Form DOGM (Last Revised 2/97)

PERMIT TRACKING FORM

X Permit Amendment (INS) ☐ Exploration Permit (INS) ☐ N.O.V. (INS) ☐ D.O. ☐ Permit Transfer ☐ Incidental Boundary Change (IBC)
☐ Permit Midterm (MT) ☐ Permit Renewal (PR) ☐ New Permit ☐ Significant Revision (SR) ☐ Bond Release (BR)

Date Received: 10/13/97	**By: tat**	PERMIT NUMBER	ACT/007/020
Title of Proposal: Abatement Plans N-97-26-7-1		PERMIT CHANGE #	97G - 1
Description:		PERMITTEE	HORIZON COAL COMPANY
# of Copies Required: 5	# of Copies Received: 1	MINE NAME	HORIZON MINE

☐ **PERMIT CHANGE APPLICATION SENT TO SLC** DATE: LETTER TO PERMITTEE:

☐ **15 DAY INITIAL RESPONSE TO PERMIT CHANGE APPLICATION OR INITIAL COMPLETENESS REVIEW**	Date Due:	Date Done:	Letter to Permittee:
☐ **Notice of Affidavit of Publication. (If change is a Significant Revision, New Permit, or Permit Transfer)**	Date Due:	Date Done:	Letter to Permittee:

PFO REVIEW TRACKING	1ST ROUND		2ND ROUND	
☐ Lead ☐ Generalist				
☐ Administrative _____				
☐ Land Use/ AQ _____				
☐ Biology _____				
☐ Engineering _____				
☐ Geology _____				
☐ Soils _____				
☐ Hydrology _____				

SLC REVIEW TRACKING	1ST ROUND		2ND ROUND	
☐ Lead				
☐ Administrative _____				
☐ Land Use/ AQ _____				
☐ Biology _____				
☐ Engineering _____				
☐ Geology _____				
☐ Soils _____				
☐ Hydrology SKF		11/6		

TA Review Done:	Date:	**Permittee Response Due** ☒ Stipulation ☐ Condition ☐ No Requirements	Date: 11-7-97	**DIVISION DECISION LETTER** ☐ APPROVE ☐ DENY
TA Review Done:	Date:	**RESPONSE RECEIVED:**	Date:	Date:

COORDINATED REVIEWS	Phone Contact	1ST ROUND Sent	1ST ROUND Due	2ND ROUND Sent	2ND ROUND Due	**RECEIVED**
☐ OSM- Copy						
☐ BLM- Copy						
☐ BLM (SLC)- Ltr						
☐ Water Rights- ltr						
☐ DEQ- Letter						
☐ DWR- Letter						

ADDITIONAL TRACKING:	**DATE**
Public Hearing	
Letter From Compliance Supervisor	
AVS Completed	
Approval Effective Date	
Approved Copy to File	
Approved Copy to Permittee	
Approved Copy to PFO/SLC	
Approved Copy to Agencies	
CHIA Modified	
Update Master TA Done/Needed	

Comments:

on inlet control and a headwater to depth ratio of one or less. An extension of UC-3 is discussed in Appendix 3-9.

Discharge at the outlet of culvert UC-1 will have an exit velocity of approximately 10.4 fps (see Appendix 7-4). This will be controlled by installing an outlet channel and impact pool. The outlet channel will have graded riprap on the bottom and along the sides of the channel for an approximate distance of 30 feet downstream from the culvert outlet to a transition to a compound channel with a riprapped low flow channel and vegetated flood plain, as proposed for the final reclamation channel (see Plates 7-4 & 7-6). The riprap in the outlet channel and the low flow channel will have a median diameter of 0.5 foot and will be placed at a thickness of 12 inches. The gradation of the riprap is presented in Table 7-6. A geotextile material will be installed beneath the outlet channel riprap as a filter blanket. A sand filter will be installed beneath the low flow channel riprap.

The outlet channel will act as an impact pool for flows from the culvert or emergency spillway. The impact pool will be created by the transition to the compound channel, due to the shallower depth of the low flow channel versus outlet channel. Under flow conditions, the water will fill the outlet channel and spill to the low flow channel until its capacity is exceeded and then spread out into the flood plain. This will ensure that low flows can be conveyed through the area, while high flows will spread over the flood plain. Additionally, the shallow depth of the low flow channel will ensure the capability of sub-irrigation and seepage into the surrounding flood plain.

By constructing these channels during operations, the area will not need to be disturbed again during reclamation. The riparian area will already be established around the channels and the area will be stabilized. If these channels are not included in the initial disturbance, then the area will be redisturbed upon reclamation.

Calculations contained in Appendix 7-4 indicate that the flow capacity of the unaltered Jewkes Creek upstream from culvert UC-3 is 27.7 cfs. The flow capacity of the unaltered Jewkes Creek downstream from culvert UC-1 is 38.7 cfs. Culverts UC-1 and UC-3 have design capacities of 59 cfs and 40 cfs, respectively. Hence, the capacities of these culverts exceed the capacity of Jewkes Creek in its unaltered state.

As indicated in Appendix 7-4, the capacity of the unaltered Portal Canyon Creek upstream from culvert UC-2 is 13.1 cfs. All of the downstream portion of this creek will be subject to the culverted diversion. Culvert UC-2 has a capacity of 22 cfs. Hence, the capacity of this culvert exceeds that of Portal Canyon Creek in its unaltered state.

To facilitate realignment of the Beaver Creek county road, Carbon County realigned a portion of Jewkes Creek downstream from the disturbed area. Calculations supporting this stream realignment are provided in Appendix 7-4. As indicated, the channel has been designed with a 6-foot bottom width, 2H:1V sideslopes, and riprap with a median diameter of 9 inches. The long-term stability of this riprap will be monitored during the operation of the mine. If damage occurs to the riprap during this period, repairs will be made immediately. If the riprap is deemed stable at the end of the operational period, it will be left in place following reclamation. Otherwise, changes will be made in consultation with DOGM.

UC-1 outlet protection requirements:

Outlet velocity (based on outlet slope of 4% and a design flow of 27.9 cfs [operational period design flow]):

V = 9.56 ft/s (see pg 17 of this section)

Provide riprap apron at culvert outlet for erosion protection. According to pg 18 of this section:

Min d_{50} = 7.4" → Use d_{50} = 8"

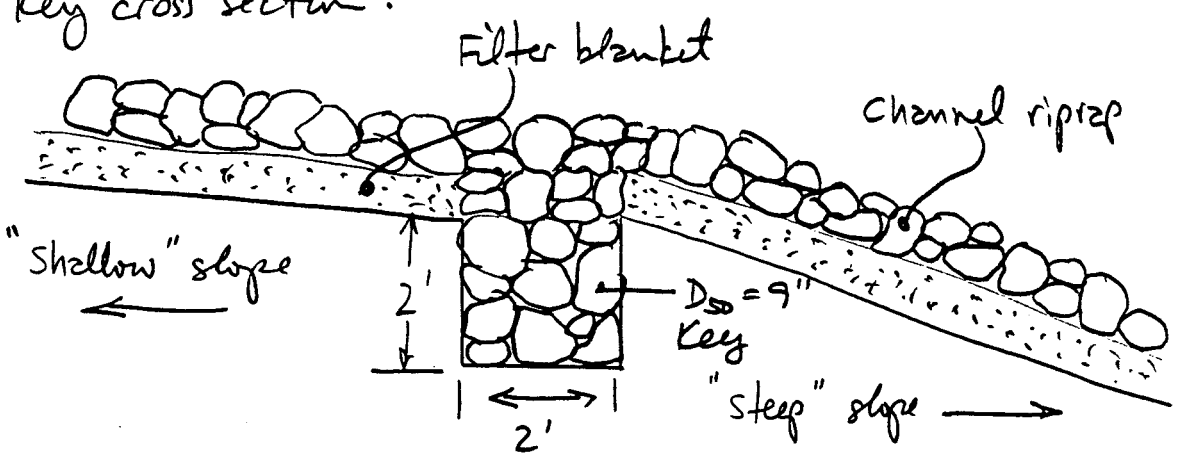
Min. apron length = 5.5' → Use length = 10'

Line area with coarse and fine filter blanket as designed for reclamation channel (6" of each)

Channel design downstream from culvert outlet → see pg 17 - 18 in this section. Extend riprap to top of bank for a distance of approximately 50 ft downstream from the outlet of UC-1 (i.e., to a point around the first bend in the outlet channel). This will provide additional erosion protection on the channel bank.

A change in the grade of the outlet channel occurs at a distance of approximately 100 ft downstream from the outlet of UC-1. To prevent headcutting at this location, install a riprap key into the channel at the change in slope. This key should have a width of 2 ft and a depth of 2 ft below the bottom of the lowest filter blanket (unless bedrock is encountered at a shallower depth). Fill the key with d_{50} = 9" riprap.

Key cross section:

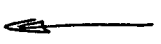


UC-1 Outlet Velocity
Worksheet for Circular Channel

Project Description	
Project File	untitled.fm2
Worksheet	Culvert Outlet Protection
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.024	
Channel Slope	0.040000	ft/ft
Diameter	36.00	in
Discharge	27.90	cfs

Results		
Depth	1.29	ft
Flow Area	2.92	ft^2
Wetted Perimeter	4.30	ft
Top Width	2.97	ft
Critical Depth	1.71	ft
Percent Full	43.12	
Critical Slope	0.015548	ft/ft
Velocity	9.56	ft/s
Velocity Head	1.42	ft
Specific Energy	2.71	ft
Froude Number	1.70	
Maximum Discharge	77.72	cfs
Full Flow Capacity	72.25	cfs
Full Flow Slope	0.005964	ft/ft
Flow is supercritical.		



Outlet velocity

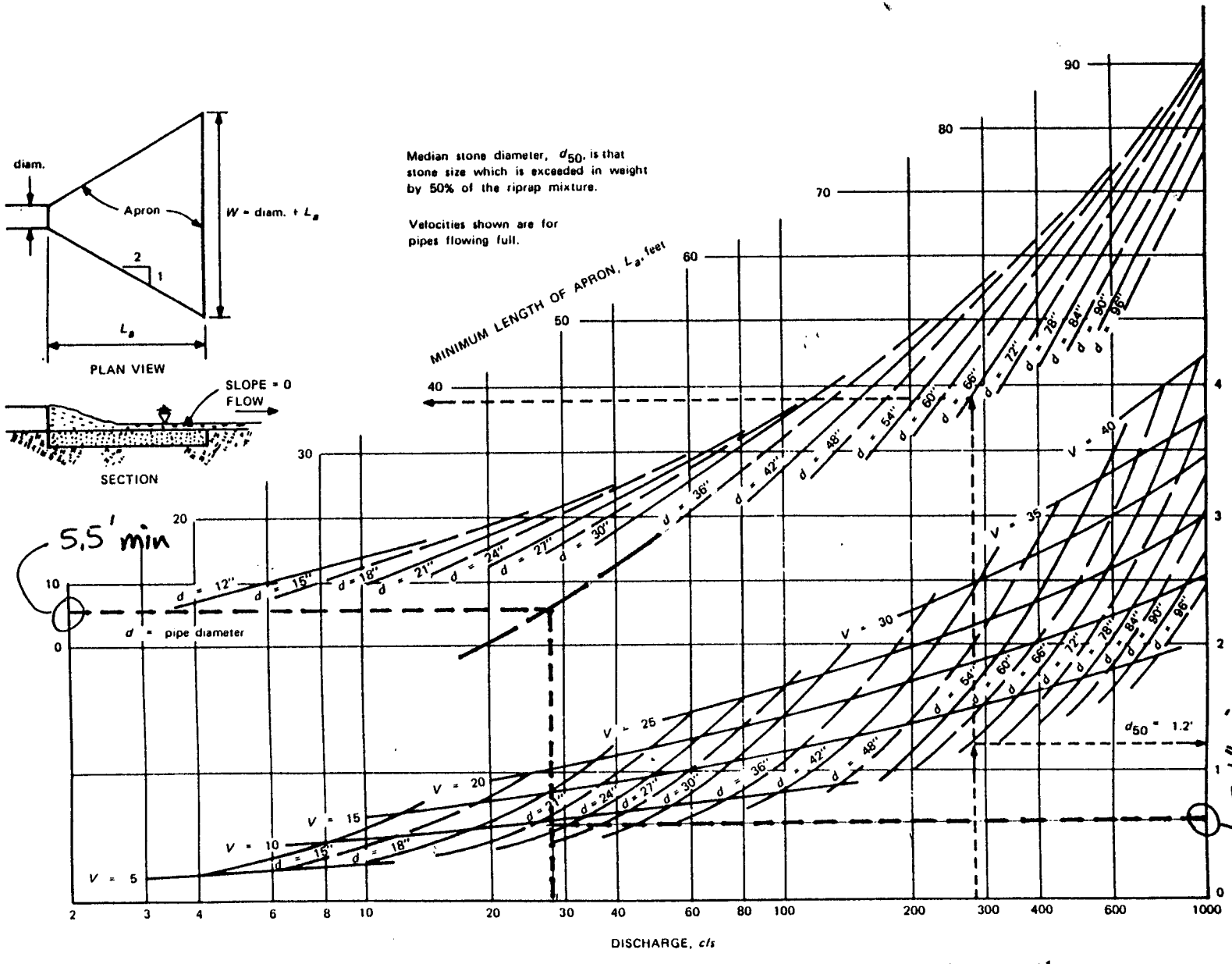


Figure I-15. Design of outlet protection – minimum tailwater condition ($T_W < 0.5$ diam.)[1]

Source: U.S. EPA (1976) — EPA-625/3-76-006

JENKES CREEK REALIGNMENT
DESIGN CALCULATIONS

Scope

- Realign the downstream end of Jenkes Creek below the Horizon No. 1 Mine facilities
- Account for runoff from realigned county road (referred to herein as the Beaver Creek county road) and from the Gordon Creek county road.
- Design event → Capacity of natural upstream channel.

Features

See pg 18b of this calc.

Design – Realigned Channel

100-yr, 6-hr peak flow:

Operational period (design flow for UC-1) → 27.9 cfs

Reclamation period (design flow for RD-3) → 30.2 cfs

Natural channel capacity at RD-3 (downstream) → 38.7 cfs ← Worst case (design condition at request of DOGM)

Maximum channel slope (use for riprap design) = 0.151 ft/ft

Calculate the roughness coefficient according to Abt et al. (1987):

$$n = 0.0456\left[(d_{50})(S)\right]^{0.159}$$

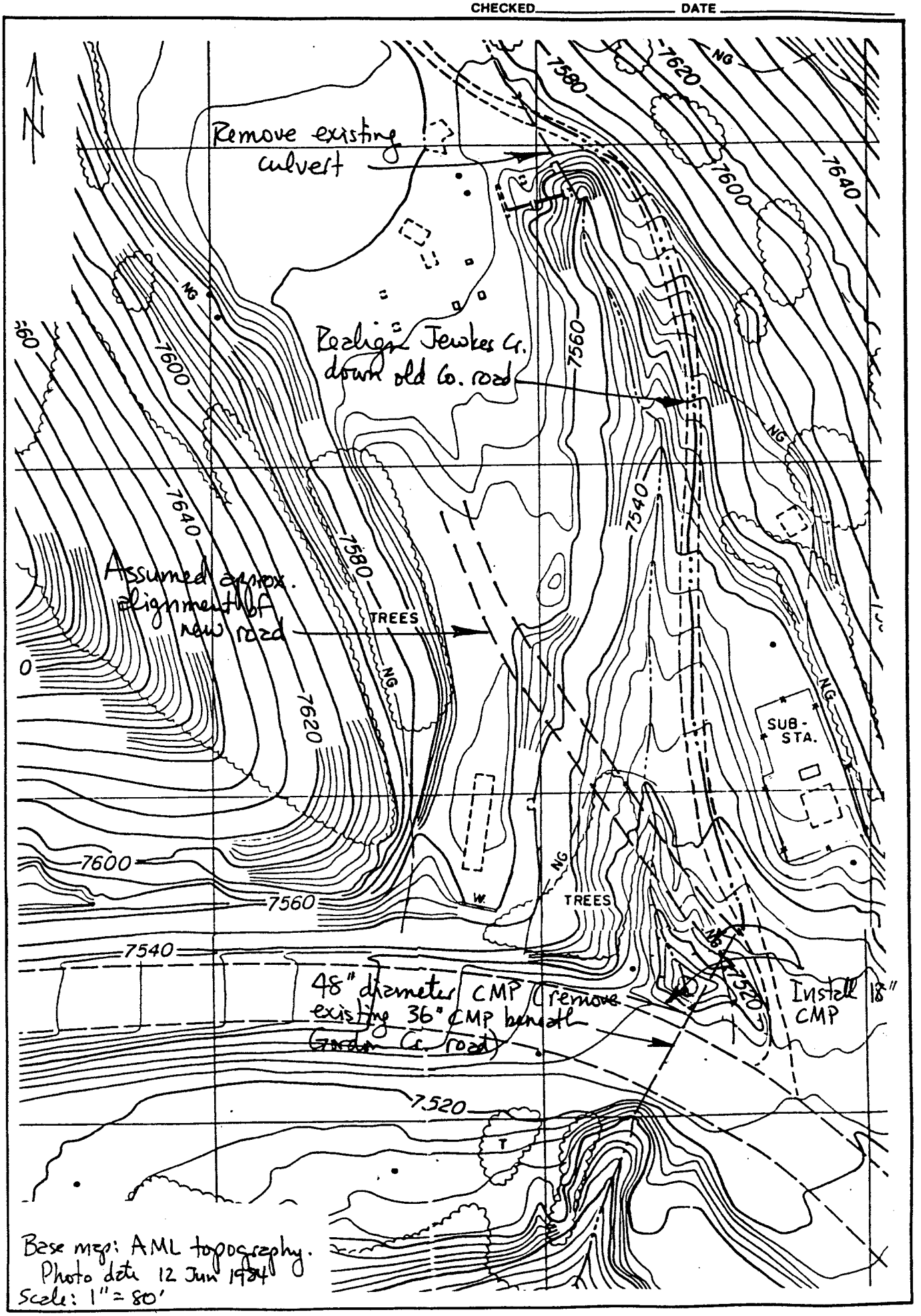
where n = Manning's roughness coefficient
d_{50} = median riprap diameter (in)
S = channel slope (ft/ft)

For $d_{50} = 9''$, $S = 0.151$ ft/ft → $n = 0.048$

See printout on pg 18c of this calc. for bottom width = 6'
side slopes = 2:1

EARTHFAX ENGINEERING, INC.
ENGINEERS / SCIENTISTS

PROJECT UC-572-02 PAGE 18b OF
COMPUTED PBW DATE 27 Jun 1997
CHECKED DATE



Base map: AML topography.
Photo date 12 Jun 1984
Scale: 1" = 80'

Jewkes Creek Realignment - Maximum Slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Mine
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.048	
Channel Slope	0.151000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	6.00	ft
Discharge	38.70	cfs

← Based on $d_{50} = 9"$ and slope = 15.1%

Results		
Depth	0.66	ft
Flow Area	4.85	ft²
Wetted Perimeter	8.96	ft
Top Width	8.65	ft
Critical Depth	0.97	ft
Critical Slope	0.038733	ft/ft
Velocity	7.99	ft/s
Velocity Head	0.99	ft
Specific Energy	1.65	ft
Froude Number	1.88	
Flow is supercritical.		

← Max. velocity

$d_{50} = 9"$ riprap can safely withstand a velocity of 9.4 ft/s against 2:1 sideslopes (see pg 18d). Hence, this riprap is adequate.

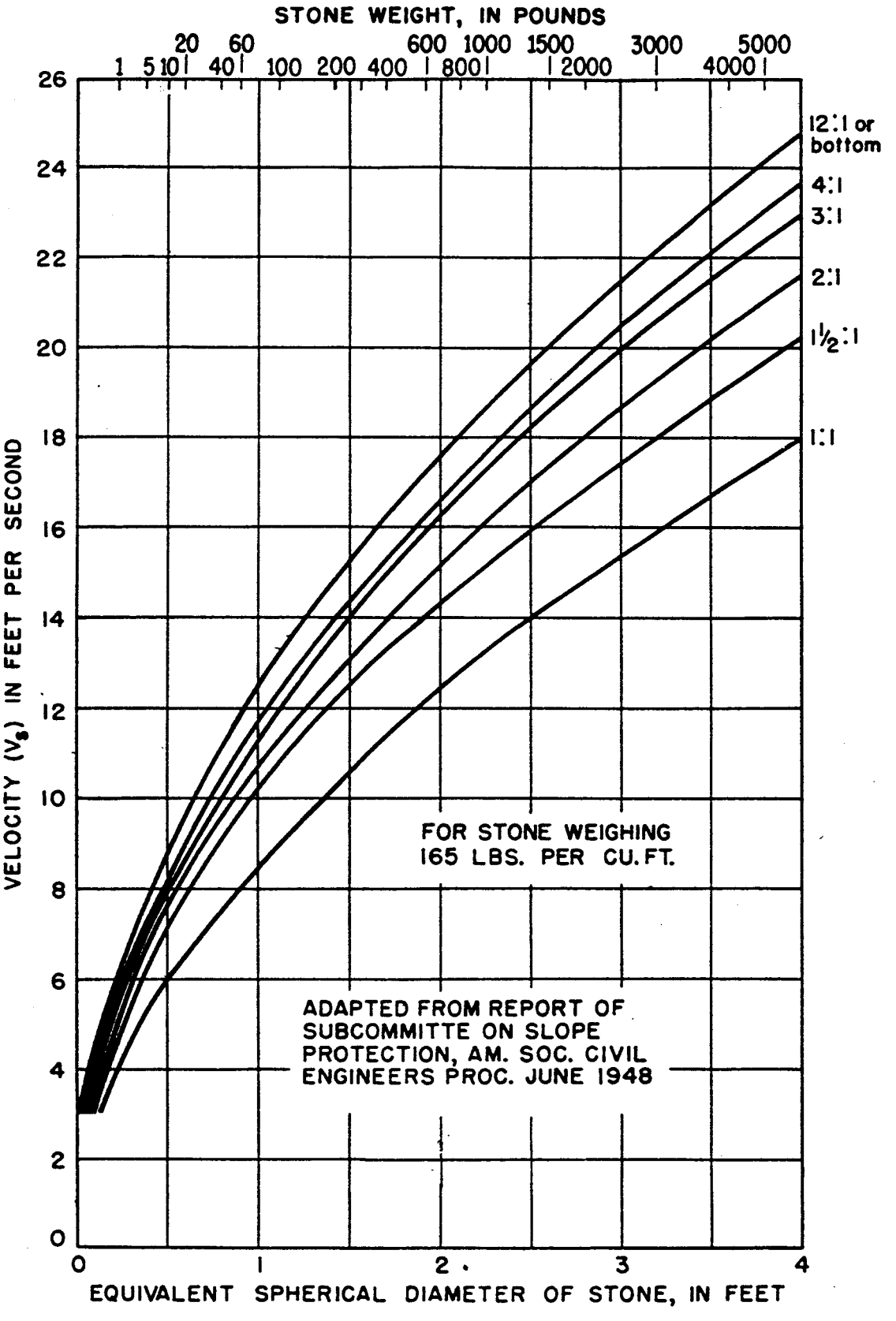


FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

Source: Sezay (1967)

Min. channel slope (use to determine channel depth) = 0.015 ft/ft (n=0.033)

See printout on pg 18f of this calc.

