Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-4544

March 11, 2008

Mr. Mike Overturf
Department for Natural Resources
Division of Mine Permits
#2 Hudson Hollow
Frankfort, KY 40601

RE: Permit Application No. 807-0355
Original
Nally & Hamilton Enterprises, Inc.

Dear Mr. Overturf:

Enclosed you will find the corrections and/or additional information to the deficiencies noted in your most recent letter dated February 5, 2008, concerning the above referenced permit. Each item has been addressed:

1. Item 31: Sediment Ponds and Impoundments:

   (a) (I – VIII) These items have been corrected.
   (b) (I – XXVI) These items have been corrected.

2. Item 31.3: This information has now been corrected.

3. Item 31.6.A (1): (a – f) This information has now been addressed.

4. Item 31.6.B: (a – b) This information has now been addressed.

If you should have any questions, please contact our office.

Sincerely,

Don R. Roberts by bhs
Don R. Roberts
Professional Engineer

DRR/bhs

Enclosures

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

January 28, 2008

Mr. Mike Overturf
Department for Natural Resources
Division of Mine Permits
#2 Hudson Hollow
Frankfort, KY 40601

RE: Permit Application No. 807-0355
Original
Nally & Hamilton Enterprises, Inc.

Dear Mr. Overturf:

Enclosed you will find the corrections and/or additional information to the deficiencies noted in your most recent letter dated January 10, 2008, concerning the above referenced permit. Each item has been enclosed as follows:

1. Item 26: Disposal of Excess Spoil:

   (a) The subsoil will be removed as modeled in the hollowfill REAME runs. This statement has been added at Attachment 26.3.A (2).

   (b) This information has now been submitted.

2. Item 31: Sediment Ponds and Impoundments:

   (a) The ponds have been redesigned using a curve number of 86.

   (b) The off-bench ponds were designed to control all sediment associated with the hollow fill. The on-bench ponds will be constructed prior to disturbance of the backfill or mining area in a relative watershed. Therefore, the on-bench ponds will control the sediment for the mining area. Off-bench ponds were designed for the hollow fill footprint to be cleared and grubbed all at one time not in stages.

   (c) This item has been corrected.

   (d) Dozer blade impressions will be used to obtain an "L" factor of 100 – 120 feet.

(e) Subwatershed Map: This information has now been corrected.

(f) Table 31.1: This information has now been corrected.

(g – j) This information has now been corrected and provided.

(k) A design for pond #16 has now been provided.

(l – m) This information has now been corrected and provided.

3. Item 31.6: The "Stream Restoration Plan" has now been provided with corrections, etc.

4. Item 32: This information has now been corrected in Table 32.3.

If you should have any questions or need additional information, please contact our office.

Sincerely,

Don R. Roberts (by bhs)
Don R. Roberts
Professional Engineer

DRR/bhs

Enclosures

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

December 20, 2007

Mr. Mike Overturf
Department for Natural Resources
Division of Mine Permits
#2 Hudson Hollow
Frankfort, KY 40601

RE: Permit Application No. 807-0355
Original
NALLY & HAMILTON ENTERPRISES, INC.

Dear Mr. Overturf:

Enclosed you will find the corrections and/or additional information to the deficiencies noted in your most recent letter dated November 27, 2007, concerning the above referenced permit. Each item has been addressed as follows:

1. Items 21.11 and 25.1: (a – f) The required discussion is now provided in the narrative at item 21.11.

2. Item 24: Blasting: (a) A blast grid map has now been included.

(b) Item 24.8: Please note there are no active underground mines within 500 feet of the proposed operation.

Communication Plan between Driller and Certified Blaster

(c – d) The required discussion is added at Attachment 24.8.A (1).

3. Item 26: Disposal of Excess Spoil: (a – c) These items have now been addressed.

4. Item 31: Sediment Ponds and Impoundments: (a – f) This information has been provided.

(g) This information has been included at Attachment 31.6.A.

5. Item 31.6: Stream Restoration Plan Diagrams: (a – e) These deficiencies will be addressed, submitted in the Stream Restoration Plan and forwarded to the Division of Permits, Critical Resources Section.

6. Item 31.6: Stream Restoration Plan Narrative: (a – g) These deficiencies will be addressed, submitted in the Stream Restoration Plan and forwarded to the Division of Permits, Critical Resources Section.

7. Item 32 Diversions: The SEDCAD runs have been included.

If you should have any questions or need additional information, please contact our office.

Sincerely,

Don R. Roberts bhs

Don R. Roberts
Professional Engineer

DRR/bhs

Enclosures

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

June 25, 2007

Mr. Mike Overturf
Department for Natural Resources
Division of Mine Permits
2 Hudson Hollow
Frankfort, Kentucky 40601

RE: Nally & Hamilton Enterprises, Inc.
Permit Application No. 807-0355
Original

Dear Mr. Overturf:

Please find enclosed the corrections and/or additional information to the deficiencies noted in your most recent letter with regards to the above-referenced application. Each item has been addressed as follows:

1. Items 11.1, 13.1, 14.1 and 14.4: The letters will be sent when received.

2. Item 11.3: No mining is proposed within 100 feet of the cemetery. A buffer zone will remain as shown on the maps.

3. Items 12.2: This item has been corrected and is now consistent. This operation contains two (2) seams and is not a leveled highwall operation.

4. Item 16 & 17: The lab data already spans six (6) months as required. However, additional months will be forthcoming to provide a total of six (6) samples. These will be provided in tech review.

5. Item 21.5: This item has been addressed.

6. Item 24.5: This item has been addressed

7. MRP Map:

a) Each of these items have been checked and are now corrected as required.

b) Each of these items have been checked and are now corrected as required.

c) Each of these items have been checked and are now corrected as required.

d) Each of these items have been checked and are now corrected as required.

e) Each of these items have been checked and are now corrected as required.

f) Each of these items have been checked and are now corrected as required.

Should you have any further questions or need additional information, please advise.

Thank you for your assistance and consideration in this matter.

Sincerely,

Don R. Roberts by S.H.

Don R. Roberts
Professional Engineer

DRR/sh

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

April 30, 2007

Department for Natural Resources
Division of Mine Permits
#2 Hudson Hollow
Frankfort, KY 40601

RE: Nally & Hamilton Enterprises, Inc.
Permit Application No. 807-0355

Dear Sirs:

Enclosed you will find one (1) red original and two (2) black copies of the MPA-03 application concerning the above referenced permit application.

If you should have any questions or need additional information, please contact our office.

Sincerely,

Don R. Roberts/dy PE

Don R. Roberts
Professional Engineer

DRR/jre

Enclosure

TECHNICAL INFORMATION FOR A MINING PERMIT

This form supplies all technical information in regard to the mining and reclamation plan for the permit. It shall be filed in conjunction with MPA-01 for all original and amendment applications.	PERMIT NUMBER 807-0355 DSMRE ID NUMBER 001939

3. Identification of Applicant/Engineer

3.1 Applicant Name Nally & Hamilton Enterprises, Inc.

3.2 Engineer Don R. Roberts Registration No. 12575
Associated with Logos Engineering
Address P.O. Box 350
City Manchester State KY Zip 40962
Telephone No. 606-598-6746

3.3 Indicate the name, address, and telephone number of the individual to whom all permit application correspondence including return of the application for correction or modification, is to be addressed. If such designation is not made, the cabinet will return the application only to the applicant. If such designation is changed at some future date, the applicant is responsible for notifying the cabinet:

Name Don R. Roberts/Logos Engineering Telephone No. 606-598-6746
Address P.O. Box 350
City Manchester State KY Zip 40962

4. Site Location Information

4.1 Name of proposed mine Jackson Mt. II
Local address Oakdale, KY

4.2 Contact person at mine site Bobby Boggs Title Mine Foreman
Telephone No. (606) 675-7300

4.3 County(ies) Bell Quadrangle(s) Balkan/Varilla
Latitude 36°45'28.06" Longitude 83°31'47.22"
Nearest named stream Brownies Creek Nearest community Oakdale

4.4 Is any of the proposed mining area previously permitted or pending permitting under KRS 350?
☐ YES ☒ NO. If "YES", list permittee names, permit numbers, and current status of operations. If additional pages are necessary, identify as "Item 4.4 continued".

5. Application Information

5.1 Type of application: ☒ Original ☐ Amendment No. _____

5.2 Type of operation: (check all appropriate boxes)

- ☒ Surface Area (SA)
- ☒ Surface Contour (SC)
- ☒ Surface Auger (SG)
- ☒ Surface Remining (SR)
- ☐ Surface Refuse Recovery (RR)
- ☐ Steep Slope (SS)
- ☐ Surface Mountaintop (SM)
- ☐ Refuse Disposal (RD)
- ☐ Underground (UG)
- ☐ Processing Plant (PP)
- ☐ Haul Road Only (HR)
- ☐ Load Out Only (LO)
- ☐ In-situ (IS)
- Other Highwall

6. Advance Notification Information

6.1 Is proposed permit located within boundaries for which a governmental planning agency has jurisdiction to act with regard to land use, air, or water quality planning? ☐ YES ☒ NO. If "YES", provide agency name and correct mailing address:

Agency Name _____
Mailing Address _____

6.2 Is proposed permit area located within boundaries of any sewage and/or water treatment authorities, water companies which provide sewage or water services to citizens in the area of the proposed permit, or have water sources, collection, treatment, or distribution facilities located in the area or the proposed permit? ☐ YES ☒ NO.

Authority/Company Name _____
Mailing Address _____

6.3 Proposed permit area located within the watershed of any U.S. Army Corps of Engineer projects? ☐ YES ☒ NO. If "YES", indicate below and provide one additional copy of the application:

Huntington District
- ☐ Dewey Lake
- ☐ Grayson Lake
- ☐ Yatesville Lake
- ☐ Fishtrap Lake
- ☐ Paintsville Lake

Louisville District
- ☐ Buckhorn Lake
- ☐ Cave Run Lake
- ☐ Carr Fork Lake
- ☐ Green River Watershed

Nashville District
- ☐ Lake Cumberland
- ☐ Martin's Fork Watershed
- ☐ Dale Hollow Lake
- ☐ Laurel River Lake
- ☐ Lake Barkely
- ☐ Middlesboro Flood Control Project Watershed

6.4 Is proposed permit area located within the official limits of any town, city or municipality?
☐ YES ☒ NO. If "YES", provide name and county:

Town/City Name _____ County _____

6.5 Was any of the data presented in this application prepared/provided as a result of a Small Operator Assistance Program (SOAP) grant? ☐ YES ☒ NO. If "YES", provide SOAP identification number

_____

6.6 Is the proposed permit boundary and acreage under this application the same as proposed under the corresponding "preliminary" permit application?
☒ YES ☐ NO. If "NO", describe differences:

_____

_____

_____

NOTE: If significant differences are determined to exist, another field walk by regional personnel may be required.

7. Permit Information

7.1 Each new original permit will be issued for a term of five (5) years. If an initial term in excess of five (5) years is required, provide the information stipulated by 405 KAR 8:010, Section 17 as "Attachment 7.1.A."

N/A

7.2 Provide the acreage associated with the following activities. If additional pages are necessary, identify as "Item 7.2 continued".

	Currently Permitted	Additions/ Deletions	Redesignations	Total Acreage
Mining or Face Up Areas				*784.24
Roads				60.38
Sediment Ponds				9.0
Spoil Storage Areas				86.51
Waste Disposal Areas				
Facility and Processing Areas				
Coal Stockpile and Loading Areas				
Surface Ventilation Areas				
Drainage Corridors				1.99
Total Surface Disturbance Area				724.34
Underground Areas				
Auger Areas (Highwall)				340.34
(Highwall) Total Underground/Auger Area				340.34
Permit Area				1064.68

*Note: 217.78 acres is for the Kellioka-Darby Seam and it doesn't affect the total acreage.

NOTE: The first three columns are used for amendments only.

7.3 If this permit contains acreage in more than one county, name the counties affected and specify surface and underground acreage within each county. If incremental acreage fees are being used, provide a table indicating acreage per county, per increment as "Attachment 7.3.A".

County	Total Surface Acreage	Total Underground Acreage

N/A

8. Bonding & Fees

8.1 Check the proposed bonding plan to be used:
☐ Single Area ☒ Incremental, with 4 total increments.

8.2 If incremental bonding is proposed, identify the increment(s) which will be initially bonded prior to permit issuance:
Increment No. 1

8.3 For incremental bonding submit an incremental bonding map to clearly identify the number and boundary of each increment.
See Attachment 8.3.A

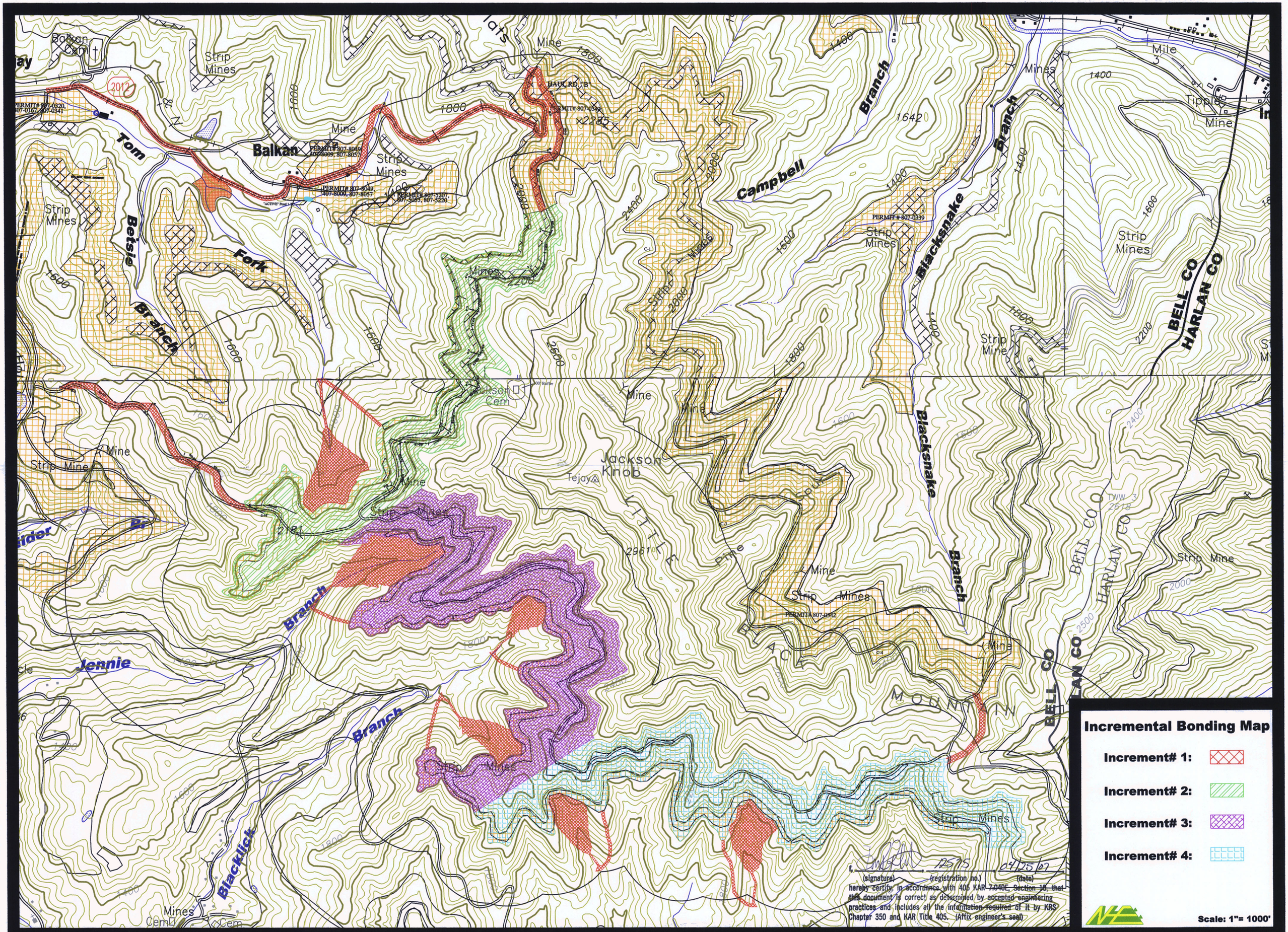
8.4 Complete the following charts with acreage for each increment:

Increment	1	2	3
Mining or Face Up Areas		*217.52	**293.58
Roads	60.37		
Sediment Ponds	9.0		
Spoil Storage Areas	86.51		
Waste Disposal Areas			
Facility and Processing Areas			
Coal Stockpile and Loading Areas			
Surface Ventilation Areas			
Drainage Corridors	1.99		
Total Surface Disturbance Area	157.87	160.85	214.53
Underground Areas			
Auger Areas (Highwall)	340.34		
Total Underground/Auger (Highwall) Area	340.34		
Permit Area	498.21	160.85	214.53

*Note: 56.67 acres is for the Kellioka-Darby Seam and it does not affect the total acreage.
**Note: 79.05 acres is for the Kellioka-Darby Seam and it does not affect the total acreage.

Increment	4		Total
Mining or Face Up Areas	*273.13		**784.23
Roads			60.37
Sediment Ponds			9.0
Spoil Storage Areas			86.51
Waste Disposal Areas			
Facility and Processing Areas			
Coal Stockpile and Loading Areas			
Surface Ventilation Areas			
Drainage Corridors			1.99
Total Surface Disturbance Area	191.09		724.34
Underground Areas			
Auger Areas (Highwall)			340.34
Total Underground/Auger Area (Highwall)			340.34
Permit Area	191.09		1064.68

*Note: 82.04 acres is for the Kellioka-Darby seam, it doesn't affect the total acres.
**Note: 217.78 acres is for the Kellioka-Darby seam, it doesn't affect the total acres



Incremental Bonding Map

- **Increment# 1:**
- **Increment# 2:**
- **Increment# 3:**
- **Increment# 4:**

I, _____ 12515 04/25/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 18, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

Scale: 1"= 1000'

8.5 Complete the following chart which details additional information about each increment.

Increment	1	2	3
Prelaw Mined Acreage			
Alternate Topsoil Acreage	157.87	160.85	214.53
Mulching Variance			
Prime Farmland Acreage			
Stream Channel Alteration Acreage			
Number of Off Bench Ponds	6	0	0

Increment	4		
Prelaw Mined Acreage			
Alternate Topsoil Acreage	191.09		
Mulching Variance			
Prime Farmland Acreage			
Stream Channel Alteration Acreage			
Number of Off Bench Ponds	0		

Increment			
Prelaw Mined Acreage			
Alternate Topsoil Acreage			
Mulching Variance			
Prime Farmland Acreage			
Stream Channel Alteration Acreage			
Number of Off Bench Ponds			

8.6 Provide a narrative describing all acreage overlaps. This includes double bonding and shared facilities (with identification of other permits involved). In addition, all overlaps shall be clearly identified on the map requested in item 8.3.

See Attachment 8.6.A

8.7 Check the method of acreage fee payment used:

☐ Single Area ☒ Incremental

8.8 ☒ Permit processing fee of $375 is included.

1 = 11850
2 = 12075
3 = 16125
4 = 14,400
54,450 total

If applicable, indicate amount of acreage fee included:

Number of surface acres ~~724.34~~ 157.8 round to ~~725~~ 158 X $75 = ~~$54,375.00~~ 11,850 acreage fee.

8.9 Have credit acres been applied to the acreage fee amount? ☐ YES ☒ NO. If "YES", list below the permit number, permittee name, acreage and amount. Attach copies of the bond release forms showing that those acreages were not disturbed. Identify attached documents as "Attachment 8.9.A, 8.9.B", etc.

Permit Number	Permittee Name	Undisturbed Acreage	Rate Per Acre	Total

Total acreage fee credit $ _____

8.10 If permittee name is different from the applicant, submit a letter from the permittee granting the credit acres to the applicant.

N/A

8.11 Based upon all surface acres total to be disturbed under the proposed permit, provide an estimate of the costs of reclamation. Attach detailed supporting calculations as "Attachment 8.11.A".

See Attachment 8.11.A

9. Right of Entry

9.1 For all properties to be permitted by this application, complete the following chart for all surface and mineral owners. In the case of surface owners of severed estates which overlie underground works, but no surface disturbance is proposed, list n/a for type of document, grantor of rights, and date.

Owner	Type of Document	Grantor of Rights	Execution Date	Acreage
Nally & Hamilton	Lease	Asher Land and Mineral, LTD	01/09/06	800±
Nally & Hamilton	Lease	Wm. S. Stewart	08/01/74	700±

ATTACHMENT 8.11.A

APPLICATION NUMBER 807-0355

A.	COST FOR REMOVAL OF ALL EQUIPMENT, BUILDINGS, AND OTHER SUPPORT FACILITIES NOT PROPOSED AS PART OF THE POST MINING LAND USE. N/A	$ 0.00
B.	COST FOR SEALING UNDERGROUND MINE OPENINGS OR AUGER HOLES. 340.34 x $100.00	$ 34,034.00
C.	COST FOR BACKFILLING AND GRADING, INCLUDING NON-PERMANENT SEDIMENT STRUCTURES. 566.46 acres x $1,000 per acre	$ 566,460.00
D.	COST FOR DISTRIBUTION OF TOPSOIL OR SUBSTITUTE MATERIAL. 652.97 acres x $420 per acre	$ 274,247.40
E.	COST FOR REVEGETATION, INCLUDING SEEDBED PREPARATION, SEEDING, MULCHING, LIMING, FERTILIZING, AND TREE PLANTING. 724.34 acres x $400 per acre	$ 289,736.00
F.	COST FOR MONITORING SEDIMENTATION STRUCTURES UNTIL REMOVAL (MINIMUM OF TWO YEARS AFTER LAST AUGMENTED SEEDING.) 43 ponds x $1,000 per pond	$ 43,000.00
G.	COST FOR MAINTENANCE OF REVEGETATED AREAS, ADDITIONAL GRADING, MAINTENANCE OF DRAINAGE CONTROLS, SEDIMENTATION STRUCTURES AND ACCESS ROADS UNTIL FINAL BOND RELEASE. 60 hours x $100 per hour	$ 6,000.00
H.	COST OF PRIME FARMLAND RECONSTRUCTION. N/A	$ 0.00
I.	COST OF CONDUCTING SURFACE AND GROUND WATER MONITORING UNTIL FINAL BOND RELEASE. 76 samples x $35 per sample	$ 2,660.00
J.	OTHER COST (IDENTIFY) _____ N/A	$ 0.00
	TOTAL COSTS (A - J)	$ 1,216,137.40

9.2 Explain the legal rights claimed by the applicant for the proposed permit area:
Legal rights claimed by the applicant are the right of ingress, egress, and the right to conduct surface, auger and highwall mining.

9.3 Are any rights to enter and mine the area, as claimed by the applicant, subject to any pending litigation?
☐ YES ☒ NO

9.4 Have the private surface and mineral estates been severed for any parcel of land within the proposed permit area? ☐ YES ☒ NO. If "YES", and the applicant proposes to extract coal by surface mining methods, one (1) of the following items shall be provided as part of this application:

(a) Notarized copy of the letter or a lease document from the surface owner(s) consenting to the use of surface mining methods to extract coal within the proposed permit area; or

(b) Notarized copy of the document of conveyance which originally severed the private surface and mineral estates and also expressly grants or reserves the right to extract coal by surface mining methods; or

(c) Notarized copy of a judicial order which expressly grants or reserves the right to extract coal by surface mining methods.

Is the order subject to pending litigation? ☐ YES ☒ NO

Documents submitted in response to this requirement shall be identified as "Attachments 9.4.A, 9.4.B", etc.

9.5 Describe any interest, options or pending bids on interest held or made by the applicant for lands which are contiguous to the proposed permit area. If additional pages are needed, identify as "Item 9.5 continued".

None

9.6 Is the proposed permit area within or adjacent to any lands where a federal agency owns either the surface or mineral rights? ☐ YES ☒ NO. If "YES", list the agency controlling such lands. Describe the location and boundaries of these lands with respect to the proposed permit area. If additional pages are needed, identify as "Item 9.6 continued".

_____
Agency

_____ (_____) _____
Address Telephone Number

10. Notice of Intention to Mine

10.1 List the name of the newspaper of largest circulation in each county in which the proposed operation will be located.

County	Newspaper
Bell	Daily News

10.2 Provide on a separate page immediately following this section the language of the "Notice of Intention to Mine" to be advertised in the newspaper(s) listed in Item 10.1 and identify as "Attachment 10.2.A". In accordance with 405 KAR 8:030, or 8:040, a copy of each of the four newspaper advertisements or an affidavit from the newspaper editor(s) including a copy of the final advertisement shall be submitted to the Department not later than 15 days after the date of the final advertisement. NOTE: The cabinet cannot complete the final processing and issuance of a mining permit unless and until all advertising requirements have been properly fulfilled by the applicant. Failure to submit accurate newspaper advertisements in a timely manner will result in the delayed issuance of a permit.

See Attachment 10.2.A

11. Areas Designated Unsuitable for Mining & Requests for Variances

NOTE: Only those waivers and variances identified in this section will be considered for approval by the cabinet.

11.1 Is any part of the proposed permit area: ☐ within lands designated by the state as unsuitable for mining; ☐ under study for designation as such; ☐ within an area with special conditions as a result of a lands unsuitable study. If entire permit area is not designated unsuitable and not currently under study for such designation, check here ☒. Attach DSMRE clearance letter as "Attachment 11.1.A".

See Attachment 11.1.A

11.2 Indicate if proposed surface mining and reclamation activities will occur on, or are adjacent to: ☐ national park system; ☐ national or state forest lands; ☐ national system of trails; ☐ national wilderness preservation system; ☐ wild and scenic rivers system, including "study" rivers; ☐ state wide rivers established pursuant to KRS 146; ☐ national recreation areas; ☐ public wildlife management area; and/or ☐ places listed in or eligible for listing in the National Register of Historic Places. If not, check here ☒.

11.3 Indicate if the proposed permit area is within: ☐ 500' of known abandoned or active underground mines; ☐ 300' of a public park, public building, school, church, community or institutional building; ☐ 300' of an occupied dwelling; ☐ 100' of the outside right-of-way line of a public road; ☐ 100' of a stream; ☐ 100' of a cemetery, or prehistoric burial ground. If not, check here ☒.

11.4 For each item checked in items 11.2 and 11.3 above, attach appropriate maps to identify the location and boundaries of the lands or facilities referenced. These attachments shall be identified as "Attachment 11.2.A" and "Attachment 11.3.A", respectively. Any required waiver documentation such as land owner consent or approval of appropriate state or federal agencies shall be attached. These attachments shall be identified as "Attachment 11.4.A, 11.4.B", etc. Any engineering designs for Item 11.3 shall be submitted in other appropriate sections of this application.

N/A

ATTACHMENT 10.2.A

NOTICE OF INTENTION TO MINE

Pursuant to Application Number 807-0355

In accordance with KRS 350.055, notice is hereby given that Nally & Hamilton Enterprises, Inc., P.O. Box 157, Bardstown, KY 40004, has applied for a permit for a surface coal and auger mining and reclamation operation affecting 1064.68 acres located 0.25 mile southwest of Tejay in Bell County.

The proposed operation is approximately 1 mile southeast from KY 2012's junction with US 119 and located 0.2 mile southeast of Tom Fork.

The proposed operation is located on the Balkan and Varilla U.S.G.S. 7½ minute quadrangle map. The operation will use the contour, area, auger, remining and highwall methods of surface mining. The surface, auger and highwall areas are owned by Asher Land and Mineral, LTD and Wm. S. Stewart.

The application has been filed for public inspection at the Division of Mine Reclamation and Enforcement's Middlesboro Regional Office, 1804 East Cumberland Avenue, Middlesboro, Kentucky 40965. Written comments, objections, or requests for a permit conference must be filed with the Director, Division of Mine Permits, #2 Hudson Hollow, U.S. 127 South, Frankfort, KY 40601.

(USE IN FINAL ADVERTISEMENT ONLY) This is the final advertisement of the application. All comments, objections, or requests for a permit conference must be received within thirty (30) days of today's date.

Note to Newspaper Publisher: The heading **"NOTICE OF INTENTION TO MINE"** must be a minimum of ten (10) point, bold face, all capitals type.

RECEIVED MAY 25 2007

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR NATURAL RESOURCES

Ernie Fletcher
Governor

2 Hudson Hollow
Frankfort, Kentucky 40601
Phone (502) 564-6940
Fax (502) 564-5698
www.naturalresources.ky.gov
www.kentucky.gov

Teresa J. Hill
Secretary

Susan C. Bush
Commissioner

May 21, 2007

DON ROBERTS
LOGOS ENGINEERING
PO BOX 350
MANCHESTER KY 40962

RE: Nally & Hamilton Enterprises, Inc.
Application # 807-0355, NW

Dear Mr. Roberts:

The Division of Mine Permits has conducted the critical resources review of the above referenced application. Attached are the Division's findings, listed by application item, describing the issues that must be addressed. These attachments and supporting documentation must be incorporated into the appropriate sections of the comprehensive application. The findings for each application item are summarized below.

11.1 Areas Designated Unsuitable for Mining: None identified
12.2 General Description of Mining and Reclamation Operations: BMPs recommended;
Stream Restoration Plan for Blacklick Br, Jennie Br and Tom Fk
13.1 Cultural or Historic Resources: Archaeological survey required
14.1 Fish and Wildlife Information: T/E species identified
Blackside dace – Phoxinus cumberlandensis
14.4 Fish and Wildlife Survey: Required as listed below
Aquatic Survey for the UT of Blacksnake Branch
21.11 Fish and Wildlife Enhancement Plan: Required

Please be advised that any changes to the proposed mine plan may require additional environmental review. If you have any questions concerning this matter, please contact the review biologist, Nashisha Henderson, or archaeologist, Rose Moore, Critical Resources Review Section, at (502) 564-2320.

Sincerely,

Susan Wind, Supervisor
Critical Resources Review Section/
Small Operator Assistance Program
Division of Mine Permits

Enclosure to Applicant
c: Rose Moore (e)
Nashisha Henderson (e)
Donna M. Neary, SHPO
Mike Hardin, KDFWR
Lee Andrews, USFWS
Permit File – w/enclosure Mike Overturf (e)
STEPHEN HAMILTON
PO BOX 157
BARDSTOWN KY 40004

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 21, 2007

Application Item 11.1: Lands Unsuitable for Mining

1. The proposed permit area may impact a stream segment that is considered important by the Cabinet for water quality and/or fish and wildlife resources. The Department will request comments from the appropriate management agency concerning potential impacts- Puckett Creek is a 303(d) and the Upper Cumberland River is a 303(d)

2. The proposed permit area may impact a stream segment classified under 401 KAR 5:026 as Outstanding Resource Water. The applicant is advised that point discharges into such streams may be subject to more stringent effluent limitations under the requirements of a KPDES individual permit. The Department will solicit comments from the Kentucky Department of Environmental Protection, Division of Water, concerning this matter. Blacksnake Branch - ORW

3. Please be advised that mining operations seeking new or modified coverage under the Coal KPDES General Permit must submit a Notice of Intent (NOI-CM) to the Division of Water. Please file the NOI-CM with the Division of Water as soon as possible in order to avoid potential delays in the processing and issuance of your SMCRA/DNR permit.

4. As of this date, there are no lands in the proposed permit area designated unsuitable for surface coal mining or under study for such designation, as provided in 405 KAR Chapter 24.

5. The proposed permit area does not fall within an area with special conditions as a result of a lands unsuitable study.

6. The proposed permit area is not located within a U.S. Army Corps of Engineers project area.

7. The proposed permit area may include an in-stream discharge and will require a Section 401 WQC from the Commonwealth of Kentucky, and a 404 Permit from the U.S. Army Corp of Engineers. As of February 1, 2007, Department for Natural Resources – Division of Mine Permits (DNR/DMP) will be reviewing and issuing the 401 certifications. Applications received prior to February 1, 2007 will be reviewed and issued by the Department for Environmental Protection – Division of Water. Applications should be submitted as soon as possible to DNR/DEP in order to expedite review.

8. The proposed permit area is located in close proximity to the Shillalah Wildlife Management Area. The Department has requested comments from the Kentucky Department of Fish and Wildlife Resources concerning potential impacts to this property. These comments will be forwarded to you upon receipt.

11.5 Indicate below all waivers and variances to be requested for the proposed operation. The acreage (or facility designation) affected should be provided as requested. Those variances which have been granted in previous applications to this permit should be marked with an [x] while those proposed or expanded as part of this application should be marked with an [*]. The documentation necessary to approve each variance requested as part of this application shall be submitted in the appropriate sections of this application.

- ☐ Post mining land use change _____
- ☐ * Alternate topsoil material for 724.34 acres
- ☐ Permanent pond # _____
- ☐ AOC variance: remining for _____ acres
- ☐ AOC variance: steep slope for _____ acres
- ☐ AOC variance: mountaintop removal for _____ acres
- ☐ * Alternate contemporaneous reclamation standards
- ☐ Alternate contemporaneous reclamation standards for joint surface and underground operations
- ☐ Mulching variance
- ☐ Permanent road(s) # _____
- ☐ Culvert spacing variance for roads # _____
- ☐ Grade variance for roads # _____

OTHERS: 0' of Blacklick Branch
0' of Jennie Branch
0' of Town Fork

11.6 If valid existing rights are claimed for any part of the proposed permit area identified in 11.1, 11.2, or 11.3, submit the required information as "Attachment 11.6.A".

N/A

12. General Description of Mining and Reclamation Operations

12.1 Indicate the types of facilities to be constructed/utilized:

- ☒ Sediment ponds, no. 43
- ☐ Fresh water ponds, no. _____
- ☐ Levees, _____ ft.
- ☐ Water treatment facilities
- ☒ Coal haulroads
- ☐ Access roads
- ☐ Conveyors, _____ ft.
- ☐ Rail loading facilities
- ☐ Coal refuse fills
- ☐ Coal slurry impoundments
- ☐ Coal stockpiles
- ☒ Excess spoil fills, no. 6
- ☐ Hard rock/durable rock fills, no. _____
- ☐ Deep mine entries, no. _____
- ☐ Coal processing facilities
- ☐ Mine management and/or support areas
- ☐ Loading facilities
- ☐ Other _____

12.2 Provide a narrative description, identified as "Attachment 12.2.A", of each phase of the proposed surface and underground mining operation. Include the anticipated starting and termination dates of each phase and/or increment, major equipment to be utilized, acreage affected in each phase, and the total acreage affected over the life of this permit. The narrative should describe the location and mitigation plans for any utility lines which will be encountered. If this application is an amendment, describe any changes to the mining plan proposed for the currently permitted area.

See Attachment 12.2.A - 12.2.A (4)

12.3 Describe the plan for maximizing resource recovery. Provide as "Attachment 12.3.A".

See Attachment 12.3.A

13. Cultural or Historic Resources

13.1 List and describe any cultural or historic resources listed, or eligible for listing, on the National Register of Historic Places and any known archaeological sites within or adjacent to the proposed permit area. Provide under separate cover a description of the measures to be taken to mitigate adverse impacts to these sites and a map showing their location.

See Attachments 13.1.A - 13.1.A (1)

14. Fish and Wildlife Information

14.1 Has any threatened or endangered species or the critical habitat of such species been identified within or adjacent to the proposed permit area? ☒ YES ☐ NO. If "No", attach DSMRE documentation to verify this determination. Identify as "Attachment 14.1.A".

See Attachment 14.1.A

14.2 If the answer to item 14.1 is "YES" or a threatened or endangered species or critical habitat has been reported within or adjacent to the proposed permit area, list the species involved and provide a map identifying its location relative to the proposed permit area. Identify as "Attachment 14.2.A".

Blackside dace - Refer to map at end of application

14.3 Will any "wetland" area be impacted by the proposed operation?
☐ YES ☒ NO.

If "YES", provide acreage of wetland, and delineate its boundaries on the ERI Map.
Acreage of wetland _____

14.4 Provide as "Attachment 14.4.A", the results of any fish and wildlife survey conducted for the proposed area, or other studies required by DSMRE.

See Attachments 14.4.A - 14.4.A (1)

14.5 Provide a description of the measures which will be taken to avoid or minimize adverse impacts to wetland areas, important fish and wildlife species, the critical habitat of such species, or other species protected by state or federal law. If additional pages are needed, identify as "Item 14.5 continued".

See Attachment 14.5.A

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 21, 2007

Application Item 12.2: General Description of Mining and Reclamation Operations
1. The proposed permit may result in impacts on aquatic resources. The Division recommends the use of Best Management Practices (BMPs) to aid in sediment control. BMPs may include, but are not limited to, any of the following, singly or in combination:

Basins
Diversion ditches
Filter strips
Land grading and reshaping
Maintenance of a 100' buffer zone along streams
Minimization of surface disturbance
Mulching
Placement of rip-rap
Rapid revegetation, especially along stream banks
Rock check dams
Silt fences
Straw bale barriers
Stream bank stabilization
Sumps
Work in periods of no or low flow or dry weather

The narrative description of mining operations (Attachment 12.2.A) provided in the comprehensive application should specify what BMPs will be implemented.

2. The proposed permit may temporarily affect intermittent or perennial stream segment(s) of Tom Fork, Jennie Branch and Blacklick Branch. The Division recommends that the applicant include a **stream restoration plan** as an attachment to Application Item 31.6. Restoration should strive to reconstruct the pre-mining conditions of the natural stream. The plan must, at a minimum, describe the following pre-disturbance stream parameters and propose measures to reconstruct them: substrate characterization, channel slope and width, riffle-pool ratios, run-bend ratios, water depth, average flow, and riparian vegetation. Profile, plan, and cross-sectional views of the pre-mining and the restored stream channel must also be included.

The applicant must include a copy of the restoration plan in the comprehensive application and submit **one (1) copy under separate cover** to the following address: Critical Resources Review Section, Division of Mine Permits, #2 Hudson Hollow, Frankfort, Kentucky 40601.

ATTACHMENT 12.2.A

CONTEMPORANEOUS RECLAMATION VARIANCE

A variance is being requested for time and distance to comply with the revised regulations, 405 KAR 16 : 020 Section 6, Supplemental Assurance. A variance is needed to meet marketing demands for different coal qualities, quantity, and the large amount of equipment and manpower and many different operations that need to be executed at the same time. The different working areas needed are for clearing & grubbing, topsoil removal, drill benching, drill operations, blasting area, overburden removal by dozer, overburden removal by loader trucks, final pit preparation, and coal loading areas. Each operation needs a separate working area so it will not interface with the other ongoing operation and to ensure continuous coal loading operations so that coal contracts can be met. The additional time is needed so that the highwall can be eliminated by progressive mining. We are requesting a distance of nine thousand (9,000) linear feet and a time of 360 days for backfilling and grading to approximate original contour. Supplemental assurance per each additional section (1,500 feet) will be submitted upon activation as concurrently as possible and in a timely manner in order to minimize the time period in which disturbed areas are exposed prior to reclamation. The proposed number of spreads of equipment that will be utilized at any one time will be (6) six to (15) fifteen.

SUPPLEMENTAL ASSURANCE BONDING CALCULATIONS:

The original bonding will initially apply to the original 1,500' of mining area. From the total of 9,000' requested under the Alternate Contemporaneous Reclamation standards a total of 7,500 feet will have an additional $50,000.00 of Supplemental Assurance Bond for each 1,500 foot section. Therefore, 7,500' divided by 1,500' = 5; 5 sections X $50,000.00=$250,000.00 in Supplemental Assurance Bond. The Supplemental Assurance Bond will be submitted as needed. Each section may contain multiple pits.

Summary:

9,000' total length of wall
9,000' - 1,500' (Initially bonded) = 7,500'
7,500' ÷ 1,500' sections = 5 additional sections
5 X $50,000.00 = $250,000.00 in Supplemental Assurance Bond

ATTACHMENT 12.2.A (1)

This application proposes surface and auger mining of the area shown on the attached maps. Mining is expected to begin within two months of the final issuance of the permit.

Removal of overburden and coal will be conducted by conventional surface mining methods. Equipment utilized will consist primarily of drills, dozers, loaders, and trucks. Drills (RDC-16) will assist in the blasting of material, with dozers (155 KOMATSU or D9 - D11 CAT)) and loaders (988 - 922 CAT) moving the overburden. Trucks (769 -777 CAT) will be used if necessary to transport material to storage areas. Similar equipment may be used as determined by the operator.

Initially, organic material will be removed before topsoil and/or alternate material can be stockpiled. All trees and brush will be windrowed on the solid berm. Since small underbrush, weeds, grasses, and a few small trees are the only forms of organic matter present, non-woody organic matter may be mixed with overburden materials where no stability problems will be created. Organic materials may also be burned if necessary.

All topsoil and/or alternate material will be removed and stockpiled or immediately redistributed on a regarded area. If topsoil and/or alternate material is not redistributed within thirty days, the stockpile will be seeded to prevent erosion, etc.

Once topsoil and/or alternate material has been removed from a site, overburden removal will begin. As stated previously, loaders, trucks, and dozers will transport material from the coal removal pit. Coal will then be removed following overburden removal. Coal removal from each pit should not exceed two weeks under normal conditions. However, variables such as weather and equipment breakdowns may cause additional delays.

Backfilling will be an automatic process. After coal has been removed from the pit area, overburden from the next proposed coal extraction point will be transported to reclaim behind the preceding operation. This operation proposes to have multiple pits open simultaneously to allow coal haulage on a continuous basis. This is necessary to fulfill contract obligations with the purchaser. Backfilling and grading to approximate original contour shall follow coal removal. Final grading will ensure that all highwalls are eliminated. The area will be compacted by several passes on each layer with the use of heavy equipment.

Following final grading of slopes, topsoil and/or alternate material will be reapplied. Care will be taken to prevent compaction of this material. The area will then be seeded and mulched according to the revegetation plan. Any eroded gullies will be regraded, reseeded, and stabilized or rip-rapped.

Mining termination will depend upon weather and market conditions.

ATTACHMENT 12.2.A (2)

Bench Pond Construction

Bench ponds will be constructed per enclosed designs at locations shown on the MRP map. However, bench ponds will not be constructed until mining has progressed through the pond location and any coal within the pond location is removed. Prior to pond construction, mining on the bench in a particular watershed will contain all the water in the pit or will be diverted back to the nearest approved/certified structure until the pond area has been mined through and the pond constructed. Since the size of the pit will exceed the pond size, water holding capacities will exceed those of the pond, thereby, providing adequate sediment control.

In no case will runoff be allowed to leave the permitted area without first passing through a certified sediment facility.

Bench ponds will be built on lowest coal seam to be mined.

ATTACHMENT 12.2.A (3)

Drainage Corridors

Drainage corridors will be permitted between the mining/storage area and the sediment pond proposed. As shown on the enlarged MRP map, the corridor will include the drainage channel and an area adjacent to the channel for access. Total width is proposed at 30 feet. This includes approximately 10 feet for the drainage channel and areas adjacent to it for any mitigation that might arise, and 20 feet to allow equipment access.

However, damage to drainage ways is not expected if design plans within the application are followed.

The drainage corridor areas will have limited usage. They will only be used when necessary for clean out or restoration of the stream channel or associated silt structure. Disturbance will be kept minimal.

Should clean out become necessary, a backhoe or excavator will be used to remove sediment from the channel. Care will be taken to minimize the effects to the stream channel and to ensure that stream characteristics are altered as little as possible. Any sediment removed will be handled according to the plan enclosed for clean out of sediment ponds. After any necessary drying, sediment will be placed with overburden on the bench.

Inspections for sediment clean out will be conducted simultaneously with pond inspections or at least annually.

ATTACHMENT 12.2.A (4)

Best Management Practices

This proposed operation intends to use the best management practices available to ensure protection of the lower lying streams and the associated areas. Erosion will be minimized by immediate seeding, mulching and revegetating of disturbed areas including ponds and outslopes. Hay checks will be placed in areas where erosion gullies or concentrated flows may occur. During pond construction, hay checks will be placed below the disturbance to filter initial disturbance runoff. Likewise, hay checks will be used if necessary along roadway ditches or any temporary ditches or drainage channels created. Rip-rap will be used when velocities or volume of runoff dictates.

Throughout the mining process, care will be taken to minimize erosion and protect surface and groundwater quantity and quality. Measures will be taken, as conditions dictated, to prevent adverse effects to the area.

Rock check dams will be constructed at the toe of each hollow fill. These dams will be constructed once the fill has been cleared. These check dams will aid in filtering of any runoff from the fill site and help reduce sediment load to the lower lying sediment pond.

ATTACHMENT 12.3.A

As can be seen from proposed mining plan narratives and production estimates, this operation is planned to remove all minable and merchantable coal from the area proposed for disturbance.

Mining will proceed in a continuous manner as described in Item 12.2. This method eliminates the possibility of leaving small strips of coal around each pit. Further, all spoil from an active pit can be placed in preceding pits where necessary. This prevents reserve losses incurred by placing spoil on merchantable coal and thereby rendering it inaccessible. All spoil storage on this operation will be in areas where coal has been removed or where no minable coal exists.

No underground mining is proposed at this time. However, any area that provides sufficient size in thickness and access to reserves that may be recovered by underground mining methods will be considered at the time they are encountered. During surface operations, if it is determined that an underground operation is economically and environmentally feasible, then an underground mining application will be filed with the Department.

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 18, 2007

Application Item 13.1: Cultural or Historic Resources

The Division of Mine Permits has received comments from the State Historic Preservation Officer (SHPO) concerning the potential for archaeological resources within the proposed permit area. A copy of the SHPO comments is attached for your information and use.

The Division of Mine Permits has considered these comments and has determined that the proposed operation may potentially impact archaeological resources that are eligible for listing in the National Register of Historic Places. **Therefore, an archaeological survey of the proposed permit area is required.** If you so request, a list of individuals and firms qualified to conduct archaeological investigations in the Commonwealth will be provided to you.

The applicant must submit five (5) copies of the resulting archaeological survey report to the following address: Critical Resources Review Section, Division of Mine Permits, Department for Natural Resources, No. 2 Hudson Hollow, Frankfort, KY 40601.

ATTACHMENT 13.1.A (1) 807-0355

COMMERCE CABINET
KENTUCKY HERITAGE COUNCIL

Ernie Fletcher
Governor

The State Historic Preservation Office
300 Washington Street
Frankfort, Kentucky 40601
Phone (502) 564-7005
Fax (502) 564-5820
www.kentucky.gov

George Ward
Secretary

May 9, 2007

Ms. Susan Wind, Supervisor
Critical Resources Review Section
DSMRE/Division of Permits
#2 Hudson Hollow Complex
U.S. 127 South
Frankfort, Kentucky 40601

Re: Nally & Hamilton Enterprises, Inc.
Application # 807-0355, NW
Bell County

Dear Ms. Wind:

Thank you for your letter of April 30, 2007 (received May 2, 2007) concerning the above referenced project. A review of our files indicates that the proposed project will not impact any previously recorded archaeological sites. However, the proposed permit area has never been investigated by a professional archaeologist to determine if any properties eligible for listing in the National Register of Historic Places are present. Investigations of projects in similar environmental contexts have resulted in the identification of a large number of sites some of which have been determined eligible for listing in the National Register. Given the project area's environmental setting, in my opinion, it has a high potential for impacting archaeological sites. Therefore, I recommend that all undisturbed portions of the proposed permit area be surveyed by a professional archaeologist.

In order to make a preliminary determination if properties eligible for listing in the National Register of Historic Places will be affected by this project, the applicant must submit photographs of all structures 50 years or older that are within and adjacent to the project area. Each photograph should be labeled by street address with a brief description of potential impacts or proposed treatment, and should be accompanied by a project map showing their location. Upon completion of our review, this office will advise the applicant if further consultation is required. As always, I would be happy to provide you with a technical review of the report documenting the results of these investigations. Should you have any questions, feel free to contact Charles Hockensmith of my staff at 564-7005.

Sincerely,

Donna M. Neary, Executive Director
and State Historic Preservation Officer

ATTACHMENT 13.1.A (1)(a)

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR NATURAL RESOURCES

Ernie Fletcher
Governor

Division of Mine Permits
2 Hudson Hollow
Frankfort, Kentucky 40601
Phone (502) 564-2320
Fax (502) 564-6764
www.minepermits.ky.gov

Teresa J. Hill
Secretary

Susan C. Bush
Commissioner

September 24, 2007

DON R. ROBERTS
LOGOS ENGINEERING
P.O. BOX 350
MANCHESTER, KENTUCKY 40962

RE: Nally & Hamilton Enterprises, Inc.
Application # 807-0355, NW

Dear Mr. Roberts:

This office recently received the report, "Phase I Archaeological Survey of the Nally & Hamilton Enterprises, Inc. Jackson Mountain #2 Coal Permit Area Bell County, Kentucky," prepared by Betty J. McGraw of McGraw, Inc. This report presents the results of a preliminary reconnaissance survey of the above referenced permit application.

During the course of the archaeological investigation, it was determined that no sites eligible for listing in the National Register of Historic Places exist within the proposed permit area. Therefore, the investigator has **recommended that no additional work be conducted within this area**. Division of Mine Permits personnel and the State Historic Preservation Officer have reviewed the author's methodology and conclusions, and concur with this recommendation. A copy of the SHPO comments is attached for your information.

The Department now considers the applicant to have successfully completed the permitting requirement to consider and protect significant cultural resources for the subject permit application. If you have any questions concerning this matter, please contact Rose Moore, staff archaeologist, Critical Resources Review Section at (502) 564-2320.

Sincerely,

Susan Wind, Supervisor
Critical Resources Review Section/
Small Operator Assistance Program/
401 WQC
Division of Mine Permits

Enclosure
c: Rose Moore (e)
Donna M. Neary, SHPO
Betty J. McGraw
Permit File Mike Overturf (e)

COMMERCE CABINET
KENTUCKY HERITAGE COUNCIL

Ernie Fletcher
Governor

The State Historic Preservation Office
300 Washington Street
Frankfort, Kentucky 40601
Phone (502) 564-7005
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George Ward
Secretary

Donna M. Neary
Executive Director and
State Historic Preservation Officer

September 10, 2007

Ms. Susan Wind, Supervisor
Critical Resources Review Section
DSMRE/Division of Permits
#2 Hudson Hollow Complex
U.S. 127 South
Frankfort, Kentucky 40601

Re: Nally & Hamilton Enterprises, Inc.
Application # 807-0355, NW
Bell County

Dear Ms. Wind:

Thank you for your letter of September 4, 2007 regarding the above referenced project. I have completed my review of the archaeological report entitled "Phase I Archeological Survey of the Nally & Hamilton Enterprises, Inc. Jackson Mountain # 2 Coal Permit Area, Bell County, Kentucky" by Betty J. McGraw. The author found no evidence of prehistoric or historic occupation in the permit area and recommends no further work. No grave markers were found for the Jackson Cemetery in the auger mining area and only a name plaque with the cemetery name was observed at the location. The cemetery location will be protected by a 100-foot buffer zone. I concur with the author's findings and recommendations. In accordance with 36CFR Part 800.4 (d) of the Advisory Council's revised regulations our finding is that there are No Historic Properties Present within the undertaking's area of potential impact. Therefore, we have no further comments and DSMRE's responsibility for consultation with the Kentucky State Historic Preservation Officer under the Section 106 review process for this individual permit is fulfilled.

Should you have any questions, feel free to contact Charles Hockensmith of my staff at (502) 564-7005.

Sincerely,

Donna M. Neary

Donna M. Neary, Executive Director
and State Historic Preservation Officer

cc: Ms. Betty J. McGraw
Dr. George Crothers

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 21, 2007

Application Item 14.1: Fish and Wildlife Information

1. The Division's review of the Kentucky State Nature Preserves Commision's Natural Heritage Database indicates that occurrences of state/federally designated threatened or endangered species **have been recorded** within or adjacent to the proposed permit area. Please refer to Attachment 14.4 for information on any site-specific resource information that is required in the permit application to satisfy 405 KAR 8:030/040, Section 20. For additional assistance, please contact:

   United States Fish & Wildlife Service
   Kentucky Ecological Services Field Office
   3761 Georgetown Road
   Frankfort, KY 40601
   (502) 695-0468

Federally listed species:

Blackside dace	*Phoxinus cumberlandensis*

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 21, 2007

Application Item 14.4: Fish and Wildlife Survey

Based upon the Division's environmental review, it has been determined that the proposed operation has the potential to impact the UT of Blacksnake Branch, an ORW. Therefore, in accordance with 405 KAR 8:030/040, Section 20(2)(a-c), the subject application will require site-specific fish and wildlife resources information, in the form of a baseline aquatic biological survey. This survey must be conducted by an appropriately qualified biologist. If you so request, a list of individuals and firms qualified to conduct aquatic assessments will be provided to you.

Prior to conducting the survey, the applicant must submit a study plan addressing the components of a baseline survey. The study plan will be reviewed by the Division and the KDFWR to determine if it is sufficient to assess the proposed environmental impact. The study plan must be approved prior to the initiation of fieldwork. The study plan must include the following items:

1. **General Description of Study Area:** Identify the stream, major drainage and sub-basin, county and quadrangle name, and location of the stream in off-setting color on a USGS 7.5 minute topographic map.

2. **Detailed Description of Study Area:** Describe the riparian vegetation, canopy coverage, location and types of discharge into the stream, drainage area of the stream, pool to riffle ratio, and run to bend ratio at each sampling site.

3. **Sample Site Locations:** For each sampling site, describe substrate, depth, width, average annual discharge, and stream order. Use the habitat data sheets found in "Methods for Assessing Biological Integrity of Surface Waters in Kentucky" (KDOW 2002)*

4. **Fieldwork dates:** Submit tentative dates for sample collection and state stream flow conditions when sampling will be initiated. The applicant is encouraged to conduct the aquatic sampling during the spring index period (mid Feb.-early June).

5. **Sampling Methodology and Reporting:** DSMRE strongly recommends using the procedures outlined in "Methods for Assessing Biological Integrity of Surface Waters in Kentucky" (KDOW 2002). DSMRE will require the applicant to include the core suite of metrics for the presentation of data, as outlined in the KDOW –SOP manual. For reporting fish community data, follow the DOW's Reference Reach Fish Community Report (1997) for IBI calculations. At a minimum, physiochemical data must include air and water temperature, dissolved oxygen, specific conductance, pH, and turbidity. Provide a quality assurance plan for the sampling and laboratory analyses.

6. **Professional Staff:** Identify all professional biologists who will be perforrriing the survey work and laboratory analyses.

The applicant must submit two (2) copies of the required study plan and two (2) copies of the subsequent survey report to the following address: Critical Resources Review Section, Division of Mine Permits, Department of Natural Resources, No. 2 Hudson Hollow, Frankfort, KY 40601.

*** This document can be obtained on the KDOW web site**

ATTACHMENT 14.4.A (1)

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR NATURAL RESOURCES

Ernie Fletcher
Governor

Division of Mine Permits
2 Hudson Hollow
Frankfort, Kentucky 40601
Phone (502) 564-2320
Fax (502) 564-6764
www.minepermits.ky.gov

Teresa J. Hill
Secretary

Susan C. Bush
Commissioner

September 4, 2007

DON ROBERTS
LOGOS ENGINEERING
PO BOX 350
MANCHESTER KY 40962

RE: Nally & Hamilton Enterprises, Inc.
Application # 807-0355, NW

Dear Mr. Roberts:

The Division of Mine Permits notified your office, by letter dated May 21, 2007, that an aquatic surveyof the UT of Blacksnake Branch was required for the above referenced permit application. Biological Systems Consultants, Inc., submitted additional information and current photographs of the stream on August 31, 2007. The current condition of the stream is that it is completely dry with no flowing water. The consultant requested a reevaluation of the aquatic survey requirement. Based upon the additional information submitted, the Critical Resources Review Section has determined that the survey is not warranted.

A copy of this letter must be included in the application as an attachment to Item 14.4. If you have any questions, please contact, Nashisha Henderson, staff biologist, Critical Resources Review Section at (502) 564-2320.

Sincerely,

Susan Wind, Supervisor
Critical Resources Review Section/
Small Operator Assistance Program
Division of Mine Permits

c: Nashisha Henderson (e)
Mike Hardin, KDFWR
Lee Andrews, USFWS
Permit File Mike Overturf (e)

ATTACHMENT 14.5.A

There are no wetland areas, important fish and wildlife species, critical habitat of such species, or other protected by state or federal law found within or near the vicinity of the proposed mining area. Therefore, no specific measures will be necessary for unrequired protection.

15. Geologic Information

15.1 Provide the information requested below concerning the coal seam(s) to be mined:

USGS Name	Thickness (inches)	% Total Sulfur	% Pyrite Sulfur	Elevation
Harlan	48 avg.	0.53 avg.	<1%	1920-2000
KelliokaZone	46-48 avg.	0.50 avg.	<1%	2120-2160
Darby	24 avg.	0.49 avg.	<1%	2170-2210

15.2 Provide a description of the geology within the proposed permit area down to and including the stratum immediately below the lowest coal seam to be mined. The description shall include the structural geology, lithology, thickness and chemical characteristics of the overburden strata which will be removed and strata which may be impacted in areas overlying underground works. Include the results of the baseline geologic sampling program on cabinet approved forms and all appropriate drill logs, stratigraphic columns, cross-sections, geochemical lab results and other information on which the description is based. Submit description and related information as "Attachment 15.2.A, 15.2.B", etc.

See Attachments 15.2.A - 15.2.C (7)

15.3 Do aquifers exist within the proposed permit area below the lowest coal seam to be mined, which may be adversely affected by the mining operation? ☐ YES ☒ NO. If "YES", describe the structural geology, lithology and thickness of each stratum from the lowest coal seam to be mined to such aquifers. Submit description and related information as "Attachment 15.3.A".

15.4 Describe all aquifers located within and adjacent to the proposed permit area which the mining operation may adversely impact. Identify the description as "Attachment 15.4.A". At a minimum, the description shall include, for each aquifer, the following information:

Aquifers within the permit area

(a) aquifer identification,
(b) top elevation,
(c) lithology,
(d) thickness,
(e) areal extent,
(f) number of users, and
(g) structural geology

Aquifers adjacent to the permit area

(a) approximate areal extent
(b) approximate thickness
(c) aquifer identification, and
(d) number of users

Correlate this information with the cross-section required in item 15.2.

None

15.5 Provide, as "Attachment 15.5.A", a volume weighted acid-base account of all overburden strata to be removed by the proposed mining operation.

See Attachment 15.5.A

15.6 Describe the sampling program used for the collection of premining geologic data within the proposed permit area. The description shall identify: (a) method of sample collection: (b) vertical sampling frequency; (c) parameters tested; (d) laboratory methods used, and (e) name of laboratory. Submit the description as "Attachment 15.6.A".

See Attachment 15.6.A

15.7 Provide the following information for each geologic sampling location.

Site No.	Type (core, rotary, etc.)	Surface Elevation	Total Depth	Latitude	Longitude
C-1	core	2302	393'	36°45'21"	83°31'24"
C-3	core	2308	398'	36°44'37"	83°31'11"
C-4	core	2301	311'	36°44'37"	83°30'38"

NOTE: Show the location of each geologic sampling site on the ERI Map.

ATTACHMENT 15.2.A

The analysis of the geology of the area begins with the consideration of the strata data collection point. The locations, as shown on the maps, were chosen to best depict characteristics of stratigraphy in the vicinity. Types and description detail of each are given in item 15.2.

Of the strata sampled, geochemical analysis of all non-acid producers less than one foot thick were grouped with the next lower strata. Each strata ranging in thickness from one to five feet were sampled at one location within the lithologic unit. Those strata found to range between five and ten feet in thickness were sampled twice at equal intervals within the units. One sample was taken for every five foot interval of strata along the core.

Samples were analyzed for neutralization potential and potential acidity. Lab analysis conducted by Kentucky Resource Labs follow procedures outlined in the E.P.A. publication, "Field and Laboratory Methods Applicable to Overburdens and Minesoils", (KPA-600/2-78-054). The neutralization potential analysis were conducted by the hydrochloric acid method found in the application.

807-0355

ATTACHMENT 15.2

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 15.2.A (1)- 15.2.A (7) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Sester
NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

ATTACHMENT 15.2.A (1) **GEOLOGICAL INFORMATION FORM** 807-0355

(Please print or type all responses)

1. Quadrangle Name: Balkan and Varilla

2. Latitude: 36°45'21"

3. Longitude: 83°31'24"

4. UTM Zone (Eastern Kentucky = 17, Western Kentucky = 16): 17

5. UTM Easting coordinate:

6. UTM Northing coordinate:

7. Quadrangle Scale: 1
   1/24,000 = 1; 1/62,500 = 2; 1/125,000 = 3; Other = 4 – Explain

8. State Identification Code Number: 21
   (Use Federal Information Processing Standards Code (FIPS). The FIPS number for Kentucky is 21; additional surrounding states may be found on the last page of this form.)

