MICHAEL B. ERP, P.E.
116 WILDWOOD DRIVE
SOMERSET, KENTUCKY 42503
PHONE: (606) 875-4271

May 12, 2022

Office of Surface Mining.
Reclamation and Enforcement
710 Locust Street, Second Floor
Knoxville, TN 37902
Attn: Mr. Mark Snyder

RE: Alden Resources, LLC., Area #6, Campbell County, Tennessee
OSM #3340 REVISION #6 APPLICATION-AS Built Certification for Pond #103

Mr. Snyder;

The attached materials are to propose a revision to the above referenced permit. This revision is to submit "as built" drawing and certification materials along with a minor sub-watershed modification to facilitate the non-construction of pond #104 and to notify OSM that mining is complete on this site.

Feel free to contact me at (606)875-4271 or via email at Michael.b.erp@gmail.com with any questions that arise. An electronic copy of this application will be mailed immediately.

Respectfully Submitted;

Michael B. Erp, P.E.
On behalf of Alden Resources, LLC.

me:ME
cc: file
G. Adams, Alden

DRAFT

APPLICATION FOR PERMIT REVISION

UNDER THE

FEDERAL PROGRAM FOR TENNESSEE

Revision Appl
Revised 1/9/08

DRAFT
APPLICATION FOR PERMIT REVISION
UNDER THE
FEDERAL PROGRAM FOR TENNESSEE

Revision applications consist of an original plus 3 copies (4 total) of --

a) An "Application for Revision"; and
b) Each individual page, map, cross section and plan needed to replace those portions of the approved permit application to be changed.

PLEASE COMPLETE THE FOLLOWING

1. Permit Number 3340
2. Expiration Date 7/15/2025

3. Circle which revision this is: 1st, 2nd, 3rd, other 6th

4. Permittee Name Alden Resources, LLC.
   Address 332 West Cumberland Gap Parkway, Suite 100, Corbin, KY 40701
   Contact Person George Adams Phone 606-523-6438

5. Mine Name Area #6
6. County Campbell

7. Consulting Firm Michael B. Erp, P.E.
   Address 116 Wildwood Drive, Somerset, KY 42503
   Contact Person Michael B. Erp Phone 606-875-4271

8. a. Is this revision the result of an enforcement action by a regulatory authority?

Yes [ ] No [X]

If yes, provide name of the RA, inspector's name and abatement date if applicable.

If no, explain why this revision is needed. (See narrative Attachment)

b. Is this revision being submitted pursuant to 30 CFR 942.785.25 - Lands Eligible for Remining?

Yes [ ] No [X]

If yes, complete attachment A.

9. Has application been made or will it be made within 60 days for Phase I, II, or III bond release?

Yes [ ] No [X]

Is this revision for postmining land use changes, retention of haulroads, or pond status changes needed to achieve final reclamation or facilitate bond release?

Yes [ ] No [ ]

10. What is the net change in permit acreage?

_____ acre increase
_____ acre decrease
___X___ no change

11. Would this revision change the results of the previously submitted PHC (Determination of probable hydrologic consequences)?

Yes [ ] No [X]

12. a. Has the permittee added a new partner, officer, member, director, or person performing a function similar to a director, person who owns 10 to 50 percent of the applicant or a person who owns or controls the applicant different than those listed in the approved permit application, pursuant to 30 CFR 942.778.11?

Yes [ ] No [X]

b. If yes, is the appropriate new information attached?

Yes [ ] No [ ]

13. Complete and attach each individual page, map, cross section and plan to replace those portions of the approved permit application proposed to be changed.

14. Submit an original and 3 copies of this application and all supporting documentation, maps, and plans to:

Office of Surface Mining
Technical Group
710 Locust Street, Second Floor
Knoxville, Tennessee 37902

15. Verification:

I certify under penalty of the Act (Public Law 95-87) that I am a responsible official for this operation, that I have personally examined and am familiar with the information submitted in this revision application and all attachments, and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in this application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature of Responsible Official George Adams

Title Plant Manager Date 6/6/2022

Subscribed and sworn to before me by George Adams

This 6th day of May, 20 22

Notary Public

My Commission Expires 4/20/2022

AFFIX SEAL:

16. This revision application must be reviewed both by the Inspector assigned to this permit, and by the Technical Group. Inspector comments and signature are to be hand-written below:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Date Signature

Print Inspector's Name: _____

OSM Inspector: Please indicate if you want to receive copies of any deficiency letters related to this revision.

Yes [ ] No [ ]

ATTACHMENT A

LANDS ELIGIBLE FOR REMINING

A. Eligibility Criteria

OSM is required to make a written finding pursuant to 30 CFR 942.773.15(m)(i)-(iii) regarding the eligibility of lands within the permitted area for expenditure of AML funds under Sections 402 (g)(4) or 404 of SMCRA. For OSM to make the written finding, the applicant is required to check one of the three statements below that applies to the area that the applicant believes may be eligible for remining and provide supporting documentation. For OSM to determine that the previously disturbed site is eligible under one of the three statements, the supporting documentation shall conclusively show that both conditions of the checked statement have been met.

