



September 19, 2024

Ms. Hunter Ridley
Environmental Protection Specialist
Colorado Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Colowyo Coal Company L.P.
Permit No. C-1981-019
Technical Revision 164 (TR-164)
Section 3 Ponds As-Built

Dear Mr. Trujillo,

Tri-State Generation and Transmission Association Inc. (Tri-State), is the parent company to Axial Basin Coal Company, which is the general partner to Colowyo Coal Company L.P. (Colowyo). Therefore, Tri-State on behalf of Colowyo is submitting technical revision 163 (TR-163) to Permit No. C-1981-019. TR-164 provides the as-built for the Upper and Lower Section 3 Ponds.

Included in this technical revision is a change of index sheet to ease incorporation of this revision into the permit document, and a public notice for the Division's review. If you should have any additional questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 or at tennyson@tristategt.org.

Sincerely,

DocuSigned by:

4BE980BE59E442F...

Chris Gilbreath
Senior Manager
Remediation and Reclamation

CG:TT

Enclosure

cc: Brad Stock (BLM)
Tony Tennyson (via email)
File: C. F. 1.1.2.152

CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: Colowyo Coal Company L.P.

Permit Number: **C-1981-019**

Date: **September 18, 2024**

Revision Description: **TR-164 Section 3 Ponds As-Built**

Volume Number	Page, Map or other Permit Entry to be REMOVED	Page, Map or other Permit Entry to be ADDED	Description of Change
1			No Change
2A			No Change
2B			No Change
2C	Appendix Exh. 7-13S3, Page Exh. 7-14S3-1 (1 page)	Appendix Exh. 7-13S3, Page Exh. 7-14S3-1 (1 page)	Appendix Exh. 7-13S3 has been updated.
2C	Figure Exh. 7-14S3-1	Figure Exh. 7-14S3-1	Section 3 Ponds design has been updated to as-built.
2C	SEDCAD Output Section 3 Ponds (21 pages)	SEDCAD Output Section 3 Ponds (21 pages)	Section 3 Ponds hydrology has been updated based on the as-built.
2D			No Change
2E			No Change
2E			No Change
3			No Change
4			No Change
5A			No Change
5B			No Change
6			No Change
7			No Change
8			No Change
9			No Change
10			No Change
12			No Change
13			No Change
14			No Change
15			No Change
16			No Change
17			No Change
18A			No Change

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18B					No Change
18C					No Change
18D					No Change
19					No Change
20					No Change
21					No Change
22					No Change

Appendix Exh. 7-14S3 Upper and Lower Section 3 Ponds

The location of the Upper and Lower Section 3 Ponds are presented on Map 12. These two ponds will eventually replace the Streeter Pond as the primary sediment controls structures in the Streeter Ditch watershed. The profiles of the associated permanent channels associated with the Upper and Lower Section 3 Ponds watershed are presented on Map 33. These channels consist of the Streeter and Buckskin Ditches, and their design information is presented in this appendix. The design configuration for the Upper and Lower Section 3 Ponds are presented on Figure Exh. 7-14S3-1, and Figure Exh. 7-14S3-2 provides the breakdown of drainage areas and hydrologic conditions for this sediment pond.

Exhibit 7, Item 14 in Volume 2D describes the hydrologic methodology used in sediment pond and post mine channel assumptions. Runoff curve numbers assigned to the undisturbed and reclaimed lands in various stages of reclamation have been selected in accordance with Table 1 in the Introductory Text for Exhibit 7 in Volume 2D. For channels protected by a riprap liner, selection of minimum riprap size is done using the Simons/OSM method in SEDCADTM. For channels to be protected by a vegetative liner, the permissible velocities are also determined using SEDCADTM routines.

Upper and Lower Section 3 Ponds

The following pages present the results of the SEDCADTM models for the post mining condition. At this stage the oldest reclamation is on the southern extent of the reclaimed West Pit, and the younger (topsoil and seeded) reclamation is the northern reaches of the Upper and Lower Section 3 Ponds watershed.