9. County Code Number (refer to county number list on the last page of this form): 7

10. Coal Company Name: Nally & Hamilton Enterprises, Inc.

11. Operator's Name: Hamilton (Last), Thomas (First), R. (M.I.)

12. Permit Number: 807-0342

13. SOAP Identification Number: N/A

14. Hole Number: C-1

15. Date (month, day, year): 11/11/05

16. Driller's Name: Taylor (Last), Marvin (First), (M.I.)

17. Type of Sample: 5
    Core = 5; Chip = 6; Auger = 7; Geophysical log = 8;
    Highwall = 9; Other = 10 – Explain

18. Top of hole elevation (round to nearest unit of measurement and indicate units used*): 2303

19. Top of hole determination: T
    (Barometer = B; Survey = S; Hand Level = H; Topo = T;
    Other = O – Explain)

20. Cumulative thickness of the sample (round to nearest unit of measurement and indicate units used*): 393'

21. Name of geologist or engineer responsible for preparing this form (last, first, middle initial and title)

Quadrangle	UTM Zone	UTM E	UTM N

ATTACHMENT 15.2.A (1) (a)

Geological Information Sheet
(Please Print or Type)

Hole Number C1-111 UTM Zone | | | Quadrangle Balkan and Varilla

Latitude 13161415121/1 UTM E Coordinate | | | | | | |

Longitude 18131311214 UTM N Coordinate | | | | | | | |

Driller _____ Date | | | | | | |
Last First MI

Type - Core____ Chip____ Highwall____ Auger____ G-log____ Other____

Unit of Measurement - Feet & Inches____ Feet & Tenths____ Metric____

Drillers Log Sheet
(Please Print or Type)

Page____ of ____ pages

	Rock Code	Unit Thickness	Cumulative Thickness	N.P. (+)	P.A. (-)	Comments
1	001	3.0	3.0	20.9	0.9	SOIL
2	564	66.0	69.0	18.4	0.1	MASS. SANDSTONE
3	543	15.0	84.0	15.4	0.2	GR. SS W/SHALE STR.
4	334	24.0	108.0	4.7	0.9	GRAY/GN. SANDY SHALE
5	020	2.0	110.0	—	—	COAL (DARBY)
6	134	7.0	117.0	4.1	0.4	GRAY/GREEN SHALE
7	334	16.0	133.0	6.6	0.5	GRAY/GN. SANDY SHALE
8	124	13.0	146.0	4.9	0.7	DK. GRAY SHALE
9	020	1.0	147.0	—	—	COAL (KELLIOKA RIDER)
10	124	7.0	154.0	5.2	0.6	DK. GRAY SHALE
11	334	6.0	160.0	8.4	0.7	GRAY/GN. SANDY SHALE
12	564	11.0	171.0	13.7	0.2	MASS. SANDSTONE
13	134	8.0	179.0	6.3	0.7	GRAY/GREEN SHALE
14	020	3.0	182.0	—	—	COAL (KELLIOKA)
15	134	15.0	197.0	7.1	0.5	GRAY/GREEN SHALE
16	564	34.0	231.0	16.9	0.2	MASS. SANDSTONE
17	134	22.0	253.0	5.5	0.6	GRAY/GREEN SHALE
18	543	48.0	301.0	14.0	0.1	GR. SS W/SHALE STR.
19	134	23.0	324.0	4.9	0.7	GRAY/GREEN SHALE
20	564	42.0	366.0	17.1	0.3	MASS. SANDSTONE
21	124	13.0	379.0	6.4	0.5	DK. GRAY SHALE
22	020	4.0	383.0	—	—	COAL (HARLAN)
23	134	10.0	393.0	4.7	0.4	GRAY/GREEN SHALE

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole # 001

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
1	20.9	0.9		
2	18.4	0.1		
3	15.4	0.2		
4	4.7	0.9		
5				0.51
6	4.1	0.4		
7	6.6	0.5		
8	4.9	0.7		
9				0.61
10	5.2	0.6		
11	8.4	0.7		
12	13.7	0.2		
13	6.3	0.7		
14				0.52
15	7.1	0.5		
16	16.9	0.2		
17	5.5	0.6		
18	14.0	0.1		
19	4.9	0.7		
20	17.1	0.3		
21				

Submitted By: Eddie Hamilton

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole # 001

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
21	6.4	0.5		
22				0.55
23	4.7	0.4		
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
21				

Submitted By: Edwin J. Nally

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole 001 Sample # 2

==========

Slake Durability **91.6%**

Submitted By:

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2Hole 001 Sample # 3

==========

Slake Durability **91.2%**

Submitted By: Eddie Mankin

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole 001 Sample # 12

==========

Slake Durability **91.8%**

Submitted By: Gabbie Hamilton

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole 001 Sample # 16

==========

Slake Durability **92.1%**

Submitted By: Eddie Nally

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole 001 Sample # 18

==========

Slake Durability **91.7%**

Submitted By: Eddie Hamilton

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit Balkan # 2 Hole 001 Sample # 20

==========

Slake Durability **92.6%**

Submitted By: Eddie Hamilton

807-0355

ATTACHMENT 15.2.B

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 15.2.B - 15.2.B (6) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Sexton

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

ATTACHMENT 15.2.B

GEOLOGICAL INFORMATION FORM

807-0355

(Please print or type all responses)

1. Quadrangle Name: Balkan and Varilla

2. Latitude: 36°44'37"

3. Longitude: 83°31'11"

4. UTM Zone (Eastern Kentucky = 17, Western Kentucky = 16): 17

5. UTM Easting coordinate:

6. UTM Northing coordinate:

7. Quadrangle Scale: 1
   1/24,000 = 1; 1/62,500 = 2; 1/125,000 = 3; Other = 4 – Explain:

8. State Identification Code Number: 21
   (Use Federal Information Processing Standards Code (FIPS). The FIPS number for Kentucky is 21; additional surrounding states may be found on the last page of this form.)

9. County Code Number (refer to county number list on the last page of this form): 7

10. Coal Company Name: Nally & Hamilton Enterprises, Inc.

11. Operator's Name: Hamilton (Last), Thomas (First), R. (M.I.)

12. Permit Number: 807-0342

13. SOAP Identification Number: N/A

14. Hole Number: C-3

15. Date (month, day, year): 11/11/05

16. Driller's Name: Taylor (Last), Marvin (First), (M.I.)

17. Type of Sample: 5
    Core = 5; Chip = 6; Auger = 7; Geophysical log = 8;
    Highwall = 9; Other = 10 – Explain:

18. Top of hole elevation (round to nearest unit of measurement and indicate units used*): 2308

19. Top of hole determination: T
    (Barometer = B; Survey = S; Hand Level = H; Topo = T;
    Other = O – Explain)

20. Cumulative thickness of the sample (round to nearest unit of measurement and indicate units used*): 398'

21. Name of geologist or engineer responsible for preparing this form (last, first, middle initial and title)

Quadrangle	UTM Zone	UTM E	UTM N

ATTACHMENT 15.2.B (1)

807-0355

Geological Information Sheet
(Please Print or Type)

Hole Number C1-131 UTM Zone ||| Quadrangle Balkan and Varilla

Latitude 13161414131711 UTM E Coordinate |||||||

Longitude 18131311111() UTM N Coordinate |||||||

Driller _____ Date |||||||
Last First MI

Type - Core____ Chip____ Highwall____ Auger____ G-log____ Other____

Unit of Measurement - Feet & Inches____ Feet & Tenths____ Metric____

Drillers Log Sheet
(Please Print or Type)

Page ____ of ____ pages

	Rock Code	Unit Thickness	Cumulative Thickness	N.P. (+)	P.A. (-)	Comments	
1	001	4.0	4.0	21.7	0.8	SOIL	
2	334	5.0	9.0	9.2	0.6	GRAY/GN. SANDY SHALE	X
3	564	47.0	56.0	13.8	0.4	MASS. SANDSTONE	—
4	124	2.0	58.0	8.4	0.6	DK. GRAY SHALE	O
5	334	12.0	70.0	5.9	0.4	GRAY/GN. SANDY SHALE	X
6	124	3.0	73.0	4.7	0.7	DK. GRAY SHALE	O
7	020	2.0	75.0			COAL (DARBY)	
8	134	9.0	84.0	4.0	0.5	GRAY/GREEN SHALE	O
9	334	14.0	98.0	9.1	0.7	GRAY/GN. SANDY SHALE	X
10	124	20.0	118.0	6.4	0.3	DK. GRAY SHALE	O
11	020	1.0	119.0			COAL (KELL. RIDER)	
12	124	9.0	128.0	7.2	0.7	DK. GRAY SHALE	O
13	334	7.0	135.0	9.4	0.5	GRAY/GN. SANDY SHALE	X
14	564	10.0	142.0	15.6	0.3	MASS. SANDSTONE	—
15	134	6.0	148.0	4.9	0.6	GRAY/GREEN SHALE	O
16	020	3.0	151.0			COAL (KELLIOKA)	
17	134	21.0	172.0	9.4	0.9	GRAY/GREEN SHALE	O
18	564	46.0	218.0	14.6	0.3	MASS. SANDSTONE	—
19	134	29.0	247.0	7.7	0.6	GRAY/GREEN SHALE	O
20	543	55.0	302.0	12.2	0.4	GR. SS W/SHALE STR.	X
21	134	36.0	338.0	4.9	0.7	GRAY/GREEN SHALE	O
22	564	24.0	362.0	16.6	0.4	MASS. SANDSTONE	—
23	124	22.0	384.0	5.9	0.5	DK. GRAY SHALE	O
24	020	4.0	388.0	—	—	COAL (HARLAN)	
25	134	10.0	398.0	6.9	0.8	GRAY/GREEN SHALE	

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole # 003

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
1	21.7	0.8		
2	9.2	0.6		
3	13.8	0.4		
4	8.4	0.6		
5	5.9	0.4		
6	4.7	0.7		
7				0.49
8	4.0	0.5		
9	9.1	0.7		
10	6.4	0.3		
11				0.52
12	7.2	0.7		
13	9.4	0.5		
14	15.6	0.3		
15	4.9	0.6		
16				0.47
17	9.4	0.9		
18	14.6	0.3		
19	7.7	0.6		
20	12.2	0.4		

Submitted By: Eddie Mahaffey

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole # 003

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
21	4.9	0.7		
22	16.6	0.4		
23	5.9	0.5		
24				0.47
25	6.9	0.8		
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
21				

Submitted By: Eddie Hamilton

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 003 Sample # 3

==========

Slake Durability **90.8%**

Submitted By: Eddie Markham

807-0355

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 003 Sample # 14

==========

Slake Durability **91.5%**

Submitted By: Eddie Marshall

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 003 Sample # 18

==========

Slake Durability **91.7%**

Submitted By: Eddie Marshall

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 003 Sample # 20

==========

Slake Durability **91.8%**

Submitted By: Eddie Hamilton

807-0355

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 003 Sample # 22

==========

Slake Durability **91.3%**

Submitted By: Eddie Newkirk

807-0355

ATTACHMENT 15.2.C

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 15.2.C (1)- 15.2.A (11) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Sexton

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

ATTACHMENT 15.2.C.(1) **GEOLOGICAL INFORMATION FORM** 807-0355

(Please print or type all responses)

1. Quadrangle Name: Balkan and Varilla

2. Latitude: 36°44'13"

3. Longitude: 83°30'38"

4. UTM Zone (Eastern Kentucky = 17, Western Kentucky = 16): 17

5. UTM Easting coordinate:

6. UTM Northing coordinate:

7. Quadrangle Scale: 1
   1/24,000 = 1; 1/62,500 = 2; 1/125,000 = 3; Other = 4 – Explain

8. State Identification Code Number: 21
   (Use Federal Information Processing Standards Code (FIPS). The FIPS number for Kentucky is 21; additional surrounding states may be found on the last page of this form.)

9. County Code Number (refer to county number list on the last page of this form): 7

10. Coal Company Name: Nally & Hamilton Enterprises, Inc.

11. Operator's Name: Hamilton (Last), Thomas (First), R. (M.I.)

12. Permit Number: 807-0342

13. SOAP Identification Number: N/A

14. Hole Number: C-4

15. Date (month, day, year): 11/11/05

16. Driller's Name: Taylor (Last), Marvin (First), (M.I.)

17. Type of Sample: 5
    Core = 5; Chip = 6; Auger = 7; Geophysical log = 8;
    Highwall = 9; Other = 10 – Explain

18. Top of hole elevation (round to nearest unit of measurement and indicate units used*): 2301

19. Top of hole determination: T
    (Barometer = B; Survey = S; Hand Level = H; Topo = T;
    Other = O – Explain)

20. Cumulative thickness of the sample (round to nearest unit of measurement and indicate units used*): 311'

21. Name of geologist or engineer responsible for preparing this form (last, first, middle initial and title)

Quadrangle	UTM Zone	UTM E	UTM N

807-0355

ATTACHMENT 15.2.C (2)

Geological Information Sheet
(Please Print or Type)

Hole Number CI-141 UTM Zone 111 Quadrangle Balkan and Varilla

Latitude 13616141411131 UTM E Coordinate 1111111

Longitude 18131310131811 UTM N Coordinate 11111111

Driller _____ Date 1111111
Last First MI

Type - Core____Chip____Highwall____Auger____G-log____Other____

Unit of Measurement - Feet & Inches____Feet & Tenths____Metric____

Drillers Log Sheet
(Please Print or Type)

Page ____ of ____ pages

	Rock Code	Unit Thickness	Cumulative Thickness	N.P. (+)	P.A. (-)	Comments	
1	001	3.0	3.0	22.7	0.6	SOIL	
2	564	39.0	42.0	20.1	0.1	MASS. SANDSTONE	—
3	543	17.0	59.0	13.2	0.4	GR. SS W/SHALE STR.	O
4	334	20.0	79.0	19.2	0.5	GRAY/GN. SANDY SHALE	X
5	020	2.0	81.0			COAL (DARBY)	
6	134	9.0	90.0	8.6	0.5	GRAY/GREEN SHALE	X
7	334	13.0	103.0	9.7	0.7	GRAY/GN. SANDY SHALE	O
8	124	6.0	109.0	4.7	0.4	DK. GRAY SHALE	X
9	020	1.0	110.0			COAL (KEL. RIDER)	
10	124	4.0	114.0	4.2	0.7	DK. GRAY SHALE	X
11	334	6.0	120.0	9.6	0.5	GRAY/GN. SANDY SHALE	O
12	564	11.0	131.0	12.7	0.5	MASS. SANDSTONE	—
13	134	7.0	138.0	4.7	0.8	GRAY/GREEN SHALE	X
14	020	3.0	141.0			COAL (KELLIOKA)	
15	134	9.0	150.0	10.0	0.4	GRAY/GREEN SHALE	X
16	564	22.0	172.0	17.1	0.4	MASS. SANDSTONE	—
17	134	17.0	189.0	5.2	0.5	GRAY/GREEN SHALE	X
18	543	35.0	224.0	11.2	0.4	GR. SS W/SHALE STR.	O
19	134	21.0	245.0	5.1	0.5	GRAY/GREEN SHALE	X
20	564	33.0	278.0	14.4	0.4	MASS. SANDSTONE	—
21	124	19.0	297.0	6.0	0.9	DK GRAY SHALE	X
22	020	4.0	301.0			COAL (HARLAN)	
23	134	10.0	311.0	7.6	0.6	GRAY/GREEN SHALE	

807-0355

ATTACHMENT 15.2.C (3)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole # 004

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
1	22.7	0.6		
2	20.1	0.1		
3	13.2	0.4		
4	9.2	0.5		
5				0.44
6	8.6	0.5		
7	9.7	0.7		
8	4.7	0.4		
9				0.54
10	4.2	0.7		
11	9.6	0.5		
12	12.7	0.5		
13	4.7	0.8		
14				0.42
15	10.0	0.4		
16	17.1	0.4		
17	5.2	0.5		
18	11.2	0.4		
19	5.1	0.5		
20	14.4	0.4		

Submitted By: Eddie Mathews

ATTACHMENT 15.2.C (4)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 15.2.C (1) (a) (1) - 15.2.C (7) are true and exact copies of the originals, this 15th day of November, 2006.

Bonda Sester

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

807-0355

ATTACHMENT 15.2.C (5)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole # 004

==========

Sample #	Neutralization Potential Tons CACO	Potential Acidity CACA	Pyritic Sulfur %	Total Sulfur %
21	6.0	0.9		
22				0.55
23	7.6	0.6		
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
21				

Submitted By: Eddie Marcellus

807-0355

ATTACHMENT 15.2.C (6)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 004 Sample # 2

==========

Slake Durability **91.6%**

Submitted By: Eddie Nally

807-0355

ATTACHMENT 15.2.C (7)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 004 Sample # 3

==========

Slake Durability **91.2%**

Submitted By: Eddie Mandallow

ATTACHMENT 15.2.C (8)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 004 Sample # 12

==========

Slake Durability **91.9%**

Submitted By: Eddie Nallan

807-0355

ATTACHMENT 15.2.C (9)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 004 Sample # 16

==========

Slake Durability **92.1%**

Submitted By: Eddie Mauldin

807-0355

ATTACHMENT 15.2.C (10)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: **Permit 807-0333 Hole 004 Sample # 18**

==========

Slake Durability **91.4%**

Submitted By: Eddie Manderbach

807-0355

ATTACHMENT 15.2.C (11)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

==========

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Permit 807-0333 Hole 004 Sample # 20

==========

Slake Durability **91.9%**

Submitted By: Eddie Mauldin

807-0355

ATTACHMENT 15.5A

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 15.5.B - 15.5.D are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Sester

NOTARY PUBLIC/STATE AT LARGE

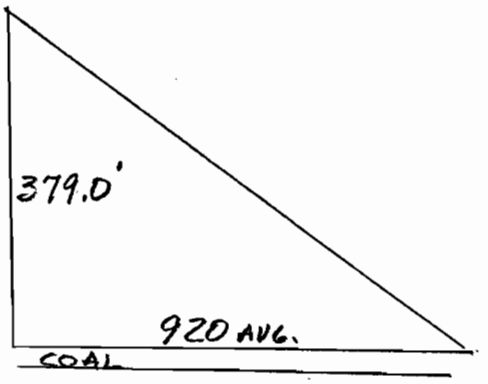
My Commission Expires: 10-16-2009

WEIGHTED ACID-BASE ACCOUNT

807-0355

ATTACHMENT 15.5.B SITE C-1

MPLE #	DEPTH	NET +/-	AREA
1	3.0	20.0	10.8
2	69.0	18.3	5707.4
3	84.0	15.2	2756.4
4	108.0	3.8	5534.4
5	110.0	—	523.6
6	117.0	3.7	1908.4
7	133.0	6.1	4804.2
8	146.0	4.2	4356.2
9	147.0	—	351.9
10	154.0	4.6	2530.6
11	160.0	7.7	2262.8
12	171.0	13.5	4373.0
13	179.0	5.6	3362.9
14	182.0	—	1300.7
15	197.0	6.6	6827.9
16	231.0	16.7	17477.6
17	253.0	4.9	12,788.7
18	301.0	13.9	31,938.2
19	324.0	4.2	17,265.0
20	366.0	16.8	52,071.3
21	379.0	5.9	11,632.1
			174,340



$$\text{OVERALL WEIGHTED NET +/-} = \frac{\Sigma \text{ NET +/- } \times \text{ AREA}}{\text{TOTAL AREA}}$$

$$= \frac{2188669.3}{174,340}$$

$$= +12.6$$

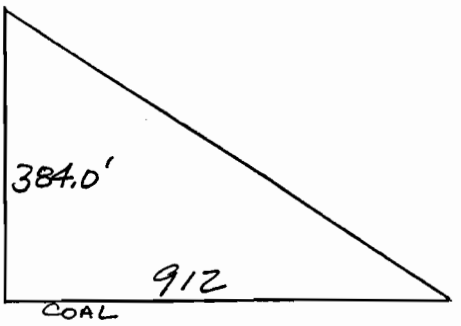
I, [signature] 12575 02/01/06
(signature) (registration no.) (date)
hereby certify in accordance with 405 KAR 7:040E, Section 10, that this document is prepared or determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

WEIGHTED ACID-BASE ACCOUNT

807-0355

ATTACHMENT 15.5.C SITE C-3

SAMPLE #	DEPTH	NET +/-	AREA
1	4.0	20.9	19.0
2	9.0	8.6	77.2
3	56.0	13.4	3627.8
4	58.0	7.8	270.8
5	70.0	5.5	1824.0
6	73.0	4.0	509.4
7	75.0	—	351.5
8	84.0	3.5	1699.3
9	98.0	8.4	3025.7
10	118.0	6.1	5130.6
11	119.0	—	281.4
12	128.0	6.5	2639.8
13	135.0	8.9	2186.2
14	142.0	15.3	2302.6
15	148.0	4.3	2056.2
16	151.0	—	1065.2
17	172.0	8.5	8054.8
18	218.0	14.3	21,303.8
19	247.0	7.1	16,013.4
20	302.0	11.8	35,856.5
21	338.0	4.2	27,360.0
22	362.0	16.2	19,950.0
23	384.0	5.4	19,489.2
			175,104



$$\text{OVERALL WEIGHTED NET +/-} = \frac{\Sigma \text{ NET +/- X AREA}}{\text{TOTAL AREA}}$$

$$= \frac{1,660,498.4}{175,104}$$

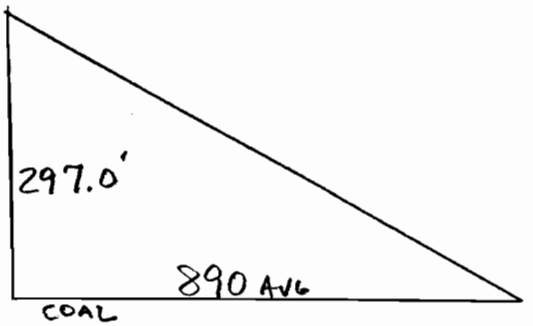
$$= +9.5$$

I, [signature] 12575 (registration no.) 08/01/06 (date), hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

WEIGHTED AKD-BASE ACCOUNT 807-0355

ATTACHMENT 15 5.D SITE C-4

SAMPLE #	DEPTH	NET +/-	AREA
1	3.0	22.1	13.4
2	42.0	20.0	2629.5
3	59.0	12.8	2572.6
4	79.0	8.7	4135.3
5	81.0	—	479.5
6	90.0	8.1	2305.9
7	103.0	9.0	3452.1
8	109.0	4.3	2213.0
9	110.0	—	328.1
10	114.0	3.5	1342.5
11	120.0	9.1	2103.6
12	131.0	12.2	4136.8
13	138.0	3.9	2821.3
14	141.0	—	1254.1
15	150.0	9.6	3924.1
16	172.0	16.7	10,614.1
17	189.0	4.7	9195.2
18	224.0	10.8	21,658.2
19	245.0	4.6	14,756.9
20	278.0	14.0	25,859.4
21	297.0	5.1	16,369.1
			132,165.0



$$\text{OVERALL WEIGHTED NET +/-} = \frac{\Sigma \text{NET +/-} \times \text{AREA}}{\text{TOTAL AREA}}$$

$$= \frac{1,525,741.4}{132,165}$$

$$= +11.5$$

I, [signature], 12553, 08/01/06
(signature) (registration no.) (date)
hereby certify in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 15.6.A

The analysis of the geology of the area begins with the consideration of the strata data collection points. The locations, as shown on the map, were chosen to best depict characteristics of stratigraphy in the vicinity. Types and description detail of each are given at item 15.7.

Of the strata sampled, geochemical analysis of all non-acid producers less than one foot thick were grouped with the next lower strata. Each strata ranging in thickness from one to five feet were sampled at one location within the litho logic unit. Those strata found to range between five and ten feet in thickness were sampled twice at equal intervals within the units. One sample was taken for every five foot interval of strata along the core.

Samples were analyzed for neutralization potential and potential acidity. Lab analysis conducted by Kentucky Resource Labs follow procedures outlined in the E.P.A. publication, "Field and Laboratory Methods Applicable to Overburden and Mine Soils", (KPS-600/2-78-054). The neutralization potential analysis was conducted by the hydrochloric acid method found in the application.

16. Ground Water

16.1 Provide the results of the ground water inventory conducted for the proposed permit and adjacent areas. The inventory shall identify wells, springs, underground mines or other similar ground water supply facilities which are currently being used, have been used in the past, or have a potential to be used. For each supply source, describe the location, ownership, type of use and where possible other relevant information such as the depths and diameters of wells, approximate rate of usage, pumpage or discharge. Provide results as "Attachment 16.1.A".

See Attachment 16.1.A

16.2 Describe the premining ground water monitoring program used to determine the seasonal variations in ground water quality and quantity for all aquifers and water transmitting zones. At a minimum, six months of data shall be collected. The description shall identify the location and construction specifications of each monitoring point used, parameters tested, and laboratory methods used. Submit the description as "Attachment 16.2.A".

See Attachment 16.2.A

16.3 On approved cabinet forms submit the results of the premining ground water monitoring program. Original or notarized copies of all laboratory analyses shall be provided. Submit this information as "Attachment 16.3.A".

See Attachment 16.3.A - 16.3.E (8)

17. Surface Water Information

Major Watershed(s) Affected:

- ☐ Big Sandy River (BS)
- ☒ Cumberland River, Upper (CU)
- ☐ Cumberland River, Lower (CL)
- ☐ Green River (GR)
- ☐ Kentucky River (KY)
- ☐ Licking River (LC)
- ☐ Little Sandy River (LS)
- ☐ Mississippi River (MS)
- ☐ Ohio River (OH)
- ☐ Salt River (ST)
- ☐ Tennessee River (TN)
- ☐ Tradewater River (TW)
- ☐ Tygarts Creek (TG)

17.1 Identify on the environmental resources map and provide a narrative description of the immediate watershed(s) receiving discharge from the proposed permit area. Describe any existing facilities or conditions within the watershed(s) (e.g. existing mining operations, abandoned surface or underground mines, logging operations, oil or gas exploration sites or wells, etc.) which may contribute to surface water pollution. Provide the description as "Attachment 17.2.A". On the ERI map, indicate the location of any existing discharges resulting from such facilities or activities.

See Attachment 17.1.A

17.2 Provide as "Attachment 17.3.A", the results of the surface water user inventory for the proposed permit and adjacent areas. This inventory shall identify the name of the surface water boundary being used as a water supply source, the location, drainage area, ownership, type of usage, and where possible, other relevant information such as the rate of withdrawal and seasonal variation.

There are no known surface water users in the vicinity of the proposed permit.

17.3 Describe the premining surface water monitoring program used to determine the seasonal variations in surface water quality and quantity. At a minimum, six months of data shall be collected. The description shall identify the location of each monitoring point, parameters tested, and laboratory methods used. Submit the description as "Attachment 17.4.A".

See Attachment 17.3.A

ATTACHMENT 16.2.A

Monitoring of ground waters has been conducted at the location noted on the enlarged maps. This point was chosen to best reflect changes in quantities and qualities of the aquifer described at item 15.4.

Six months of data from the monitoring station has been collected to properly address seasonal variations affecting flows. Laboratory reports provide a base for comparison of premining water to during mining and post-mining conditions.

As can be seen from these reports, samples collected were tested for pH, alkalinity, acidity, conductivity, sulfate, dissolved iron, and dissolved manganese. All laboratory procedures were in accordance with required methods prescribed by E.P.A.

Additional information on ground water monitoring is given in the hydrologic consequences determination at item 18.1 regarding ground water.

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☐ Premining
☐ During Mining/Reclamation
☒ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: BC3 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☒ Well
☐ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): 1240

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 713.68

LATITUDE (DMS): 36°43'33.94" LONGITUDE (DMS): 83°32'56.25"

UTM ZONE: ____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS:

*Refer to coding Instructions for list of codes.

ATTACHMENT 16.3.A

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # BC3

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06				7.70	0	121.69	10	480	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	58		0.40		0.67		40			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/14/06				7.50	0	120.11	14	490	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	55		0.68		0.62		40			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/28/07				7.60	0	118.41	12	456	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	52		0.22		0.95		40			

COMMENT:

ATTACHMENT 16.3.A (1)

807-0355

807-0355

ATTACHMENT 16.3.A(1)(a)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 16.3.A (2) - 16.3.A (4) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Seaton

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC3
Lab# 16
Date Sampled: 09-26-2006
Date Analyzed: 09-26-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.70		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	121.69	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.40	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.67	Mg/L	
Total Suspended Solids	10	Mg/L	
Total Dissolved Solids	480	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	58	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	40	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC3
Lab# 16
Date Sampled: 12-14-2006
Date Analyzed: 12-14-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.50		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	120.11	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.68	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.62	Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	490	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	55	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	40	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC3
Lab# 16
Date Sampled: 02-28-2007
Date Analyzed: 02-28-2007
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.60		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	118.41	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.22	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.95	Mg/L	
Total Suspended Solids	12	Mg/L	
Total Dissolved Solids	456	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	52	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	40	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☐ Premining
☐ During Mining/Reclamation
☒ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: BC318 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☒ Well
☐ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): 1320

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 764.60

LATITUDE (DMS): 36°43'06.09" LONGITUDE (DMS): 83°32'02.87"

UTM ZONE: ____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: ____

*Refer to coding Instructions for list of codes.

ATTACHMENT 16.3.B

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # BC318

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06				8.40	0	120.55	11	490	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	70		0.36		0.90					

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/14/06				8.00	0	121.05	15	400	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	46		0.16		1.10					

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/28/07				8.20	0	121.92	14	466	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	64		0.32		0.94					

COMMENT:

ATTACHMENT 16.3.B (1)

807-0355

807-0355

ATTACHMENT 16.3.B (1) (a)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 16.3.B (2) - 16.3.B (4) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Lester

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC318
Lab# 16
Date Sampled: 09-26-2006
Date Analyzed: 09-26-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	8.40		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	120.55	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.36	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.90	Mg/L	
Total Suspended Solids	11	Mg/L	
Total Dissolved Solids	490	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	70	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

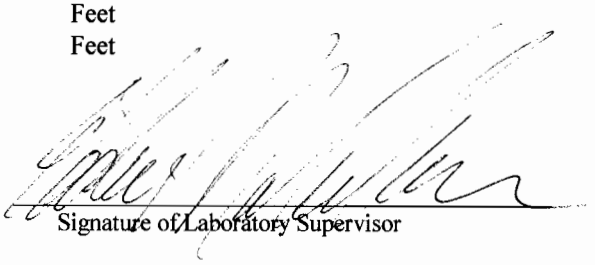
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC318
Lab# 16
Date Sampled: 12-14-2006
Date Analyzed: 12-14-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	8.00		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	121.05	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.16	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	1.10	Mg/L	
Total Suspended Solids	15	Mg/L	
Total Dissolved Solids	400	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	46	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.



Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC318
Lab# 16
Date Sampled: 02-28-2007
Date Analyzed: 02-28-2007
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	8.20		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	121.92	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.32	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.94	Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	466	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	64	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☐ Premining
☐ During Mining/Reclamation
☒ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: BC341 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☒ Well
☐ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): 1420

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 563.89

LATITUDE (DMS): 36°43'08.28" LONGITUDE (DMS): 83°30'47.84"

UTM ZONE: ____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: ____

*Refer to coding Instructions for list of codes.

ATTACHMENT 16.3.C

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # BC341

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06				6.80	0	100.55	13	455	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	47		0.98		0.20		25			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/14/06				6.60	0	90.11	10	418	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	59		1.40		0.75		25			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/28/07				6.50	0	102.18	14	410	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	40		1.05		0.37		25			

COMMENT:

ATTACHMENT 16.3.C (1)

807-0355

807-0355

ATTACHMENT 16.3.C (1) (a)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 16.3.C (2) - 16.3.C (4) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Sester

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC341
Lab# I6
Date Sampled: 09-26-2006
Date Analyzed: 09-26-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	6.80		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	100.55	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	0.98	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.20	Mg/L	
Total Suspended Solids	13	Mg/L	
Total Dissolved Solids	455	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	47	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	25	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC341
Lab# 16
Date Sampled: 12-14-2006
Date Analyzed: 12-14-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	6.60		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	90.11	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	1.40	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.75	Mg/L	
Total Suspended Solids	10	Mg/L	
Total Dissolved Solids	418	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	59	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	25	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 BC341
Lab# 16
Date Sampled: 02-28-2007
Date Analyzed: 02-28-2007
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	6.50		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	102.18	Mg/L	treatment
Total Iron		Mg/L	
Dissolved Iron	1.05	Mg/L	
Total Manganese		Mg/L	
Dissolved Manganese	0.37	Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	410	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	40	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)		GPM	
Flow Rate (Cfs)		CFS	
Depth to Water	25	Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

807-0355

I, Brenda Sester, hereby certify that Attachments 16.3.D (3) – 16.3.D (8) are true and exact copies of the original documents.

Brenda Sester My Commission Expires: 10-16-2009.

Date: 06-25-07.

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-8056, A. 01 STATION#: G-3 SOAP PERMITTEE#: N/A

*COUNTY#: Bell *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☒ Well
☐ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): 50 CASING DIAMETER (in.): 6" AQUIFER DESCRIPTION: Stress Relief Fracturing
TOP OF AQUIFER (MSL): Unknown AQUIFER THICKNESS (ft.): 100+ TOP OF WELL ELEVATION (MSL): 1210

WATERSHED DESCRIPTION: Sloping Forest Land, Previous Mining DRAINAGE AREA (acres): 166

LATITUDE (DMS): 36°44'39.2" LONGITUDE (DMS): 83°33'24"

UTM ZONE: _____ 16 West of 84° Longitude
17 East of 84° Longitude
UTM EASTING: _____ UTM NORTHING: _____

LOCAL STREAM NAME: Hen Wilder

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Kentucky Resource Lab

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: _____

Refer to coding Instructions for list of codes.

ATTACHMENT 16.3.D

807-0355

Revision Date: 06/15/2003

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-8056 STATION # G-3

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/02/05	56°	------	380	6.5	0	156	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	96	----	0.26	----	0.2	---	13'			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	10/05/05	56°	--------	346	6.6	0	180	-----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	84	----	0.18	--------	0.22	----	15'			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	11/11/05	54°	--------	396	6.7	0	125	------	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	80	----	0.18	--------	0.2	-------	12.6'			

COMMENT:

ATTACHMENT 16.3.D (1)

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-8056 STATION # G-3

Sample No. [4]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/15/05	53°	------	375	6.9	0	180	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	82	----	0.2	----	0.18	---	14.4'			

COMMENT:

Sample No. [5]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	01/12/06	53°	--------	388	6.8	0	180	-----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	90	----	0.24	--------	0.08	----	13.0'			

COMMENT:

Sample No. [6]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/20/06	52°	--------	420	6.5	0	180	------	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	92	----	0.2	--------	0.46	-------	15'			

COMMENT:

ATTACHMENT 16.3.D (2)

807-0355

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 09/02/05

Job I.D.: Whipple Tipple/G-3
Temperature: 56°
Depth to Water: 13'

Parameter	Results
pH	6.5
Alkalinity	156 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.26 mg/l
Dissolved Manganese	0.2 mg/l
Sulfate	96 mg/l
Specific Conductance	380 umhos/cm

Signed: Woodrow Avery

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS

GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 10/05/05

Job I.D.: Whipple Tipple/G-3
Temperature: 56°
Depth to Water: 15'

Parameter	Results
pH	6.6
Alkalinity	180 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.18 mg/l
Dissolved Manganese	0.22 mg/l
Sulfate	84 mg/l
Specific Conductance	346 umhos/cm

Signed: Woodson Asm

ATTACHMENT 16.3. D (5)

807-0355

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS

GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 11/11/05

Job I.D.: Whipple Tipple/G-3
Temperature: 54°
Depth to Water: 12.6'

Parameter	Results
pH	6.7
Alkalinity	125 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.18 mg/l
Dissolved Manganese	0.2 mg/l
Sulfate	80 mg/l
Specific Conductance	396 umhos/cm

Signed: Woodson Allen

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 12/15/05

Job I.D.: Whipple Tipple/G-3
Temperature: 53°
Depth to Water: 14.4'

Parameter	Results
pH	6.9
Alkalinity	180 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.2 mg/l
Dissolved Manganese	0.18 mg/l
Sulfate	82 mg/l
Specific Conductance	375 umhos/cm

Signed: Woodrow Flora

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS

GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 01/12/06

Job I.D.: Whipple Tipple/G-3
Temperature: 53°
Depth to Water: 13.0'

Parameter	Results
pH	6.8
Alkalinity	180 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.24 mg/l
Dissolved Manganese	0.08 mg/l
Sulfate	90 mg/l
Specific Conductance	388 umhos/cm

Signed: Woodson Allen

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUNDWATER

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056, A. 01
County: Bell
Sampled by: Lab
Date: 02/20/06
Job I.D.: Whipple Tipple/G-3
Temperature: 52°
Depth to Water: 15'

Parameter	Results
pH	6.5
Alkalinity	180 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Dissolved Iron	0.2 mg/l
Dissolved Manganese	0.46 mg/l
Sulfate	92 mg/l
Specific Conductance	420. umhos/cm

Signed: [signature]

807-0355

I, Brenda Sester, hereby certify that Attachments 16.3.E (3) – 16.3.E (8) are true and exact copies of the original documents.

Brenda Sester My Commission Expires: 10-16-2009.

Date: 06-25-07.

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-0353 STATION#: BC322 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☒ Well
☐ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): 50.5 CASING DIAMETER (in.): 6 AQUIFER DESCRIPTION: Fracture Flow
TOP OF AQUIFER (MSL): AQUIFER THICKNESS (ft.): TOP OF WELL ELEVATION (MSL):

WATERSHED DESCRIPTION: DRAINAGE AREA (acres):

LATITUDE (DMS): 36°45'35" LONGITUDE (DMS): 83°33'11"

UTM ZONE: 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: UTM NORTHING:

LOCAL STREAM NAME: Tom Fork

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Kentucky Resource Lab

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS:

*Refer to coding Instructions for list of codes.

ATTACHMENT 16.3.E

Revision Date: 06/15/2003

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0353 STATION # BC322

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06	49	----	360	8.20	0	115.10	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	46	----	0.89	----	0.47	----	10.6			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	10/16/06	48	----	365	8.2	0	114	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	46	----	0.87	----	0.45	----	10.5			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	11/15/06	50	----	367	7.9	0	115	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	40	----	0.89	----	0.42	----	10.5			

COMMENT:

ATTACHMENT 16.3.E (1)

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0353 STATION # BC322

Sample No. [4]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/26/06	51	----	363	8.0	0	118.78	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	41	----	1.14	----	0.59	----	10.3			

COMMENT:

Sample No. [5]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	01/17/07	50	----	375	8.0	0	117	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	44	----	0.98	----	0.55	----	10.4			

COMMENT:

Sample No. [6]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/13/07	51	----	370	8.1	0	119	----	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	43	----	1.06	----	0.61	----	10.4			

COMMENT:

ATTACHMENT 16.3.E. (2)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	49°
Date:	09/26/06	Depth to Water:	10.6'

Parameter	Results	
pH	8.20	
Alkalinity	115.10	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	0.89	mg/l
Dissolved Manganese	0.47	mg/l
Sulfate	46	mg/l
Specific Conductance	360	umhos/cm

Signed: Woodson Owen

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	48°
Date:	10/16/06	Depth to Water:	10.5'

Parameter	Results	
pH	8.2	
Alkalinity	114	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	0.87	mg/l
Dissolved Manganese	0.45	mg/l
Sulfate	46	mg/l
Specific Conductance	365	umhos/cm

Signed: Woodson Ann

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	50°
Date:	11/15/06	Depth to Water:	10.5'

Parameter	Results	
pH	7.9	
Alkalinity	115	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	0.89	mg/l
Dissolved Manganese	0.42	mg/l
Sulfate	40	mg/l
Specific Conductance	367	umhos/cm

Signed: Woodrow Ann

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	51°
Date:	12/26/06	Depth to Water:	10.3'

Parameter	Results	
pH	8.0	
Alkalinity	118.78	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	1.14	mg/l
Dissolved Manganese	0.59	mg/l
Sulfate	41	mg/l
Specific Conductance	363	umhos/cm

Signed: _____

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	50°
Date:	01/17/07	Depth to Water:	10.4'

Parameter	Results	
pH	8	
Alkalinity	117	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	0.98	mg/l
Dissolved Manganese	0.55	mg/l
Sulfate	44	mg/l
Specific Conductance	375	umhos/cm

Signed: Wesley Hom

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS GROUND

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157

Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/BC 322
Sampled by:	Lab	Temperature:	51°
Date:	02/13/07	Depth to Water:	10.4'

Parameter	Results	
pH	8.1	
Alkalinity	119	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Dissolved Iron	1.06	mg/l
Dissolved Manganese	0.61	mg/l
Sulfate	43	mg/l
Specific Conductance	370	umhos/cm

Signed: [signature]

ATTACHMENT 17.1.A

Disturbance will be within the watersheds of Betsi Branch, Hen Wilder Branch, Jennie Branch, Blacklick Branch, Coal Stone Branch, Blacksnake Branch and Brownies Creek. There should be no stability or water quality problems within the proposed permit area.

ATTACHMENT 17.3.A

The monitoring programs for this particular mine site was designed to collect representative water data at locations that would provide optimum information on watershed characteristics. The points, as shown on the attached maps, are located downstream of the mine site and will therefore reflect actual conditions of water quantities and qualities flowing from the site.

Data has been collected for six (6) months, as reflected on each of the laboratory reports attached. This type of collection period provides information on seasonal variation in both quantity and quality. Lab reports indicate differences in flows and temperature levels for each month sampled.

Field measurements of temperature and discharge were taken along with pH. Samples were then returned to the laboratory for analysis of acidity, alkalinity, sulfate, total iron, total manganese, total suspended solids, and specific conductance. Results of each are given on the reports attached and labeled as 17.5.A.

17.4 On cabinet approved forms submit the results of the premining surface water monitoring program. Original or notarized copies of all laboratory analyses shall be provided. Submit this information as "Attachment 17.5.A".

See Attachment 17.5.A - 17.5.E (8)

18. Determination of Probable Hydrologic Consequences

18.1 Provide as "Attachment 18.1.A", a determination of the probable hydrologic consequences (PHC) which the proposed mining operation will have on both surface water and ground water systems within the proposed permit and adjacent areas. The contents of the determination shall conform to the requirements of 405 KAR 8:030, Section 32 (surface mine) or 405 KAR 8:040, Section 32 (underground mine).

See Attachment 18.1.A - 18.1.B (1)

18.2 Provide as "Attachments 18.2.A", a detailed description of the protective measures to be taken as part of the mining and reclamation operations to ensure compliance with 405 KAR 16:060, Sections 1, 2, 3, 4, 5, 6, 8, 9, 12, and 405 KAR 16:080 (surface mine) or 405 KAR 18:060, Sections 1, 2, 3, 4, 5, 7, and 405 KAR 18:080 (underground mine). Detailed designs of protective measures shall be presented in other pertinent sections of this application.

See Attachment 18.2.A - 18.2.B

19. Alternate Water Supply Information

19.1 Describe the extent to which the proposed mining activities may approximately result in the contamination, diminution, or interruption of underground or surface sources of water within the proposed permit or adjacent areas which are used for domestic, agricultural, industrial or other beneficial uses. This description shall be noted as "Attachment 19.1.A".

See Attachment 19.1.A

19.2 If contamination, diminution, or interruption may result, identify and describe the adequacy of the alternate sources of water supply that could be developed. Provide this information as "Attachment 19.2.A".

See Attachment 19.2.A

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: SW-1 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☐ Well
☒ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): _____ CASING DIAMETER (in.): _____ AQUIFER DESCRIPTION: _____
TOP OF AQUIFER (MSL): _____ AQUIFER THICKNESS (ft.): _____ TOP OF WELL ELEVATION (MSL): _____

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 1163.60

LATITUDE (DMS): 36°42'56.07" LONGITUDE (DMS): 83°30'47.72"

UTM ZONE: _____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: _____ UTM NORTHING: _____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: _____

*Refer to coding Instructions for list of codes.

ATTACHMENT 17.5.A

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # SW-1

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	11/03/06	45	0.036	280	6.4	0	26	4	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	1.6	----	----	0.04	----	0.12	----			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/04/06	43	0.027	325	6.2	0	24	14	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	1.6	----	----	0.06	----	0.18	----			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	01/03/07	39	0.058	310	6.0	0	22	6	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	3.3	----	----	0.21	---	0.31	----			

COMMENT:

ATTACHMENT 17-5.A (1)

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # SW-1

Sample No. [4]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/01/07	38	0.032	350	6.1	15	18	4	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	1.6	----	----	0.11	----	0.37	----			

COMMENT:

Sample No. [5]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	03/01/07	40	0.123	310	6.2	0	2	2	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	1.6	----	----	0.04	----	0.12	----			

COMMENT:

Sample No. [6]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	04/02/07	45	0.042	314	6.0	16	18	8	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	4.9	----	----	0.31	---	0.31	----			

COMMENT:

ATTACHMENT 17.5.A (2)

807-0355

ATTACHMENT 17.4.A (3)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	45 °
Date:	11/03/06	Discharge:	0.036 cfs

Parameter	Results	
pH	6.4	
Alkalinity	26	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	4	mg/l
Total Iron	0.04	mg/l
Total Manganese	0.12	mg/l
Sulfate	1.6	mg/l
Specific Conductance	280	umhos/cm

Signed: _____

ATTACHMENT 17.4.A (4)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	43°
Date:	12/04/06	Discharge:	0.027 cfs

Parameter	Results	
pH	6.2	
Alkalinity	24	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	14	mg/l
Total Iron	0.06	mg/l
Total Manganese	0.18	mg/l
Sulfate	1.6	mg/l
Specific Conductance	325	umhos/cm

Signed: [signature]

ATTACHMENT 17.4.A (5)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	39 °
Date:	01/03/07	Discharge:	0.058 cfs

Parameter	Results	
pH	6.0	
Alkalinity	22	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	6	mg/l
Total Iron	0.21	mg/l
Total Manganese	0.31	mg/l
Sulfate	3.3	mg/l
Specific Conductance	310	umhos/cm

Signed:

ATTACHMENT 17.4.A (6)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	38°
Date:	02/01/07	Discharge:	0.032 cfs

Parameter	Results	
pH	6.1	
Alkalinity	18	mg/l $CaCO_3$
Acidity	15	mg/l $CaCO_3$
Total Suspended Solids	4	mg/l
Total Iron	0.11	mg/l
Total Manganese	0.12	mg/l
Sulfate	1.6	mg/l
Specific Conductance	350	umhos/cm

Signed: [signature]

ATTACHMENT 17.4.A (7)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	40°
Date:	03/01/07	Discharge:	0.123 cfs

Parameter	Results	
pH	6.2	
Alkalinity	22	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	2	mg/l
Total Iron	0.04	mg/l
Total Manganese	0.12	mg/l
Sulfate	1.6	mg/l
Specific Conductance	310	umhos/cm

Signed: [signature]

ATTACHMENT 17.4.A (8)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0355		
County:	Bell	Job I.D.:	Blacksnake No. 3/SW-1
Sampled by:	Lab	Temperature:	45°
Date:	04/02/07	Discharge:	0.042 cfs

Parameter	Results	
pH	6.0	
Alkalinity	18	mg/l $CaCO_3$
Acidity	16	mg/l $CaCO_3$
Total Suspended Solids	8	mg/l
Total Iron	0.31	mg/l
Total Manganese	0.31	mg/l
Sulfate	4.9	mg/l
Specific Conductance	314	umhos/cm

Signed:

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: SW004 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☐ Well
☒ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): ____

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 772.9

LATITUDE (DMS): 36°43'26.37" LONGITUDE (DMS): 83°33'08.83"

UTM ZONE: ____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: ____

*Refer to coding Instructions for list of codes.

ATTACHMENT 17.5.B

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # SW004

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06		15.6 gpm		7.80	0	120.90	14	400	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	55			0.10		0.62				

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/14/06		10.5 gpm		7.90	0	118.55	8	290	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	56			0.33		0.10				

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/28/07		15.5 gpm		7.90	0	121.10	12	421	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	54			0.56		0.88				

COMMENT:

ATTACHMENT 17.5.B (1)

807-0355

807-0355

ATTACHMENT 17.5.B (1) (a)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 17.5.B (2) - 17.5.B (4) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Seaton

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2007

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW004
Lab# 16
Date Sampled: 09-26-2006
Date Analyzed: 09-26-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.80		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	120.90	Mg/L	treatment
Total Iron	0.10	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	0.62	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	400	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	55	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	15.6	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW004
Lab# 16
Date Sampled: 12-14-2006
Date Analyzed: 12-14-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.90		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	118.55	Mg/L	treatment
Total Iron	0.33	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	0.10	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	8	Mg/L	
Total Dissolved Solids	290	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	56	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	10.5	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.

P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW004
Lab# 16
Date Sampled: 02-28-2007
Date Analyzed: 02-28-2007
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.90		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	121.10	Mg/L	treatment
Total Iron	0.56	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	0.88	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	12	Mg/L	
Total Dissolved Solids	421	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	54	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	15.5	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
- ☐ Premining
- ☐ During Mining/Reclamation
- ☒ Other

STATION INFORMATION

PERMIT#: 807-0355 STATION#: SW024 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
- ☐ Spring
- ☒ Stream
- ☐ Lake
- ☐ Well
- ☐ Sediment Pond/Influent
- ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): ____

WATERSHED DESCRIPTION: Forestland DRAINAGE AREA (acres): 801.4

LATITUDE (DMS): 36°43'04.88" LONGITUDE (DMS): 83°32'15.45"

UTM ZONE: ____ 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Brownies Creek

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Nally & Hamilton Enterprises, Inc.

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: ____

*Refer to coding Instructions for list of codes.

ATTACHMENT 17.5.C

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0355 STATION # SW024

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06		10.5 gpm		7.30	0	100.56	10	340	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	58			0.12		0.95				

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/14/06		15.2 gpm		7.00	0	101.28	14	388	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	51			0.69		0.91				

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/28/07		9.55 gpm		7.40	0	101.12	14	363	

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	55			0.59		1.06				

COMMENT:

ATTACHMENT 17.5.C (1)

807-0355

807-0355

ATTACHMENT 17.5.C (1) (a)

Affidavit of True and Exact Copy of Original

STATE OF KENTUCKY, COUNTY OF CLAY

I hereby certify that Attachments 17.5.C (2) - 17.5.C (4) are true and exact copies of the originals, this 26th day of April, 2007.

Brenda Seale

NOTARY PUBLIC/STATE AT LARGE

My Commission Expires: 10-16-2009

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW024
Lab# 16
Date Sampled: 09-26-2006
Date Analyzed: 09-26-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.30		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	100.56	Mg/L	treatment
Total Iron	0.12	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	0.95	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	10	Mg/L	
Total Dissolved Solids	340	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	58	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	10.5	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

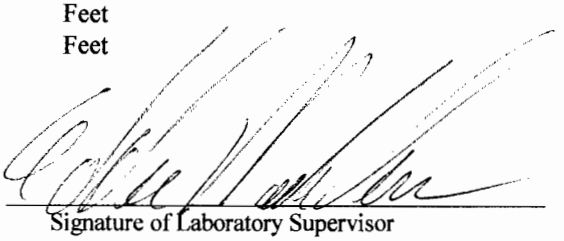
TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW024
Lab# 16
Date Sampled: 12-14-2006
Date Analyzed: 12-14-2006
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.00		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	101.28	Mg/L	treatment
Total Iron	0.69	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	0.91	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	388	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	51	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	15.2	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.



Signature of Laboratory Supervisor

TECHNICAL WATER LABORATORIES, INC.
P.O. Box 309 Bledsoe, KY 40810 (606) 558-5079 Fax (606)558-5565

SAMPLE ANALYSIS RESULTS

Tested for (Company Name): Nally & Hamilton Enterprises, Inc.
Sample ID: 807-5221 SW024
Lab# 16
Date Sampled: 02-28-2007
Date Analyzed: 02-28-2007
Sampled By: Technical Water Laboratories, Inc.

Parameter	Value	Units	Remarks
PH	7.40		
Acidity to pH 8.3	0	Mg/L	*with hot peroxide
Alkalinity to pH 4.5	101.12	Mg/L	treatment
Total Iron	0.59	Mg/L	
Dissolved Iron		Mg/L	
Total Manganese	1.06	Mg/L	
Dissolved Manganese		Mg/L	
Total Suspended Solids	14	Mg/L	
Total Dissolved Solids	363	Mg/L	
Settleable Solids		Mg/L	
Total Solids		Mg/L	
Sulfates	55	Mg/L	
Calcium		Mg/L	
Nitrates		Mg/L	
Nitrogen (Ammonia)		Mg/L	
Bicarbonate		Mg/L	
Sodium		Mg/L	
Potassium		Mg/L	
Chloride		Mg/L	
Temperature		degrees F	
Turbidity			
Specific Conductance		Michromhos/CM	
Dissolved Oxygen		Mg/L	
Hardness		Mg/L	
Flow Rate (Gpm)	9.55	GPM	
Flow Rate (Cfs)		CFS	
Depth to Water		Feet	
Well Depth		Feet	

All tests are conducted in accordance with Acceptable analytical methods and Procedures and are correct and accurate to The best of my knowledge.

Signature of Laboratory Supervisor

807-0355

I, Brenda Sester, hereby certify that Attachments 17.5.D (3) – 17.5.D (8) are true and exact copies of the original documents.

Brenda Sester My Commission Expires: 10-16-2009.

Date: 06-25-07.

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-0353 STATION#: SW 009 SOAP PERMITTEE#: N/A

*COUNTY#: 007 *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☐ Well
☒ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): ____ CASING DIAMETER (in.): ____ AQUIFER DESCRIPTION: ____
TOP OF AQUIFER (MSL): ____ AQUIFER THICKNESS (ft.): ____ TOP OF WELL ELEVATION (MSL): ____

WATERSHED DESCRIPTION: Forest/mining area DRAINAGE AREA (acres): ____

LATITUDE (DMS): 36°45'47" LONGITUDE (DMS): 83°33'29"

UTM ZONE: 17 16 West of 84^0 Longitude
17 East of 84^0 Longitude
UTM EASTING: ____ UTM NORTHING: ____

LOCAL STREAM NAME: Tom Fork

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Kentucky Resource Lab

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: ____

*Refer to coding Instructions for list of codes.

ATTACHMENT 17.5.D

807-0355

Revision Date: 06/15/2003

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0353 STATION # SW 009

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/26/06	65	20	210	7.10	0	106.88	14	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	64	----	----	0.98	----	0.10	----			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	10/16/06	51	18.7	171	7.0	0	103.63	16	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	58	----	----	0.96	----	0.11	----			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	11/15/06	45	19.2	177	7.05	0	105.92	19	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	60	----	----	0.94	----	0.13	----			

COMMENT:

ATTACHMENT 17.5.D (1)

807-0355

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-0353 STATION # SW 009

Sample No. [4]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/26/06	39	20.2	151	7.0	0	101.45	11	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	56	----	----	1.05	----	0.08	----			

COMMENT:

Sample No. [5]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	01/17/07	39	21.1	167	7.1	0	100	13	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	54	----	----	0.99	----	0.1	----			

COMMENT:

Sample No. [6]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/13/07	36	21.5	171	7.2	0	101.6	14	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	59	----	----	0.14	----	0.14	----			

COMMENT:

ATTACHMENT 17.5.D (2)

807-0355

ATTACHMENT 17.5.D (3) 807-0355

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	65°
Date:	09/26/06	Discharge:	20 cfs

Parameter	Results	
pH	7.10	
Alkalinity	106.88	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	14	mg/l
Total Iron	0.98	mg/l
Total Manganese	0.10	mg/l
Sulfate	64	mg/l
Specific Conductance	210	umhos/cm

Signed: Woodrow Pm

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	51°
Date:	10/16/06	Discharge:	18.7 cfs

Parameter	Results	
pH	7	
Alkalinity	103.63	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	16	mg/l
Total Iron	0.96	mg/l
Total Manganese	0.11	mg/l
Sulfate	58	mg/l
Specific Conductance	171	umhos/cm

Signed:

ATTACHMENT 17.5.D (5)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	45°
Date:	11/15/06	Discharge:	19.2 fps

Parameter	Results	
pH	7.05	
Alkalinity	105.92	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	19	mg/l
Total Iron	0.94	mg/l
Total Manganese	0.13	mg/l
Sulfate	60	mg/l
Specific Conductance	177	umhos/cm

Signed: [signature]

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	39°
Date:	12/26/06	Discharge:	20.2 fps

Parameter	Results	
pH	7.0	
Alkalinity	101.45	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	11	mg/l
Total Iron	1.05	mg/l
Total Manganese	0.08	mg/l
Sulfate	56	mg/l
Specific Conductance	151	umhos/cm

Signed: Woodrow A Dehm

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	39°
Date:	01/17/07	Discharge:	21.1 cfs

Parameter	Results	
pH	7.1	
Alkalinity	100	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	13	mg/l
Total Iron	0.99	mg/l
Total Manganese	0.1	mg/l
Sulfate	54	mg/l
Specific Conductance	167	umhos/cm

Signed: Woodrow Ann

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.:	807-0353		
County:	Bell	Job I.D.:	Mason Seam/SW 009
Sampled by:	Lab	Temperature:	36°
Date:	02/13/07	Discharge:	21.5 cfs

Parameter	Results	
Ph	7.2	
Alkalinity	101.6	mg/l $CaCO_3$
Acidity	0	mg/l $CaCO_3$
Total Suspended Solids	14	mg/l
Total Iron	1.09	mg/l
Total Manganese	0.14	mg/l
Sulfate	59	mg/l
Specific Conductance	171	umhos/cm

Signed: Woodson Ramey

807-0355

I, Brenda Sester, hereby certify that Attachments 17.5.E (3) — 17.5.E (8) are true And exact copies of the original documents.

Brenda Sester My Commission Expires: 10-16-2009.

Date: 10-16-2009.

WATER QUALITY DATA ENTRY FORMS: Part 1

Type of Report
☒ Premining
☐ During Mining/Reclamation
☐ Other

STATION INFORMATION

PERMIT#: 807-8056, A. 01 STATION#: S-4 SOAP PERMITTEE#: N/A

*COUNTY#: Bell *BASIN#: 02 QUAD NAME: Balkan/Varilla

STATION TYPER (check):
☐ Spring ☐ Well
☒ Stream ☐ Sediment Pond/Influent
☐ Lake ☐ Sediment Pond/Discharge

FOR WELLS ONLY

DEPTH (ft.): _____ CASING DIAMETER (in.): _____ AQUIFER DESCRIPTION: _____
TOP OF AQUIFER (MSL): _____ AQUIFER THICKNESS (ft.): _____ TOP OF WELL ELEVATION (MSL): _____

WATERSHED DESCRIPTION: _____ DRAINAGE AREA (acres): _____

LATITUDE (DMS): 36°44'36" LONGITUDE (DMS): 83°33'34"

UTM ZONE: _____ 16 West of 84° Longitude
17 East of 84° Longitude
UTM EASTING: _____ UTM NORTHING: _____

LOCAL STREAM NAME: Hen Wilder

COAL COMPANY NAME: Nally & Hamilton Enterprises, Inc.

COLLECTING FIRM NAME: Kentucky Resource Lab

ANALZING FIRM NAME: Kentucky Resource Lab

COMMENTS: _____

Refer to coding Instructions for list of codes.

ATTACHMENT 17.5.E

Revision Date: 06/15/2003

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-8056 STATION # S-4

Sample No. [1]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	09/02/05	60°	5.423	180	6.7	0	40	8	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	30	----	------	0.2	------	0.2	----			

COMMENT:

Sample No. [2]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	10/05/05	53°	5.721	331	6.7	0	104	4	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	50	----	-------	0.2	----	0.1	----			

COMMENT:

Sample No. [3]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	11/11/05	45°	7.212	180	6.8	0	98	5	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	38	----	-------	0.3	-----	0.2	------			

COMMENT:

ATTACHMENT 17.5.E(1)

WATER QUALITY DATA ENTRY FORMS: Part 2

SAMPLE DATA

PERMIT # 807-8056 STATION # S-4

Sample No. [4]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	12/15/05	41°	5.216	188	6.7	0	52	6	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	36	----	------	0.2	------	0.1	----			

COMMENT:

Sample No. [5]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	01/12/06	37°	5.76	172	6.7	0	52	5	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	42	----	-------	0.24	----	0.2	----			

COMMENT:

Sample No. [6]

PARAMETER	DATE MM/DD/YY	TEMP (F)	DISCHARGE (cfs)	CONDUCTIVITY (umhos)	pH. (Std. Units)	ACIDITY mg/l	ALKALINITY mg/l	TSS mg/l	TDS mg/l	SETT. SOLIDS ml/l
VALUE	02/20/06	35°	4.188	140	6.6	0	62	8	----	----

PARAMETER	SO_4 DISS. mg/l	O_2 DISS. mg./l	Fe, Diss. mg/l	Fe, Total mg/l	Mn, Diss. mg/l	Mn, Total mg/l	Depth to Water/ft.			
VALUE	50	----	-------	0.18	-----	0.28	-------			

COMMENT:

ATTACHMENT 17.5.E (2)

ATTACHMENT 17.5.E (3)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 09/02/05

Job I.D.: Whipple Tipple/S-4
Temperature: 60°
Discharge: 5.423

Parameter	Results
pH	6.7
Alkalinity	40 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	8 mg/l
Total Iron	0.2 mg/l
Total Manganese	0.2 mg/l
Sulfate	30 mg/l
Specific Conductance	180 umhos/cm

Signed: Woodson Allen

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 10/05/05

Job I.D.: Whipple Tipple/S-4
Temperature: 53°
Discharge: 5.721

Parameter	Results
pH	6.7
Alkalinity	104 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	4 mg/l
Total Iron	0.2 mg/l
Total Manganese	0.1 mg/l
Sulfate	50 mg/l
Specific Conductance	331 umhos/cm

Signed: Woodrow Rice

ATTACHMENT 17.5.E (5)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 11/11/05

Job I.D.: Whipple Tipple/S-4
Temperature: 45°
Discharge: 7.212

Parameter	Results
pH	6.8
Alkalinity	98 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	5 mg/l
Total Iron	0.3 mg/l
Total Manganese	0.2 mg/l
Sulfate	38 mg/l
Specific Conductance	180 umhos/cm

Signed: Woodrow Allen

ATTACHMENT 17.5.E (6)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 12/15/05

Job I.D.: Whipple Tipple/S-4
Temperature: 41°
Discharge: 5.216

Parameter	Results
pH	6.7
Alkalinity	52 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	6 mg/l
Total Iron	0.2 mg/l
Total Manganese	0.1 mg/l
Sulfate	36 mg/l
Specific Conductance	188 umhos/cm

Signed: Woodrow Allen

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 01/12/06

Job I.D.: Whipple Tipple/S-4
Temperature: 37°
Discharge: 5.76

Parameter	Results
pH	6.7
Alkalinity	52 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	5 mg/l
Total Iron	0.24 mg/l
Total Manganese	0.2 mg/l
Sulfate	42 mg/l
Specific Conductance	172 umhos/cm

Signed: Woodson Allen

ATTACHMENT 17.5.E (8)

KENTUCKY RESOURCE LABS
P.O. Box 350
Manchester, KY 40962
606-598-2605

WATER ANALYSIS STREAM

TO: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, KY 40004

Permit No.: 807-8056
County: Bell
Sampled by: Lab
Date: 02/20/06

Job I.D.: Whipple Tipple/S-4
Temperature: 35°
Discharge: 4.188

Parameter	Results
pH	6.6
Alkalinity	62 mg/l $CaCO_3$
Acidity	0 mg/l $CaCO_3$
Total Suspended Solids	8 mg/l
Total Iron	0.18 mg/l
Total Manganese	0.28 mg/l
Sulfate	50 mg/l
Specific Conductance	140 umhos/cm

Signed: Woodrow A

ATTACHMENT 18.2.A

DESCRIPTION OF PROTECTIVE MEASURES

As was discussed previously in the PHC, potential adverse hydrologic consequences are virtually negligible. Water qualities and quantities should vary little in lower lying streams and these slight variations are not expected to be considered adverse or permanent. Once sediment control facilities are constructed, flows should approximate the pre-mining conditions except in large precipitation events.