Design flow depth = 1.03 ft

Design channel depth = 2.0 ft (0.97' freeboard)

Construct channel w/ double filter blanket as designed for Horizon reclamation channels. See typical cross section on pg 18g of this calc.

Design – Culvert System at downstream end of channel

Using nomograph on pg 18h of this calc → 36" CMP is marginally adequate. Use 48" CMP to provide factor of safety.

Installation guidelines:

- Projecting inlet is acceptable
- Provide riprap (as in channel) on slope (i.e., road outslope) at culvert inlet
- Provide trash rack at culvert inlet
- Install at depth recommended by manufacturer

Given the limited space between the inlet of the existing culvert beneath the Gordon Creek road and the probable toe of the outslope of the new Beaver Creek road, it is recommended that the new Beaver Creek road culvert be extended completely beneath the Gordon Creek road. This will require removal of the existing Gordon Creek road culvert. Use 48" CMP throughout. Water from roadside ditches to enter primary culvert via ditch-relief culverts.

Gordon Creek road ditch relief culvert:

Watershed area = 7.16 ac (See pg 18i of this calc.)

Avg watershed slope = 63.7%

Hydraulic length = 1400 ft

Assume curve number = 80 (sagebrush w/ rock outcrops)

$$S = \frac{1000}{CN} - 10 = 2.50$$

18f/
Revised 2/11/98

Jewkes Creek Realignment - Minimum Slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Mine
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.033	
Channel Slope	0.015000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	6.00	ft
Discharge	38.70	cfs

← Based on $d_{50} = 9''$, Slope = 1.5%

Results		
Depth	1.03	ft
Flow Area	8.27	ft²
Wetted Perimeter	10.59	ft
Top Width	10.11	ft
Critical Depth	0.97	ft
Critical Slope	0.018307	ft/ft
Velocity	4.68	ft/s
Velocity Head	0.34	ft
Specific Energy	1.37	ft
Froude Number	0.91	
Flow is subcritical.		

← Max flow depth. Design w/ channel depth = 2.0' (0.97' freeboard)

Horizon Coal
P.O. Box 599
Helper, UT 84526

February 11, 1998

Pamela Grubaugh-Littig
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Subject: Culvert Extension - ACT/007/020-97D

Dear Pam,

Upon a request by Horizon Coal Corporation, please find enclosed 6 copies of changes to the Horizon Coal Corporation permit associated with the extension of Culvert UC-3.
If you have any questions please contact me at (801) 561-1555.

Sincerely yours,

Vicky

Vicky S. Bailey

cc: Bill Malensick

APPLICATION FOR PERMIT PROCESSING

Permit Change ☐	New Permit ☐	Renewal ☐	Transfer ☐	Exploration ☐	Bond Release ☐	Permit Number: ACT/007/020

Title of Proposal:

Extension of Culvert UC-3 and Adjacent Disturbed Area Boundary

Mine: HORIZON

Permittee: HORIZON COAL

Description, include reason for application and timing required to implement:

Instructions: *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.*

☐Yes	☒ No	1. Change in the size of the Permit Area? _____ acres Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐Yes	☒ No	2. Is the application submitted as a result of a Division Order? DO #
☐Yes	☒ No	3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐Yes	☒ No	4. Does application include operations in hydrologic basins other than as currently approved?
☐Yes	☒ No	5. Does application result from cancellation, reduction or increase of insurance or reclamation bond?
☐Yes	☒ No	6. Does the application require or include public notice/publication?
☐Yes	☒ No	7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☒Yes	☐ No	8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐Yes	☒ No	9. Is the application submitted as a result of a Violation? NOV #
☐Yes	☒ No	10. Is the application submitted as a result of other laws or regulations or policies? Explain:
☐Yes	☒ No	11. Does the application affect the surface landowner or change the post mining land use?
☐Yes	☒ No	12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?)
☐Yes	☒ No	13. Does the application require or include collection and reporting of any baseline information?
☐Yes	☒ No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☒Yes	☐ No	15. Does application require or include soil removal, storage or placement?
☒Yes	☐ No	16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐Yes	☒ No	17. Does the application require or include construction, modification, or removal of surface facilities?
☒Yes	☐ No	18. Does the application require or include water monitoring, sediment or drainage control measures?
☒Yes	☐ No	19. Does the application require or include certified designs, maps, or calculations?
☐Yes	☒ No	20. Does the application require or include subsidence control or monitoring?
☒Yes	☐ No	21. Have reclamation costs for bonding been provided for?
☒Yes	☐ No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐Yes	☒ No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

☒ **Attach _6_ complete copies of the application.**

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.

Larry H. Jones 2/11/98

Signed - Name - Position - Date

Subscribed and sworn to before me this 11th day of Feb., 19 98.

Julie G McKenzie

Notary Public

My Commission Expires:

Attest: STATE OF

COUNTY OF

JULIE G MCKENZIE
NOTARY PUBLIC • STATE of UTAH
50 SOUTH MAIN #1600
SALT LAKE CITY, UT 84144
COMM. EXP. 5-25-2001

Received by Oil, Gas & Mining

RECEIVED
FEB 11 1998
DIV. OF OIL, GAS & MINING

APPLICATION TRACKING NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: Extension of Culvert UC-3 and Adjacent Disturbed Area Boundary	Permit Number: ACT/007/020
	Mine: Horizon Mine
	Permittee: Horizon Coal

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	X REPLACE	☐ REMOVE	Chapter 3, Pages 3-5, 3-29, 3-30, and 3-44
☐ ADD	X REPLACE	☐ REMOVE	Appendix 3-9
☐ ADD	X REPLACE	☐ REMOVE	Table 8-3 and Topsoil Stockpile Table in Appendix 8-1

February 11, 1998

Horizon Coal
P.O. Box 599
Helper, UT 84526

February 11, 1998

Pamela Grubaugh-Littig
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

ACT/007/020
#2
1A BG1
Copy Joe #5

Subject: Channel Configuration for NOV N97-26-7-1

Dear Pam,

Upon a request by Horizon Coal Corporation, please find enclosed 6 copies of changes to the Horizon Coal Corporation permit. These changes address soils issues associated with NOV N97-26-7-1. One copy of Plates 3-1, 3-7, 3-7A and Appendix 8-1, Plate B have been included for reference, six copies of the same plates were submitted on February 9, 1998 to address N97-45-1-1.

If you have any questions please contact me at (801) 561-1555.

Sincerely yours,

Vicky

Vicky S. Bailey

cc: Bill Malensick

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: Channel Configuration - NOV N97-26-7-1	Permit Number: ACT/007/020
	Mine: Horizon Mine
	Permittee: Horizon Coal

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			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	X REPLACE	☐ REMOVE	Chapter 7, Pages 7-54
☐ ADD	X REPLACE	☐ REMOVE	Appendix 7-4, Operational Hydrology Section, Pages 16 through 18f

February 11, 1998

APPLICATION FOR PERMIT PROCESSING

Permit Change ☐	New Permit ☐	Renewal ☐	Transfer ☐	Exploration ☐	Bond Release ☐	Permit Number: ACT/007/020

Title of Proposal:
Channel Configuration - N97-26-7-1

Mine: HORIZON

Permittee: HORIZON COAL

Description, include reason for application and timing required to implement:

Instructions: *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.*

☐Yes	☒ No	1. Change in the size of the Permit Area? _____ acres Disturbed Area? _____ acres ☐ increase ☐ decrease.
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Larry H. James 2/11/98
Signed - Name - Position - Date

Subscribed and sworn to before me this 11th day of Feb., 19 98.

Julie G. McKenzie
Notary Public

My Commission Expires:
Attest: STATE OF
COUNTY OF

JULIE G. MCKENZIE
NOTARY PUBLIC • STATE of UTAH
80 SOUTH MAIN #1600
SALT LAKE CITY, UT 84
COMM. EXP. 8-23-2

Received by Oil, Gas & Mining
RECEIVED
FEB 11 1998
DIV. OF OIL, GAS & MINING
ASSIGNED TRACKING NUMBER

on inlet control and a headwater to depth ratio of one or less. An extension of UC-3 is discussed in Appendix 3-9.

Discharge at the outlet of culvert UC-1 will have an exit velocity of approximately 10.4 fps (see Appendix 7-4). This will be controlled by installing an outlet channel and impact pool. The outlet channel will have graded riprap on the bottom and along the sides of the channel for an approximate distance of 30 feet downstream from the culvert outlet to a transition to a compound channel with a riprapped low flow channel and vegetated flood plain, as proposed for the final reclamation channel (see Plates 7-4 & 7-6). The riprap in the outlet channel and the low flow channel will have a median diameter of 0.5 foot and will be placed at a thickness of 12 inches. The gradation of the riprap is presented in Table 7-6. A geotextile material will be installed beneath the outlet channel riprap as a filter blanket. A sand filter will be installed beneath the low flow channel riprap.

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Calculations contained in Appendix 7-4 indicate that the flow capacity of the unaltered Jewkes Creek upstream from culvert UC-3 is 27.7 cfs. The flow capacity of the unaltered Jewkes Creek downstream from culvert UC-1 is 38.7 cfs. Culverts UC-1 and UC-3 have design capacities of 59 cfs and 40 cfs, respectively. Hence, the capacities of these culverts exceed the capacity of Jewkes Creek in its unaltered state.

As indicated in Appendix 7-4, the capacity of the unaltered Portal Canyon Creek upstream from culvert UC-2 is 13.1 cfs. All of the downstream portion of this creek will be subject to the culverted diversion. Culvert UC-2 has a capacity of 22 cfs. Hence, the capacity of this culvert exceeds that of Portal Canyon Creek in its unaltered state.

To facilitate realignment of the Beaver Creek county road, Carbon County realigned a portion of Jewkes Creek downstream from the disturbed area. Calculations supporting this stream realignment are provided in Appendix 7-4. As indicated, the channel has been designed with a 6-foot bottom width, 2H:1V sideslopes, and riprap with a median diameter of 9 inches. The long-term stability of this riprap will be monitored during the operation of the mine. If damage occurs to the riprap during this period, repairs will be made immediately. If the riprap is deemed stable at the end of the operational period, it will be left in place following reclamation. Otherwise, changes will be made in consultation with DOGM.

UC-1 outlet protection requirements:

Outlet velocity (based on outlet slope of 4% and a design flow of 27.9 cfs [operational period design flow]):

V = 9.56 ft/s (see pg 17 of this section)

Provide riprap apron at culvert outlet for erosion protection. According to pg 18 of this section:

Min d_{50} = 7.4" → Use d_{50} = 8"

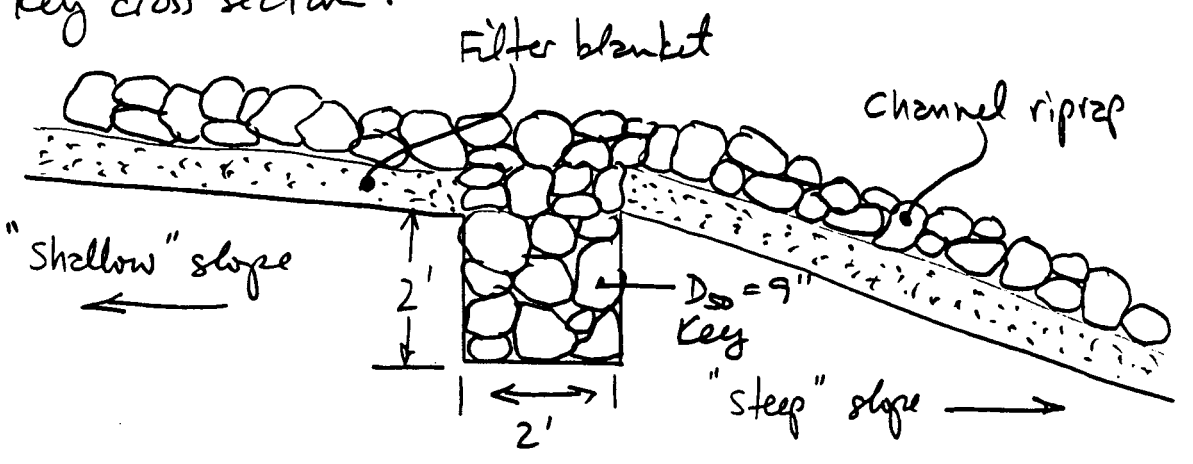
Min. apron length = 5.5' → Use length = 10'

Line area with coarse and fine filter blanket as designed for reclamation channel (6" of each)

Channel design downstream from culvert outlet → see pg 17 - 18 in of this section. Extend riprap to top of bank for a distance of approximately 50 ft downstream from the outlet of UC-1 (i.e. to a point around the first bend in the outlet channel). This will provide additional erosion protection on the channel bank.

A change in the grade of the outlet channel occurs at a distance of approximately 100 ft downstream from the outlet of UC-1. To prevent headcutting at this location, install a riprap key into the channel at the change in slope. This key should have a width of 2 ft and a depth of 2 ft below the bottom of the lowest filter blanket (unless bedrock is encountered at a shallower depth). Fill the key with d_{50} = 9" riprap.

Key cross section:



UC-1 Outlet Velocity
Worksheet for Circular Channel

Project Description	
Project File	untitled.fm2
Worksheet	Culvert Outlet Protection
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.024	
Channel Slope	0.040000	ft/ft
Diameter	36.00	in
Discharge	27.90	cfs

Results		
Depth	1.29	ft
Flow Area	2.92	ft²
Wetted Perimeter	4.30	ft
Top Width	2.97	ft
Critical Depth	1.71	ft
Percent Full	43.12	
Critical Slope	0.015548	ft/ft
Velocity	9.56	ft/s ← Outlet velocity
Velocity Head	1.42	ft
Specific Energy	2.71	ft
Froude Number	1.70	
Maximum Discharge	77.72	cfs
Full Flow Capacity	72.25	cfs
Full Flow Slope	0.005964	ft/ft
Flow is supercritical.		

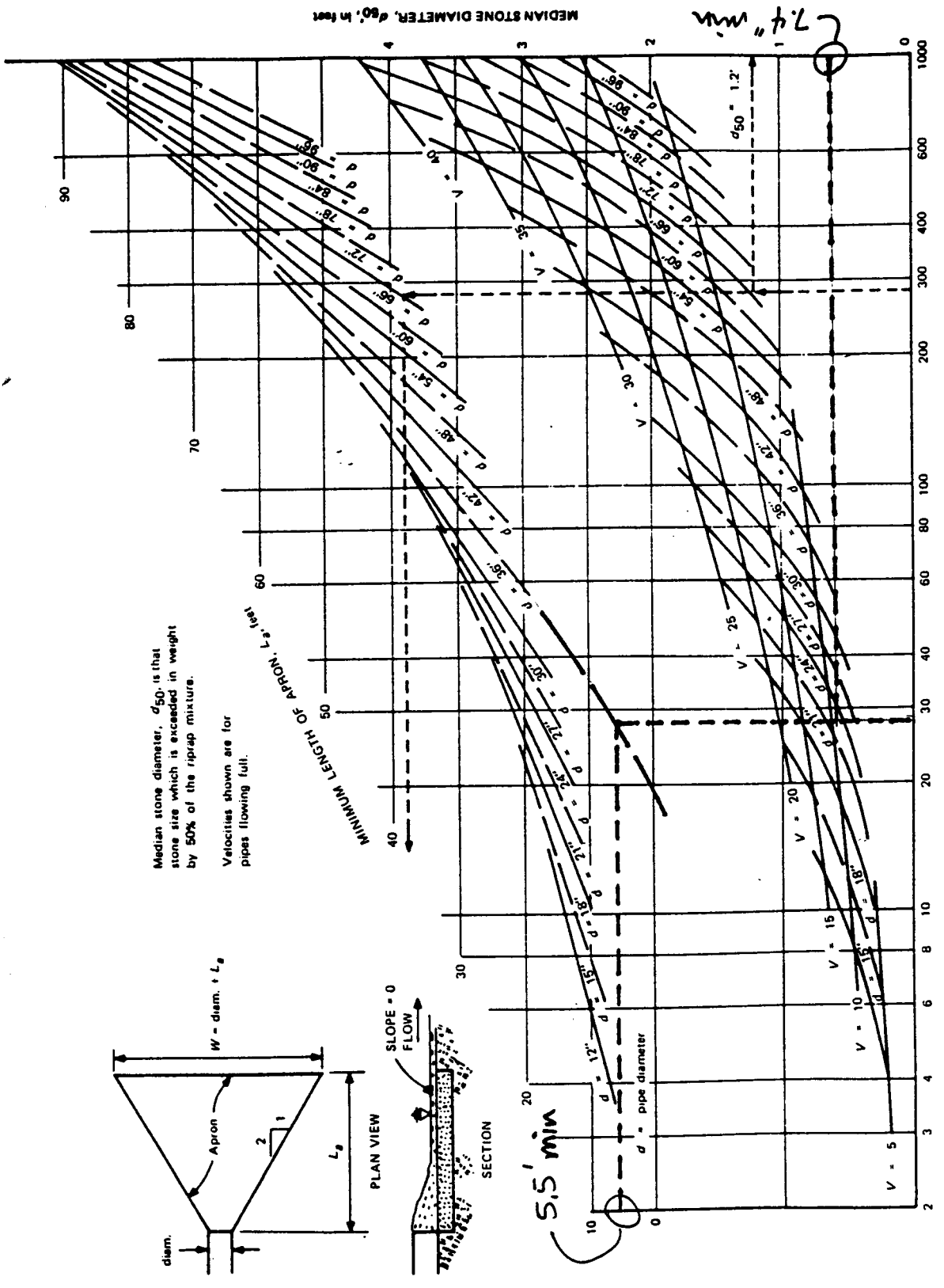


Figure I-15. Design of outlet protection – minimum tailwater condition ($T_W < 0.5$ diam.)[1]

Source: U.S. EPA (1976) — EPA-625/3-76-006

JEWKES CREEK REALIGNMENT
DESIGN CALCULATIONS

Scope

- Realign the downstream end of Jewkes Creek below the Horizon No. 1 Mine facilities
- Account for runoff from realigned county road (referred to herein as the Beaver Creek county road) and from the Gordon Creek county road.
- Design event → capacity of natural upstream channel.

Features

See pg 18b of this calc.

Design – Realigned Channel

100-yr, 6-hr peak flow:

Operational period (design flow for UC-1) → 27.9 cfs
Reclamation period (design flow for RD-3) → 30.2 cfs
Natural channel capacity at RD-3 (downstream) → 38.7 cfs

Worst case (design condition at request of DOGM)

Maximum channel slope (use for riprap design) = 0.151 ft/ft

Calculate the roughness coefficient according to Abt et al. (1987):

$$n = 0.0456\left[(d_{50})(S)\right]^{0.159}$$

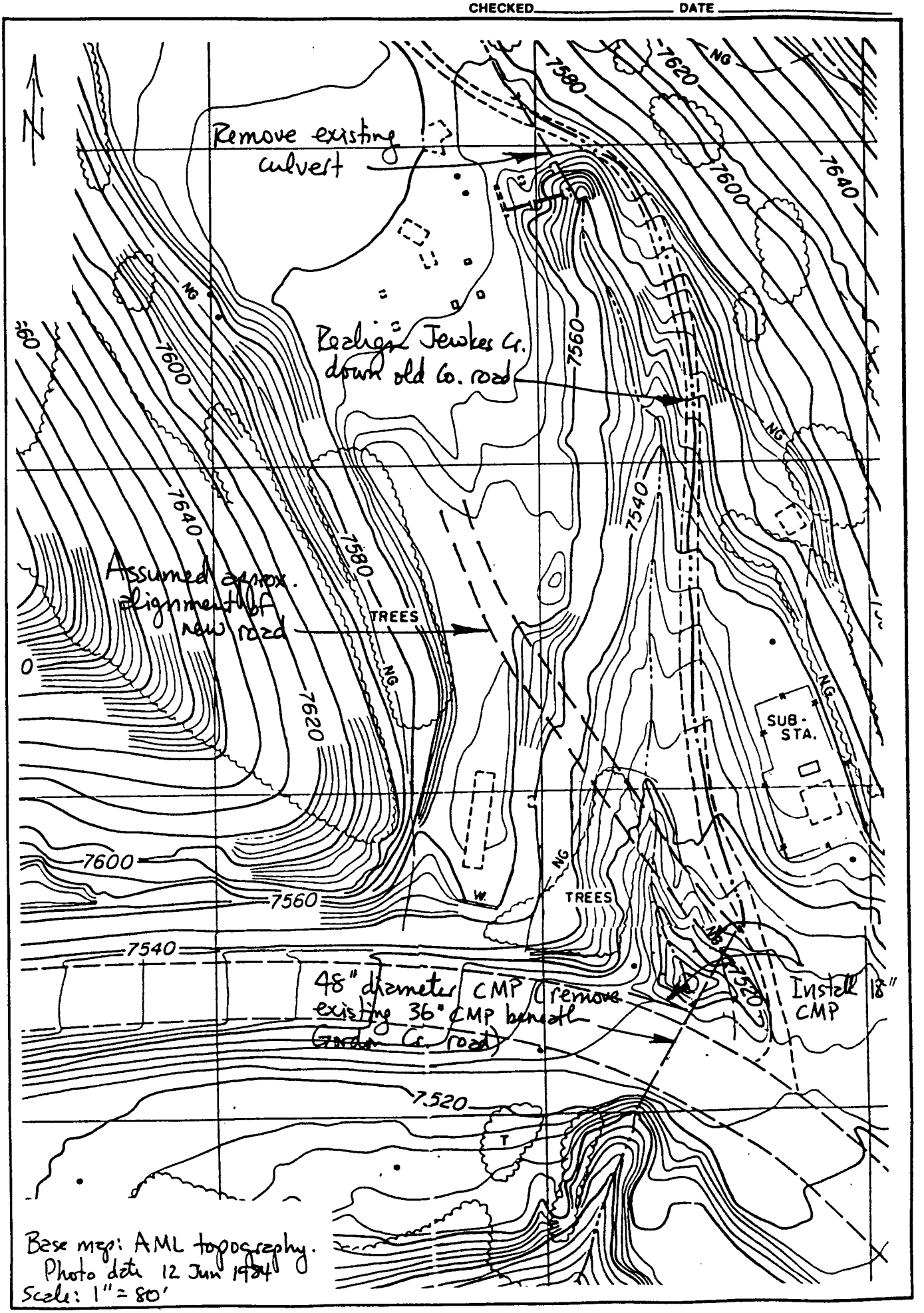
where n = Manning's roughness coefficient
d_{50} = median riprap diameter (in)
S = channel slope (ft/ft)

For $d_{50} = 9''$
$S = 0.151$ ft/ft } $n = 0.048$

See printout on pg 18c of this calc. for bottom width = 6'
side slopes = 2:1

EARTHFAX ENGINEERING, INC.
ENGINEERS / SCIENTISTS

PROJECT UC-572-02 PAGE 18b OF
COMPUTED DBW DATE 27 Jun 1997
CHECKED DATE



Base map: AML topography.
Photo date 12 Jun 1984
Scale: 1" = 80'

Jewkes Creek Realignment - Maximum Slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Mine
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.048	
Channel Slope	0.151000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	6.00	ft
Discharge	38.70	cfs

← Based on $d_{50} = 9"$ and slope = 15.1%

Results		
Depth	0.66	ft
Flow Area	4.85	ft²
Wetted Perimeter	8.96	ft
Top Width	8.65	ft
Critical Depth	0.97	ft
Critical Slope	0.038733	ft/ft
Velocity	7.99	ft/s
Velocity Head	0.99	ft
Specific Energy	1.65	ft
Froude Number	1.88	
Flow is supercritical.		