[ ] The area proposed for remining eligibility was mined between August 4, 1977 and August 10, 1982 **AND** funds for reclamation or abatement which are available pursuant to a bond or other form of financial guarantee or from any other source are not sufficient to provide for adequate reclamation or abatement at the site.

[ ] The area proposed for remining eligibility was mined between August 4, 1977 and November 5, 1990 **AND** the surety for the mining operator became insolvent during such period and as of November 5, 1990 funds immediately available from proceedings relating to such insolvency, or from any financial guarantee or other source are not sufficient to provide for adequate reclamation or abatement at the site.

[ ] The area proposed for remining eligibility was mined for coal or affected by such mining, wastebanks, coal processing, or other coal mining processes and abandoned or left in an inadequate reclamation status prior to August 3, 1977, **AND** for which there is no continuing reclamation responsibility under State or other Federal laws.

Documentation to support the determination for lands eligible for remining may include, but is not limited to, information available from OSM, Mine Safety and Health Administration (MSHA), Tennessee Valley Authority (TVA), Divisions of Land Reclamation and Water Pollution Control within the Tennessee Department of Environment and Conservation, and the Natural Resources Conservation Service (NRCS). Aerial photographs may also be submitted.

B. Potential Environmental and Safety Problems

OSM is required to make written findings pursuant to 30 CFR 942.773.15(m)(ii) and (iii) regarding the: (1) identification of potential environmental and safety problems that could reasonably be anticipated to occur on those lands eligible for remining and (2) mitigation plans contained in the revision application that demonstrate that the required reclamation can be accomplished. For OSM to make the written findings, the applicant is required to address the following:

1. Are there any potential environmental and safety problem(s) related to prior mining activity which could be reasonably anticipated to occur at the site?
Yes [ ] No [ ]

   Provide a detailed narrative describing the nature of the investigation to identify potential problems which shall include visual observations at the site, a record review of past mining at the site, and environmental sampling tailored to current site conditions.

2. If yes, identify the **type and degree** of the potential problems and provide a mitigation plan to sufficiently address these problems so that reclamation as required by 30 CFR 942, Tennessee Federal Program, can be accomplished.

C. Outstanding Violations

1. Are there any unabated violations that occurred after October 24, 1992, related to lands eligible for remining which arose from unanticipated events or conditions?
Yes [ ] No [ ]

   If yes, provide the following information for each outstanding violation:

   a. NOV/CO/Violation Number: _____

   b. Date the Violation Occurred: _____

   c. A detailed narrative with supporting documentation demonstrating that the violation resulted from an unanticipated event or condition arising from surface coal mining and reclamation operations on lands eligible for remining.

D. Map Requirements

Delineate on the Mining Operations Map those areas within the permitted area that have been previously disturbed or affected by surface coal mining operations and are believed to be lands eligible for remining.

Alden Resources, LLC. Area #6 OSM #3340
Revision #6 Narrative
As Built Certification for Pond #103
Notification of Discontinuation of Mining

This revision is to complete the "as built" certification process for the above referenced pond. As discussed with OSM personnel on site, this revision also proposes to slightly increase the disturbed drainage area of pond #103 by about 2.1 acres. This small area captures the very end of the disturbance and eliminates the need to construct pond #104.

No additional mining will be done on this site once reclamation procedures are completed. Hence, pond #104 will remain on the map at its location even though its originally approved drainage area will be reduced by 2.1 acres which now will be contained in pond #103.

The materials presented in this revision include the certification form, revision form, as built drawing and the SEDCAD analysis for the encompassed drainage areas. A modified watershed map is included to clarify the sub-watershed modification.

Once this revision is approved and the site reclamation/grading/seeding procedures are completed, a Phase I bond release will be submitted.

OFFICE OF SURFACE MINING (OSM)

CONSTRUCTION INSPECTION CERTIFICATE

This certification and any revision applications stemming from this certification shall be submitted to the OSM, Inspection Group, promptly after inspection.