Therefore, protective measures in regard to the hydrologic balance shall only include maintenance of sediment ponds, construction of ditches, and prompt vegetation of disturbed areas as given in the plan of operation for this particular site. Compliance with regulations regarding effluent are expected and indicated in the pond designs, the discussion provided in the geologic section of this application, and the PHC of the previous item. No special protective measures are proposed. However, should a problem arise with either quantity or quality, immediate attention and resolution will be provided in accordance with regulations and Departmental requirements.

As discussed in the geologic section no acid or toxic drainage is expected. Overburden materials indicated an excess of alkaline strata with higher potentials for acid neutralization. Analysis based upon volume further indicated non-acid conditions in overburden. Monitoring of ponds is required on a regular basis and will reflect any increase in parameters; indicating a potential rise in acid forming conditions. Should this occur, immediate treatment will be employed using chemicals as necessary to reduce excessive parameter values to acceptable limits.

Control of on-site drainage, as well as discharge of effluent to lower lying streams, will be accomplished by the use of sediment ponds and diversion ditches as necessary. Locations of these facilities are shown on the enlarged maps and designs are given within the application.

All mining activities will be conducted in a manner that facilitates reclamation which will restore approximate pre-mining recharge capacities. Care will be taken to prevent excess compaction of the surface to allow proper infiltration of surface water, thereby allowing normal recharge capacities to approximate pre-mining conditions.

ATTACHMENT 18.2.A (2)

Therefore, no diminution of potential supplies is expected. However, should any potential water supplies of area residents be depleted, additional water wells will be drilled, a cistern constructed or residents will be connected to city water to replace the supply.

Likewise, adjacent areas will not be affected by the proposed operation. Control of sediment and water quality will be achieved on the mine-site so that effluent from the site is acceptable. Water quality will thereby remain acceptable in adjacent downstream areas. No acid or toxic drainage will be allowed to flow untreated to off-site areas. Water supplies or adjacent areas are not expected to be affected.

ATTACHMENT 19.1.A

The proposed mining operation is not expected to affect surface or underground sources of water. Mining will only temporarily alter flows across the area proposed for coal removal. Overburden removal and creation of a highwall will change velocities. Also, diversion ditches will redirect flows as shown on the drainage plan. Though these minor deviations in flow direction will occur, flow quantities and overall flow patterns will not be greatly affected.

Ponds will reduce sediment loads from surface run-off from the mining area. No other form of contamination or degradation is expected. However, should any unforeseen problem arise, treatment will be conducted within the appropriate sediment structure.

Therefore, no alternate water supply source is proposed.

ATTACHMENT 19.2.A

Replacement of Drinking Water Should Adverse Impact Occur

Should diminution, contamination or interruption of any water source occur as an adverse impact of mining, the requirements of 405 KAR 16:06 Section 8 will apply. These will include: providing drinking water within 48 hours of notification by the Cabinet; providing a temporary water supply connected to plumbing within 2 weeks; and providing a permanent water supply within 2 years. All other requirements of Section 8 will apply.

20. Prime Farmland Investigation

20.1 Based on the applicant's review of relevant information and the performance of an on-site investigation of the permit area, the applicant proposes a negative determination on 724.34 acres of this permit. This request is based on the following:

☒ 724.34 acres should not be considered prime farmland due to the slope being greater than 10% or the soil is very rocky or the area floods during a growing season more than once every two years thus reducing crop yields, etc. Documentation demonstrating this assertion is submitted as "Attachment 20.1.A".

☐ _____ acres should not be considered prime farmland as it has not been historically used as cropland. The standard departmental surface owner and third party affidavits are submitted as "Attachment 20.1.B and 20.1.C". Applicant should provide a narrative explaining why the acreage has not been farmed. This narrative should reference the history of nearby and adjacent lands.

☐ _____ acres should not be considered prime farmland as demonstrated by the following U.S. Soil Conservation Service statement.

The land designated on the USGS topographic map attached to permit application no. _____ has

☐ no prime farmland soils
☐ some prime farmland soils
☐ all prime farmland soils

Name _____ Title _____

Signature _____ Date _____

20.2 For applicants claiming an exemption from prime farmland reconstruction submit proper documentation as "Attachment 20.2.A" to demonstrate that a permit had been obtained prior to August 3, 1977, or that the other requirements of 405 KAR 8:050, Section 3, have been met.

N/A

20.3 Identify the acreage of prime farmland to be restored. Provide as "Attachment 20.3.A" the prime farmland restoration plan.

N/A

21. Land Use Information

21.1 Describe the capability of the proposed permit area, before any mining, to support a variety of land uses. Consideration shall be given to soil and foundation, topography, vegetative cover and hydrology. Submit as "Attachment 21.1.A".

See Attachment 21.1.A

21.2 Provide an estimate of the permit area's potential productivity expressed in average of food, fiber, forage, or wood products. Provide as "Attachment 21.2.A".

See Attachment 21.2.A

21.3 Describe the existing uses of the lands adjacent to the proposed permit areas and identify any local land use classifications of the proposed permit area. Submit as "Attachment 21.3.A".

See Attachment 21.3.A

ATTACHMENT 21.1.A

CAPABILITY OF PROPOSED PERMIT AREA

As previously described within this application, land slopes in the area of the proposed mine site are generally considered steep with flatter slopes occurring near the valley floor.

Capabilities of the alluvium at the valley floor are considerably higher than that of the steeper slopes. Soils are deeper and slopes are much more suited for agricultural production. Row crops are considered feasible in this area since erosion potential is reduced. Only the areas very near the larger streams are considered questionable due to infrequent flooding.

However, the steeper slopes above the valley are somewhat less capable of supporting a wide variety of agricultural uses. Soils are shallow and rocky in most areas. Drainage is considered excessive with high potential for erosion on unvegetated, unprotected slopes. Due primarily to steepness and soil depth, the area is limited to woodland production and/or grazing or pasture lands. Crop planting and harvesting is not feasible since limitations for necessary equipment use is severe.

Capabilities of woodland production and pasture or grazing lands are relatively high with proper management primarily necessary during initial planting.

ATTACHMENT 21.2.A

Potential productivities of this particular mine area are considered relatively high and would justify intensive levels of management.

Woodland production would require the highest level of management due to the severity of plant competition. This competition exists since sufficient moisture is available during growing seasons. Generally, low quality trees that tolerate shade establish themselves in the understory of layer stands and thereby hinder desirable trees from starting once the saw-log sized trees are removed.

Slope steepness would require immediate vegetation, of disturbed areas, with grasses and legumes to prevent erosion until tree species could dominate and stabilize slopes.

ATTACHMENT 21.3.A

Areas in the vicinity of the proposed mine site consist of land use similar to that found within the proposed permit boundaries. Attached maps delineate vegetation type and land use of the areas. No local land use classification is associated with the site.

The land use includes the following:

Forest Lands

These areas are not managed for timber production though hardwoods of logging size do exist. Primarily, however, pole timber sized trees cover the area. Areal productivity varies with aspect and land form along with many other considerations. Though some pine and spruce exist, the area is primarily covered with hardwoods including oak, hickory, ash and yellow poplar.

21.4 Describe the consideration which has been given to making the proposed postmining activities consistent with surface owner plans and applicable state and local land use plans and programs. Submit as "Attachment 21.4.A".

See Attachment 21.4.A

21.5 Attach copies of the comments concerning the proposed postmining land use from legal or equitable owner of record of the surface area to be affected. Also, attach any comments from federal, state, and local government agencies which would have to initiate, implement, approve, or authorize the proposed land use following reclamation. Submit as "Attachment 21.5.A, 21.5.B" etc.

21.6 Indicate existing land uses within the proposed permit area:

☒	Forestland (40)	724.34 ac.	☐	Developed Water Resources (53)	ac.
☐	Pastureland (20)	ac.	☐	Residential (11)	ac.
☐	Cropland (21)	ac.	☐	Industrial/ Commercial (13)	ac.
☐	Fish and Wildlife (01)	ac.	☐	Undeveloped (60)	ac.
☐	Recreation (02)	ac.			
☐	Mined Lands (30)	ac.			

Clearly delineate on the Environmental Resources Map, the boundaries of each land use checked above.

21.7 If active coal mining is being conducted within the proposed permit area or if previous mining has been conducted within the proposed permit area, provide the following information: If not applicable, check here ☒.

Premining Land Use(s)	Acres

21.8 If any land use (other than mining) has been in existence less than five years prior to the date of this application, describe the historic land use. Submit this description as "Attachment 21.8.A". If not applicable, check here ☒.

21.9 If previous mining has occurred within the proposed permit area, describe the type of mining used, coal seam or other strata mined, areal extent of such mining, and approximate dates of the disturbances. Submit as "Attachment 21.9.A". All areas of prior disturbance shall be shown on the MRP Map. If not applicable, check here ☒.

21.10 Indicate the proposed postmining land use(s) of the permit area:

☒	Forestland (40)	724.34 ac.	☒	Developed Water Resources (53)	ac.
☐	Pastureland (20)	ac.	☐	Residential (11)	ac.
☐	Cropland (21)	ac.	☐	Industrial/ Commercial (13)	ac.
☐	Fish and Wildlife (01)	ac.			
☐	Recreation (02)	ac.			

21.11 Describe how the proposed postmining land use(s) will be achieved and identify any necessary support or management activities which will be used. Submit as "Attachment 21.11.A".

See Attachment 21.11.A

ATTACHMENT 21.4.A

The premining land use for this proposed operation is classified as forestland. Reconnaissance of the area indicates trees to be present on the area proposed for surface disturbance, as well as the area overlaying the proposed underground portion. As discussed in the vegetation types section of the application, hardwoods dominate in the area.

Post mining landuse of forestland is also proposed after mining activities have ceased. Once final grading has been completed, the area will be seeded immediately in accordance with the vegetation plan. Seeding is required to adequately minimize erosion and reduce the possibilities of adverse effects to water quality and/or fish and wildlife habitat. Silt structures will, however, be utilized as the primary control mechanism use in reduction of settleable solids to lower lying streams.

Trees are then to be planted over the area according to the revegetation plan. Plantings and survival rate will be in accordance with 405 KAR 16:200 section 7.

The landuse restoration plans will be conducted in a timely manner and will be carried out under the supervision of a registered professional engineer. He will ensure that final grading and drainage will be compatible with the surrounding areas and will achieve adequate land stability.

The proposed postmining landuse will not pose any further actual or probable threat of water flow diminution or pollution. Therefore, this request is made in compliance with the landowners request for a postmining landuse of forestland. No particular support or management activities are necessary on the site.

ATTACHMENT 21.5.A 807-0355

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

June 20, 2007

Asher Land and Mineral, Ltd
P. O. Box 463
Pineville, KY 40977

RE: Nally & Hamilton Enterprises, Inc.
Permit No. 807-0355

Dear Sirs:

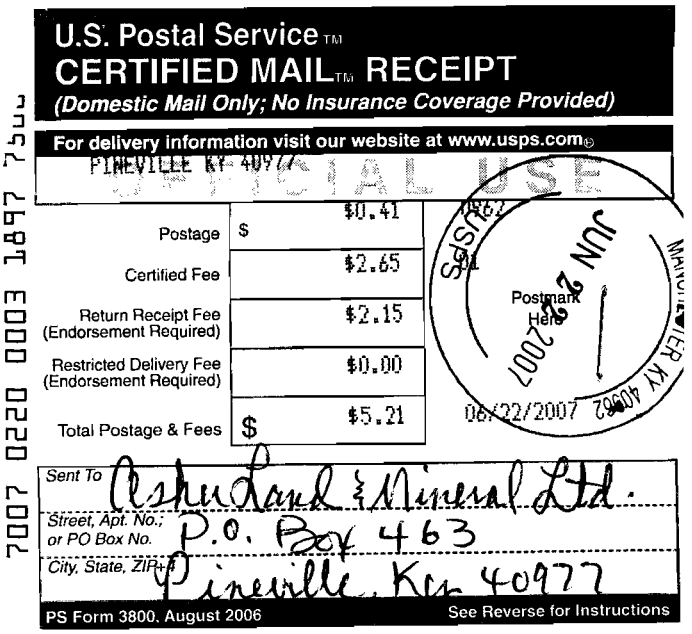
In preparation of the mining application referenced above, this is to inform you that no land use change, associated with your property, is proposed on Nally & Hamilton Enterprises, Inc., Permit No. 807-0355. The land use will remain forestland.

Though no change is proposed and no action is required on your part, we are required to notify you. Thank you.

Sincerely,

Don R. Roberts
Professional Engineer

DRR/bhs



ATTACHMENT 21.5.B 807-0355

Logos Engineering
P.O. Box 350
Manchester, Kentucky 40962

Don R. Roberts
Professional Engineer

Office (606) 598-6746
Fax (606) 598-1544

June 20, 2007

Mr. Wm. S. Stewart
P. O. Box 386
Pineville, KY 40977

RE: Nally & Hamilton Enterprises, Inc.
Permit No. 807-0355

Dear Mr. Stewart:

In preparation of the mining application referenced above, this is to inform you that no land use change, associated with your property, is proposed on Nally & Hamilton Enterprises, Inc., Permit No. 807-0355. The land use will remain forestland.

Though no change is proposed and no action is required on your part, we are required to notify you. Thank you.

Sincerely,

Don R. Roberts
Professional Engineer

DRR/bhs

ATTACHMENT 21.11.A

The premining land use for this operation is classified as forestland. As can be seen from the revegetation maps, most of the surrounding area is currently in trees.

The land use restoration plans will be conducted in a timely manner and will be carried out under the supervision of a registered professional engineer. He will ensure that final grading and drainage will be compatible with the surrounding areas and will achieve adequate land stability.

All areas are to be seeded immediately after final grading and placement of topsoil, as set forth in the revegetation plan. This will eliminate any possible adverse effects on water quality or fish and wildlife. Silt structures are also designed to contain runoff from disturbed areas.

The proposed post mining land use will not pose any further actual or probable threat of water flow diminution or pollution than the pre mining land use of forestland.

Establishing of the post-mining land use of forest land will be achieved by first ensuring that a minimum of four feet of best available soil growth medium is applied to the surface layer. This will provide a rooting zone for seedlings to develop. This final layer will be less intensively graded to minimize compaction. Equipment passes will be limited to one or two passes where possible to reduce compaction. Large boulders will be removed where necessary. However, some rocks will remain and are desirable to improve natural conditions. Additionally, coarse grading that allows for minor depressions, hills, mounds, gullies, rills and other non-uniform features that better reflect natural conditions.

Once final grade preparation is complete, the soil will be tested to establish fertilizer rates. The recommended fertilizer combination will contain adequate rates of phosphorus and potassium and a low rate of nitrogen.

Ground cover species have been chosen that will not be aggressive or invasive and will not hinder tree growth. The species will allow tree growth with minimal competition. Species were selected from TRM #21 and should provide short-term and long-term erosion control.

Nally & Hamilton Enterprises, Inc.
Application No. 807-0355, NW
May 21, 2007

Application Item 21.11: Fish and Wildlife Enhancement Plan

Based on the Division's environmental review, it has been determined that the application **will** require a fish and wildlife enhancement plan, as specified in 405 KAR 8:030/040, Section 36(1). This plan must be submitted as an attachment to application item 21.11.

KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES
COMMERCE CABINET

Ernie Fletcher
Governor

#1 Game Farm Road
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
Fax (502) 564-0506
fw.ky.gov

George Ward
Secretary

Dr. Jonathan W. Gassett
Commissioner

April 27, 2007

Ms. Susan Wind, Supervisor
Critical Resources Review Section
DMRE/Division of Mine Permits
#2 Hudson Hollow,
Frankfort, KY 40601

RE: Nally & Hamilton Enterprises, Inc.
Application #807-0355
Bell County, Kentucky

Dear Ms. Wind,

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has reviewed the information provided by your staff concerning the above-referenced permit application. KDFWR offers the following comments:

X The black-side dace (*Phoxinus cumberlandensis*) are known to inhabit Blacksnake Branch and could be affected by impacts from Sediment Pond #5 associated with this proposed project. KDFWR requests the applicant contact the USFWS to determine the extent of survey and/or protection needed to offset any impacts to the endangered species or its habitat.

X KDFWR recommends to the applicant the following measures for appropriate stream channel restoration:

1) The stream channel should be reconstructed/restored following natural stream channel design concepts. The mitigation stream channel design should be referenced to streams of similar size in the area or constructed to be similar to the original stream dimensions. The newly constructed stream channel should parallel the original stream profile (stream gradient, width, depth, pool/riffle ratio, and habitat).

2) All disturbed areas should be revegetated with species beneficial to wildlife as soon as construction ceases. KDFWR requests the riparian area to be restored with native vegetation for a minimum width of 100 feet on each side of the channel. The riparian area is important to the overall health of the stream by contributing shade, nutrients, stable stream banks, cooler water temperatures, and a buffer zone.

3) KDFWR recommends the applicant implement adequate sediment control measures when conducting construction of the stream channel. Best management practices (BMP's), such as immediate vegetation of dam outslopes, silt fences, and straw bales, will assist in control of sedimentation and minimize impacts on aquatic resources.

Should you require any information or have any questions, please feel free to contact me at (502) 564-5448.

Sincerely,

Marla Barbour Callaghan

Marla Barbour Callaghan
Fisheries Biologist III
Assistant Project Leader, Environmental Section

Xc: Environmental Section Files

21.12 If the proposed postmining land use(s) represent a change from the existing or premining land use(s), provide the following information:

(a) A discussion of the feasibility, i.e. suitability, capability, cost effectiveness of the proposed postmining land use(s). Submit as "Attachment 21.12.A".

(b) A schedule for achieving the proposed postmining land use(s). Submit as "Attachment 21.12.B".

(c) A discussion of how the proposed postmining land use(s) will be achieved within a reasonable time frame. Submit as "Attachment 21.12.C".

(d) A separate map showing the proposed postmining land use(s). Submit as "Attachment 21.12.D".

If section 21.12 is not applicable, check here ☒.

22. Vegetation Information

22.1 Provide as "Attachment 22.1.A", a map and narrative description of the existing vegetative types and plant communities within the proposed permit and any proposed reference area. This description shall include adequate information to predict the potential success for re-establishing vegetation on the proposed permit area.

See Attachment 22.1.A - 22.1.A (1)

22.2 Complete the following table to describe the plan for revegetating the proposed permit area.

Proposed Postmining Land Use Forestland	Rate per Acre	Acreage	Planting Dates
Permanent Grass: Orchard Grass Timothy	 5 lbs. 5 lbs.	 724.34 "	March - June 1 and Aug. 30 - Dec. 1
Legumes: Kobe Lespedeza	3 - 5 lbs.	"	"
Trees: White Oak Northern Red Oak Shagbark Hickory Black Locust White Ash	 60 Stems 60 Stems 60 Stems 60 Stems 60 Stems	 507.04 " " " "	 " " " " "
Temporary Plants: Annual Rye	15 - 20 lbs.	724.34	"
Mulch: Hay & Straw	1500 lbs.	"	"
Small Grains: N/A			

ATTACHMENT 22.1.A

DESCRIPTION OF VEGETATION TYPES

Forest

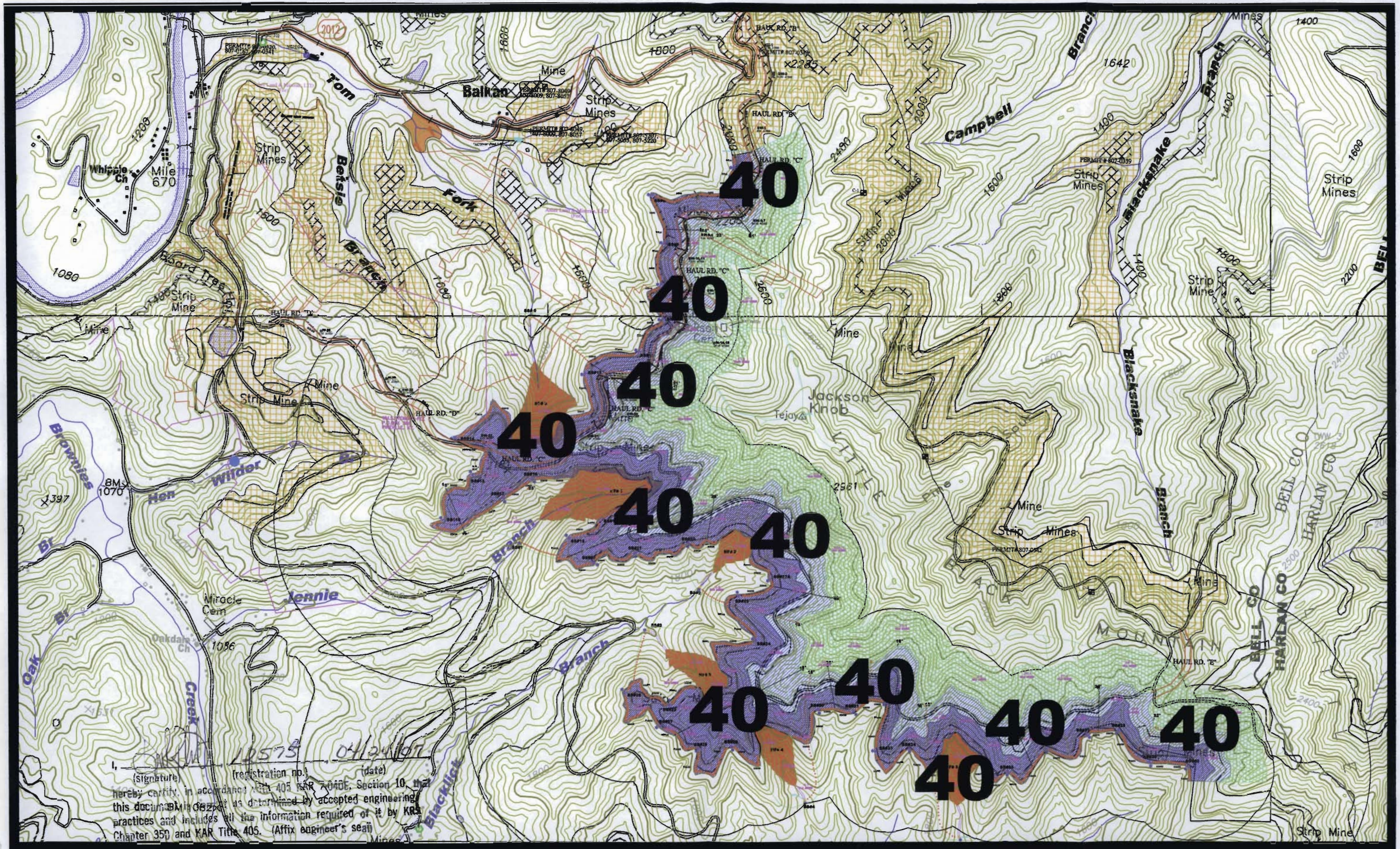
This vegetation type occurs on gently sloping to steep areas and is composed of mostly hardwood species with pine trees occurring in association. The trees are mostly pole-timber size with some saw-timber occurring in various locations. The major forest cover type is oak-yellow poplar pine. Species composition varies with past land use and site conditions.

The three dominant tree species of the area are southern red oak, yellow poplar, and shortleaf pine. Common associates are scarlet oak, black oak, red maple, white oak, mocker nut hickory, Virginia pine and black gum. American beech is also a common associate and in some moist sites such as north and east facing side slopes, foot slopes, and concave land forms.

Under story plants of the area are composed of various tree, shrub, and herbaceous species. They include flowering dogwood, black oak, red maple, American Beech, mocker nut hickory, sour wood, devil's walking-stick, blackberry, Japanese honeysuckle, false-Solomon's seal, striped pipsissiwa, strawberry-bush, and green brier. Other common under story components which are more prevalent on moist sites include redbud, umbrella magnolia, poison ivy, spice bush, papaw, and Christmas fern.

Grass-Legume

These areas have been seeded with tall fescue, serecia lespedeza, Korean Lespedeza, and red clover. Foxtail and other weeds have seeded in naturally and have become quite prominent in places. Moderate to frequent mowing of these fields has been conducted with some grazing of most of the area.



01= Fish / Wildlife
20= Pasture **40= Forest**

Vegetation Map

Scale: 1"= 1500'

22.3 Are alternate soil stabilizers in lieu of mulch being requested? ☐ YES ☒ NO. If "YES", justify this proposal, identify acreage for which this variance is requested and describe the nature of the soil stabilizer. Provide as "Attachment 23.3.A".

22.4 Provide, as "Attachment 22.4.A", detailed descriptions of:

(a) The methods to be used in planting, seeding and mulching, including irrigation, pest and disease control measures.

(b) The measures to be used to determine the success of revegetation as required by 405 KAR 16:200 and 405 KAR 18:200.

(c) The soil testing plan for evaluating the results of topsoil handling and reclamation procedures related to revegetation.

See Attachment 22.4.A - 22.4.A (1)

23. Soils Resources Information

23.1 Is soil survey information for the proposed permit area available from the U.S. Soil Conservation Service? ☒ YES ☐ NO. If "YES", use the appropriate information to provide a description of existing soils that will be disturbed within the proposed permit area.

See Attachment 23.1.A - 23.1.A (2)

23.2 Does the applicant propose to use selected overburden materials as a supplement or substitute for topsoil? ☒ YES ☐ NO. If "YES", provide the following information:

(a) A geologic cross-section of the proposed permit area identifying the proposed alternate material(s) to be used. Submit as "Attachment 23.2.A".

(b) The results of chemical and physical analyses of the existing soils and the proposed alternate materials conducted in accordance with 405 KAR 16:050. Submit as "Attachment 23.2.B".

(c) Certification by a qualified soil scientist or agronomist that the alternate material is equal to, or more suitable than, the existing topsoil. Submit as "Attachment 23.2.C".

See Attachments 23.2.A - 23.2.C (1)

23.3 Describe, as "Attachment 23.3.A", how topsoil or alternate topsoil materials will be removed, stored, stabilized, protected, and redistributed in the proposed permit area. Indicate on the MRP Map where topsoil and/or alternate topsoil stockpiles will be located.

See Attachment 23.3.A

24. Surface Blasting Plan

24.1 Is surface blasting proposed for the permit area? ☒ YES ☐ NO.

24.2 Will blasting be conducted within 1000' of any building used as a dwelling, public building, school, church, commercial, community, or institutional building? ☐ YES ☒ NO. If "YES", submit as "Attachment 24.2.A", an anticipated blast design prepared and signed by a certified blaster with this application, or at a time prior to the blasting operation. If the design will be submitted after permit issuance, the design shall be provided thirty days prior to the anticipated blasting and such blasting may not be initiated until DSMRE approval is obtained.

24.3 Will blasting be conducted within 500' of an active or abandoned underground mine? ☐ YES ☒ NO. If "YES", attach the blast designs and for active mines the appropriate MSHA Blasting Approval Form as "Attachment 24.3.A".

ATTACHMENT 22.4.A

This operation will be re-vegetated in a timely manner once final activities have ceased. The area will be scarified prior to seeding. If necessary, a disc, bog harrow, or chisel plow will be utilized to break up soil.

The soil testing plan for this operation will be conducted on the mining site immediately after final activities have ceased. The plan will include several random field tests to determine pH levels. These tests are for early indications of soil characteristics to aid in seeding, fertilizing, and lime requirements. A series of soil samples will also be collected at various points to equally represent the entire disturbed area. One sample will be taken for every ten acres of disturbance. These samples will undergo a more accurate laboratory analysis to determine existing soil characteristics. In particular, a buffer pH reading will be taken. A minimum reading of 5.5 will be attained before bond release is requested. Readings of less than 5.5 will indicate the need for lime applications. Rates of lime to be applied will be based on the degree of acidity in the buffer pH reading and the potential acidity reading.

Once the area is completely prepared, seeding will be employed according to application rates and species specified in the re-vegetation plan. Seeding of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final activities have ceased. This is to be accomplished either by hand, hydro-seeder, or a combination of the two. If available, a hydro-seeder will be used on most of the area. However, some inaccessible areas will require hand seeding.

Fertilizers will be added to the hydro-seeder to be spread simultaneously with seed mixtures. In areas where hand seeding is used, fertilizers will be added prior to the spreading of seed mixtures.

Suitable mulch shall be used on the area to control erosion, promote germination of seeds, or increase the moisture retention capacity of the soil. Amounts and application rates are specified in the re-vegetation plan. Success standards for ground cover and productivity shall be measured as described in 405 KAR 16:18:200 Section 5. Ground cover shall be at least ninety (90) percent, and productivity shall be at least ninety (90) percent of the average yield for that hay in the county in the three years prior to the year of measurement as determined from "Kentucky

ATTACHMENT 22.4.A (1)

Agricultural Statistics 1989 - 1990", and "Kentucky Agricultural Statistics 1990 -1991", "Kentucky Agricultural Statistics 1991 - 1992", and "Kentucky Agricultural 1993 - 1994", with a statistical confidence of ninety (90) percent.

Ground cover and productivity shall equal the approved standard for the last two consecutive years of the responsibility period. The period of extended responsibility under the performance bond requirements of 405 KAR Chapter 10 will begin after the final seeding and will continue for not less than five years.

Ground cover and productivity of living plants on the re-vegetated area within the permit area shall be at least 90% of the technical standards, as required by TRM #19.

TABLE 8.—*Acreage and proportionate extent, by counties, of soils and land*

Soil or land type	Capability class or subclass	Bell		Breathitt		Clay		Floyd		Harlan		Johnson	
		Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Sequatchie fine sandy loam, 6 to 12 percent slopes.	IIIe	------	------	120	1. 7	100	0. 6	70	1. 8	------	------	70	2. 0
Stendal gravelly fine sandy loam	IIw	90	1. 1	60	. 8	420	2. 5	60	1. 5	140	1. 7	70	2. 0
Stendal fine sandy loam	IIw	20	. 3	------	------	------	------	40	1. 0	------	------	------	------
Stendal silt loam	IIw	------	------	70	1. 0	260	1. 6	------	------	150	1. 8	40	1. 1
Strip mine	None	------	------	------	------	40	. 2	------	------	------	------	------	------
Tyler silt loam	IIIw	------	------	100	1. 4	140	. 8	------	------	60	. 7	10	. 3
Wellston silt loam, 6 to 12 percent slopes.	IIIe	------	------	------	------	------	------	------	------	------	------	------	------
Wellston silt loam, 12 to 20 percent slopes.	IVe	20	. 3	------	------	------	------	------	------	------	------	------	------
Wellston silt loam, 12 to 20 percent slopes, eroded.	IVe	------	------	------	------	------	------	------	------	------	------	------	------
Whitwell loam	IIw	------	------	60	. 8	120	. 7	------	------	40	. 5	------	------
Zaleski silt loam, 2 to 6 percent slopes	IIe	------	------	------	------	------	------	20	. 5	------	------	20	. 6
Total		7, 880	100. 0	7, 160	100. 0	16, 650	100. 0	3, 910	100. 0	8, 130	100. 0	3, 510	100. 0

[1] Less than 0.1 percent.

(Db) **Dekalb-Muskingum-Berks association: Dominantly moderately deep, steep to very steep, very stony soils in mountainous areas**

This soil association makes up parts of all 14 counties and is rough, broken, mountainous, and deeply dissected by many small streams. Ridgetops in the association are very narrow and generally very stony, and side slopes are very steep, are very stony, and are marked by rock outcrops in a few places. The valley floors consist of narrow flood plains that are bordered by strongly sloping colluvial soils. Figure 3 shows the relationship of the major soils in this association to parent material and topography.

The Dekalb, Muskingum, and Berks soils make up about 96 percent of the association and occupy the ridgetops and very steep side slopes. All of these soils are generally very stony.

The Dekalb soils, which account for about 70 percent of this association, are shallow to moderately deep over sandstone and siltstone. They have a fine sandy loam or loam surface layer and a subsoil that contains many stone fragments.

The Muskingum soils make up approximately 19 percent of the association. They are shallow to moderately deep over interbedded siltstone and shale and have a silt loam surface layer and subsoil.

The Berks soils account for about 7 percent of the association. They are shallow to moderately deep over interbedded siltstone and shale. Their surface layer is silt loam, and their subsoil contains many stones and fragments of shale.

The Jefferson, Stendal, and Pope soils make up about 3 percent of the association and occur on the lower foot slopes and on flood plains. The Jefferson soils are deep, are well drained, and generally have a gravelly loam or stony loam surface layer and a clay loam or loam subsoil. The somewhat poorly drained Stendal and the well-drained Pope soils are on flood plains and consist of deep silt loam to fine sandy loam.

Also in this soil association, but accounting for less than 1 percent of it, are Wellston, Enders, Rarden, and Upshur soils, mostly on ridgetops; Barbourville, Hayter, Cotaco, Zaleski, Holston, Allegheny, Monongahela, Tyler, Purdy, Sequatchie, and Whitwell soils on the lower foot slopes and benches; and Philo, Atkins, Bruno, Huntington, and Newark soils on the narrow flood plains.

The following kinds of miscellaneous land make up a small acreage of this association: (1) Built-up areas consisting of villages, towns, mining camps, and railroad and highway rights-of-way on the valley floors and their adjacent foot slopes; (2) Rock land consisting of many small areas of sandstone outcrops, of bouldery and very stony land, and of limestone outcrops along Pine Mountain; (3) stony and sandy alluvial land along some of the streams; and (4) a few small areas in which the surface layers of rock have been removed from the underlying coal. Mine spoil and waste are prominent in parts of the association that have been mined extensively for coal. Drift and auger coal mines are common. Auger mine trails, shown on county soil maps by a special symbol, average between 40 and 80 feet in width and follow the contour of the mountains.

This soil association is largely in hardwood forest, but small, scattered areas have been cleared and are used for row crops, meadow or pasture, or are idle. Although the dominant Dekalb, Muskingum, and Berks soils are droughty and low in natural fertility, they are well suited to trees if woodland management is good. The Jefferson soils on foot slopes and the Pope and Stendal soils on flood plains are moderately low to moderately high in natural fertility. These soils generally respond well to additions of lime and fertilizer and to other good management. The less extensive soils range from moderately low to moderately high in natural fertility. On the steep slopes erosion is a severe hazard.

TABLE 11.—*Acreage and proportionate extent, by counties, of*

[Dashed lines indicate soil does not occur in county.

Soil or land type	Capability subclass	Bell		Breathitt		Clay		Floyd		Harlan		Johnson	
		Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Dekalb fine sandy loam, 12 to 20 percent slopes.	VIe	------	------	------	------	60	2. 8	------	------	------	------	------	------
Dekalb stony loam, 12 to 20 percent slopes.	VIs	------	------	90	1. 9	40	1. 9	40	0. 5	------	------	20	0. 5
Dekalb stony loam, 12 to 20 percent slopes, severely eroded.	VIIs	------	------	------	------	------	------	------	------	------	------	------	------
Dekalb stony loam, 20 to 30 percent slopes.	VIIs	140	2. 2	60	1. 2	70	3. 3	110	1. 4	140	1. 5	70	1. 8
Dekalb stony loam, 20 to 30 percent slopes, severely eroded.	VIIs	80	1. 2	------	------	20	1. 0	40	. 5	20	. 2	30	. 8
Dekalb-Muskingum-Berks stony soils, 30 to 50 percent slopes.	VIIs	100	1. 5	260	5. 3	30	1. 4	250	3. 1	460	5. 0	100	2. 6
Dekalb-Muskingum-Berks stony soils, 30 to 50 percent slopes, severely eroded.	VIIs	------	------	60	1. 2	------	------	50	. 6	100	1. 1	------	------
Dekalb-Muskingum-Berks stony soils, 50+ percent slopes.	VIIs	210	3. 2	430	8. 8	20	1. 0	370	4. 6	440	4. 8	300	7. 7
Dekalb-Muskingum-Berks stony soils, 50+ percent slopes, severely eroded.	VIIs	------	------	90	1. 8	------	------	130	1. 6	100	1. 1	50	1. 3
Muskingum-Gilpin silt loams, 6 to 12 percent slopes.	IIIe	------	------	40	. 8	------	------	------	------	------	------	20	. 5
Muskingum-Gilpin silt loams, 6 to 12 percent slopes, severely eroded.	IVe	------	------	------	------	------	------	------	------	------	------	------	------
Muskingum-Gilpin silt loams, 12 to 20 percent slopes.	IVe	100	1. 5	------	------	30	1. 4	20	. 3	40	. 4	30	. 8
Muskingum-Gilpin silt loams, 12 to 20 percent slopes, severely eroded.	VIe	------	------	------	------	20	1. 0	------	------	------	------	------	------
Muskingum-Gilpin silt loams, 20 to 30 percent slopes.	VIe	100	1. 5	------	------	------	------	30	. 4	60	. 7	------	------
Rock land	VIIs	5, 840	88. 9	3, 870	79. 0	1, 810	86. 2	6, 970	87. 0	7, 820	85. 2	3, 260	84. 0
Total		6, 570	100. 0	4, 900	100. 0	2, 100	100. 0	8, 010	100. 0	9, 180	100. 0	3, 880	100. 0

[1] Less than 0.1 percent.

Forestry, wildlife, and recreation are good uses for soils in this association. Many small, fairly smooth areas of Dekalb, Muskingum, Berks, and Jefferson soils occur throughout the association and are fair to good for pasture and meadow. The Pope, Stendal, and other soils on the narrow flood plains produce good to high yields of many kinds of crops.

About 94 percent of this soil association consists of soils in capability subclass VIIs, and 1 percent, of soils in subclass VIe. The remaining 5 percent of the association consists of soils in capability subclasses IIe, IIw, IIs, IIIe, IIIw, IVe, IVw, IVs, and VIIe, and of small areas of miscellaneous land.

(Dg) Dekalb-Muskingum-Gilpin-Jefferson association: Dominantly steep, moderately deep, silty soils in hilly areas

This soil association occurs only in Johnson and Lawrence Counties. It is hilly and is dissected by many small streams. Valleys and ridgetops are narrow, and side slopes are steep. The valley floors are flood plains that are bordered by strongly sloping colluvial soils. Figure 4 shows the relationship of the major soils in this association to the parent material and topography.

The Dekalb soils, which make up about 46 percent of the soil association, are on ridgetops and moderately steep to steep side slopes. These soils are excessively drained, are moderately deep to shallow, and are underlain by sandstone and siltstone. Their surface soil is fine sandy loam or loam; their subsoil contains many stone fragments.

The Muskingum soils are somewhat excessively drained. They account for about 26 percent of the association, and they occur with the Gilpin soils on ridgetops and on moderately steep to steep side slopes. The Muskingum soils have a silt loam surface layer and subsoil and are moderately deep to shallow over siltstone and shale. Some areas are stony, and a few rocks crop out in places.

The Gilpin soils, which are well drained and somewhat excessively drained, amount to about 7 percent of the soil association. They occur with the Muskingum soils on the ridgetops and moderately steep to steep side slopes. Generally, Gilpin soils are moderately deep over siltstone and shale. They have a surface layer of silt loam and a subsoil of heavy silt loam or light silty clay loam.

Jefferson soils make up approximately 6 percent of the association and occur on the lower foot slopes. They are deep, are well drained, and generally have a gravelly loam surface layer and a clay loam or loam subsoil.

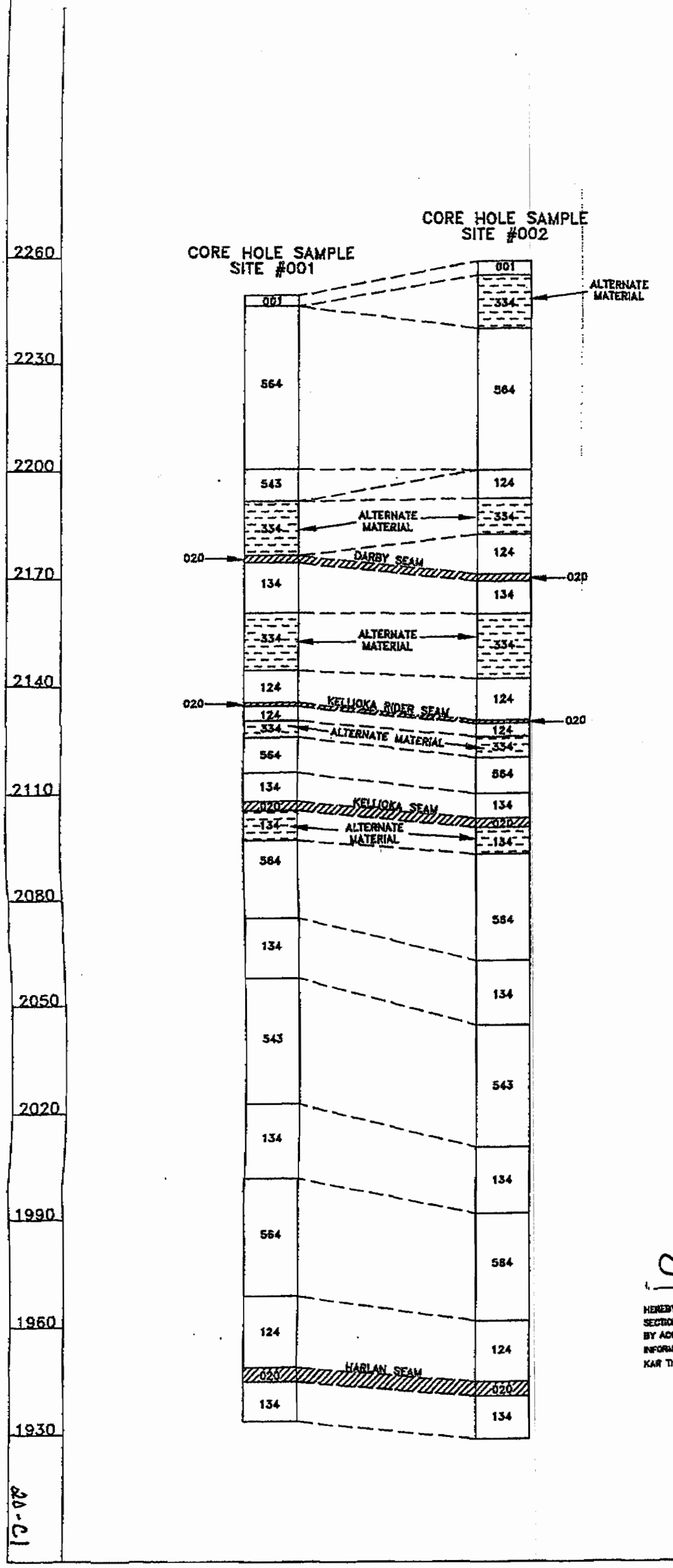
The Pope soils account for about 3 percent of the association and occur on bottoms along the streams. These soils are deep, are well drained, and generally have a silt loam to fine sandy loam surface layer and subsoil.

ATTACHMENT 23.1.A (2)

BY: DD	SHEET 1
DATE: 10/13/2005	
BALKAN #1	OF 1

ATTACHMENT 23.2.A

SCALE:
VERTICLE: 1" = 30'
HORIZONTAL: 1" = 1'



STATE OF KENTUCKY
J. L. MILLER 8735 LICENSED PROFESSIONAL ENGINEER

I, _____ (ENGINEER) 8735 (REG. NO.) 3/1/06 (DATE)
HEREBY CERTIFY, IN ACCORDANCE WITH 405 KAR 7:040E SECTION 10 THAT THIS DRAWING IS CORRECT AS DETERMINED BY ACCEPTED ENGINEERING PRACTICES AND INCLUDES ALL INFORMATION REQUIRED OF IT BY KRS CHAPTER 350 AND KAR TITLE 405.

23-C1

ATTACHMENT 23.2.B

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 001 Sample # 4

pH	**6.81**
Buffer pH	**6.87**
Neutralizaton Potential	**5.9**
Potential Acidity	**0.9**
Phosphourus	**110**
Potassium	**104**
Nitrogen	**.09**
Texture Class	
Sand	**42%**
Silt	**42%**
Clay	**16%**

Submitted By:

ATTACHMENT 23.2.B (1)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 001 Sample # 7

pH	**6.77**
Buffer pH	**6.83**
Neutralizaton Potential	**9.2**
Potential Acidity	**0.4**
Phosphourus	**114**
Potassium	**111**
Nitrogen	**.07**
Texture Class	
Sand	**43%**
Silt	**44%**
Clay	**13%**

Submitted By: Eddie Hamilton

ATTACHMENT 23.2.B (2)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 001 Sample # 11

pH	**6.91**
Buffer pH	**6.98**
Neutralizaton Potential	**10.1**
Potential Acidity	**0.5**
Phosphourus	**109**
Potassium	**102**
Nitrogen	**.06**
Texture Class	
Sand	**45%**
Silt	**42%**
Clay	**13%**

Submitted By: Eddie Hamilton

ATTACHMENT 23.2.B (3)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 001 Sample # 15

pH	**6.74**
Buffer pH	**6.80**
Neutralizaton Potential	**7.6**
Potential Acidity	**0.6**
Phosphourus	**107**
Potassium	**101**
Nitrogen	**.06**
Texture Class	
Sand	**44%**
Silt	**44%**
Clay	**12%**

Submitted By:

ATTACHMENT 23.2.B (4)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 002 Sample # 2

pH	**6.44**
Buffer pH	**6.51**
Neutralizaton Potential	**4.4**
Potential Acidity	**0.6**
Phosphourus	**104**
Potassium	**98**
Nitrogen	**.04**
Texture Class	
Sand	**48%**
Silt	**41%**
Clay	**11%**

Submitted By: Eddie Mankaller

20-C.6

ATTACHMENT 23.2.B (5)

Technical Water Laboratories, Inc.

P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 002 Sample # 5

pH	**6.47**
Buffer pH	**6.55**
Neutralizaton Potential	**8.2**
Potential Acidity	**0.6**
Phosphourus	**105**
Potassium	**101**
Nitrogen	**.05**
Texture Class	
Sand	**41%**
Silt	**47%**
Clay	**12%**

Submitted By: Eddie McMahan

20-07

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 002 Sample # 9

pH	**6.59**
Buffer pH	**6.66**
Neutralizaton Potential	**8.4**
Potential Acidity	**0.7**
Phosphourus	**109**
Potassium	**104**
Nitrogen	**.06**
Texture Class	
Sand	**39%**
Silt	**40%**
Clay	**21%**

Submitted By: Eddie Mahaffey

20-C8

ATTACHMENT 23.2.B (7)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 002 Sample # 13

pH	**6.52**
Buffer pH	**6.60**
Neutralizaton Potential	**8.8**
Potential Acidity	**0.6**
Phosphourus	**110**
Potassium	**107**
Nitrogen	**.07**
Texture Class	
Sand	**42%**
Silt	**43%**
Clay	**13%**

Submitted By: Eddie Nanhalter

20-C9

ATTACHMENT 23.2.B (8)

Technical Water Laboratories, Inc.
P.O. Box 309 Bledsoe, KY 40810
(606)558-5079 (606)768-6969 Fax (606)558-5565
email techlabs@tds.net

Sample Analysis Resutls

Company Name: Nally & Hamilton Enterprises, Inc.

Date of Analysis: 11-18-2005

Sample ID: Hole # 002 Sample # 17

pH	**6.64**
Buffer pH	**6.71**
Neutralizaton Potential	**9.1**
Potential Acidity	**0.5**
Phosphourus	**111**
Potassium	**107**
Nitrogen	**.07**
Texture Class	
Sand	**41%**
Silt	**42%**
Clay	**17%**

Submitted By: Eddie McMillan

20-C10

ATTACHMENT 23.2.C(1)

Howard D. York, Jr.
P.O. Box 1309
Harlan, Kentucky 40831

December 7, 2005

Division of Permits, DSMRE
Management Support Branch
Work Area B41
#2 Hudson Hollow Complex
Frankfort, Kentucky 40601

RE: Nally & Hamilton Enterprises, Inc.
P.O. Box 157
Bardstown, Kentucky 40004

Balkan #1

Dear Sir:

I do hereby certify that the analysis performed by Technical Water Laboratories, Inc., P.O. Box 309, Bledsoe, Kentucky 40810, on alternate topsoil materials indicate the following:

1) Physical examination of the mine area revealed that the topsoil exists in an insufficient quantity on the permit area to cover the spoil and sustain adequate vegetation.

2) The alternate material analyzed was the best available material to use as alternate topsoil material.

3) Chemical analysis of the alternate material indicates that with the addition of 35 lbs/acre of K2O5 that the alternate material will be of equal or superior quality to the topsoil indigenous to the area.

It is my recommendation that with the addition of the fertilizer listed in item 3 that the alternate materials be used as a substitute material or in combination with the topsoil in the post mining land use.

Respectfully submitted,

Howard D. York

Howard D. York, Jr., Soil Scientist
P.O. Box 1309
Harlan, Kentucky 40831

20-C11

36° 45' 20"
45' 18"
45' 16"
45' 14"
45' 12"
45' 10"
45' 08"
45' 06"
45' 04"
45' 02"
36° 45' 00"
44' 58"
44' 56"
44' 54"
44' 52"
44' 50"
44' 48"
44' 46"
44' 44"
44' 42"
36° 44' 40"
44' 38"
44' 36"
44' 34"
44' 32"
44' 30"
44' 28"
44' 26"
44' 24"
44' 22"
36° 44' 20"

31' 10" 31' 08" 31' 06" 31' 04" 31' 02" 83° 31' 00" 30' 58" 30' 56" 30' 54" 30' 52" 30' 50" 30' 48" 30' 46" 30' 44" 30' 42" 83° 30' 40" 30' 38" 30' 36" 30' 34" 30' 32" 30' 30" 30' 28" 30' 26" 30' 24" 30' 22" 83° 30' 20" 30' 18" 30' 16" 30' 14" 30' 12" 30' 10" 30' 08" 30' 06" 30' 04" 30' 02" 83° 30' 00" 29' 58" 29' 56"

Balkan
Tom Betsie Branch
Fork
Campbell
Branch
Blacksnake
Branch
Jennie Branch
Blacklick
Oaks
Coal Stone Branch
Br
Betsie Gap
Jackson Knob
MOUNTAIN
BELL CO
HARLAN CO

PERMIT# 807-8049, 407-8009, 807-8057
PERMIT# 807-5207, 807-5053, 807-5220
PERMIT# 807-0342
PERMIT # 807-0339
HAUL RD. "A"
HAUL RD. "B"
HAUL RD. "C"
HAUL RD. "D"
HAUL RD. "E"
SW009
SW004
SW024
BC-322
BC-318
BC-341
HF# 0
HF# 1
HF# 2
HF# 3
HF# 4
HF# 5
SS#1 SS#2 SS#3 SS#4 SS#5
SS#6 SS#7 SS#8 SS#9 SS#10 SS#11 SS#12 SS#13 SS#14 SS#15 SS#16 SS#17 SS#18 SS#18A SS#19 SS#20 SS#21 SS#22 SS#22A SS#23 SS#24 SS#25 SS#26 SS#27 SS#28 SS#29 SS#30 SS#31 SS#32 SS#33 SS#34 SS#35 SS#36 SS#37 SS#38 SS#39 SS#40
"ACTIVE" Pond 1-15
100' Buffer
Strip Mines
Mine
Cem

I, _____ (signature) 12575 (registration no.) 12-21-07 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

STATE OF KENTUCKY DON R. ROBERTS 12,575 LICENSED PROFESSIONAL ENGINEER

Nally & Hamilton Enterprises Inc.
Jackson Mountian #2
Permit #: 807-0355
Quadrangle: Balkan, Varilla

Blasting Map

Scale: 1"= 500'

24.4 Describe, in "Attachment 24.4.A", the blast warning, all-clear signals and site access control procedures to be used. Also, describe how all persons within one-half mile of areas affected by surface operations or facilities will be notified of the meaning of the blast signals.

See Attachment 24.4.A

24.5 Does the proposed surface mining operation include blasting operations using more than five (5) pounds of explosives? ☒ YES ☐ NO. If "YES", submit a sample copy of the blasting schedule to be published in a newspaper of general circulation in the locality of the blasting operation. Describe the procedure for circulating the schedule to the DSMRE regional office, local governments, public utilities, and to each resident within a one-half mile of areas affected by surface operations or facilities in accordance with 405 KAR 16:120, Section 3. Submit as "Attachment 24.5.A".

See Attachment 24.5.A - 24.5.A (1)

24.6 Describe how all residents within one-half mile of areas affected by surface operations or facilities will be informed about the procedure for requesting a preblast survey, and the procedures for recording and reporting to DSMRE the results of any requested preblast surveys. Submit this description as "Attachment 24.6.A".

See Attachment 24.6.A - 24.6.A (1)

24.7 Describe the procedures to be used for insuring that airblasts are controlled in accordance with 405 KAR 16:120 or 18:120. Submit description as "Attachment 24.7.A".

See Attachment 24.7.A

24.8 Describe the procedures to be used to control flyrock and how prevention of adverse impacts of blasting will be ensured in accordance with 405 KAR 16:120 or 18:120. Submit this description as "Attachment 24.8.A".

See Attachment 24.8.A

24.9 Will blast monitoring equipment be utilized in lieu of the scaled distance equations presented in Appendix C of 405 KAR 16:120 or 405 KAR 18:120? ☒ YES ☐ NO. If "YES", provide a description of the types, capabilities, sensitivities and locations of the equipment proposed for use. Submit this description as "Attachment 24.9.A".

See Attachment 24.9.A

25. Backfilling and Grading Plan

25.1 Describe the methods to be used for backfilling and grading the proposed permit area, including soil stabilization and compaction practices. Provide a map and/or appropriate cross-sections to illustrate and define the proposed postmining configuration of the permit area. If cross-sections are used identify the location of the cross section on the MRP map or other appropriate map. Provide this information as "Attachment 25.1.A".

See Attachment 25.1.A - 25.1.P

25.2 Is a variance requested from approximate original contour requirements for any portion of the proposed permit area? ☐ YES ☒ NO. If "YES", provide as "Attachment 25.2.A", the following information:

(a) A complete description, including location, of the area(s) for which a variance is requested.

(b) A detailed explanation of how the applicant meets the "criteria for approval" under one or more of the following regulations: (1) 405 KAR 8:050, Section 4, mountaintop removal; (2) 405 KAR 8:050, Section 6, steep slopes; (3) 405 KAR 16:190, Section 4, thin overburden; (4) 405 KAR 16:190, Section 5, thick overburden; (5) 405 KAR 16:190, Section 7, remining.

25.3 Provide complete calculations on spoil generation and disposal for the proposed permit area. Include a stability analysis to demonstrate that backfilled benches will meet a minimum static safety factor of 1.3. Submit this information as "Attachment 25.3.A".

See Attachment 25.3.A - 25.3.A (2)

ATTACHMENT 24.4.A

Prior to detonation of any blast, a warning signal will be sounded. The warning signal shall consist of a one (1) minute series of long blasts on a siren five minutes prior to blast signal. The blast signal shall consist of a series of short blasts one (1) minute prior to the shot. The siren used to sound these warnings shall be audible to a minimum of ½ mile. The sounding of the blast signal will be conducted after the area has been visually inspected for persons or domestic animals near the blast site. Once detonation has been accomplished, the site will again be visually inspected to insure safe conditions. A prolonged blast on the siren following the inspection of the blast area will be sounded to designate "all clear".

All roads leading to the site will be properly blocked to prohibit public access during blasting operations. Company vehicles or machinery will be used to block the roadway.

All persons within one-half mile of the site will be notified by mail or hand delivering of a copy of the blasting schedule which includes signals and times proposed for blasting. Further, the siren will be used to alert residents of immediate blasts. Also, signs will be erected on the site to inform the public approaching the site.

Each person within ½ mile of the permit area will be notified as to the meanings of audible signals.

Blasting will be conducted Monday through Saturday, each day not before sunrise or after sunset. There will be no scheduled blasting after sunset except in an emergency situation. Unscheduled blasting may occur in an emergency situation where weather, atmospheric conditions, operator safety, or public safety requires unscheduled detonation.

All unscheduled blast shall be conducted in accordance with 405 KAR 16:120 Section 4 (1) (b) 1-3 and (c).

ATTACHMENT 24.5.A

A copy of the blasting schedule will be mailed or hand delivered in some cases to residents within ½ mile of the site. Further, a copy will also be mailed to the Department for Natural Resources' Regional Office, all public utilities, and the local government. Mailing will be accomplished prior to any blasting on the site. Signs will be erected on the site to further inform the public of signals, etc....

Prior to detonation of any blast, a warning signal will be sounded. The warning signal shall consist of a one (1) minute series of long blasts on a siren five minutes prior to blast signal. The blast signal shall consist of a series of short blasts one (1) minute prior to the shot. The siren used to sound these warnings shall be audible to a minimum of ½ mile. The sounding of the blast signal will be conducted after the area has been visually inspected for persons or domestic animals near the blast site. Once detonation has been accomplished, the site will again be visually inspected to insure safe conditions. A prolonged blast on the siren following the inspection of the blast area will be sounded to designate "all clear".

All blasts will require notifying each resident within ½ mile at least 1 (one) hour prior to detonation. This will be accomplished visiting each resident and verbally notifying them or by leaving a notice giving details of anticipated blasting time, location and warning signals.

A complete written report of unscheduled blasting or blasting at night will be filed by the permittee with the cabinet not later than three (3) days after the unscheduled blasting or the night blasting, not including Saturdays, Sundays, or legal holidays. The report shall include a detailed description of the reasons for the delay in blasting including why the blast could not be held over to the next day, identification of the time at which the blast was actually conducted, a description of the warning notices given, and a copy of the blast record required by Section 6 of 16:120.

Prior approval for conducting the blasting between sunset and sunrise will be obtained from the Kentucky Department of Mines and Minerals.

ATTACHMENT 24.5.A (1)

To Be Published In: Middlesboro Daily News

NOTICE OF BLASTING SCHEDULE

Permit Number 807-0355

In accordance with the provisions of 405 KAR 16:120, Section 3, Nally & Hamilton Enterprises, Inc., P.O. Box 157, Bardstown, KY 40004, telephone number (606) 878-1500, shall conduct blasting operations on its 724.34 acre surface mine, permit number 807-0355, located 0.25 mile southwest of Tejay in Bell County.

Blasting will be conducted Monday through Saturday, each day not before sunrise or after sunset. There will be no scheduled blasting after sunset except in an emergency situation. Unscheduled blasting may occur in an emergency situation where weather, atmospheric conditions, operator safety, or public safety requires unscheduled detonation. Any major alteration of this blasting schedule will be published in this paper.

Control of the blasting area will be obtained by the blocking of any access roads near the area prior to blasting. Prior to detonation of any blast, a warning signal will be sounded. The warning signal shall consist of one (1) minute series of long blasts on a siren five minutes prior to the blast signal. The blast signal shall consist of a series of short blasts one (1) minute prior to the shot. The siren used to sound these warnings shall be conducted after the area has been visually inspected for persons or domestic animals near the blast site. Once detonation has been accomplished, the site will again be visually inspected to insure safe conditions. A prolonged blast on the siren following the inspection of the blast area will be sounded to designate "all clear".

ATTACHMENT 24.6.A

Blasting operations will not begin until all residents or owners of dwellings located within one-half mile of the permit area have been notified of how to request a preblast survey. This notice will be given at least thirty days prior to initiation of any blasts. This notification will be mailed or hand delivered to each resident and will inform the resident that he may make the request for a preblast survey in writing to the permittee or the Cabinet.

If a request is made, the permittee will promptly perform the survey prior to the initiation of blasting if the request has been made ten days or more before the planned blasting operations begin.

The results of any survey will be prepared and signed by the person who conducted the survey including any recommendations for adjustments to the blasting plan. The final report will then be kept on file in the office of the permittee or his engineer.

Copies of the report shall be promptly provided to the person requesting the survey and the Cabinet.

A signed copy of any preblast survey conducted will be submitted to appropriate Regional Office atfer completion of the survey.

ATTACHMENT 24.6.A (1)

NOTICE OF YOUR RIGHT TO REQUEST A PREBLASTING SURVEY

(name and address of resident or owner)

_____

_____

_____

_____

_____

Telephone: _____

Your home, school, church, shop or other manmade structure is located within 1/2 mile of the surface mining permit no. 807-0355, of Nally & Hamilton Enterprises, Inc. The mining operation is located in the Tejay area of Bell County. The latitude is 36°45'28.06", and longitude is 83°31'47.22".

Federal and state laws and regulations (405 KAR 16:120/18:120, Section 2) require that the coal permittee notify residents or owners of any manmade structures within 1/2 mile of the permit area of their to request a preblasting survey of the structure. This survey is conducted at no charge to the resident/owner and it is done at the resident's/owner's convenience.

It is not expected that the blasting will cause any problems or damage. However, a preblasting survey is required and conducted for the protection of the resident's/owner's property. The survey will determine and document the existing condition of the structure(s), and any physical factors that could reasonably be affected by the blasting. If wells are used for the water supply, a water sample will be taken and included with the survey. In addition, the permittee should be notified (by the resident/owner) if any changes are made to the structure so the survey can be updated.

Upon completion of the survey, the original copy will be on file at the mine office, one copy will be sent to the regional office of the Division of Mine Reclamation and Enforcement, (DMRE), and one copy will be sent to the resident/owner. If the resident/owner disagrees with the results of the survey, he can notify (in writing) both the permittee and DMRE. You can request the survey by writing either:

DMRE Regional Office Address:	Permittee Address:
Division of Mine Reclamation and Enforcement	Nally & Hamilton Enterprises, Inc.
1804 East Cumberland Avenue	P.O. Box 157
Middlesboro, KY 40965	Bardstown, KY 40004
Telephone (606) 248-6166	Telephone (606) 878-1500

Please include the following permit number in your request: 807-0355

Sincerely,

_____

ATTACHMENT 24.7.A

Airblasts shall be controlled in a manner not to exceed values specified in Appendix A (Airblast Limitations) also found at Attachment 24.7.A (1). Airblast will be controlled at any public building, school, church, commercial, community or institutional building outside the permit area.

Periodic monitoring of airblasts shall be conducted to include monitoring as follows:

Three (3) consecutive blasts will be monitored at least one time during the period from January - June and three (3) consecutive blasts will be monitored at least one time during the period from July - December.

Airblast monitoring will be conducted at dwellings nearest the particular blast being detonated unless worst case conditions warrant otherwise.

Equipment will include an extension unit to the seismograph which shall have a flat frequency response of a least 2 Hz or lower (133 peak dB max. level) or a 6 Hz or lower (129 peak dB max. level).

If necessary, airblasts will further be reduced by use of loose material placed over the shot or by increasing the depth of stemming from the surface.

Records of each air blast, along with associated blasting records in accordance with 405 KAR 16:120 Section 6 will be kept at the company office for at least 5 years.