← Max. velocity

$d_{50} = 9"$ riprap can safely withstand a velocity of 9.4 ft/s against 2:1 sideslopes (see pg 18d). Hence, this riprap is adequate.

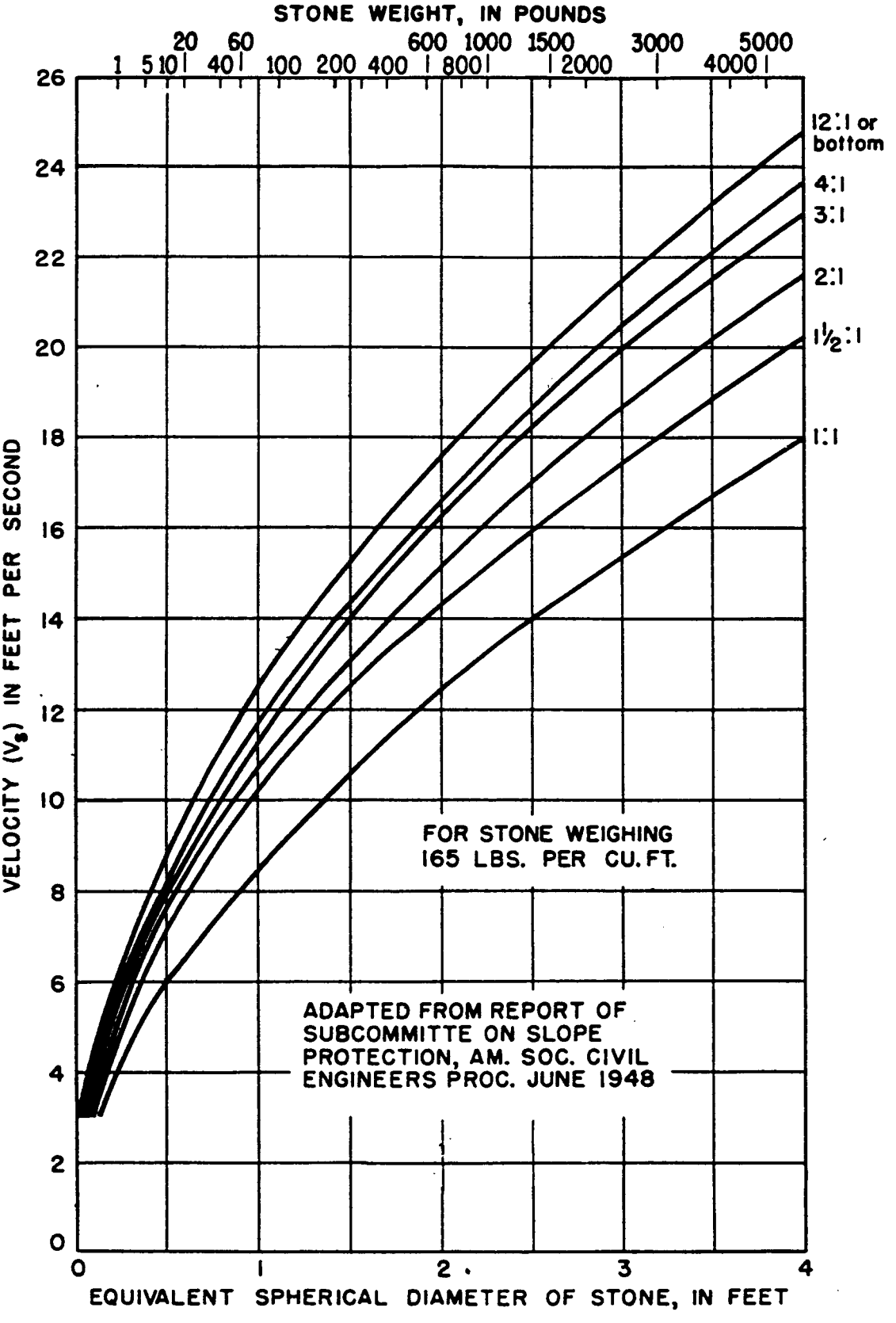


FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

Source: Sezay (1967)

Min. channel slope (use to determine channel depth) = 0.015 ft/ft (n=0.033)

See printout on pg 18f of this calc.

Design flow depth = 1.03 ft

Design channel depth = 2.0 ft (0.97' freeboard)

Construct channel w/ double filter blanket as designed for Horizon reclamation channels. See typical cross section on pg 18g of this calc.

Design – Culvert System at downstream end of channel

Using nomograph on pg 18h of this calc → 36" CMP is marginally adequate. Use 48" CMP to provide factor of safety.

Installation guidelines:

- Projecting inlet is acceptable
- Provide riprap (as in channel) on slope (i.e., road outslope) at culvert inlet
- Provide trash rack at culvert inlet
- Install at depth recommended by manufacturer

Given the limited space between the inlet of the existing culvert beneath the Gordon Creek road and the probable toe of the outslope of the new Beaver Creek road, it is recommended that the new Beaver Creek road culvert be extended completely beneath the Gordon Creek road. This will require removal of the existing Gordon Creek road culvert. Use 48" CMP throughout. Water from roadside ditches to enter primary culvert via ditch-relief culverts.

Gordon Creek road ditch relief culvert:

Watershed area = 7.16 ac (see pg 18i of this calc.)

Avg watershed slope = 63.7%

Hydraulic length = 1400 ft

Assume curve number = 80 (sagebrush w/ rock outcrops)

$$S = \frac{1000}{CN} - 10 = 2.50$$

18f/
Revised 2/11/98

Jewkes Creek Realignment - Minimum Slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Mine
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.033	
Channel Slope	0.015000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	6.00	ft
Discharge	38.70	cfs

← Based on $d_{50} = 9''$, Slope = 1.5%

Results		
Depth	1.03	ft
Flow Area	8.27	ft²
Wetted Perimeter	10.59	ft
Top Width	10.11	ft
Critical Depth	0.97	ft
Critical Slope	0.018307	ft/ft
Velocity	4.68	ft/s
Velocity Head	0.34	ft
Specific Energy	1.37	ft
Froude Number	0.91	
Flow is subcritical.		

← Max flow depth. Design w/ channel depth = 2.0' (0.97' freeboard)

3.2.8 Water Diversion Structures

Diversions will be installed to direct disturbed-area runoff to sediment-control structures and/or facilities. Runoff from undisturbed areas will be diverted away from the disturbed areas to the extent practical. Detailed discussions of the design of diversion structures are provided in Chapter 7.

3.2.9 Sedimentation Control Structures and Water Treatment Facilities

All runoff from the disturbed area is directed into the sedimentation pond located directly below the area of disturbance. The pond has been designed to contain runoff resulting from the 10-year, 24-hour precipitation event. The pond spillway has been designed to safely pass the peak flow resulting from a 25-year, 6-hour precipitation event.

The location of the pond is shown on Plate 3-1. Design, construction, maintenance and operation of the pond are discussed in detail in Section 7.2.3.2.

3.2.10 Transportation, Roads, Parking Area, Railroad Spurs

Coal will be transported from the mine via a conveyor and discharged onto the coal storage area. Coal handling is discussed in Section 3.2.4. Transportation to and from the mine site (coal, personnel, and materials) is discussed below.

Roads

Both primary and ancillary roads will exist within the permit area. Road alignments, widths, gradients, and other design details are shown on Plate 3-4 and 3-4A. A plan view of the roads is shown on Plate 3-1. The roads include primary roads for coal haulage, and ancillary drill and fan portal access roads.

The fan portal access and drill roads are existing roads that will be cleaned and graded to provide vehicle access to the fan for construction and maintenance and access to monitoring well HZ-95-3.

The mine's disturbed area will be accessed by the ~~Consumers/Clear Creek~~ Beaver Creek Road, a county owned and maintained road extending from Consumers Canyon to Clear Creek. Plate 3-1 shows the width of the Beaver Creek road and it associated right-of-way, parallel to the disturbed area boundary.

Parking Areas

A parking area will be established adjacent to the bathhouse. This area will be graveled and sloped to drain to the sedimentation pond.

Railroad Spurs

There are no railroads in the Gordon Creek area.

topography that is compatible with the post-mining land use, using materials that are available at the site (Plates 3-7 and 3-7A). Cut and fill calculations are provided in Table 3-1, for the for the operational to post-mining (i.e., reclamation) phase. The excess fill noted in Table 3-1 will be derrived from topsoil, while accounting for compaction of common fill during backfilling.

In general, the backfilling and regrading will proceed as follows:

(a) After sealing of the portals and removal of all structures, a backhoe (Cat 235 or larger) will be brought to the upper portal terrace (Portal Canyon). The road on the north side of Portal Canyon will be backfilled, regraded, recontoured, fertilized, seeded and mulched (See Sections 3.5.5 for additional method details).

(b) The backhoe will begin by reaching down over the fill bank and retrieving as much material as can be reached to be placed on the terrace. A dozer (Cat D-7 or larger) will work with the backhoe, taking the retrieved material and spreading and compacting it from the faceup outward.

(c) The mine yard will then be recontoured using backhoes and dozers to drain to the center of the canyons. The reclamation slopes will be achieved during this backfilling and grading operation. In general, fill material for reclamation will be obtained from adjacent areas of cut material. Prior to cutting or filling in areas shown on Plate 3-7 as having been contemporaneously reclaimed, the topsoil on those areas will be stripped and temporarily set aside in an area that will not be impacted by construction activities. Topsoil stripping operations will be supervised by an individual who is experienced in the field identification of topsoil resources. Once an area is properly prepared, this topsoil will be placed on regraded slopes in accordance with the topsoil placement procedures outlined elsewhere in this M&RP. Based on an affected area of 0.20 acre (as noted on Plate 3-7) and an average topsoil thickness in the contemporaeously reclaimed areas of 1.1 inches (see Section 8.8.1 of this M&RP), a total of 296 cubic yards of topsoil will be affected by this effort. Reclamation channels (described in Chapter 7) will be constructed to convey runoff through the reclaimed area. Operational culverts will be removed as the construction of the reclamation channel moves down each canyon. Details regarding the reestablishment of drainages in Jewkes Creek and Portal Canyon are provided in Section 7.2.3.2.

(d) During backfilling and regrading operations, the surface will be scarified to prevent slippage of topsoil and promote root penetration.

(e) A loader will be used to load topsoil into haul trucks at the topsoil stockpiles. The haul trucks will be used to deliver the topsoil from the topsoil stockpiles to the area where the dozer and backhoe will be working. The dozer will be used to evenly distribute the topsoil over the area.

TABLE 3-1

RECLAMATION CUT AND FILL CALCULATIONS

Total inclusion area: 9.15 acres
Cut to Fill ratio: ~~0.87~~0.73
Cut volume: ~~11,238~~11,695 cubic yards
Fill volume: ~~12,939~~15,935 cubic yards

Cut and fill data based on Softdesk Civil/Survey software, release 8.0 and AutoCAD Map software, release 2.

3.5.8 Cost Estimate for Final Reclamation

The estimated cost to reclaim the Horizon No. 1 Mine surface facilities is provided in Appendix 3-7.

The reclamation costs were evaluated to determine if the 100-foot culvert extension planned for 1997 (Appendix 3-9) would be covered by the estimated amount. The previous calculations allowed for 4 days of backhoe use to remove the culverts within the disturbed area. It is currently estimated that a period of only 2.3 days will be required to remove the culverts within the disturbed area. Therefore, the original estimate of 4 days is sufficient to cover the additional 100 feet of culvert installed in 1998. No increase in earthwork bonding costs are necessary with the removal of the 100-foot culvert extension during reclamation, refer to Appendix 3-9.

APPENDIX 3-9

UC-3 CULVERT EXTENSION

TABLE OF CONTENTS

APPENDIX 3-9
UC-3 CULVERT EXTENSION

3-9.1 Scope

The purpose of this appendix is to discuss the proposed extension of culvert UC-3 to allow for a small expansion of the surface facilities at the Horizon Mine. The information contained in this appendix is intended to fulfill the requirements of a letter dated September 11, 1997 and a Technical Analysis dated October 3, 1997 from the Division of Oil, Gas and Mining and it's permit supervisor, Daron R. Haddock, to Horizon Coal Corporation.

The 100-foot extension of culvert UC-3 is proposed for several reasons, the primary reason being safety. The truck turnaround for the mine is on the Jewkes Creek pad area. To access the mine's truck turnaround coal trucks exit the Beaver Creek County Road from the west and reenter the county road from the east. A hill blocks the view of both the trucks exiting the mine from the east and southbound traffic using the Beaver Creek County Road. By removing the hill (i.e., expanding the pad area), this safety concern is alleviated. The secondary reason for expanding the pad is the size of the truck turnaround and the need for storage at the mine. The designed turnaround radius was insufficient for loading and turning; therefore the additional footage improves the truck driver's safety and provides space for material storage.

The area intended for installation of the UC-3 culvert is approximately 100 feet x 50 feet in size. An additional 100 feet x 50 feet portion of an adjacent hillside will also be disturbed at the time of culvert installation. When making the assumption that the upstream end of Jewkes Creek is north, the hillside runs north and south, paralleling Jewkes Creek on the west side of the creek. This hillside blocks the view of existing traffic on the Carbon County Beaver Creek road from vehicles exiting the mine site and will be disturbed to improve safety conditions. Topsoil will be removed on the east hillside as well, during pad construction and stockpile as described below. The topsoil removal area is shown on Plate A in Appendix 8-1.

Field observations indicate that precipitation in the summer of 1997 has been greater than normal. The unusually wet year will require the installation of the culvert with more water in Jewkes Creek than is normal. To accommodate the installation of the culvert, the water will be diverted to the side of or through the intended culvert extension. This diversion will be accomplished by building a small coffer dam upstream from the proposed culvert extension and installing a section of 8-inch (minimum) diameter HDPE culvert along side or through the proposed extension. This diversion will discharge into the upstream end of the existing culvert. It is anticipated that this diversion will be needed for a maximum period of one day.

Following installation of the temporary diversion, topsoil/growth medium will be removed from beneath the area designated for culvert placement. The culvert extension will then be placed. As soon as the culvert extension is secured, the temporary diversion will be removed and the flow of Jewkes Creek will again be redirected into the installed culvert.

Following diversion of the stream flow through the culvert extension, fill material will be placed and compacted on each side of the extension to support the culvert during the removal

of the remaining topsoil/growth medium. The topsoil/growth medium will be removed from one side of the culvert and the area filled and compacted. The soil will then be removed from the other side of the culvert and fill placed and compacted. The fill material will be placed and compacted to meet manufacturer and permit specifications.

Once the topsoil/growth medium is removed from the area of proposed disturbance, the fill material to be placed atop the culvert will be placed and compacted to meet manufacturer and permit specifications.

When the Portal Canyon pad area was determined to be too high (approximately 2 feet), the fill was removed from around the entrance to the three portals, beneath the convey, around the substation, and in front of the office trailer. The fill was stockpiled temporarily awaiting the approval of the culvert extension. Quantities of rock and soils associated with the faceup of the highwall above the portals were also stockpiled and used for fill around the culvert. All topsoil had previously been removed (1996) from these areas.

3-9.2 Disturbed Area Boundary

The location of the proposed culvert extension is indicated on Drawing A, which identifies the surveyed disturbed area boundary as it existed in the field in October 1997. This drawing differs from those which were submitted prior to permit approval due to an inaccurate survey performed by the previous permittee. These inaccuracies resulted in confusion concerning the location of (1) the sediment pond, (2) well access road, (3) lower pad area, (4) topsoil stockpile, and (5) fan portal road. The inaccuracies were discovered during pad construction in the Fall and Winter of 1996.

The current permittee performed a survey of the disturbed area boundary and the above listed locations. The resurveyed disturbed area boundary on Drawing A reflects the markers on the ground combined with the site features listed above.

Within the disturbed area, a 2-foot contour interval was used to prepare Drawing A. This contour interval allows the areas and features within the disturbed area to be more accurately located than was possible on maps provided to the Division prior to permit approval. This has contributed to the visual changes in the disturbed area when comparing Drawing A to previous maps.

Although the disturbed area boundary appears different, the amount of disturbed area identified by this resurvey is less than that used in the initial Mining and Reclamation Plan (M&RP). The amount of bonded disturbed area listed in the approved permit is 9.15 acres, whereas the resurveyed disturbed area is 8.23 acres, including the area of the proposed culvert extension. Nonetheless, the permit will continue to reflect 9.15 acres of disturbance.

3-9.3 Hydrology and Drainage

A letter dated September 15, 1997 from Mr. Richard B. White of EarthFax Engineering, Inc. has been included in this appendix. This letter indicates that extending the culvert upstream for a distance of 100 feet will not adversely impact the design of the culvert. He further

states that "based on the information presented above, it is my opinion that the extension of culvert UC-3 will not adversely impact the hydrologic balance of the area". Mr. White has stamped and signed this letter.

A letter dated September 8, 1997 addressed to Mr. Daron Haddock and stamped received at the Division of Oil, Gas and Mining has also been included in this appendix. This letter indicates that the culvert will be installed "in accordance with the manufacturers specifications as indicated in Horizon's UDOGM Permit". This commitment agrees with that stated above in Section 3-9.1 of this appendix.

The letter to Mr. Haddock references Appendix 7-4 of the M&RP as the location for flow capacity and design details. In addition to Appendix 7-4, Section 7.2.3 within the approved permit discusses the installation of culverts as well as sediment controls.

With the change in the disturbed-area boundary, the drainage area to the sedimentation pond has also changed. The pond was designed with a total drainage area of 35.1 acres, of which 9.1 acres were assumed to be disturbed and 26.0 acres were assumed to be undisturbed. Plate 7-5 has been modified to reflect the changes in the disturbed and undisturbed areas. According to this plate, the actual undisturbed area draining to the pond is 26.8 acres, with 8.2 acres of disturbed area, resulting in a total area of 35.0 acres now draining to the pond. The 0.1-acre decrease in pond drainage area resulted from a slight decrease in the extent of the disturbed area at the upstream end of Portal Canyon.

According to Appendix 7-4 of this M&RP, the design of the sedimentation pond was based on a weighted-average curve number of 70 for the combined undisturbed and disturbed areas. Using this curve number, the required runoff storage volume resulting from the 10-year, 24-hour storm over the 35.0-acre watershed area is 0.55 acre foot. The pond was designed based on a runoff storage volume of 0.56 acre foot.

The sediment storage volume for the pond was based on a ratio of 0.1 acre foot of sediment for every acre of disturbed area. With the reduced disturbed area, the design sediment storage volume is adequate. Hence, even with the additional pad created by the culvert extension, the pond has been adequately designed.

3-9.4 Reclamation

Revisions of the reclamation cost estimate associated with the removal of the additional 100 feet of culvert are reflected in Section 3.5.8 and Appendix 3-7 of the M&RP. The September 8, 1997, letter addressed to Mr. Daron Haddock commits to the following:

> "The permit reclamation commitments and corresponding regulations will apply to the intended culvert extension disturbance. Since a portion of this disturbance is a riparian area, the commitments within the Horizon permit concerning riparian reclamation will apply."

Appendix 9-2 of the M&RP contains a survey and map of the riparian area proposed for disturbance in this culvert extension.

The reclamation plan is located in Section 3.5 of this M&RP. The area affected by the extended culvert will be reclaimed as described in the approved permit.

Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

3-9.5 Refuse

Section 3.3 of the approved permit states, "Refuse material will be segregated on the coal stockpile for temporary storage. The maximum quantity of refuse at the mine prior to disposal will be 500 tons. This refuse material will be blended (in small portion) into the coal to be shipped to customers as contract quality specifications allow." In accordance with the approved permit, refuse will not be used as fill material over the culvert extension.

3-9.6 Soils

Topsoil/growth medium (660 cubic yards (CY) will be salvaged from the bottom of Jewkes Canyon and along the adjacent hillsides. Horizon intends to disturb limited soil and vegetation on the east hillside, but intends to salvage all available topsoil/growth medium on the west hillside. The evaluation of the west hillside assumed that approximately four feet of topsoil was available for salvage, however when Carbon County was working on the road which parallels the west hillside they found the soil to consist of boulders interspersed with a silty loam. The available topsoil may be less than we have estimated.