1. The construction inspection herein certified was made (check one)

   _____ during construction.

   ___X__ upon completion of construction.

2. I, hereby certify, in accordance with 30 CFR 942.816.49(a)(10)(ii) and others as applicable, that with respect to the following facility:

   Name of Permittee ___Alden Resources, LLC._____ Permit No. ___3340_____
   Mine Name _____Area #6_____ Facility No._Pond #103_____
   Which is a (check one)

   _____ primary road
   __X__ sedimentation pond
   _____ permanent water impoundment
   _____ temporary water impoundment
   _____ *refuse pile
   _____ *excess spoil disposal fill
   _____ *coal processing waste dam
   _____ *processing waste impoundment

   a. I, or persons under my supervision, have conducted adequate inspection of the construction of the structure; and

   b. This certification is in accordance with the rules of professional conduct promulgated by the Tennessee Board of Examiners for Architects and Engineers; and

   c. The construction has been performed in accordance with accepted construction practices; and (check one)

   _____ The facility HAS BEEN constructed in accordance with the design approved in this permit; and actual location and dimensions ARE within accepted engineering tolerances for such facilities.

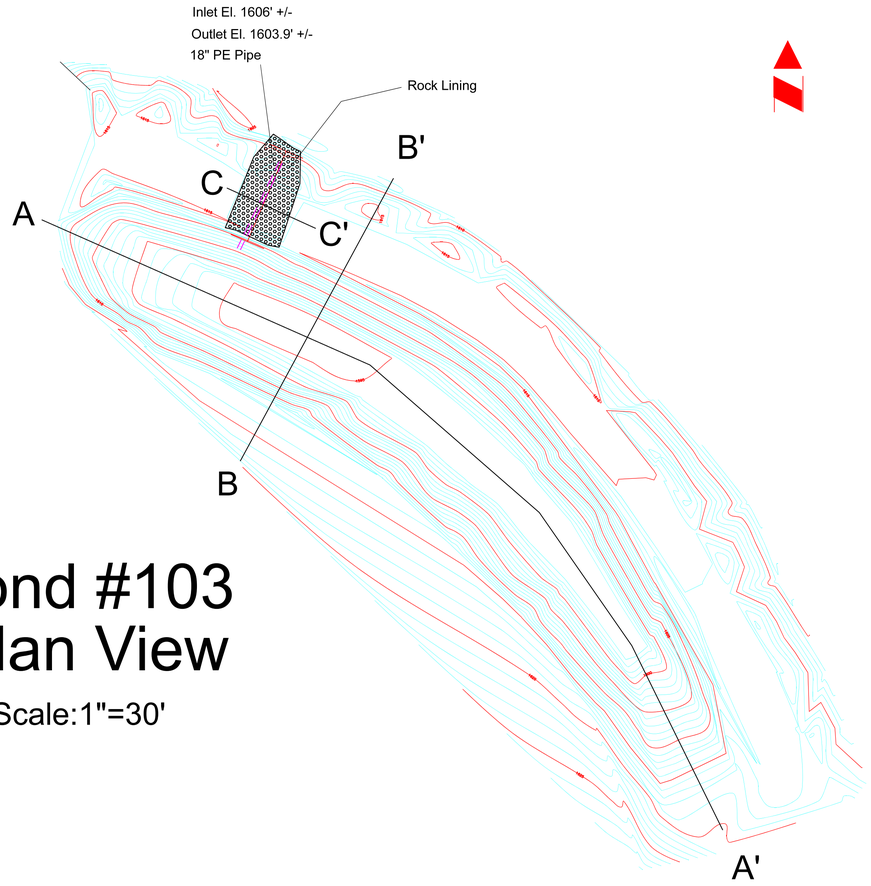
   __X___ The facility HAS NOT BEEN constructed in accordance with the design approved in this permit; or actual location or dimensions ARE NOT within accepted engineering tolerances for such facilities. (In this instance, submit 5 copies of a revision application with this certification).

Affix seal of engineer making this certification. All data on the seal must be legible:

Seal

*ADuring construction reports are required@

Certific.con

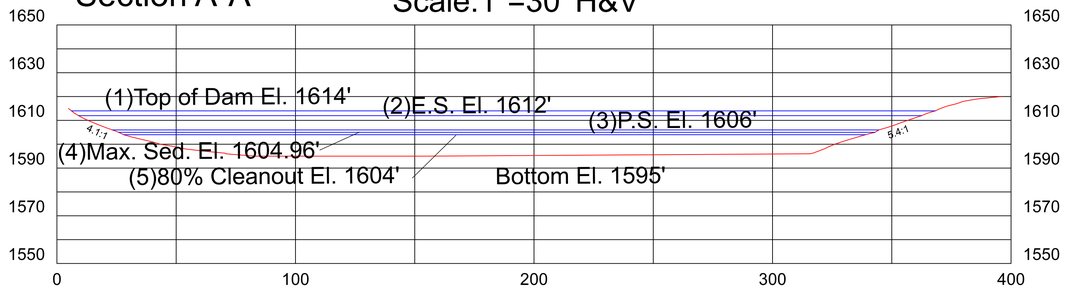


Pond #103
Plan View

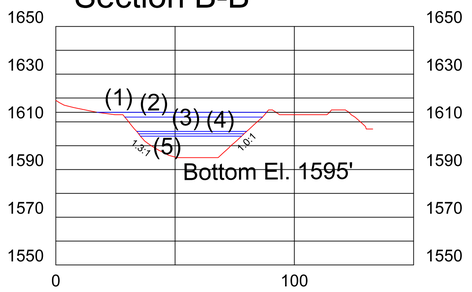
Scale:1"=30'