ATTACHMENT 24.8.A

Flyrock, including blasted material traveling along the ground, may not be cast from the blast site more than half the distance to the nearest structure and in no case beyond the boundary of the permit area.

Flyrock shall be controlled as necessary by increasing stemming of holes or by placement of loose material over the top of the blast. Other measures may include a blasting blanket constructed of steel wire mesh to restrict potential flyrock. Care will be taken to ensure that no hole to be detonated is excessively close to the "free edge" of the proposed shot area.

Every effort will be made to prevent adverse effects to area residents, utilities and roads. Special consideration will be given to any of these facilities prior to each blast. Planning will be employed to keep vibration, dust and noise associated with blasting to a minimum. However, safety will be the first consideration throughout the entire time of the operation.

The blasting plan will initially utilize scaled-distance equations. As blasting approaches any dwellings, utilities or other facilities, a seismograph will be utilized in conjunction with the equations. The pounds per delay will be considered along with seismic readings at the nearest dwelling. Weights may then be gradually increased until the approximate powder factor is reached or the peak particle velocity limits are approached as stated in Appendix B. This method will provide added safety precaution to aid in prevention of damages and violations.

The proposed mining operations will at all times ensure motorist safety on the public roads in the area. When blasting operations are within 800 feet of a public road, and to insure public safety, the applicant will require that traffic be stopped until the all-clear signal is sounded. Precautions may include industry accepted practices and/or stopping traffic. If traffic is stopped, flagmen will coordinate with the blaster to insure that traffic has been stopped. If traffic is not stopped, spotters will be posted on the roadway before each blast. The spotters will coordinate with the blaster to insure that all detonation, within the 800 feet of public roadways, will be during no traffic flow. Blasting should be avoided during periods of heavy usage or when school buses are picking up or returning children to their homes, unless weather conditions or an emergency warrant detonation. Access to the permit area will be closed prior to any blasting and the road will remain closed until the area is determined safe. Also, mining will be conducted in such a way to prevent spoil from leaving the permit area and entering the public road. Signs will be posted in areas where trucks will be entering and leaving the public roadways, adequate to alert traffic on said roads.

ATTACHMENT 24.8.A (1)

The blaster will be in charge of all blasting activities. The applicant will provide the certified blaster with a complete copy of the approved blast plan contained in the permit package. Anytime a new blaster is placed in charge, he/she will also receive a copy of the complete plan.

A drill log, along with a brief description of any geological anomalies such as voids, mud seams, major fractures and fissures, underground workings, water encountered, and variations in downhole drilling pressure, deviation of holes, etc....which would aid the certified blaster in designing the blast to prevent flyrock and adverse impacts will be provided to the blaster.

The driller will include any other pertinent observations in designing the blast to prevent flyrock depending upon various conditions encountered during drilling.

Attachment No. 24.9

Seismograph Monitoring

Seismograph monitoring will be conducted along with the use of weight distance equation.

SEISMOGRAPH TYPE : White, Alpha Seismite

CAPABILITY : Will record the maximum peak particle velocity. Both the largest or the peak particle velocities measured in three mutually perpendicular directions and vector the sum thereof.

SENSITIVITY : Range is from 0 to 5" per second particle velocity.

LOCATION : Nearest structure, Seismograph will be located at houses or other structures affected by the surface blasting as needed. However the seismograph will be located at the nearest structure if the scale distance equation is exceeded.

Blasts will be monitored at the nearest structure. Seismograph data will be obtained and used in determining if any limits are exceeded.

At least three (3) consecutive blasts will be monitored as per 405 KAR 16:120.

Seismic	Range	10 in/s (254 mm/s)
	Resolution	0.005 in/s (0.127 mm/s), to 0.000625 in/s (0.0159mm/s) with built in preamp
	Trigger Levels	0.005 to 10 in/s (0.127 to 254 mm/s) in steps of 0.001 in/s (0.01 mm)
	Frequency Analysis	National and Local Standards for all countries
	Accuracy	3% at 15 Hz
	Acceleration, Displacement	calculated using entire waveform, not estimated at peak
Air Linear	Range	88-148 dB (500 Pa peak)
	Resolution	0.1 dB above 120 dB (0.25 Pa)
	Trigger Levels	100-148 dB in 1 dB steps
	Accuracy	0.2 dB at 30 Hertz and 127 dB
A Weight (optional)	Range	50 to 110 dB in steps of 0.1 dB
Sampling Rate		Standard 1024 samples per second per channel to 16, 384 (8,192 for 8 channel)
Event Storage	Full Waveform events	300 standard, 900 and 1500 optional at standard sample rates of 1024
	Summary Events	1750 standard, 5250 and 8750 optional at standard sample rates of 1024
Frequency Response	2 to 300 Hz	Ground and Air, independent of record time
Full Waveform Recording	Fixed Record Modes	Manual, single shot, continuous and programmed start/stop
	Fixed Record Time	1 to 100, 300 to 500 sec plus 0.25 sec pretrigger
	Auto Record	1 to 100, 300 to 500 sec plus 0.25

807-0355

	Mode	sec pretrigger
Strip Chart Recording	Record Method	Record to memory and/or internal printer. Program interval 5, 15, 60 or 300 sec.
	Days Storage	3, 9 or 15 days at 5 second interval. 34, 107 or 180 days at 5 minute interval
Special Functions	Timer Operation	Programmed start/stop
	Self Check	Programmable daily Check
	Scaled Distance	Weight and distance stored with event
	Monitor Log	History printout programmable up to all events stored
	Measurement Units	Imperial or metric, dB or linear air pressure, or in units of custom sensors
	Location	Log GPS (Global Positioning System) data into record
Printer (BlastMate only)	Resolution	576 dots/line and 0.0049 inches (00.125mm) per dot
	Print Time	Less than 10 seconds for typical 1 second event with full analysis
	Paper Control	Paper tear slot or automatic paper takeup, seperate keys for feed and takeup
	Rated Life - print head	18 miles (30 km) of printing
	# of Copies	1 to 10 automatic, any number manual.
User Interface	Keyboard	64 domed tactile with seperate keys for common functions. (Minimate plus 8 keys)
	Display	4 line by 20 character high contrast backlit display with on line help
Battery Life	MiniMate Plus	10 days continuous recording, 25 days with timer
	BlastMate	30 days continuous recording, 70 days with timer, printing will decrease life
Dimensions	MiniMate Plus	3.2" x 3.6" x 6.3" (81 mm x 91 mm x 160 mm)
	BlastMate	10.6" x 14" x 6.5" (269 mm x 355 mm x 165 mm)
Weight	MiniMate Plus	3 lbs. (1.4 kg)
	BlastMate	14 lbs. (6.4 kg)

ATTACHMENT 25.1.A

807-0355

CONTEMPORANEOUS RECLAMATION VARIANCE

A variance is being requested for time and distance to comply with the revised regulations, 405 KAR 16 : 020 Section 6, Supplemental Assurance. A variance is needed to meet marketing demands for different coal qualities, quantity, and the large amount of equipment and manpower and many different operations that need to be executed at the same time. The different working areas needed are for clearing & grubbing, topsoil removal, drill benching, drill operations, blasting area, overburden removal by dozer, overburden removal by loader trucks, final pit preparation, and coal loading areas. Each operation needs a separate working area so it will not interface with the other ongoing operation and to ensure continuous coal loading operations so that coal contracts can be met. The additional time is needed so that the highwall can be eliminated by progressive mining. We are requesting a distance of nine thousand (9,000) linear feet and a time of 360 days for backfilling and grading to approximate original contour. Supplemental assurance per each additional section (1,500 feet) will be submitted upon activation as concurrently as possible and in a timely manner in order to minimize the time period in which disturbed areas are exposed prior to reclamation. The proposed number of spreads of equipment that will be utilized at any one time will be (6) six to (15) fifteen.

SUPPLEMENTAL ASSURANCE BONDING CALCULATIONS:

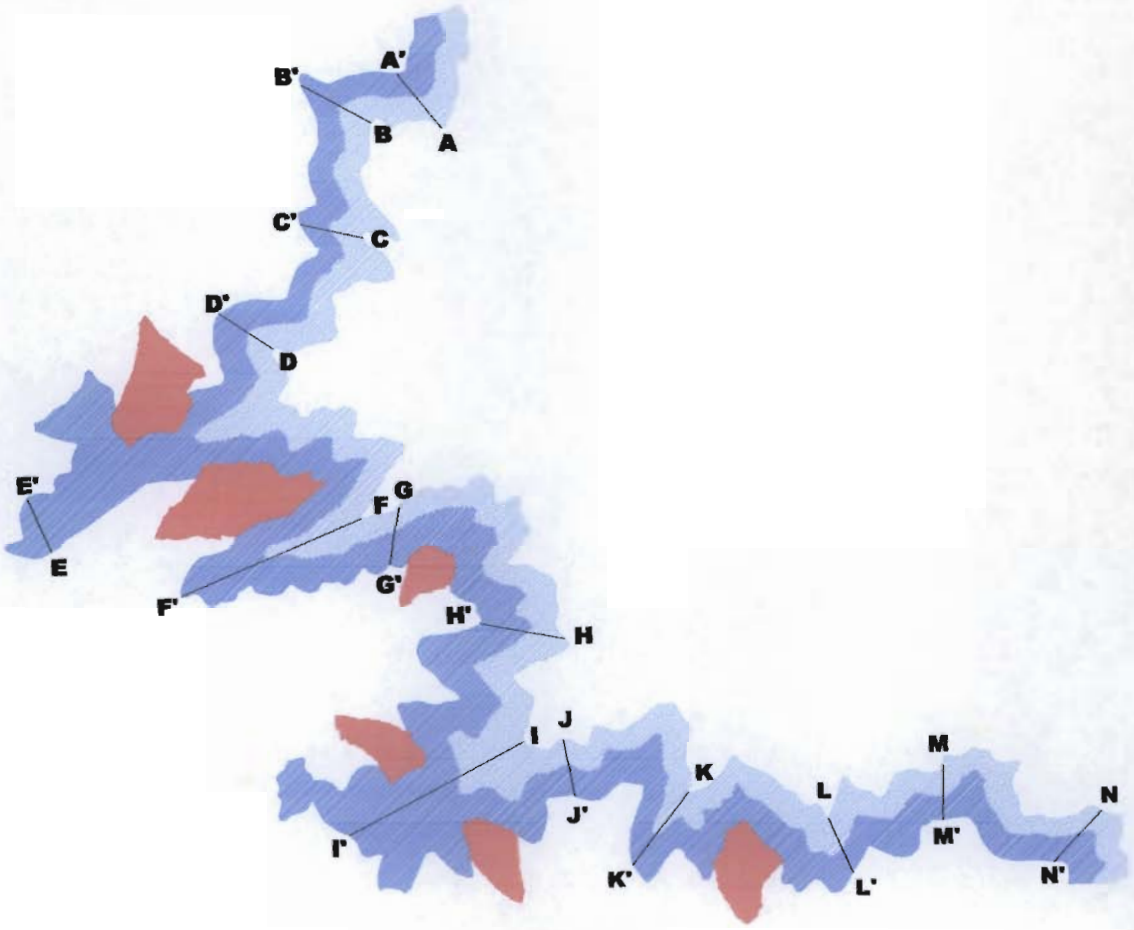
The original bonding will initially apply to the original 1,500' of mining area. From the total of 9,000' requested under the Alternate Contemporaneous Reclamation standards a total of 7,500 feet will have an additional $50,000.00 of Supplemental Assurance Bond for each 1,500 foot section. Therefore, 7,500' divided by 1,500' = 5; 5 sections X $50,000.00=$250,000.00 in Supplemental Assurance Bond. The Supplemental Assurance Bond will be submitted as needed. Each section may contain multiple pits.

Summary:

9,000' total length of wall
9,000' - 1,500' (Initially bonded) = 7,500'
7,500' ÷ 1,500' sections = 5 additional sections
5 X $50,000.00 = $250,000.00 in Supplemental Assurance Bond

ATTACHMENT 25.1.B

CROSS SECTION MAP



NOT TO SCALE

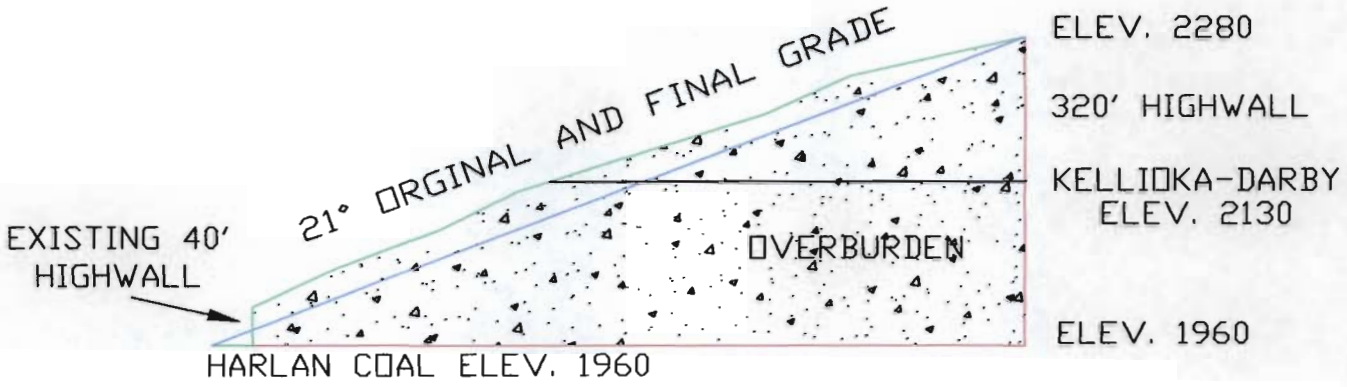
WORST CASE D'-D

I, _____, 12575, 04/09/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.C

CROSS-SECTION A'-A

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

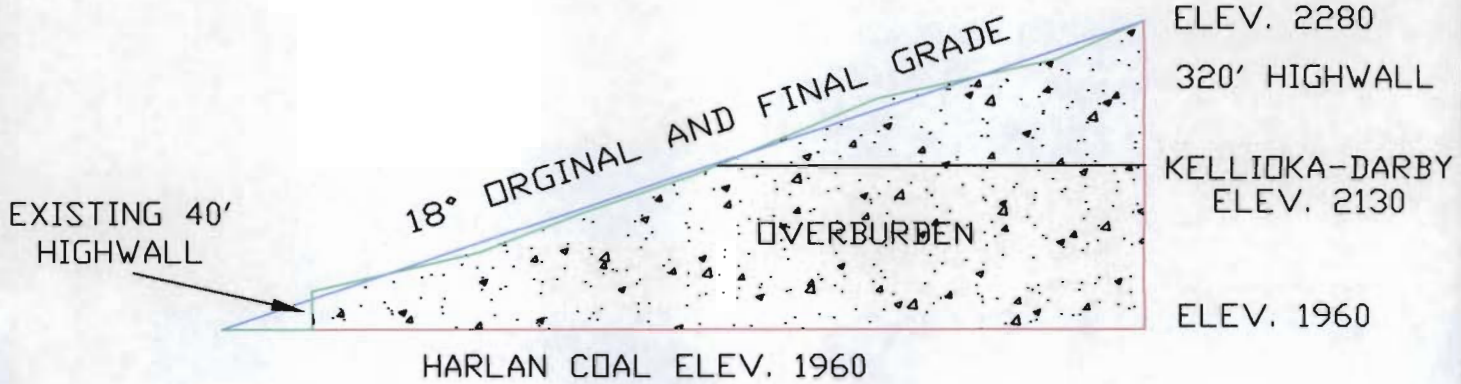
OVERBURDEN

I, _____ 12575 04/09/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.D

CROSS-SECTION B'-B

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

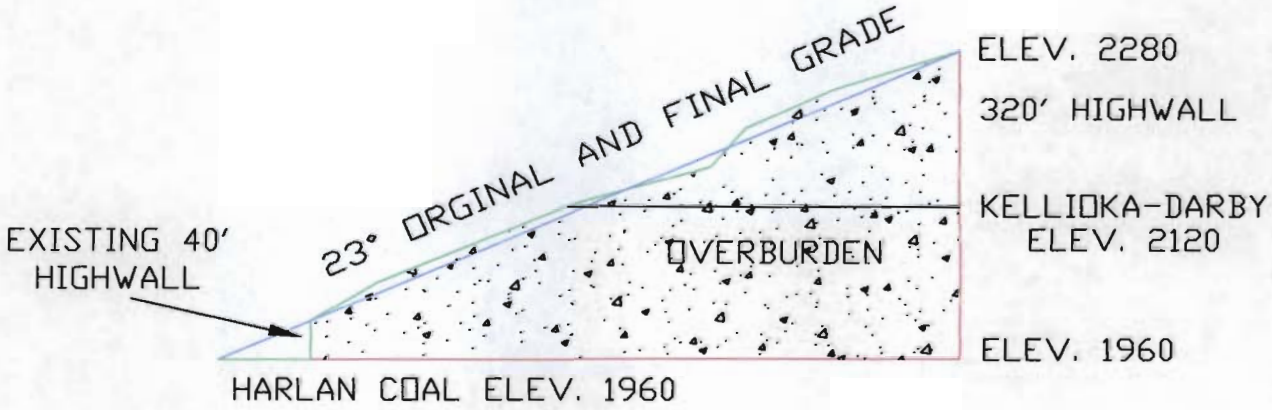
OVERBURDEN

I, _____, 12575, 04/09/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.E

CROSS-SECTION C'-C

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

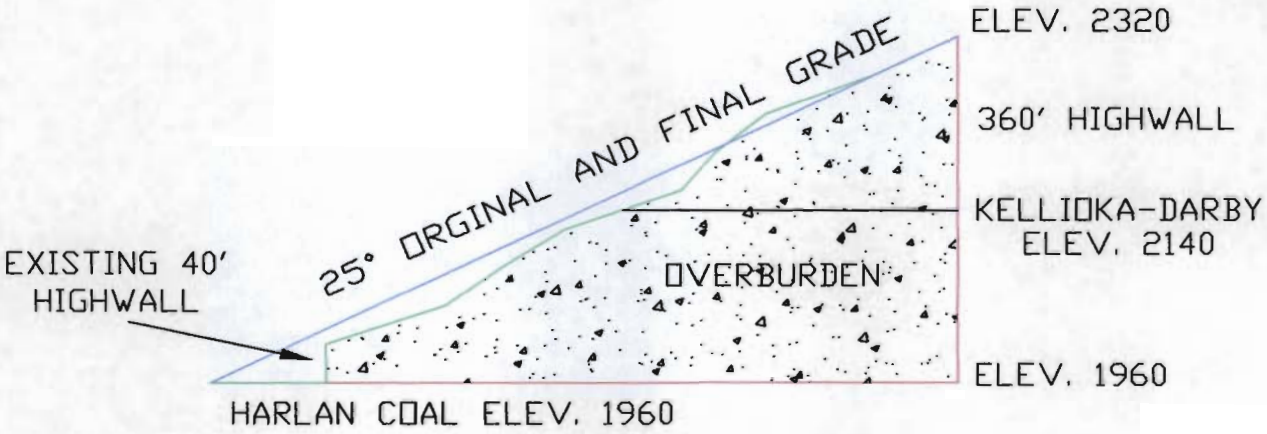
OVERBURDEN

I, [signature], 12575, 04/09/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.F

CROSS-SECTION D'-D

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

I, [signature] 12575 04/09/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.G

CROSS-SECTION E'-E

1"= 200'

ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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(signature) (registration no.) (date)
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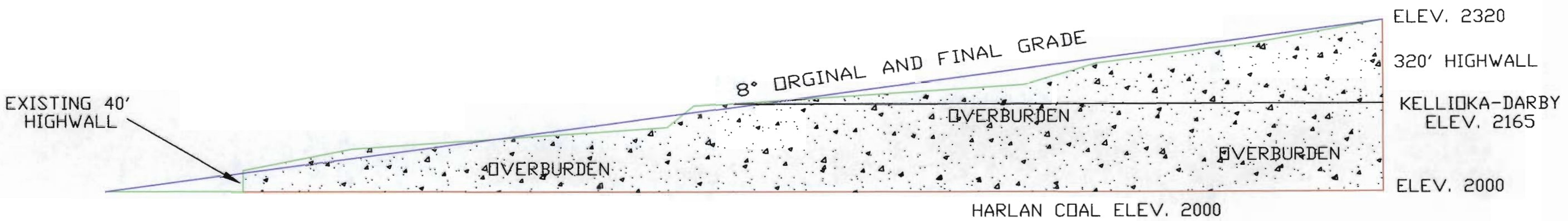
ATTACHMENT 25.1.H

CROSS-SECTION F'-F

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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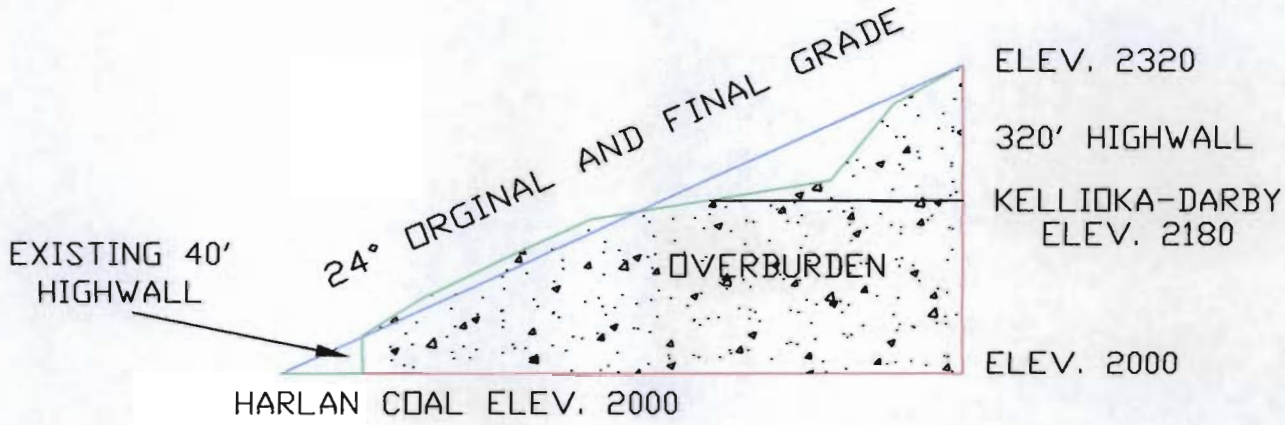
ATTACHMENT 25.1.I

CROSS-SECTION G'-G

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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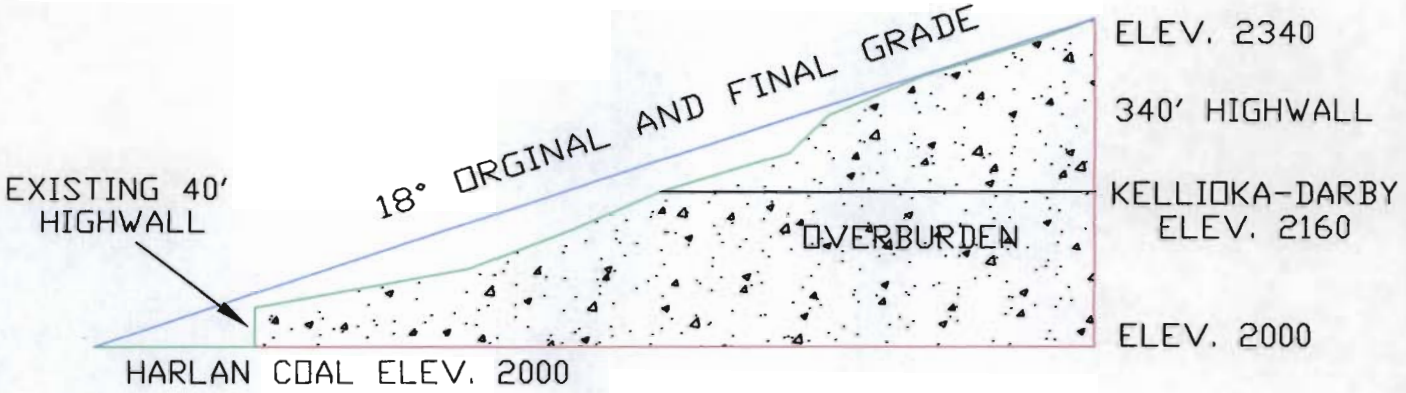
ATTACHMENT 25.1.J

CROSS-SECTION H'-H

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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(signature) (registration no.) (date)
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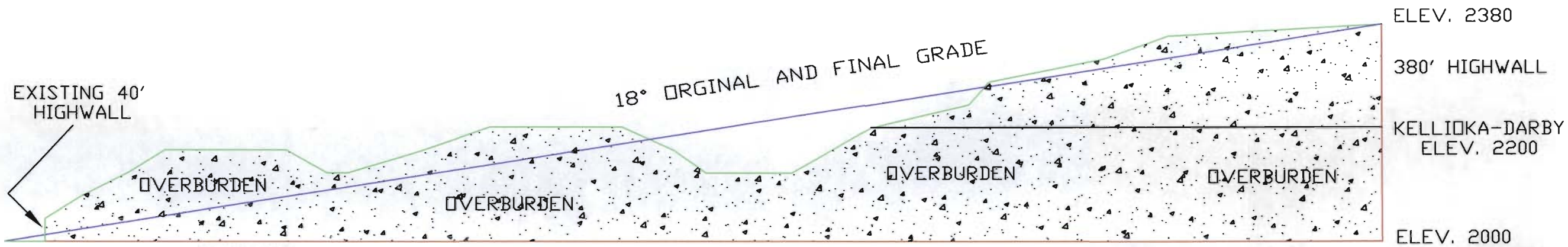
ATTACHMENT 25.1.K

CROSS-SECTION I'-I

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

I, _____, 12575, 04/09/07.
(signature) (registration no.) (date)
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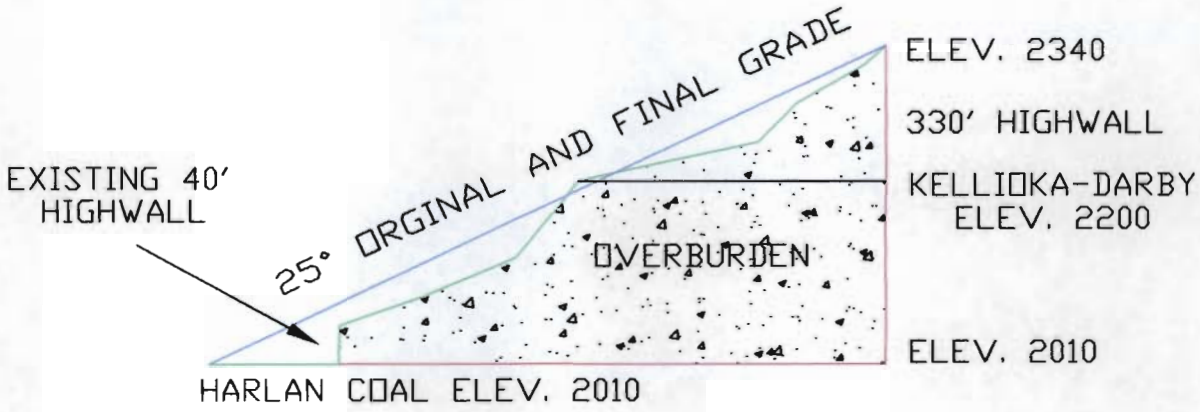
ATTACHMENT 25.1.L

CROSS-SECTION J'-J

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

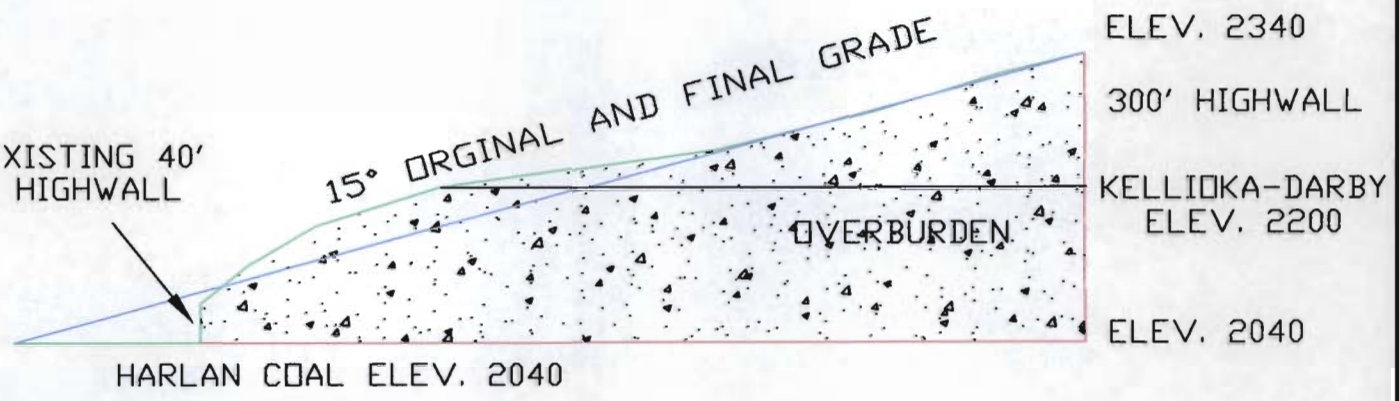
OVERBURDEN

I, _____ (signature), 12575 (registration no.), 04/09/07 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 25.1.M

CROSS-SECTION K'-K

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

I, _____ 12575 04/09/07
(signature) (registration no.) (date)
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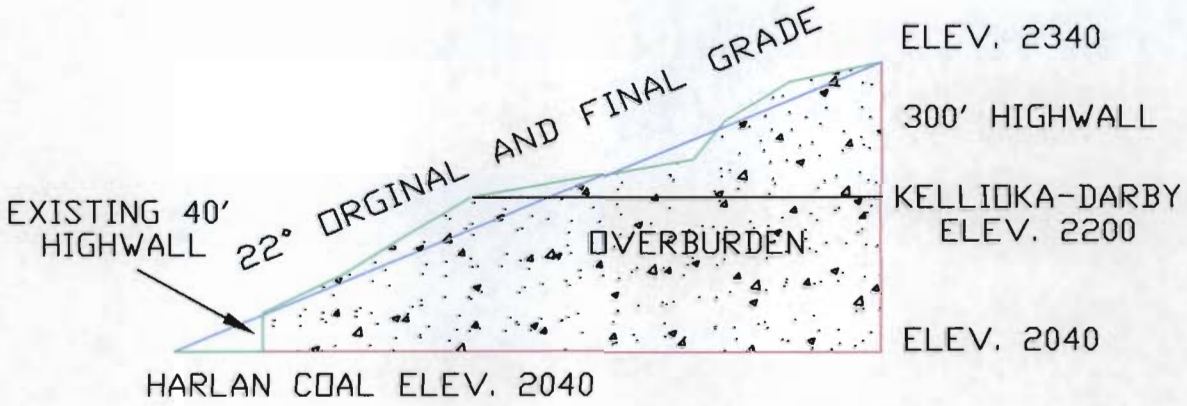
ATTACHMENT 25.1.N

CROSS-SECTION L'-L

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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(signature) (registration no.) (date)
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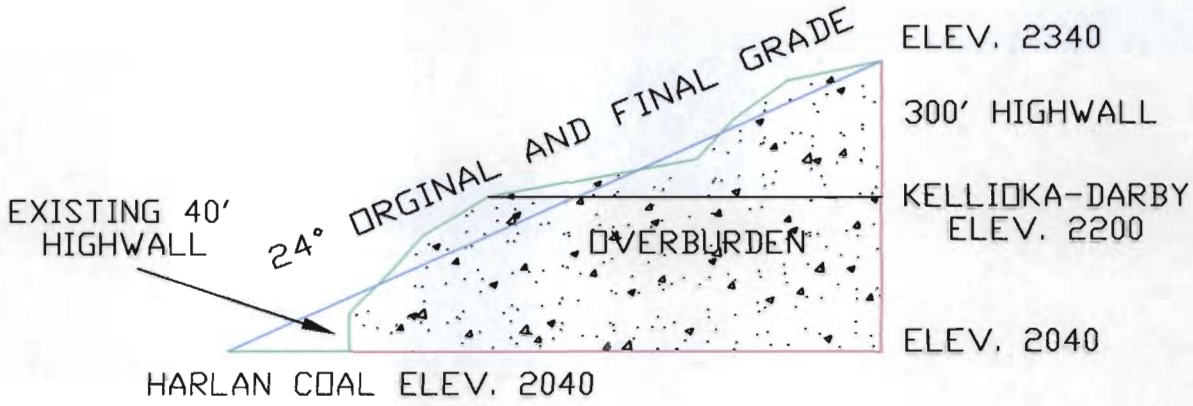
ATTACHMENT 25.1.0

CROSS-SECTION M'-M

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

I, [signature], 12575, 04/09/07
(signature) (registration no.) (date)
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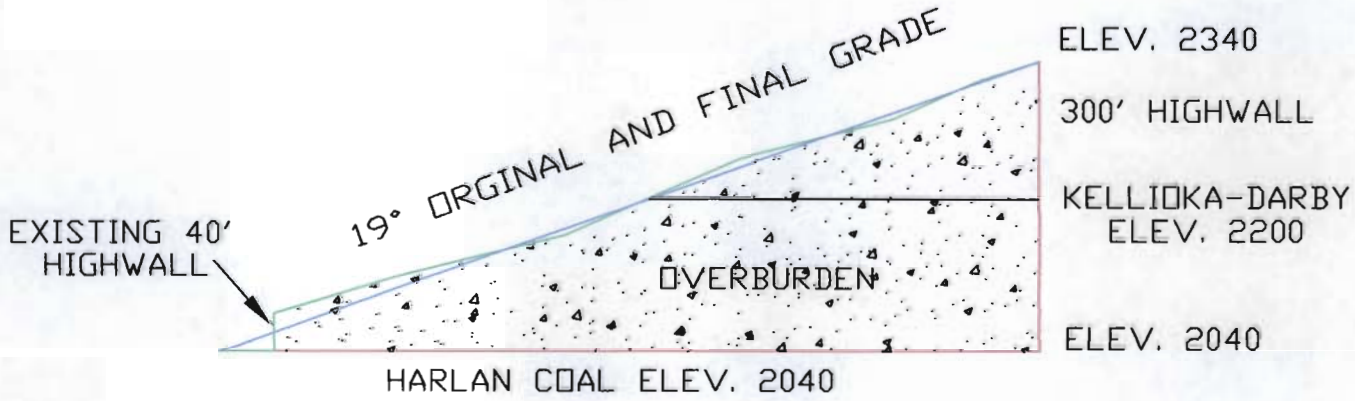
ATTACHMENT 25.1.P

CROSS-SECTION N'-N

1"= 200'



ORIGINAL GRADE/PRE MINING GROUND
FINAL GRADE/POST MINING GROUND
DURING MINING GROUND

OVERBURDEN

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(signature) (registration no.) (date)
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ATTACHMENT 25.3.A

Spoil Calculations

Generated spoil:(from Autocad 2006 DTM software)		=112,404,966.67 cy
(566.46 acres-116.96 previous mined acres=449.5 acres coal removal)		
Total Coal Removed:		= 6,429,447.93 cy
DARBY	3.0' of coal@217.78 acres	1,054,055.20 cy
KELLIOKA	2.75' of coal@217.78 acres	966,217.27 cy
HARLAN	6.08' of coal@449.5 acres	4,409,175.47 cy
Remaining Spoil		=105,975,518.73 cy
Swell 25%:		= 26,493,879.68 cy
Total Generated Spoil		=132,469,398.42 cy
Storage: Return to A.O.C.		=122,918,043.60 cy
(449.5 coal removal acres + 116.96 previous mined=566.46 bench storage acres)		
Remaining Material:		= 9,551,354.82 cy ✓

Hollow Fill Capacity

	Storage
HF#0	2,315,471.49 cy
HF#1	3,352,302.96 cy
HF#2	480,933.07 cy
HF#3	813,685.91 cy
HF#4	1,045,841.11 cy
HF#5	1,350,659.25 cy
Total	9,358,894 cy √

The remaining 192461 cy of excess spoil will be distributed throughout the bench storage area (566.46 acres) at a depth of 0.21' ✓

I, _____, 12575, 4/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

OVERBURDEN VOLUME

Volumes Report.txt

Volumes Report

Interval: 1
Units: Feet

Fill Compaction Factor: 1

Cut (C.Y.) 112404966.67
Fill (C.Y.) 00000000

Net=Cut Volume (C.Y.) 112404966.67

I, _____ 12575 _____ 4/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted surveying practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405, Chapter 7.

BENCH STORAGE VOLUME WITH PREVIOUS MINING

Volumes Report

Interval: 1
Units: Feet

Fill Compaction Factor: 1

Cut (C.Y.) 00000000
Fill (C.Y.) 122918043.6

Net=Fill Volume (C.Y.) 122918043.6

I, _____, 12575, 4/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, th
this document is correct as determined by accepted engineering
practices and includes all the information required of it by KRS
Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\WCBJMD.DAT

TITLE -WORST CASE BACKFILL JACKSON MT.

NO. OF STATIC AND SEISMIC CASES (NCASE) = 1

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 3
 1  X COORD.= 0             Y COORD.= 2320
 2  X COORD.= 0             Y COORD.= 1960
 3  X COORD.= 777.4538      Y COORD.= 1960

NO. OF POINTS ON BOUNDARY LINE 2 = 2
 1  X COORD.= 0             Y COORD.= 2320
 2  X COORD.= 777.4538      Y COORD.= 1960

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1   99999.000       0.000
 2      -0.463

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1               1              3

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             200           30            125

NO SEEPAGE
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0
INPUT COORD. OF GRID POINTS 1,2,AND 3
```

POINT 1 X COORD. = 320 Y COORD. = 2995
POINT 2 X COORD. = 320 Y COORD. = 2320
POINT 3 X COORD. = 860 Y COORD. = 2320

X INCREMENT (XINC) = 64 Y INCREMENT (YINC) = 64
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
320	2995	1	1	747.011	1000.000	0
320	2860	5	1	627.694	3.026	0
320	2725	5	1	516.164	1.689	0
320	2590	5	1	418.688	1.521	0
320	2455	11	4	293.103	1.579	0
320	2320	8	6	162.291	1.708	0
455	2995	5	1	814.033	1.818	0
455	2860	5	1	706.134	1.524	0
455	2725	5	1	609.139	1.471	0
455	2590	11	10	482.637	1.501	0
455	2455	8	5	345.873	1.555	0
455	2320	8	5	224.949	1.633	0
590	2995	5	1	896.507	1.459	0
590	2860	5	1	799.813	1.442	0
590	2725	11	9	670.536	1.460	0
590	2590	11	9	540.898	1.486	0
590	2455	11	9	414.020	1.523	0
590	2320	11	9	287.142	1.586	0
725	2995	5	1	990.581	1.422	0
725	2860	11	3	857.861	1.434	0
725	2725	11	8	732.502	1.451	0
725	2590	11	8	601.876	1.473	0
725	2455	11	10	474.642	1.504	0
725	2320	11	9	346.159	1.552	0
860	2995	5	1	1038.286	1.417	0
860	2860	5	1	903.778	1.432	0
860	2725	5	1	769.441	1.458	0
860	2590	5	1	635.385	1.506	0
860	2455	5	1	501.836	1.616	0
860	2320	5	1	369.343	1.997	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

320	3130	1	1	870.919	1000.000	0
455	3130	5	1	929.045	3.259	0
590	3130	5	1	1002.098	1.571	0
725	3130	5	1	1087.072	1.425	0

860	3130	5	1	1172.908	1.406	0
320	3265	1	1	997.710	1000.000	0
455	3265	2	1	1048.833	49.009	0
590	3265	5	1	1114.058	1.919	0
725	3265	5	1	1191.071	1.477	0
860	3265	5	1	1277.742	1.404	0
320	3400	1	1	1126.410	1000.000	0
455	3400	1	1	1171.932	1000.000	0
590	3400	5	1	1230.650	3.352	0
725	3400	5	1	1300.779	1.618	0
860	3400	5	1	1380.580	1.430	0
995	3400	5	1	1456.340	1.397	0
995	3265	5	1	1323.008	1.414	0
995	3130	5	1	1190.053	1.442	0
995	2995	5	1	1057.616	1.493	0
995	2860	5	1	925.919	1.594	0
995	2725	5	1	795.331	1.851	0
995	2590	5	1	666.503	2.927	0
995	2455	3	1	540.695	56.118	0
995	2320	1	1	420.626	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	320.000	455.000	590.000	725.000	860.000	995.000
3400.000	1000.000	1000.000	3.352	1.618	1.430	1.397
3265.000	1000.000	49.009	1.919	1.477	1.404	1.414
3130.000	1000.000	3.259	1.571	1.425	1.406	1.442
2995.000	1000.000	1.818	1.459	1.422	1.417	1.493
2860.000	3.026	1.524	1.442	1.434	1.432	1.594
2725.000	1.689	1.471	1.460	1.451	1.458	1.851
2590.000	1.521	1.501	1.486	1.473	1.506	2.927
2455.000	1.579	1.555	1.523	1.504	1.616	56.118
2320.000	1.708	1.633	1.586	1.552	1.997	1000.000

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 2 CENTERS

FACTOR OF SAFETY = 1.397 AT (995.000,3400.000)
FACTOR OF SAFETY = 1.404 AT (860.000,3265.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (995 3400) RADIUS 1456.340
THE MINIMUM FACTOR OF SAFETY IS 1.397

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X	CENTER Y	NO. OF CIRCLE			LOWEST	WARNING
COORDINATE	COORDINATE	TOTAL	CRITIC.	RADIUS	F.S.	
995	3400	5	1	1456.340	1.397	0
1059	3400	5	1	1467.266	1.420	0
931	3400	5	1	1425.890	1.401	0
995	3464	5	1	1516.167	1.393	0

995	3528	5	1	1565.021	1.401	0
1059	3464	5	1	1530.126	1.408	0
931	3464	5	1	1474.957	1.412	0
1011	3464	5	1	1522.025	1.394	0
979	3464	5	1	1505.715	1.397	0
995	3480	5	1	1528.275	1.395	0
995	3448	5	1	1503.819	1.392	0
995	3432	5	1	1487.989	1.394	0
1011	3448	5	1	1506.216	1.395	0
979	3448	5	1	1493.595	1.395	0

AT POINT (995 3448) RADIUS 1503.819

THE MINIMUM FACTOR OF SAFETY IS 1.392

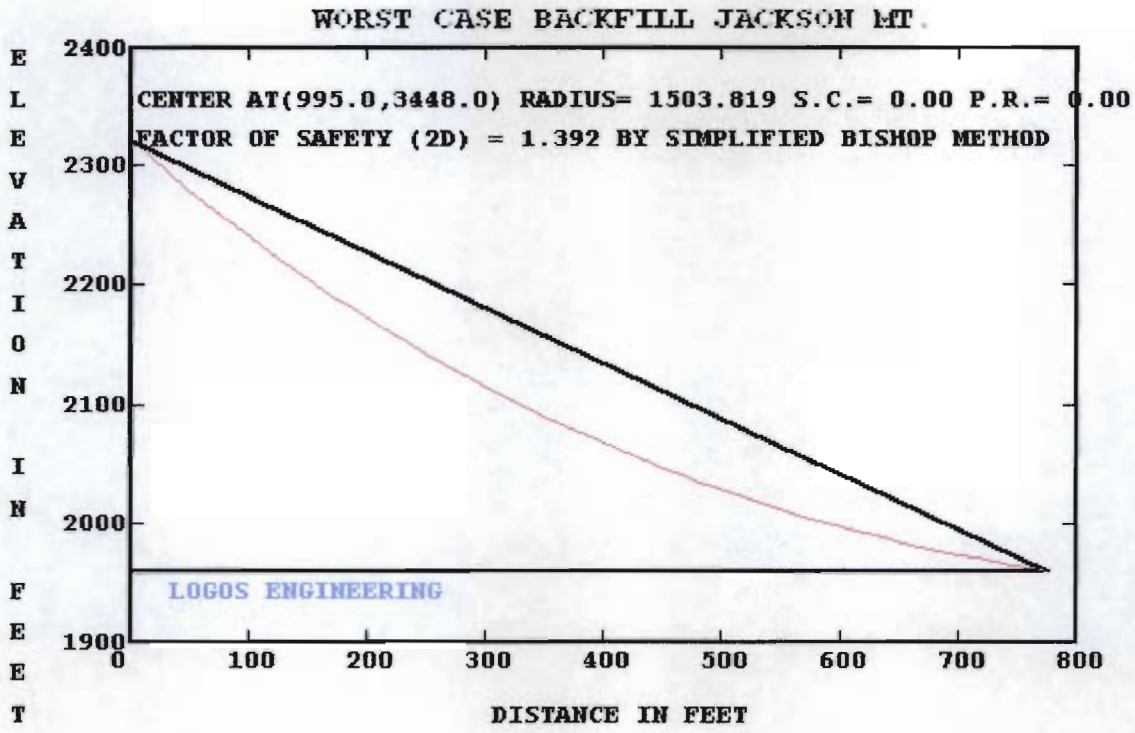
AFTER SEARCH, MINIMUN F.S. STILL FALLS OUTSIDE THE GRID, SO GRID IS EXPANDED

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
320	3535	1	1	1256.433	1000.000	0
455	3535	1	1	1297.401	1000.000	0
590	3535	3	1	1350.676	26.074	0
725	3535	5	1	1414.867	1.995	0
860	3535	5	1	1488.565	1.500	0
995	3535	5	1	1570.430	1.403	0
1130	3535	5	1	1613.974	1.432	0
1130	3400	5	1	1482.528	1.478	0
1130	3265	5	1	1351.782	1.560	0
1130	3130	5	1	1221.961	1.731	0
1130	2995	5	1	1093.396	2.195	0
1130	2860	5	1	966.586	4.488	0
1130	2725	1	1	842.326	1000.000	0
1130	2590	1	1	721.934	1000.000	0
1130	2455	1	1	607.712	1000.000	0
1130	2320	1	1	503.874	1000.000	0

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	77.646	15.069	0.000	-.635	.146E+06	.146E+06	.128E+09	.140E+09
2	1	77.646	38.837	0.000	-.584	.377E+06	.377E+06	.295E+09	.331E+09
3	1	77.646	55.093	0.000	-.532	.535E+06	.535E+06	.421E+09	.428E+09
4	1	77.646	64.728	0.000	-.480	.628E+06	.628E+06	.505E+09	.454E+09
5	1	77.646	68.409	0.000	-.429	.664E+06	.664E+06	.547E+09	.428E+09
6	1	77.646	66.644	0.000	-.377	.647E+06	.647E+06	.545E+09	.367E+09
7	1	77.646	59.827	0.000	-.325	.581E+06	.581E+06	.501E+09	.284E+09
8	1	77.646	48.262	0.000	-.274	.468E+06	.468E+06	.415E+09	.193E+09
9	1	77.646	32.186	0.000	-.222	.312E+06	.312E+06	.288E+09	.104E+09
10	1	77.646	11.782	0.000	-.170	.114E+06	.114E+06	.122E+09	.293E+08
							SUM	.377E+10	.276E+10

AT CENTER (995.000 , 3448.000) WITH RADIUS 1503.819 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.366
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.392



I, _____ (signature) 12575 (registration no.) 04/09/07 (date)

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 370 and KAR Title 405. (Affix engineer's seal)

25.4 Describe the measures to be used to seal or manage mine openings, exploration holes, auger holes, bore holes, wells and other openings within the proposed permit area. Provide design specifications for ensuring stability of each permanent entry seal and down slope barrier. Include all maps, drawings, etc., required to adequately support the description of the proposed measures. Submit this information as "Attachment 25.4.A".

See Attachment 25.4.A

26. Disposal of Excess Spoil

26.1 Are any excess spoil disposal structures proposed for use in the permit area? ☒ YES ☐ NO. If "YES", provide the following information for each proposed structure:

Facility I.D.	Type of Fill	Storage Volume	Type of Underdrain	Natural Ground Slope	Latitude	Longitude
HF #0	Hollowfill	2,315,471.49	Durable Rock	23°	36°44'52.57"	83°32'32.91"
HF #1	Hollowfill	3,352,302.96	Durable Rock	9°	36°44'25.99"	83°32'31.97"
HF #2	Hollowfill	480,933.07	Durable Rock	15°	36°44'17.06"	83°31'55.79"
HF #3	Hollowfill	813,685.91	Durable Rock	15°	36°44'04.10"	83°32'05.69"
HF #4	Hollowfill	1,045,841.11	Durable Rock	13°	36°43'41.35"	83°31'38.76"
HF #5	Hollowfill	1,350,659.25	Durable Rock	13°	36°43'38.00"	83°31'05.21"

ATTACHMENT 25.4.A

This proposed operation includes surface and auger/highwall mining only. Therefore, no mine openings will be created unless an underground application is filed and approved by the Department.

All drilled holes such as exploration points, bored blast holes, monitoring wells, etc... will be completely filled and sealed after use. These holes will be filled either with cuttings from drilling or with earth from the mine site or an adjacent area. Once the holes are filled to within 12 inches of the top, rocks will then be placed in the remaining portion of the hole. These rocks are to be approximately the size of the hole so that they will have to be forced into place. This prevents the top of the filled hole from settling and posing any danger to animals, etc... When the hole has been completely filled, additional earth material will then be placed over the rock and mounted over the hole.

All auger/highwall mining holes will be properly sealed also. Once auger/highwall mining is completed, holes will be sealed by forcing spoil into the openings. Where available, clay material will be used to seal openings. Heavy equipment will force the clay into the bored openings as far as possible. This procedure creates a plug to seal of any drainage from the openings. As noted in the backfilling plan, all high walls will be eliminated, thereby further sealing auger/highwall mining holes. However, where auger/highwall mining is employed, the high wall will be backfilled to a minimum depth of five (5) feet over the top of the coal seam.

Each auger/highwall mining hole discharging water containing toxic-forming or acid forming material shall be plugged within seventy-two (72) hours after completion by backfilling and compacting at least 4 feet of non-toxic, noncombustible, impervious material into the hole to a depth sufficient to a form watertight seal. All discharges shall be treated as necessary to meet the requirements of 405 KAR 16:070, Section 1 (1) (g) until the hole is properly sealed; and each auger/highwall mining hole not discharging water containing acid-forming of toxic-forming material shall be sealed, as above described, to close the opening within thirty (30) days following completion.

26.1 Did construction of any of the above structures start prior to January 18, 1983? ☐ YES ☒ NO. If "YES", provide the information required by 405 KAR 8:030, or 8:040, Sections 25 for existing structures. Submit this information as "Attachment 26.2.A".

26.2 For each proposed excess spoil disposal structure provide a detailed plan (including, but not limited to, all engineering design calculations, cross-sections, maps and designs). Each plan shall meet the requirements of 405 KAR 8:030, Section 27; 405 KAR 8:040, Section 28; 405 KAR 16:130; and 405 KAR 18:130.

Attachment 26.2.A

27. Coal Mine Waste

27.1 Will any coal processing waste or underground development waste be generated or disposed of within the proposed permit area? ☐ YES ☒ NO. If "YES", provide the following information for each disposal area:

Facility I.D.	Type	Storage Volume Cu. Yds.	Latitude	Longitude	Anticipated Construction Date

27.2 Did construction of any of the above structures begin prior to January 18, 1983? ☐ YES ☒ NO. If "YES", provide the information required by 405 KAR 8:030, or 8:040, Section 25 for existing structures. Submit this information as "Attachment 27.2.A".

27.3 Will any coal mine waste be disposed of in abandoned underground mines? ☐ YES ☒ NO. If "YES", provide as "Attachment 27.3.A", the information to satisfy the requirements of 405 KAR 8:040, Sections 27 and 28.

ATTACHMENT 26.3.A

Construction Specifications
For Durable Rock Hollow Fills

Clearing and Grubbing

Initially, clearing and grubbing of portions of the fills will be conducted. These areas will include underdrains, the toe area where rock checks are to be constructed and the upper portions of the fills where dumping will be initiated. Clearing and grubbing may include the entire footprint of the fill to facilitate the Indiana bat habitat handling plan especially concerning, as a minimum, removal of trees during tree cutting periods of mid-November through the end of March.

Material cleared and grubbed will be windrowed along the outside edge of the fills but within the permitted area. This material will serve as a barrier for sediment and provide a wildlife enhancement area.

Rock Check Structures

Rock check dams will be constructed below each fill to minimize siltation below each fill area. These structures will also assist with entrapment of debris that might affect proper functioning of sediment ponds. Period maintenance will ensure that the rock check structures are free of debris as well as sediment build up. Sediment will be removed, prior to final construction of the underdrain and placement of material at the final toe, to ensure that the underdrain functions properly.

Underdrain Construction

The underdrain will be constructed in accordance with designs and drawings attached. The underdrain channel will be prepared by removing organic material and topsoil initially. The channel will be constructed to design depth and width. Durable rock will then be placed in the channel. Underdrain material will be taken from strata designated in the stratigraphic column having an acceptable SDI value. Care will be taken to ensure that underdrain materials are blasted, transported and otherwise handled to maximize integrity relating to its use in the underdrain. Only the most competent materials will be used in underdrain construction.

ATTACHMENT 26.3.A (1)

Initially, the underdrain will be constructed from the top rim of the fill down to the toe. Care will be taken to ensure that the underdrain is not interrupted or improperly constructed prior to placement of fill material.

In no case will outcrop or degraded material be used in underdrain construction. This material will not be placed in or around the drain in a manner that may cause plugging. A minimum of 4 feet of non-degraded material will be used to cover the underdrain to prevent crushing by equipment or plugging of the drain.

Placement of Material

Once underdrains are installed, end dumping will begin around the top perimeter of the fill. Dumping locations will change periodically to promote fill stability by interlocking dumped material. Dumping may also be conducted at lower elevations within the fill if deemed necessary by the Department or by the operator to ensure proper construction. However, in no case will dumping occur outside the footprint of the fill or in any area where the underdrain is not properly constructed.

Keyway cuts are not necessary since fills are designed to toe out on slopes of less than 36%.

Areal reconnaissance did not reveal any springs, abnormal seepages or apparent stability problems. Should springs or seepages be encountered, the underdrain will be extended to intercept these areas to drain off flow. No adverse geologic conditions were noted including faults or underground mines.

ATTACHMENT 26.3.A (2)

All organic material shall be removed from the disposal area and the topsoil will be removed and segregated pursuant to 405 KAR 16:050 Section 1(5)(a) before the material is place in the disposal area.

A system of underdrains constructed of durable rock shall be installed along the natural drainage system, shall extend from the toe to the head of the fill and contain lateral drains to each area of potential drainage or seepage. In constructing the underdrains, no more than ten (10) percent of the rock may be larger than twenty-five (25) percent of the width of the drain. No rock shall be used in underdrains if it tends to easily disintegrate and thereby clog the drain or if it is acid-forming or toxic-forming. The minimum size of the main underdrain shall be:

Total amount of fill material	Perdominant type of fill material	Drain size in feet	
		Width	Height
Less than 1 million cubic yards	Sandstone	10	4
	Shale	16	8
More than 1 million cubic yards	Sandstone	16	8
	Shale	16	16

ATTACHMENT 26.3.A (3)

SDI

An SDI analysis was run on each strata to be placed in the fills and each revealed a value higher than 90%. Therefore, of the material to be place in fills 100% is considered durable material. This, of course, does not include topsoil or coal. Results of SDI analysis are shown on attached geologic sheets.

Stability

In order to maintain stability, the subsoil material will be removed, as modeled in the hollowfill REAME runs, down to rock prior to placement of material.

ATTACHMENT 26.3.B

807-0355

CERTIFICATION OF DESIGN

I, _____ , 

(Signature) (Affix Seal)

12575 , 12/12/07 ,
(Registration No.) (Date Certified)

hereby certify, in accordance with 405 KAR 7:040, Section 10, that the design of each of the following facilities, whose design is included in this application, Application # 807-0355 :

a) is in accordance with accepted engineering practices and recognized professional standards;

b) complies with the design requirements of KRS Chapter 350 and KAR Title 405; and

c) provided that the facility is properly constructed, operated and maintained, is adequate for the facility to meet the applicable performance standards of KRS Chapter 350 and KAR Title 405 insofar as such performance can reasonably be predicted by accepted engineering practices.

FACILITY TYPE: Excess spoil disposal fill
(One facility type only)

FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN	FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN
HF #0	---	12/12/07			
HF #1	---	12/12/07			
HF #2	---	12/12/07			
HF #3	---	12/12/07			
HF #4	---	12/12/07			
HF #5	---	12/12/07			

TYPES OF FACILITIES:

-- sedimentation pond
-- excess spoil disposal fill
-- temporary water impoundment
-- permanent water impoundment
-- coal processing waste impoundment
-- coal processing waste dam
-- coal processing waste bank
-- road
-- postmining land use plan
-- permanent ditches

* Show hazard class, if applicable.

HOLLOW FILL #0

1" = 100'

STRIKE S 41° E

DIP 0.84° NE

PROFILE

UNDERDRAIN

EAST TOP DITCH

TOE OF FILL 2000

2000

COAL

2000

WEST TOP DITCH

CROSS-SECTION

HF# 0

1800

1800.

WEST FACE DITCH

EAST FACE DITCH

1600

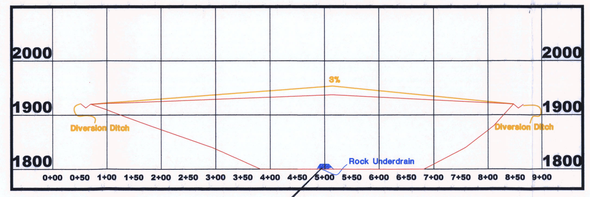
1600

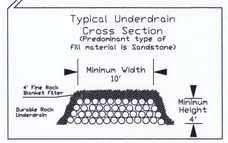
1540

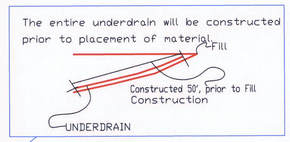
TOE OF FILL 1540

ROCK CHECK DAM

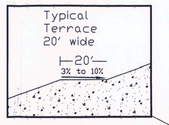
CROSS-SECTION VIEW

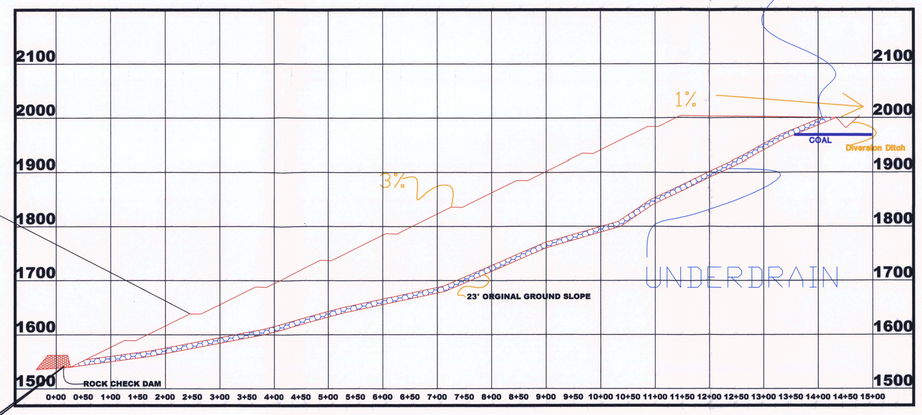


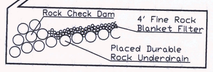




PROFILE VIEW







STATE OF KENTUCKY
DON R. ROBERTS
12575
LICENSED
PROFESSIONAL ENGINEER

I, Don R. Roberts, 12575, 12-12-07
(Signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

Blacksnake #3-Volume Report HF#0.txt

Volume Report 3/5/2007 09:09
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2646207.17,156757.38 to 2647612.17,158577.38
Grid resolution X: 281, Y: 364 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 8,280.0 S.F., 0.19 Acres
Area in Fill: 895,678.4 S.F., 20.56 Acres
Total inclusion area: 903,958.3 S.F., 20.75 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 2.26 Average Fill Depth: 69.80
Max Cut Depth: 11.42 Max Fill Depth: 183.50
Cut (C.Y.) / Area (acres): 33.44
Fill (C.Y.) / Area (acres): 111578.08
Cut volume: 18,735.2 C.F., 693.89 C.Y.
Fill volume: 62,517,730.2 C.F., 2,315,471.49 C.Y.

I, _____, 12575, 4/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

HOLLOWFILL# 0

NEAREST CORE HOLE C-3

		FRICTION ANGLE		
SANDSTONE	127.00 FT.	40	127.00 FT. / 377.00 FT = 33.687%	33.687% X 40 = 13.5
SANDY SHALE	93.00 FT.	37.5	93.00 FT. / 377.00 FT = 24.668%	24.668% X 38 = 9.3
SHALE	157.00 FT.	35	157.00 FT. / 377.00 FT = 41.645%	41.645% X 35 = 14.6
TOTAL	377.00 FT.			FRICTION ANGLE 37.4

COHESION

80% DURABLE ROCK

20% MINE SPOIL

MINE SPOIL COHESION=200

20%X200=40

COHESION=40

12575 4/2/7

(registration no.) (date)

certify in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF0PF.DAT

TITLE -HOLLOWFILL#0 PLANE FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 3

NO. OF POINTS ON BOUNDARY LINE 1 = 12
 1  X COORD.= 0              Y COORD.= 1540
 2  X COORD.= 146.5309       Y COORD.= 1559.932
 3  X COORD.= 355.5782       Y COORD.= 1599.835
 4  X COORD.= 500.6332       Y COORD.= 1639.767
 5  X COORD.= 688.1926       Y COORD.= 1679.68
 6  X COORD.= 873.6866       Y COORD.= 1759.594
 7  X COORD.= 1009.979       Y COORD.= 1799.531
 8  X COORD.= 1068.516       Y COORD.= 1839.503
 9  X COORD.= 1151.355       Y COORD.= 1879.465
 10 X COORD.= 1237.049       Y COORD.= 1919.425
 11 X COORD.= 1308.871       Y COORD.= 1959.392
 12 X COORD.= 1406.883       Y COORD.= 1999.346

NO. OF POINTS ON BOUNDARY LINE 2 = 12
 1  X COORD.= 0              Y COORD.= 1540
 2  X COORD.= 146.5309       Y COORD.= 1559.938
 3  X COORD.= 355.5782       Y COORD.= 1599.835
 4  X COORD.= 500.6332       Y COORD.= 1639.767
 5  X COORD.= 688.1926       Y COORD.= 1679.68
 6  X COORD.= 873.6866       Y COORD.= 1759.594
 7  X COORD.= 1009.979       Y COORD.= 1799.531
 8  X COORD.= 1068.516       Y COORD.= 1839.503
 9  X COORD.= 1151.355       Y COORD.= 1879.465
 10 X COORD.= 1237.049       Y COORD.= 1919.425
 11 X COORD.= 1308.871       Y COORD.= 1959.392
 12 X COORD.= 1406.883       Y COORD.= 1999.346

NO. OF POINTS ON BOUNDARY LINE 3 = 21
 1  X COORD.= 0              Y COORD.= 1540
 2  X COORD.= 99.1504        Y COORD.= 1589.452
 3  X COORD.= 119.1586       Y COORD.= 1588.826
 4  X COORD.= 219.2242       Y COORD.= 1638.692
 5  X COORD.= 239.2323       Y COORD.= 1638.065
 6  X COORD.= 339.2979       Y COORD.= 1687.931
 7  X COORD.= 359.3061       Y COORD.= 1687.304
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 8  X COORD.= 459.3716      Y COORD.= 1737.171
 9  X COORD.= 479.3798      Y COORD.= 1736.544
 10 X COORD.= 579.4454      Y COORD.= 1786.41
 11 X COORD.= 599.4536      Y COORD.= 1785.783
 12 X COORD.= 699.5191      Y COORD.= 1835.649
 13 X COORD.= 719.5273      Y COORD.= 1835.022
 14 X COORD.= 819.5929      Y COORD.= 1884.889
 15 X COORD.= 839.601       Y COORD.= 1884.262
 16 X COORD.= 939.6666      Y COORD.= 1934.128
 17 X COORD.= 959.6748      Y COORD.= 1933.501
 18 X COORD.= 1059.74       Y COORD.= 1983.367
 19 X COORD.= 1079.749      Y COORD.= 1983.141
 20 X COORD.= 1119.775      Y COORD.= 2003.087
 21 X COORD.= 1406.883      Y COORD.= 1999.346

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.136       0.191       0.275       0.213       0.431       0.293
         0.683       0.482       0.466       0.556       0.408
 2       0.136       0.191       0.275       0.213       0.431       0.293
         0.683       0.482       0.466       0.556       0.408
 3       0.499      -0.031       0.498      -0.031       0.498      -0.031
         0.498      -0.031       0.498      -0.031       0.498      -0.031
         0.498      -0.031       0.498      -0.031       0.498      -0.011
         0.498      -0.013


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             160           24            125
 2             40            37.4          125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY MODIFIED SPENCER METHOD (MTHD=4)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
LOCATION OF MOMENT CENTER: X0 =  0    Y0 =  2100
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1  = 12
 1  X COORD.= 0             Y COORD.= 1540
 2  X COORD.= 146.5309      Y COORD.= 1559.932
 3  X COORD.= 355.5782      Y COORD.= 1599.835
 4  X COORD.= 500.6332      Y COORD.= 1639.767
 5  X COORD.= 688.1926      Y COORD.= 1679.68
 6  X COORD.= 873.6866      Y COORD.= 1759.594
 7  X COORD.= 1009.979      Y COORD.= 1799.531
 8  X COORD.= 1068.516      Y COORD.= 1839.503
 9  X COORD.= 1151.355      Y COORD.= 1879.465
 10 X COORD.= 1237.049      Y COORD.= 1919.425
```