A portion of the topsoil/growth medium salvaged from the hillsides during the installation of UC-3 will be placed (to a depth of approximately 6 inches) on a slope adjacent to the culvert, the remainder will be placed in a temporary stockpile (Area E). The riparian topsoil removed during the extension will be stockpiled and temporarily stored on the area designated as Area E on Plate A in Appendix 8-1. A layer of geotextile fabric will be placed on the temporary area prior to the placement of the riparian topsoil, making it simple to determine the extent of riparian topsoil to be moved to the permanent stockpile. The riparian soil will be moved to the permanent topsoil stockpile ~~once access is available~~ in February of 1998. The temporary mine fan ~~is currently~~ was blocking access to the permanent topsoil stockpile when the soil was

initially salvaged. Both the temporary and permanent riparian topsoil locations will be signed to identify the soil as riparian. A qualified soils specialist will be on site during the removal of the topsoil/growth medium during the extension of Culvert UC-3.

Topsoil/growth medium salvaged from the bottom of Jewkes Canyon will be segreated, dried, and identified as soil to be returned to the bottom of Jewkes Canyon in the floodplain areas during final reclamation. However, Horizon is not aware of the differences/advantages of the salvaged riparian soil and other soils salvaged in the area after multiple years of laying dormant in a topsoil/growth medium stockpile.

A table, to be included in Appendix 8-1, includes the ~~potential~~ quantity of topsoil/growth medium salvaged, placed and available for distribution during final reclamation. The locations of the soils ~~currently and potentially~~ placed can be found on Plate A within Appendix 8-1. The salvagable topsoil\growth medium from the extension of Culvert UC-3 (Area 12) is outlined on Figure 8-2B.

3-9.7 Environmental Resource Information

Baseline information for the approximately area proposed for disturbance by the culvert extension is provided in Appendices 3-5, 3-7, 3-8, 4-1, 5-1, 7-2, 7-3, 7-6, 7-11, 7-12, 8-1, 9-1, 9-2, 10-1 and 10-2 of the approved permit.

Appendix 8-1

Topsoil Stockpile Table

Topsoil/Growth Medium Recovery and Placement Calculations			
	1996	1997	Total (CY)
Topsoil Recovered During Mine Construction[a]	10,993[b]		10,993
Topsoil Recovered from Culvert UC-3 Extension[c]		660	660
Topsoil Placed on Area D Appendix 8-1 - Plate A	-	499	- 499
Topsoil in Stockpile			11,154
Area E -Riparian Soil			156
Area E -Soils not Riparian*			334
			11,644
In-place Soils (Estimate) Areas 10 & 11	3,733		3,733
Soil Medium Potentially Available for Reclamation[d]			15,377

(a) Surveyed Quantity

(b) Excludes hill described in Section 8.8.1 and on Plate A.

(c) The quantity of recoverable topsoil is estimated, since this table was prepared prior to its removal.

(d) Total of topsoil in stockpile plus in-place soils to be salvaged from areas 10 and 11. Approximately ~~22"~~ 20" of soil will be available for final reclamation (5 ~~49~~ ~~04~~acres within disturbed area to be resoiled). Soils placed on Areas A, B, and C were generated during county road construction. Volume of soil used in Areas A, B, and C is not included in stockpile calculation. If these areas require additional soils at final reclamation, sufficient soils should be available from the stockpile.

- Approximately 200 cy of this soil was placed on Area E as contemporaneous reclamation topsoil per approval by Robert Davidson. Thus reducing available reclamation topsoil to 15, 177.

Imported Topsoil Table	
Area	Topsoil (CY)
Jewkes Canyon - Area A	337
Portal Canyon - Area B	189
Portal Canyon - Area C	449
Total	**975**

TABLE 8-3

Topsoil/Growth Medium Calculations

Recovery Area No.	Soil Type	Depth To Be Removed (Feet)	Volume (CY)[A]
1	DM	1.0	513
2	GIG	2.0	704
3	JIB	3.0	3000
4	DM	3.0	1173
5	DM	1.5	773
6	DM	3.0	1280
7	GIG	4.5	1600
8	FIA	2.5	667
9	DM	3.0	227
10	FIA/JIB	4.0	2133
11	JIB	3.0	1600
12[B]	Riparian	1	156
12[B]	GIG/DM	1.5	334
		Total	14,160 CY

[A] All topsoil/growth medium to be stored at the top of Portal Canyon.
[B] Soil temporarily stored in Area E, Plate A, Appendix 8-1

3.2.8 Water Diversion Structures

Diversions will be installed to direct disturbed-area runoff to sediment-control structures and/or facilities. Runoff from undisturbed areas will be diverted away from the disturbed areas to the extent practical. Detailed discussions of the design of diversion structures are provided in Chapter 7.

3.2.9 Sedimentation Control Structures and Water Treatment Facilities

All runoff from the disturbed area is directed into the sedimentation pond located directly below the area of disturbance. The pond has been designed to contain runoff resulting from the 10-year, 24-hour precipitation event. The pond spillway has been designed to safely pass the peak flow resulting from a 25-year, 6-hour precipitation event.

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3.2.10 Transportation, Roads, Parking Area, Railroad Spurs

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Parking Areas

A parking area will be established adjacent to the bathhouse. This area will be graveled and sloped to drain to the sedimentation pond.

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There are no railroads in the Gordon Creek area.

topography that is compatible with the post-mining land use, using materials that are available at the site (Plates 3-7 and 3-7A). Cut and fill calculations are provided in Table 3-1, for the for the operational to post-mining (i.e., reclamation) phase. The excess fill noted in Table 3-1 will be derrived from topsoil, while accounting for compaction of common fill during backfilling.

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Total inclusion area: 9.15 acres
Cut to Fill ratio: ~~0.87~~0.73
Cut volume: ~~11,238~~11,695 cubic yards
Fill volume: ~~12,939~~15,935 cubic yards

Cut and fill data based on Softdesk Civil/Survey software, release 8.0 and AutoCAD Map software, release 2.

3.5.8 Cost Estimate for Final Reclamation

The estimated cost to reclaim the Horizon No. 1 Mine surface facilities is provided in Appendix 3-7.

The reclamation costs were evaluated to determine if the 100-foot culvert extension planned for 1997 (Appendix 3-9) would be covered by the estimated amount. The previous calculations allowed for 4 days of backhoe use to remove the culverts within the disturbed area. It is currently estimated that a period of only 2.3 days will be required to remove the culverts within the disturbed area. Therefore, the original estimate of 4 days is sufficient to cover the additional 100 feet of culvert installed in 1998. No increase in earthwork bonding costs are necessary with the removal of the 100-foot culvert extension during reclamation, refer to Appendix 3-9.

APPENDIX 3-9

UC-3 CULVERT EXTENSION

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APPENDIX 3-9
UC-3 CULVERT EXTENSION

3-9.1 Scope

The purpose of this appendix is to discuss the proposed extension of culvert UC-3 to allow for a small expansion of the surface facilities at the Horizon Mine. The information contained in this appendix is intended to fulfill the requirements of a letter dated September 11, 1997 and a Technical Analysis dated October 3, 1997 from the Division of Oil, Gas and Mining and it's permit supervisor, Daron R. Haddock, to Horizon Coal Corporation.

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The area intended for installation of the UC-3 culvert is approximately 100 feet x 50 feet in size. An additional 100 feet x 50 feet portion of an adjacent hillside will also be disturbed at the time of culvert installation. When making the assumption that the upstream end of Jewkes Creek is north, the hillside runs north and south, paralleling Jewkes Creek on the west side of the creek. This hillside blocks the view of existing traffic on the Carbon County Beaver Creek road from vehicles exiting the mine site and will be disturbed to improve safety conditions. Topsoil will be removed on the east hillside as well, during pad construction and stockpile as described below. The topsoil removal area is shown on Plate A in Appendix 8-1.

Field observations indicate that precipitation in the summer of 1997 has been greater than normal. The unusually wet year will require the installation of the culvert with more water in Jewkes Creek than is normal. To accommodate the installation of the culvert, the water will be diverted to the side of or through the intended culvert extension. This diversion will be accomplished by building a small coffer dam upstream from the proposed culvert extension and installing a section of 8-inch (minimum) diameter HDPE culvert along side or through the proposed extension. This diversion will discharge into the upstream end of the existing culvert. It is anticipated that this diversion will be needed for a maximum period of one day.

Following installation of the temporary diversion, topsoil/growth medium will be removed from beneath the area designated for culvert placement. The culvert extension will then be placed. As soon as the culvert extension is secured, the temporary diversion will be removed and the flow of Jewkes Creek will again be redirected into the installed culvert.

Following diversion of the stream flow through the culvert extension, fill material will be placed and compacted on each side of the extension to support the culvert during the removal

of the remaining topsoil/growth medium. The topsoil/growth medium will be removed from one side of the culvert and the area filled and compacted. The soil will then be removed from the other side of the culvert and fill placed and compacted. The fill material will be placed and compacted to meet manufacturer and permit specifications.

Once the topsoil/growth medium is removed from the area of proposed disturbance, the fill material to be placed atop the culvert will be placed and compacted to meet manufacturer and permit specifications.

When the Portal Canyon pad area was determined to be too high (approximately 2 feet), the fill was removed from around the entrance to the three portals, beneath the convey, around the substation, and in front of the office trailer. The fill was stockpiled temporarily awaiting the approval of the culvert extension. Quantities of rock and soils associated with the faceup of the highwall above the portals were also stockpiled and used for fill around the culvert. All topsoil had previously been removed (1996) from these areas.

3-9.2 Disturbed Area Boundary

The location of the proposed culvert extension is indicated on Drawing A, which identifies the surveyed disturbed area boundary as it existed in the field in October 1997. This drawing differs from those which were submitted prior to permit approval due to an inaccurate survey performed by the previous permittee. These inaccuracies resulted in confusion concerning the location of (1) the sediment pond, (2) well access road, (3) lower pad area, (4) topsoil stockpile, and (5) fan portal road. The inaccuracies were discovered during pad construction in the Fall and Winter of 1996.

The current permittee performed a survey of the disturbed area boundary and the above listed locations. The resurveyed disturbed area boundary on Drawing A reflects the markers on the ground combined with the site features listed above.

Within the disturbed area, a 2-foot contour interval was used to prepare Drawing A. This contour interval allows the areas and features within the disturbed area to be more accurately located than was possible on maps provided to the Division prior to permit approval. This has contributed to the visual changes in the disturbed area when comparing Drawing A to previous maps.

Although the disturbed area boundary appears different, the amount of disturbed area identified by this resurvey is less than that used in the initial Mining and Reclamation Plan (M&RP). The amount of bonded disturbed area listed in the approved permit is 9.15 acres, whereas the resurveyed disturbed area is 8.23 acres, including the area of the proposed culvert extension. Nonetheless, the permit will continue to reflect 9.15 acres of disturbance.

3-9.3 Hydrology and Drainage

A letter dated September 15, 1997 from Mr. Richard B. White of EarthFax Engineering, Inc. has been included in this appendix. This letter indicates that extending the culvert upstream for a distance of 100 feet will not adversely impact the design of the culvert. He further

states that "based on the information presented above, it is my opinion that the extension of culvert UC-3 will not adversely impact the hydrologic balance of the area". Mr. White has stamped and signed this letter.

A letter dated September 8, 1997 addressed to Mr. Daron Haddock and stamped received at the Division of Oil, Gas and Mining has also been included in this appendix. This letter indicates that the culvert will be installed "in accordance with the manufacturers specifications as indicated in Horizon's UDOGM Permit". This commitment agrees with that stated above in Section 3-9.1 of this appendix.

The letter to Mr. Haddock references Appendix 7-4 of the M&RP as the location for flow capacity and design details. In addition to Appendix 7-4, Section 7.2.3 within the approved permit discusses the installation of culverts as well as sediment controls.

With the change in the disturbed-area boundary, the drainage area to the sedimentation pond has also changed. The pond was designed with a total drainage area of 35.1 acres, of which 9.1 acres were assumed to be disturbed and 26.0 acres were assumed to be undisturbed. Plate 7-5 has been modified to reflect the changes in the disturbed and undisturbed areas. According to this plate, the actual undisturbed area draining to the pond is 26.8 acres, with 8.2 acres of disturbed area, resulting in a total area of 35.0 acres now draining to the pond. The 0.1-acre decrease in pond drainage area resulted from a slight decrease in the extent of the disturbed area at the upstream end of Portal Canyon.

According to Appendix 7-4 of this M&RP, the design of the sedimentation pond was based on a weighted-average curve number of 70 for the combined undisturbed and disturbed areas. Using this curve number, the required runoff storage volume resulting from the 10-year, 24-hour storm over the 35.0-acre watershed area is 0.55 acre foot. The pond was designed based on a runoff storage volume of 0.56 acre foot.

The sediment storage volume for the pond was based on a ratio of 0.1 acre foot of sediment for every acre of disturbed area. With the reduced disturbed area, the design sediment storage volume is adequate. Hence, even with the additional pad created by the culvert extension, the pond has been adequately designed.

3-9.4 Reclamation

Revisions of the reclamation cost estimate associated with the removal of the additional 100 feet of culvert are reflected in Section 3.5.8 and Appendix 3-7 of the M&RP. The September 8, 1997, letter addressed to Mr. Daron Haddock commits to the following:

> "The permit reclamation commitments and corresponding regulations will apply to the intended culvert extension disturbance. Since a portion of this disturbance is a riparian area, the commitments within the Horizon permit concerning riparian reclamation will apply."

Appendix 9-2 of the M&RP contains a survey and map of the riparian area proposed for disturbance in this culvert extension.

The reclamation plan is located in Section 3.5 of this M&RP. The area affected by the extended culvert will be reclaimed as described in the approved permit.

Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

3-9.5 Refuse

Section 3.3 of the approved permit states, "Refuse material will be segregated on the coal stockpile for temporary storage. The maximum quantity of refuse at the mine prior to disposal will be 500 tons. This refuse material will be blended (in small portion) into the coal to be shipped to customers as contract quality specifications allow." In accordance with the approved permit, refuse will not be used as fill material over the culvert extension.

3-9.6 Soils

Topsoil/growth medium (660 cubic yards (CY) will be salvaged from the bottom of Jewkes Canyon and along the adjacent hillsides. Horizon intends to disturb limited soil and vegetation on the east hillside, but intends to salvage all available topsoil/growth medium on the west hillside. The evaluation of the west hillside assumed that approximately four feet of topsoil was available for salvage, however when Carbon County was working on the road which parallels the west hillside they found the soil to consist of boulders interspersed with a silty loam. The available topsoil may be less than we have estimated.

A portion of the topsoil/growth medium salvaged from the hillsides during the installation of UC-3 will be placed (to a depth of approximately 6 inches) on a slope adjacent to the culvert, the remainder will be placed in a temporary stockpile (Area E). The riparian topsoil removed during the extension will be stockpiled and temporarily stored on the area designated as Area E on Plate A in Appendix 8-1. A layer of geotextile fabric will be placed on the temporary area prior to the placement of the riparian topsoil, making it simple to determine the extent of riparian topsoil to be moved to the permanent stockpile. The riparian soil will be moved to the permanent topsoil stockpile ~~once access is available~~ in February of 1998. The temporary mine fan ~~is currently~~ was blocking access to the permanent topsoil stockpile when the soil was

initially salvaged. Both the temporary and permanent riparian topsoil locations will be signed to identify the soil as riparian. A qualified soils specialist will be on site during the removal of the topsoil/growth medium during the extension of Culvert UC-3.

Topsoil/growth medium salvaged from the bottom of Jewkes Canyon will be segreated, dried, and identified as soil to be returned to the bottom of Jewkes Canyon in the floodplain areas during final reclamation. However, Horizon is not aware of the differences/advantages of the salvaged riparian soil and other soils salvaged in the area after multiple years of laying dormant in a topsoil/growth medium stockpile.

A table, to be included in Appendix 8-1, includes the ~~potential~~ quantity of topsoil/growth medium salvaged, placed and available for distribution during final reclamation. The locations of the soils ~~currently and potentially~~ placed can be found on Plate A within Appendix 8-1. The salvagable topsoil\growth medium from the extension of Culvert UC-3 (Area 12) is outlined on Figure 8-2B.

3-9.7 Environmental Resource Information

Baseline information for the approximately area proposed for disturbance by the culvert extension is provided in Appendices 3-5, 3-7, 3-8, 4-1, 5-1, 7-2, 7-3, 7-6, 7-11, 7-12, 8-1, 9-1, 9-2, 10-1 and 10-2 of the approved permit.

Appendix 8-1

Topsoil Stockpile Table

Topsoil/Growth Medium Recovery and Placement Calculations			
	1996	1997	Total (CY)
Topsoil Recovered During Mine Construction[a]	10,993[b]		10,993
Topsoil Recovered from Culvert UC-3 Extension[c]		660	660
Topsoil Placed on Area D Appendix 8-1 - Plate A	-	499	- 499
Topsoil in Stockpile			11,154
Area E -Riparian Soil			156
Area E -Soils not Riparian*			334
			11,644
In-place Soils (Estimate) Areas 10 & 11	3,733		3,733
Soil Medium Potentially Available for Reclamation[d]			15,377

(a) Surveyed Quantity

(b) Excludes hill described in Section 8.8.1 and on Plate A.

(c) The quantity of recoverable topsoil is estimated, since this table was prepared prior to its removal.

(d) Total of topsoil in stockpile plus in-place soils to be salvaged from areas 10 and 11. Approximately ~~22"~~ 20" of soil will be available for final reclamation (5 ~~49~~ ~~04~~acres within disturbed area to be resoiled). Soils placed on Areas A, B, and C were generated during county road construction. Volume of soil used in Areas A, B, and C is not included in stockpile calculation. If these areas require additional soils at final reclamation, sufficient soils should be available from the stockpile.

- Approximately 200 cy of this soil was placed on Area E as contemporaneous reclamation topsoil per approval by Robert Davidson. Thus reducing available reclamation topsoil to 15, 177.

Imported Topsoil Table	
Area	Topsoil (CY)
Jewkes Canyon - Area A	337
Portal Canyon - Area B	189
Portal Canyon - Area C	449
Total	975

TABLE 8-3

Topsoil/Growth Medium Calculations

Recovery Area No.	Soil Type	Depth To Be Removed (Feet)	Volume (CY)[A]
1	DM	1.0	513
2	GIG	2.0	704
3	JIB	3.0	3000
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3-9.3 Hydrology and Drainage

A letter dated September 15, 1997 from Mr. Richard B. White of EarthFax Engineering, Inc. has been included in this appendix. This letter indicates that extending the culvert upstream for a distance of 100 feet will not adversely impact the design of the culvert. He further

states that "based on the information presented above, it is my opinion that the extension of culvert UC-3 will not adversely impact the hydrologic balance of the area". Mr. White has stamped and signed this letter.

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With the change in the disturbed-area boundary, the drainage area to the sedimentation pond has also changed. The pond was designed with a total drainage area of 35.1 acres, of which 9.1 acres were assumed to be disturbed and 26.0 acres were assumed to be undisturbed. Plate 7-5 has been modified to reflect the changes in the disturbed and undisturbed areas. According to this plate, the actual undisturbed area draining to the pond is 26.8 acres, with 8.2 acres of disturbed area, resulting in a total area of 35.0 acres now draining to the pond. The 0.1-acre decrease in pond drainage area resulted from a slight decrease in the extent of the disturbed area at the upstream end of Portal Canyon.

According to Appendix 7-4 of this M&RP, the design of the sedimentation pond was based on a weighted-average curve number of 70 for the combined undisturbed and disturbed areas. Using this curve number, the required runoff storage volume resulting from the 10-year, 24-hour storm over the 35.0-acre watershed area is 0.55 acre foot. The pond was designed based on a runoff storage volume of 0.56 acre foot.

The sediment storage volume for the pond was based on a ratio of 0.1 acre foot of sediment for every acre of disturbed area. With the reduced disturbed area, the design sediment storage volume is adequate. Hence, even with the additional pad created by the culvert extension, the pond has been adequately designed.

3-9.4 Reclamation

Revisions of the reclamation cost estimate associated with the removal of the additional 100 feet of culvert are reflected in Section 3.5.8 and Appendix 3-7 of the M&RP. The September 8, 1997, letter addressed to Mr. Daron Haddock commits to the following:

> "The permit reclamation commitments and corresponding regulations will apply to the intended culvert extension disturbance. Since a portion of this disturbance is a riparian area, the commitments within the Horizon permit concerning riparian reclamation will apply."

Appendix 9-2 of the M&RP contains a survey and map of the riparian area proposed for disturbance in this culvert extension.

The reclamation plan is located in Section 3.5 of this M&RP. The area affected by the extended culvert will be reclaimed as described in the approved permit.

Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

3-9.5 Refuse

Section 3.3 of the approved permit states, "Refuse material will be segregated on the coal stockpile for temporary storage. The maximum quantity of refuse at the mine prior to disposal will be 500 tons. This refuse material will be blended (in small portion) into the coal to be shipped to customers as contract quality specifications allow." In accordance with the approved permit, refuse will not be used as fill material over the culvert extension.

3-9.6 Soils

Topsoil/growth medium (660 cubic yards (CY) will be salvaged from the bottom of Jewkes Canyon and along the adjacent hillsides. Horizon intends to disturb limited soil and vegetation on the east hillside, but intends to salvage all available topsoil/growth medium on the west hillside. The evaluation of the west hillside assumed that approximately four feet of topsoil was available for salvage, however when Carbon County was working on the road which parallels the west hillside they found the soil to consist of boulders interspersed with a silty loam. The available topsoil may be less than we have estimated.

A portion of the topsoil/growth medium salvaged from the hillsides during the installation of UC-3 will be placed (to a depth of approximately 6 inches) on a slope adjacent to the culvert, the remainder will be placed in a temporary stockpile (Area E). The riparian topsoil removed during the extension will be stockpiled and temporarily stored on the area designated as Area E on Plate A in Appendix 8-1. A layer of geotextile fabric will be placed on the temporary area prior to the placement of the riparian topsoil, making it simple to determine the extent of riparian topsoil to be moved to the permanent stockpile. The riparian soil will be moved to the permanent topsoil stockpile ~~once access is available~~ in February of 1998. The temporary mine fan ~~is currently~~ was blocking access to the permanent topsoil stockpile when the soil was

initially salvaged. Both the temporary and permanent riparian topsoil locations will be signed to identify the soil as riparian. A qualified soils specialist will be on site during the removal of the topsoil/growth medium during the extension of Culvert UC-3.