Section A-A'

Scale:1"=30' H&V

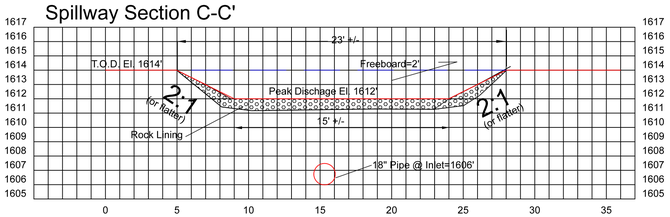


Section B-B'



Scale:1"=30' H&V

Spillway Section C-C'



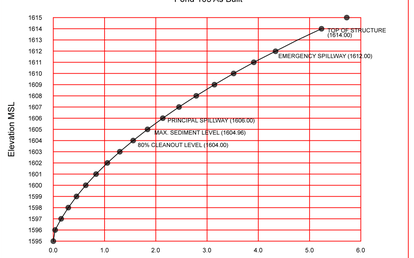
Scale:1"=5' H & V

AP. 3340

Stage Storage Curve

Pond 103 As Built

52.0



Storage volume computations
3340
Pond 103 As Built

ELEV (ft)	Width (ft)	LENGTH (ft)	AREA (ac)	Avg. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC STORAGE (ac-ft)	STAGE INTERVAL (ft)
1595.00	N/A	N/A	0.0278					
1596.00	N/A	N/A	0.1067	0.0672	1.00	0.0356	0.0356	1.00
1597.00	N/A	N/A	0.1287	0.1177	1.00	0.1174	0.1530	2.00
1598.00	N/A	N/A	0.1504	0.1396	1.00	0.1393	0.2923	3.00
1599.00	N/A	N/A	0.1704	0.1604	1.00	0.1602	0.4525	4.00
1600.00	N/A	N/A	0.1909	0.1807	1.00	0.1805	0.6330	5.00
1601.00	N/A	N/A	0.2110	0.2010	1.00	0.2009	0.8339	6.00
1602.00	N/A	N/A	0.2318	0.2214	1.00	0.2214	1.0552	7.00
1603.00	N/A	N/A	0.2519	0.2419	1.00	0.2418	1.2970	8.00
1604.00	N/A	N/A	0.2710	0.2614	1.00	0.2612	1.5582	9.00
1605.00	N/A	N/A	0.2896	0.2803	1.00	0.2799	1.8382	10.00
1606.00	N/A	N/A	0.3064	0.2980	1.00	0.2980	2.1362	11.00
1607.00	N/A	N/A	0.3254	0.3164	1.00	0.3165	2.4527	12.00
1608.00	N/A	N/A	0.3457	0.3361	1.00	0.3360	2.7887	13.00
1609.00	N/A	N/A	0.3649	0.3553	1.00	0.3552	3.1439	14.00
1610.00	N/A	N/A	0.3842	0.3745	1.00	0.3745	3.5184	15.00
1611.00	N/A	N/A	0.4033	0.3937	1.00	0.3937	3.9121	16.00
1613.00	N/A	N/A	0.4523	0.4278	2.00	0.8556	4.7678	18.00
1614.00	N/A	N/A	0.4769	0.4451	1.00	0.4452	5.2330	19.00

1

DATE	DESCRIPTION OF REVISION
05/09/22	POND_103_CERT
DATE2	DESCRIPT2
DATE3	DESCRIPT3
DATE4	DESCRIPT4

FILENAME: POND_103_AB
STA NO: STANO
PLOT DATE: 05/09/22

DRAWN BY: MBE
CHECKED BY: MBE
APPROVED BY: MBE
PER. NO: 3340

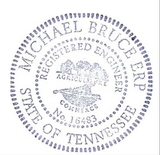
Alden Resources, LLC.
Area #6 OSM #3340

Pd 103 As Built

Prepared By:

Michael, B. Erp, P.E.
116 Wildwood Drive
Somerset, Kentucky 42503
Voice: (606) 875-4271
Email: Michael.b.erp@gmail.com

SCALE: AS_SHOWN
DATE: 5/09/22
ATTACHMENT: 52
SHEET: 1
OF: 1



Alden Resources, LLC.
Area #6

Pond #103 10yr-24hrEvent
OPEN CHANNEL AS BUILT

Michael B. Erp

Michael B. Erp, P.E.
116 Wildwood Drive
Somerset, KY 42503

Phone: 606-875-4271
Email: Michael.b.erp@gmail.com

General Information

Storm Information:

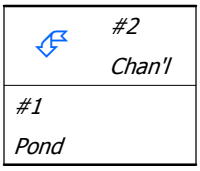
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	4.800 inches

Particle Size Distribution:

Size (mm)	Disturbed	Undisturbed
3.0000	100.000%	100.000%
2.0000	93.000%	99.900%
1.0000	86.000%	98.000%
0.5000	78.000%	92.000%
0.3000	73.000%	87.000%
0.2000	67.000%	80.000%
0.1000	55.000%	70.000%
0.0500	44.000%	60.000%
0.0300	35.000%	50.000%
0.0200	27.000%	42.000%
0.0100	18.000%	32.000%
0.0050	14.000%	21.000%
0.0030	9.000%	15.000%
0.0010	3.000%	4.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond 103
Channel	#2	==>	#1	0.222	0.238	DD 103-1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	6. Grassed waterway	1.06	13.00	1,231.00	1.54	0.222
#2	**Muskingum K:**					**0.222**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#2		26.300	26.300	70.74	5.98	236.1	60,739	38.82	18.25
#1	In	0.000	26.300	64.57	5.98	236.1	77,301	49.40	18.29
	Out			19.35	5.98	40.9	10,943	0.16	0.08

The 24 hour Arithmetic Average (24AA) is under review. It is anticipated that the 24AA will be replaced by the peak settleable solids concentration (ml/l) with the addition of new sediment input factor values.

The 24AA is provided for your convenience during this transition period.

		24AA (ml/l)
#2		4.99
#1	In	5.10
	Out	0.03

Particle Size Distribution(s) at Each Structure

Structure #2 (DD 103-1):

Size (mm)	In/Out
3.0000	100.000%
2.0000	93.032%
1.0000	86.055%
0.5000	78.063%
0.3000	73.063%
0.2000	67.058%
0.1000	55.067%
0.0500	44.071%
0.0300	35.066%
0.0200	27.066%
0.0100	18.062%
0.0050	14.031%
0.0030	9.026%
0.0010	3.004%
0.0001	0.000%

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	93.032%	100.000%
1.0000	86.055%	100.000%
0.5000	78.063%	100.000%
0.3000	73.063%	100.000%
0.2000	67.058%	100.000%
0.1000	55.067%	100.000%
0.0500	44.071%	100.000%
0.0300	35.066%	100.000%
0.0200	27.066%	100.000%
0.0100	18.062%	100.000%
0.0050	14.031%	81.073%
0.0030	9.026%	52.156%
0.0010	3.004%	17.360%
0.0001	0.000%	0.000%

Structure Detail:

Structure #2 (Vegetated Channel)

DD 103-1

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

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)
4.00	2.0:1	3.0:1	1.0	D, B	0.30			5.0

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:	70.74 cfs		70.74 cfs	
Depth:	1.82 ft	2.12 ft	2.55 ft	2.85 ft
Top Width:	13.09 ft	14.59 ft	16.77 ft	18.27 ft
Velocity:	4.56 fps		2.67 fps	
X-Section Area:	15.52 sq ft		26.54 sq ft	
Hydraulic Radius:	1.126		1.494	
Froude Number:	0.74		0.37	
Roughness Coefficient:	0.0354		0.0731	

Structure #1 (Pond)

Pond 103

Pond Inputs:

Initial Pool Elev:	1,606.00
Initial Pool:	0.31 ac-ft
*Sediment Storage:	1.67 ac-ft
Dead Space:	40.00 %

**Sediment capacity calculated from 0.120 times disturbed acres*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	60.00	2.00	0.0140	1,606.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,612.00	40.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	1,612.00
H'graph Detention Time:	1.24 hrs
Pond Model:	CSTRS
Dewater Time:	0.95 days
Trap Efficiency:	82.69 %

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)	
1,604.96	0.289	0.000	0.000		Top of Sed. Storage
1,605.00	0.290	0.011	0.000		
1,605.50	0.298	0.158	0.000		
1,605.90	0.306	0.279	0.000		
1,606.00	0.307	0.310	0.000		Spillway #1
1,606.30	0.313	0.403	0.532	9.90	
1,606.50	0.317	0.466	1.111	1.00	
1,607.00	0.326	0.626	3.142	7.70	
1,607.50	0.335	0.791	5.774	1.30	
1,608.00	0.345	0.961	8.425	0.60	
1,608.50	0.354	1.136	10.472	0.35	
1,609.00	0.364	1.316	12.173	0.30	
1,609.50	0.374	1.501	13.675	0.25	
1,610.00	0.384	1.690	15.003	0.25	
1,610.50	0.395	1.885	16.242	0.25	
1,611.00	0.406	2.085	17.381	0.25	
1,611.50	0.418	2.291	18.479	0.25	
1,612.00	0.429	2.503	19.335		Spillway #2
1,612.00	0.429	2.503	19.351	0.40	Peak Stage
1,612.50	0.441	2.721	35.888		
1,613.00	0.453	2.944	52.398		
1,613.50	0.465	3.174	91.902		
1,614.00	0.477	3.409	140.953		