11 X COORD.= 1308.871 Y COORD.= 1959.392
12 X COORD.= 1406.883 Y COORD.= 1999.346

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.912

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	1	99.150	0.136	5.581E+04	2.481E+04	8.824E+03	.11E+06	.32E+05	10.909
2	1	20.008	0.136	1.987E+04	3.280E+04	1.167E+04	.38E+05	.12E+05	12.117
3	1	21.530	0.136	2.264E+04	4.184E+04	1.488E+04	.44E+05	.14E+05	13.724
4	1	5.843	0.136	6.908E+03	4.456E+04	1.585E+04	.13E+05	.43E+04	14.133
5	1	72.693	0.191	1.068E+05	5.913E+04	2.103E+04	.21E+06	.94E+05	21.180
6	1	20.008	0.191	3.400E+04	6.353E+04	2.260E+04	.66E+05	.30E+05	22.905
7	1	42.144	0.191	7.622E+04	7.318E+04	2.603E+04	.15E+06	.68E+05	26.387
8	1	57.921	0.191	1.277E+05	8.837E+04	3.143E+04	.25E+06	.11E+06	30.597
9	2	14.835	0.191	6.060E+04	1.165E+05	4.142E+04	.12E+06	.34E+05	25.374
10	2	1.445	0.191	5.783E+03	1.191E+05	4.238E+04	.11E+05	.32E+04	25.040
11	2	3.728	0.275	1.413E+04	1.223E+05	4.351E+04	.28E+05	.11E+05	24.686
12	2	62.759	0.275	2.553E+05	1.797E+05	6.392E+04	.51E+06	.21E+06	21.063
13	2	37.307	0.275	1.698E+05	2.178E+05	7.747E+04	.34E+06	.14E+06	20.129
14	2	20.008	0.275	9.201E+04	2.384E+05	8.481E+04	.18E+06	.75E+05	19.933
15	2	21.253	0.275	9.710E+04	2.602E+05	9.256E+04	.19E+06	.79E+05	19.909
16	2	62.120	0.213	3.247E+05	3.902E+05	1.388E+05	.63E+06	.20E+06	20.694
17	2	16.692	0.213	9.565E+04	4.285E+05	1.524E+05	.19E+06	.60E+05	21.130
18	2	20.008	0.213	1.146E+05	4.744E+05	1.687E+05	.22E+06	.71E+05	21.815
19	2	88.739	0.213	5.489E+05	6.940E+05	2.469E+05	.11E+07	.34E+06	25.615
20	2	11.326	0.431	6.970E+04	6.801E+05	2.419E+05	.15E+06	.90E+05	25.283
21	2	3.923	0.431	2.405E+04	6.753E+05	2.402E+05	.50E+05	.31E+05	25.168
22	2	16.086	0.431	9.562E+04	6.563E+05	2.334E+05	.20E+06	.12E+06	24.679
23	2	100.066	0.431	5.935E+05	5.380E+05	1.914E+05	.12E+07	.76E+06	21.803
24	2	20.008	0.431	1.176E+05	5.146E+05	1.830E+05	.24E+06	.15E+06	21.267
25	2	4.529	0.431	2.581E+04	5.094E+05	1.812E+05	.54E+05	.33E+05	21.141
26	2	29.557	0.431	1.698E+05	4.756E+05	1.692E+05	.35E+06	.22E+06	20.357
27	2	65.980	0.293	4.219E+05	5.489E+05	1.952E+05	.84E+06	.37E+06	21.521
28	2	20.008	0.293	1.310E+05	5.716E+05	2.033E+05	.26E+06	.11E+06	21.902
29	2	25.144	0.293	1.639E+05	6.001E+05	2.135E+05	.33E+06	.14E+06	22.411
30	2	25.161	0.293	1.696E+05	6.295E+05	2.239E+05	.34E+06	.15E+06	22.913
31	2	49.761	0.683	2.976E+05	3.917E+05	1.393E+05	.69E+06	.60E+06	15.627
32	2	8.776	0.683	4.991E+04	3.518E+05	1.251E+05	.12E+06	.10E+06	14.368
33	2	11.232	0.482	6.372E+04	3.307E+05	1.176E+05	.14E+06	.92E+05	13.821
34	2	40.026	0.482	2.231E+05	2.568E+05	9.133E+04	.47E+06	.32E+06	12.017
35	2	5.732	0.482	3.170E+04	2.463E+05	8.760E+04	.67E+05	.46E+05	11.790
36	2	25.849	0.482	1.349E+05	2.016E+05	7.172E+04	.29E+06	.19E+06	10.773
37	2	85.693	0.466	3.561E+05	9.876E+04	3.513E+04	.75E+06	.50E+06	7.628
38	2	29.146	0.556	8.541E+04	5.540E+04	1.971E+04	.19E+06	.14E+06	5.473
39	2	42.676	0.556	9.069E+04	9.746E+03	3.467E+03	.20E+06	.15E+06	2.527
40	2	98.012	0.408	8.501E+04	-7.715E-02	0.000E+00	.18E+06	.10E+06	0.000
		SUM					.11E+08	.60E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.000
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.342 AND FACTOR OF SAFETY IS 1.912

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

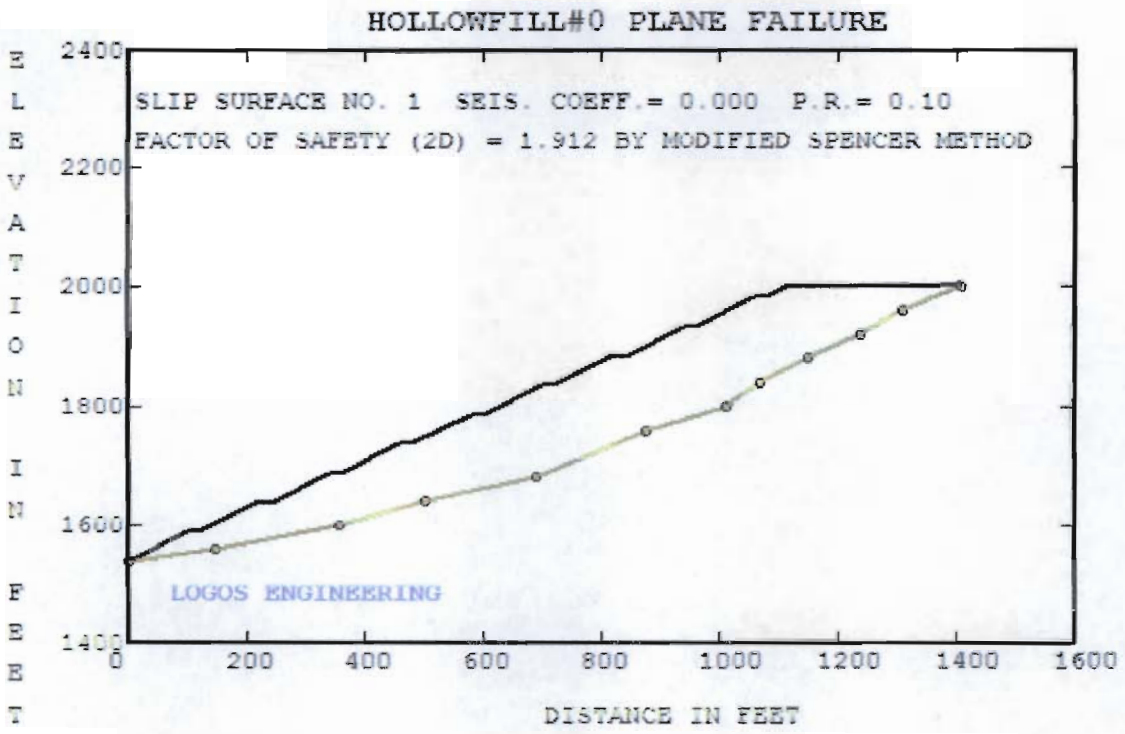
SLIP SURFACE NO. 1

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.440

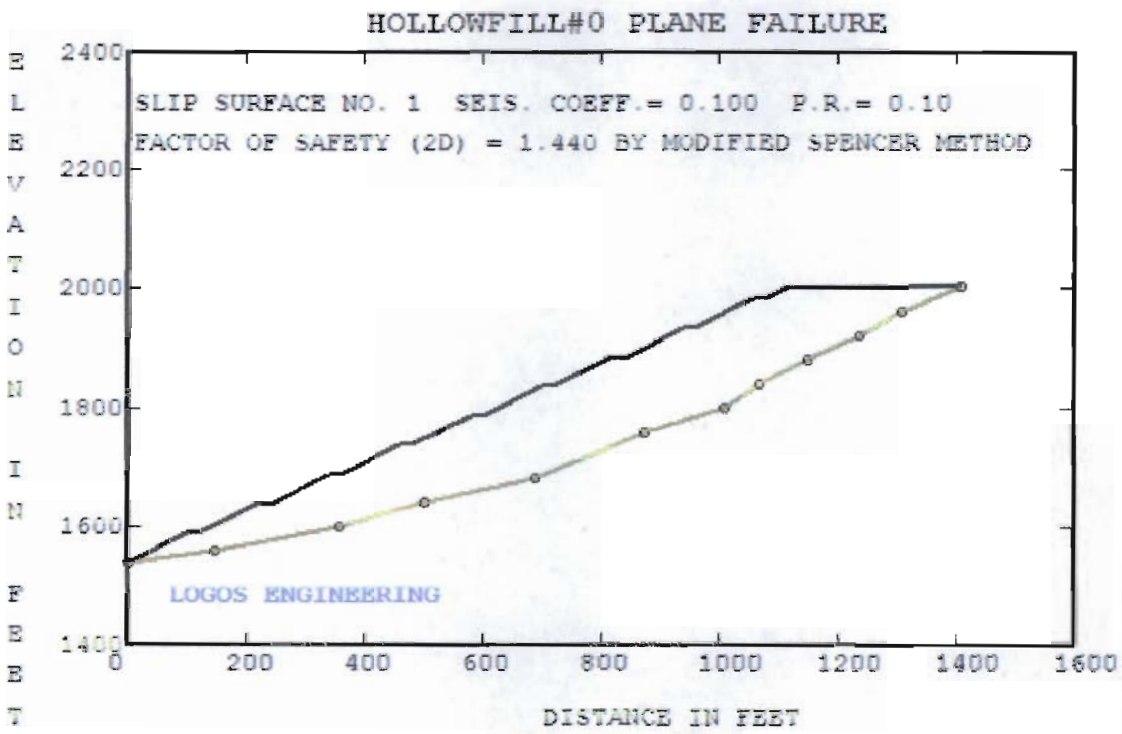
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	1	99.150	0.136	7.474E+04	2.100E+04	1.343E+04	.11E+06	.54E+05	15.454
2	1	20.008	0.136	2.639E+04	2.687E+04	1.719E+04	.38E+05	.21E+05	15.590
3	1	21.530	0.136	3.005E+04	3.344E+04	2.139E+04	.44E+05	.24E+05	16.955
4	1	5.843	0.136	9.159E+03	3.536E+04	2.262E+04	.13E+05	.73E+04	17.121
5	1	72.693	0.191	1.381E+05	3.411E+04	2.182E+04	.20E+06	.14E+06	12.592
6	1	20.008	0.191	4.390E+04	3.331E+04	2.131E+04	.64E+05	.45E+05	7.252
7	1	42.144	0.191	9.839E+04	3.119E+04	1.995E+04	.14E+06	.10E+06	-10.485
8	1	57.921	0.191	1.646E+05	2.605E+04	1.667E+04	.24E+06	.17E+06	-78.068
9	2	14.835	0.191	8.419E+04	5.938E+04	3.798E+04	.12E+06	.52E+05	-41.985
10	2	1.445	0.191	8.034E+03	6.255E+04	4.001E+04	.12E+05	.50E+04	-40.331
11	2	3.728	0.275	1.872E+04	6.612E+04	4.229E+04	.28E+05	.16E+05	-39.497
12	2	62.759	0.275	3.383E+05	1.306E+05	8.352E+04	.51E+06	.29E+06	-28.979
13	2	37.307	0.275	2.250E+05	1.733E+05	1.109E+05	.34E+06	.19E+06	-24.614
14	2	20.008	0.275	1.219E+05	1.965E+05	1.257E+05	.18E+06	.10E+06	-21.951
15	2	21.253	0.275	1.287E+05	2.209E+05	1.413E+05	.19E+06	.11E+06	-18.823
16	2	62.120	0.213	4.452E+05	3.730E+05	2.386E+05	.66E+06	.30E+06	-4.071
17	2	16.692	0.213	1.311E+05	4.178E+05	2.672E+05	.19E+06	.89E+05	-0.941
18	2	20.008	0.213	1.571E+05	4.714E+05	3.015E+05	.23E+06	.11E+06	2.924
19	2	88.739	0.213	7.525E+05	7.281E+05	4.657E+05	.11E+07	.51E+06	18.704
20	2	11.326	0.431	8.599E+04	7.127E+05	4.559E+05	.13E+06	.11E+06	19.250
21	2	3.923	0.431	2.968E+04	7.074E+05	4.525E+05	.47E+05	.38E+05	19.438
22	2	16.086	0.431	1.180E+05	6.863E+05	4.390E+05	.18E+06	.15E+06	20.352
23	2	100.066	0.431	7.322E+05	5.554E+05	3.553E+05	.11E+07	.93E+06	24.830
24	2	20.008	0.431	1.451E+05	5.295E+05	3.387E+05	.23E+06	.18E+06	25.444
25	2	4.529	0.431	3.184E+04	5.238E+05	3.350E+05	.50E+05	.40E+05	25.623
26	2	29.557	0.431	2.095E+05	4.864E+05	3.111E+05	.33E+06	.27E+06	26.509
27	2	65.980	0.293	5.538E+05	5.672E+05	3.628E+05	.83E+06	.50E+06	27.992
28	2	20.008	0.293	1.719E+05	5.923E+05	3.789E+05	.26E+06	.15E+06	28.732
29	2	25.144	0.293	2.151E+05	6.237E+05	3.989E+05	.32E+06	.19E+06	30.030
30	2	25.161	0.293	2.226E+05	6.562E+05	4.197E+05	.33E+06	.20E+06	31.199
31	2	49.761	0.683	3.369E+05	4.166E+05	2.665E+05	.59E+06	.65E+06	28.601
32	2	8.776	0.683	5.649E+04	3.765E+05	2.408E+05	.99E+05	.11E+06	28.117
33	2	11.232	0.482	7.706E+04	3.537E+05	2.263E+05	.12E+06	.11E+06	27.809
34	2	40.026	0.482	2.698E+05	2.742E+05	1.754E+05	.43E+06	.38E+06	25.600
35	2	5.732	0.482	3.833E+04	2.629E+05	1.681E+05	.61E+05	.54E+05	25.051
36	2	25.849	0.482	1.631E+05	2.149E+05	1.374E+05	.26E+06	.23E+06	22.553
37	2	85.693	0.466	4.334E+05	1.035E+05	6.617E+04	.69E+06	.59E+06	15.197
38	2	29.146	0.556	1.007E+05	5.819E+04	3.722E+04	.17E+06	.16E+06	13.345
39	2	42.676	0.556	1.070E+05	1.060E+04	6.782E+03	.18E+06	.17E+06	13.152
40	2	98.012	0.408	1.064E+05	9.570E-02	0.000E+00	.17E+06	.13E+06	0.000
		SUM					.11E+08	.77E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.100
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.569 AND FACTOR OF SAFETY IS 1.440



I, _____ (signature), 12575 (registration no.), 4/2/9 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) _____ 17575 (registration no.) _____ 4/2/1 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

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TITLE -HOLLOWFILL#0

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS (THREED = 0)

CASE NO. 1 SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 12

1	X COORD.= 0	Y COORD.= 1540
2	X COORD.= 146.5309	Y COORD.= 1559.932
3	X COORD.= 355.5782	Y COORD.= 1599.835
4	X COORD.= 500.6332	Y COORD.= 1639.767
5	X COORD.= 688.1926	Y COORD.= 1679.68
6	X COORD.= 873.6866	Y COORD.= 1759.594
7	X COORD.= 1009.979	Y COORD.= 1799.531
8	X COORD.= 1068.516	Y COORD.= 1839.503
9	X COORD.= 1151.355	Y COORD.= 1879.465
10	X COORD.= 1237.049	Y COORD.= 1919.425
11	X COORD.= 1308.871	Y COORD.= 1959.392
12	X COORD.= 1406.883	Y COORD.= 1999.346

NO. OF POINTS ON BOUNDARY LINE 2 = 21

1	X COORD.= 0	Y COORD.= 1540
2	X COORD.= 99.1504	Y COORD.= 1589.452
3	X COORD.= 119.1586	Y COORD.= 1588.826
4	X COORD.= 219.2242	Y COORD.= 1638.692
5	X COORD.= 239.2323	Y COORD.= 1638.065
6	X COORD.= 339.2979	Y COORD.= 1687.931
7	X COORD.= 359.3061	Y COORD.= 1687.304
8	X COORD.= 459.3716	Y COORD.= 1737.171
9	X COORD.= 479.3798	Y COORD.= 1736.544
10	X COORD.= 579.4454	Y COORD.= 1786.41
11	X COORD.= 599.4536	Y COORD.= 1785.783
12	X COORD.= 699.5191	Y COORD.= 1835.649
13	X COORD.= 719.5273	Y COORD.= 1835.022
14	X COORD.= 819.5929	Y COORD.= 1884.889
15	X COORD.= 839.601	Y COORD.= 1884.262
16	X COORD.= 939.6666	Y COORD.= 1934.128
17	X COORD.= 959.6748	Y COORD.= 1933.501
18	X COORD.= 1059.74	Y COORD.= 1983.367
19	X COORD.= 1079.749	Y COORD.= 1983.141
20	X COORD.= 1119.775	Y COORD.= 2003.087
21	X COORD.= 1406.883	Y COORD.= 1999.346

```
LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.136       0.191       0.275       0.213       0.431       0.293
         0.683       0.482       0.466       0.556       0.408
 2       0.499      -0.031       0.498      -0.031       0.498      -0.031
         0.498      -0.031       0.498      -0.031       0.498      -0.031
         0.498      -0.031       0.498      -0.031       0.498      -0.011
         0.498      -0.013

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               12

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             40            37.4          125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-120    Y COORD. = 2975
POINT 2 X COORD. =-120    Y COORD. = 2000
POINT 3 X COORD. = 660    Y COORD. = 2000

X INCREMENT (XINC) = 96     Y INCREMENT (YINC) = 96
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER  X   CENTER  Y        NO. OF CIRCLE          LOWEST   WARNING
COORDINATE  COORDINATE    TOTAL CRITIC. RADIUS       F.S.
 -120          2975         11    9   1405.898       1.825      0
```

-120	2780	14	10	1214.791	1.826	0
-120	2585	11	4	1023.819	1.846	0
-120	2390	5	1	858.429	1.851	0
-120	2195	11	2	661.518	1.845	0
-120	2000	11	9	472.846	1.794	0
75	2975	11	11	1318.483	1.828	0
75	2780	11	10	1141.541	1.842	0
75	2585	8	5	948.772	1.859	0
75	2390	14	5	765.887	1.838	0
75	2195	11	7	604.469	1.858	0
75	2000	11	4	411.688	1.829	0
270	2975	8	5	1244.898	1.837	0
270	2780	8	5	1062.606	1.835	0
270	2585	11	9	897.228	1.849	0
270	2390	8	8	683.561	1.811	0
270	2195	8	5	515.666	1.845	0
270	2000	8	8	324.113	1.702	0
465	2975	8	6	1164.737	1.830	0
465	2780	8	7	976.430	1.833	0
465	2585	8	8	791.520	1.790	0
465	2390	8	6	622.729	1.861	0
465	2195	8	8	430.624	1.698	0
465	2000	8	8	248.090	1.904	0
660	2975	8	7	1082.309	1.966	0
660	2780	8	8	897.589	1.793	0
660	2585	8	7	722.580	1.837	0
660	2390	8	8	536.520	1.733	0
660	2195	8	8	355.523	1.883	0
660	2000	8	5	196.295	2.032	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-120.000	75.000	270.000	465.000	660.000
2975.000	1.825	1.828	1.837	1.830	1.966
2780.000	1.826	1.842	1.835	1.833	1.793
2585.000	1.846	1.859	1.849	1.790	1.837
2390.000	1.851	1.838	1.811	1.861	1.733
2195.000	1.845	1.858	1.845	1.698	1.883
2000.000	1.794	1.829	1.702	1.904	2.032

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 9 CENTERS

FACTOR OF SAFETY = 1.825 AT (-120.000,2975.000)
FACTOR OF SAFETY = 1.830 AT (465.000,2975.000)
FACTOR OF SAFETY = 1.793 AT (660.000,2780.000)
FACTOR OF SAFETY = 1.790 AT (465.000,2585.000)
FACTOR OF SAFETY = 1.811 AT (270.000,2390.000)
FACTOR OF SAFETY = 1.733 AT (660.000,2390.000)
FACTOR OF SAFETY = 1.698 AT (465.000,2195.000)
FACTOR OF SAFETY = 1.794 AT (-120.000,2000.000)
FACTOR OF SAFETY = 1.702 AT (270.000,2000.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (465 2195) RADIUS 430.624

THE MINIMUM FACTOR OF SAFETY IS 1.698

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
465	2195	8	8	430.624	1.698	0
561	2195	8	6	405.894	1.843	0
369	2195	11	10	492.879	1.895	0
465	2291	8	8	518.762	1.824	0
465	2099	8	5	357.624	1.855	0
489	2195	8	8	422.021	1.725	0
441	2195	8	6	450.020	1.857	0
465	2219	8	5	472.771	1.914	0
465	2171	8	8	407.545	1.833	0

AT POINT (465 2195) RADIUS 430.624

THE MINIMUM FACTOR OF SAFETY IS 1.698

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.199	0.820	0.000	.326	.105E+04	.993E+03	.495E+06	.147E+06
2	1	10.199	2.244	0.000	.349	.286E+04	.272E+04	.103E+07	.431E+06
3	1	10.199	3.375	0.000	.373	.430E+04	.409E+04	.144E+07	.691E+06
4	1	10.199	4.203	0.000	.397	.536E+04	.509E+04	.173E+07	.916E+06
5	1	10.199	4.719	0.000	.420	.602E+04	.572E+04	.190E+07	.109E+07
6	1	10.199	4.911	0.000	.444	.626E+04	.595E+04	.195E+07	.120E+07
7	1	10.199	4.768	0.000	.468	.608E+04	.577E+04	.188E+07	.122E+07
8	1	10.199	4.274	0.000	.492	.545E+04	.518E+04	.169E+07	.115E+07
9	1	10.199	3.414	0.000	.515	.435E+04	.414E+04	.137E+07	.966E+06
10	1	7.558	2.354	0.000	.536	.222E+04	.211E+04	.742E+06	.513E+06
11	1	2.641	0.909	0.000	.548	.300E+03	.285E+03	.133E+06	.708E+05
							SUM	.144E+08	.840E+07

AT CENTER (465.000 , 2195.000) WITH RADIUS 430.624 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.709
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.698

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING

-120	2975	11	9	1405.898	1.408	0
-120	2780	14	10	1214.791	1.410	0
-120	2585	11	3	1033.092	1.424	0
-120	2390	5	1	858.429	1.429	0
-120	2195	11	8	662.614	1.427	0
-120	2000	11	8	473.865	1.401	0
75	2975	11	11	1318.483	1.411	0
75	2780	11	10	1141.541	1.420	0
75	2585	8	5	948.772	1.435	0
75	2390	14	5	765.887	1.422	0
75	2195	11	7	604.469	1.438	0
75	2000	11	4	411.688	1.421	0
270	2975	8	5	1244.898	1.417	0
270	2780	8	5	1062.606	1.416	0
270	2585	11	9	897.228	1.428	0
270	2390	8	8	683.561	1.422	0
270	2195	8	5	515.666	1.431	0
270	2000	8	8	324.113	1.355	0
465	2975	8	6	1164.737	1.413	0
465	2780	8	7	976.430	1.420	0
465	2585	8	8	791.520	1.401	0
465	2390	8	6	622.729	1.439	0
465	2195	8	8	430.624	1.349	0
465	2000	8	8	248.090	1.485	0
660	2975	8	7	1082.309	1.508	0
660	2780	8	8	897.589	1.405	0
660	2585	8	7	722.580	1.426	0
660	2390	8	8	536.520	1.378	0
660	2195	8	8	355.523	1.466	0
660	2000	8	5	196.295	1.579	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-120.000	75.000	270.000	465.000	660.000
2975.000	1.408	1.411	1.417	1.413	1.508
2780.000	1.410	1.420	1.416	1.420	1.405
2585.000	1.424	1.435	1.428	1.401	1.426
2390.000	1.429	1.422	1.422	1.439	1.378
2195.000	1.427	1.438	1.431	1.349	1.466
2000.000	1.401	1.421	1.355	1.485	1.579

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 10 CENTERS

FACTOR OF SAFETY = 1.408 AT (-120.000,2975.000)
FACTOR OF SAFETY = 1.413 AT (465.000,2975.000)
FACTOR OF SAFETY = 1.416 AT (270.000,2780.000)
FACTOR OF SAFETY = 1.405 AT (660.000,2780.000)
FACTOR OF SAFETY = 1.401 AT (465.000,2585.000)
FACTOR OF SAFETY = 1.422 AT (270.000,2390.000)
FACTOR OF SAFETY = 1.378 AT (660.000,2390.000)
FACTOR OF SAFETY = 1.349 AT (465.000,2195.000)
FACTOR OF SAFETY = 1.401 AT (-120.000,2000.000)
FACTOR OF SAFETY = 1.355 AT (270.000,2000.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (465 2195) RADIUS 430.624
THE MINIMUM FACTOR OF SAFETY IS 1.349

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
465	2195	8	8	430.624	1.349	0
561	2195	8	6	405.894	1.430	0
369	2195	8	7	470.667	1.438	0
465	2291	8	8	518.762	1.425	0
465	2099	8	5	357.624	1.442	0
489	2195	8	8	422.021	1.358	0
441	2195	8	6	450.020	1.438	0
465	2219	8	5	472.771	1.477	0
465	2171	8	6	420.121	1.461	0

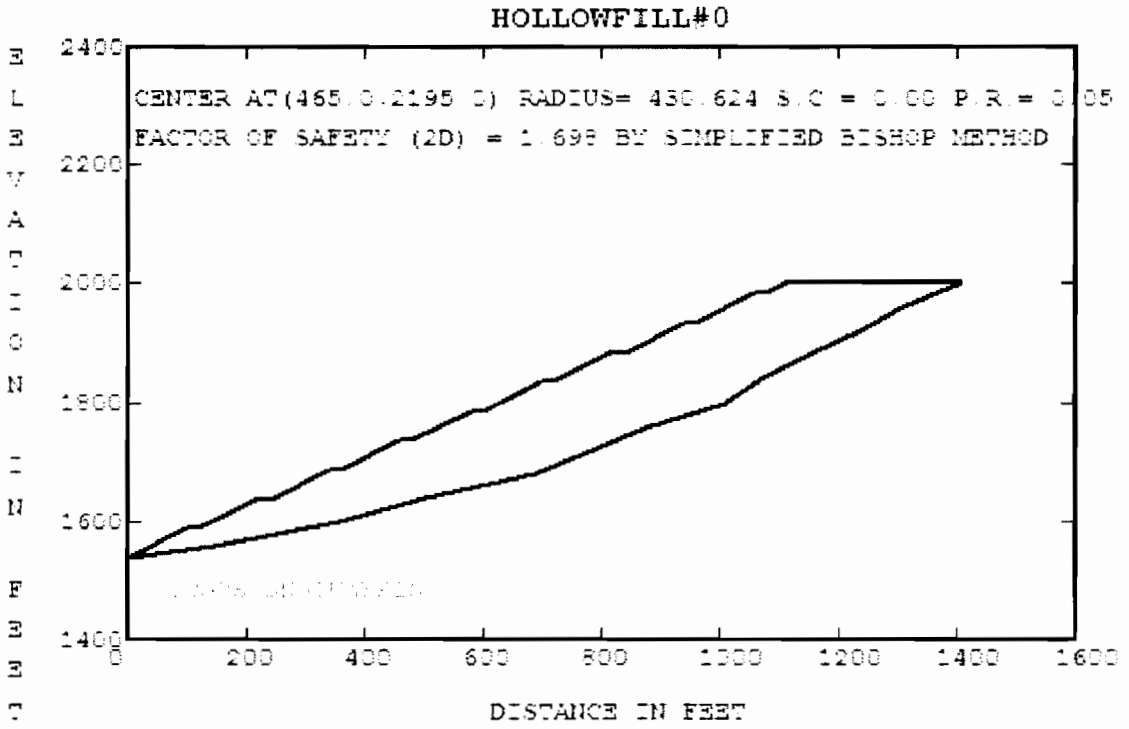
AT POINT (465 2195) RADIUS 430.624

THE MINIMUM FACTOR OF SAFETY IS 1.349

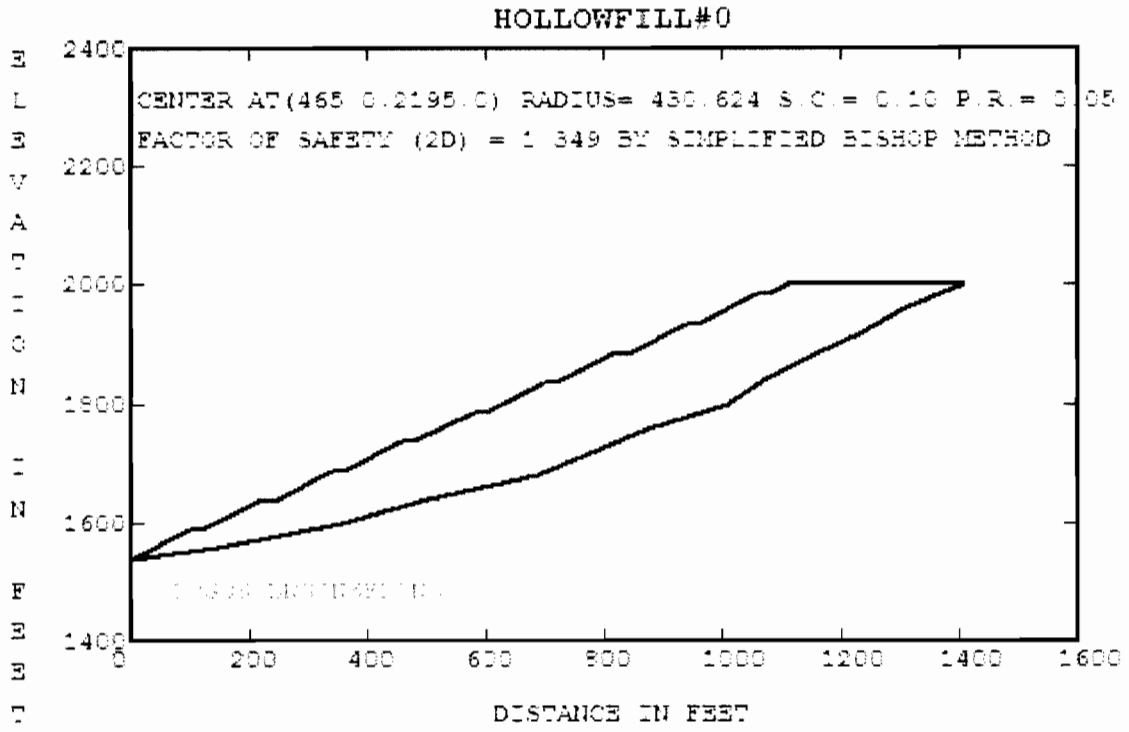
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.199	0.820	0.000	.326	.105E+04	.993E+03	.484E+06	.189E+06
2	1	10.199	2.244	0.000	.349	.286E+04	.272E+04	.993E+06	.546E+06
3	1	10.199	3.375	0.000	.373	.430E+04	.409E+04	.139E+07	.863E+06
4	1	10.199	4.203	0.000	.397	.536E+04	.509E+04	.166E+07	.113E+07
5	1	10.199	4.719	0.000	.420	.602E+04	.572E+04	.182E+07	.132E+07
6	1	10.199	4.911	0.000	.444	.626E+04	.595E+04	.186E+07	.144E+07
7	1	10.199	4.768	0.000	.468	.608E+04	.577E+04	.179E+07	.145E+07
8	1	10.199	4.274	0.000	.492	.545E+04	.518E+04	.160E+07	.136E+07
9	1	10.199	3.414	0.000	.515	.435E+04	.414E+04	.130E+07	.113E+07
10	1	7.558	2.354	0.000	.536	.222E+04	.211E+04	.702E+06	.594E+06
11	1	2.641	0.909	0.000	.548	.300E+03	.285E+03	.127E+06	.816E+05
							SUM	.137E+08	.101E+08

AT CENTER (465.000 , 2195.000) WITH RADIUS 430.624 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.358
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.349



I, _____, 12575, 9/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature), 12575 (registration no.), 4/2/9 (date), hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOW FILL #1

1"= 100'

DIP 0.84° NE

STRIKE S 41° E

PROFILE

UNDERDRAIN

HF#1

NORTH TOP DITCH

SOUTH TOP DITCH

TOP OF FILL 1990

2000

2000

COAL

CROSS-SECTION

1800

1800

NORTH FACE DITCH

1640

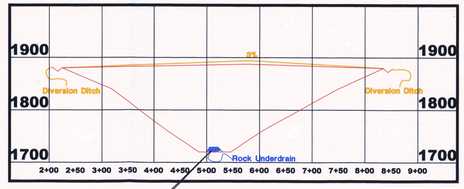
1640

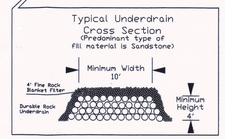
SOUTH FACE DITCH

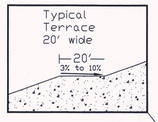
ROCK CHECK DAM

TOE OF FILL 1640

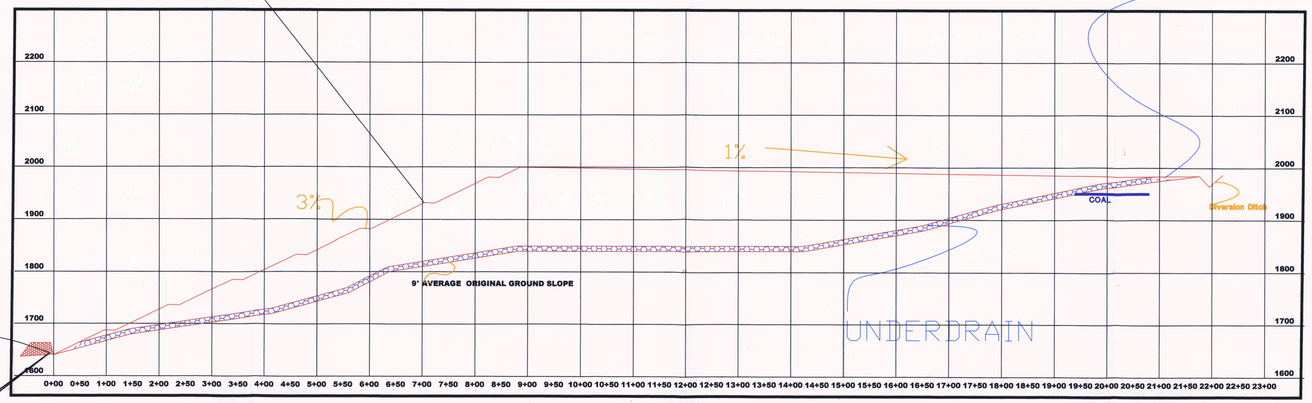
CROSS-SECTION VIEW

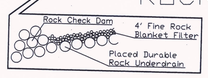


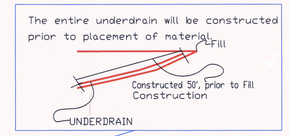




PROFILE VIEW







(signature) 12575 (registration no.) 12-12-07 (date)

I hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

Blacksnake #3-Volume Report HF#1.txt

Volume Report 3/5/2007 09:16
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2646687.15,155562.84 to 2649002.15,156912.84
Grid resolution X: 463, Y: 270 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 11,484.5 S.F., 0.26 Acres
Area in Fill: 1,131,277.3 S.F., 25.97 Acres
Total inclusion area: 1,142,761.8 S.F., 26.23 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 2.45 Average Fill Depth: 80.01
Max Cut Depth: 13.58 Max Fill Depth: 245.67
Cut (C.Y.) / Area (acres): 39.74
Fill (C.Y.) / Area (acres): 127783.69
Cut volume: 28,145.6 C.F., 1,042.43 C.Y.
Fill volume: 90,512,180.0 C.F., 3,352,302.96 C.Y.

I, _____ (signature), 12575 (registration no.), 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOWFILL# 1
NEAREST CORE HOLE C-3

		FRICTION ANGLE		
SANDSTONE	127.00 FT.	40	127.00 FT. / 377.00 FT = 33.687%	33.687% X 40 = 13.5
SANDY SHALE	93.00 FT.	37.5	93.00 FT. / 377.00 FT = 24.668%	24.668% X 38 = 9.3
SHALE	157.00 FT.	35	157.00 FT. / 377.00 FT = 41.645%	41.645% X 35 = 14.6
TOTAL	377.00 FT.			FRICTION ANGLE 37.4

COHESION

80% DURABLE ROCK
20% MINE SPOIL

MINE SPOIL COHESION=200
20%X200=40
COHESION=40

I, [signature] 12575, 4/2/09
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF1PF.DAT

TITLE -HOLLOWFILL#1 PLANE FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 3

NO. OF POINTS ON BOUNDARY LINE 1 = 12
 1  X COORD.= 0             Y COORD.= 1640
 2  X COORD.= 147.6147      Y COORD.= 1679.751
 3  X COORD.= 414.8932      Y COORD.= 1719.751
 4  X COORD.= 560.4232      Y COORD.= 1759.751
 5  X COORD.= 637.5331      Y COORD.= 1799.751
 6  X COORD.= 880.0941      Y COORD.= 1839.751
 7  X COORD.= 1380.796      Y COORD.= 1839.751
 8  X COORD.= 1424.363      Y COORD.= 1839.751
 9  X COORD.= 1653.433      Y COORD.= 1879.751
 10 X COORD.= 1795.083      Y COORD.= 1919.751
 11 X COORD.= 1991.656      Y COORD.= 1959.751
 12 X COORD.= 2175.76       Y COORD.= 1984.751

NO. OF POINTS ON BOUNDARY LINE 2 = 12
 1  X COORD.= 0             Y COORD.= 1640
 2  X COORD.= 147.6147      Y COORD.= 1679.751
 3  X COORD.= 414.8932      Y COORD.= 1719.751
 4  X COORD.= 560.4232      Y COORD.= 1759.751
 5  X COORD.= 637.5331      Y COORD.= 1799.751
 6  X COORD.= 880.0941      Y COORD.= 1839.751
 7  X COORD.= 1380.796      Y COORD.= 1839.751
 8  X COORD.= 1424.363      Y COORD.= 1839.751
 9  X COORD.= 1653.433      Y COORD.= 1879.751
 10 X COORD.= 1795.083      Y COORD.= 1919.751
 11 X COORD.= 1991.656      Y COORD.= 1959.751
 12 X COORD.= 2175.76       Y COORD.= 1984.751

NO. OF POINTS ON BOUNDARY LINE 3 = 17
 1  X COORD.= 0             Y COORD.= 1640
 2  X COORD.= 96.2725       Y COORD.= 1687.145
 3  X COORD.= 116.5056      Y COORD.= 1686.453
 4  X COORD.= 217.6711      Y COORD.= 1735.993
 5  X COORD.= 237.9042      Y COORD.= 1735.302
 6  X COORD.= 339.0696      Y COORD.= 1784.842
 7  X COORD.= 359.3027      Y COORD.= 1784.15
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 8  X COORD.= 460.4681       Y COORD.= 1833.691
 9  X COORD.= 480.7013       Y COORD.= 1832.999
 10 X COORD.= 581.8666       Y COORD.= 1882.54
 11 X COORD.= 602.0998       Y COORD.= 1881.848
 12 X COORD.= 703.2652       Y COORD.= 1931.389
 13 X COORD.= 723.4983       Y COORD.= 1930.697
 14 X COORD.= 824.6637       Y COORD.= 1980.237
 15 X COORD.= 844.8969       Y COORD.= 1979.545
 16 X COORD.= 885.363        Y COORD.= 1999.362
 17 X COORD.= 2175.76        Y COORD.= 1984.751

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1        0.269       0.150       0.275       0.519       0.165       0.000
          0.000       0.175       0.282       0.203       0.136
 2        0.269       0.150       0.275       0.519       0.165       0.000
          0.000       0.175       0.282       0.203       0.136
 3        0.490      -0.034       0.490      -0.034       0.490      -0.034
          0.490      -0.034       0.490      -0.034       0.490      -0.034
          0.490      -0.034       0.490      -0.011


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.       COHESION       FRIC. ANGLE    UNIT WEIGHT
 1              160             24             125
 2              40              37.4           125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SPENCERS METHOD (MTHD=3)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)
CENTER AT (0.0 , 2100.0)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1  = 12
 1  X COORD.= 0              Y COORD.= 1640
 2  X COORD.= 147.6147       Y COORD.= 1679.751
 3  X COORD.= 414.8932       Y COORD.= 1719.751
 4  X COORD.= 560.4232       Y COORD.= 1759.751
 5  X COORD.= 637.5331       Y COORD.= 1799.751
 6  X COORD.= 880.0941       Y COORD.= 1839.751
 7  X COORD.= 1380.796       Y COORD.= 1839.751
 8  X COORD.= 1424.363       Y COORD.= 1839.751
 9  X COORD.= 1653.433       Y COORD.= 1879.751
 10 X COORD.= 1795.083       Y COORD.= 1919.751
 11 X COORD.= 1991.656       Y COORD.= 1959.751
 12 X COORD.= 2175.76        Y COORD.= 1984.751

SLIP SURFACE NO. 1
```

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 2.407

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	2	96.273	10.610	0.000	0.260	.128E+06	.115E+06	.395E+08	.147E+08
2	2	20.233	18.150	0.000	0.260	.459E+05	.413E+05	.139E+08	.530E+07
3	2	31.109	18.508	0.000	0.260	.720E+05	.648E+05	.218E+08	.831E+07
4	2	69.961	33.831	0.000	0.148	.296E+06	.266E+06	.893E+08	.192E+08
5	2	20.328	43.907	0.000	0.148	.112E+06	.100E+06	.336E+08	.722E+07
6	2	101.165	59.239	0.000	0.148	.749E+06	.674E+06	.225E+09	.485E+08
7	2	20.233	74.579	0.000	0.148	.189E+06	.170E+06	.565E+08	.122E+08
8	2	55.590	82.171	0.000	0.148	.571E+06	.514E+06	.171E+09	.370E+08
9	2	20.259	93.799	0.000	0.265	.238E+06	.214E+06	.755E+08	.300E+08
10	2	25.316	98.694	0.000	0.265	.312E+06	.281E+06	.993E+08	.395E+08
11	2	20.233	98.287	0.000	0.265	.249E+06	.224E+06	.790E+08	.314E+08
12	2	79.722	103.725	0.000	0.265	.103E+07	.930E+06	.328E+09	.131E+09
13	2	21.443	111.977	0.000	0.460	.300E+06	.270E+06	.103E+09	.774E+08
14	2	20.233	106.072	0.000	0.460	.268E+06	.241E+06	.923E+08	.692E+08
15	2	35.433	99.963	0.000	0.460	.443E+06	.398E+06	.152E+09	.114E+09
16	2	15.195	101.917	0.000	0.163	.194E+06	.174E+06	.528E+08	.126E+08
17	2	50.537	112.591	0.000	0.163	.711E+06	.640E+06	.194E+09	.463E+08
18	2	20.233	118.784	0.000	0.163	.300E+06	.270E+06	.819E+08	.196E+08
19	2	101.165	133.199	0.000	0.163	.168E+07	.152E+07	.459E+09	.110E+09
20	2	20.233	147.613	0.000	0.163	.373E+06	.336E+06	.102E+09	.243E+08
21	2	25.407	149.725	0.000	0.163	.476E+06	.428E+06	.130E+09	.309E+08
22	2	9.790	155.441	0.000	0.163	.190E+06	.171E+06	.518E+08	.124E+08
23	2	5.269	158.321	0.000	0.000	.104E+06	.938E+05	.187E+08	.000E+00
24	2	202.517	158.465	0.000	0.000	.401E+07	.361E+07	.720E+09	.000E+00
25	2	217.576	156.086	0.000	0.000	.425E+07	.382E+07	.762E+09	.000E+00
26	2	75.340	154.428	0.000	0.000	.145E+07	.131E+07	.261E+09	.000E+00
27	2	43.567	153.755	0.000	0.000	.837E+06	.754E+06	.150E+09	.128E+03
28	2	98.669	144.335	0.000	0.172	.178E+07	.160E+07	.607E+09	.154E+09
29	2	130.401	123.038	0.000	0.172	.201E+07	.180E+07	.684E+09	.173E+09
30	2	87.175	98.112	0.000	0.272	.107E+07	.962E+06	.471E+09	.192E+09
31	2	54.475	77.310	0.000	0.272	.526E+06	.474E+06	.232E+09	.946E+08
32	2	163.101	51.792	0.000	0.199	.106E+07	.950E+06	.384E+09	.113E+09
33	2	33.472	30.680	0.000	0.199	.128E+06	.116E+06	.470E+08	.137E+08
34	2	184.104	13.542	0.000	0.135	.312E+06	.280E+06	.895E+08	.171E+08
		SUM						.708E+10	.166E+10

SLIP SURFACE 1 WITH CENTER (0.000,2100.000 AND SEISMIC COEFF. 0.000
FACTOR OF SAFETY BY NORMAL METHOD IS 4.273

THRUST INCLINATION	MOMENT F.S.	FORCE F.S.
0.000	1.270	5.419
0.300	2.407	5.625
0.600	3.303	5.882

FROM SPENCER METHOD, INCLINATION (DEL) = 0.300 AND FACTOR OF SAFETY = 2.407

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.832

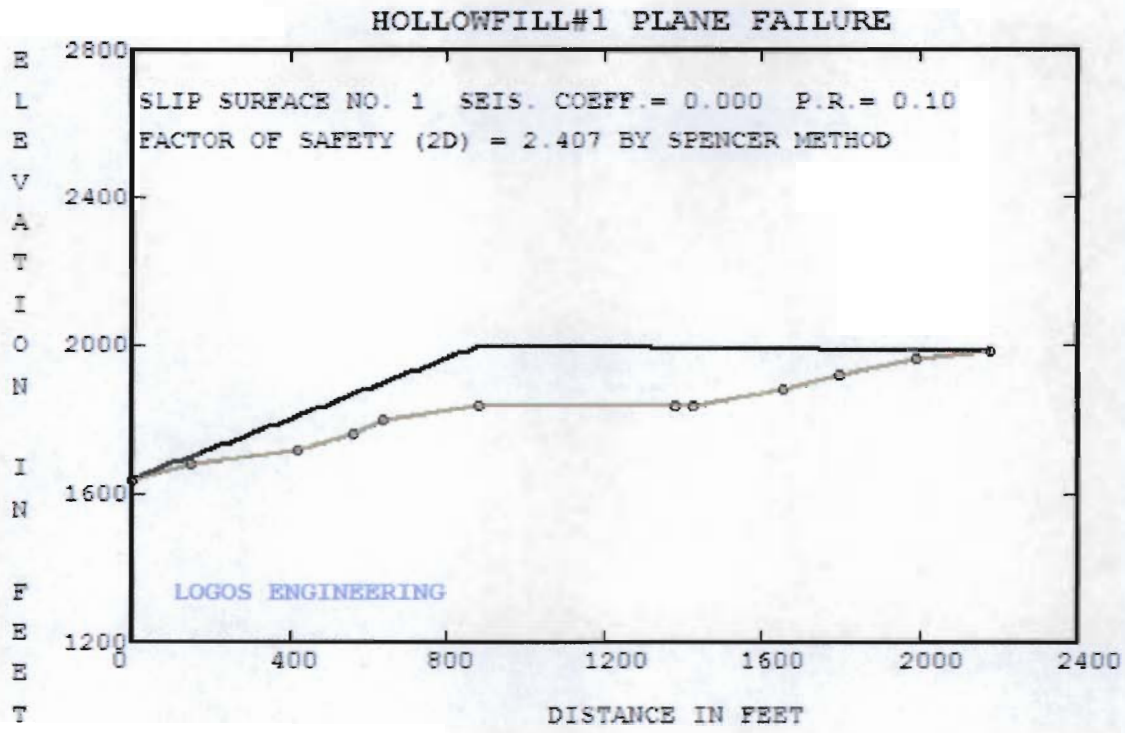
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	2	96.273	10.610	0.000	0.260	.128E+06	.115E+06	.383E+08	.202E+08
2	2	20.233	18.150	0.000	0.260	.459E+05	.413E+05	.135E+08	.723E+07
3	2	31.109	18.508	0.000	0.260	.720E+05	.648E+05	.212E+08	.113E+08
4	2	69.961	33.831	0.000	0.148	.296E+06	.266E+06	.879E+08	.315E+08
5	2	20.328	43.907	0.000	0.148	.112E+06	.100E+06	.330E+08	.118E+08
6	2	101.165	59.239	0.000	0.148	.749E+06	.674E+06	.221E+09	.787E+08
7	2	20.233	74.579	0.000	0.148	.189E+06	.170E+06	.556E+08	.197E+08
8	2	55.590	82.171	0.000	0.148	.571E+06	.514E+06	.168E+09	.593E+08
9	2	20.259	93.799	0.000	0.265	.238E+06	.214E+06	.732E+08	.398E+08
10	2	25.316	98.694	0.000	0.265	.312E+06	.281E+06	.962E+08	.523E+08
11	2	20.233	98.287	0.000	0.265	.249E+06	.224E+06	.766E+08	.416E+08
12	2	79.722	103.725	0.000	0.265	.103E+07	.930E+06	.318E+09	.173E+09
13	2	21.443	111.977	0.000	0.460	.300E+06	.270E+06	.973E+08	.907E+08
14	2	20.233	106.072	0.000	0.460	.268E+06	.241E+06	.870E+08	.811E+08
15	2	35.433	99.963	0.000	0.460	.443E+06	.398E+06	.144E+09	.134E+09
16	2	15.195	101.917	0.000	0.163	.194E+06	.174E+06	.519E+08	.193E+08
17	2	50.537	112.591	0.000	0.163	.711E+06	.640E+06	.190E+09	.704E+08
18	2	20.233	118.784	0.000	0.163	.300E+06	.270E+06	.804E+08	.296E+08
19	2	101.165	133.199	0.000	0.163	.168E+07	.152E+07	.451E+09	.165E+09
20	2	20.233	147.613	0.000	0.163	.373E+06	.336E+06	.999E+08	.363E+08
21	2	25.407	149.725	0.000	0.163	.476E+06	.428E+06	.127E+09	.462E+08
22	2	9.790	155.441	0.000	0.163	.190E+06	.171E+06	.509E+08	.184E+08
23	2	5.269	158.321	0.000	0.000	.104E+06	.938E+05	.187E+08	.189E+07
24	2	202.517	158.465	0.000	0.000	.401E+07	.361E+07	.720E+09	.726E+08
25	2	217.576	156.086	0.000	0.000	.425E+07	.382E+07	.762E+09	.773E+08
26	2	75.340	154.428	0.000	0.000	.145E+07	.131E+07	.261E+09	.266E+08
27	2	43.567	153.755	0.000	0.000	.837E+06	.754E+06	.150E+09	.154E+08
28	2	98.669	144.335	0.000	0.172	.178E+07	.160E+07	.595E+09	.229E+09
29	2	130.401	123.038	0.000	0.172	.201E+07	.180E+07	.671E+09	.260E+09
30	2	87.175	98.112	0.000	0.272	.107E+07	.962E+06	.456E+09	.255E+09
31	2	54.475	77.310	0.000	0.272	.526E+06	.474E+06	.225E+09	.126E+09
32	2	163.101	51.792	0.000	0.199	.106E+07	.950E+06	.376E+09	.165E+09
33	2	33.472	30.680	0.000	0.199	.128E+06	.116E+06	.460E+08	.202E+08
34	2	184.104	13.542	0.000	0.135	.312E+06	.280E+06	.882E+08	.294E+08
		SUM						.695E+10	.251E+10

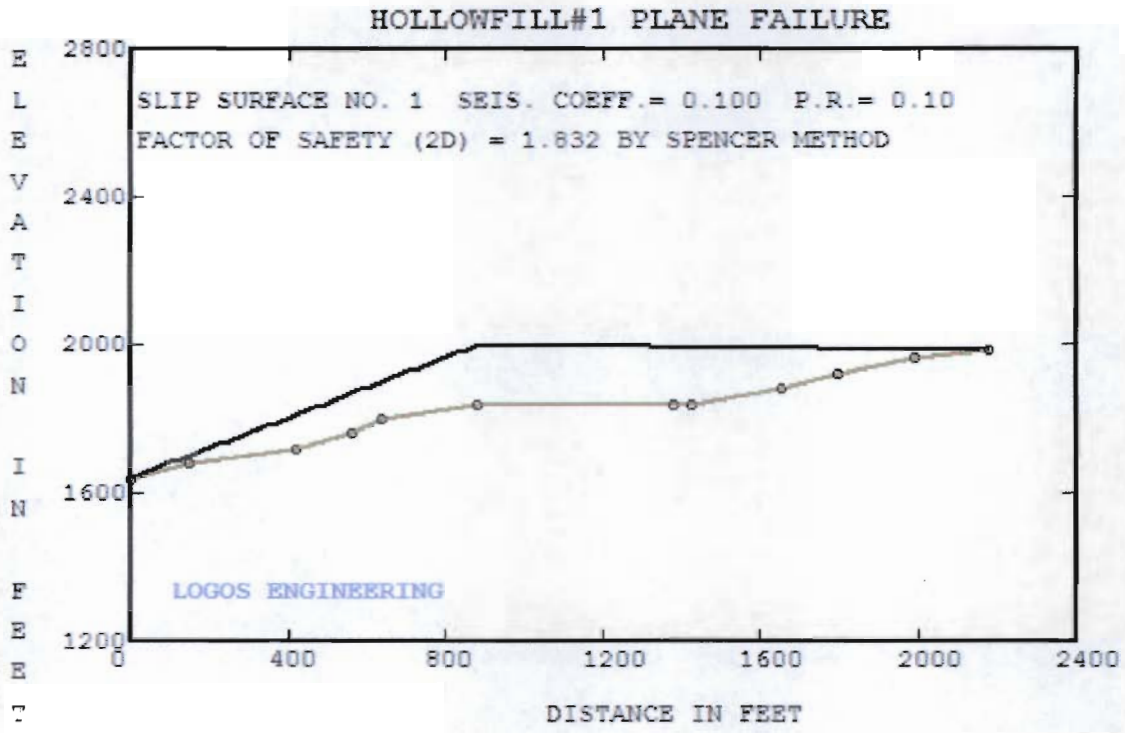
SLIP SURFACE 1 WITH CENTER (0.000,2100.000 AND SEISMIC COEFF. 0.100
FACTOR OF SAFETY BY NORMAL METHOD IS 2.765

THRUST INCLINATION	MOMENT F.S.	FORCE F.S.
0.000	1.095	3.014
0.300	1.832	3.081
0.600	2.310	3.169

FROM SPENCER METHOD, INCLINATION (DEL) = 0.300 AND FACTOR OF SAFETY = 1.832



I, _____ (signature) _____ (registration no.) 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) 12575 (registration no.) 4/2/7 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF1.DAT

TITLE -HOLLOWFILL#1

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 12
 1  X COORD.= 0             Y COORD.= 1640
 2  X COORD.= 147.6147      Y COORD.= 1679.751
 3  X COORD.= 414.8932      Y COORD.= 1719.751
 4  X COORD.= 560.4232      Y COORD.= 1759.751
 5  X COORD.= 637.5331      Y COORD.= 1799.751
 6  X COORD.= 880.0941      Y COORD.= 1839.751
 7  X COORD.= 1380.796      Y COORD.= 1839.751
 8  X COORD.= 1424.363      Y COORD.= 1839.751
 9  X COORD.= 1653.433      Y COORD.= 1879.751
 10 X COORD.= 1795.083      Y COORD.= 1919.751
 11 X COORD.= 1991.656      Y COORD.= 1959.751
 12 X COORD.= 2175.76       Y COORD.= 1984.751

NO. OF POINTS ON BOUNDARY LINE 2 = 17
 1  X COORD.= 0             Y COORD.= 1640
 2  X COORD.= 96.2725       Y COORD.= 1687.145
 3  X COORD.= 116.5056      Y COORD.= 1686.453
 4  X COORD.= 217.6711      Y COORD.= 1735.993
 5  X COORD.= 237.9042      Y COORD.= 1735.302
 6  X COORD.= 339.0696      Y COORD.= 1784.842
 7  X COORD.= 359.3027      Y COORD.= 1784.151
 8  X COORD.= 460.4681      Y COORD.= 1833.691
 9  X COORD.= 480.7013      Y COORD.= 1832.999
 10 X COORD.= 581.8666      Y COORD.= 1882.54
 11 X COORD.= 602.0998      Y COORD.= 1881.848
 12 X COORD.= 703.2652      Y COORD.= 1931.389
 13 X COORD.= 723.4983      Y COORD.= 1930.697
 14 X COORD.= 824.6637      Y COORD.= 1980.237
 15 X COORD.= 844.8969      Y COORD.= 1979.545
 16 X COORD.= 885.363       Y COORD.= 1999.362
 17 X COORD.= 2175.76       Y COORD.= 1984.751

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.269       0.150       0.275       0.519       0.165       0.000
         0.000       0.175       0.282       0.203       0.136
```

```
 2       0.490       -0.034       0.490       -0.034       0.490       -0.034
         0.490       -0.034       0.490       -0.034       0.490       -0.034
         0.490       -0.034       0.490       -0.011

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               12

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             40            37.4          125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-100    Y COORD. = 2755
POINT 2 X COORD. =-100    Y COORD. = 1980
POINT 3 X COORD. = 520    Y COORD. = 1980

X INCREMENT (XINC) = 76     Y INCREMENT (YINC) = 76
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER  X   CENTER  Y        NO. OF CIRCLE          LOWEST   WARNING
COORDINATE  COORDINATE    TOTAL CRITIC. RADIUS       F.S.
 -100          2755         11    8   1089.916       1.862      0
 -100          2600         11    6    938.389       1.882      0
 -100          2445         5     1    803.312       1.889      0
 -100          2290         5     1    653.644       1.916      0
 -100          2135         5     1    503.976       1.918      0
 -100          1980         5     1    354.401       1.706      0
```