The SEDCADTM model herein provides the results of the 100-year, 24-hour design storm and demonstrates the Lower Section 3 Pond will fully contain the modeled event.

The final post mining topographic surface and the final locations of the permanent drainage channels as presented on Map 12 were used to model the watershed for the post-mining condition. Three in-stream stock ponds (SD-1, SD-2, and SD-3) are included in the permanent channels to decrease peak flows from the modeled storm event, and to provide a water source to support the post-mining land use. A typical design for these stock ponds is presented on Figure 2.05-6 in Volume 1; however, each stock pond will ultimately be design and constructed to account for local ground conditions present in the post mine topography at the time of construction.

In summary, for the post mining case, the 100-year, 24-hour storm produces 106.83 acre-feet of runoff into the Upper Section 3 Pond. The storm event peaks in the Lower Section 3 Pond at 7,146.5', which is below the emergency spillway elevation (7,147').

Lower and Upper Section 3 Ponds **100-Year 24-Hour Storm Event**

Total Containment Demonstration

Tony Tennyson

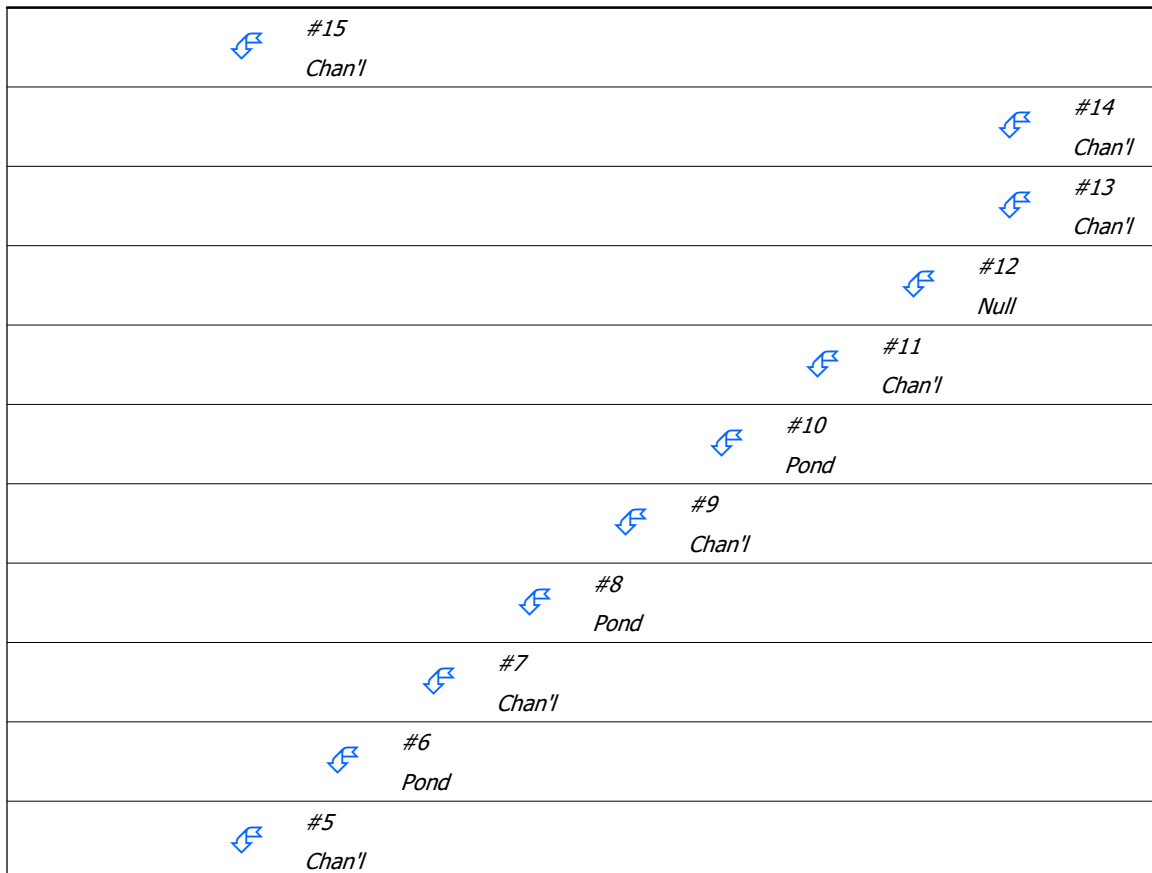
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	2.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Null Below Lower Section 3 Pond
Pond	#2	==>	#1	0.000	0.000	Lower Section 3 Pond Lower Section 3 Pond
Pond	#4	==>	#2	0.000	0.000	Upper Section 3 Pond
Channel	#5	==>	#4	0.000	0.000	Streeter Ditch 0+00 to SD-1
Pond	#6	==>	#5	0.000	0.000	SD-1 Stockpond
Channel	#7	==>	#6	0.000	0.000	Streeter Ditch SD-1 to SD-2
Pond	#8	==>	#7	0.000	0.000	SD-2 Stockpond
Channel	#9	==>	#8	0.000	0.000	Streeter Ditch SD-2 to SD-3
Pond	#10	==>	#9	0.000	0.000	SD-3 Stockpond
Channel	#11	==>	#10	0.000	0.000	Streeter Ditch SD-3 to Confluence w/Buckskin Ditch
Null	#12	==>	#11	0.000	0.000	Null at Confluence of Streeter Ditch & Buckskin Ditch
Channel	#13	==>	#12	0.000	0.000	Streeter Ditch from Confluence to Station 101+46
Channel	#14	==>	#12	0.000	0.000	Buckskin Ditch
Channel	#15	==>	#4	0.000	0.000	Stoker Ditch



