May also want to discuss how ditches will be maintained during topsoil stripping process.



$\frac{2'}{150'} = 1.3\%$ slope

New ditch designs need P.E. certification

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change:

Revise refuse pile ditches CGD-6 and CGD-7.

Permit Number ACT/007/038

Mine: Willow Creek Mine

Permittee: Cyprus Plateau Mining Corp.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. Include page, section and drawing numbers as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	Replace text pages 3.4-7 and 3.4-8 in Volume 13, Exhibit 19, Section 3.4. ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace page 3.4-73 (Table 3.4-21), and page 3.4-74 (Table 3.4-22) in Volume 13, Exhibit 19, Tables Section. ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace pages 47 and 48 in Appendix 3.4J, Volume 13A (ditch CGD-7 upper & CGRD-7). ✓
☒ ADD	☐ REPLACE	☐ REMOVE	Add page 48a to Appendix 3.4J, Volume 13A (ditch CGD-7 upper & CGRD-7). ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace page 49 in Appendix 3.4J, Volume 13A (ditch CGD-6 upper & CGRD-8). ✓
☒ ADD	☐ REPLACE	☐ REMOVE	Add page 49a in Appendix 3.4J, Volume 13A (ditch CGD-6 upper & CGRD-8). ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace page 50 in Appendix 3.4J, Volume 13A (ditch CGD-6 upper & CGRD-8). ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace pages 63, in Appendix 3.4J, Volume 13A (Diversion Summary). ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace pages 64, in Appendix 3.4J, Volume 13A (Permanent Channel Riprap Vols.). ✓
☐ ADD	☒ REPLACE	☐ REMOVE	Replace pages 65, in Appendix 3.4J, Volume 13A (Filter Blanket Material Volume).
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?