Topsoil/growth medium salvaged from the bottom of Jewkes Canyon will be segreated, dried, and identified as soil to be returned to the bottom of Jewkes Canyon in the floodplain areas during final reclamation. However, Horizon is not aware of the differences/advantages of the salvaged riparian soil and other soils salvaged in the area after multiple years of laying dormant in a topsoil/growth medium stockpile.

A table, to be included in Appendix 8-1, includes the ~~potential~~ quantity of topsoil/growth medium salvaged, placed and available for distribution during final reclamation. The locations of the soils ~~currently and potentially~~ placed can be found on Plate A within Appendix 8-1. The salvagable topsoil\growth medium from the extension of Culvert UC-3 (Area 12) is outlined on Figure 8-2B.

3-9.7 Environmental Resource Information

Baseline information for the approximately area proposed for disturbance by the culvert extension is provided in Appendices 3-5, 3-7, 3-8, 4-1, 5-1, 7-2, 7-3, 7-6, 7-11, 7-12, 8-1, 9-1, 9-2, 10-1 and 10-2 of the approved permit.

Appendix 8-1

Topsoil Stockpile Table

Topsoil/Growth Medium Recovery and Placement Calculations			
	1996	1997	Total (CY)
Topsoil Recovered During Mine Construction[a]	10,993[b]		10,993
Topsoil Recovered from Culvert UC-3 Extension[c]		660	660
Topsoil Placed on Area D Appendix 8-1 - Plate A	-	499	- 499
Topsoil in Stockpile			11,154
Area E -Riparian Soil			156
Area E -Soils not Riparian*			334
			11,644
In-place Soils (Estimate) Areas 10 & 11	3,733		3,733
Soil Medium Potentially Available for Reclamation[d]			15,377

(a) Surveyed Quantity

(b) Excludes hill described in Section 8.8.1 and on Plate A.

(c) The quantity of recoverable topsoil is estimated, since this table was prepared prior to its removal.

(d) Total of topsoil in stockpile plus in-place soils to be salvaged from areas 10 and 11. Approximately ~~22"~~ 20" of soil will be available for final reclamation (5~~.49~~ ~~.04~~acres within disturbed area to be resoiled). Soils placed on Areas A, B, and C were generated during county road construction. Volume of soil used in Areas A, B, and C is not included in stockpile calculation. If these areas require additional soils at final reclamation, sufficient soils should be available from the stockpile.

- Approximately 200 cy of this soil was placed on Area E as contemporaneous reclamation topsoil per approval by Robert Davidson. Thus reducing available reclamation topsoil to 15, 177.

Imported Topsoil Table	
Area	Topsoil (CY)
Jewkes Canyon - Area A	337
Portal Canyon - Area B	189
Portal Canyon - Area C	449
Total	**975**

TABLE 8-3

Topsoil/Growth Medium Calculations

Recovery Area No.	Soil Type	Depth To Be Removed (Feet)	Volume (CY)[A]
1	DM	1.0	513
2	GIG	2.0	704
3	JIB	3.0	3000
4	DM	3.0	1173
5	DM	1.5	773
6	DM	3.0	1280
7	GIG	4.5	1600
8	FIA	2.5	667
9	DM	3.0	227
10	FIA/JIB	4.0	2133
11	JIB	3.0	1600
12[B]	Riparian	1	156
12[B]	GIG/DM	1.5	334
		Total	14,160 CY

[A] All topsoil/growth medium to be stored at the top of Portal Canyon.
[B] Soil temporarily stored in Area E, Plate A, Appendix 8-1

3.2.8 Water Diversion Structures

Diversions will be installed to direct disturbed-area runoff to sediment-control structures and/or facilities. Runoff from undisturbed areas will be diverted away from the disturbed areas to the extent practical. Detailed discussions of the design of diversion structures are provided in Chapter 7.

3.2.9 Sedimentation Control Structures and Water Treatment Facilities

All runoff from the disturbed area is directed into the sedimentation pond located directly below the area of disturbance. The pond has been designed to contain runoff resulting from the 10-year, 24-hour precipitation event. The pond spillway has been designed to safely pass the peak flow resulting from a 25-year, 6-hour precipitation event.

The location of the pond is shown on Plate 3-1. Design, construction, maintenance and operation of the pond are discussed in detail in Section 7.2.3.2.

3.2.10 Transportation, Roads, Parking Area, Railroad Spurs

Coal will be transported from the mine via a conveyor and discharged onto the coal storage area. Coal handling is discussed in Section 3.2.4. Transportation to and from the mine site (coal, personnel, and materials) is discussed below.

Roads

Both primary and ancillary roads will exist within the permit area. Road alignments, widths, gradients, and other design details are shown on Plate 3-4 and 3-4A. A plan view of the roads is shown on Plate 3-1. The roads include primary roads for coal haulage, and ancillary drill and fan portal access roads.

The fan portal access and drill roads are existing roads that will be cleaned and graded to provide vehicle access to the fan for construction and maintenance and access to monitoring well HZ-95-3.

The mine's disturbed area will be accessed by the ~~Consumers/Clear Creek~~ Beaver Creek Road, a county owned and maintained road extending from Consumers Canyon to Clear Creek. Plate 3-1 shows the width of the Beaver Creek road and it associated right-of-way, parallel to the disturbed area boundary.

Parking Areas

A parking area will be established adjacent to the bathhouse. This area will be graveled and sloped to drain to the sedimentation pond.

Railroad Spurs

There are no railroads in the Gordon Creek area.

topography that is compatible with the post-mining land use, using materials that are available at the site (Plates 3-7 and 3-7A). Cut and fill calculations are provided in Table 3-1, for the for the operational to post-mining (i.e., reclamation) phase. The excess fill noted in Table 3-1 will be derrived from topsoil, while accounting for compaction of common fill during backfilling.

In general, the backfilling and regrading will proceed as follows:

(a) After sealing of the portals and removal of all structures, a backhoe (Cat 235 or larger) will be brought to the upper portal terrace (Portal Canyon). The road on the north side of Portal Canyon will be backfilled, regraded, recontoured, fertilized, seeded and mulched (See Sections 3.5.5 for additional method details).

(b) The backhoe will begin by reaching down over the fill bank and retrieving as much material as can be reached to be placed on the terrace. A dozer (Cat D-7 or larger) will work with the backhoe, taking the retrieved material and spreading and compacting it from the faceup outward.

(c) The mine yard will then be recontoured using backhoes and dozers to drain to the center of the canyons. The reclamation slopes will be achieved during this backfilling and grading operation. In general, fill material for reclamation will be obtained from adjacent areas of cut material. Prior to cutting or filling in areas shown on Plate 3-7 as having been contemporaneously reclaimed, the topsoil on those areas will be stripped and temporarily set aside in an area that will not be impacted by construction activities. Topsoil stripping operations will be supervised by an individual who is experienced in the field identification of topsoil resources. Once an area is properly prepared, this topsoil will be placed on regraded slopes in accordance with the topsoil placement procedures outlined elsewhere in this M&RP. Based on an affected area of 0.20 acre (as noted on Plate 3-7) and an average topsoil thickness in the contemporaeously reclaimed areas of 11 inches (see Section 8.8.1 of this M&RP), a total of 296 cubic yards of topsoil will be affected by this effort. Reclamation channels (described in Chapter 7) will be constructed to convey runoff through the reclaimed area. Operational culverts will be removed as the construction of the reclamation channel moves down each canyon. Details regarding the reestablishment of drainages in Jewkes Creek and Portal Canyon are provided in Section 7.2.3.2.

(d) During backfilling and regrading operations, the surface will be scarified to prevent slippage of topsoil and promote root penetration.

(e) A loader will be used to load topsoil into haul trucks at the topsoil stockpiles. The haul trucks will be used to deliver the topsoil from the topsoil stockpiles to the area where the dozer and backhoe will be working. The dozer will be used to evenly distribute the topsoil over the area.

TABLE 3-1

RECLAMATION CUT AND FILL CALCULATIONS

Total inclusion area: 9.15 acres
Cut to Fill ratio: ~~0.87~~0.73
Cut volume: ~~11,238~~11,695 cubic yards
Fill volume: ~~12,939~~15,935 cubic yards

Cut and fill data based on Softdesk Civil/Survey software, release 8.0 and AutoCAD Map software, release 2.

3.5.8 Cost Estimate for Final Reclamation

The estimated cost to reclaim the Horizon No. 1 Mine surface facilities is provided in Appendix 3-7.

The reclamation costs were evaluated to determine if the 100-foot culvert extension planned for 1997 (Appendix 3-9) would be covered by the estimated amount. The previous calculations allowed for 4 days of backhoe use to remove the culverts within the disturbed area. It is currently estimated that a period of only 2.3 days will be required to remove the culverts within the disturbed area. Therefore, the original estimate of 4 days is sufficient to cover the additional 100 feet of culvert installed in 1998. No increase in earthwork bonding costs are necessary with the removal of the 100-foot culvert extension during reclamation, refer to Appendix 3-9.

APPENDIX 3-9

UC-3 CULVERT EXTENSION

TABLE OF CONTENTS

APPENDIX 3-9
UC-3 CULVERT EXTENSION

3-9.1 Scope

The purpose of this appendix is to discuss the proposed extension of culvert UC-3 to allow for a small expansion of the surface facilities at the Horizon Mine. The information contained in this appendix is intended to fulfill the requirements of a letter dated September 11, 1997 and a Technical Analysis dated October 3, 1997 from the Division of Oil, Gas and Mining and it's permit supervisor, Daron R. Haddock, to Horizon Coal Corporation.

The 100-foot extension of culvert UC-3 is proposed for several reasons, the primary reason being safety. The truck turnaround for the mine is on the Jewkes Creek pad area. To access the mine's truck turnaround coal trucks exit the Beaver Creek County Road from the west and reenter the county road from the east. A hill blocks the view of both the trucks exiting the mine from the east and southbound traffic using the Beaver Creek County Road. By removing the hill (i.e., expanding the pad area), this safety concern is alleviated. The secondary reason for expanding the pad is the size of the truck turnaround and the need for storage at the mine. The designed turnaround radius was insufficient for loading and turning; therefore the additional footage improves the truck driver's safety and provides space for material storage.

The area intended for installation of the UC-3 culvert is approximately 100 feet x 50 feet in size. An additional 100 feet x 50 feet portion of an adjacent hillside will also be disturbed at the time of culvert installation. When making the assumption that the upstream end of Jewkes Creek is north, the hillside runs north and south, paralleling Jewkes Creek on the west side of the creek. This hillside blocks the view of existing traffic on the Carbon County Beaver Creek road from vehicles exiting the mine site and will be disturbed to improve safety conditions. Topsoil will be removed on the east hillside as well, during pad construction and stockpile as described below. The topsoil removal area is shown on Plate A in Appendix 8-1.

Field observations indicate that precipitation in the summer of 1997 has been greater than normal. The unusually wet year will require the installation of the culvert with more water in Jewkes Creek than is normal. To accommodate the installation of the culvert, the water will be diverted to the side of or through the intended culvert extension. This diversion will be accomplished by building a small coffer dam upstream from the proposed culvert extension and installing a section of 8-inch (minimum) diameter HDPE culvert along side or through the proposed extension. This diversion will discharge into the upstream end of the existing culvert. It is anticipated that this diversion will be needed for a maximum period of one day.

Following installation of the temporary diversion, topsoil/growth medium will be removed from beneath the area designated for culvert placement. The culvert extension will then be placed. As soon as the culvert extension is secured, the temporary diversion will be removed and the flow of Jewkes Creek will again be redirected into the installed culvert.

Following diversion of the stream flow through the culvert extension, fill material will be placed and compacted on each side of the extension to support the culvert during the removal

of the remaining topsoil/growth medium. The topsoil/growth medium will be removed from one side of the culvert and the area filled and compacted. The soil will then be removed from the other side of the culvert and fill placed and compacted. The fill material will be placed and compacted to meet manufacturer and permit specifications.

Once the topsoil/growth medium is removed from the area of proposed disturbance, the fill material to be placed atop the culvert will be placed and compacted to meet manufacturer and permit specifications.

When the Portal Canyon pad area was determined to be too high (approximately 2 feet), the fill was removed from around the entrance to the three portals, beneath the convey, around the substation, and in front of the office trailer. The fill was stockpiled temporarily awaiting the approval of the culvert extension. Quantities of rock and soils associated with the faceup of the highwall above the portals were also stockpiled and used for fill around the culvert. All topsoil had previously been removed (1996) from these areas.

3-9.2 Disturbed Area Boundary

The location of the proposed culvert extension is indicated on Drawing A, which identifies the surveyed disturbed area boundary as it existed in the field in October 1997. This drawing differs from those which were submitted prior to permit approval due to an inaccurate survey performed by the previous permittee. These inaccuracies resulted in confusion concerning the location of (1) the sediment pond, (2) well access road, (3) lower pad area, (4) topsoil stockpile, and (5) fan portal road. The inaccuracies were discovered during pad construction in the Fall and Winter of 1996.

The current permittee performed a survey of the disturbed area boundary and the above listed locations. The resurveyed disturbed area boundary on Drawing A reflects the markers on the ground combined with the site features listed above.

Within the disturbed area, a 2-foot contour interval was used to prepare Drawing A. This contour interval allows the areas and features within the disturbed area to be more accurately located than was possible on maps provided to the Division prior to permit approval. This has contributed to the visual changes in the disturbed area when comparing Drawing A to previous maps.

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Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

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		Total	14,160 CY

[A] All topsoil/growth medium to be stored at the top of Portal Canyon.
[B] Soil temporarily stored in Area E, Plate A, Appendix 8-1

3.2.8 Water Diversion Structures

Diversions will be installed to direct disturbed-area runoff to sediment-control structures and/or facilities. Runoff from undisturbed areas will be diverted away from the disturbed areas to the extent practical. Detailed discussions of the design of diversion structures are provided in Chapter 7.

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All runoff from the disturbed area is directed into the sedimentation pond located directly below the area of disturbance. The pond has been designed to contain runoff resulting from the 10-year, 24-hour precipitation event. The pond spillway has been designed to safely pass the peak flow resulting from a 25-year, 6-hour precipitation event.

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3.2.10 Transportation, Roads, Parking Area, Railroad Spurs

Coal will be transported from the mine via a conveyor and discharged onto the coal storage area. Coal handling is discussed in Section 3.2.4. Transportation to and from the mine site (coal, personnel, and materials) is discussed below.

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Parking Areas

A parking area will be established adjacent to the bathhouse. This area will be graveled and sloped to drain to the sedimentation pond.

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There are no railroads in the Gordon Creek area.

topography that is compatible with the post-mining land use, using materials that are available at the site (Plates 3-7 and 3-7A). Cut and fill calculations are provided in Table 3-1, for the for the operational to post-mining (i.e., reclamation) phase. The excess fill noted in Table 3-1 will be derrived from topsoil, while accounting for compaction of common fill during backfilling.

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Total inclusion area: 9.15 acres
Cut to Fill ratio: ~~0.87~~0.73
Cut volume: ~~11,238~~11,695 cubic yards
Fill volume: ~~12,939~~15,935 cubic yards

Cut and fill data based on Softdesk Civil/Survey software, release 8.0 and AutoCAD Map software, release 2.

3.5.8 Cost Estimate for Final Reclamation

The estimated cost to reclaim the Horizon No. 1 Mine surface facilities is provided in Appendix 3-7.

The reclamation costs were evaluated to determine if the 100-foot culvert extension planned for 1997 (Appendix 3-9) would be covered by the estimated amount. The previous calculations allowed for 4 days of backhoe use to remove the culverts within the disturbed area. It is currently estimated that a period of only 2.3 days will be required to remove the culverts within the disturbed area. Therefore, the original estimate of 4 days is sufficient to cover the additional 100 feet of culvert installed in 1998. No increase in earthwork bonding costs are necessary with the removal of the 100-foot culvert extension during reclamation, refer to Appendix 3-9.

APPENDIX 3-9

UC-3 CULVERT EXTENSION

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APPENDIX 3-9
UC-3 CULVERT EXTENSION

3-9.1 Scope

The purpose of this appendix is to discuss the proposed extension of culvert UC-3 to allow for a small expansion of the surface facilities at the Horizon Mine. The information contained in this appendix is intended to fulfill the requirements of a letter dated September 11, 1997 and a Technical Analysis dated October 3, 1997 from the Division of Oil, Gas and Mining and it's permit supervisor, Daron R. Haddock, to Horizon Coal Corporation.

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The area intended for installation of the UC-3 culvert is approximately 100 feet x 50 feet in size. An additional 100 feet x 50 feet portion of an adjacent hillside will also be disturbed at the time of culvert installation. When making the assumption that the upstream end of Jewkes Creek is north, the hillside runs north and south, paralleling Jewkes Creek on the west side of the creek. This hillside blocks the view of existing traffic on the Carbon County Beaver Creek road from vehicles exiting the mine site and will be disturbed to improve safety conditions. Topsoil will be removed on the east hillside as well, during pad construction and stockpile as described below. The topsoil removal area is shown on Plate A in Appendix 8-1.

Field observations indicate that precipitation in the summer of 1997 has been greater than normal. The unusually wet year will require the installation of the culvert with more water in Jewkes Creek than is normal. To accommodate the installation of the culvert, the water will be diverted to the side of or through the intended culvert extension. This diversion will be accomplished by building a small coffer dam upstream from the proposed culvert extension and installing a section of 8-inch (minimum) diameter HDPE culvert along side or through the proposed extension. This diversion will discharge into the upstream end of the existing culvert. It is anticipated that this diversion will be needed for a maximum period of one day.

Following installation of the temporary diversion, topsoil/growth medium will be removed from beneath the area designated for culvert placement. The culvert extension will then be placed. As soon as the culvert extension is secured, the temporary diversion will be removed and the flow of Jewkes Creek will again be redirected into the installed culvert.

Following diversion of the stream flow through the culvert extension, fill material will be placed and compacted on each side of the extension to support the culvert during the removal

of the remaining topsoil/growth medium. The topsoil/growth medium will be removed from one side of the culvert and the area filled and compacted. The soil will then be removed from the other side of the culvert and fill placed and compacted. The fill material will be placed and compacted to meet manufacturer and permit specifications.

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When the Portal Canyon pad area was determined to be too high (approximately 2 feet), the fill was removed from around the entrance to the three portals, beneath the convey, around the substation, and in front of the office trailer. The fill was stockpiled temporarily awaiting the approval of the culvert extension. Quantities of rock and soils associated with the faceup of the highwall above the portals were also stockpiled and used for fill around the culvert. All topsoil had previously been removed (1996) from these areas.

3-9.2 Disturbed Area Boundary

The location of the proposed culvert extension is indicated on Drawing A, which identifies the surveyed disturbed area boundary as it existed in the field in October 1997. This drawing differs from those which were submitted prior to permit approval due to an inaccurate survey performed by the previous permittee. These inaccuracies resulted in confusion concerning the location of (1) the sediment pond, (2) well access road, (3) lower pad area, (4) topsoil stockpile, and (5) fan portal road. The inaccuracies were discovered during pad construction in the Fall and Winter of 1996.

The current permittee performed a survey of the disturbed area boundary and the above listed locations. The resurveyed disturbed area boundary on Drawing A reflects the markers on the ground combined with the site features listed above.

Within the disturbed area, a 2-foot contour interval was used to prepare Drawing A. This contour interval allows the areas and features within the disturbed area to be more accurately located than was possible on maps provided to the Division prior to permit approval. This has contributed to the visual changes in the disturbed area when comparing Drawing A to previous maps.

Although the disturbed area boundary appears different, the amount of disturbed area identified by this resurvey is less than that used in the initial Mining and Reclamation Plan (M&RP). The amount of bonded disturbed area listed in the approved permit is 9.15 acres, whereas the resurveyed disturbed area is 8.23 acres, including the area of the proposed culvert extension. Nonetheless, the permit will continue to reflect 9.15 acres of disturbance.

3-9.3 Hydrology and Drainage

A letter dated September 15, 1997 from Mr. Richard B. White of EarthFax Engineering, Inc. has been included in this appendix. This letter indicates that extending the culvert upstream for a distance of 100 feet will not adversely impact the design of the culvert. He further

states that "based on the information presented above, it is my opinion that the extension of culvert UC-3 will not adversely impact the hydrologic balance of the area". Mr. White has stamped and signed this letter.

A letter dated September 8, 1997 addressed to Mr. Daron Haddock and stamped received at the Division of Oil, Gas and Mining has also been included in this appendix. This letter indicates that the culvert will be installed "in accordance with the manufacturers specifications as indicated in Horizon's UDOGM Permit". This commitment agrees with that stated above in Section 3-9.1 of this appendix.

The letter to Mr. Haddock references Appendix 7-4 of the M&RP as the location for flow capacity and design details. In addition to Appendix 7-4, Section 7.2.3 within the approved permit discusses the installation of culverts as well as sediment controls.

With the change in the disturbed-area boundary, the drainage area to the sedimentation pond has also changed. The pond was designed with a total drainage area of 35.1 acres, of which 9.1 acres were assumed to be disturbed and 26.0 acres were assumed to be undisturbed. Plate 7-5 has been modified to reflect the changes in the disturbed and undisturbed areas. According to this plate, the actual undisturbed area draining to the pond is 26.8 acres, with 8.2 acres of disturbed area, resulting in a total area of 35.0 acres now draining to the pond. The 0.1-acre decrease in pond drainage area resulted from a slight decrease in the extent of the disturbed area at the upstream end of Portal Canyon.

According to Appendix 7-4 of this M&RP, the design of the sedimentation pond was based on a weighted-average curve number of 70 for the combined undisturbed and disturbed areas. Using this curve number, the required runoff storage volume resulting from the 10-year, 24-hour storm over the 35.0-acre watershed area is 0.55 acre foot. The pond was designed based on a runoff storage volume of 0.56 acre foot.

The sediment storage volume for the pond was based on a ratio of 0.1 acre foot of sediment for every acre of disturbed area. With the reduced disturbed area, the design sediment storage volume is adequate. Hence, even with the additional pad created by the culvert extension, the pond has been adequately designed.

3-9.4 Reclamation

Revisions of the reclamation cost estimate associated with the removal of the additional 100 feet of culvert are reflected in Section 3.5.8 and Appendix 3-7 of the M&RP. The September 8, 1997, letter addressed to Mr. Daron Haddock commits to the following:

> "The permit reclamation commitments and corresponding regulations will apply to the intended culvert extension disturbance. Since a portion of this disturbance is a riparian area, the commitments within the Horizon permit concerning riparian reclamation will apply."