	#4 <i>Pond</i>
	#2 <i>Pond</i>
#1 <i>Null</i>	

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#15	19.600	19.600	19.06	1.43
#14	135.200	135.200	37.48	4.87
#13	350.100	350.100	81.98	14.85
#12	0.000	485.300	98.63	19.72
#11	45.500	530.800	104.21	21.71
#10 In	0.000	530.800	104.21	21.71
Out			101.46	21.71
#9	176.300	707.100	111.97	25.52
#8 In	0.000	707.100	111.97	25.52
Out			106.44	25.47
#7	55.000	762.100	109.89	27.71
#6 In	0.000	762.100	109.89	27.71
Out			102.61	27.56
#5	24.400	786.500	104.12	28.63
#4 In	19.200	825.300	106.83	30.49
Out			14.71	13.43
#2 In	58.000	883.300	14.87	13.66
Out			0.00	0.00
#1	0.000	883.300	0.00	0.00

Structure Detail:

Structure #15 (Vegetated Channel)

Stoker Ditch

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.00	1.0:1	7.0:1	3.0	D, B	1.58			7.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	19.06 cfs		19.06 cfs	
Depth:	0.92 ft	2.50 ft	1.42 ft	3.00 ft
Top Width:	9.37 ft	22.01 ft	13.38 ft	26.02 ft
Velocity:	3.64 fps		1.74 fps	
X-Section Area:	5.23 sq ft		10.95 sq ft	
Hydraulic Radius:	0.546 ft		0.797 ft	
Froude Number:	0.86		0.34	
Roughness Coefficient:	0.0473		0.1272	

Structure #14 (Vegetated Channel)

Buckskin Ditch

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	3.0:1	3.0:1	4.0	D, B	3.00			7.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	37.48 cfs		37.48 cfs	
Depth:	0.62 ft	3.62 ft	1.00 ft	4.00 ft

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Top Width:	15.70 ft	33.70 ft	17.98 ft	35.98 ft
Velocity:	4.39 fps		2.51 fps	
X-Section Area:	8.55 sq ft		14.95 sq ft	
Hydraulic Radius:	0.537 ft		0.816 ft	
Froude Number:	1.05		0.48	
Roughness Coefficient:	0.0449		0.1037	

Structure #13 (Vegetated Channel)