55	2755	11	4	1034.797	1.877	0
55	2600	11	9	896.559	1.889	0
55	2445	17	14	742.013	1.899	0
55	2290	11	10	605.285	1.898	0
55	2135	11	3	451.102	1.864	0
55	1980	8	5	295.348	1.734	0
210	2755	11	9	982.759	1.888	0
210	2600	8	8	810.937	1.892	0
210	2445	14	5	678.022	1.891	0
210	2290	11	8	553.413	1.903	0
210	2135	11	9	396.923	1.874	0
210	1980	8	7	237.603	1.749	0
365	2755	8	5	910.969	1.904	0
365	2600	8	8	754.053	1.841	0
365	2445	8	5	622.345	1.842	0
365	2290	11	9	496.092	1.929	0
365	2135	8	5	335.582	1.923	0
365	1980	8	8	177.925	1.815	0
520	2755	8	7	845.426	2.033	0
520	2600	8	8	696.503	1.865	0
520	2445	8	5	567.436	1.873	0
520	2290	11	9	438.183	1.957	0
520	2135	8	5	278.995	1.955	0
520	1980	8	8	119.707	1.921	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	1825	1	1	210.297	1000.000	0
55	1825	5	1	164.335	2.212	0
210	1825	11	9	114.130	2.423	0
365	1825	8	8	38.045	1.926	0
520	1825	1	1	73.629	1000.000	0
-255	2755	11	1	1142.953	1.858	0
-255	2600	5	1	993.284	1.861	0
-255	2445	5	1	844.423	1.897	0
-255	2290	5	1	698.230	1.923	0
-255	2135	1	1	556.821	1000.000	0
-255	1980	1	1	425.000	1000.000	0
-255	1825	1	1	315.040	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-255.000	-100.000	55.000	210.000	365.000	520.000
2755.000	1.858	1.862	1.877	1.888	1.904	2.033
2600.000	1.861	1.882	1.889	1.892	1.841	1.865
2445.000	1.897	1.889	1.899	1.891	1.842	1.873
2290.000	1.923	1.916	1.898	1.903	1.929	1.957
2135.000	1000.000	1.918	1.864	1.874	1.923	1.955
1980.000	1000.000	1.706	1.734	1.749	1.815	1.921
1825.000	1000.000	1000.000	2.212	2.423	1.926	1000.000

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.858 AT (-255.000,2755.000)
FACTOR OF SAFETY = 1.841 AT (365.000,2600.000)
FACTOR OF SAFETY = 1.706 AT (-100.000,1980.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (-100 1980) RADIUS 354.401
THE MINIMUM FACTOR OF SAFETY IS 1.706

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	1980	5	1	354.401	1.706	0
-24	1980	5	1	334.545	1.968	0
-176	1980	1	1	382.852	1000.000	0
-100	2056	11	9	425.167	1.831	0
-100	1904	5	1	282.305	2.358	0
-81	1980	11	8	348.108	1.746	0
-119	1980	5	1	360.224	1.906	0
-100	1999	5	1	372.667	1.712	0
-100	1961	5	1	336.216	1.759	0

AT POINT (-100 1980) RADIUS 354.401

THE MINIMUM FACTOR OF SAFETY IS 1.706

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	9.943	0.933	0.000	.296	.116E+04	.110E+04	.433E+06	.122E+06
2	1	9.943	2.557	0.000	.324	.318E+04	.302E+04	.923E+06	.365E+06
3	1	9.943	3.851	0.000	.352	.479E+04	.455E+04	.130E+07	.598E+06
4	1	9.943	4.805	0.000	.380	.597E+04	.567E+04	.157E+07	.805E+06
5	1	9.943	5.406	0.000	.408	.672E+04	.638E+04	.173E+07	.973E+06
6	1	9.943	5.641	0.000	.436	.701E+04	.666E+04	.178E+07	.108E+07
7	1	9.943	5.492	0.000	.465	.683E+04	.648E+04	.172E+07	.112E+07
8	1	9.943	4.941	0.000	.493	.614E+04	.583E+04	.154E+07	.107E+07
9	1	9.943	3.966	0.000	.521	.493E+04	.468E+04	.125E+07	.910E+06
10	1	6.785	2.800	0.000	.544	.237E+04	.226E+04	.628E+06	.458E+06
11	1	3.158	1.123	0.000	.558	.443E+03	.421E+03	.149E+06	.877E+05
							SUM	.130E+08	.760E+07

AT CENTER (-100.000 , 1980.000) WITH RADIUS 354.401 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.714
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.706

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	2755	11	8	1089.916	1.433	0
-100	2600	11	1	952.981	1.449	0
-100	2445	5	1	803.312	1.453	0
-100	2290	5	1	653.644	1.473	0
-100	2135	5	1	503.976	1.479	0
-100	1980	5	1	354.401	1.352	0
55	2755	11	4	1034.797	1.444	0
55	2600	11	9	896.559	1.454	0
55	2445	17	14	742.013	1.461	0
55	2290	11	10	605.285	1.463	0
55	2135	11	3	451.102	1.443	0
55	1980	8	5	295.348	1.374	0
210	2755	11	10	977.851	1.452	0
210	2600	8	5	825.139	1.463	0
210	2445	8	5	678.022	1.460	0
210	2290	11	8	553.413	1.470	0
210	2135	11	9	396.923	1.452	0
210	1980	8	6	240.386	1.378	0
365	2755	8	5	910.969	1.463	0
365	2600	8	8	754.053	1.445	0
365	2445	8	5	622.345	1.425	0
365	2290	11	9	496.092	1.489	0
365	2135	8	5	335.582	1.486	0
365	1980	8	8	177.925	1.432	0
520	2755	8	7	845.426	1.551	0
520	2600	8	8	696.503	1.456	0
520	2445	8	5	567.436	1.445	0
520	2290	11	10	433.110	1.509	0
520	2135	8	5	278.995	1.512	0
520	1980	8	8	119.707	1.505	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	1825	1	1	210.297	1000.000	0
55	1825	5	1	164.335	1.689	0
210	1825	11	7	111.876	1.860	0
365	1825	8	8	38.045	1.539	0
520	1825	1	1	73.629	1000.000	0
-255	2755	11	1	1142.953	1.432	0
-255	2600	5	1	993.284	1.437	0
-255	2445	5	1	844.423	1.467	0
-255	2290	5	1	698.230	1.534	0
-255	2135	1	1	556.821	1000.000	0
-255	1980	1	1	425.000	1000.000	0
-255	1825	1	1	315.040	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-255.000	-100.000	55.000	210.000	365.000	520.000
2755.000	1.432	1.433	1.444	1.452	1.463	1.551
2600.000	1.437	1.449	1.454	1.463	1.445	1.456
2445.000	1.467	1.453	1.461	1.460	1.425	1.445

2290.000	1.534	1.473	1.463	1.470	1.489	1.509
2135.000	1000.000	1.479	1.443	1.452	1.486	1.512
1980.000	1000.000	1.352	1.374	1.378	1.432	1.505
1825.000	1000.000	1000.000	1.689	1.860	1.539	1000.000

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.432 AT (-255.000,2755.000)
FACTOR OF SAFETY = 1.425 AT (365.000,2445.000)
FACTOR OF SAFETY = 1.352 AT (-100.000,1980.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (-100 1980) RADIUS 354.401
THE MINIMUM FACTOR OF SAFETY IS 1.352

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	1980	5	1	354.401	1.352	0
-24	1980	5	1	334.545	1.515	0
-176	1980	1	1	382.852	1000.000	0
-100	2056	11	2	425.672	1.427	0
-100	1904	5	1	282.305	1.895	0
-81	1980	5	1	349.367	1.372	0
-119	1980	5	1	360.224	1.519	0
-100	1999	5	1	372.667	1.350	0
-100	2018	5	1	391.000	1.369	0
-81	1999	11	2	365.779	1.402	0
-119	1999	5	1	378.209	1.427	0

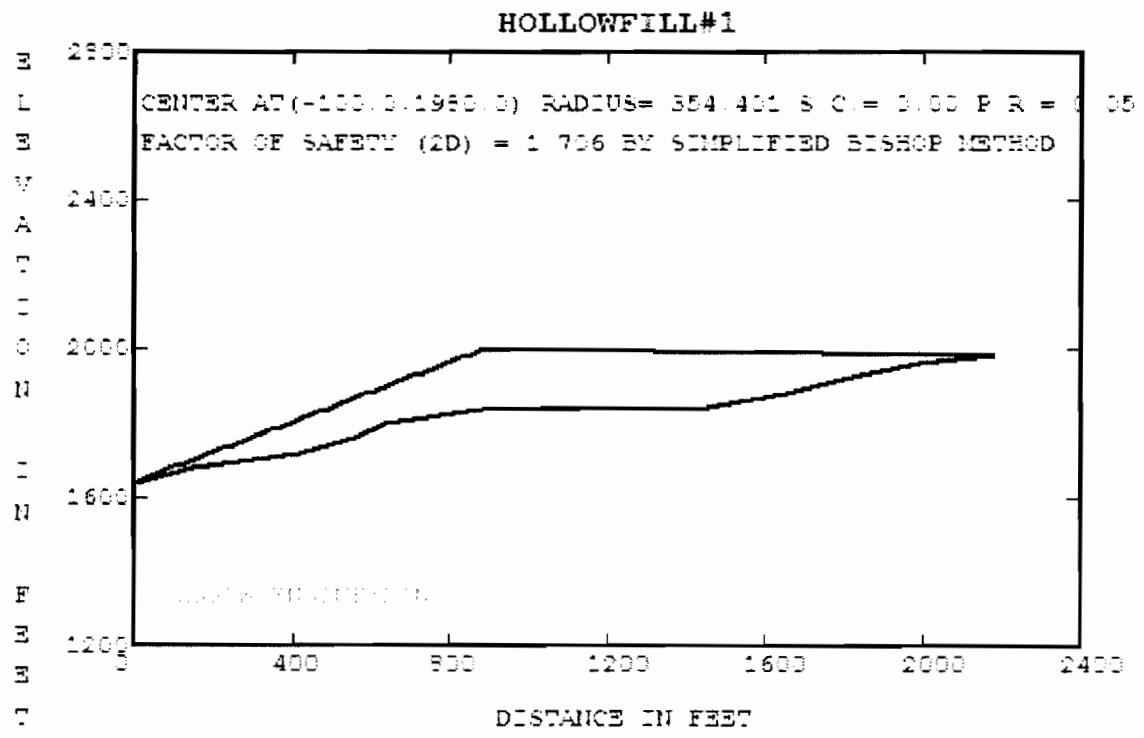
AT POINT (-100 1999) RADIUS 372.667

THE MINIMUM FACTOR OF SAFETY IS 1.350

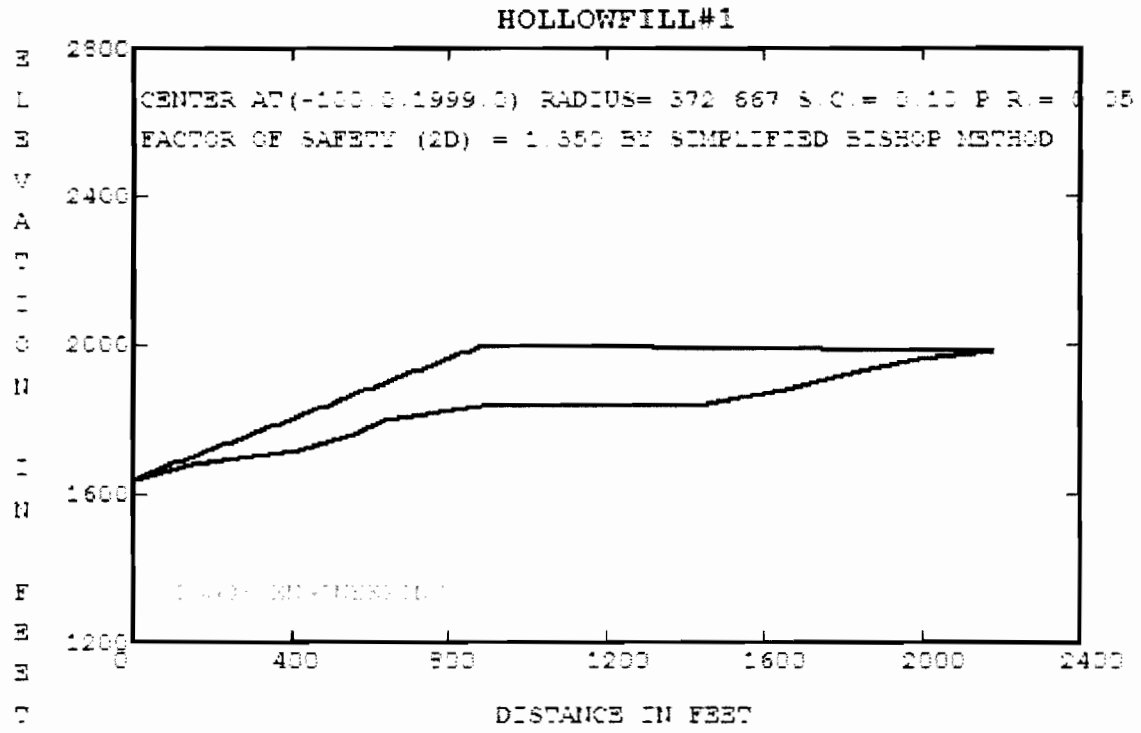
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.364	1.054	0.000	.282	.137E+04	.130E+04	.505E+06	.192E+06
2	1	10.364	2.915	0.000	.310	.378E+04	.359E+04	.110E+07	.570E+06
3	1	10.364	4.441	0.000	.338	.575E+04	.547E+04	.157E+07	.925E+06
4	1	10.364	5.621	0.000	.366	.728E+04	.692E+04	.192E+07	.124E+07
5	1	10.364	6.444	0.000	.393	.835E+04	.793E+04	.215E+07	.151E+07
6	1	10.364	6.895	0.000	.421	.893E+04	.849E+04	.226E+07	.170E+07
7	1	10.364	6.960	0.000	.449	.902E+04	.857E+04	.224E+07	.181E+07
8	1	10.364	6.620	0.000	.477	.858E+04	.815E+04	.210E+07	.180E+07
9	1	10.364	5.856	0.000	.505	.759E+04	.721E+04	.184E+07	.167E+07
10	1	2.995	5.128	0.000	.523	.192E+04	.182E+04	.467E+06	.434E+06
11	1	7.369	2.499	0.000	.537	.230E+04	.219E+04	.621E+06	.532E+06
							SUM	.168E+08	.124E+08

AT CENTER (-100.000 , 1999.000) WITH RADIUS 372.667 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.355
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.350



I, _____, 12515, 4/2/17
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



(signature) 12575 (registration no.) 4/2/97 (date)

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

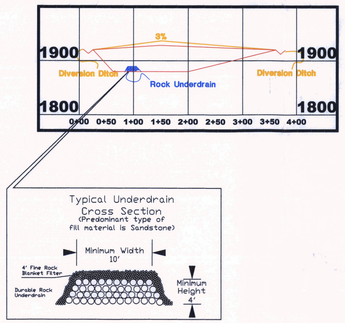
HOLLOW FILL #2

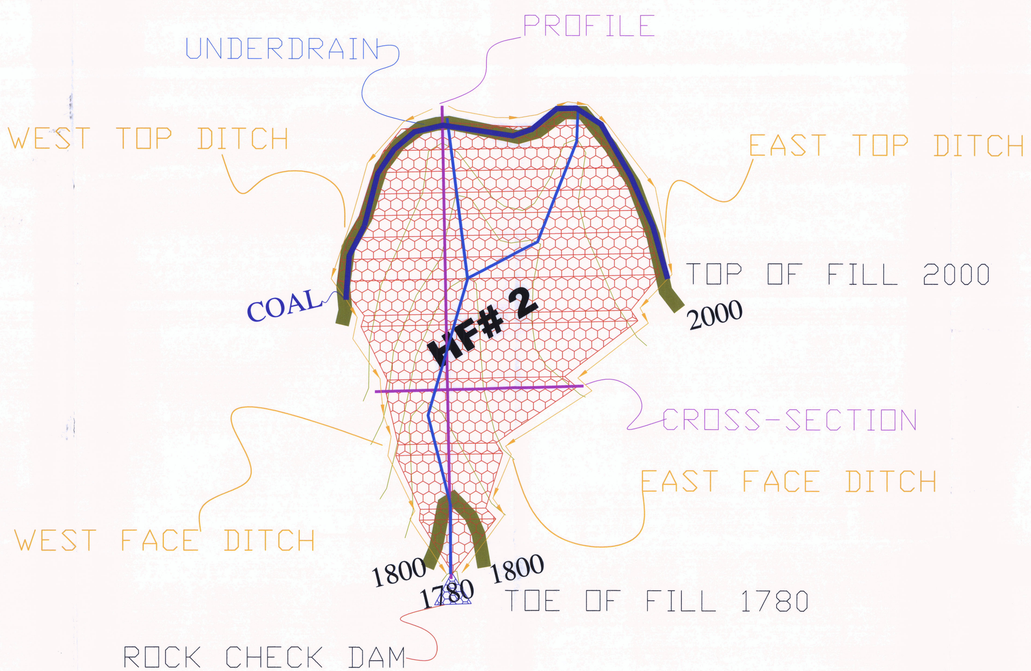
1"= 100'

DIP 0.84° NE

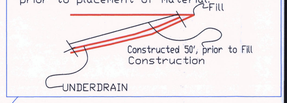
STRIKE S 41° E

CROSS-SECTION VIEW

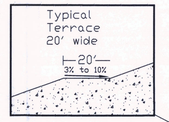


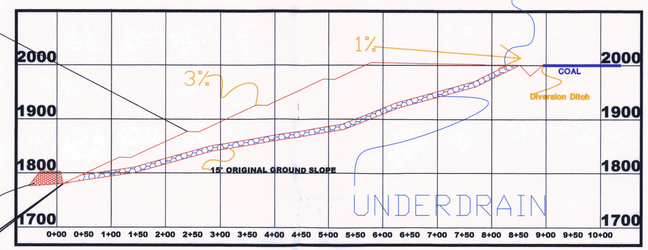


The entire underdrain will be constructed prior to placement of material.

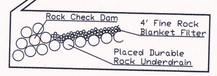


PROFILE VIEW





ROCK CHECK DAM



I, [signature], 12575 (registration no.), 12-12-07 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

Blacksnake #3-Volume Report HF#2.txt

Volume Report 3/5/2007 09:45
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2649635.87,154889.71 to 2650665.87,155859.71
Grid resolution X: 206, Y: 194 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 1,941.1 S.F., 0.04 Acres
Area in Fill: 289,359.1 S.F., 6.64 Acres
Total inclusion area: 291,300.2 S.F., 6.69 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 0.91 Average Fill Depth: 44.88
Max Cut Depth: 6.36 Max Fill Depth: 128.89
Cut (C.Y.) / Area (acres): 9.77
Fill (C.Y.) / Area (acres): 71917.03
Cut volume: 1,763.8 C.F., 65.32 C.Y.
Fill volume: 12,985,192.9 C.F., 480,933.07 C.Y.

(signature) 12575 (registration no.) 4/2/7 (date)

I hereby certify, in accordance with 405 KAR 7:040E, Section 10, that [illegible] is correct as determined by accepted engineering [illegible] includes all the information required of it by KRS [illegible] Title 405. (affix engineer's seal)

807-0355

HOLLOWFILL# 2

NEAREST CORE HOLE C-3

		FRICTION ANGLE	
SANDSTONE	127.00 FT.	40	127.00 FT. / 377.00 FT = 33.687% 33.687% X 40 = 13.5
SANDY SHALE	93.00 FT.	37.5	93.00 FT. / 377.00 FT = 24.668% 24.668% X 38 = 9.3
SHALE	157.00 FT.	35	157.00 FT. / 377.00 FT = 41.645% 41.645% X 35 = 14.6
TOTAL	377.00 FT.		FRICTION ANGLE 37.4

COHESION

80% DURABLE ROCK

20% MINE SPOIL

MINE SPOIL COHESION=200

20%X200=40

COHESION=40

I, [signature] 12575 4/2/7

(signature) (registration no.) (date)

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF2.DAT

TITLE -HOLLOWFILL#2

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 7
 1  X COORD.= 0             Y COORD.= 1780
 2  X COORD.= 133.6113      Y COORD.= 1800.598
 3  X COORD.= 273.3005      Y COORD.= 1840.598
 4  X COORD.= 517.0262      Y COORD.= 1880.598
 5  X COORD.= 615.8821      Y COORD.= 1920.598
 6  X COORD.= 759.4999      Y COORD.= 1960.074
 7  X COORD.= 840.527       Y COORD.= 2000.281

NO. OF POINTS ON BOUNDARY LINE 2 = 11
 1  X COORD.= 0             Y COORD.= 1780
 2  X COORD.= 103.6314      Y COORD.= 1828.868
 3  X COORD.= 124.4731      Y COORD.= 1828.092
 4  X COORD.= 228.6822      Y COORD.= 1877.213
 5  X COORD.= 249.524       Y COORD.= 1876.437
 6  X COORD.= 353.733       Y COORD.= 1925.557
 7  X COORD.= 374.5748      Y COORD.= 1924.781
 8  X COORD.= 478.7838      Y COORD.= 1973.902
 9  X COORD.= 499.6257      Y COORD.= 1973.126
 10 X COORD.= 567.153       Y COORD.= 2004.956
 11 X COORD.= 840.527       Y COORD.= 2000.281

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.154       0.286       0.164       0.405       0.275       0.496
 2       0.472      -0.037       0.471      -0.037       0.471      -0.037
         0.471      -0.037       0.471      -0.017

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               7
```

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.	COHESION	FRIC. ANGLE	UNIT WEIGHT
1	40	37.4	125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-60 Y COORD. = 2500
POINT 2 X COORD. =-60 Y COORD. = 2000
POINT 3 X COORD. = 340 Y COORD. = 2000

X INCREMENT (XINC) = 48 Y INCREMENT (YINC) = 48
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-60	2500	14	8	715.591	1.960	0
-60	2400	8	5	599.669	1.855	0
-60	2300	5	1	523.071	1.940	0
-60	2200	11	1	424.238	1.971	0
-60	2100	11	8	321.883	1.805	0
-60	2000	5	1	228.035	1.873	0
40	2500	11	9	676.816	1.967	0
40	2400	11	8	576.593	1.923	0
40	2300	11	8	490.863	2.007	0
40	2200	8	5	379.741	1.803	0
40	2100	11	3	297.501	2.026	0
40	2000	5	1	211.337	2.144	0
140	2500	11	10	630.864	1.921	0
140	2400	11	10	547.714	1.996	0
140	2300	14	12	437.109	1.800	0
140	2200	11	4	353.734	1.999	0
140	2100	11	7	272.190	2.033	0
140	2000	8	6	155.038	1.824	0
240	2500	8	6	589.503	2.006	0

240	2400	11	4	515.306	2.017	0
240	2300	11	10	411.553	1.977	0
240	2200	11	4	322.266	1.993	0
240	2100	8	7	211.793	1.826	0
240	2000	8	6	122.882	1.778	0
340	2500	8	8	548.886	2.067	0
340	2400	8	5	466.747	2.105	0
340	2300	8	5	372.029	2.025	0
340	2200	8	7	271.707	1.828	0
340	2100	8	8	176.832	1.870	0
340	2000	11	8	107.558	2.670	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-60	1900	1	1	134.164	1000.000	0
40	1900	11	10	97.785	1.832	0
140	1900	8	5	65.500	1.868	0
240	1900	5	1	66.274	4.284	0
340	1900	2	1	47.816	9.135	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-60.000	40.000	140.000	240.000	340.000
2500.000	1.960	1.967	1.921	2.006	2.067
2400.000	1.855	1.923	1.996	2.017	2.105
2300.000	1.940	2.007	1.800	1.977	2.025
2200.000	1.971	1.803	1.999	1.993	1.828
2100.000	1.805	2.026	2.033	1.826	1.870
2000.000	1.873	2.144	1.824	1.778	2.670
1900.000	1000.000	1.832	1.868	4.284	9.135

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 8 CENTERS

FACTOR OF SAFETY = 1.921 AT (140.000,2500.000)
FACTOR OF SAFETY = 1.855 AT (-60.000,2400.000)
FACTOR OF SAFETY = 1.800 AT (140.000,2300.000)
FACTOR OF SAFETY = 1.803 AT (40.000,2200.000)
FACTOR OF SAFETY = 1.828 AT (340.000,2200.000)
FACTOR OF SAFETY = 1.805 AT (-60.000,2100.000)
FACTOR OF SAFETY = 1.778 AT (240.000,2000.000)
FACTOR OF SAFETY = 1.832 AT (40.000,1900.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (240 2000) RADIUS 122.882
THE MINIMUM FACTOR OF SAFETY IS 1.778

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
240	2000	8	6	122.882	1.778	0

288	2000	8	7	101.319	1.828	0
192	2000	11	10	161.382	2.308	0
240	2048	8	5	169.410	1.740	0
240	2096	8	7	208.142	1.816	0
288	2048	8	7	145.132	2.095	0
192	2048	11	3	202.935	2.149	0
252	2048	8	6	162.229	1.765	0
228	2048	8	6	171.554	1.748	0
240	2060	8	6	177.872	1.745	0
240	2036	8	5	158.359	1.739	0
240	2024	8	5	147.311	1.747	0
252	2036	8	6	151.226	1.753	0
228	2036	8	6	160.571	1.755	0

AT POINT (240 2036) RADIUS 158.359

THE MINIMUM FACTOR OF SAFETY IS 1.739

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.002	1.857	0.000	.115	.232E+04	.221E+04	.329E+06	.424E+05
2	1	10.002	5.086	0.000	.178	.636E+04	.604E+04	.784E+06	.180E+06
3	1	10.002	7.650	0.000	.242	.957E+04	.909E+04	.113E+07	.366E+06
4	1	10.002	9.522	0.000	.305	.119E+05	.113E+05	.137E+07	.575E+06
5	1	10.002	10.662	0.000	.368	.133E+05	.127E+05	.149E+07	.777E+06
6	1	10.002	11.014	0.000	.431	.138E+05	.131E+05	.150E+07	.940E+06
7	1	10.002	10.504	0.000	.494	.131E+05	.125E+05	.139E+07	.103E+07
8	1	10.002	9.029	0.000	.557	.113E+05	.107E+05	.115E+07	.997E+06
9	1	10.002	6.445	0.000	.621	.806E+04	.765E+04	.808E+06	.792E+06
10	1	10.002	2.541	0.000	.684	.318E+04	.302E+04	.353E+06	.344E+06
							SUM	.103E+08	.604E+07

AT CENTER (240.000 , 2036.000) WITH RADIUS 158.359 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.707
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.739

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-60	2500	14	8	715.591	1.501	0
-60	2400	8	5	599.669	1.461	0
-60	2300	5	1	523.071	1.490	0
-60	2200	5	1	424.238	1.513	0
-60	2100	11	10	322.411	1.411	0
-60	2000	5	1	228.035	1.483	0

40	2500	11	9	676.816	1.506	0
40	2400	11	8	576.593	1.479	0
40	2300	11	8	490.863	1.537	0
40	2200	8	5	379.741	1.409	0
40	2100	11	3	297.501	1.556	0
40	2000	5	1	211.337	1.646	0
140	2500	11	10	630.864	1.477	0
140	2400	11	10	547.714	1.528	0
140	2300	14	12	437.109	1.407	0
140	2200	11	4	353.734	1.535	0
140	2100	11	7	272.190	1.569	0
140	2000	8	6	155.038	1.434	0
240	2500	11	10	601.253	1.553	0
240	2400	11	4	515.306	1.543	0
240	2300	11	10	411.553	1.517	0
240	2200	11	4	322.266	1.533	0
240	2100	8	6	214.547	1.434	0
240	2000	8	6	122.882	1.406	0
340	2500	8	8	548.886	1.604	0
340	2400	8	5	466.747	1.596	0
340	2300	8	5	372.029	1.549	0
340	2200	8	7	271.707	1.427	0
340	2100	8	8	176.832	1.480	0
340	2000	11	4	104.018	2.028	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-60	1900	1	1	134.164	1000.000	0
40	1900	11	10	97.785	1.447	0
140	1900	8	5	65.500	1.482	0
240	1900	11	3	49.042	3.233	0
340	1900	2	1	47.816	7.477	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-60.000	40.000	140.000	240.000	340.000
2500.000	1.501	1.506	1.477	1.553	1.604
2400.000	1.461	1.479	1.528	1.543	1.596
2300.000	1.490	1.537	1.407	1.517	1.549
2200.000	1.513	1.409	1.535	1.533	1.427
2100.000	1.411	1.556	1.569	1.434	1.480
2000.000	1.483	1.646	1.434	1.406	2.028
1900.000	1000.000	1.447	1.482	3.233	7.477

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 8 CENTERS

FACTOR OF SAFETY = 1.477 AT (140.000,2500.000)
FACTOR OF SAFETY = 1.461 AT (-60.000,2400.000)
FACTOR OF SAFETY = 1.407 AT (140.000,2300.000)
FACTOR OF SAFETY = 1.409 AT (40.000,2200.000)
FACTOR OF SAFETY = 1.427 AT (340.000,2200.000)
FACTOR OF SAFETY = 1.411 AT (-60.000,2100.000)
FACTOR OF SAFETY = 1.406 AT (240.000,2000.000)
FACTOR OF SAFETY = 1.447 AT (40.000,1900.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (240 2000) RADIUS 122.882
THE MINIMUM FACTOR OF SAFETY IS 1.406

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
240	2000	8	6	122.882	1.406	0
288	2000	8	7	101.319	1.444	0
192	2000	11	3	156.635	1.770	0
240	2048	8	5	169.410	1.373	0
240	2096	8	6	210.880	1.425	0
288	2048	8	7	145.132	1.612	0
192	2048	11	3	202.935	1.655	0
252	2048	8	6	162.229	1.391	0
228	2048	8	6	171.554	1.381	0
240	2060	8	6	177.872	1.377	0
240	2036	8	5	158.359	1.374	0

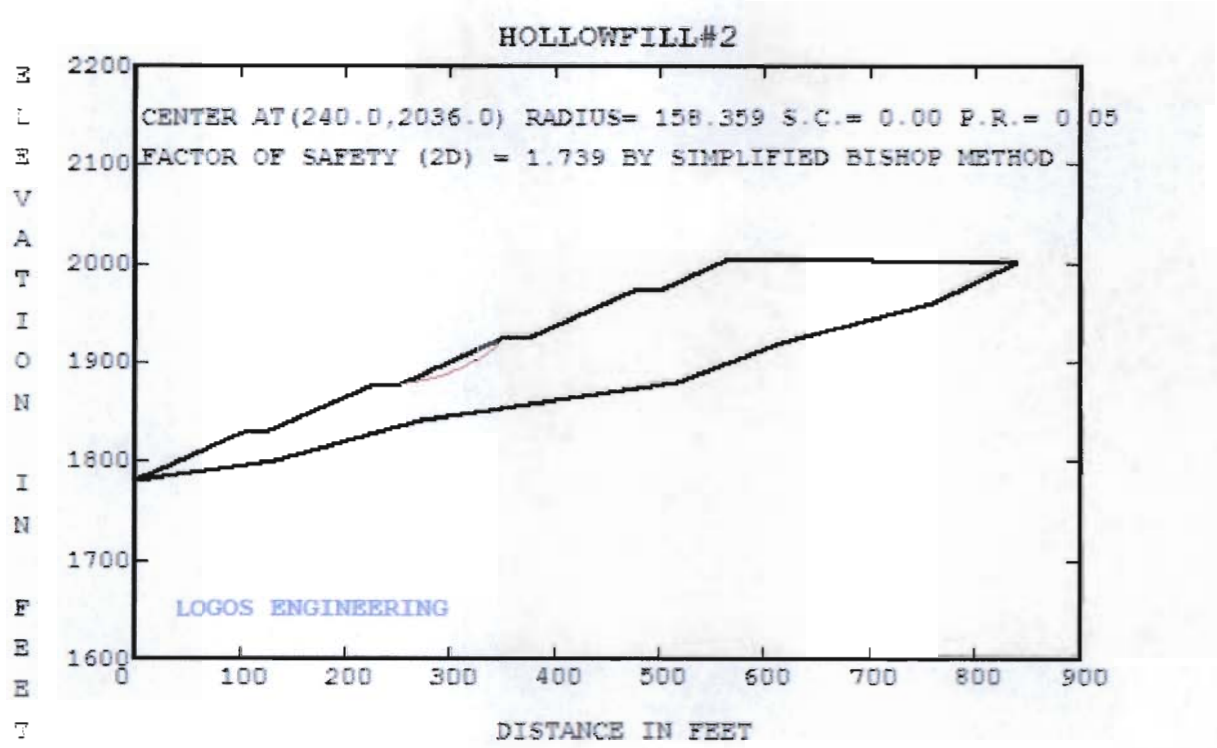
AT POINT (240 2048) RADIUS 169.410

THE MINIMUM FACTOR OF SAFETY IS 1.373

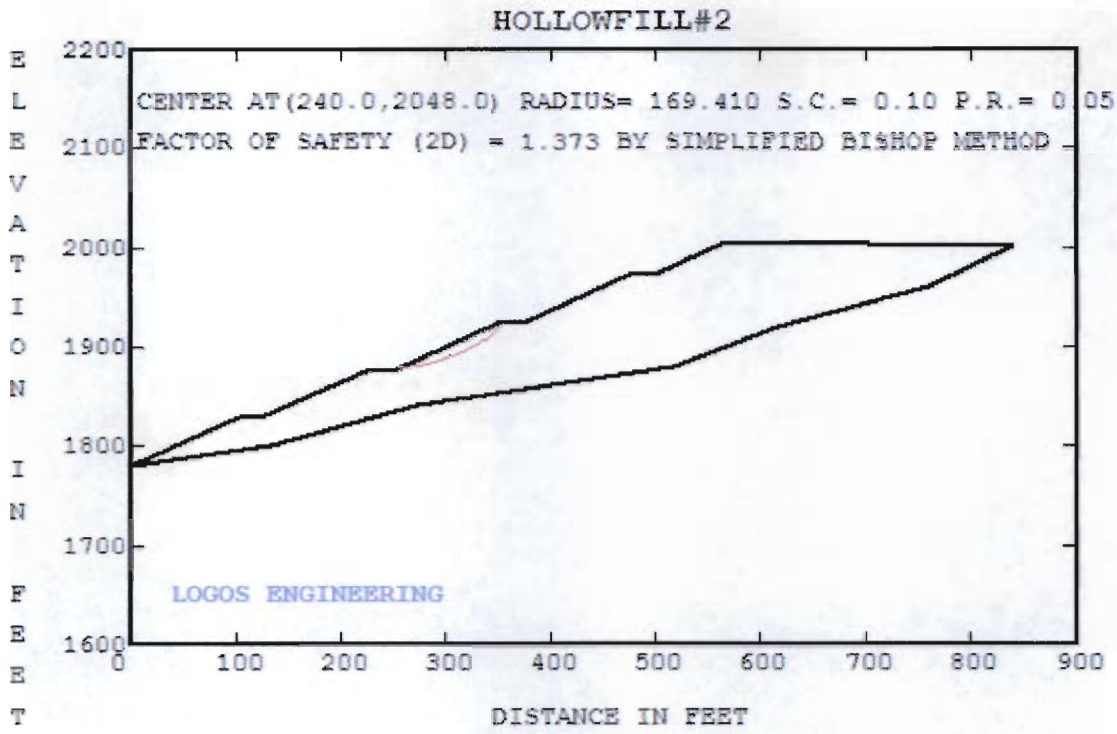
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.133	1.842	0.000	.122	.233E+04	.222E+04	.350E+06	.873E+05
2	1	10.133	5.059	0.000	.182	.641E+04	.609E+04	.830E+06	.303E+06
3	1	10.133	7.637	0.000	.242	.967E+04	.919E+04	.120E+07	.552E+06
4	1	10.133	9.552	0.000	.302	.121E+05	.115E+05	.144E+07	.808E+06
5	1	10.133	10.766	0.000	.361	.136E+05	.130E+05	.157E+07	.104E+07
6	1	10.133	11.231	0.000	.421	.142E+05	.135E+05	.159E+07	.123E+07
7	1	10.133	10.882	0.000	.481	.138E+05	.131E+05	.148E+07	.132E+07
8	1	10.133	9.631	0.000	.541	.122E+05	.116E+05	.126E+07	.129E+07
9	1	10.133	7.358	0.000	.601	.932E+04	.885E+04	.930E+06	.107E+07
10	1	6.913	4.531	0.000	.651	.392E+04	.372E+04	.394E+06	.481E+06
11	1	3.220	1.577	0.000	.681	.635E+03	.603E+03	.814E+05	.810E+05
							SUM	.111E+08	.826E+07

AT CENTER (240.000 , 2048.000) WITH RADIUS 169.410 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.347
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.373



I, Dan Zadel (signature) 12575 (registration no.) 4/2/07 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) 12595 (registration no.) 4/2/7 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -Z:\bs3 reame\bs1fill2planefail.DAT

TITLE -hollowfill 2 plainfailure

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 7
 1  X COORD.= 0             Y COORD.= 1780
 2  X COORD.= 133.6113      Y COORD.= 1800.598
 3  X COORD.= 273.3005      Y COORD.= 1840.598
 4  X COORD.= 517.0262      Y COORD.= 1880.598
 5  X COORD.= 615.8821      Y COORD.= 1920.598
 6  X COORD.= 759.4999      Y COORD.= 1960.074
 7  X COORD.= 840.527       Y COORD.= 2000.281

NO. OF POINTS ON BOUNDARY LINE 2 = 11
 1  X COORD.= 0             Y COORD.= 1780
 2  X COORD.= 103.6314      Y COORD.= 1828.868
 3  X COORD.= 124.4731      Y COORD.= 1828.092
 4  X COORD.= 228.6822      Y COORD.= 1877.213
 5  X COORD.= 249.524       Y COORD.= 1876.437
 6  X COORD.= 353.733       Y COORD.= 1925.557
 7  X COORD.= 374.5748      Y COORD.= 1924.781
 8  X COORD.= 478.7838      Y COORD.= 1973.902
 9  X COORD.= 499.6257      Y COORD.= 1973.126
 10 X COORD.= 567.153       Y COORD.= 2004.956
 11 X COORD.= 840.527       Y COORD.= 2000.281

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.154       0.286       0.164       0.405       0.275       0.496
 2       0.472      -0.037       0.471      -0.037       0.471      -0.037
         0.471      -0.037       0.471      -0.017


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             40            37.4          125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
```

ANALYSIS BY MODIFIED SPENCER METHOD (MTHD=4)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
LOCATION OF MOMENT CENTER: X0 = 0 Y0 = 2500
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1 = 7

1	X COORD.= 0	Y COORD.= 1780
2	X COORD.= 133.6113	Y COORD.= 1800.598
3	X COORD.= 273.3005	Y COORD.= 1840.598
4	X COORD.= 517.0262	Y COORD.= 1880.598
5	X COORD.= 615.8821	Y COORD.= 1920.598
6	X COORD.= 759.4999	Y COORD.= 1960.074
7	X COORD.= 840.527	Y COORD.= 2000.281

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 2.697

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	1	84.053	0.154	3.694E+04	1.517E+04	3.913E+03	.10E+06	.22E+05	4.383
2	1	19.579	0.154	1.884E+04	2.270E+04	5.855E+03	.51E+05	.12E+05	4.633
3	1	20.842	0.154	2.080E+04	3.100E+04	7.997E+03	.57E+05	.13E+05	5.275
4	1	9.138	0.154	8.960E+03	3.458E+04	8.920E+03	.24E+05	.55E+04	5.633
5	1	34.494	0.286	3.723E+04	3.041E+04	7.845E+03	.10E+06	.43E+05	5.378
6	1	60.577	0.286	8.158E+04	2.103E+04	5.424E+03	.23E+06	.94E+05	5.711
7	1	20.842	0.286	2.948E+04	1.762E+04	4.544E+03	.83E+05	.34E+05	6.179
8	1	2.634	0.286	3.476E+03	1.722E+04	4.442E+03	.98E+04	.40E+04	6.248
9	1	21.142	0.286	2.931E+04	1.384E+04	3.569E+03	.82E+05	.34E+05	7.114
10	1	62.910	0.164	1.139E+05	5.440E+04	1.403E+04	.31E+06	.75E+05	5.532
11	1	17.522	0.164	3.859E+04	6.810E+04	1.756E+04	.11E+06	.25E+05	5.906
12	1	20.842	0.164	4.630E+04	8.453E+04	2.180E+04	.13E+06	.30E+05	6.533
13	1	45.689	0.164	1.086E+05	1.231E+05	3.174E+04	.30E+06	.72E+05	8.124
14	1	58.520	0.164	1.688E+05	1.828E+05	4.715E+04	.46E+06	.11E+06	10.087
15	1	20.842	0.164	6.466E+04	2.057E+05	5.305E+04	.18E+06	.43E+05	10.823
16	1	4.690	0.164	1.435E+04	2.107E+05	5.436E+04	.39E+05	.95E+04	10.999
17	1	12.710	0.164	3.995E+04	2.249E+05	5.800E+04	.11E+06	.26E+05	11.469
18	1	50.127	0.405	1.531E+05	1.393E+05	3.593E+04	.45E+06	.25E+06	8.937
19	1	21.216	0.405	6.303E+04	1.041E+05	2.685E+04	.18E+06	.10E+06	8.334
20	1	27.513	0.405	7.335E+04	6.319E+04	1.630E+04	.21E+06	.12E+06	8.407
21	1	56.540	0.275	1.307E+05	5.320E+04	1.372E+04	.37E+06	.15E+06	8.971
22	1	84.053	0.275	1.416E+05	4.274E+04	1.102E+04	.40E+06	.16E+06	9.619
23	1	3.026	0.275	3.926E+03	4.246E+04	1.095E+04	.11E+05	.44E+04	9.633
24	1	81.027	0.496	5.073E+04	-1.172E-02	0.000E+00	.15E+06	.99E+05	0.000
		SUM					.41E+07	.15E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.000

BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.252 AND FACTOR OF SAFETY IS 2.697

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

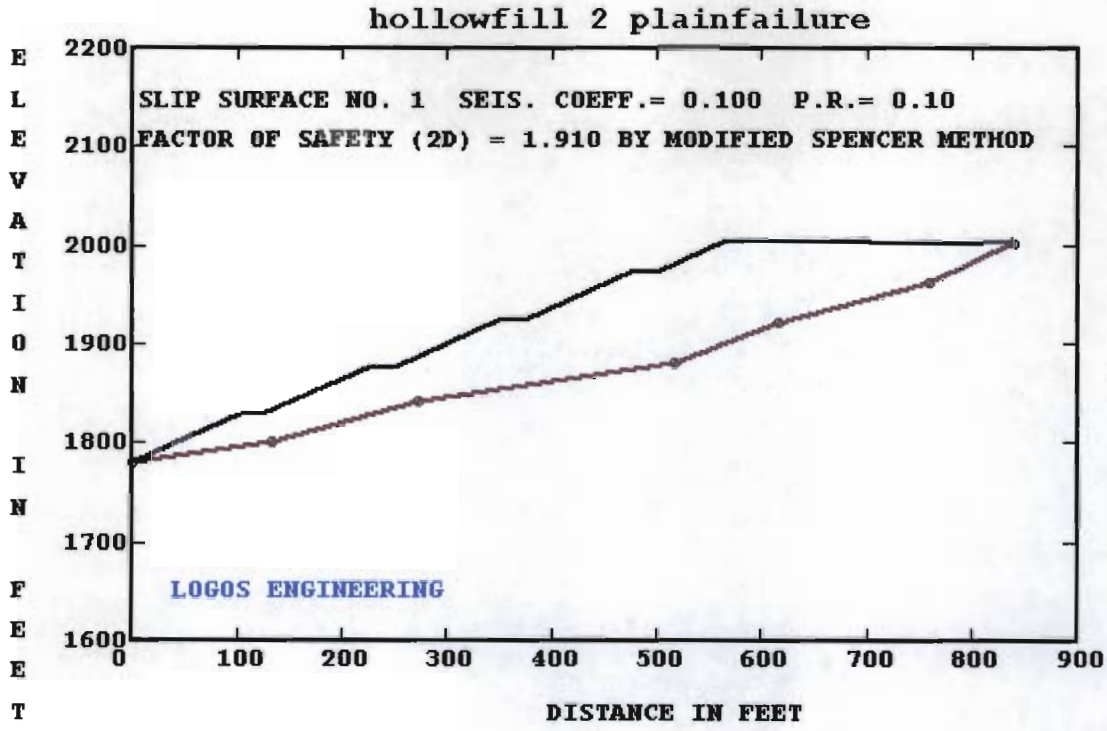
SLIP SURFACE NO. 1

FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.910

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

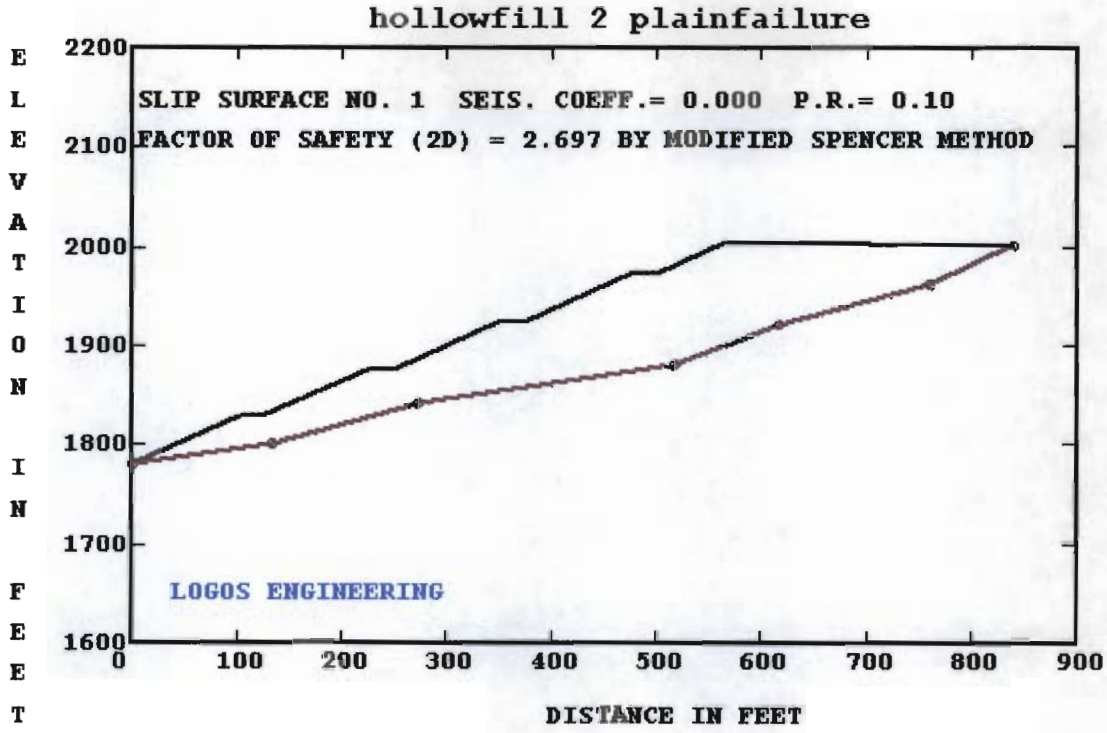
SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	1	84.053	0.154	5.382E+04	1.720E+04	1.057E+04	.10E+06	.37E+05	13.942
2	1	19.579	0.154	2.738E+04	2.558E+04	1.572E+04	.53E+05	.19E+05	12.680
3	1	20.842	0.154	3.021E+04	3.481E+04	2.140E+04	.58E+05	.21E+05	14.079
4	1	9.138	0.154	1.302E+04	3.879E+04	2.384E+04	.25E+05	.92E+04	15.275
5	1	34.494	0.286	5.021E+04	3.364E+04	2.067E+04	.10E+06	.57E+05	21.983
6	1	60.577	0.286	1.100E+05	2.197E+04	1.350E+04	.22E+06	.13E+06	25.823
7	1	20.842	0.286	3.973E+04	1.773E+04	1.090E+04	.79E+05	.46E+05	24.115
8	1	2.634	0.286	4.685E+03	1.723E+04	1.059E+04	.93E+04	.54E+04	23.930
9	1	21.142	0.286	3.950E+04	1.303E+04	8.007E+03	.79E+05	.45E+05	19.109
10	1	62.910	0.164	1.644E+05	5.733E+04	3.524E+04	.32E+06	.12E+06	-0.303
11	1	17.522	0.164	5.566E+04	7.227E+04	4.442E+04	.11E+06	.41E+05	-0.382
12	1	20.842	0.164	6.677E+04	9.018E+04	5.543E+04	.13E+06	.50E+05	1.152
13	1	45.689	0.164	1.566E+05	1.322E+05	8.123E+04	.30E+06	.12E+06	6.105
14	1	58.520	0.164	2.433E+05	1.972E+05	1.212E+05	.47E+06	.18E+06	10.914
15	1	20.842	0.164	9.322E+04	2.221E+05	1.365E+05	.18E+06	.70E+05	12.992
16	1	4.690	0.164	2.068E+04	2.276E+05	1.399E+05	.40E+05	.15E+05	13.577
17	1	12.710	0.164	5.760E+04	2.429E+05	1.493E+05	.11E+06	.43E+05	15.080
18	1	50.127	0.405	1.947E+05	1.519E+05	9.336E+04	.40E+06	.30E+06	16.210
19	1	21.216	0.405	8.019E+04	1.144E+05	7.032E+04	.17E+06	.12E+06	15.221
20	1	27.513	0.405	9.333E+04	7.089E+04	4.357E+04	.19E+06	.14E+06	12.782
21	1	56.540	0.275	1.770E+05	5.735E+04	3.525E+04	.35E+06	.20E+06	2.405
22	1	84.053	0.275	1.920E+05	4.321E+04	2.656E+04	.38E+06	.21E+06	0.039
23	1	3.026	0.275	5.323E+03	4.283E+04	2.632E+04	.11E+05	.59E+04	0.294
24	1	81.027	0.496	6.243E+04	0.000E+00	0.000E+00	.13E+06	.11E+06	0.000
		SUM					.40E+07	.21E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.100
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.551 AND FACTOR OF SAFETY IS 1.910



I, Don R. Roberts, 12575, 01-23-08
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and contains the information required of it by KRS Chapter 370 and KAR Title 405. (affix engineer's seal)

STATE OF KENTUCKY
DON R. ROBERTS
12,575
LICENSED PROFESSIONAL ENGINEER

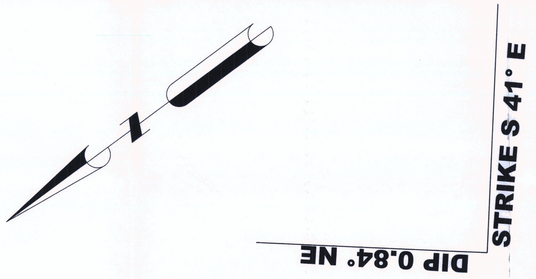


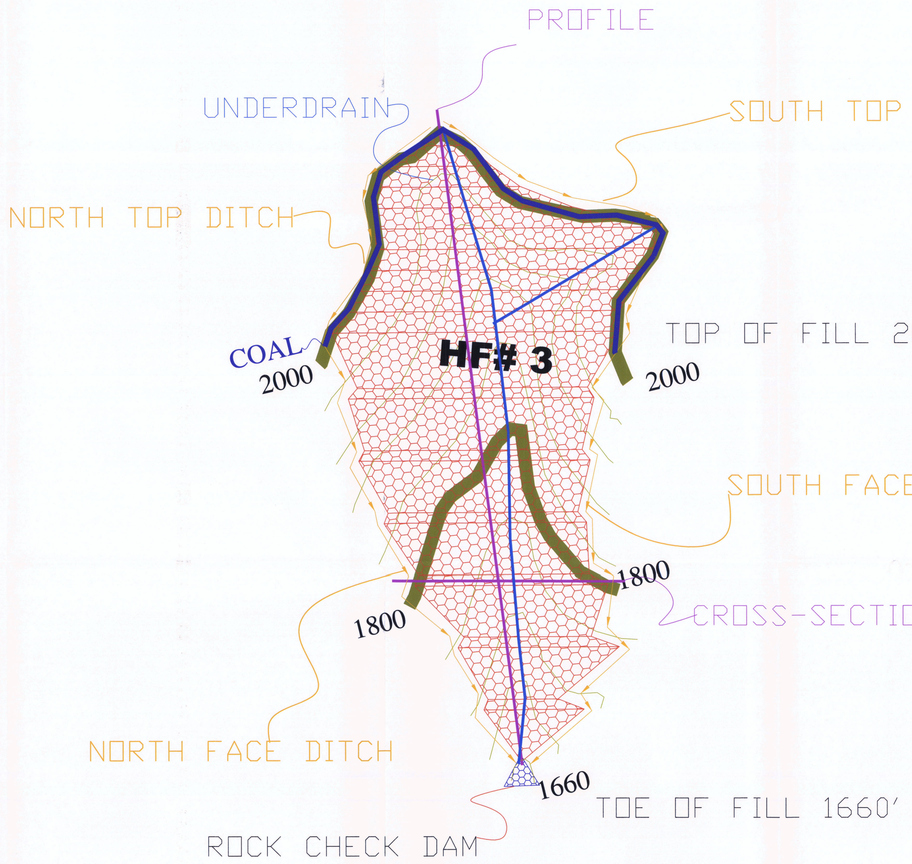
STATE OF KENTUCKY
DON R. ROBERTS
12,575
LICENSED PROFESSIONAL ENGINEER

I, [signature], 12575, 01-23-08,
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

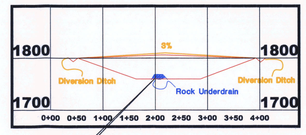
HOLLOW FILL #3

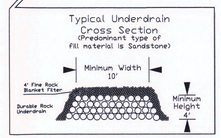
1"= 100'



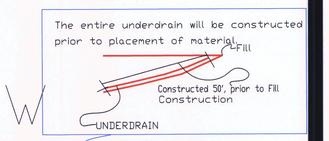


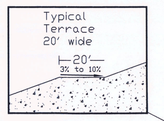
CROSS-SECTION VIEW

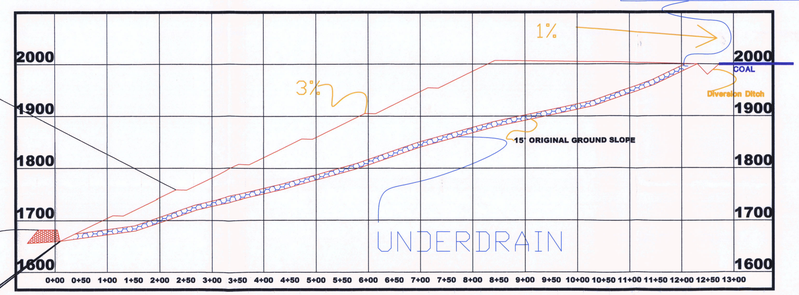




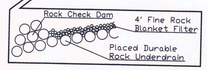
PROFILE VIEW







ROCK CHECK DAM



(signature) (registration no.) 12575 (date) 12-12-07

I hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

COMMONWEALTH OF KENTUCKY
DON R. ROBERTS
18,575
LICENSED PROFESSIONAL ENGINEER

807-0355

Blacksnake #3-Volume Report HF#3.txt

Volume Report 3/5/2007 09:31
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2649025.28,152652.22 to 2650210.28,153772.22
Grid resolution X: 237, Y: 224 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 7,126.6 S.F., 0.16 Acres
Area in Fill: 423,101.4 S.F., 9.71 Acres
Total inclusion area: 430,228.0 S.F., 9.88 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 2.67 Average Fill Depth: 51.92
Max Cut Depth: 19.70 Max Fill Depth: 160.91
Cut (C.Y.) / Area (acres): 71.23
Fill (C.Y.) / Area (acres): 82384.59
Cut volume: 18,994.7 C.F., 703.51 C.Y.
Fill volume: 21,969,519.4 C.F., 813,685.91 C.Y.