Detailed Discharge Table

Elevation	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,604.96	0.000	0.000	0.000
1,605.00	0.000	0.000	0.000
1,605.50	0.000	0.000	0.000
1,605.90	0.000	0.000	0.000
1,606.00	0.000	0.000	0.000
1,606.30	(3)>0.532	0.000	0.532
1,606.50	(3)>1.111	0.000	1.111
1,607.00	(3)>3.142	0.000	3.142
1,607.50	(3)>5.774	0.000	5.774
1,608.00	(5)>8.425	0.000	8.425
1,608.50	(5)>10.472	0.000	10.472
1,609.00	(5)>12.173	0.000	12.173
1,609.50	(5)>13.675	0.000	13.675
1,610.00	(5)>15.003	0.000	15.003
1,610.50	(5)>16.242	0.000	16.242
1,611.00	(5)>17.381	0.000	17.381
1,611.50	(5)>18.479	0.000	18.479
1,612.00	(5)>19.335	0.000	19.335
1,612.50	(6)>20.161	15.727	35.888
1,613.00	(6)>20.944	31.453	52.398
1,613.50	(6)>21.678	70.223	91.902
1,614.00	(6)>22.413	118.540	140.953

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)
#2	1	3.900	0.113	0.000	0.000	86.000	F	12.37	1.066
	2	3.200	0.037	0.113	0.184	73.000	S	7.37	0.567
	3	6.000	0.088	0.000	0.000	86.000	F	19.03	1.640
	4	6.100	0.053	0.088	0.231	73.000	S	14.04	1.080
	5	4.000	0.027	0.000	0.000	79.000	M	10.89	0.877
	6	1.000	0.000	0.030	0.313	73.000	S	2.30	0.177
	7	2.100	0.038	0.096	0.252	86.000	F	6.66	0.574
	Σ	**26.300**						**70.74**	**5.981**
#1	Σ	**26.300**						**64.57**	**5.981**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.220	100.00	1.00	0.8000	1.0000	1	9.9	12,372	7.91	4.36
	2	0.170	50.00	22.00	0.0030	1.0000	2	0.3	672	0.36	0.19
	3	0.220	100.00	10.00	0.8000	1.0000	1	156.5	121,459	77.68	43.18
	4	0.170	50.00	22.00	0.0030	1.0000	2	0.6	730	0.39	0.21
	5	0.220	100.00	26.00	0.1400	1.0000	1	47.4	72,008	46.05	24.88
	6	0.170	100.00	39.00	0.0030	1.0000	2	0.2	1,619	0.87	0.45
	7	0.220	100.00	20.00	0.1400	1.0000	1	21.2	49,670	31.76	17.13
	Σ							**236.1**	**60,739**	**38.82**	**18.25**
#1	Σ							**236.1**	**77,301**	**49.40**	**18.29**

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	0.99	4.00	405.00	0.990	0.113
#2	**1**	**Time of Concentration:**					**0.113**
#2	2	1. Forest with heavy ground litter	21.88	35.00	160.00	1.180	0.037
#2	**2**	**Time of Concentration:**					**0.037**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.16	10.00	464.00	1.460	0.088
#2	**3**	**Time of Concentration:**					**0.088**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	4	1. Forest with heavy ground litter	22.03	50.00	227.00	1.180	0.053
#2	**4**	**Time of Concentration:**					**0.053**
#2	5	3. Short grass pasture	15.82	50.00	316.00	3.180	0.027
#2	**5**	**Time of Concentration:**					**0.027**
#2	7	5. Nearly bare and untilled, and alluvial valley fans	15.45	85.00	550.00	3.930	0.038
#2	**7**	**Time of Concentration:**					**0.038**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	2	5. Nearly bare and untilled, and alluvial valley fans	0.99	4.00	405.00	0.990	0.113
#2	**2**	**Muskingum K:**					**0.113**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	2.16	10.00	464.00	1.460	0.088
#2	**4**	**Muskingum K:**					**0.088**
#2	6	3. Short grass pasture	12.66	40.00	316.00	2.840	0.030
#2	**6**	**Muskingum K:**					**0.030**
#2	7	6. Grassed waterway	1.33	8.00	600.00	1.730	0.096
#2	**7**	**Muskingum K:**					**0.096**

Alden Resources, LLC.
Area #6

Pond #103 25yr-6hrEvent

OPEN CHANNEL AS BUILT

Michael B. Erp

Michael B. Erp, P.E.
116 Wildwood Drive
Somerset, KY 42503

Phone: 606-875-4271
Email: Michael.b.erp@gmail.com

General Information

Storm Information:

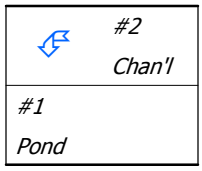
Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	3.900 inches

Particle Size Distribution:

Size (mm)	Disturbed	Undisturbed
3.0000	100.000%	100.000%
2.0000	93.000%	99.900%
1.0000	86.000%	98.000%
0.5000	78.000%	92.000%
0.3000	73.000%	87.000%
0.2000	67.000%	80.000%
0.1000	55.000%	70.000%
0.0500	44.000%	60.000%
0.0300	35.000%	50.000%
0.0200	27.000%	42.000%
0.0100	18.000%	32.000%
0.0050	14.000%	21.000%
0.0030	9.000%	15.000%
0.0010	3.000%	4.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond 103
Channel	#2	==>	#1	0.222	0.238	DD 103-1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	6. Grassed waterway	1.06	13.00	1,231.00	1.54	0.222
#2	**Muskingum K:**					**0.222**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#2		26.300	26.300	76.38	4.33	211.8	54,706	34.96	22.63
#1	In	0.000	26.300	66.99	4.33	211.8	78,876	50.41	22.61
	Out			18.61	4.33	36.3	11,780	0.16	0.08

The 24 hour Arithmetic Average (24AA) is under review. It is anticipated that the 24AA will be replaced by the peak settleable solids concentration (ml/l) with the addition of new sediment input factor values.

The 24AA is provided for your convenience during this transition period.

		24AA (ml/l)
#2		7.02
#1	In	2.22
	Out	0.03

Particle Size Distribution(s) at Each Structure

Structure #2 (DD 103-1):

Size (mm)	In/Out
3.0000	100.000%
2.0000	93.030%
1.0000	86.051%
0.5000	78.059%
0.3000	73.059%
0.2000	67.055%
0.1000	55.063%
0.0500	44.066%
0.0300	35.062%
0.0200	27.062%
0.0100	18.058%
0.0050	14.029%
0.0030	9.025%
0.0010	3.004%
0.0001	0.000%

Structure #1:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	93.030%	100.000%
1.0000	86.051%	100.000%
0.5000	78.059%	100.000%
0.3000	73.059%	100.000%
0.2000	67.055%	100.000%
0.1000	55.063%	100.000%
0.0500	44.066%	100.000%
0.0300	35.062%	100.000%
0.0200	27.062%	100.000%
0.0100	18.058%	100.000%
0.0050	14.029%	81.939%
0.0030	9.025%	52.711%
0.0010	3.004%	17.546%
0.0001	0.000%	0.000%

Structure Detail:

Structure #2 (Vegetated Channel)

DD 103-1

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

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)
4.00	2.0:1	3.0:1	1.0	D, B	0.30			5.0

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:	76.38 cfs		76.38 cfs	
Depth:	1.87 ft	2.17 ft	2.61 ft	2.91 ft
Top Width:	13.35 ft	14.85 ft	17.04 ft	18.54 ft
Velocity:	4.71 fps		2.78 fps	
X-Section Area:	16.22 sq ft		27.44 sq ft	
Hydraulic Radius:	1.153		1.520	
Froude Number:	0.75		0.39	
Roughness Coefficient:	0.0348		0.0708	

Structure #1 (Pond)

Pond 103

Pond Inputs:

Initial Pool Elev:	1,606.00
Initial Pool:	0.31 ac-ft
*Sediment Storage:	1.67 ac-ft
Dead Space:	40.00 %

**Sediment capacity calculated from 0.120 times disturbed acres*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Entrance Loss Coefficient	Tailwater Depth (ft)
18.00	60.00	2.00	0.0140	1,606.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,612.00	40.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	1,611.58
H'graph Detention Time:	1.17 hrs
Pond Model:	CSTRS
Dewater Time:	0.63 days
Trap Efficiency:	82.88 %

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)	
1,604.96	0.289	0.000	0.000		Top of Sed. Storage
1,605.00	0.290	0.011	0.000		
1,605.50	0.298	0.158	0.000		
1,605.90	0.306	0.279	0.000		
1,606.00	0.307	0.310	0.000		Spillway #1
1,606.30	0.313	0.403	0.532	9.90	
1,606.50	0.317	0.466	1.111	1.00	
1,607.00	0.326	0.626	3.142	0.95	
1,607.50	0.335	0.791	5.774	0.50	
1,608.00	0.345	0.961	8.425	0.50	
1,608.50	0.354	1.136	10.472	0.40	
1,609.00	0.364	1.316	12.173	0.30	
1,609.50	0.374	1.501	13.675	0.30	
1,610.00	0.384	1.690	15.003	0.25	
1,610.50	0.395	1.885	16.242	0.30	
1,611.00	0.406	2.085	17.381	0.25	
1,611.50	0.418	2.291	18.479	0.35	
1,611.58	0.420	2.325	18.614	0.20	Peak Stage
1,612.00	0.429	2.503	19.335		Spillway #2
1,612.50	0.441	2.721	35.888		
1,613.00	0.453	2.944	52.398		
1,613.50	0.465	3.174	91.902		
1,614.00	0.477	3.409	140.953		