Streeter Ditch from Confluence to Station 101+46

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
15.00	3.0:1	3.0:1	2.6	D, B	2.67			7.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	81.98 cfs		81.98 cfs	
Depth:	0.89 ft	3.56 ft	1.33 ft	4.00 ft
Top Width:	20.33 ft	36.35 ft	23.00 ft	39.02 ft
Velocity:	5.23 fps		3.23 fps	
X-Section Area:	15.69 sq ft		25.35 sq ft	
Hydraulic Radius:	0.761 ft		1.082 ft	
Froude Number:	1.05		0.54	
Roughness Coefficient:	0.0382		0.0782	

Structure #12 (Null)

Null at Confluence of Streeter Ditch & Buckskin Ditch

Structure #11 (Vegetated Channel)

Streeter Ditch SD-3 to Confluence w/Buckskin Ditch

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
15.00	3.0:1	3.0:1	2.1	D, B	2.47			7.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	104.21 cfs		104.21 cfs	
Depth:	1.05 ft	3.52 ft	1.53 ft	4.00 ft
Top Width:	21.28 ft	36.10 ft	24.19 ft	39.01 ft
Velocity:	5.49 fps		3.47 fps	
X-Section Area:	18.99 sq ft		30.02 sq ft	
Hydraulic Radius:	0.878 ft		1.216 ft	
Froude Number:	1.02		0.55	
Roughness Coefficient:	0.0361		0.0709	

Structure #10 (Pond)

SD-3 Stockpond

Pond Inputs:

Initial Pool Elev:	104.00 ft
Initial Pool:	1.63 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	100.00	2.00	0.0150	104.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
106.00	30.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	107.47 ft
Dewater Time:	0.84 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
100.00	0.016	0.000	0.000	
101.00	0.096	0.050	0.000	
102.00	0.539	0.338	0.000	
103.00	0.654	0.933	0.000	
104.00	0.735	1.628	0.000	Spillway #1
105.00	0.843	2.416	2.094	4.56*
106.00	0.872	3.273	4.414	3.60 Spillway #2
107.00	0.872	4.145	49.083	11.35
107.47	0.872	4.552	101.459	0.70 Peak Stage
108.00	0.872	5.017	161.389	

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
100.00	0.000	0.000	0.000
101.00	0.000	0.000	0.000
102.00	0.000	0.000	0.000
103.00	0.000	0.000	0.000
104.00	0.000	0.000	0.000
105.00	(3)>2.094	0.000	2.094
106.00	(5)>4.414	0.000	4.414
107.00	(6)>5.182	43.900	49.083
108.00	(6)>5.793	155.596	161.389

Structure #9 (Vegetated Channel)

Streeter Ditch SD-2 to SD-3

Trapezoidal Vegetated Channel Inputs:

Material: Smooth brome

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
15.00	3.0:1	3.0:1	2.7	D, B	2.55			7.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	111.97 cfs		111.97 cfs	
Depth:	1.00 ft	3.55 ft	1.45 ft	4.00 ft
Top Width:	21.00 ft	36.30 ft	23.68 ft	38.98 ft
Velocity:	6.22 fps		4.00 fps	
X-Section Area:	18.00 sq ft		27.99 sq ft	
Hydraulic Radius:	0.844 ft		1.159 ft	
Froude Number:	1.18		0.65	
Roughness Coefficient:	0.0351		0.0674	

Structure #8 (Pond)

SD-2 Stockpond

Pond Inputs:

Initial Pool Elev:	104.00 ft
Initial Pool:	1.63 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	100.00	2.00	0.0150	104.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
106.00	20.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	107.44 ft
Dewater Time:	1.03 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
100.00	0.016	0.000	0.000	
101.00	0.096	0.050	0.000	
102.00	0.539	0.338	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
103.00	0.654	0.933	0.000	
104.00	0.735	1.628	0.000	Spillway #1
105.00	0.843	2.416	2.094	4.56*
106.00	0.872	3.273	4.414	7.70 Spillway #2
107.00	0.872	4.145	53.583	11.70
107.44	0.872	4.531	106.445	0.75 Peak Stage
108.00	0.872	5.017	173.190	