Appendix 9-2 of the M&RP contains a survey and map of the riparian area proposed for disturbance in this culvert extension.

The reclamation plan is located in Section 3.5 of this M&RP. The area affected by the extended culvert will be reclaimed as described in the approved permit.

Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

3-9.5 Refuse

Section 3.3 of the approved permit states, "Refuse material will be segregated on the coal stockpile for temporary storage. The maximum quantity of refuse at the mine prior to disposal will be 500 tons. This refuse material will be blended (in small portion) into the coal to be shipped to customers as contract quality specifications allow." In accordance with the approved permit, refuse will not be used as fill material over the culvert extension.

3-9.6 Soils

Topsoil/growth medium (660 cubic yards (CY) will be salvaged from the bottom of Jewkes Canyon and along the adjacent hillsides. Horizon intends to disturb limited soil and vegetation on the east hillside, but intends to salvage all available topsoil/growth medium on the west hillside. The evaluation of the west hillside assumed that approximately four feet of topsoil was available for salvage, however when Carbon County was working on the road which parallels the west hillside they found the soil to consist of boulders interspersed with a silty loam. The available topsoil may be less than we have estimated.

A portion of the topsoil/growth medium salvaged from the hillsides during the installation of UC-3 will be placed (to a depth of approximately 6 inches) on a slope adjacent to the culvert, the remainder will be placed in a temporary stockpile (Area E). The riparian topsoil removed during the extension will be stockpiled and temporarily stored on the area designated as Area E on Plate A in Appendix 8-1. A layer of geotextile fabric will be placed on the temporary area prior to the placement of the riparian topsoil, making it simple to determine the extent of riparian topsoil to be moved to the permanent stockpile. The riparian soil will be moved to the permanent topsoil stockpile ~~once access is available~~ in February of 1998. The temporary mine fan ~~is currently~~ was blocking access to the permanent topsoil stockpile when the soil was

initially salvaged. Both the temporary and permanent riparian topsoil locations will be signed to identify the soil as riparian. A qualified soils specialist will be on site during the removal of the topsoil/growth medium during the extension of Culvert UC-3.

Topsoil/growth medium salvaged from the bottom of Jewkes Canyon will be segreated, dried, and identified as soil to be returned to the bottom of Jewkes Canyon in the floodplain areas during final reclamation. However, Horizon is not aware of the differences/advantages of the salvaged riparian soil and other soils salvaged in the area after multiple years of laying dormant in a topsoil/growth medium stockpile.

A table, to be included in Appendix 8-1, includes the ~~potential~~ quantity of topsoil/growth medium salvaged, placed and available for distribution during final reclamation. The locations of the soils ~~currently and potentially~~ placed can be found on Plate A within Appendix 8-1. The salvagable topsoil\growth medium from the extension of Culvert UC-3 (Area 12) is outlined on Figure 8-2B.

3-9.7 Environmental Resource Information

Baseline information for the approximately area proposed for disturbance by the culvert extension is provided in Appendices 3-5, 3-7, 3-8, 4-1, 5-1, 7-2, 7-3, 7-6, 7-11, 7-12, 8-1, 9-1, 9-2, 10-1 and 10-2 of the approved permit.

Appendix 8-1

Topsoil Stockpile Table

Topsoil/Growth Medium Recovery and Placement Calculations			
	1996	1997	Total (CY)
Topsoil Recovered During Mine Construction[a]	10,993[b]		10,993
Topsoil Recovered from Culvert UC-3 Extension[c]		660	660
Topsoil Placed on Area D Appendix 8-1 - Plate A	-	499	- 499
Topsoil in Stockpile			11,154
Area E -Riparian Soil			156
Area E -Soils not Riparian*			334
			11,644
In-place Soils (Estimate) Areas 10 & 11	3,733		3,733
Soil Medium Potentially Available for Reclamation[d]			15,377

(a) Surveyed Quantity

(b) Excludes hill described in Section 8.8.1 and on Plate A.

(c) The quantity of recoverable topsoil is estimated, since this table was prepared prior to its removal.

(d) Total of topsoil in stockpile plus in-place soils to be salvaged from areas 10 and 11. Approximately ~~22"~~ 20" of soil will be available for final reclamation (5.~~49~~ 04acres within disturbed area to be resoiled). Soils placed on Areas A, B, and C were generated during county road construction. Volume of soil used in Areas A, B, and C is not included in stockpile calculation. If these areas require additional soils at final reclamation, sufficient soils should be available from the stockpile.

- Approximately 200 cy of this soil was placed on Area E as contemporaneous reclamation topsoil per approval by Robert Davidson. Thus reducing available reclamation topsoil to 15, 177.

Imported Topsoil Table	
Area	Topsoil (CY)
Jewkes Canyon - Area A	337
Portal Canyon - Area B	189
Portal Canyon - Area C	449
Total	975

TABLE 8-3

Topsoil/Growth Medium Calculations

Recovery Area No.	Soil Type	Depth To Be Removed (Feet)	Volume (CY)[A]
1	DM	1.0	513
2	GIG	2.0	704
3	JIB	3.0	3000
4	DM	3.0	1173
5	DM	1.5	773
6	DM	3.0	1280
7	GIG	4.5	1600
8	FIA	2.5	667
9	DM	3.0	227
10	FIA/JIB	4.0	2133
11	JIB	3.0	1600
12[B]	Riparian	1	156
12[B]	GIG/DM	1.5	334
		Total	14,160 CY

[A] All topsoil/growth medium to be stored at the top of Portal Canyon.
[B] Soil temporarily stored in Area E, Plate A, Appendix 8-1

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3-9.3 Hydrology and Drainage

A letter dated September 15, 1997 from Mr. Richard B. White of EarthFax Engineering, Inc. has been included in this appendix. This letter indicates that extending the culvert upstream for a distance of 100 feet will not adversely impact the design of the culvert. He further

states that "based on the information presented above, it is my opinion that the extension of culvert UC-3 will not adversely impact the hydrologic balance of the area". Mr. White has stamped and signed this letter.

A letter dated September 8, 1997 addressed to Mr. Daron Haddock and stamped received at the Division of Oil, Gas and Mining has also been included in this appendix. This letter indicates that the culvert will be installed "in accordance with the manufacturers specifications as indicated in Horizon's UDOGM Permit". This commitment agrees with that stated above in Section 3-9.1 of this appendix.

The letter to Mr. Haddock references Appendix 7-4 of the M&RP as the location for flow capacity and design details. In addition to Appendix 7-4, Section 7.2.3 within the approved permit discusses the installation of culverts as well as sediment controls.

With the change in the disturbed-area boundary, the drainage area to the sedimentation pond has also changed. The pond was designed with a total drainage area of 35.1 acres, of which 9.1 acres were assumed to be disturbed and 26.0 acres were assumed to be undisturbed. Plate 7-5 has been modified to reflect the changes in the disturbed and undisturbed areas. According to this plate, the actual undisturbed area draining to the pond is 26.8 acres, with 8.2 acres of disturbed area, resulting in a total area of 35.0 acres now draining to the pond. The 0.1-acre decrease in pond drainage area resulted from a slight decrease in the extent of the disturbed area at the upstream end of Portal Canyon.

According to Appendix 7-4 of this M&RP, the design of the sedimentation pond was based on a weighted-average curve number of 70 for the combined undisturbed and disturbed areas. Using this curve number, the required runoff storage volume resulting from the 10-year, 24-hour storm over the 35.0-acre watershed area is 0.55 acre foot. The pond was designed based on a runoff storage volume of 0.56 acre foot.

The sediment storage volume for the pond was based on a ratio of 0.1 acre foot of sediment for every acre of disturbed area. With the reduced disturbed area, the design sediment storage volume is adequate. Hence, even with the additional pad created by the culvert extension, the pond has been adequately designed.

3-9.4 Reclamation

Revisions of the reclamation cost estimate associated with the removal of the additional 100 feet of culvert are reflected in Section 3.5.8 and Appendix 3-7 of the M&RP. The September 8, 1997, letter addressed to Mr. Daron Haddock commits to the following:

> "The permit reclamation commitments and corresponding regulations will apply to the intended culvert extension disturbance. Since a portion of this disturbance is a riparian area, the commitments within the Horizon permit concerning riparian reclamation will apply."

Appendix 9-2 of the M&RP contains a survey and map of the riparian area proposed for disturbance in this culvert extension.

The reclamation plan is located in Section 3.5 of this M&RP. The area affected by the extended culvert will be reclaimed as described in the approved permit.

Since the intended fill material for the culvert extension area will come from the lowering (2 feet) of the upper pad area, this soil/fill has been included in the original mass balance calculations. The quantities of rock and soils associated with the faceup of the highwall above the portals which may also be used for fill around the culvert were estimated and were also included in the original mass balance calculations. Therefore, the material to be used for fill around the culvert has been designated for placement during reclamation in the current approved permit.

Small quantities of coal were generated during faceup of the highwall. This material was not separated from the rock and soils removed from the highwall and may be included in the fill material placed over the culvert.

The reclamation contours for the site and the contours associated with the installation and subsequent removal of the culvert decrease the earthwork volumes originally calculated in the approved M&RP. Therefore no revision in the earthwork bond estimate is necessary for the removal of the culvert extension.

3-9.5 Refuse

Section 3.3 of the approved permit states, "Refuse material will be segregated on the coal stockpile for temporary storage. The maximum quantity of refuse at the mine prior to disposal will be 500 tons. This refuse material will be blended (in small portion) into the coal to be shipped to customers as contract quality specifications allow." In accordance with the approved permit, refuse will not be used as fill material over the culvert extension.

3-9.6 Soils

Topsoil/growth medium (660 cubic yards (CY) will be salvaged from the bottom of Jewkes Canyon and along the adjacent hillsides. Horizon intends to disturb limited soil and vegetation on the east hillside, but intends to salvage all available topsoil/growth medium on the west hillside. The evaluation of the west hillside assumed that approximately four feet of topsoil was available for salvage, however when Carbon County was working on the road which parallels the west hillside they found the soil to consist of boulders interspersed with a silty loam. The available topsoil may be less than we have estimated.

A portion of the topsoil/growth medium salvaged from the hillsides during the installation of UC-3 will be placed (to a depth of approximately 6 inches) on a slope adjacent to the culvert, the remainder will be placed in a temporary stockpile (Area E). The riparian topsoil removed during the extension will be stockpiled and temporarily stored on the area designated as Area E on Plate A in Appendix 8-1. A layer of geotextile fabric will be placed on the temporary area prior to the placement of the riparian topsoil, making it simple to determine the extent of riparian topsoil to be moved to the permanent stockpile. The riparian soil will be moved to the permanent topsoil stockpile ~~once access is available~~ in February of 1998. The temporary mine fan ~~is currently~~ was blocking access to the permanent topsoil stockpile when the soil was

initially salvaged. Both the temporary and permanent riparian topsoil locations will be signed to identify the soil as riparian. A qualified soils specialist will be on site during the removal of the topsoil/growth medium during the extension of Culvert UC-3.

Topsoil/growth medium salvaged from the bottom of Jewkes Canyon will be segreated, dried, and identified as soil to be returned to the bottom of Jewkes Canyon in the floodplain areas during final reclamation. However, Horizon is not aware of the differences/advantages of the salvaged riparian soil and other soils salvaged in the area after multiple years of laying dormant in a topsoil/growth medium stockpile.

A table, to be included in Appendix 8-1, includes the ~~potential~~ quantity of topsoil/growth medium salvaged, placed and available for distribution during final reclamation. The locations of the soils ~~currently and potentially~~ placed can be found on Plate A within Appendix 8-1. The salvagable topsoil\growth medium from the extension of Culvert UC-3 (Area 12) is outlined on Figure 8-2B.

3-9.7 Environmental Resource Information

Baseline information for the approximately area proposed for disturbance by the culvert extension is provided in Appendices 3-5, 3-7, 3-8, 4-1, 5-1, 7-2, 7-3, 7-6, 7-11, 7-12, 8-1, 9-1, 9-2, 10-1 and 10-2 of the approved permit.

Appendix 8-1

Topsoil Stockpile Table

Topsoil/Growth Medium Recovery and Placement Calculations			
	1996	1997	Total (CY)
Topsoil Recovered During Mine Construction[a]	10,993[b]		10,993
Topsoil Recovered from Culvert UC-3 Extension[c]		660	660
Topsoil Placed on Area D Appendix 8-1 - Plate A	-	499	- 499
Topsoil in Stockpile			11,154
Area E -Riparian Soil			156
Area E -Soils not Riparian*			334
			11,644
In-place Soils (Estimate) Areas 10 & 11	3,733		3,733
Soil Medium Potentially Available for Reclamation[d]			15,377

(a) Surveyed Quantity

(b) Excludes hill described in Section 8.8.1 and on Plate A.

(c) The quantity of recoverable topsoil is estimated, since this table was prepared prior to its removal.

(d) Total of topsoil in stockpile plus in-place soils to be salvaged from areas 10 and 11. Approximately ~~22"~~ 20" of soil will be available for final reclamation (5 ~~49~~ ~~04~~acres within disturbed area to be resoiled). Soils placed on Areas A, B, and C were generated during county road construction. Volume of soil used in Areas A, B, and C is not included in stockpile calculation. If these areas require additional soils at final reclamation, sufficient soils should be available from the stockpile.

- Approximately 200 cy of this soil was placed on Area E as contemporaneous reclamation topsoil per approval by Robert Davidson. Thus reducing available reclamation topsoil to 15, 177.

Imported Topsoil Table	
Area	Topsoil (CY)
Jewkes Canyon - Area A	337
Portal Canyon - Area B	189
Portal Canyon - Area C	449
Total	975

TABLE 8-3

Topsoil/Growth Medium Calculations

Recovery Area No.	Soil Type	Depth To Be Removed (Feet)	Volume (CY)[A]
1	DM	1.0	513
2	GIG	2.0	704
3	JIB	3.0	3000
4	DM	3.0	1173
5	DM	1.5	773
6	DM	3.0	1280
7	GIG	4.5	1600
8	FIA	2.5	667
9	DM	3.0	227
10	FIA/JIB	4.0	2133
11	JIB	3.0	1600
12[B]	Riparian	1	156
12[B]	GIG/DM	1.5	334
		Total	14,160 CY

[A] All topsoil/growth medium to be stored at the top of Portal Canyon.
[B] Soil temporarily stored in Area E, Plate A, Appendix 8-1

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
Lowell P. Braxton
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January 23, 1998

Vicky Bailey
Horizon Coal Company
P.O. Box 599
Helper, Utah 84526

Re: N97-26-7-1, Channel Configuration, Horizon Coal Company, Horizon Mine, ACT/007/020-97G-1, Folder #2, Carbon County, Utah

Dear Ms. Bailey:

This submittal incorporates changes associated with the changes to the county road and resulting stream re-alignment changes to the existing plan.

Analysis:

The channel at the outlet of UC-1 was impacted during two consecutive storm events in August of 1997 which resulted in erosion downstream of the culvert. Recently the county re-constructed the creek downstream of the disturbed area. The permitted design was initially constructed to tie into the channel which had different characteristics than the one which presently exists.

The magnitude of the events occurring in 1997 indicates a need to increase the riprap and rock check dam design requirements to be stable. The velocity resulting from the flow equal to the maximum channel capacity above and below the site should be used to design the riprap and rock check dams in the lower Jewkes Creek section re-constructed with the county road re-alignment.

The information submitted did not increase the riprap and rock check dam requirements to provide increased stability as is warranted in perennial systems. The information provided meets minimum regulatory requirements except for:

- Page 7-63 indicates the downstream channel capacity of Jewkes creek is 38.7 cfs not the 33 cfs used in the calculations on the design sheet for "Jewkes Creek Realignment - Maximum slope", page 18c.

The following were identified as concerns regarding the adequacy of riprap with

proposed designs for Jewkes Creek:

- **The D_{50} riprap design results in a safety factor less than one.** The Hydraulic Engineering Circular No. 11, **Use of Riprap for Bank Protection,** Searcy (1967) was used to design the riprap. The methods used in this design result in a safety factor less than 1 according to the Colorado State University (CSU) design criteria. According to C.T, Haan, B.J. Barfield, and J.C. Hayes, 1994, Design Hydrology and Sedimentology for Small Catchments, "The CSU procedure is the most theoretically complete and conservative of the three procedures [Federal Highway Administration (Norman, 1975), Soil Conservation Service (1979) Engineering Field Manual, and Colorado State University (Stevens and Simons, 1971, Simons and Senturk, 1977, 1992)]".

- **Prior to the deposition of sedimentation the slope is increased and the check dams may have to withstand greater flow velocities.** The estimate for appropriate gradation and distribution for a dam of 3.3 ft height according to and a peak flow of 35.3 cfs with a D_{50} around 7.2 inches which is close to the 6 inch D_{50} estimated for the proposed design with a 2 foot height according to the design, criteria identified in Heede, 1976 "Gully Development and Control" . However, the design for the maximum velocity against the riprap in the check dam did not consider the period prior to sedimentation build up. The check dam will be roughly 1.5 feet from the base of the channel to the spillway. The maximum capacity of flow against the check dam at this height is approximately 65 cfs with an approximate 6 fps velocity against the stone.

- **The riprap sizing result from Abt et. al. resulted in reduced velocity and a smaller D_{50} than would result using the standard equation for Manning's n.** The applicant uses Abt et. al. (1987) to estimate Manning's n. According to C.T, Haan, B.J. Barfield, and J.C. Hayes, 1994, Design Hydrology and Sedimentology for Small Catchments, Abt et. al. (1987), this procedure has not been officially adopted but, for the conditions tested it appeared to better describe Manning's n.

Findings:

Because added stability in design is warranted in perennial systems, design criteria are specified according to **R645-301-742.324.**

> **R645-301-742.324.** 1) Design the Jewkes Creek channel riprap and the riprap key at the transition area to the steep gradient to withstand the velocities for the maximum downstream channel capacity as identified on page 7-63, wherein, the plan indicates the

downstream channel capacity of Jewkes creek is 38.7 cfs. and,
2) Design the riprap to have a safety factor of 1.3 assuming a combination of rounded and angular riprap is used using the Colorado State University Procedure (Stevens and Simons, 1971, Simons and Senturk, 1977, 1992) for forces on the channel bank as well as the channel bed. Adjust the riprap gradation and other design criteria as necessary. It is recommended that the D_{50} for check dams be adjusted for the potentially larger flow that could be retained behind the dam prior to sediment deposition.

Recommendation:

The recommendations under the findings section above should be incorporated into design and constructed in the field.

The abatement time has been extended to allow for the submittal of revised abatement plans. Please address the remaining deficiency by February 6, 1998.

If you have any questions, please call.

Sincerely,

Joseph C. Helfrich
Permit Supervisor

tt
Enclosure
cc: Denise Dragoo, Van Cott, Bagley, Cornwall & McCarthy
Bill Malencik
Sharon Falvey
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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
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801-538-7223 (TDD)

January 20, 1998

TO: File

THRU: Joe Helfrich, Permit Supervisor

FROM: Sharon Falvey, Senior Reclamation Specialist

RE: N97-26-7-1, Channel Configuration, Horizon Coal Company, Horizon Mine, ACT/007/020-97G, Folder #2, Carbon County, Utah.

Summary:

This submittal incorporates changes associated with the changes to the county road and resulting stream re-alignment changes to the existing plan.

Analysis:

The channel at the outlet of UC-1 was impacted during two consecutive storm events in August of 1997 which resulted in erosion downstream of the culvert. Recently the county re-constructed the creek downstream of the disturbed area. The permitted design was initially constructed to tie into the channel which had different characteristics than the one which presently exists.

The magnitude of the events occurring in 1997 indicates a need to increase the riprap and rock check dam design requirements to be stable. The velocity resulting from the flow equal to the maximum channel capacity above and below the site should be used to design the riprap and rock check dams in the lower Jewkes Creek section re-constructed with the county road re-alignment.

The information submitted did not increase the riprap and rock check dam requirements to provide increased stability as is warranted in perennial systems. The information provided meets minimum regulatory requirements except for:

- Page 7-63 indicates the downstream channel capacity of Jewkes creek is 38.7 cfs not the 33 cfs used in the calculations on the design sheet for "Jewkes Creek Realignment -Maximum slope", page 18c.

The following were identified as concerns regarding the adequacy of riprap with proposed

designs for Jewkes Creek:

- **The D_{50} riprap design results in a safety factor less than one**. The Hydraulic Engineering Circular No. 11, **Use of Riprap for Bank Protection,** Searcy (1967) was used to design the riprap. The methods used in this design result in a safety factor less than 1 according to the Colorado State University (CSU) design criteria. According to C.T, Haan, B.J. Barfield, and J.C. Hayes, 1994, Design Hydrology and Sedimentology for Small Catchments, "The CSU procedure is the most theoretically complete and conservative of the three procedures [Federal Highway Administration (Norman, 1975), Soil Conservation Service (1979) Engineering Field Manual, and Colorado State University (Stevens and Simons, 1971, Simons and Senturk, 1977, 1992)]".

- **Prior to the deposition of sedimentation the slope is increased and the check dams may have to withstand greater flow velocities**. The estimate for appropriate gradation and distribution for a dam of 3.3 ft height accotding to and a peak flow of 35.3 cfs with a D_{50} around 7.2 inches which is close to the 6 inch D_{50} estimated for the proposed design with a 2 foot height according to the design, criteria identified in Heede, 1976 "Gully Development and Control" . However, the design for the maximum velocity against the riprap in the check dam did not consider the period prior to sedimentation build up. The check dam will be roughly 1.5 feet from the base of the channel to the spillway. The maximum capacity of flow against the check dam at this height is approximately 65 cfs with an approximate 6 fps velocity against the stone.

- **The riprap sizing result from Abt et. al. resulted in reduced velocity and a smaller D_{50} than would result using the standard equation for Manning's n.** The applicant uses Abt et. al. (1987) to estimate Manning's n. According to C.T, Haan, B.J. Barfield, and J.C. Hayes, 1994, Design Hydrology and Sedimentology for Small Catchments, Abt et. al. (1987), this procedure has not been officially adopted but, for the conditions tested it appeared to better describe Manning's n.