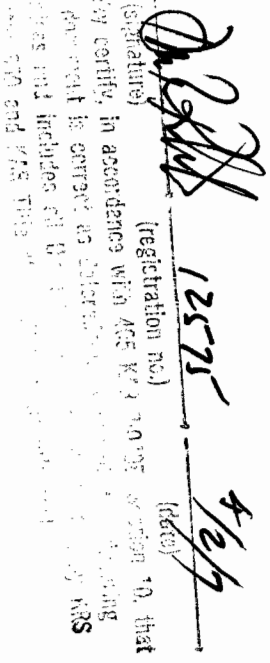
I, _____ (signature), 12575 (registration no.), 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10. that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOWFILL# 3
NEAREST CORE HOLE C-3

		FRICTION ANGLE	
SANDSTONE	127.00 FT.	40	127.00 FT. / 377.00 FT = 33.687% 33.687% X 40 = 13.5
SANDY SHALE	93.00 FT.	37.5	93.00 FT. / 377.00 FT = 24.668% 24.668% X 38 = 9.3
SHALE	157.00 FT.	35	157.00 FT. / 377.00 FT = 41.645% 41.645% X 35 = 14.6
TOTAL	377.00 FT.		FRICTION ANGLE 37.4

COHESION

80% DURABLE ROCK
20% MINE SPOIL
MINE SPOIL COHESION=200
20%X200=40
COHESION=40



807-0365

REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

LOGOS ENGINEERING

INPUT FILE NAME -C:\REAME2004\BS3HF3PF.DAT

TITLE -BLACK SNAKE HOLLOWFILL#3 PLANE FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS (THREED = 0)

CASE NO. 1 SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 3

NO. OF POINTS ON BOUNDARY LINE 1 = 10

1	X COORD.= 0	Y COORD.= 1660
2	X COORD.= 144.5121	Y COORD.= 1680
3	X COORD.= 260.7286	Y COORD.= 1720
4	X COORD.= 429.4706	Y COORD.= 1760
5	X COORD.= 570.9738	Y COORD.= 1800
6	X COORD.= 688.9167	Y COORD.= 1840
7	X COORD.= 833.3434	Y COORD.= 1880
8	X COORD.= 1023.351	Y COORD.= 1920
9	X COORD.= 1137.479	Y COORD.= 1960
10	X COORD.= 1220.426	Y COORD.= 1999.972

NO. OF POINTS ON BOUNDARY LINE 2 = 10

1	X COORD.= 0	Y COORD.= 1660
2	X COORD.= 144.5121	Y COORD.= 1680
3	X COORD.= 260.7286	Y COORD.= 1720
4	X COORD.= 429.4706	Y COORD.= 1760
5	X COORD.= 570.9738	Y COORD.= 1800
6	X COORD.= 688.9167	Y COORD.= 1840
7	X COORD.= 833.3434	Y COORD.= 1880
8	X COORD.= 1023.351	Y COORD.= 1920
9	X COORD.= 1137.479	Y COORD.= 1960
10	X COORD.= 1220.426	Y COORD.= 1999.972

NO. OF POINTS ON BOUNDARY LINE 3 = 15

1	X COORD.= 0	Y COORD.= 1660
2	X COORD.= 100.5741	Y COORD.= 1709.574
3	X COORD.= 120.7192	Y COORD.= 1708.902
4	X COORD.= 221.4447	Y COORD.= 1758.54
5	X COORD.= 241.5898	Y COORD.= 1757.867
6	X COORD.= 342.3154	Y COORD.= 1807.505
7	X COORD.= 362.4604	Y COORD.= 1806.833
8	X COORD.= 463.186	Y COORD.= 1856.471
9	X COORD.= 483.3311	Y COORD.= 1855.798
10	X COORD.= 584.0565	Y COORD.= 1905.437
11	X COORD.= 604.2016	Y COORD.= 1904.764

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 12 X COORD.= 704.9271      Y COORD.= 1954.402
 13 X COORD.= 725.0722      Y COORD.= 1953.73
 14 X COORD.= 833.05        Y COORD.= 2006.942
 15 X COORD.= 1220.426      Y COORD.= 1999.972

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.138       0.344       0.237       0.283       0.339       0.277
         0.211       0.350       0.482
 2       0.138       0.344       0.237       0.283       0.339       0.277
         0.211       0.350       0.482
 3       0.493      -0.033       0.493      -0.033       0.493      -0.033
         0.493      -0.033       0.493      -0.033       0.493      -0.033
         0.493      -0.018


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             160           24            125
 2             40            37.4          125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY MODIFIED SPENCER METHOD (MTHD=4)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
LOCATION OF MOMENT CENTER: X0 =  0    Y0 =  2106.942
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1  = 10
 1  X COORD.= 0             Y COORD.= 1660
 2  X COORD.= 144.5121      Y COORD.= 1680
 3  X COORD.= 260.7286      Y COORD.= 1720
 4  X COORD.= 429.4706      Y COORD.= 1760
 5  X COORD.= 570.9738      Y COORD.= 1800
 6  X COORD.= 688.9167      Y COORD.= 1840
 7  X COORD.= 833.3434      Y COORD.= 1880
 8  X COORD.= 1023.351      Y COORD.= 1920
 9  X COORD.= 1137.479      Y COORD.= 1960
 10 X COORD.= 1220.426      Y COORD.= 1999.972

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO.  1  FACTOR OF SAFETY IS 2.518


          SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. SOIL  SLICE BOTTOM   BOTTOM    INTERSLICE FORCE  RESISTING  DRIVING THRUST
NO.  NO.  WIDTH TANGENT  SHEAR     NORMAL     SHEAR    FORCE      FORCE  HEIGHT
                                  0.000E+00                                0.000
```

1	2	100.574	0.138	6.352E+04	3.187E+04	8.950E+03	.16E+06	.32E+05	7.177
2	2	20.145	0.138	2.391E+04	4.372E+04	1.228E+04	.61E+05	.12E+05	7.717
3	2	1.323	0.138	1.502E+03	4.447E+04	1.249E+04	.38E+04	.77E+03	7.775
4	2	22.469	0.138	2.877E+04	5.872E+04	1.649E+04	.73E+05	.15E+05	8.706
5	2	76.933	0.344	1.155E+05	3.019E+04	8.479E+03	.31E+06	.15E+06	9.787
6	2	20.145	0.344	3.147E+04	2.240E+04	6.291E+03	.84E+05	.41E+05	11.699
7	2	2.495	0.344	3.609E+03	2.151E+04	6.041E+03	.96E+04	.47E+04	12.022
8	2	16.643	0.344	2.483E+04	1.538E+04	4.319E+03	.66E+05	.32E+05	15.557
9	2	81.587	0.237	1.572E+05	3.598E+04	1.011E+04	.41E+06	.14E+06	9.214
10	2	20.145	0.237	4.395E+04	4.171E+04	1.171E+04	.11E+06	.39E+05	8.777
11	2	3.668	0.237	7.728E+03	4.272E+04	1.200E+04	.20E+05	.69E+04	8.729
12	2	63.343	0.237	1.514E+05	6.236E+04	1.751E+04	.39E+06	.14E+06	8.332
13	2	33.715	0.283	9.217E+04	5.905E+04	1.658E+04	.24E+06	.99E+05	8.744
14	2	20.145	0.283	5.531E+04	5.706E+04	1.602E+04	.14E+06	.59E+05	9.017
15	2	4.839	0.283	1.286E+04	5.660E+04	1.590E+04	.34E+05	.14E+05	9.082
16	2	82.803	0.283	2.450E+05	4.769E+04	1.339E+04	.64E+06	.26E+06	10.637
17	2	13.083	0.339	4.217E+04	3.771E+04	1.059E+04	.11E+06	.55E+05	12.592
18	2	20.145	0.339	6.316E+04	2.278E+04	6.396E+03	.17E+06	.82E+05	19.299
19	2	6.012	0.339	1.821E+04	1.847E+04	5.187E+03	.48E+05	.24E+05	23.406
20	2	78.703	0.339	2.549E+05	-4.186E+04	-1.176E+04	.68E+06	.33E+06	-11.604
21	2	16.010	0.277	5.683E+04	-4.281E+04	-1.202E+04	.15E+06	.60E+05	-11.281
22	2	20.145	0.277	7.059E+04	-4.399E+04	-1.235E+04	.18E+06	.74E+05	-10.896
23	2	7.184	0.277	2.462E+04	-4.440E+04	-1.247E+04	.64E+05	.26E+05	-10.766
24	2	100.794	0.277	3.838E+05	-5.094E+04	-1.431E+04	.10E+07	.40E+06	-8.991
25	2	0.293	0.277	1.221E+03	-5.096E+04	-1.431E+04	.32E+04	.13E+04	-8.986
26	2	20.955	0.211	8.756E+04	-3.132E+04	-8.795E+03	.23E+06	.70E+05	-12.679
27	2	122.043	0.211	4.433E+05	6.834E+04	1.919E+04	.11E+07	.35E+06	8.144
28	2	47.010	0.211	1.404E+05	1.000E+05	2.809E+04	.36E+06	.11E+06	8.358
29	2	75.033	0.350	1.685E+05	5.396E+04	1.515E+04	.45E+06	.22E+06	8.066
30	2	39.096	0.350	6.149E+04	3.739E+04	1.050E+04	.16E+06	.82E+05	8.327
31	2	82.947	0.482	5.508E+04	-3.906E-03	0.000E+00	.15E+06	.99E+05	0.000
		SUM					.77E+07	.30E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.000
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.274 AND FACTOR OF SAFETY IS 2.518

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

SLIP SURFACE NO. 1

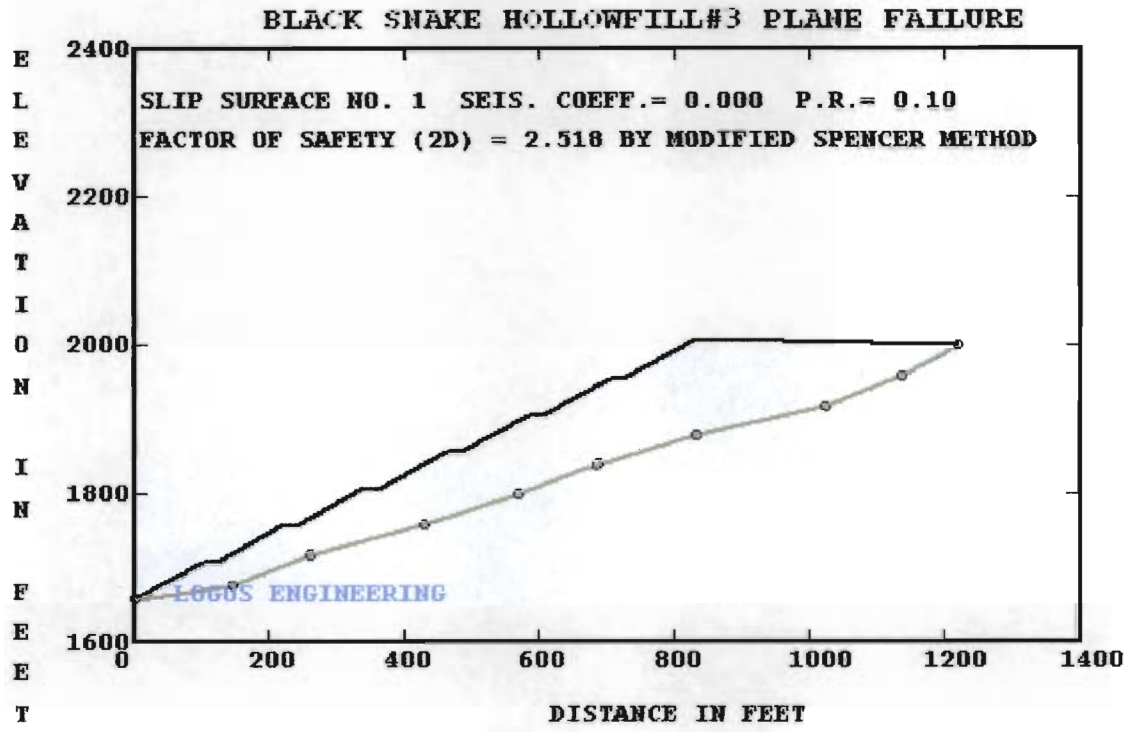
FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.818

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

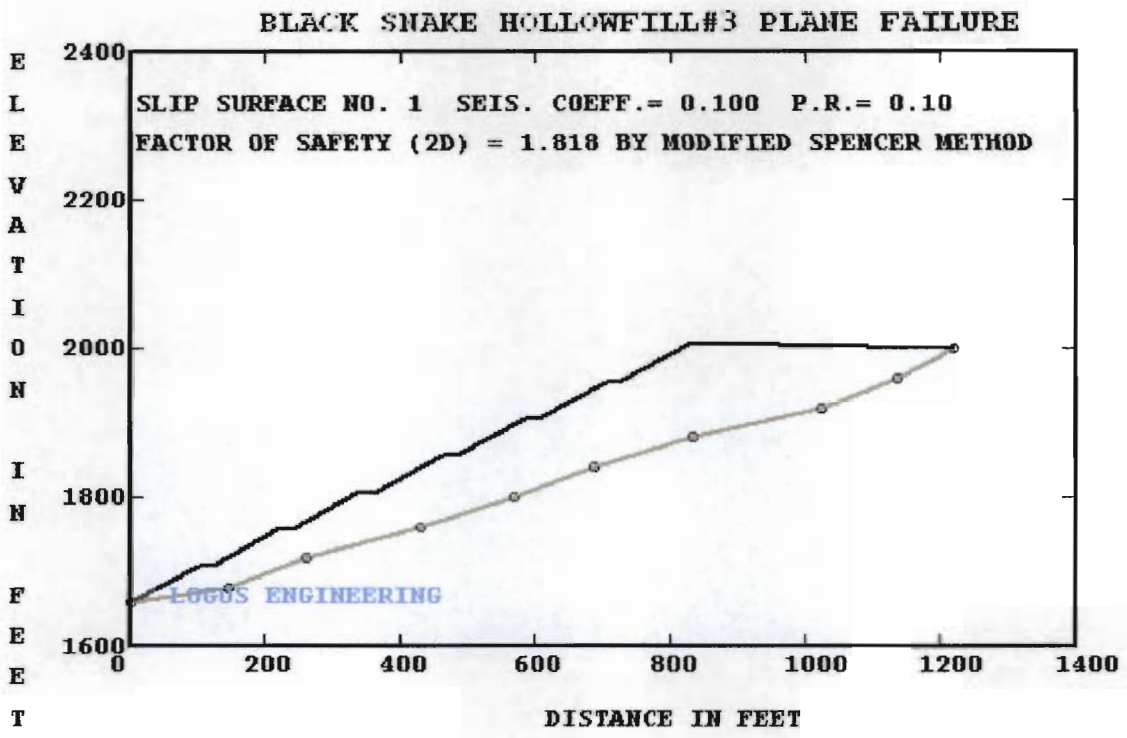
SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	2	100.574	0.138	1.128E+05	5.021E+04	7.422E+04	.21E+06	.64E+05	63.224
2	2	20.145	0.138	4.224E+04	6.871E+04	1.016E+05	.78E+05	.24E+05	67.388
3	2	1.323	0.138	2.654E+03	6.987E+04	1.033E+05	.49E+04	.15E+04	67.896
4	2	22.469	0.138	5.081E+04	9.210E+04	1.361E+05	.93E+05	.29E+05	75.867
5	2	76.933	0.344	1.373E+05	5.712E+04	8.444E+04	.26E+06	.18E+06	217.866
6	2	20.145	0.344	3.741E+04	4.756E+04	7.031E+04	.72E+05	.49E+05	280.551
7	2	2.495	0.344	4.293E+03	4.647E+04	6.869E+04	.83E+04	.56E+04	289.320

8	2	16.643	0.344	2.952E+04	3.895E+04	5.758E+04	.57E+05	.39E+05	360.140
9	2	81.587	0.237	2.232E+05	6.190E+04	9.151E+04	.42E+06	.21E+06	281.419
10	2	20.145	0.237	6.238E+04	6.825E+04	1.009E+05	.12E+06	.58E+05	271.117
11	2	3.668	0.237	1.097E+04	6.936E+04	1.025E+05	.21E+05	.10E+05	269.926
12	2	63.343	0.237	2.149E+05	9.108E+04	1.346E+05	.40E+06	.20E+06	252.249
13	2	33.715	0.283	1.204E+05	8.446E+04	1.249E+05	.23E+06	.13E+06	296.439
14	2	20.145	0.283	7.225E+04	8.048E+04	1.190E+05	.14E+06	.79E+05	324.716
15	2	4.839	0.283	1.681E+04	7.956E+04	1.176E+05	.32E+05	.18E+05	331.776
16	2	82.803	0.283	3.199E+05	6.178E+04	9.133E+04	.60E+06	.35E+06	471.905
17	2	13.083	0.339	5.030E+04	4.932E+04	7.291E+04	.97E+05	.66E+05	591.262
18	2	20.145	0.339	7.534E+04	3.068E+04	4.535E+04	.14E+06	.98E+05	941.595
19	2	6.012	0.339	2.173E+04	2.531E+04	3.741E+04	.42E+05	.28E+05	1135.842
20	2	78.703	0.339	3.040E+05	-5.000E+04	-7.392E+04	.58E+06	.40E+06	-453.516
21	2	16.010	0.277	7.490E+04	-5.280E+04	-7.805E+04	.14E+06	.81E+05	-388.632
22	2	20.145	0.277	9.304E+04	-5.626E+04	-8.317E+04	.18E+06	.10E+06	-315.766
23	2	7.184	0.277	3.245E+04	-5.746E+04	-8.495E+04	.61E+05	.35E+05	-292.104
24	2	100.794	0.277	5.057E+05	-7.654E+04	-1.132E+05	.95E+06	.54E+06	-2.591
25	2	0.293	0.277	1.608E+03	-7.660E+04	-1.132E+05	.30E+04	.17E+04	-1.852
26	2	20.955	0.211	1.307E+05	-5.198E+04	-7.684E+04	.24E+06	.11E+06	69.123
27	2	122.043	0.211	6.620E+05	7.310E+04	1.081E+05	.12E+07	.55E+06	-149.031
28	2	47.010	0.211	2.098E+05	1.129E+05	1.669E+05	.39E+06	.17E+06	-68.077
29	2	75.033	0.350	1.979E+05	5.710E+04	8.441E+04	.38E+06	.27E+06	-48.935
30	2	39.096	0.350	7.242E+04	3.706E+04	5.479E+04	.14E+06	.97E+05	-35.166
31	2	82.947	0.482	5.551E+04	2.734E-02	0.000E+00	.11E+06	.99E+05	0.000
		SUM					.74E+07	.41E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.100
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.976 AND FACTOR OF SAFETY IS 1.818



I, _____, 12575, 4/2/19
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10. that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature), _____ (registration no.), _____ (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

LOGOS ENGINEERING

INPUT FILE NAME -C:\REAME2004\BS3HF3CF.DAT

TITLE -BLACK SNAKE HOLLOWFILL#3 CIRCULAR FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS (THREED = 0)

CASE NO. 1 SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 10

1	X COORD.= 0	Y COORD.= 1660
2	X COORD.= 144.5121	Y COORD.= 1680
3	X COORD.= 260.7286	Y COORD.= 1720
4	X COORD.= 429.4706	Y COORD.= 1760
5	X COORD.= 570.9738	Y COORD.= 1800
6	X COORD.= 688.9167	Y COORD.= 1840
7	X COORD.= 833.3434	Y COORD.= 1880
8	X COORD.= 1023.351	Y COORD.= 1920
9	X COORD.= 1137.479	Y COORD.= 1960
10	X COORD.= 1220.426	Y COORD.= 1999.972

NO. OF POINTS ON BOUNDARY LINE 2 = 15

1	X COORD.= 0	Y COORD.= 1660
2	X COORD.= 100.5741	Y COORD.= 1709.574
3	X COORD.= 120.7192	Y COORD.= 1708.902
4	X COORD.= 221.4447	Y COORD.= 1758.54
5	X COORD.= 241.5898	Y COORD.= 1757.867
6	X COORD.= 342.3154	Y COORD.= 1807.505
7	X COORD.= 362.4604	Y COORD.= 1806.833
8	X COORD.= 463.186	Y COORD.= 1856.471
9	X COORD.= 483.3311	Y COORD.= 1855.798
10	X COORD.= 584.0565	Y COORD.= 1905.437
11	X COORD.= 604.2016	Y COORD.= 1904.764
12	X COORD.= 704.9271	Y COORD.= 1954.402
13	X COORD.= 725.0722	Y COORD.= 1953.73
14	X COORD.= 833.05	Y COORD.= 2006.942
15	X COORD.= 1220.426	Y COORD.= 1999.972

LINE NO. AND SLOPE OF EACH SEGMENT ARE:

1	0.138	0.344	0.237	0.283	0.339	0.277
	0.211	0.350	0.482			
2	0.493	-0.033	0.493	-0.033	0.493	-0.033
	0.493	-0.033	0.493	-0.033	0.493	-0.033
	0.493	-0.018				

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1

LINE NO. (LINO)	BEG. NO. (NBP)	END NO. (NEP)
1	1	10

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.	COHESION	FRIC. ANGLE	UNIT WEIGHT
1	40	37.4	125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-100 Y COORD. = 2725
POINT 2 X COORD. =-100 Y COORD. = 2000
POINT 3 X COORD. = 480 Y COORD. = 2000

X INCREMENT (XINC) = 72 Y INCREMENT (YINC) = 72
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	2725	11	4	1038.183	1.846	0
-100	2580	11	9	897.132	1.843	0
-100	2435	14	8	776.526	1.864	0
-100	2290	5	1	637.887	1.877	0
-100	2145	5	1	495.202	1.881	0
-100	2000	5	1	354.401	1.686	0
45	2725	17	15	986.256	1.840	0
45	2580	14	7	868.972	1.874	0
45	2435	11	9	723.225	1.873	0
45	2290	11	7	584.581	1.890	0

45	2145	11	9	450.815	1.920	0
45	2000	8	6	299.990	1.683	0
190	2725	11	11	930.470	1.853	0
190	2580	14	5	789.333	1.852	0
190	2435	11	4	668.686	1.882	0
190	2290	11	11	522.210	1.901	0
190	2145	11	10	388.148	1.906	0
190	2000	8	6	247.316	1.655	0
335	2725	8	5	874.189	1.873	0
335	2580	8	5	738.151	1.857	0
335	2435	11	10	612.218	1.891	0
335	2290	8	6	464.628	1.913	0
335	2145	11	10	339.860	1.916	0
335	2000	8	7	192.399	1.668	0
480	2725	8	8	805.582	1.854	0
480	2580	8	5	685.629	1.847	0
480	2435	11	10	560.613	1.893	0
480	2290	8	8	403.136	1.870	0
480	2145	8	5	280.137	1.985	0
480	2000	8	7	139.459	1.680	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	1855	1	1	219.146	1000.000	0
45	1855	5	1	186.990	2.097	0
190	1855	11	8	133.445	2.320	0
335	1855	11	7	81.142	2.936	0
480	1855	4	1	77.673	5.914	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-100.000	45.000	190.000	335.000	480.000
2725.000	1.846	1.840	1.853	1.873	1.854
2580.000	1.843	1.874	1.852	1.857	1.847
2435.000	1.864	1.873	1.882	1.891	1.893
2290.000	1.877	1.890	1.901	1.913	1.870
2145.000	1.881	1.920	1.906	1.916	1.985
2000.000	1.686	1.683	1.655	1.668	1.680
1855.000	1000.000	2.097	2.320	2.936	5.914

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 6 CENTERS

FACTOR OF SAFETY = 1.840 AT (45.000,2725.000)
FACTOR OF SAFETY = 1.843 AT (-100.000,2580.000)
FACTOR OF SAFETY = 1.852 AT (190.000,2580.000)
FACTOR OF SAFETY = 1.847 AT (480.000,2580.000)
FACTOR OF SAFETY = 1.870 AT (480.000,2290.000)
FACTOR OF SAFETY = 1.655 AT (190.000,2000.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (190 2000) RADIUS 247.316
THE MINIMUM FACTOR OF SAFETY IS 1.655

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
190	2000	8	6	247.316	1.655	0
262	2000	11	6	243.546	1.979	0
118	2000	11	9	289.373	1.921	0
190	2072	8	7	310.004	1.804	0
190	1928	11	7	196.025	2.043	0
208	2000	8	6	239.926	1.709	0
172	2000	11	10	260.646	1.947	0
190	2018	8	6	263.663	1.675	0
190	1982	8	7	228.603	1.717	0

AT POINT (190 2000) RADIUS 247.316

THE MINIMUM FACTOR OF SAFETY IS 1.655

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.264	1.357	0.000	.233	.174E+04	.165E+04	.408E+06	.100E+06
2	1	10.264	3.720	0.000	.275	.477E+04	.453E+04	.930E+06	.324E+06
3	1	10.264	5.605	0.000	.316	.719E+04	.683E+04	.133E+07	.562E+06
4	1	10.264	6.990	0.000	.358	.897E+04	.852E+04	.161E+07	.793E+06
5	1	10.264	7.852	0.000	.399	.101E+05	.957E+04	.177E+07	.994E+06
6	1	10.264	8.160	0.000	.441	.105E+05	.995E+04	.180E+07	.114E+07
7	1	10.264	7.879	0.000	.482	.101E+05	.960E+04	.171E+07	.121E+07
8	1	10.264	6.963	0.000	.524	.893E+04	.849E+04	.149E+07	.116E+07
9	1	10.264	5.358	0.000	.565	.687E+04	.653E+04	.114E+07	.961E+06
10	1	7.420	3.368	0.000	.601	.312E+04	.297E+04	.540E+06	.464E+06
11	1	2.844	1.185	0.000	.622	.421E+03	.400E+03	.952E+05	.647E+05
							SUM	.128E+08	.777E+07

AT CENTER (190.000 , 2000.000) WITH RADIUS 247.316 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.651
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.655

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	2725	11	4	1038.183	1.425	0
-100	2580	11	9	897.132	1.426	0
-100	2435	14	8	776.526	1.437	0

-100	2290	5	1	637.887	1.448	0
-100	2145	5	1	495.202	1.454	0
-100	2000	5	1	354.401	1.337	0
45	2725	17	15	986.256	1.420	0
45	2580	14	7	868.972	1.445	0
45	2435	11	9	723.225	1.444	0
45	2290	11	7	584.581	1.457	0
45	2145	11	9	450.815	1.481	0
45	2000	8	6	299.990	1.336	0
190	2725	11	11	930.470	1.430	0
190	2580	14	5	789.333	1.432	0
190	2435	11	4	668.686	1.451	0
190	2290	11	11	522.210	1.466	0
190	2145	11	10	388.148	1.472	0
190	2000	8	6	247.316	1.312	0
335	2725	8	5	874.189	1.444	0
335	2580	8	5	738.151	1.433	0
335	2435	11	10	612.218	1.458	0
335	2290	8	5	468.809	1.475	0
335	2145	11	11	335.837	1.481	0
335	2000	8	7	192.399	1.325	0
480	2725	8	8	805.582	1.451	0
480	2580	8	5	685.629	1.427	0
480	2435	11	10	560.613	1.462	0
480	2290	8	6	412.623	1.481	0
480	2145	8	5	280.137	1.528	0
480	2000	8	7	139.459	1.335	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	1855	1	1	219.146	1000.000	0
45	1855	5	1	186.990	1.625	0
190	1855	11	9	128.523	1.787	0
335	1855	11	4	74.524	2.230	0
480	1855	4	1	77.673	4.737	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-100.000	45.000	190.000	335.000	480.000
2725.000	1.425	1.420	1.430	1.444	1.451
2580.000	1.426	1.445	1.432	1.433	1.427
2435.000	1.437	1.444	1.451	1.458	1.462
2290.000	1.448	1.457	1.466	1.475	1.481
2145.000	1.454	1.481	1.472	1.481	1.528
2000.000	1.337	1.336	1.312	1.325	1.335
1855.000	1000.000	1.625	1.787	2.230	4.737

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.420 AT (45.000,2725.000)
FACTOR OF SAFETY = 1.427 AT (480.000,2580.000)
FACTOR OF SAFETY = 1.312 AT (190.000,2000.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (190 2000) RADIUS 247.316
THE MINIMUM FACTOR OF SAFETY IS 1.312

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
190	2000	8	6	247.316	1.312	0
262	2000	11	7	240.367	1.539	0
118	2000	11	9	289.373	1.490	0
190	2072	8	6	312.716	1.410	0
190	1928	11	8	193.658	1.583	0
208	2000	8	6	239.926	1.348	0
172	2000	11	10	260.646	1.507	0
190	2018	8	6	263.663	1.324	0
190	1982	8	7	228.603	1.364	0

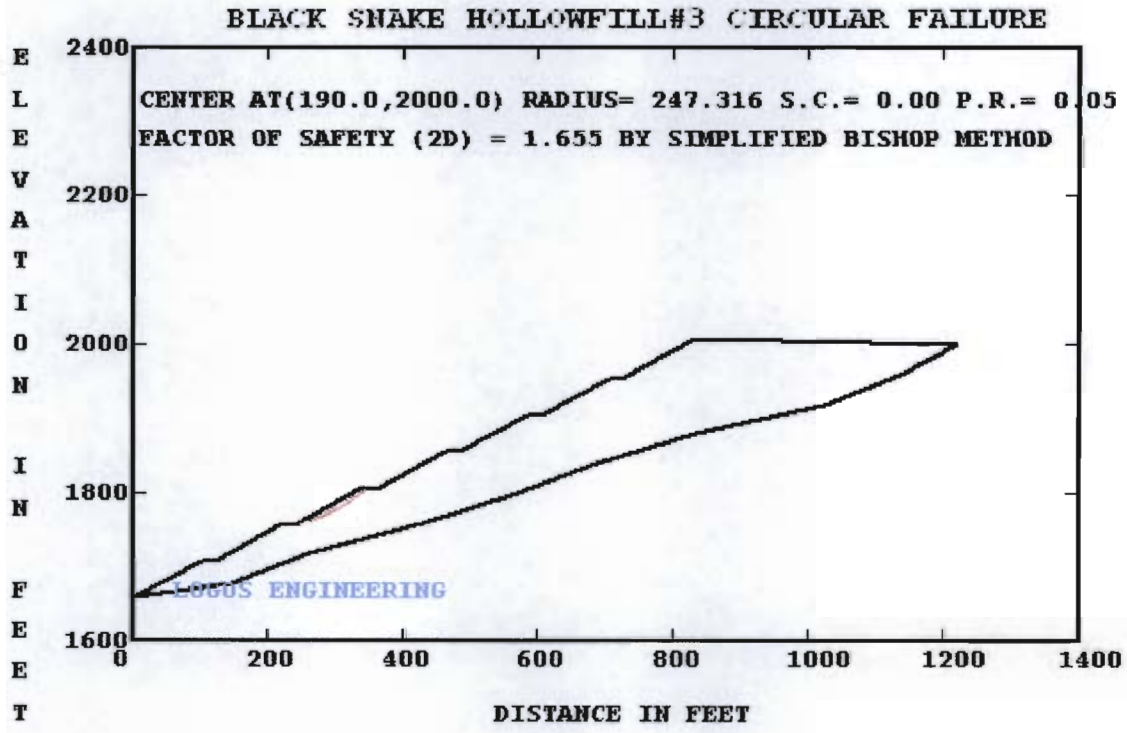
AT POINT (190 2000) RADIUS 247.316

THE MINIMUM FACTOR OF SAFETY IS 1.312

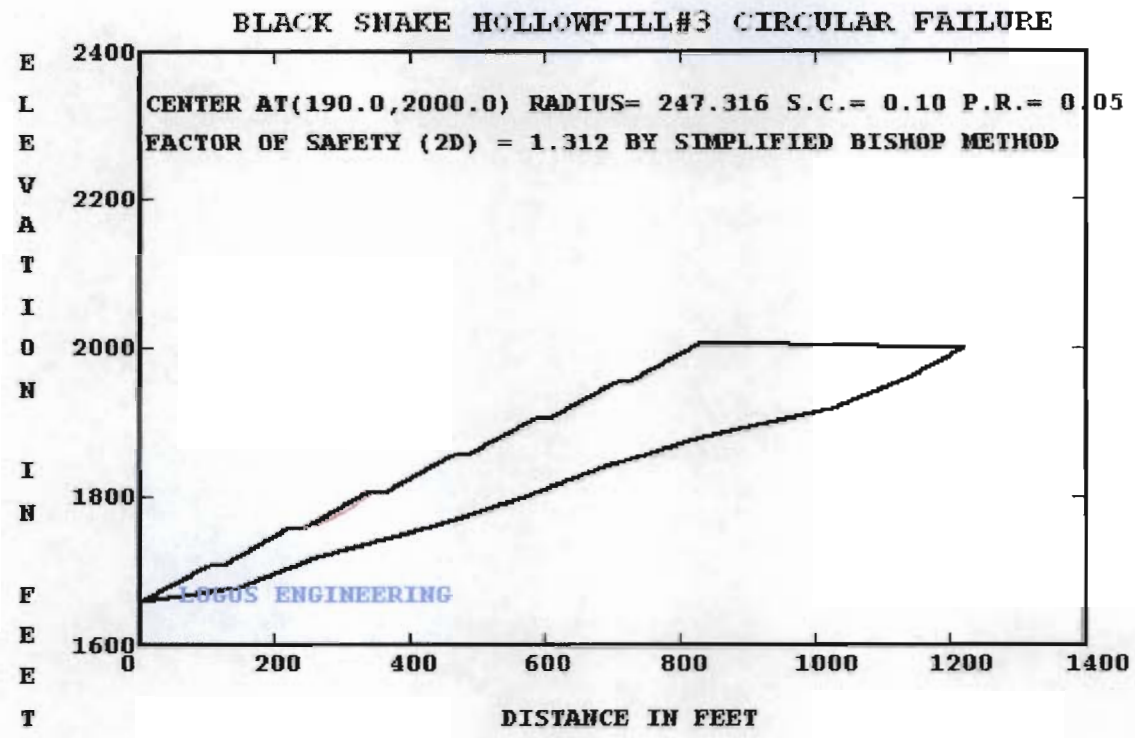
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.264	1.357	0.000	.233	.174E+04	.165E+04	.401E+06	.142E+06
2	1	10.264	3.720	0.000	.275	.477E+04	.453E+04	.905E+06	.437E+06
3	1	10.264	5.605	0.000	.316	.719E+04	.683E+04	.129E+07	.729E+06
4	1	10.264	6.990	0.000	.358	.897E+04	.852E+04	.155E+07	.997E+06
5	1	10.264	7.852	0.000	.399	.101E+05	.957E+04	.169E+07	.122E+07
6	1	10.264	8.160	0.000	.441	.105E+05	.995E+04	.171E+07	.137E+07
7	1	10.264	7.879	0.000	.482	.101E+05	.960E+04	.161E+07	.142E+07
8	1	10.264	6.963	0.000	.524	.893E+04	.849E+04	.140E+07	.134E+07
9	1	10.264	5.358	0.000	.565	.687E+04	.653E+04	.107E+07	.110E+07
10	1	7.420	3.368	0.000	.601	.312E+04	.297E+04	.505E+06	.525E+06
11	1	2.844	1.185	0.000	.622	.421E+03	.400E+03	.902E+05	.729E+05
							SUM	.122E+08	.935E+07

AT CENTER (190.000 , 2000.000) WITH RADIUS 247.316 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.308
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.312



I, _____ (signature) 12575 (registration no.) 4/2/7 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) _____ (registration no.) _____ (date)

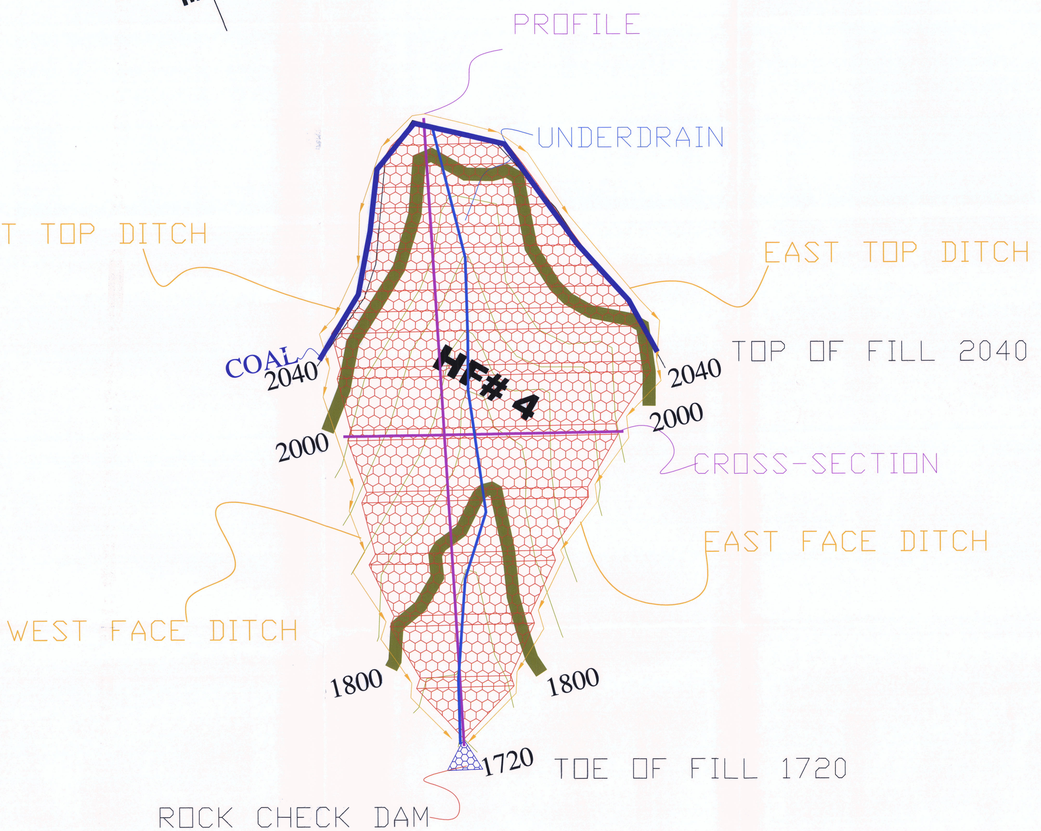
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOW FILL #4

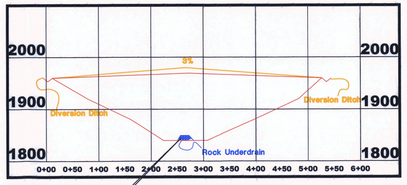
1"= 100'

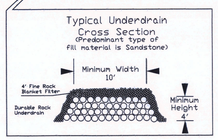
DIP 0.84° NE

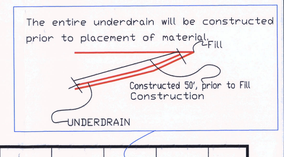
STRIKE S 41° E



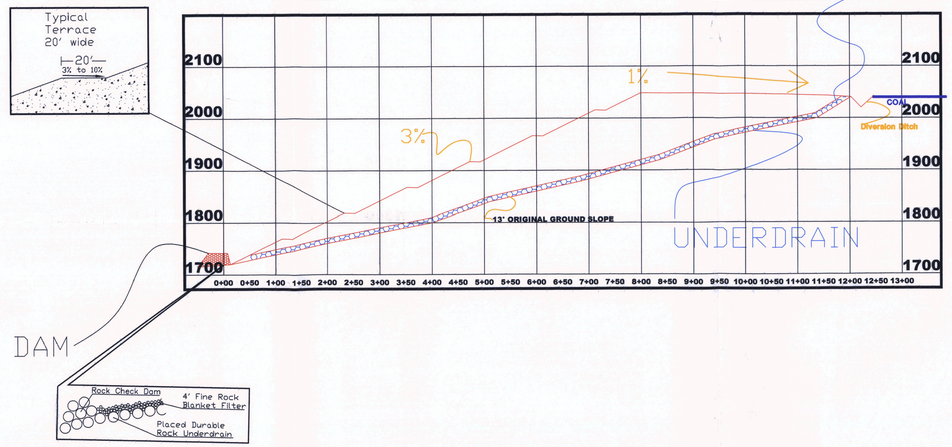
CROSS-SECTION VIEW







PROFILE VIEW



ROCK CHECK DAM

(Initiated) (registration no.) 12575 12-12-07 (date)

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405, (affix engineer's seal)

807-0355

Blacksnake #3-Volume Report HF#4.txt

Volume Report 3/5/2007 09:42
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2650602.92,151221.66 to 2651397.92,152466.66
Grid resolution X: 159, Y: 249 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 2,008.8 S.F., 0.05 Acres
Area in Fill: 437,890.7 S.F., 10.05 Acres
Total inclusion area: 439,899.6 S.F., 10.10 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 1.11 Average Fill Depth: 64.49
Max Cut Depth: 5.47 Max Fill Depth: 168.63
Cut (C.Y.) / Area (acres): 8.16
Fill (C.Y.) / Area (acres): 103561.91
Cut volume: 2,224.9 C.F., 82.40 C.Y.
Fill volume: 28,237,709.9 C.F., 1,045,841.11 C.Y.

I, _____ (signature), 12576 (registration no.), 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

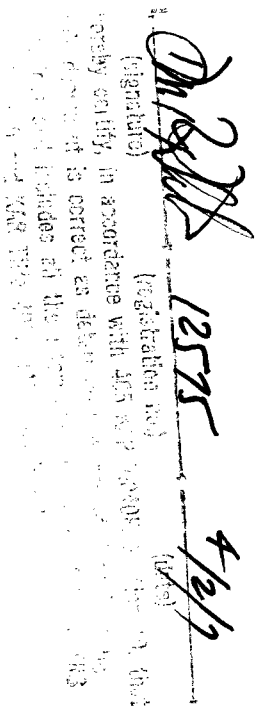
HOLLOWFILL# 4
NEAREST CORE HOLE C-3

		FRICTION ANGLE	
SANDSTONE	127.00 FT.	40	127.00 FT. / 377.00 FT = 33.687% 33.687% X 40 = 13.5
SANDY SHALE	93.00 FT.	37.5	93.00 FT. / 377.00 FT = 24.668% 24.668% X 38 = 9.3
SHALE	157.00 FT.	35	157.00 FT. / 377.00 FT = 41.645% 41.645% X 35 = 14.6
TOTAL	377.00 FT.		FRICTION ANGLE 37.4

COHESION

80% DURABLE ROCK
20% MINE SPOIL

MINE SPOIL COHESION=200
20%X200=40
COHESION=40



807-0355

REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

LOGOS ENGINEERING

INPUT FILE NAME -C:\REAME2004\BS3HF4PF.DAT

TITLE -BLACK SNAKE#3 HOLLOWFILL#4 PLANE FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS (THREED = 0)

CASE NO. 1 SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 3

NO. OF POINTS ON BOUNDARY LINE 1 = 9

1	X COORD.= 0	Y COORD.= 1720
2	X COORD.= 187.9236	Y COORD.= 1760
3	X COORD.= 388.3797	Y COORD.= 1800
4	X COORD.= 497.3595	Y COORD.= 1840
5	X COORD.= 675.7198	Y COORD.= 1880
6	X COORD.= 824.9546	Y COORD.= 1920
7	X COORD.= 930.7267	Y COORD.= 1960
8	X COORD.= 1124.685	Y COORD.= 2000
9	X COORD.= 1189.372	Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 2 = 9

1	X COORD.= 0	Y COORD.= 1720
2	X COORD.= 187.9236	Y COORD.= 1760
3	X COORD.= 388.3797	Y COORD.= 1800
4	X COORD.= 497.3595	Y COORD.= 1840
5	X COORD.= 675.7198	Y COORD.= 1880
6	X COORD.= 824.9546	Y COORD.= 1920
7	X COORD.= 930.7267	Y COORD.= 1960
8	X COORD.= 1124.685	Y COORD.= 2000
9	X COORD.= 1189.372	Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 3 = 15

1	X COORD.= 0	Y COORD.= 1720
2	X COORD.= 99.1418	Y COORD.= 1769.427
3	X COORD.= 119.1554	Y COORD.= 1768.805
4	X COORD.= 219.2238	Y COORD.= 1818.694
5	X COORD.= 239.2375	Y COORD.= 1818.072
6	X COORD.= 339.3058	Y COORD.= 1867.961
7	X COORD.= 359.3194	Y COORD.= 1867.339
8	X COORD.= 459.3877	Y COORD.= 1917.228
9	X COORD.= 479.4014	Y COORD.= 1916.606
10	X COORD.= 579.4696	Y COORD.= 1966.495
11	X COORD.= 599.4833	Y COORD.= 1965.873
12	X COORD.= 699.5517	Y COORD.= 2015.762
13	X COORD.= 719.5653	Y COORD.= 2015.14

```
 14 X COORD.= 786.8112      Y COORD.= 2048.665
 15 X COORD.= 1189.372      Y COORD.= 2040

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.213       0.200       0.367       0.224       0.268       0.378
         0.206       0.618
 2       0.213       0.200       0.367       0.224       0.268       0.378
         0.206       0.618
 3       0.499      -0.031       0.499      -0.031       0.499      -0.031
         0.499      -0.031       0.499      -0.031       0.499      -0.031
         0.499      -0.022


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             160           24            125
 2             40            37.4          125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY MODIFIED SPENCER METHOD (MTHD=4)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
LOCATION OF MOMENT CENTER: X0 =  0    Y0 =  2148.665
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1  = 9
 1  X COORD.= 0             Y COORD.= 1720
 2  X COORD.= 187.9236      Y COORD.= 1760
 3  X COORD.= 388.3797      Y COORD.= 1800
 4  X COORD.= 497.3595      Y COORD.= 1840
 5  X COORD.= 675.7198      Y COORD.= 1880
 6  X COORD.= 824.9546      Y COORD.= 1920
 7  X COORD.= 930.7267      Y COORD.= 1960
 8  X COORD.= 1124.685      Y COORD.= 2000
 9  X COORD.= 1189.372      Y COORD.= 2040

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO.  1  FACTOR OF SAFETY IS 2.595
```

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	2	99.142	0.213	4.701E+04	1.013E+04	2.705E+03	.12E+06	.38E+05	2.698
2	2	19.795	0.213	1.691E+04	1.357E+04	3.625E+03	.45E+05	.14E+05	2.954
3	2	0.218	0.213	1.691E+02	1.361E+04	3.634E+03	.45E+03	.14E+03	2.958

4	2	68.768	0.213	7.511E+04	2.868E+04	7.657E+03	.20E+06	.62E+05	4.164
5	2	31.300	0.200	4.911E+04	4.082E+04	1.090E+04	.13E+06	.38E+05	4.730
6	2	18.651	0.200	3.080E+04	4.842E+04	1.293E+04	.81E+05	.24E+05	5.152
7	2	1.363	0.200	2.149E+03	4.895E+04	1.307E+04	.57E+04	.17E+04	5.188
8	2	100.068	0.200	2.059E+05	9.948E+04	2.656E+04	.54E+06	.16E+06	7.609
9	2	17.506	0.200	4.338E+04	1.101E+05	2.939E+04	.11E+06	.34E+05	8.005
10	2	2.508	0.200	6.027E+03	1.116E+05	2.979E+04	.16E+05	.47E+04	8.068
11	2	29.060	0.200	7.367E+04	1.296E+05	3.459E+04	.19E+06	.57E+05	8.779
12	2	71.008	0.367	1.914E+05	5.858E+04	1.564E+04	.53E+06	.27E+06	8.040
13	2	16.361	0.367	4.481E+04	4.195E+04	1.120E+04	.12E+06	.64E+05	9.270
14	2	3.653	0.367	9.553E+03	3.841E+04	1.026E+04	.26E+05	.14E+05	9.744
15	2	17.958	0.367	4.722E+04	2.091E+04	5.583E+03	.13E+06	.68E+05	15.360
16	2	82.110	0.224	2.574E+05	5.957E+04	1.591E+04	.68E+06	.23E+06	7.777
17	2	15.216	0.224	5.228E+04	6.740E+04	1.800E+04	.14E+06	.46E+05	7.490
18	2	4.797	0.224	1.609E+04	6.982E+04	1.864E+04	.43E+05	.14E+05	7.434
19	2	76.237	0.224	2.798E+05	1.117E+05	2.982E+04	.74E+06	.24E+06	7.312
20	2	23.832	0.268	9.622E+04	1.103E+05	2.945E+04	.26E+06	.10E+06	7.386
21	2	14.072	0.268	5.710E+04	1.095E+05	2.923E+04	.15E+06	.60E+05	7.432
22	2	5.942	0.268	2.355E+04	1.091E+05	2.914E+04	.63E+05	.25E+05	7.450
23	2	67.246	0.268	2.811E+05	1.050E+05	2.804E+04	.76E+06	.30E+06	7.689
24	2	38.143	0.268	1.622E+05	1.026E+05	2.741E+04	.44E+06	.17E+06	7.838
25	2	7.606	0.378	2.982E+04	9.034E+04	2.412E+04	.83E+05	.44E+05	8.004
26	2	98.166	0.378	3.207E+05	-4.159E+04	-1.111E+04	.89E+06	.47E+06	-11.006
27	2	20.771	0.206	5.638E+04	-2.926E+04	-7.812E+03	.15E+06	.45E+05	-14.111
28	2	118.937	0.206	2.615E+05	2.822E+04	7.534E+03	.69E+06	.21E+06	14.498
29	2	54.250	0.206	8.456E+04	4.699E+04	1.255E+04	.22E+06	.68E+05	11.355
30	2	64.688	0.618	4.145E+04	-7.813E-03	0.000E+00	.13E+06	.96E+05	0.000
		SUM					.77E+07	.30E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.000
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.261 AND FACTOR OF SAFETY IS 2.595

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

SLIP SURFACE NO. 1

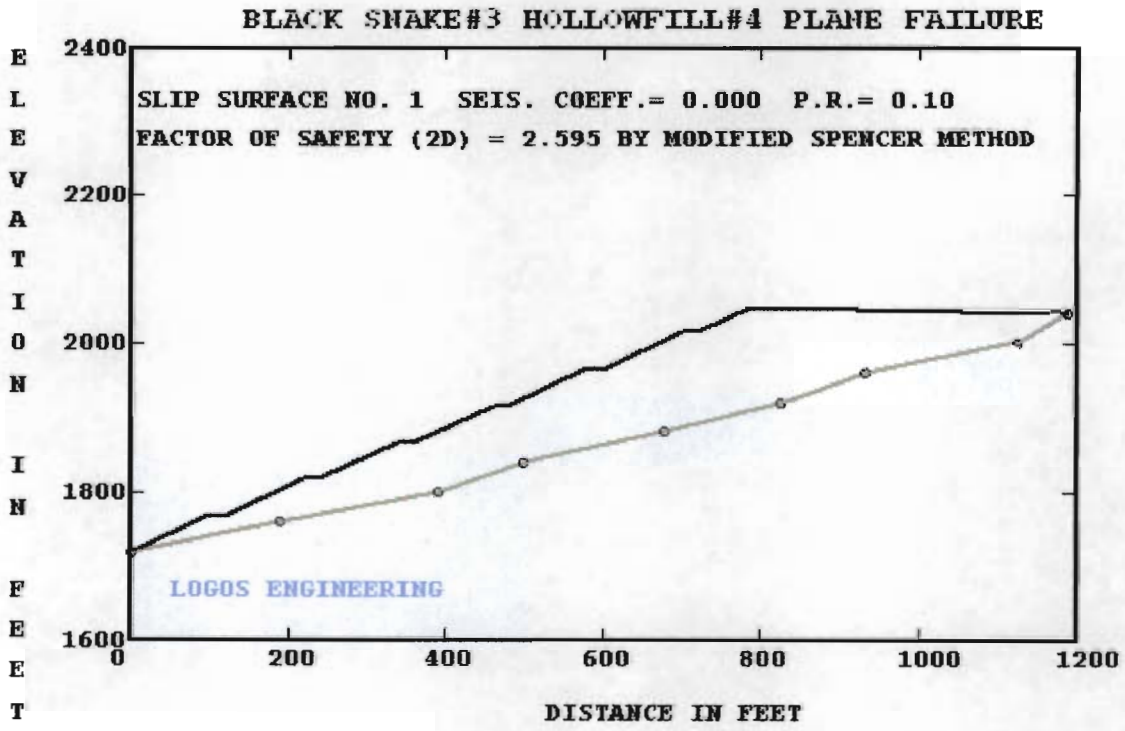
FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 1.856

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

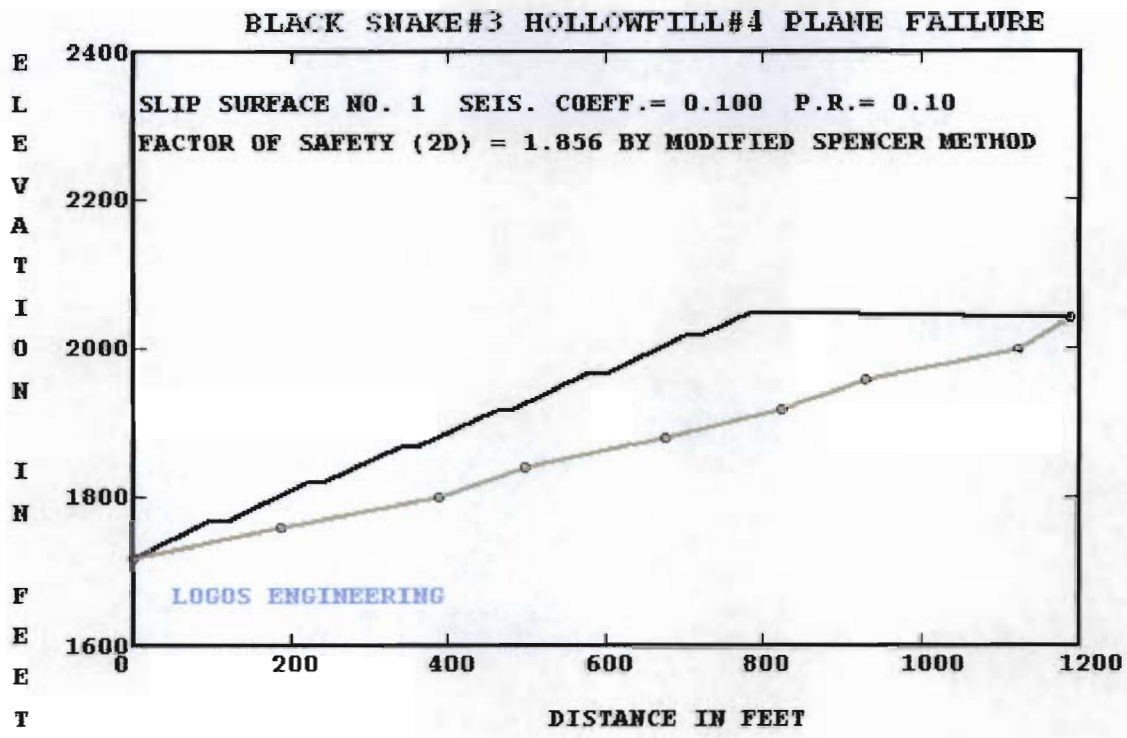
SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	2	99.142	0.213	6.823E+04	1.207E+04	1.307E+04	.13E+06	.58E+05	32.868
2	2	19.795	0.213	2.441E+04	1.605E+04	1.739E+04	.46E+05	.21E+05	34.635
3	2	0.218	0.213	2.442E+02	1.609E+04	1.743E+04	.46E+03	.21E+03	34.693
4	2	68.768	0.213	1.083E+05	3.336E+04	3.613E+04	.21E+06	.93E+05	46.863
5	2	31.300	0.200	7.192E+04	4.763E+04	5.159E+04	.14E+06	.59E+05	46.976
6	2	18.651	0.200	4.509E+04	5.655E+04	6.126E+04	.85E+05	.37E+05	49.535
7	2	1.363	0.200	3.146E+03	5.718E+04	6.193E+04	.60E+04	.26E+04	49.850
8	2	100.068	0.200	3.013E+05	1.163E+05	1.260E+05	.57E+06	.25E+06	69.284
9	2	17.506	0.200	6.345E+04	1.287E+05	1.394E+05	.12E+06	.52E+05	72.474
10	2	2.508	0.200	8.815E+03	1.304E+05	1.413E+05	.17E+05	.73E+04	73.072
11	2	29.060	0.200	1.077E+05	1.514E+05	1.640E+05	.20E+06	.89E+05	79.643

12	2	71.008	0.367	2.318E+05	7.157E+04	7.752E+04	.46E+06	.33E+06	201.423
13	2	16.361	0.367	5.428E+04	5.286E+04	5.725E+04	.11E+06	.77E+05	271.579
14	2	3.653	0.367	1.157E+04	4.887E+04	5.294E+04	.23E+05	.16E+05	293.155
15	2	17.958	0.367	5.720E+04	2.917E+04	3.160E+04	.11E+06	.81E+05	480.903
16	2	82.110	0.224	3.646E+05	7.055E+04	7.642E+04	.69E+06	.33E+06	180.545
17	2	15.216	0.224	7.403E+04	7.892E+04	8.548E+04	.14E+06	.67E+05	160.210
18	2	4.797	0.224	2.278E+04	8.150E+04	8.828E+04	.43E+05	.21E+05	155.254
19	2	76.237	0.224	3.962E+05	1.262E+05	1.367E+05	.75E+06	.36E+06	105.617
20	2	23.832	0.268	1.292E+05	1.223E+05	1.325E+05	.25E+06	.14E+06	109.193
21	2	14.072	0.268	7.670E+04	1.200E+05	1.300E+05	.15E+06	.82E+05	111.009
22	2	5.942	0.268	3.163E+04	1.190E+05	1.289E+05	.61E+05	.34E+05	111.942
23	2	67.246	0.268	3.776E+05	1.076E+05	1.166E+05	.73E+06	.40E+06	114.414
24	2	38.143	0.268	2.178E+05	1.010E+05	1.094E+05	.42E+06	.23E+06	112.040
25	2	7.606	0.378	3.570E+04	8.733E+04	9.459E+04	.71E+05	.52E+05	126.673
26	2	98.166	0.378	3.841E+05	-5.917E+04	-6.409E+04	.76E+06	.56E+06	-88.713
27	2	20.771	0.206	8.172E+04	-4.504E+04	-4.878E+04	.15E+06	.69E+05	-75.512
28	2	118.937	0.206	3.792E+05	2.101E+04	2.276E+04	.72E+06	.32E+06	-58.033
29	2	54.250	0.206	1.228E+05	4.272E+04	4.627E+04	.23E+06	.10E+06	-10.996
30	2	64.688	0.618	4.158E+04	3.516E-02	0.000E+00	.91E+05	.92E+05	0.000
		SUM					.75E+07	.40E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.100
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.825 AND FACTOR OF SAFETY IS 1.856



I, _____ (signature), 12575 (registration no.), 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, [signature] 12575 (registration no.) 4/2/19 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                              LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF4CF.DAT

TITLE -BLACK SNAKE #3 HOLLOWFILL#4 CIRCULAR FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 9
 1  X COORD.= 0              Y COORD.= 1720
 2  X COORD.= 187.9236       Y COORD.= 1760
 3  X COORD.= 388.3797       Y COORD.= 1800
 4  X COORD.= 497.3595       Y COORD.= 1840
 5  X COORD.= 675.7198       Y COORD.= 1880
 6  X COORD.= 824.9546       Y COORD.= 1920
 7  X COORD.= 930.7267       Y COORD.= 1960
 8  X COORD.= 1124.685       Y COORD.= 2000
 9  X COORD.= 1189.372       Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 2 = 15
 1  X COORD.= 0              Y COORD.= 1720
 2  X COORD.= 99.1418        Y COORD.= 1769.427
 3  X COORD.= 119.1554       Y COORD.= 1768.805
 4  X COORD.= 219.2238       Y COORD.= 1818.694
 5  X COORD.= 239.2375       Y COORD.= 1818.072
 6  X COORD.= 339.3194       Y COORD.= 1867.961
 7  X COORD.= 359.3194       Y COORD.= 1867.339
 8  X COORD.= 459.3877       Y COORD.= 1917.228
 9  X COORD.= 479.4014       Y COORD.= 1916.606
 10 X COORD.= 579.4696       Y COORD.= 1966.495
 11 X COORD.= 599.4833       Y COORD.= 1965.873
 12 X COORD.= 699.5517       Y COORD.= 2015.762
 13 X COORD.= 719.5653       Y COORD.= 2015.14
 14 X COORD.= 786.8112       Y COORD.= 2048.665
 15 X COORD.= 1189.372       Y COORD.= 2040

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.213       0.200       0.367       0.224       0.268       0.378
         0.206       0.618
 2       0.499      -0.031       0.499      -0.031       0.498      -0.031
         0.499      -0.031       0.499      -0.031       0.499      -0.031
         0.499      -0.022

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
```

NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1

LINE NO. (LINO)	BEG. NO. (NBP)	END NO. (NEP)
1	1	9

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.	COHESION	FRIC. ANGLE	UNIT WEIGHT
1	40	37.4	125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-80 Y COORD. = 2715
POINT 2 X COORD. =-80 Y COORD. = 2040
POINT 3 X COORD. = 460 Y COORD. = 2040

X INCREMENT (XINC) = 64 Y INCREMENT (YINC) = 64
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2715	11	11	965.147	1.826	0
-80	2580	11	4	833.924	1.818	0
-80	2445	14	8	721.021	1.849	0
-80	2310	11	1	593.727	1.870	0
-80	2175	5	1	461.685	1.842	0
-80	2040	5	1	329.848	1.673	0
55	2715	11	10	914.203	1.832	0
55	2580	14	5	779.396	1.854	0
55	2445	11	9	673.249	1.851	0
55	2310	11	9	534.685	1.865	0
55	2175	11	8	410.893	1.858	0

55	2040	8	5	277.371	1.654	0
190	2715	11	11	863.374	1.839	0
190	2580	14	5	732.460	1.801	0
190	2445	11	4	624.053	1.855	0
190	2310	8	5	481.054	1.870	0
190	2175	11	11	357.709	1.901	0
190	2040	8	7	225.945	1.676	0
325	2715	8	5	810.765	1.857	0
325	2580	8	6	678.529	1.838	0
325	2445	11	4	576.694	1.864	0
325	2310	8	5	432.223	1.861	0
325	2175	8	5	307.297	1.904	0
325	2040	8	8	173.700	1.752	0
460	2715	8	8	745.276	1.979	0
460	2580	8	6	630.573	1.919	0
460	2445	8	8	496.401	1.755	0
460	2310	8	5	384.307	1.858	0
460	2175	8	8	244.663	1.843	0
460	2040	8	8	123.300	1.749	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-80	1905	4	1	201.556	5.042	0
55	1905	5	1	169.496	2.120	0
190	1905	11	3	121.522	2.353	0
325	1905	11	4	69.975	3.017	0
460	1905	4	1	73.892	6.261	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-80.000	55.000	190.000	325.000	460.000
2715.000	1.826	1.832	1.839	1.857	1.979
2580.000	1.818	1.854	1.801	1.838	1.919
2445.000	1.849	1.851	1.855	1.864	1.755
2310.000	1.870	1.865	1.870	1.861	1.858
2175.000	1.842	1.858	1.901	1.904	1.843
2040.000	1.673	1.654	1.676	1.752	1.749
1905.000	5.042	2.120	2.353	3.017	6.261

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 5 CENTERS

FACTOR OF SAFETY = 1.818 AT (-80.000,2580.000)
FACTOR OF SAFETY = 1.801 AT (190.000,2580.000)
FACTOR OF SAFETY = 1.755 AT (460.000,2445.000)
FACTOR OF SAFETY = 1.654 AT (55.000,2040.000)
FACTOR OF SAFETY = 1.749 AT (460.000,2040.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (55 2040) RADIUS 277.371
THE MINIMUM FACTOR OF SAFETY IS 1.654

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE

MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
55	2040	8	5	277.371	1.654	0
119	2040	11	3	270.105	1.913	0
-9	2040	5	1	314.862	1.888	0
55	2104	8	5	335.712	1.775	0
55	1976	14	5	216.777	1.853	0
71	2040	8	5	270.994	1.695	0
39	2040	8	5	282.715	1.715	0
55	2056	8	5	291.956	1.670	0
55	2024	8	5	262.786	1.659	0

AT POINT (55 2040) RADIUS 277.371

THE MINIMUM FACTOR OF SAFETY IS 1.654

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	9.756	1.121	0.000	.268	.137E+04	.130E+04	.378E+06	.102E+06
2	1	9.756	3.074	0.000	.303	.375E+04	.356E+04	.833E+06	.316E+06
3	1	9.756	4.630	0.000	.339	.565E+04	.536E+04	.119E+07	.530E+06
4	1	9.756	5.775	0.000	.374	.704E+04	.669E+04	.143E+07	.730E+06
5	1	9.756	6.488	0.000	.409	.791E+04	.752E+04	.157E+07	.898E+06
6	1	9.756	6.750	0.000	.444	.823E+04	.782E+04	.161E+07	.101E+07
7	1	9.756	6.535	0.000	.479	.797E+04	.757E+04	.153E+07	.106E+07
8	1	9.756	5.811	0.000	.514	.709E+04	.673E+04	.135E+07	.101E+07
9	1	9.756	4.542	0.000	.550	.554E+04	.526E+04	.106E+07	.844E+06
10	1	6.890	2.996	0.000	.580	.258E+04	.245E+04	.517E+06	.415E+06
11	1	2.866	1.119	0.000	.597	.401E+03	.381E+03	.104E+06	.664E+05
							SUM	.116E+08	.699E+07

AT CENTER (55.000 , 2040.000) WITH RADIUS 277.371 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.657
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.654

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2715	11	11	965.147	1.412	0
-80	2580	11	4	833.924	1.409	0
-80	2445	14	8	721.021	1.429	0
-80	2310	11	1	593.727	1.444	0
-80	2175	5	1	461.685	1.429	0

-80	2040	5	1	329.848	1.321	0
55	2715	11	10	914.203	1.416	0
55	2580	14	7	811.122	1.436	0
55	2445	11	9	673.249	1.431	0
55	2310	11	9	534.685	1.442	0
55	2175	11	8	410.893	1.440	0
55	2040	8	5	277.371	1.313	0
190	2715	11	11	863.374	1.421	0
190	2580	8	5	732.460	1.398	0
190	2445	11	4	624.053	1.435	0
190	2310	8	5	481.054	1.448	0
190	2175	11	11	357.709	1.469	0
190	2040	8	7	225.945	1.333	0
325	2715	8	5	810.765	1.433	0
325	2580	8	6	678.529	1.427	0
325	2445	11	9	572.329	1.443	0
325	2310	8	5	432.223	1.442	0
325	2175	8	5	307.297	1.473	0
325	2040	8	8	173.700	1.397	0
460	2715	8	6	757.559	1.543	0
460	2580	8	6	630.573	1.478	0
460	2445	8	8	496.401	1.383	0
460	2310	8	5	384.307	1.441	0
460	2175	8	7	249.420	1.446	0
460	2040	8	8	123.300	1.394	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-80	1905	4	1	201.556	4.136	0
55	1905	5	1	169.496	1.639	0
190	1905	11	9	118.988	1.813	0
325	1905	11	10	62.409	2.281	0
460	1905	4	1	73.892	5.044	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-80.000	55.000	190.000	325.000	460.000
2715.000	1.412	1.416	1.421	1.433	1.543
2580.000	1.409	1.436	1.398	1.427	1.478
2445.000	1.429	1.431	1.435	1.443	1.383
2310.000	1.444	1.442	1.448	1.442	1.441
2175.000	1.429	1.440	1.469	1.473	1.446
2040.000	1.321	1.313	1.333	1.397	1.394
1905.000	4.136	1.639	1.813	2.281	5.044

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 5 CENTERS

FACTOR OF SAFETY = 1.409 AT (-80.000,2580.000)
FACTOR OF SAFETY = 1.398 AT (190.000,2580.000)
FACTOR OF SAFETY = 1.383 AT (460.000,2445.000)
FACTOR OF SAFETY = 1.313 AT (55.000,2040.000)
FACTOR OF SAFETY = 1.394 AT (460.000,2040.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (55 2040) RADIUS 277.371
THE MINIMUM FACTOR OF SAFETY IS 1.313

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
55	2040	8	5	277.371	1.313	0
119	2040	11	3	270.105	1.486	0
-9	2040	5	1	314.862	1.465	0
55	2104	8	5	335.712	1.392	0
55	1976	14	5	216.777	1.480	0
71	2040	8	5	270.994	1.339	0
39	2040	8	5	282.715	1.365	0
55	2056	8	5	291.956	1.322	0
55	2024	8	5	262.786	1.319	0