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
100.00	0.000	0.000	0.000
101.00	0.000	0.000	0.000
102.00	0.000	0.000	0.000
103.00	0.000	0.000	0.000
104.00	0.000	0.000	0.000
105.00	(3)>2.094	0.000	2.094
106.00	(5)>4.414	0.000	4.414
107.00	(6)>5.182	48.400	53.583
108.00	(6)>5.793	167.398	173.190

Structure #7 (Riprap Channel)

Streeter Ditch SD-1 to SD-2

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
15.00	3.0:1	3.0:1	4.4	3.16		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	109.89 cfs	
Depth:	0.84 ft	4.00 ft
Top Width:	20.04 ft	39.00 ft
Velocity*:		
X-Section Area:	14.71 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	0.724 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #6 (Pond)

SD-1 Stockpond

Pond Inputs:

Initial Pool Elev:	104.00 ft
Initial Pool:	1.63 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	100.00	2.00	0.0150	104.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
106.00	30.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	107.48 ft
Dewater Time:	1.21 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
100.00	0.016	0.000	0.000	
101.00	0.096	0.050	0.000	
102.00	0.539	0.338	0.000	
103.00	0.654	0.933	0.000	
104.00	0.735	1.628	0.000	Spillway #1
105.00	0.843	2.416	2.094	4.56*

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
106.00	0.872	3.273	4.414	11.60	Spillway #2
107.00	0.872	4.145	49.083	11.90	
107.48	0.872	4.561	102.612	1.00	Peak Stage
108.00	0.872	5.017	161.389		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
100.00	0.000	0.000	0.000
101.00	0.000	0.000	0.000
102.00	0.000	0.000	0.000
103.00	0.000	0.000	0.000
104.00	0.000	0.000	0.000
105.00	(3)>2.094	0.000	2.094
106.00	(5)>4.414	0.000	4.414
107.00	(6)>5.182	43.900	49.083
108.00	(6)>5.793	155.596	161.389

Structure #5 (Riprap Channel)

Streeter Ditch 0+00 to SD-1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
15.00	3.0:1	3.0:1	4.7	3.19		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	104.12 cfs	
Depth:	0.81 ft	4.00 ft
Top Width:	19.87 ft	39.01 ft
Velocity*:		
X-Section Area:	14.15 sq ft	
Hydraulic Radius:	0.703 ft	
Froude Number*:		
Manning's n*:		

	w/o Freeboard	w/ Freeboard
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #4 (Pond)

Upper Section 3 Pond

Pond Inputs:

Initial Pool Elev:	7,169.00 ft
Initial Pool:	2.24 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,180.00	50.00	2.00:1	2.00:1	14.00

Pond Results:

Peak Elevation:	7,180.54 ft
Dewater Time:	1.35 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
7,167.00	0.580	0.000	0.000	
7,168.00	0.940	0.753	0.000	
7,169.00	1.080	1.762	0.000	
7,170.00	1.180	2.892	0.000	
7,171.00	1.270	4.116	0.000	
7,172.00	1.350	5.426	0.000	
7,173.00	1.420	6.811	0.000	
7,174.00	1.500	8.271	0.000	
7,175.00	1.570	9.806	0.000	
7,176.00	1.650	11.416	0.000	
7,177.00	1.740	13.110	0.000	
7,178.00	1.830	14.895	0.000	
7,179.00	1.930	16.775	0.000	
7,180.00	2.040	18.760	0.000	Spillway #1
7,180.54	2.146	19.916	14.714	31.45 Peak Stage
7,181.00	2.210	20.884	27.032	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
7,182.00	2.360	23.169	106.367	
7,183.00	2.500	25.598	227.569	
7,184.00	2.620	28.158	400.582	
7,185.00	2.770	30.853	622.062	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,167.00	0.000	0.000
7,168.00	0.000	0.000
7,169.00	0.000	0.000
7,170.00	0.000	0.000
7,171.00	0.000	0.000
7,172.00	0.000	0.000
7,173.00	0.000	0.000
7,174.00	0.000	0.000
7,175.00	0.000	0.000
7,176.00	0.000	0.000
7,177.00	0.000	0.000
7,178.00	0.000	0.000
7,179.00	0.000	0.000
7,180.00	0.000	0.000
7,181.00	27.032	27.032
7,182.00	106.367	106.367
7,183.00	227.569	227.569
7,184.00	400.582	400.582
7,185.00	622.062	622.062