Detailed Discharge Table

Elevation	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,604.96	0.000	0.000	0.000
1,605.00	0.000	0.000	0.000
1,605.50	0.000	0.000	0.000
1,605.90	0.000	0.000	0.000
1,606.00	0.000	0.000	0.000
1,606.30	(3)>0.532	0.000	0.532
1,606.50	(3)>1.111	0.000	1.111
1,607.00	(3)>3.142	0.000	3.142
1,607.50	(3)>5.774	0.000	5.774
1,608.00	(5)>8.425	0.000	8.425
1,608.50	(5)>10.472	0.000	10.472
1,609.00	(5)>12.173	0.000	12.173
1,609.50	(5)>13.675	0.000	13.675
1,610.00	(5)>15.003	0.000	15.003
1,610.50	(5)>16.242	0.000	16.242
1,611.00	(5)>17.381	0.000	17.381
1,611.50	(5)>18.479	0.000	18.479
1,612.00	(5)>19.335	0.000	19.335
1,612.50	(6)>20.161	15.727	35.888
1,613.00	(6)>20.944	31.453	52.398
1,613.50	(6)>21.678	70.223	91.902
1,614.00	(6)>22.413	118.540	140.953

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)
#2	1	3.900	0.113	0.000	0.000	86.000	F	13.81	0.798
	2	3.200	0.037	0.113	0.184	73.000	S	7.83	0.388
	3	6.000	0.088	0.000	0.000	86.000	F	21.25	1.228
	4	6.100	0.053	0.088	0.231	73.000	S	14.92	0.740
	5	4.000	0.027	0.000	0.000	79.000	M	11.86	0.628
	6	1.000	0.000	0.030	0.313	73.000	S	2.45	0.121
	7	2.100	0.038	0.096	0.252	86.000	F	7.44	0.430
	Σ	**26.300**						**76.38**	**4.333**
#1	Σ	**26.300**						**66.99**	**4.333**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.220	100.00	1.00	0.8000	1.0000	1	9.0	12,245	7.83	5.28
	2	0.170	50.00	22.00	0.0030	1.0000	2	0.2	692	0.37	0.23
	3	0.220	100.00	10.00	0.8000	1.0000	1	141.6	120,266	76.91	52.25
	4	0.170	50.00	22.00	0.0030	1.0000	2	0.5	755	0.41	0.25
	5	0.220	100.00	26.00	0.1400	1.0000	1	41.2	73,212	46.82	30.30
	6	0.170	100.00	39.00	0.0030	1.0000	2	0.2	1,678	0.90	0.56
	7	0.220	100.00	20.00	0.1400	1.0000	1	19.2	49,111	31.41	20.73
	Σ							**211.8**	**54,706**	**34.96**	**22.63**
#1	Σ							**211.8**	**78,876**	**50.41**	**22.61**

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	0.99	4.00	405.00	0.990	0.113
#2	**1**	**Time of Concentration:**					**0.113**
#2	2	1. Forest with heavy ground litter	21.88	35.00	160.00	1.180	0.037
#2	**2**	**Time of Concentration:**					**0.037**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.16	10.00	464.00	1.460	0.088
#2	**3**	**Time of Concentration:**					**0.088**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	4	1. Forest with heavy ground litter	22.03	50.00	227.00	1.180	0.053
#2	**4**	**Time of Concentration:**					**0.053**
#2	5	3. Short grass pasture	15.82	50.00	316.00	3.180	0.027
#2	**5**	**Time of Concentration:**					**0.027**
#2	7	5. Nearly bare and untilled, and alluvial valley fans	15.45	85.00	550.00	3.930	0.038
#2	**7**	**Time of Concentration:**					**0.038**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	2	5. Nearly bare and untilled, and alluvial valley fans	0.99	4.00	405.00	0.990	0.113
#2	**2**	**Muskingum K:**					**0.113**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	2.16	10.00	464.00	1.460	0.088
#2	**4**	**Muskingum K:**					**0.088**
#2	6	3. Short grass pasture	12.66	40.00	316.00	2.840	0.030
#2	**6**	**Muskingum K:**					**0.030**
#2	7	6. Grassed waterway	1.33	8.00	600.00	1.730	0.096
#2	**7**	**Muskingum K:**					**0.096**