Findings:

Because added stability in design is warranted in perennial systems, design criteria are specified according to **R645-301-742.324.**

R645-301-742.324. 1) Design the Jewkes Creek channel riprap and the riprap key at the transition area to the steep gradient to withstand the velocities for the maximum downstream channel

capacity as identified on page 7-63, wherein, the plan indicates the downstream channel capacity of Jewkes creek is 38.7 cfs. and,
2) Design the riprap to have a safety factor of 1.3 assuming a combination of rounded and angular riprap is used using the Colorado State University Procedure (Stevens and Simons, 1971, Simons and Senturk, 1977, 1992) for forces on the channel bank as well as the channel bed. Adjust the riprap gradation and other design criteria as necessary. It is recommended that the D_{50} for check dams be adjusted for the potentially larger flow that could be retained behind the dam prior to sediment deposition.

Recommendation:

The recommendations under the findings section above should be incorporated into design and constructed in the field.

Horizon Coal Corporation
P.O. Box 599
Helper, Utah 84526

November 25, 1997

Mr. Joseph C. Helfrich
Permit Supervisor
Utah Division of Oil, Gas and Mining
1594 West North Temple
Suite 1210
Salt Lake City, Utah 84114-5801

ACT/007/020 #5
NOV file
Copy Joe

Subject: Response to NOV N97-26-7-1, Channel Configuration, Horizon Coal Company, Horizon Mine

Dear Mr. Helfrich:

The following is submitted in response to your letter of November 7, 1997 regarding the above subject. The letter outlined a deficiency in the design of the Jewkes Creek realignment as follows:

> **R645-301-774.314.** 1) Redesign the reclamation riprap and check dams to be stable for flow velocities resulting from the flow equal to the maximum channel capacity above and below the site, and 2) Provide a design for the transition area between the reclamation channel and the channel reconstructed by the county.

To address these deficiencies, we herewith submit the following information:

- Calculations on the attached pages 25 through 31. These should be *added* at the end of the reclamation hydrology calculations in Appendix 7-4 of the Horizon M&RP. These calculations address the first above-noted deficiency and indicate that the reclamation channels as designed will adequately convey a flow equal to the capacity of the adjacent natural stream channels, with the reclamation channels remaining stable and conditions being nonerosive during such an event.

- Calculations on the attached pages 16 through 18m. These should *replace* pages 16 through 18 of the operational hydrology calculations in Appendix 7-4 of the Horizon M&RP. These calculations address the second above-noted deficiency and indicate that a riprap key will be installed in the channel downstream from culvert UC-1 at the change in slope. The purpose of this key will be to prevent headcutting in the channel. The calculations also provide

design information concerning the realigned channel downstream from culvert UC-1.

- Revised pages 7-54, 7-63, and 7-67. The first of these pages present revisions that address the second above-mentioned deficiency. The second two pages present revisions that address the first above-mentioned deficiency.

In addition to the information discussed above, we have also attached revisions to pages 6 through 8 of the reclamation hydrology calculations of Appendix 7-4. These latter revisions were necessitated to correct the Manning's roughness coefficient which had been previously assumed in the design of reclamation channel RD-1. It was previously assumed that the roughness coefficient would be 0.032. However, since this channel will be lined with riprap that has a median diameter of 6 inches, the roughness coefficient should have been 0.035. These pages correct this assumption.

Please contact us if you have questions regarding this submittal.

Sincerely,

Vicky S. Bailey

Vicky S. Bailey, Permitting Consultant
EarthFax Engineering, Inc.

APPLICATION FOR PERMIT PROCESSING

Permit Change ☒ A	New Permit ☐	Renewal ☐	Transfer ☐	Exploration ☐	Bond Release ☐

Permit Number: ACT/007/020

Title of Proposal: Response to the Hydrology for NOV N97-26-7-1 and a copy of Table for Appendix 8-1.

Mine: HORIZON

Permittee: HORIZON COAL

Description, include reason for application and timing required to implement:

Instructions: *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.*

☐ Yes	■ No	1. Change in the size of the Permit Area? _____ acres Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	■ No	2. Is the application submitted as a result of a Division Order? DO #
☐ Yes	■ No	3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes	■ No	4. Does application include operations in hydrologic basins other than as currently approved?
☐ Yes	■ No	5. Does application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	■ No	6. Does the application require or include public notice/publication?
☐ Yes	■ No	7. Does the application require or include ownership, control, right-of-entry, or compliance information?
■ Yes	☐ No	8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
■ Yes	☐ No	9. Is the application submitted as a result of a Violation? NOV # N97-26-7-1
☐ Yes	■ No	10. Is the application submitted as a result of other laws or regulations or policies? Explain:
☐ Yes	■ No	11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes	■ No	12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?)
☐ Yes	■ No	13. Does the application require or include collection and reporting of any baseline information?
☐ Yes	■ No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
■ Yes	☐ No	15. Does application require or include soil removal, storage or placement?
☐ Yes	■ No	16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	■ No	17. Does the application require or include construction, modification, or removal of surface facilities?
■ Yes	☐ No	18. Does the application require or include water monitoring, sediment or drainage control measures?
☐ Yes	■ No	19. Does the application require or include certified designs, maps, or calculations?
☐ Yes	■ No	20. Does the application require or include subsidence control or monitoring?
■ Yes	☐ No	21. Have reclamation costs for bonding been provided for?
■ Yes	☐ No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
■ Yes	☐ No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

☐ **Attach 6 complete copies of the application.**

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.

Larry H. Jones V.P. Mining
Signed - Name - Position - Date

Subscribed and sworn to before me this 24th day of November, 19 97.

JULIE G MCKENZIE
NOTARY PUBLIC - STATE of UTAH
50 SOUTH MAIN #1600
SALT LAKE CITY, UT 84144
COMM. EXP. 5-23-2001

Julie G McKenzie
Notary Public

My Commission Expires: 5-23-2001
Attest: STATE OF UTAH) ss:
COUNTY OF _____)

RECEIVED
NOV 25 1997
DIV. OF OIL, GAS & M

Received by Oil, Gas & Mining

ASSIGNED TRACKING NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: Response to the Hydrology for N97-26-7-1 and Corrected Table for Appendix 8-1.	Permit Number: ACT/007/020
	Mine: Horizon Mine
	Permittee: Horizon Coal Corporation

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	X REPLACE	☐ REMOVE	Chapter 7, Pages 7-54, 7-63 and 7-67
☐ ADD	X REPLACE	☐ REMOVE	Appendix 7-4, Reclamation Hydrology Calculations - Pages 25 through 31
☐ ADD	X REPLACE	☐ REMOVE	Appendix 7-4, Operational Hydrology Calculations - Pages 16 through 18m
☐ ADD	X REPLACE	☐ REMOVE	Appendix 7-4, Reclamation Hydrology Calculations - Pages 6 through 8
☐ ADD	X REPLACE	☐ REMOVE	Appendix 8-1, Select Soil Analytical Data and the associated lab data
☐ ADD	☐ REPLACE	☐ REMOVE	

November 25, 1997

a.9

Culvert UC-2 will receive runoff from Portal Canyon. The 100-year, 6-hour peak flow for this culvert is 8.3 cfs. A 24-inch diameter culvert is planned to be installed at this location. This size is based on inlet control and a headwater to depth ratio of one or less. A trash rack will be installed on the inlet to this culvert, as indicated in Figure 7-8.

Culvert UC-3 will receive runoff from Jewkes Creek. The 100-year, 6-hour peak flow to this culvert is 19.6 cfs. This flow can adequately be handled by a 30-inch diameter culvert, based on inlet control and a headwater to depth ration of one or less.

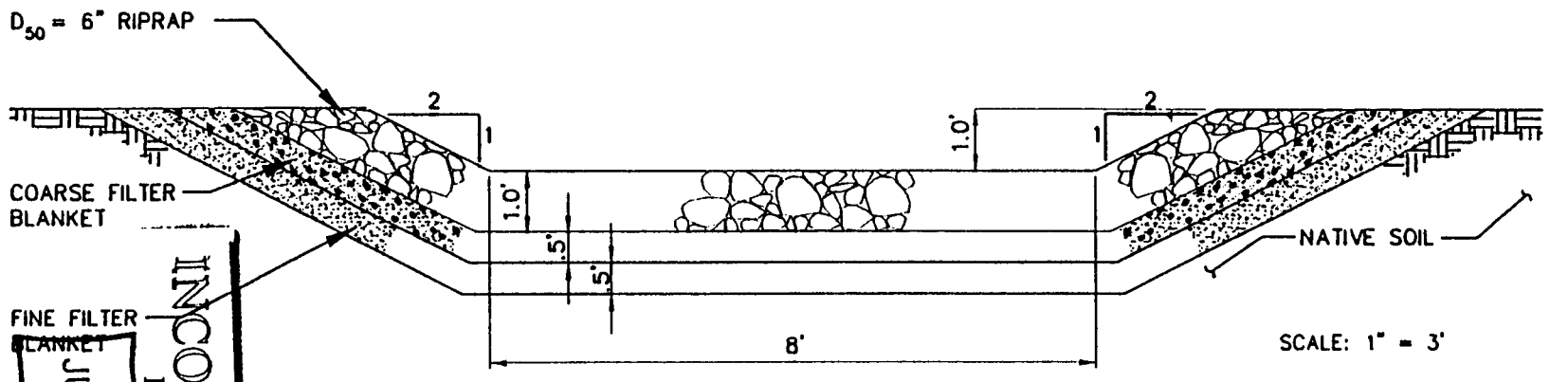
Discharge at the outlet of culvert UC-1 will have an exit velocity of approximately 10.4 fps (see Appendix 7-4). This will be controlled by installing an outlet channel and impact pool. The outlet channel will have graded riprap on the bottom and along the sides of the channel for an approximate distance of 30 feet downstream from the culvert outlet to a transition to a compound channel with a riprapped low flow channel and vegetated flood plain, as proposed for the final reclamation channel (see Plates 7-4 & 7-6). The riprap in the outlet channel and the low flow channel will have a median diameter of 0.5 foot and will be placed at a thickness of 12 inches. The gradation of the riprap is presented in Table 7-6. A geotextile material will be installed beneath the outlet channel riprap as a filter blanket. A sand filter will be installed beneath the low flow channel riprap.

The outlet channel will act as an impact pool for flows from the culvert or emergency spillway. The impact pool will be created by the transition to the compound channel, due to the shallower depth of the low flow channel versus outlet channel. Under flow conditions, the water will fill the outlet channel and spill to the low flow channel until its capacity is exceeded and then spread out into the flood plain. This will ensure that low flows can be conveyed through the area, while high flows will spread over the flood plain. Additionally, the shallow depth of the low flow channel will ensure the capability of sub-irrigation and seepage into the surrounding flood plain.

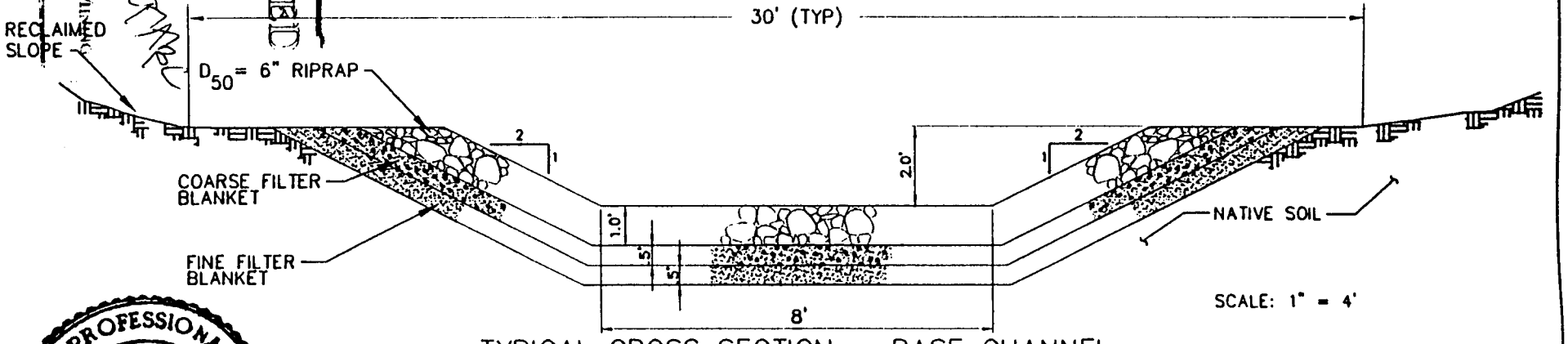
By constructing these channels during operations, the area will not need to be disturbed again during reclamation. The riparian area will already be established around the channels and the area will be stabilized. If these channels are not included in the initial disturbance, then the area will be redisturbed upon reclamation.

Calculations contained in Appendix 7-4 indicate that the flow capacity of the unaltered Jewkes Creek upstream from culvert UC-3 is 27.7 cfs. The flow capacity of the unaltered Jewkes Creek downstream from culvert UC-1 is 38.7 cfs. Culverts UC-1 and UC-3 have design capacities of 59 cfs and 40 cfs, respectively. Hence, the capacities of these culverts exceed the capacity of Jewkes Creek in its unaltered state.

As indicated in Appendix 7-4, the capacity of the unaltered Portal Canyon Creek upstream from culvert UC-2 is 13.1 cfs. All of the downstream portion of this creek will be subject to the culverted diversion. Culvert UC-2 has a capacity of 22 cfs. Hence, the capacity of this culvert exceeds that of Portal Canyon Creek in its unaltered state.



PORTAL CANYON CROSS SECTION – RD-1



TYPICAL CROSS SECTION – BASE CHANNEL
RD-2 AND RD-3

FIGURE 7-12. TYPICAL CROSS SECTIONS FOR RECLAIMED CHANNELS

EarthFax

Second, loose-rock check dams will be installed at the locations indicated on Plate 3-7 in accordance with Figure 7-12a. These check dams have been designed in accordance with the procedures outlined by Heede (1976) as indicated in Appendix 7-4 and will cause naturally-occurring sediment in the stream to be deposited in the reclaimed channel. This deposited sediment will provide an additional soil base for re-establishment of the riparian/wet meadow vegetation and will also provide a cross section which is more typical of that which currently exists. Nonetheless, should a major storm event occur, the underlying base channel will provide long-term protection against excessive erosion.

The check dams have been designed with a spillway that is capable of passing the peak flow resulting from the 10-year, 6-hour precipitation event. Discharge in excess of that event will flow onto the adjacent flood plain. By spreading this flow, moisture will be provided to the riparian/wet meadow vegetation to assist in its re-establishment. Data included in Appendix 7-4 indicate that the soil in the flood plain will be erosionally stable during runoff resulting from the 100-year, 6-hour rainfall event.

The width of the reclaimed flood plain will be at least equal to that of the current riparian/wet meadow vegetation community, as defined on Figure 2 of Appendix 9-2. The planned width of the reclamation flood plain is indicated on Plate 3-7. Check dams will be installed within the flood-plain sections as indicated on Plate 3-7. Even though the calculations provided in Appendix 7-4 indicate that the flood plain soils will be erosionally stable, a temporary jute matting will be installed in these flood plain areas to provide additional protection for the seeds until vegetation is established.

The flood plain of channel RD-2 will also be trapezoidal in shape and will be constructed with a typical bottom width of 30 feet, 2H:1V sideslopes, and a channel slope ranging from approximately 0.02 to 0.03 foot/foot (see Figure 7-12 and Plate 3-7). Peak flow for this flood plain channel, based on the 100-year, 6-hour event, is 19.75 cfs. Allowing for the capacity of the low flow channel, the flood plain will only be required to handle 10.29 cfs. The channel will be constructed in regraded materials and will be stabilized using a temporary jute mesh erosion control blanket. This blanket will be in place only until the vegetation planting for the flood plain mature and provide natural protection. To handle this event, the flood plain channel will have a maximum flow depth of 0.16 foot and a maximum velocity of 2.32 fps. The velocity is less than the 5.5 fps allowed for jute mesh.

Reclamation channel RD-3 will receive flow from the 551.0 acre Lower Jewkes Creek drainage, below the confluence of Jewkes Creek and Portal Canyon. The reclaimed channel will also be a compound channel. It will consist of a base channel and a flood plain, with loose-rock check dams. The base channel will be trapezoidal in shape and will be constructed with an 8-foot bottom width, 2H:1V sideslopes, and a channel slope ranging from approximately 0.03 to 0.07 foot/foot (see Figure 7-12 and Plate 3-7). Peak flow for this base channel, based on the 100-year, 6-hour event, is 30.21 cfs. The channel will be constructed in regraded materials and will be riprapped to provide a stable stream section. To handle this event, the base channel will have a maximum flow depth of 0.64 foot and a maximum velocity of 6.60 fps. The channel depth is planned to be 2.0 feet, resulting in a freeboard of

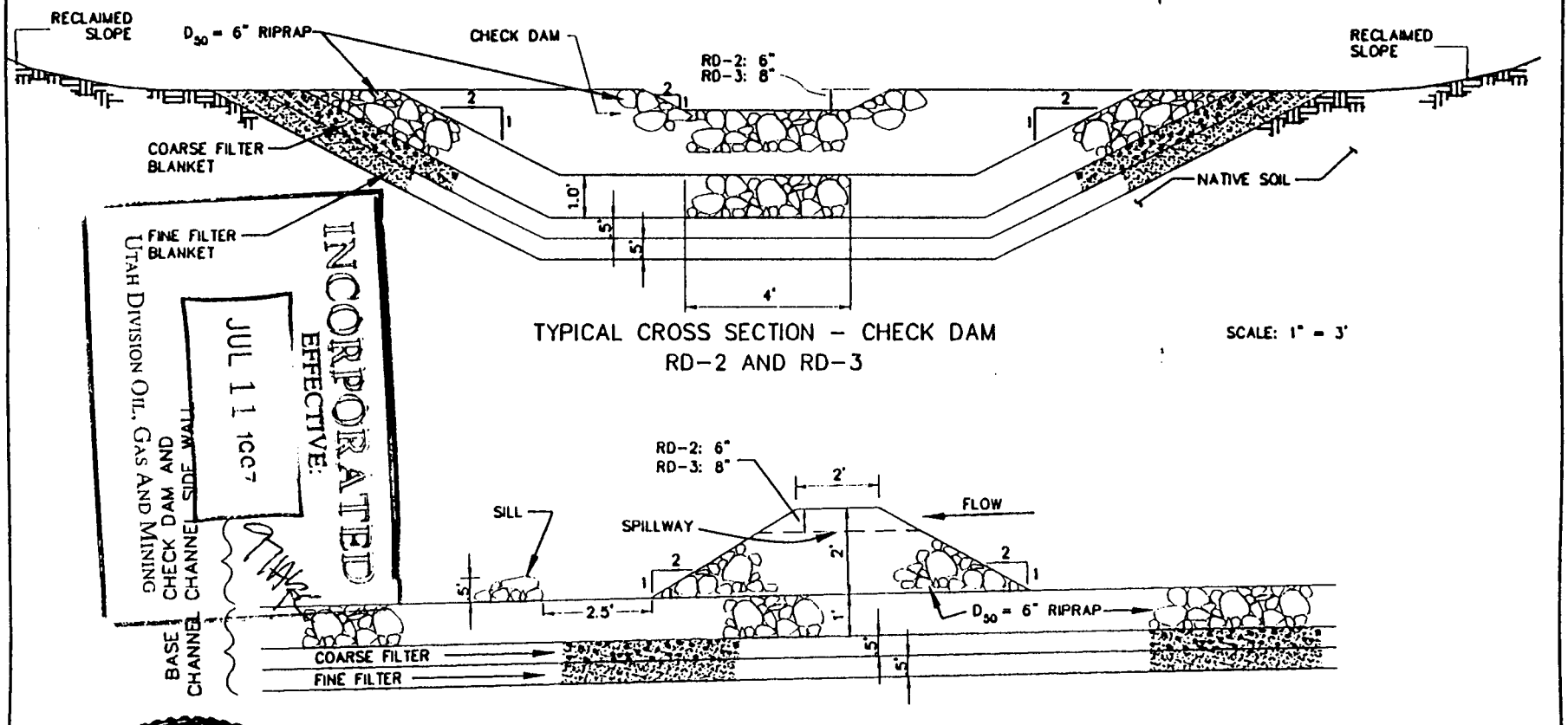


FIGURE 7-12A. TYPICAL CHECK DAM CROSS SECTIONS

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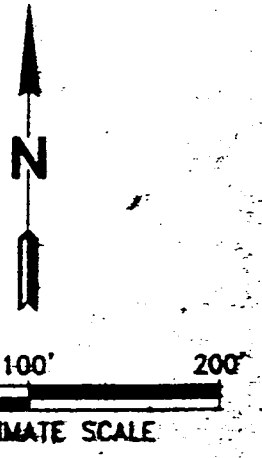
INCORPORATED
EFFECTIVE:
JUL 11 1997

UTAH DIVISION OIL, GAS AND MINING

RECEIVED
JUL 28 1997
DIV. OF OIL, GAS & MINING

LICENSED PROFESSIONAL ENGINEER
No. 168246
RICHARD B. WHITE
7/23/97
STATE OF UTAH



REVISION	

PLATE 7-4

DRAINAGE DIVERSIONS

HORIZON No. 1 MINE

HORIZON COAL CORPORATION
P.O. BOX 2560
WISE, VIRGINIA 24273

DRAWN BY: SWF	CHECKED BY: RBW	DATE: 2-6-97
APPROVED BY: VSB	AUTOCAD FILE: PLT7-DRDIC	

BOURQUIN MINERAL ENGINEERING
EarthFax Engineering, Inc.

During the summer of 1997 the Horizon Mine site received extensive precipitation, with several storm events testing the drainage capacity of the culverts within the disturbed area. Runoff from storms on August 4 and 5 blocked or bypassed culverts ranging in size from 18 - 48" within the disturbed and permit boundaries. During the storm events the riparian vegetation above and below the pad area was flattened by runoff and in some places uprooted and carried downstream. The damage to the area included extensive erosion, displacement of culverts, sediment control structures, and the cutting of new stream channels. To prevent additional erosion and damage to the area, a single channel (containing Jewkes Creek) was defined and constructed within the disturbed area boundary as described in Section 7.2.3.2.

The Jewkes Creek channel extends below the disturbed area boundary and joins the North Fork of Gordon Creek. The altered Jewkes Creek channel involves property owned by Hidden Splendor Resources and Carbon County and a commitment has been made to reestablish riparian vegetation in this area (Stream Channel Alteration Permits Numbers 97-91-06SA and 97-91-12SA). Horizon was requested by both parties to assist in the planting of riparian vegetation. Horizon agreed to provide labor, seed, and plants to complete the planting of the entire realigned channel (861 feet) both within (151 feet) and beyond (710 feet) the disturbed area boundary. The channel bottom width is 10 feet within the disturbed area boundary and varies between 6 and 10 feet below the disturbed area boundary. The channel area receiving riparian mitigation outside the disturbed boundary is approximately 0.13 acre. The reseeded area within the disturbed bo 034 acre.