Structure #2 (Pond)

Lower Section 3 Pond

Lower Section 3 Pond

Pond Inputs:

Initial Pool Elev:	7,140.00 ft
Initial Pool:	3.69 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
7,147.00	40.00	2.00:1	2.00:1	11.00

Pond Results:

Peak Elevation:	7,146.52 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
7,137.00	0.310	0.000	0.000	
7,138.00	1.150	0.686	0.000	
7,139.00	1.430	1.973	0.000	
7,140.00	1.560	3.468	0.000	
7,141.00	1.700	5.097	0.000	
7,142.00	1.900	6.896	0.000	
7,143.00	2.040	8.866	0.000	
7,144.00	2.190	10.980	0.000	
7,145.00	2.370	13.260	0.000	
7,146.00	2.550	15.719	0.000	
7,146.52	2.644	17.101	0.000	0.00 Peak Stage
7,147.00	2.730	18.359	0.000	Spillway #1
7,148.00	2.910	21.178	23.595	
7,149.00	3.100	24.183	91.246	
7,150.00	3.270	27.367	195.404	
7,151.00	3.450	30.727	351.783	
7,152.00	3.640	34.272	542.893	
7,153.00	3.820	38.001	787.210	
7,154.00	4.060	41.941	1,082.313	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,137.00	0.000	0.000
7,138.00	0.000	0.000
7,139.00	0.000	0.000
7,140.00	0.000	0.000
7,141.00	0.000	0.000
7,142.00	0.000	0.000
7,143.00	0.000	0.000
7,144.00	0.000	0.000
7,145.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
7,146.00	0.000	0.000
7,147.00	0.000	0.000
7,148.00	23.595	23.595
7,149.00	91.246	91.246
7,150.00	195.404	195.404
7,151.00	351.783	351.783
7,152.00	542.893	542.893
7,153.00	787.210	787.210
7,154.00	1,082.313	1,082.313

Structure #1 (Null)

Null Below Lower Section 3 Pond

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#15	1	4.000	0.077	0.000	0.000	62.000	M	1.23	0.095
	2	15.600	0.044	0.000	0.000	80.000	F	17.84	1.337
	Σ	19.600						19.06	1.432
#14	1	99.100	0.462	0.000	0.000	62.000	M	8.42	1.881
	2	36.100	0.135	0.000	0.000	80.000	F	34.15	2.985
	Σ	135.200						37.48	4.866
#13	1	10.700	0.077	0.000	0.000	62.000	M	3.29	0.254
	2	6.300	0.085	0.000	0.000	47.000	S	0.02	0.008
	3	52.900	0.288	0.000	0.000	62.000	M	5.84	1.007
	4	221.000	0.830	0.000	0.000	74.000	F	74.84	12.531
	5	9.700	0.118	0.000	0.000	62.000	M	2.98	0.231
	6	35.200	0.164	0.000	0.000	47.000	S	0.06	0.033
	7	7.100	0.102	0.000	0.000	62.000	M	2.18	0.169
	8	7.200	0.058	0.000	0.000	80.000	F	8.23	0.617
	Σ	350.100						81.98	14.850
#12	Σ	485.300						98.63	19.716
#11	1	20.500	0.074	0.000	0.000	80.000	F	23.44	1.757
	2	9.500	0.110	0.000	0.000	62.000	M	2.92	0.226
	3	15.500	0.164	0.000	0.000	47.000	S	0.02	0.014
	Σ	530.800						104.21	21.714
#10	Σ	530.800						104.21	21.714
#9	1	12.100	0.057	0.000	0.000	80.000	F	13.83	1.037
	2	26.700	0.055	0.000	0.000	47.000	S	0.06	0.037
	3	15.100	0.040	0.000	0.000	80.000	F	17.26	1.294
	4	16.600	0.205	0.000	0.000	80.000	F	15.00	1.341
	5	80.000	0.231	0.000	0.000	47.000	S	0.13	0.075
	6	25.800	0.221	0.000	0.000	47.000	S	0.04	0.024
	Σ	707.100						111.97	25.516
#8	Σ	707.100						111.97	25.516
#7	1	0.700	0.023	0.000	0.000	80.000	F	0.80	0.060
	2	6.900	0.054	0.000	0.000	47.000	S	0.02	0.009
	3	18.200	0.055	0.000	0.000	80.000	F	20.81	1.560
	4	3.300	0.022	0.000	0.000	80.000	F	3.77	0.283
	5	7.600	0.107	0.000	0.000	47.000	S	0.02	0.010
	6	6.500	0.080	0.000	0.000	62.000	M	2.00	0.155

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	7	1.700	0.100	0.000	0.000	80.000	F	1.94	0.146
	8	9.300	0.081	0.000	0.000	47.000	S	0.02	0.012
	9	0.800	0.058	0.000	0.000	47.000	S	0.00	0.000
	Σ	762.100						109.89	27.707
#6	Σ	762.100						109.89	27.707
#5	1	12.200	0.042	0.000	0.000	80.000	F	13.95	1.046
	2	12.200	0.122	0.000	0.000	47.000	S	0.03	0.017
	Σ	786.500						104.12	28.627
#4	1	4.800	0.030	0.000	0.000	80.000	F	5.49	0.411
	2	14.400	0.124	0.000	0.000	47.000	S	0.04	0.020
	Σ	825.300						106.83	30.490
#2	1	1.300	0.025	0.000	0.000	80.000	F	1.49	0.111
	2	26.600	0.101	0.000	0.000	47.000	S	0.06	0.037
	3	17.300	0.118	0.000	0.000	47.000	S	0.04	0.024
	4	0.600	0.019	0.000	0.000	80.000	F	0.69	0.051
	5	12.200	0.375	0.000	0.000	47.000	S	0.02	0.011
	Σ	883.300						14.87	13.663
#1	Σ	883.300						0.00	0.000

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	5. Nearly bare and untilled, and alluvial valley fans	14.00	47.88	342.00	3.740	0.025
#2	1	Time of Concentration:					0.025
#2	2	3. Short grass pasture	10.00	92.10	921.00	2.520	0.101
#2	2	Time of Concentration:					0.101
#2	3	3. Short grass pasture	11.00	124.41	1,131.00	2.650	0.118
#2	3	Time of Concentration:					0.118
#2	4	5. Nearly bare and untilled, and alluvial valley fans	2.00	2.00	100.00	1.410	0.019
#2	4	Time of Concentration:					0.019
#2	5	3. Short grass pasture	4.00	86.40	2,160.00	1.600	0.375
#2	5	Time of Concentration:					0.375
#4	1	3. Short grass pasture	15.00	51.30	342.00	3.090	0.030
#4	1	Time of Concentration:					0.030
#4	2	3. Short grass pasture	6.00	52.44	874.00	1.950	0.124
#4	2	Time of Concentration:					0.124
#5	2	3. Short grass pasture	6.00	51.60	860.00	1.950	0.122