The channel was planted in 19 tion Seed Mix (Appendix 3-9) approved by the Division of Water Righ ion Permits Numbers 97-91-06SA and 97-91-12SA). The recla ed in Section 3.5.5.2 will be planted in the reclamation char the disturbed area boundary.

Do not incorporate into plan. Pg. 9-7 w/ culvert extension is more current

An area approximately 40' onstruction riparian vegetation below the sediment pond on the east eek was left as a mitigation requirement of UDOGM. The area is fenced a annual precipitation for the area. However, due to the alteration of Jewkes Cre ea receives no water from the creek. The planting of riparian vegetation in the alter wkes Creek channel outside the disturbed area should compensate for this area in addition to the area (0.068 acre) planned for disturbance in the extension of Culvert UC-3. At the request of UDOGM and the Division of Wildlife Resources and to satisfy mitigation requirements a wetland (approximately 1.5 acres) owned by the Division of Wildlife Resources was fenced by Horizon in Coal Canyon one mile to the west of the mine site.

A threatened and endangered vegetation study of the permit area was done the week of August 21, 1995 by Patrick Collins of Mt. Nebo Scientific.

9.4.1.3 Moderately Disturbed Areas

Some of the areas have had considerable disturbance to the vegetation and the top few inches of soil, but have had relatively little deep, subsurface disturbance. These areas are presently

During the summer of 1997 the Horizon Mine site received extensive precipitation, with several storm events testing the drainage capacity of the culverts within the disturbed area. Runoff from storms on August 4 and 5 blocked or bypassed culverts ranging in size from 18 - 48" within the disturbed and permit boundaries. During the storm events the riparian vegetation above and below the pad area was flattened by runoff and in some places uprooted and carried downstream. The damage to the area included extensive erosion, displacement of culverts, sediment control structures, and the cutting of new stream channels. To prevent additional erosion and damage to the area, a single channel (containing Jewkes Creek) was defined and constructed within the disturbed area boundary as described in Section 7.2.3.2.

The Jewkes Creek channel extends below the disturbed area boundary and joins the North Fork of Gordon Creek. The altered Jewkes Creek channel involves property owned by Hidden Splendor Resources and Carbon County and a commitment has been made to reestablish riparian vegetation in this area (Stream Channel Alteration Permits Numbers 97-91-06SA and 97-91-12SA). Horizon was requested by both parties to assist in the planting of riparian vegetation. Horizon agreed to provide labor, seed, and plants to complete the planting of the entire realigned channel (861 feet) both within (151 feet) and beyond (710 feet) the disturbed area boundary. The channel bottom width is 10 feet within the disturbed area boundary and varies between 6 and 10 feet below the disturbed area boundary. The channel area receiving riparian mitigation outside the disturbed area boundary is approximately 0.13 acre. The reseeded area within the disturbed boundary is 0.034 acre.

The channel was planted in 1997 with the Revegetation Seed Mix (Appendix 3-9) approved by the Division of Water Rights (Stream Channel Alteration Permits Numbers 97-91-06SA and 97-91-12SA). The reclamation riparian seed mix described in Section 3.5.5.2 will be planted in the reclamation channel during final reclamation within the disturbed area boundary.

An area approximately 40' x 60' (0.055 acre) of preconstruction riparian vegetation below the sediment pond on the east side of Jewkes Creek was left as a mitigation requirement of UDOGM. The area is fenced and receives the annual precipitation for the area. However, due to the alteration of Jewkes Creek, the area receives no water from the creek. The planting of riparian vegetation in the altered Jewkes Creek channel outside the disturbed area should compensate for this area in addition to the area (0.068 acre) planned for disturbance in the extension of Culvert UC-3. At the request of UDOGM and the Division of Wildlife Resources and to satisfy mitigation requirements a wetland (approximately 1.5 acres) owned by the Division of Wildlife Resources was fenced by Horizon in Coal Canyon one mile to the west of the mine site.

A threatened and endangered vegetation study of the permit area was done the week of August 21, 1995 by Patrick Collins of Mt. Nebo Scientific.

9.4.1.3 Moderately Disturbed Areas

Some of the areas have had considerable disturbance to the vegetation and the top few inches of soil, but have had relatively little deep, subsurface disturbance. These areas are presently

October 13, 1997

ABATEMENT PLAN

The channel at the outlet of UC-1 was impacted during two consecutive storm event in August of 1997. Due to these impacts a reconstruction of the channel was necessary. According to the Horizon approved permit two options were available to accomplish the reconstruction. For clarification purposes, the flow from the outlet of UC-1 is undisturbed drainage; UC-1 merely provides a bypass through the disturbed area for the flow of Jewkes Creek.

The first option was constructed and in place prior to the August storm events, however the flow was uncontrolled and caused damage and erosion to the properties below the outlet. Reconstruction of the identical channel (Appendix 7-4, page 16) would provide results which Horizon, the Division of Water Rights and Hidden Splendor Resources (landowner) consider inadvisable due to the experiences of 1997.

Description of Diversion after the Storm Events

- 36" culvert containing flow
- Area above culvert 100' wide
- Diversion below culvert 4' wide
- Culvert discharge resulted in an uncontrolled flooding verses a controlled flood that spread out the runoff in a controlled manner
- The diversion constructed by the county controlled the runoff except for the road culvert
- The operator constructed the current diversion to exceed the final reclamation diversion design.

The second option was constructed using the base channel as described in Appendix 7-4, Determination of Peak Flows for Reclaimed Drainages, page 13 and etc (attached). The construction provided a more controlled permanent channel for the flow of Jewkes Creek to the North Fork of Gordon Creek.

The Jewkes Creek channel lies both within (151 feet) and beyond (710 feet) the disturbed area boundary and joins the North Fork of Gordon Creek. The altered Jewkes Creek channel (Stream Channel Alteration Permits Numbers 97-91-06SA and 97-91-12SA) involves property owned by Hidden Splendor Resources and Carbon County. A commitment has been made to the Division of Water Rights to reestablish riparian vegetation in the channel. Horizon was requested by both parties to assist in the planting and eventual establishment of riparian vegetation. Horizon volunteered to provide labor, seed, and plants to complete the planting of the entire realigned channel (861 feet). The channel area receiving riparian mitigation outside the disturbed area boundary is approximately 0.16 acre and 0.034 acre within the disturbed area boundary. The second option furnished a better environment for the restoration of a riparian area, providing a confined area to catch stream flow and a defined area for planting. This option would provide the opportunity to plant riparian vegetation presently and allow the establishment of mature communities during the operation of the mine.

An area approximately 40' x 60' (0.055 acre) of preconstruction riparian vegetation below the sediment pond on the east side of Jewkes Creek was left as a mitigation requirement of UDOGM. The area is fenced and receives the annual precipitation for the area. However, due to the alteration of Jewkes Creek, the area receives no water from the creek. The operator does not have water rights to Jewkes Creek therefore water cannot be diverted from the creek to water this riparian vegetation. The planting of riparian vegetation in the altered Jewkes Creek channel outside the disturbed area should compensate for this bypassed area.

A summary of the advantages associated with the second option follow:

- Extended area for the deposit of sediment
- Less potential for erosion, thus less sediment load in the North Fork of Gordon Creek
- Establishment of riparian environment prior to reclamation
- Control of Jewkes Creek flow during spring runoff and storm events
- Prevention of damage to property not owned or controlled by the mine

Horizon has observed the sediment in Jewkes Creek is sufficient to constitute a soil base for the planting of willows and grasses along the edges and banks of the channel during 1997. These plantings would serve to stabilize the banks, to recreate a riparian environment in the channel, and provide additional opportunity for the restoration of riparian vegetation during the operational life of the mine. Horizon also commits to place supplemental riprap as needed for bank protection.

DETERMINE RIPRAP OUTLET PROTECTION REQUIRED AT UC-1 CULVERT OUTLET.

BASED ON A 3.0 FT DIAMETER CULVERT & A 5% OUTLET SLOPE:

OUTLET VELOCITY = 10.38 FPS

TO ASSURE PROTECTION OF THE RIPARIAN AREA BELOW THE SEDIMENT POND AND UC-1 CULVERT OUTLET IT IS PROPOSED THAT A SERIES OF CHANNELS BE CONSTRUCTED. THE FIRST IS AN IMPACT POOL/OUTLET CHANNEL FROM CULVERT UC-1 & THE EMERGENCY SPILLWAY OF THE SEDIMENT POND. THIS CHANNEL WILL BE TRAPEZOIDAL IN SHAPE, RIPRAPPED W/ 0.5 FT D_{50} RIPRAP, & 2FT DEEP. THE OUTLET CHANNEL WILL TRANSITION TO THE LOW FLOW CHANNEL & FLOOD PLAIN CONFIGURATION PROPOSED FOR FINAL RECLAMATION OF JEWKES CREEK. THIS TRANSITION WILL CREATE THE IMPACT POOL, BECAUSE THE LOW FLOW CHANNEL IS NOT AS DEEP BELOW THE FLOOD PLAIN AS THE OUTLET CHANNEL.

THE LOW FLOW CHANNEL* WILL BE TRAPEZOIDAL IN SHAPE WITH A BOTTOM WIDTH OF 4 FT, RIPRAPPED W/ 0.5 FT D_{50} RIPRAP, & A DEPTH OF 0.6 FT. THIS WILL ENSURE THAT LOW FLOWS CAN SAFELY BE CONVEYED THRU THE AREA, HOWEVER THE HIGH FLOWS WILL SPREAD OVER THE FLOOD PLAIN. ADDITIONALLY, THE VERY SHALLOW DEPTH OF THE LOW FLOW CHANNEL WILL INSURE THE CAPABILITY OF SUB-IRRIGATION & SEEPAGE INTO THE SURROUNDING FLOOD PLAIN.

BY CONSTRUCTING THESE CHANNELS NOW, IT WILL NOT BE NECESSARY TO RE-DISTURB THE AREA WHEN THE SITE IS RECLAIMED. THE RIPARIAN AREA WILL ALREADY BE ESTABLISHED AROUND THE RECLAIMED CHANNEL AND ANY NEW DISTURBANCE WOULD JUST CONNECT TO IT.

* SEE PAGE 10 OF RECLAMATION CALC'S.

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Culvert UC-1

Comment: Outlet Protection Determination

Solve For Actual Depth

Given Input Data:

Diameter.....	3.00 ft
Slope.....	0.0500 ft/ft
Manning's n.....	0.024
Discharge.....	27.87 cfs

Computed Results:

Depth.....	1.22 ft
Velocity.....	10.38 fps
Flow Area.....	2.69 sf
Critical Depth....	1.71 ft
Critical Slope....	0.0155 ft/ft
Percent Full.....	40.52 %
Full Capacity.....	80.79 cfs
QMAX @.94D.....	86.90 cfs
Froude Number.....	1.91 (flow is Supercritical)

OUTLET CHANNEL

CHANNEL SHAPE: TRAPEZOIDAL

BOTTOM WIDTH: 10 FT

SIDESLOPES: 2H:1V

MANNING'S n: 0.035 (D_{50} = 0.5 FT)

CHANNEL SLOPE: 0.03 FT/FT

DISCHARGE: 27.37 CFS

FLOW DEPTH = 0.55 FT

FLOW VELOCITY = 4.57 FPS

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Culvert UC-1

Comment: Outlet Channel

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.035 — D_{50} = 0.5FT
Channel Slope....	0.0300 ft/ft
Discharge.....	27.87 cfs

Computed Results:

Depth.....	0.55 ft
Velocity.....	4.57 fps
Flow Area.....	6.10 sf
Flow Top Width...	12.20 ft
Wetted Perimeter.	12.46 ft
Critical Depth...	0.60 ft
Critical Slope...	0.0226 ft/ft
Froude Number....	1.14 (flow is Supercritical)

RD-3

Base channel:

Design Q = 30.21 cfs (100-yr, 6-hr)
Bottom width = 8 ft (2:1 side slopes)
Max slope = 0.071 ft/ft
Min slope = 0.032 ft/ft
D_{50} = 6" (n = 0.035)
Max velocity = 6.60 ft/s } See pp 14 and 14a of this calc. Acceptable.
Max flow depth = 0.64 ft } Min design depth = 1.0 ft. Increase to 2.0' for constructability

Check dam:

Design Q = 14.55 cfs (10-yr, 6-hr)
Bottom width = 4 ft (2:1 side slopes)
Max slope = (0.7)(0.071) = 0.050 ft/ft
Min slope = (0.7)(0.032) = 0.022 ft/ft
D_{50} = 6" (n = 0.035)
Max velocity = 5.36 ft/s } See pp 14b & 14c of this calc. Acceptable.
Max flow depth = 0.67 ft } Design w/ notch depth of 8" (no freeboard)

Flood plain:

Design Q = 30.21 cfs − 14.55 cfs = 15.66 cfs
Bottom width = 30 ft (typical of current condition)
Max slope = 0.071 ft/ft } see above
Min slope = 0.022 ft/ft }
No riprap → n = 0.030
Max velocity = 3.59 ft/s < 5 ft/s. No riprap req'd
Max flow depth = 0.20 ft
→ See pp 14d and 14e of this calc.

See pg 23 of this calc. for typical design.

RD-3, Base channel, Maximum slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Reclamation Channels
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.071000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	8.00	ft
Discharge	30.21	cfs

Results		
Depth	0.51	ft
Flow Area	4.58	ft^2
Wetted Perimeter	10.27	ft
Top Width	10.03	ft
Critical Depth	0.72	ft
Critical Slope	0.021787	ft/ft
Velocity	6.60	ft/s
Velocity Head	0.68	ft
Specific Energy	1.18	ft
Froude Number	1.72	
Flow is supercritical.		

RD-3, Base channel, Minimum slope
Worksheet for Trapezoidal Channel

Project Description	
Project File	untitled.fm2
Worksheet	Horizon Reclamation Channels
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.032000	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	8.00	ft
Discharge	30.21	cfs

Results		
Depth	0.64	ft
Flow Area	5.95	ft^2
Wetted Perimeter	10.86	ft
Top Width	10.56	ft
Critical Depth	0.72	ft
Critical Slope	0.021788	ft/ft
Velocity	5.08	ft/s
Velocity Head	0.40	ft
Specific Energy	1.04	ft
Froude Number	1.19	
Flow is supercritical.		

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
Box 145801
Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

November 7, 1997

Vicky Bailey
Horizon Coal Company
P.O. Box 599
Helper, Utah 84526

Re: N97-26-7-1, Channel Configuration, Horizon Coal Company, Horizon Mine, ACT/007/020-97G, Folder #2, Carbon County, Utah

Dear Ms. Bailey:

The Division has reviewed the abatement plans, received on October 13, 1997, for N.O.V N97-26-7-1. Sharon Falvey, Reclamation Specialist for the Division, finds the following deficiency:

R645-301-774.314. 1) Redesign the reclamation channel riprap and check dams to be stable for flow velocities resulting from the flow equal to the maximum channel capacity above and below the site, and 2) Provide a design for the transition area between the reclamation channel and the channel reconstructed by the county.

The abatement time has been extended to allow for resubmittal of revised abatement plans. Please submit new plans by November 26, 1997.

If you have any questions, please call.

Sincerely,

Jene W. Kelley
for Joseph C. Helfrich

Joseph C. Helfrich
Permit Supervisor

tt
Enclosure
cc: Bill Malencik
Sharon Falvey
O:\007020.HZN\FINAL\DEFICIEN.97G

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
Box 145801
Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

November 6, 1997

TO: File

THRU: Joe Helfrich, Permit Supervisor JK for Joe Helfrich

FROM: Sharon Falvey, Senior Reclamation Specialist SKF

RE: N97-26-7-1, Channel Configuration, Horizon Coal Company, Horizon Mine, ACT/007/020-97G, Folder #2, Carbon County, Utah.

Summary:

This submittal incorporates changes to the text on page 9-7. Updated information is contained in the amendment for culvert extension and essentially invalidates the need for changes at this site. With the changes to the county road and resulting stream re-alignment changes to the existing plan are necessary.

Analysis:

The channel at the outlet of UC-1 was impacted during two consecutive storm events in August of 1997 which resulted in erosion downstream of the culvert. Recently the county re-constructed the creek downstream of the disturbed area. The permitted design was initially constructed to tie into the which had different characteristics than the one which presently exists. Currently, there are no designs for the transition area between the reclamation channel and the channel reconstructed by the county. Construction and designs are necessary for the transition area.

The magnitude of the events occurring in 1997 indicates a need to increase the riprap and rock check dam design requirements to be stable. The velocity resulting from the flow equal to the maximum channel capacity above and below the site should be used to design the riprap and rock check dams and must be incorporated into the reclamation channel design.

Findings:

R645-301-774.314. 1) Redesign the reclamation channel riprap and check dams to be stable for flow velocities resulting from the flow equal to the maximum channel capacity above and below

the site, and 2) provide a design for the transition area between the reclamation channel and the channel reconstructed by the county.

Recommendation:

The recommendations under the findings section above should be incorporated into design and constructed in the field where appropriate.

cc: Bill Malencik
O:\007020.HZN\FINAL\N972671.WPD

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
Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340
(801) 359-3940 (Fax)

October 16, 1997

To: File

Thru: Joe Helfrich, Permit Supervisor, Compliance JK for Joe Helfrich

From: Wm. J Malencik, Reclamation Specialist

RE: NOV 97-26-7-1, Horizon Coal Mine, Horizon Mine, ACT/007/020, Folder #5, Carbon County, Utah

Attached is a plan prepared by the operator with the assistance from Earthfax.

Since this is predominately a hydrology matter, it is only appropriate that Sharon review the plan.

I believe the channel as constructed will provide for the following:

(1) The establishment of a riparian area in the stream channel.

(2) Will provide the necessary interface between a three foot culvert outlet, UC-1 reconstructed channel, and finally the intertie into the county reconstructed channel.

In my opinion, it does not appear reasonable, in light of what took place with the recent storms, to reconstruct the channel to it's pre-flood design.

sd

SLC COPY

(B)

Horizon Coal Corporation
P.O. Box 599
Helper, UT 84526

RECEIVED
OCT 13 1997
DIV. OF OIL, GAS & MINING

October 13, 1997

Mr. Bill Malensick
Utah Division of Oil, Gas & Mining
451 East 400 North
Price, UT 84501

Subject: Notice of Violation No. N97-26-7-1

Dear Bill,

The information attached is to address Notice of Violation No. N97-26-7-1, which was issued on August 21, 1997 by the Utah Division of Oil, Gas & Mining to Horizon Coal Corporation. The stated nature of the violation was "failure to receive Division of Oil, Gas & Mining approval before modifying an undisturbed diversion". It is our understanding that the NOV was issued for the channel downstream from culvert UC-1 at the Horizon Mine.

Pages 7-54, 7-64, 7-65, 7-66, and the cover of Plate 7-4 from the approved permit have been included for ease of review.

Revisions to Chapter 9 have been included to clarify the methods used to restore the riparian vegetation downstream from culvert UC-1.

Horizon Coal Corporation requests that Notice of Violation No. N97-26-7-1 be vacated in accordance with the attached information.

Sincerely,

Vicky S. Bailey

Vicky S. Bailey
Permitting Consultant, EarthFax Engineering, Inc.

Horizon Coal Corporation
P.O. Box 599
Helper, UT 84526

September 19, 1997

Mr. Bill Malensick
Utah Division of Oil, Gas & Mining
451 East 400 North
Price, UT 84501

Subject: Notice of Violation No. N97-26-7-1

Dear Bill,

The purpose of this letter is to address Notice of Violation No. N97-26-7-1, which was issued on August 21, 1997 by the Utah Division of Oil, Gas & Mining to Horizon Coal Corporation. The stated nature of the violation was "failure to receive Division of Oil, Gas & Mining approval before modifying an undisturbed diversion" (spelling corrected for clarity). It is our understanding that the NOV was issued for the channel downstream from culvert UC-1 at the Horizon Mine.

As you may be aware, Carbon County intended to realign their road downstream from the Horizon Mine disturbed area during the time that the surface facilities were being constructed at the mine. As part of this alignment, the County was intending to also realign Jewkes Creek downstream from the disturbed area to the point where it flows beneath the Consumers road.

The approved design for the channel downstream from culvert UC-1 is presented on page 7-54 of the Mining and Reclamation Plan. According to this design, an impact pool will be constructed immediately downstream from the culvert, transitioning into the approved base reclamation channel. The impact pool was designed with a minimum bottom width of 10 feet (see Plate 7-4), while the base reclamation channel was designed with a minimum bottom width of 8 feet (see Figure 7-12). Loose-rock check dams (Figure 7-12A) would eventually also be placed in the reclamation channel for the reasons outlined on page 7-65 of the Mining and Reclamation Plan.

At the time culvert UC-1 was installed, the County had not yet completed realignment of either the road or the creek. Construction of the base reclamation channel downstream from culvert UC-1 would, therefore, have resulted in an abrupt change in channel conditions at the downstream end of the reclamation channel until such time as the realigned county channel was constructed. Given the significant precipitation events which were occurring in the area at the time, such an abrupt change would likely cause significant channel erosion and was not

considered appropriate. Therefore, a small amount of temporary riprap was placed downstream from the culvert outlet to provide interim protection until the county channel was completed.

As soon as the County had completed realignment of the road and channel, the approved outlet channel was constructed downstream from UC-1. This constructed channel has a bottom width of 10 feet immediately downstream from the culvert outlet (i.e., in the area of the approved impact pool) and 9 to 10 feet downstream from the impact pool, thereby meeting or exceeding the minimum requirements of the approved plan. Riprap sizing and channel side slopes also meet or exceed the minimum requirements of the approved plan.

Hence, Horizon Coal Corporation did not modify an undisturbed diversion without UDOGM approval. The activity which had occurred downstream from the culvert outlet at the time of the NOV was approved and was completed to connect with the County's completed stream channel realignment. As soon as the County completed their work, the base channel of the diversion was constructed to meet the minimum requirements of the approved plan.

Horizon Coal Corporation therefore requests that Notice of Violation No. N97-26-7-1 be vacated.

Sincerely,

Vicky S. Bailey
Permitting Consultant, EarthFax Engineering, Inc.

Michael A. Gipson
Mine Manager, Horizon Coal Corporation