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	2	Time of Concentration:					0.122
#7	1	5. Nearly bare and untilled, and alluvial valley fans	1.00	0.85	86.00	1.000	0.023
#7	1	Time of Concentration:					0.023
#7	2	3. Short grass pasture	16.00	99.84	624.00	3.200	0.054
#7	2	Time of Concentration:					0.054
#7	3	5. Nearly bare and untilled, and alluvial valley fans	16.00	128.48	803.00	4.000	0.055
#7	3	Time of Concentration:					0.055
#7	4	5. Nearly bare and untilled, and alluvial valley fans	10.00	26.10	261.00	3.160	0.022
#7	4	Time of Concentration:					0.022
#7	5	3. Short grass pasture	4.00	24.80	620.00	1.600	0.107
#7	5	Time of Concentration:					0.107
#7	6	3. Short grass pasture	5.00	25.75	515.00	1.780	0.080
#7	6	Time of Concentration:					0.080
#7	7	5. Nearly bare and untilled, and alluvial valley fans	2.00	10.24	512.00	1.410	0.100
#7	7	Time of Concentration:					0.100
#7	8	3. Short grass pasture	12.00	97.07	809.00	2.770	0.081
#7	8	Time of Concentration:					0.081
#7	9	3. Short grass pasture	2.00	4.71	236.00	1.130	0.058
#7	9	Time of Concentration:					0.058
#9	1	5. Nearly bare and untilled, and alluvial valley fans	5.00	23.10	462.00	2.230	0.057
#9	1	Time of Concentration:					0.057
#9	2	3. Short grass pasture	16.00	101.60	635.00	3.200	0.055
#9	2	Time of Concentration:					0.055
#9	3	5. Nearly bare and untilled, and alluvial valley fans	11.00	52.69	479.00	3.310	0.040
#9	3	Time of Concentration:					0.040
#9	4	5. Nearly bare and untilled, and alluvial valley fans	5.00	82.30	1,646.00	2.230	0.205
#9	4	Time of Concentration:					0.205
#9	5	3. Short grass pasture	10.00	210.40	2,104.00	2.520	0.231
#9	5	Time of Concentration:					0.231
#9	6	3. Short grass pasture	6.30	100.61	1,597.00	2.000	0.221
#9	6	Time of Concentration:					0.221
#11	1	5. Nearly bare and untilled, and alluvial valley fans	13.00	125.84	968.00	3.600	0.074
#11	1	Time of Concentration:					0.074
#11	2	3. Short grass pasture	10.00	100.50	1,005.00	2.520	0.110
#11	2	Time of Concentration:					0.110
#11	3	3. Short grass pasture	9.00	128.25	1,425.00	2.400	0.164
#11	3	Time of Concentration:					0.164
#13	1	3. Short grass pasture	8.00	50.32	629.00	2.260	0.077
#13	1	Time of Concentration:					0.077

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#13	2	3. Short grass pasture	10.00	77.90	779.00	2.520	0.085
#13	2	Time of Concentration:					0.085
#13	3	3. Short grass pasture	13.00	389.34	2,995.00	2.880	0.288
#13	3	Time of Concentration:					0.288
#13	4	3. Short grass pasture	9.00	645.57	7,173.00	2.400	0.830
#13	4	Time of Concentration:					0.830
#13	5	3. Short grass pasture	2.00	9.67	484.00	1.130	0.118
#13	5	Time of Concentration:					0.118
#13	6	3. Short grass pasture	9.00	128.07	1,423.00	2.400	0.164
#13	6	Time of Concentration:					0.164
#13	7	3. Short grass pasture	4.00	23.60	590.00	1.600	0.102
#13	7	Time of Concentration:					0.102
#13	8	5. Nearly bare and untilled, and alluvial valley fans	11.00	76.44	695.00	3.310	0.058
#13	8	Time of Concentration:					0.058
#14	1	3. Short grass pasture	8.00	300.95	3,761.87	2.260	0.462
#14	1	Time of Concentration:					0.462
#14	2	5. Nearly bare and untilled, and alluvial valley fans	6.00	71.40	1,190.00	2.440	0.135
#14	2	Time of Concentration:					0.135
#15	1	3. Short grass pasture	2.00	6.30	315.00	1.130	0.077
#15	1	Time of Concentration:					0.077
#15	2	5. Nearly bare and untilled, and alluvial valley fans	13.00	75.39	580.00	3.600	0.044
#15	2	Time of Concentration:					0.044