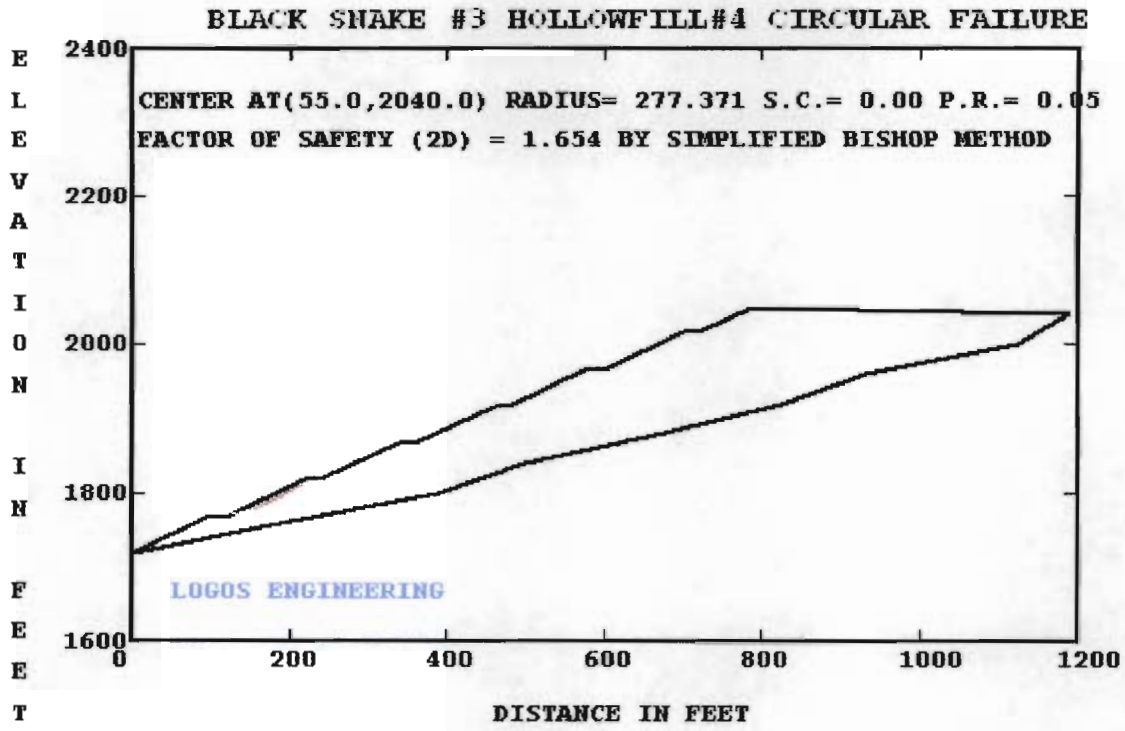
AT POINT (55 2040) RADIUS 277.371

THE MINIMUM FACTOR OF SAFETY IS 1.313

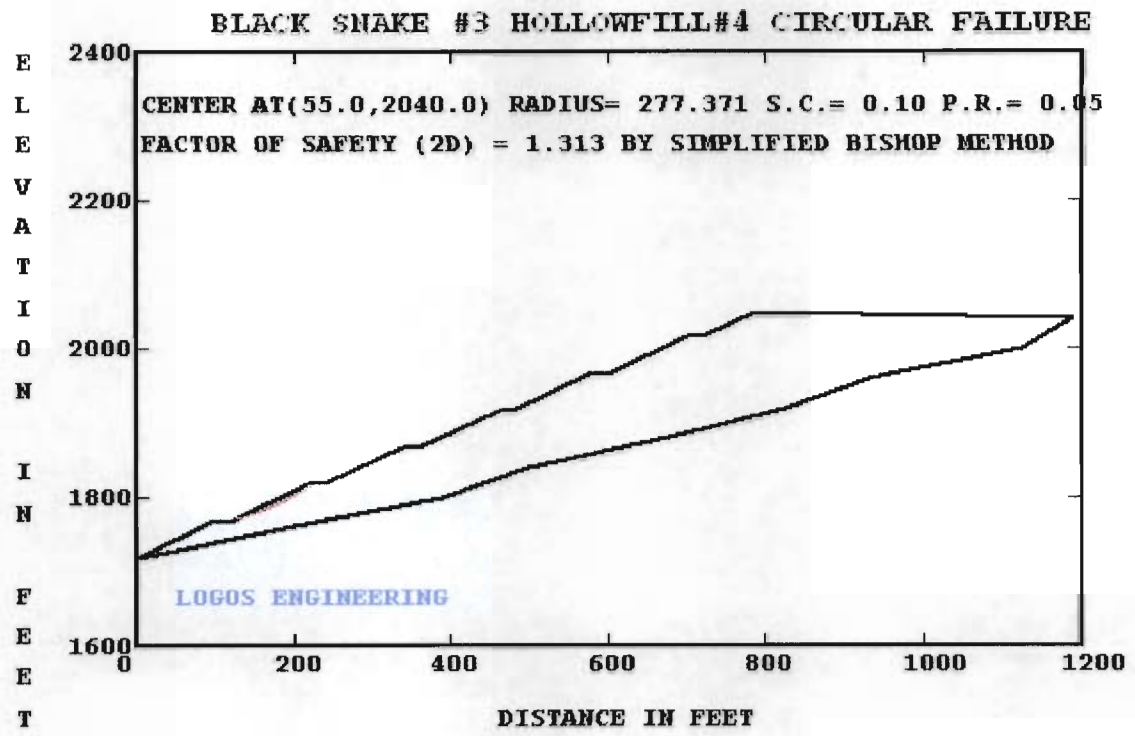
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	9.756	1.121	0.000	.268	.137E+04	.130E+04	.370E+06	.138E+06
2	1	9.756	3.074	0.000	.303	.375E+04	.356E+04	.809E+06	.414E+06
3	1	9.756	4.630	0.000	.339	.565E+04	.536E+04	.114E+07	.676E+06
4	1	9.756	5.775	0.000	.374	.704E+04	.669E+04	.138E+07	.909E+06
5	1	9.756	6.488	0.000	.409	.791E+04	.752E+04	.150E+07	.110E+07
6	1	9.756	6.750	0.000	.444	.823E+04	.782E+04	.153E+07	.122E+07
7	1	9.756	6.535	0.000	.479	.797E+04	.757E+04	.145E+07	.125E+07
8	1	9.756	5.811	0.000	.514	.709E+04	.673E+04	.127E+07	.118E+07
9	1	9.756	4.542	0.000	.550	.554E+04	.526E+04	.997E+06	.972E+06
10	1	6.890	2.996	0.000	.580	.258E+04	.245E+04	.486E+06	.473E+06
11	1	2.866	1.119	0.000	.597	.401E+03	.381E+03	.993E+05	.753E+05
							SUM	.110E+08	.840E+07

AT CENTER (55.000 , 2040.000) WITH RADIUS 277.371 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.315
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.313



I, Dan Kelly, 12515, 4/2/9
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) _____ (registration no.) _____ (date)

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOW FILL #5

1" = 100'

DIP 0.84° NE

STRIKE S 41° E

PROFILE

UNDERDRAIN

WEST TOP DITCH

EAST TOP DITCH

COAL

2040

2000

HF# 5

TOP OF FILL 2040

2040

EAST FACE DITCH

2000

CROSS-SECTION

WEST FACE DITCH

1800

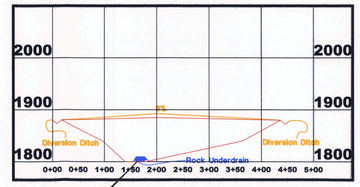
1800

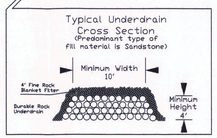
1740

TOE OF FILL 1740

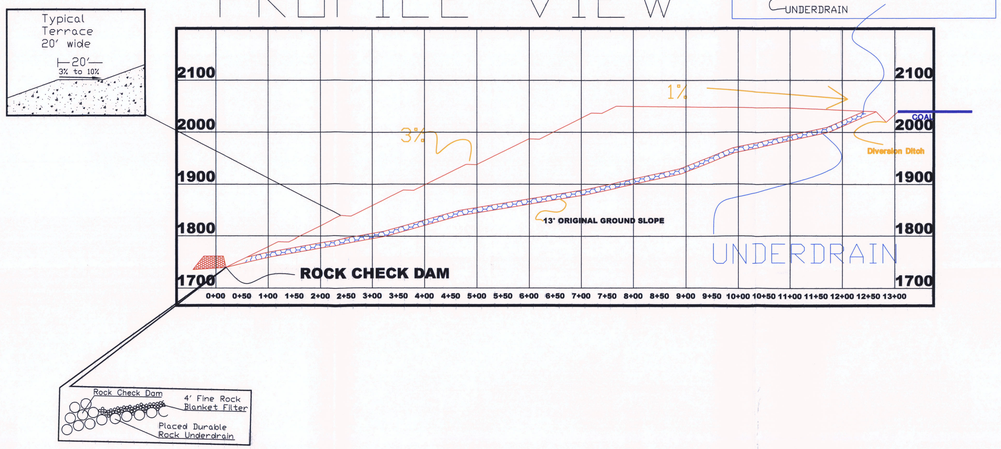
ROCK CHECK DAM

CROSS-SECTION VIEW





PROFILE VIEW



(Signature) 12575 (registration no.) 12-12-07 (date)

I hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

Blacksnake #3-Volume Report HF #5.txt

Volume Report 3/5/2007 09:36
Comparing GRiD file: C:/Program Files/scadd2006/USER/grid1.grd
and GRiD file: C:/Program Files/scadd2006/USER/grid2.grd
Grid corner locations: 2653572.63,151010.16 to 2654552.63,152390.16
Grid resolution X: 196, Y: 276 Grid cell size X: 5.00, Y: 5.00
Area in Cut : 5,174.7 S.F., 0.12 Acres
Area in Fill: 554,860.1 S.F., 12.74 Acres
Total inclusion area: 560,034.8 S.F., 12.86 Acres
Cut to Fill ratio: 0.00
Average Cut Depth: 3.89 Average Fill Depth: 65.72
Max Cut Depth: 19.05 Max Fill Depth: 172.87
Cut (C.Y.) / Area (acres): 57.96
Fill (C.Y.) / Area (acres): 105055.47
Cut volume: 20,120.7 C.F., 745.21 C.Y.
Fill volume: 36,467,799.7 C.F., 1,350,659.25 C.Y.

I, _____ 12575 4/2/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

HOLLOWFILL# 5
NEAREST CORE HOLE C-4

		FRICTION ANGLE	
SANDSTONE	105.00 FT.	40	105.00 FT. / 288.00 FT = 36.458% 36.458% X 40 = 14.6
SANDY SHALE	71.00 FT.	37.5	71.00 FT. / 288.00 FT = 24.653% 24.653% X 38 = 9.2
SHALE	112.00 FT.	35	112.00 FT. / 288.00 FT = 38.889% 38.889% X 35 = 13.6
TOTAL	288.00 FT.		FRICTION ANGLE 37.4

COHESION
80% DURABLE ROCK
20% MINE SPOIL
MINE SPOIL COHESION=200
20%X200=40
COHESION=40

(signature) 12575 (registration no.) 4/2/07 (date)

I hereby certify that this document complies with 405 KAR 7:040E, Section 10 that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF5PF.DAT

TITLE -BLACKSNAKE#3 HOLLOWFILL#5 PLANE FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 1

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 3

NO. OF POINTS ON BOUNDARY LINE 1 = 9
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 83.7156       Y COORD.= 1760
 3  X COORD.= 305.6771      Y COORD.= 1800
 4  X COORD.= 448.6027      Y COORD.= 1840
 5  X COORD.= 691.1038      Y COORD.= 1880
 6  X COORD.= 871.1741      Y COORD.= 1920
 7  X COORD.= 972.3676      Y COORD.= 1960
 8  X COORD.= 1154.256      Y COORD.= 2000
 9  X COORD.= 1245.215      Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 2 = 9
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 83.7156       Y COORD.= 1760
 3  X COORD.= 305.6771      Y COORD.= 1800
 4  X COORD.= 448.6027      Y COORD.= 1840
 5  X COORD.= 691.1038      Y COORD.= 1880
 6  X COORD.= 871.1741      Y COORD.= 1920
 7  X COORD.= 972.3676      Y COORD.= 1960
 8  X COORD.= 1154.256      Y COORD.= 2000
 9  X COORD.= 1245.215      Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 3 = 15
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 99.8095       Y COORD.= 1789.902
 3  X COORD.= 119.8095      Y COORD.= 1789.301
 4  X COORD.= 219.8095      Y COORD.= 1839.298
 5  X COORD.= 239.8095      Y COORD.= 1838.697
 6  X COORD.= 339.8096      Y COORD.= 1888.694
 7  X COORD.= 359.8095      Y COORD.= 1888.094
 8  X COORD.= 459.8096      Y COORD.= 1938.091
 9  X COORD.= 479.8097      Y COORD.= 1937.49
 10 X COORD.= 579.8097      Y COORD.= 1987.487
 11 X COORD.= 599.8097      Y COORD.= 1986.886
 12 X COORD.= 699.8098      Y COORD.= 2036.883
 13 X COORD.= 719.8098      Y COORD.= 2036.283
```

```
 14 X COORD.= 747.8033      Y COORD.= 2050.292
 15 X COORD.= 1245.215      Y COORD.= 2040

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.239       0.180       0.280       0.165       0.222       0.395
         0.220       0.440
 2       0.239       0.180       0.280       0.165       0.222       0.395
         0.220       0.440
 3       0.500      -0.030       0.500      -0.030       0.500      -0.030
         0.500      -0.030       0.500      -0.030       0.500      -0.030
         0.500      -0.021


UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.      COHESION      FRIC. ANGLE   UNIT WEIGHT
 1             160           24            125
 2             40            37.4          125

USE PORE PRESSURE RATIO
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY MODIFIED SPENCER METHOD (MTHD=4)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 1

PORE PRESSURE RATIO (RU) = 0.1

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
LOCATION OF MOMENT CENTER: X0 =  0    Y0 =  2150.292
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED (NSUB = 1)

NO. OF POINTS ON SLIP SURFACE (NPSS) 1  = 9
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 83.7156       Y COORD.= 1760
 3  X COORD.= 305.6771      Y COORD.= 1800
 4  X COORD.= 448.6027      Y COORD.= 1840
 5  X COORD.= 691.1038      Y COORD.= 1880
 6  X COORD.= 871.1741      Y COORD.= 1920
 7  X COORD.= 972.3676      Y COORD.= 1960
 8  X COORD.= 1154.256      Y COORD.= 2000
 9  X COORD.= 1245.215      Y COORD.= 2040

SLIP SURFACE NO. 1

FOR SLIP SURFACE NO.  1  FACTOR OF SAFETY IS 3.013
```

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	2	83.716	0.239	2.638E+04	-1.878E+02	-4.440E+01	.82E+05	.27E+05	-0.082
2	2	16.094	0.180	1.126E+04	2.287E+03	5.409E+02	.34E+05	.90E+04	0.426
3	2	20.000	0.180	1.425E+04	5.418E+03	1.281E+03	.44E+05	.11E+05	0.987

4	2	4.712	0.180	3.179E+03	6.118E+03	1.447E+03	.97E+04	.25E+04	1.126
5	2	95.288	0.180	1.071E+05	2.905E+04	6.870E+03	.33E+06	.86E+05	3.510
6	2	20.000	0.180	2.984E+04	3.538E+04	8.366E+03	.91E+05	.24E+05	3.916
7	2	9.233	0.180	1.362E+04	3.826E+04	9.048E+03	.42E+05	.11E+05	4.125
8	2	56.634	0.180	1.003E+05	5.940E+04	1.405E+04	.31E+06	.81E+05	5.299
9	2	34.133	0.280	7.075E+04	4.387E+04	1.038E+04	.22E+06	.89E+05	5.450
10	2	20.000	0.280	4.181E+04	3.470E+04	8.205E+03	.13E+06	.53E+05	5.920
11	2	13.755	0.280	2.816E+04	2.852E+04	6.744E+03	.88E+05	.35E+05	6.548
12	2	75.038	0.280	1.737E+05	-9.729E+03	-2.301E+03	.54E+06	.22E+06	-16.084
13	2	11.207	0.165	2.999E+04	-1.460E+03	-3.452E+02	.92E+05	.22E+05	-104.104
14	2	20.000	0.165	5.348E+04	1.329E+04	3.142E+03	.16E+06	.39E+05	12.078
15	2	18.276	0.165	4.945E+04	2.692E+04	6.365E+03	.15E+06	.36E+05	6.945
16	2	81.724	0.165	2.597E+05	9.838E+04	2.327E+04	.79E+06	.19E+06	5.647
17	2	20.000	0.165	7.019E+04	1.177E+05	2.783E+04	.21E+06	.52E+05	6.044
18	2	22.798	0.165	8.121E+04	1.400E+05	3.311E+04	.25E+06	.60E+05	6.591
19	2	68.497	0.165	2.735E+05	2.151E+05	5.086E+04	.84E+06	.20E+06	8.361
20	2	8.706	0.222	3.721E+04	2.160E+05	5.108E+04	.11E+06	.37E+05	8.454
21	2	20.000	0.222	8.476E+04	2.181E+05	5.157E+04	.26E+06	.85E+05	8.669
22	2	27.319	0.222	1.167E+05	2.209E+05	5.224E+04	.36E+06	.12E+06	8.960
23	2	0.674	0.222	2.955E+03	2.210E+05	5.226E+04	.91E+04	.30E+04	8.967
24	2	123.371	0.222	4.896E+05	2.330E+05	5.510E+04	.15E+07	.49E+06	10.284
25	2	0.476	0.395	1.635E+03	2.319E+05	5.483E+04	.53E+04	.29E+04	10.259
26	2	100.717	0.395	2.890E+05	3.095E+04	7.318E+03	.94E+06	.51E+06	9.156
27	2	23.804	0.220	5.497E+04	3.296E+04	7.793E+03	.17E+06	.54E+05	8.991
28	2	124.522	0.220	2.259E+05	4.156E+04	9.827E+03	.70E+06	.22E+06	9.032
29	2	33.563	0.220	4.320E+04	4.333E+04	1.025E+04	.13E+06	.42E+05	9.224
30	2	90.959	0.440	5.206E+04	3.906E-03	0.000E+00	.17E+06	.10E+06	0.000
		SUM					.88E+07	.29E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.000
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.232 AND FACTOR OF SAFETY IS 3.013

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

SLIP SURFACE NO. 1

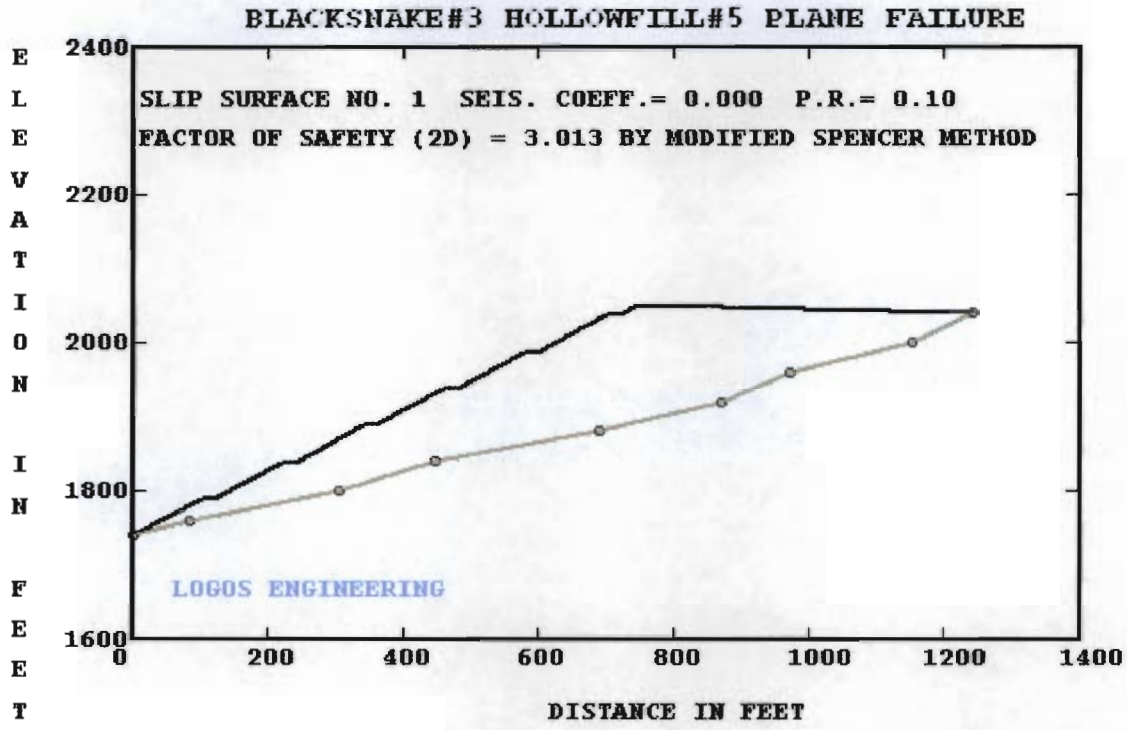
FOR SLIP SURFACE NO. 1 FACTOR OF SAFETY IS 2.069

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	BOTTOM TANGENT	BOTTOM SHEAR	INTERSLICE FORCE NORMAL	INTERSLICE FORCE SHEAR	RESISTING FORCE	DRIVING FORCE	THRUST HEIGHT
					0.000E+00				0.000
1	2	83.716	0.239	3.738E+04	-2.639E+02	-2.365E+02	.80E+05	.39E+05	264.298
2	2	16.094	0.180	1.675E+04	2.536E+03	2.272E+03	.35E+05	.14E+05	-46.011
3	2	20.000	0.180	2.121E+04	6.073E+03	5.442E+03	.45E+05	.18E+05	-21.816
4	2	4.712	0.180	4.733E+03	6.867E+03	6.154E+03	.99E+04	.40E+04	-18.492
5	2	95.288	0.180	1.590E+05	3.239E+04	2.902E+04	.33E+06	.14E+06	8.698
6	2	20.000	0.180	4.430E+04	3.937E+04	3.528E+04	.93E+05	.38E+05	11.403
7	2	9.233	0.180	2.021E+04	4.256E+04	3.814E+04	.42E+05	.17E+05	13.243
8	2	56.634	0.180	1.488E+05	6.583E+04	5.899E+04	.31E+06	.13E+06	20.908
9	2	34.133	0.280	9.560E+04	4.752E+04	4.258E+04	.21E+06	.12E+06	28.558
10	2	20.000	0.280	5.650E+04	3.669E+04	3.288E+04	.12E+06	.69E+05	31.440
11	2	13.755	0.280	3.805E+04	2.940E+04	2.635E+04	.82E+05	.47E+05	32.555

12	2	75.038	0.280	2.346E+05	-1.576E+04	-1.412E+04	.50E+06	.29E+06	130.356
13	2	11.207	0.165	4.518E+04	-6.380E+03	-5.717E+03	.95E+05	.36E+05	433.962
14	2	20.000	0.165	8.057E+04	1.035E+04	9.271E+03	.17E+06	.65E+05	-372.257
15	2	18.276	0.165	7.449E+04	2.580E+04	2.312E+04	.16E+06	.60E+05	-180.167
16	2	81.724	0.165	3.912E+05	1.067E+05	9.566E+04	.82E+06	.32E+06	-66.621
17	2	20.000	0.165	1.057E+05	1.286E+05	1.152E+05	.22E+06	.85E+05	-56.840
18	2	22.798	0.165	1.223E+05	1.538E+05	1.379E+05	.26E+06	.99E+05	-46.848
19	2	68.497	0.165	4.119E+05	2.388E+05	2.140E+05	.86E+06	.33E+06	-24.661
20	2	8.706	0.222	5.293E+04	2.390E+05	2.142E+05	.11E+06	.54E+05	-24.145
21	2	20.000	0.222	1.206E+05	2.396E+05	2.148E+05	.26E+06	.12E+06	-22.732
22	2	27.319	0.222	1.660E+05	2.405E+05	2.155E+05	.35E+06	.17E+06	-21.034
23	2	0.674	0.222	4.203E+03	2.405E+05	2.155E+05	.89E+04	.43E+04	-21.013
24	2	123.371	0.222	6.965E+05	2.442E+05	2.189E+05	.15E+07	.71E+06	-2.429
25	2	0.476	0.395	2.013E+03	2.431E+05	2.178E+05	.45E+04	.33E+04	-2.401
26	2	100.717	0.395	3.560E+05	3.489E+04	3.126E+04	.79E+06	.59E+06	-20.635
27	2	23.804	0.220	7.841E+04	3.613E+04	3.237E+04	.17E+06	.79E+05	-32.317
28	2	124.522	0.220	3.224E+05	4.179E+04	3.745E+04	.68E+06	.32E+06	-27.925
29	2	33.563	0.220	6.170E+04	4.308E+04	3.860E+04	.13E+06	.62E+05	-14.988
30	2	90.959	0.440	6.267E+04	-1.172E-02	0.000E+00	.14E+06	.11E+06	0.000
		SUM					.86E+07	.41E+07	

FOR SLIP SURFACE NO. 1 WITH SEISMIC COEFFICIENT 0.100
BY MODIFIED SPENCER METHOD, DEL ANGLE = 0.731 AND FACTOR OF SAFETY IS 2.069



I, _____, 12575, 4/2/07
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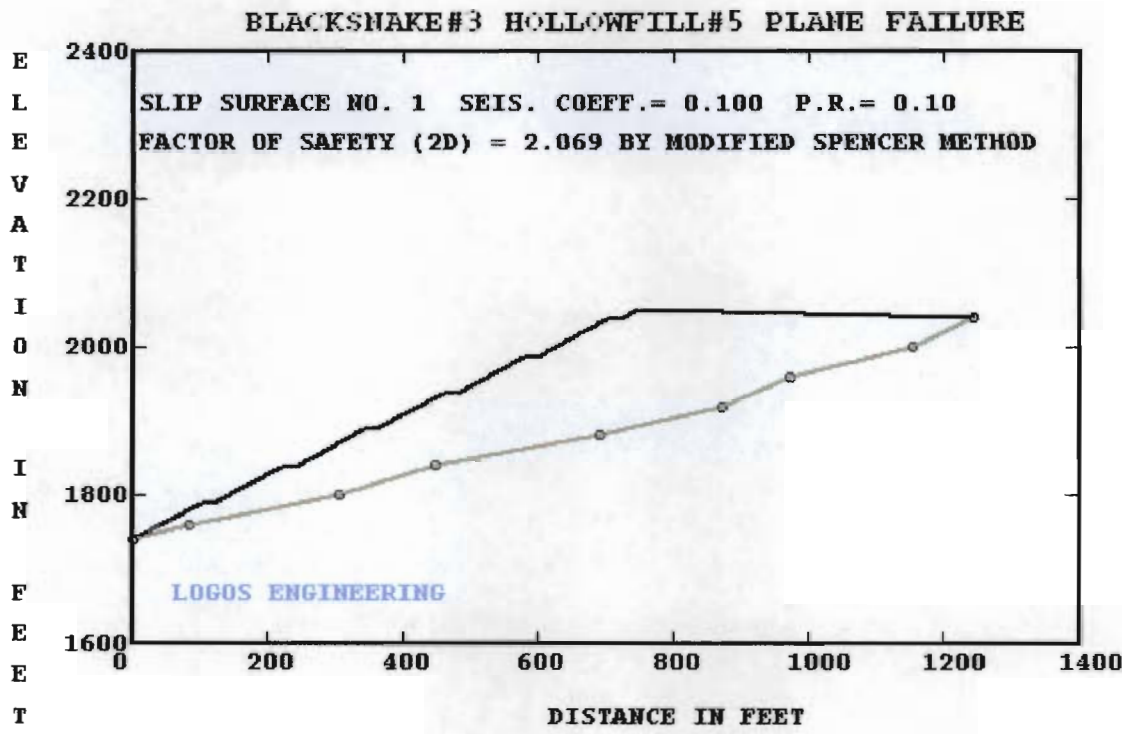
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, [signature] 12575 4/2/7
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2004 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                          LOGOS ENGINEERING

INPUT FILE NAME  -C:\REAME2004\BS3HF5CF.DAT

TITLE -BLACKSNAKE#3 HOLLOWFILL#5 CIRCULAR FAILURE

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR SLIP SURFACES (NSS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 9
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 83.7156       Y COORD.= 1760
 3  X COORD.= 305.6771      Y COORD.= 1800
 4  X COORD.= 448.6027      Y COORD.= 1840
 5  X COORD.= 691.1038      Y COORD.= 1880
 6  X COORD.= 871.1741      Y COORD.= 1920
 7  X COORD.= 972.3676      Y COORD.= 1960
 8  X COORD.= 1154.256      Y COORD.= 2000
 9  X COORD.= 1245.215      Y COORD.= 2040

NO. OF POINTS ON BOUNDARY LINE 2 = 15
 1  X COORD.= 0             Y COORD.= 1740
 2  X COORD.= 99.8095       Y COORD.= 1789.902
 3  X COORD.= 119.8095      Y COORD.= 1789.301
 4  X COORD.= 219.8095      Y COORD.= 1839.298
 5  X COORD.= 239.6095      Y COORD.= 1838.697
 6  X COORD.= 339.8096      Y COORD.= 1888.694
 7  X COORD.= 359.8095      Y COORD.= 1888.094
 8  X COORD.= 459.8096      Y COORD.= 1938.091
 9  X COORD.= 479.8097      Y COORD.= 1937.49
 10 X COORD.= 579.8097      Y COORD.= 1987.487
 11 X COORD.= 599.8097      Y COORD.= 1986.886
 12 X COORD.= 699.8098      Y COORD.= 2036.883
 13 X COORD.= 719.8098      Y COORD.= 2036.283
 14 X COORD.= 747.8033      Y COORD.= 2050.292
 15 X COORD.= 1245.215      Y COORD.= 2040

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.239       0.180       0.280       0.165       0.222       0.395
         0.220       0.440
 2       0.500      -0.030       0.500      -0.030       0.499      -0.030
         0.500      -0.030       0.500      -0.030       0.500      -0.030
         0.500      -0.021

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
```

NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
ID NO. FOR FIRST CIRCLE (INFC) FOR ZONE 1 = 1
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1

LINE NO. (LINO)	BEG. NO. (NBP)	END NO. (NEP)
1	1	9

UNIT WEIGHT OF WATER (GW) = 62.4

SOIL NO.	COHESION	FRIC. ANGLE	UNIT WEIGHT
1	40	37.4	125

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-80 Y COORD. = 2690
POINT 2 X COORD. =-80 Y COORD. = 2040
POINT 3 X COORD. = 440 Y COORD. = 2040

X INCREMENT (XINC) = 64 Y INCREMENT (YINC) = 64
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2690	11	8	929.485	1.844	0
-80	2560	11	4	794.977	1.811	0
-80	2430	8	5	667.876	1.822	0
-80	2300	11	2	558.781	1.843	0
-80	2170	11	1	436.820	1.863	0
-80	2040	5	1	310.484	1.644	0
50	2690	11	7	886.670	1.848	0
50	2560	11	9	752.928	1.858	0
50	2430	11	9	642.135	1.840	0
50	2300	11	8	511.889	1.825	0
50	2170	17	4	386.830	1.863	0

50	2040	11	8	266.949	1.905	0
180	2690	8	5	820.016	1.843	0
180	2560	11	10	707.094	1.857	0
180	2430	11	4	594.866	1.863	0
180	2300	11	10	463.192	1.816	0
180	2170	14	13	329.398	1.790	0
180	2040	11	9	223.468	1.953	0
310	2690	8	6	768.846	1.821	0
310	2560	11	11	657.983	1.856	0
310	2430	11	10	541.770	1.873	0
310	2300	8	5	409.419	1.873	0
310	2170	8	7	282.494	1.713	0
310	2040	11	9	180.723	2.058	0
440	2690	8	7	716.613	2.043	0
440	2560	8	8	590.468	1.851	0
440	2430	8	6	481.993	1.874	0
440	2300	8	5	364.942	1.877	0
440	2170	8	7	235.892	1.661	0
440	2040	11	10	132.292	2.271	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-80	1910	1	1	187.883	1000.000	0
50	1910	8	1	153.742	2.164	0
180	1910	8	7	85.992	2.115	0
310	1910	8	8	35.993	1.910	0
440	1910	4	1	70.467	6.765	0
-210	2690	8	1	972.794	1.817	0
-210	2560	5	1	846.463	1.801	0
-210	2430	11	7	720.237	1.845	0
-210	2300	5	1	598.080	1.760	0
-210	2170	1	1	478.540	1000.000	0
-210	2040	1	1	366.197	1000.000	0
-210	1910	1	1	270.185	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-210.000	-80.000	50.000	180.000	310.000	440.000
2690.000	1.817	1.844	1.848	1.843	1.821	2.043
2560.000	1.801	1.811	1.858	1.857	1.856	1.851
2430.000	1.845	1.822	1.840	1.863	1.873	1.874
2300.000	1.760	1.843	1.825	1.816	1.873	1.877
2170.000	1000.000	1.863	1.863	1.790	1.713	1.661
2040.000	1000.000	1.644	1.905	1.953	2.058	2.271
1910.000	1000.000	1000.000	2.164	2.115	1.910	6.765

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 7 CENTERS

FACTOR OF SAFETY = 1.821 AT (310.000,2690.000)
FACTOR OF SAFETY = 1.801 AT (-210.000,2560.000)
FACTOR OF SAFETY = 1.851 AT (440.000,2560.000)
FACTOR OF SAFETY = 1.760 AT (-210.000,2300.000)
FACTOR OF SAFETY = 1.661 AT (440.000,2170.000)
FACTOR OF SAFETY = 1.644 AT (-80.000,2040.000)
FACTOR OF SAFETY = 1.910 AT (310.000,1910.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE

SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (-80 2040) RADIUS 310.484
THE MINIMUM FACTOR OF SAFETY IS 1.644

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2040	5	1	310.484	1.644	0
-16	2040	5	1	295.506	1.919	0
-144	2040	1	1	332.770	1000.000	0
-80	2104	11	3	368.116	1.762	0
-80	1976	5	1	249.191	1.909	0
-64	2040	11	9	304.233	1.688	0
-96	2040	5	1	314.986	1.740	0
-80	2056	5	1	325.969	1.660	0
-80	2024	5	1	295.053	1.666	0

AT POINT (-80 2040) RADIUS 310.484

THE MINIMUM FACTOR OF SAFETY IS 1.644

SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.382	1.163	0.000	.274	.151E+04	.143E+04	.461E+06	.129E+06
2	1	10.382	3.194	0.000	.308	.414E+04	.394E+04	.102E+07	.396E+06
3	1	10.382	4.822	0.000	.341	.626E+04	.594E+04	.146E+07	.663E+06
4	1	10.382	6.031	0.000	.375	.783E+04	.744E+04	.178E+07	.911E+06
5	1	10.382	6.805	0.000	.408	.883E+04	.839E+04	.196E+07	.112E+07
6	1	10.382	7.122	0.000	.442	.924E+04	.878E+04	.201E+07	.127E+07
7	1	10.382	6.959	0.000	.475	.903E+04	.858E+04	.194E+07	.133E+07
8	1	10.382	6.285	0.000	.508	.816E+04	.775E+04	.173E+07	.129E+07
9	1	10.382	5.067	0.000	.542	.658E+04	.625E+04	.140E+07	.111E+07
10	1	6.370	3.660	0.000	.569	.291E+04	.277E+04	.637E+06	.515E+06
11	1	4.013	1.522	0.000	.586	.763E+03	.725E+03	.201E+06	.139E+06
							SUM	.146E+08	.886E+07

AT CENTER (-80.000 , 2040.000) WITH RADIUS 310.484 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.648
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.644

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE

MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2690	11	8	929.485	1.423	0
-80	2560	11	4	794.977	1.407	0
-80	2430	8	1	689.703	1.421	0
-80	2300	11	8	559.901	1.427	0
-80	2170	5	1	436.820	1.443	0
-80	2040	5	1	310.484	1.305	0
50	2690	11	7	886.670	1.427	0
50	2560	11	9	752.928	1.434	0
50	2430	11	9	642.135	1.425	0
50	2300	11	8	511.889	1.415	0
50	2170	17	4	386.830	1.444	0
50	2040	11	8	266.949	1.479	0
180	2690	8	5	820.016	1.424	0
180	2560	11	10	707.094	1.434	0
180	2430	11	9	591.058	1.440	0
180	2300	11	10	463.192	1.411	0
180	2170	8	7	329.398	1.404	0
180	2040	11	9	223.468	1.517	0
310	2690	8	6	768.846	1.411	0
310	2560	11	11	657.983	1.434	0
310	2430	8	6	527.993	1.459	0
310	2300	8	5	409.419	1.451	0
310	2170	8	7	282.494	1.349	0
310	2040	11	10	176.936	1.600	0
440	2690	8	7	716.613	1.557	0
440	2560	8	8	590.468	1.445	0
440	2430	8	6	481.993	1.448	0
440	2300	8	5	364.942	1.456	0
440	2170	8	7	235.892	1.313	0
440	2040	8	5	122.800	1.773	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-80	1910	1	1	187.883	1000.000	0
50	1910	5	1	153.742	1.664	0
180	1910	8	7	85.992	1.638	0
310	1910	8	8	35.993	1.531	0
440	1910	4	1	70.467	5.571	0
-210	2690	5	1	972.794	1.406	0
-210	2560	5	1	846.463	1.398	0
-210	2430	11	7	720.237	1.433	0
-210	2300	5	1	598.080	1.401	0
-210	2170	1	1	478.540	1000.000	0
-210	2040	1	1	366.197	1000.000	0
-210	1910	1	1	270.185	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-210.000	-80.000	50.000	180.000	310.000	440.000
2690.000	1.406	1.423	1.427	1.424	1.411	1.557
2560.000	1.398	1.407	1.434	1.434	1.434	1.445
2430.000	1.433	1.421	1.425	1.440	1.459	1.448
2300.000	1.401	1.427	1.415	1.411	1.451	1.456

2170.000	1000.000	1.443	1.444	1.404	1.349	1.313
2040.000	1000.000	1.305	1.479	1.517	1.600	1.773
1910.000	1000.000	1000.000	1.664	1.638	1.531	5.571

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 6 CENTERS

FACTOR OF SAFETY = 1.411 AT (310.000,2690.000)
FACTOR OF SAFETY = 1.398 AT (-210.000,2560.000)
FACTOR OF SAFETY = 1.401 AT (-210.000,2300.000)
FACTOR OF SAFETY = 1.313 AT (440.000,2170.000)
FACTOR OF SAFETY = 1.305 AT (-80.000,2040.000)
FACTOR OF SAFETY = 1.531 AT (310.000,1910.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S. MORE SEARCH FROM OTHER CENTER MAY BE NEEDED TO ENSURE THAT MINIMUM F.S. IS OBTAINED.

AT POINT (-80 2040) RADIUS 310.484
THE MINIMUM FACTOR OF SAFETY IS 1.305

FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-80	2040	5	1	310.484	1.305	0
-16	2040	5	1	295.506	1.484	0
-144	2040	1	1	332.770	1000.000	0
-80	2104	11	7	369.244	1.382	0
-80	1976	5	1	249.191	1.528	0
-64	2040	11	2	304.718	1.332	0
-96	2040	5	1	314.986	1.387	0
-80	2056	5	1	325.969	1.312	0
-80	2024	5	1	295.053	1.325	0

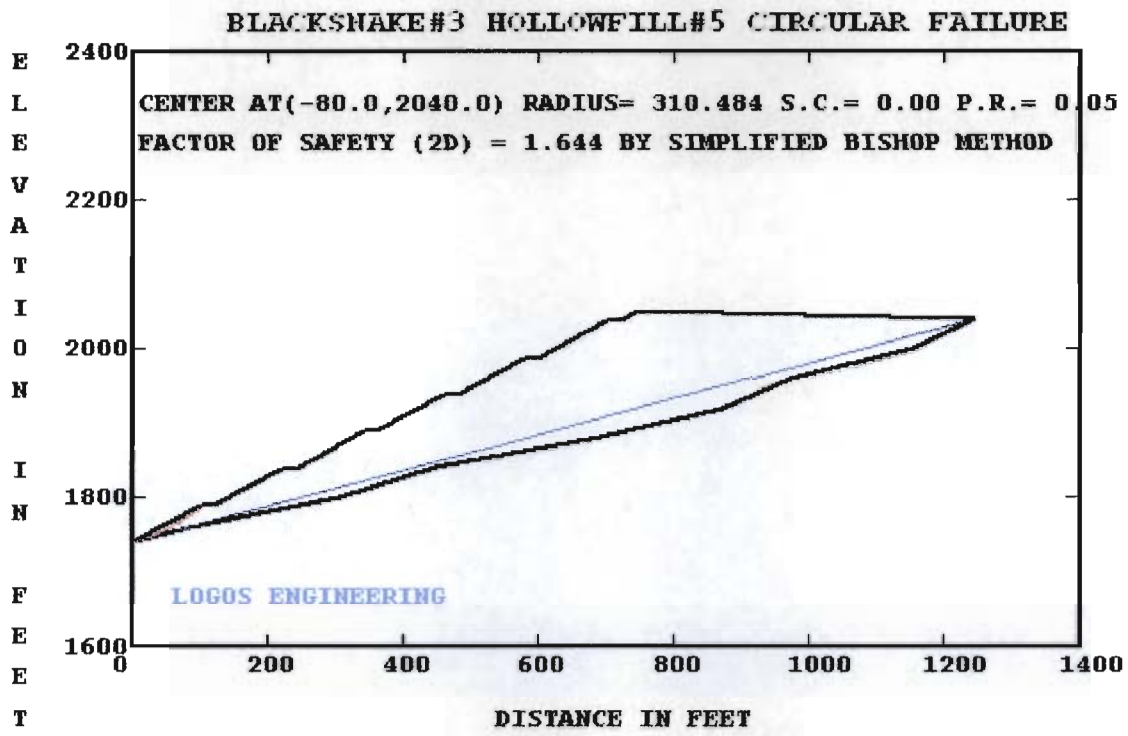
AT POINT (-80 2040) RADIUS 310.484

THE MINIMUM FACTOR OF SAFETY IS 1.305

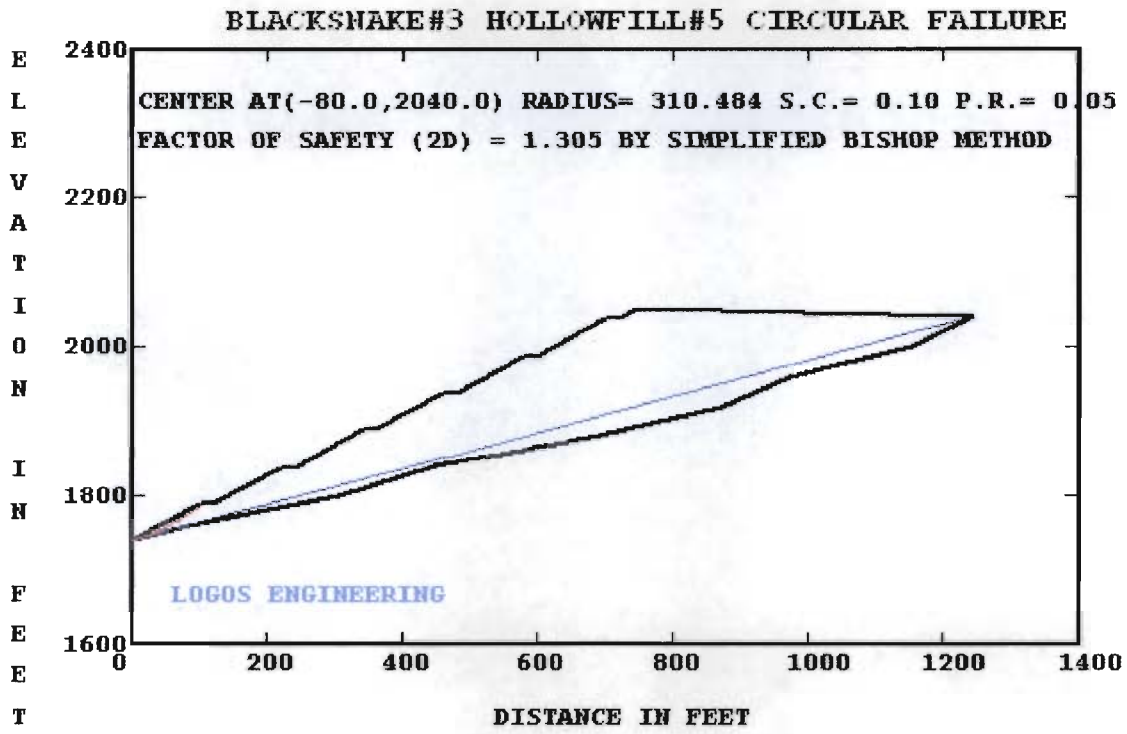
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL SLIP SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	10.382	1.163	0.000	.274	.151E+04	.143E+04	.452E+06	.174E+06
2	1	10.382	3.194	0.000	.308	.414E+04	.394E+04	.995E+06	.518E+06
3	1	10.382	4.822	0.000	.341	.626E+04	.594E+04	.141E+07	.844E+06
4	1	10.382	6.031	0.000	.375	.783E+04	.744E+04	.171E+07	.113E+07
5	1	10.382	6.805	0.000	.408	.883E+04	.839E+04	.187E+07	.137E+07
6	1	10.382	7.122	0.000	.442	.924E+04	.878E+04	.192E+07	.152E+07
7	1	10.382	6.959	0.000	.475	.903E+04	.858E+04	.184E+07	.158E+07
8	1	10.382	6.285	0.000	.508	.816E+04	.775E+04	.164E+07	.150E+07
9	1	10.382	5.067	0.000	.542	.658E+04	.625E+04	.132E+07	.128E+07
10	1	6.370	3.660	0.000	.569	.291E+04	.277E+04	.597E+06	.589E+06
11	1	4.013	1.522	0.000	.586	.763E+03	.725E+03	.190E+06	.158E+06
							SUM	.139E+08	.107E+08

AT CENTER (-80.000 , 2040.000) WITH RADIUS 310.484 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.307
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.305



I, _____ (signature), 12575 (registration no.), 4/2/7 (date) hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)



I, _____ (signature) 12575 (registration no.) 4/2/7 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

27.4 Will coal mine waste materials, from activities located outside the proposed permit area, be disposed of within the proposed permit area? ☐ YES ☒ NO. If "YES", provide as "Attachment 27.4.A", a detailed discussion (based on relevant hydrologic, geotechnical, physical, and chemical analyses) to make a showing in accordance with 405 KAR 16:140 or 18:140, Section 1, that the disposal of such waste will not:

(a) Adversely affect water quality, water flow, or vegetation;
(b) Create public health hazards; and
(c) Cause instability in the disposal area(s).

27.5 Provide a detailed plan (including all engineering design calculations, cross-sections, maps and drawings) for each proposed structure. Each plan shall meet the applicable requirements of 405 KAR 8:030, Section 34, or 405 KAR 8:040, Section 34, as appropriate. The plan(s) shall be provided as "Attachment 27.5.A, 27.5.B, etc."

N/A

28. Disposal of Waste Other Than Coal, Soil or Rock

28.1 Provide as "Attachment 28.1.A", a description of the measures to be used for the temporary storage and final disposal of waste such as: grease, lubricants, paints, flammable liquids, garbage, abandoned machinery, timber, brush, and other combustibles generated during the mining activities. Show all storage and/or disposal sites on the MRP Map.

See Attachment 28.1.A

29. Toxic Materials Handling Plan

29.1 Based on the results of the premining geologic sampling program, identify all acidic or toxic strata which will be encountered during the proposed mining operation:

Site No.	Thickness	Lithology	Elevation	Potential Acidity	Neutralization Potential

N/A

ATTACHMENT 28.1.A

This operation does not propose the disposal of any type of waste or combustible material other than ordinary timber and/or brush. As was stated previously in the backfilling and grading plan, this timber and/or brush will be windrowed on the solid berm to remain above the coal outcrop.

No disposal of paint, grease, garbage, abandoned machinery, or other combustibles is proposed. Should disposal of any of these become necessary, they will be hauled to a state approved landfill.

Any garbage affiliated with the operation will be stored in leakproof barrels or containers until their removal from the site.

29.2 Describe how acidic and/or toxic strata will be handled to avoid contamination of surface and ground water resources within, and adjacent to the proposed permit area, and to minimize adverse effects on plant growth and land uses. Submit the description, if applicable, as "Attachment 29.2.A".

N/A

30. Surface and Ground Water Monitoring

30.1 Provide a detailed description of the in-stream surface water quality and quantity monitoring program to be used during the mining and reclamation operations. The description shall specifically address all of the following:

(a) the location of each sampling point and the rationale for selection
(b) the frequency of sample collection
(c) the method(s) to be used for sample collection
(d) the parameters to be tested
(e) the procedures to be used for reporting the analytical results of the testing program to DSMRE

Submit the description as "Attachment 30.1.A", and show the location of all monitoring points on the MRP Map.

See Attachment 30.1.A

30.2 Submit as "Attachment 30.2.A", a description of the applicant's proposed KPDES point source discharge monitoring program. Discharges from sediment ponds, underground mines and other similar discharge points within the proposed permit area shall be monitored. The description shall, at a minimum, address: (a) the frequency of sample collection; (b) the parameters to be tested; and (c) the procedures to be used for reporting the analytical results of the laboratory tests. Show the location of all sampling points on the MRP Map.

See Attachment 30.2.A

30.3 Provide, as "Attachment 30.3.A", a detailed description of the ground water quality and quantity monitoring program to be used during the mining and reclamation operations. The description shall specifically address all the following:

(a) the location of each sampling point and the rationale for selection
(b) the frequency of sample collection
(c) the method(s) to be used for sample collection
(d) the parameters to be tested
(e) the procedures to be used for reporting the results of the laboratory testing program to DSMRE

Show the location of all sampling points on the MRP Map.

See Attachment 30.3.A

30.4 Provide a detailed description of each monitoring point proposed for use in the ground water monitoring program. The description shall address:

(a) the aquifer(s) to be monitored
(b) the construction specifications of each monitoring point
(c) the adequacy of each monitoring point, taking into account design, construction, and location to fulfill its intended use

Submit the description as "Attachment 30.4.A".

See Attachment 30.4.A

ATTACHMENT 30.1.A

Monitoring of surface water quality and quantity during the mining operation will be conducted at the instream monitoring stations as shown on the enlarged maps. These locations should best reflect changes or problems with water quality or quantity and would better indicate the source of any problems.

Samples will be taken by "grab" type procedures once each quarter or as required by the Department. Lab tests will be conducted immediately to ensure accurate representation of the surface water characteristics. All Sampling procedures and lab analysis will be in accordance with EPA requirements.

Parameters analyzed will include discharge, temperature, pH, acidity, alkalinity, total iron, total manganese, total suspended solids, sulfate, and total dissolved solids.

Discharges of water from areas disturbed by surface mining activities shall at all times be in compliance with all applicable will all applicable federal and state water quality standards including the effluent limitations guidelines for coal mining promulgated by U.S. EPA in 40 CFR 434.

A regular report of all measurements will be supplied to the Department within one (1) month of sample collection.

ATTACHMENT 30.2.A

All monitoring of the KPDES point source discharge monitoring program will be conducted. Points of monitoring are identical to those described and shown on the maps. Likewise, procedures and frequencies, as well as reporting requirements, are to be conducted as described in Attachment 30.1.A.

No monitoring of underground mines or points other than sediment ponds and background data collection points are proposed.

ATTACHMENT 30.3.A

Monitoring of ground water quality and quantity during the mining operation will be conducted at the point shown on the enlarged maps. The location should best reflect changes or problems with water quality or quantity and would better indicate the source of any problems.

Samples will be taken by "grab" type procedures at least quarterly or as required by the Department. Lab tests will be conducted immediately to ensure accurate representation of the ground water characteristics. All sampling procedures and lab analysis will be in accordance with EPA and KPDES requirements.

No adverse effects to ground water are anticipated. However, should it become necessary, additional wells will be drilled to provide further information on water levels, infiltration rates, subsurface flow, and other storage characteristics including quality of the ground water.

Ground water monitoring will include water level, pH, acidity, alkalinity, sulfate, dissolved iron, dissolved manganese, and total dissolved solids. The ground water compliance monitoring results will be submitted to the Department quarterly, within 30 days after the samples are taken.

30.5 Provide the following information for the surface and ground water monitoring locations

I.D. Number	Pond Number if Applicable	Type Surface/Ground	Latitude	Longitude
BC3		Ground	36-43-33.94	83-32-56.25
BC318		Ground	36-43-06.09	83-32-02.87
BC341		Ground	36-43-08.28	83-30-47.84
SW-1		Surface	36-42-56.07	83-30-47.72
SW004		Surface	36-43-26.37	83-33-08.83
SW024		Surface	36-43-04.88	83-32-15.45
SS #0	Pond	Surface	36-45-00.1	83-32-33.9
SS #1	Pond	Surface	36-44-22.4	83-32-35.8
SS #2	Pond	Surface	36-44-14.6	83-31-58.6
SS #3	Pond	Surface	36-44-07.4	83-32-09.4
SS #4	Pond	Surface	36-43-38.9	83-31-36.8
SS #5	Pond	Surface	36-43-32.7	83-31-04.8
SS #6	Pond	Surface	36-45-25.4	83-31-51.3
SS #7	Pond	Surface	36-45-21.3	83-31-52.9
SS #8	Pond	Surface	36-45-20.7	83-32-08.5
SS #9	Pond	Surface	36-45-12.7	83-32-06
SS #10	Pond	Surface	36-45-05.6	83-32-06.5
SS #11	Pond	Surface	36-44-59.4	83-32-06.2
SS #12	Pond	Surface	36-44-54.3	83-32-11.2
SS #13	Pond	Surface	36-44-50.7	83-32-22.4
SS #14	Pond	Surface	36-44-39.8	83-32-49.3
SS #15	Pond	Surface	36-44-33.6	83-32-45.7
SS #16	Pond	Surface	36-44-26..2	83-32-51.6
SS #17	Pond	Surface	36-44-29.6	83-32-39.3

I.D. Number	Pond Number if Applicable	Type Surface/Ground	Latitude	Longitude
SS #18	Pond	Surface	36-44-32.8	83-32-33.3
SS #18A	Pond	Surface	36-44-25.8	83-32-19.3
SS #19	Pond	Surface	36-44-22.8	83-32.25.7
SS #20	Pond	Surface	36-44-18.7	83-32-20.7
SS #21	Pond	Surface	36-44-20.4	83-32-12.0
SS #22	Pond	Surface	36-44-22.1	83-32-01.1
SS #22A	Pond	Surface	36-44-16.3	83-31-44.0
SS #23	Pond	Surface	36-44-13.2	83-31-50.5
SS #24	Pond	Surface	36-44-05.7	83-31-46.9
SS #25	Pond	Surface	36-43-54.8	83-32-05.1
SS #26	Pond	Surface	36-43-56.9	83-32-14.2
SS #27	Pond	Surface	36-43-51.3	83-32-06.8
SS #28	Pond	Surface	36-43-47.5	83-31-58.9
SS #29	Pond	Surface	36-43-47.9	83-31-52.1
SS #30	Pond	Surface	36-43-54.1	83-31-34.1
SS #31	Pond	Surface	36-43-53.7	83-31.26.7
SS #32	Pond	Surface	36-43-55.2	83-31-19.8
SS #33	Pond	Surface	36-43-47.1	83-31-22.1
SS #34	Pond	Surface	36-43-47.6	83-31-15.2
SS #35	Pond	Surface	36-43-43.5	83-20-54.8
SS #36	Pond	Surface	36-43-47.4	83-30-46.8
SS #37	Pond	Surface	36-43-49.8	83-30-38.3
SS #38	Pond	Surface	36-43-50.5	83-30-31.7
SS #39	Pond	Surface	36-43-45.1	83-30-25.3

I.D. Number	Pond Number if Applicable	Type Surface/Ground	Latitude	Longitude
SS #40	Pond	Surface	36-43-44.4	83-30-17.3

30.6 List the name and address of the laboratory which will perform required testing of water samples.

Name Technical Water Laboratories, Inc.
Address P.O. Box 309, Bledsoe, KY 440810

31. Sediment Ponds and Impoundments

31.1 Complete the following table for each proposed sediment pond and impoundment. The numbers preceding the rows refer to the list of titles below the chart.

1	0	1	2	3	4	5	6
2	A	A	A	A	A	A	A
3	110.90	188.4	212.3	58.3	40.90	90.10	23.8
4	56.7	99.10	84.3	35.8	26.5	42.2	7.5
5	7.9	4.44	2.96	2.98	3.63	4.67	1.24
6	8.698	5.29	3.719	4.909	4.575	5.406	1.536
7	13.114	14.2	10.843	7.260	6.856	10.338	2.984
8	5.8	4.339	7.9	3.0	5.0	11	Dugout
9	16.012	17.536	14.330	10.728	8.752	15.945	4.057
10	23.55	20	18.5	11.8	18.2	23.2	Dugout
11	36-45-00.1	36-44-22.4	36-44-14.6	36-44-07.4	36-43-38.9	36-43-32.7	36-45-25.4
12	83-32-33.9	83-32-35.8	83-31-58.6	83-32-09.4	83-31-36.8	83-31-04.8	83-31-51.3

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
7.) Storage Capacity at Emergency Spillway (Acre-Feet)
8.) Structure Height at Emergency Spillway Measured from Upstream Toe (Feet)
9.) Storage Capacity at Top of Dam (Acre-Feet)
10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	7	8	9	10	11	12	13
2	A	A	A	A	A	A	A
3	45.83	8.21	15.55	39.34	67.56	33.88	17.7
4	17.6	8.21	8.75	12.81	13.77	15.3	15
5	1.42	0.81	1.57	1.14	1.52	0.93	1.65
6	1.728	1.423	1.824	1.382	1.906	1.14	2.015
7	5.029	2.303	2.865	3.598	6.377	3.22	5.156
8	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
9	5.557	2.922	3.669	4.985	6.878	4.401	6.104
10	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
11	36-45-21.3	36-45-20.7	36-45-12.7	36-45-05.6	36-44-59.4	36-44-54.3	36-44-50.7
12	83-31-52.9	83-32-08.5	83-32-06	83-32-06.5	83-32-06.2	83-32-11.2	83-32-22.4

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
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9.) Storage Capacity at Top of Dam (Acre-Feet)
10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	14	15	16	17	18	18A	19
2	A	A	A	A	A	A	A
3	7.60	8	8.8	5.8	5.2	12.7	5.4
4	7.60	8	8.8	5.8	5.2	12.7	5.4
5	0.32	0.63	0.19	0.71	0.67	1.13	0.32
6	0.433	1.537	1.139	1.948	1.294	1.353	0.431
7	2.306	2.306	2.306	2.559	2.249	3.221	1.099
8	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
9	2.922	2.922	2.922	3.272	2.536	3.986	1.505
10	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
11	36-44-39.8	36-44-33.6	36-44-26.2	36-44-29.6	36-44-32.8	36-44-25.8	36-44-22.8
12	83-32-49.3	83-32-45.7	83-32-51.6	83-32-39.3	83-32-33.3	83-32-19.3	83-32-25.7

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
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10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	20	21	22	22A	23	24	25
2	A	A	A	A	A	A	A
3	4.7	10	12.1	72.2	7.3	31.20	4.7
4	4.7	10	11.1	26.4	7.3	24.80	4.7
5	0.32	1.15	0.83	1.12	0.55	2.33	0.60
6	0.937	2.251	1.183	1.474	0.688	2.869	----
7	2.306	3.528	3.3	6.854	1.736	4.925	1.982
8	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
9	2.922	4.30	4.351	9.118	2.251	6.736	2.536
10	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
11	36-44-18.7	36-44-20.4	36-44-22.1	36-44-16.3	36-44-13.2	36-44-05.7	36-43-54.8
12	83-32-20.7	83-32-12.0	83-32-01.1	83-31-44.0	83-31-50.5	83-31-46.9	83-32-05.1

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
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10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	26	27	28	29	30	31	32
2	A	A	A	A	A	A	A
3	5.4	3.5	9.30	6.60	19.10	16.2	51.80
4	5.4	3.5	9.30	6.60	14.7	8.7	19.5
5	0.39	0.44	1.25	0.71	1.83	0.84	1.36
6	0.584	0.838	1.618	0.906	2.277	1.008	1.671
7	1.10	1.099	2.537	1.509	3.598	2.254	4.530
8	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
9	1.505	1.505	3.174	1.987	4.491	2.85	6.115
10	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
11	36-43-56.9	36-43-51.3	36-43-47.5	36-43-47.9	36-43-54.1	36-43-53.7	36-43-55.2
12	83-32-14.2	83-32-06.8	83-31-58.9	83-31-52.1	83-31-34.1	83-31-26.7	83-31-19.8

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
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10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	33	34	35	36	37	38	39
2	A	A	A	A	A	A	A
3	5.30	7.9	5.10	38.8	25.9	52.20	8.50
4	5.30	7.9	5.10	15.3	11.9	16.10	7.60
5	0.49	1.02	0.71	1.10	1.72	1.15	1.26
6	0.624	1.224	0.923	1.343	2.235	1.433	1.508
7	1.509	1.947	1.508	3.387	4.528	4.279	2.253
8	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
9	1.987	2.565	1.987	4.496	5.556	5.557	2.850
10	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout	Dugout
11	36-43-47.1	36-43-47.6	36-43-43.5	36-43-47.4	36-43-49.8	36-43-50.5	36-43-45.1
12	83-31-22.1	83-31-15.2	83-20-54.8	83-30-46.8	83-30-38-3	83-30-31-7	83-30-25.3

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
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10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

1	40						
2	A						
3	58.9						
4	16.8						
5	1.18						
6	1.426						
7	3.423						
8	Dugout						
9	4.491						
10	Dugout						
11	36-43-44.4						
12	83-30-17.3						

1.) Facility ID No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
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5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
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10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

31.2 Were any of the structures listed in chart 31.1 constructed prior to January 18, 1983? ☐ YES ☒ NO. If "YES", identify each structure and submit as "Attachment 31.2.A, 31.2.B", etc., the descriptions and compliance plan(s) required by 405 KAR 8:030, Section 25, or 405 KAR 8:040, Section 25, as appropriate.

31.3 For each proposed impoundment submit the applicable design plans and descriptions, including compliance demonstration documents, as required by 405 KAR 8:030 or 8:040, Section 34. Design plans and descriptions shall be submitted as "Attachment 31.3.A, 31.3.B", etc. Compliance demonstration documents shall be appropriately labeled and submitted in a separate document cover entitled "Sediment Ponds – Compliance Demonstration Documents". Put the applicant's name and the application number on the face of the document cover. If other state or federal agencies receive a copy of the permit application, a copy of the compliance demonstration documents shall also be provided to such agencies unless specifically waived.

NOTE: If any proposed sediment ponds are to be retained as permanent impoundments, the applicant shall ensure that such structures have been designated to meet the requirements of 405 KAR 16:100 or 405 KAR 18:100 as appropriate.

See Separate Folder

31.4 Will water be chemically treated at any of the proposed or existing sediment structures? ☐ YES ☒ NO. If "YES", provide the following information:

I.D. Number	Treatment Chemicals	Describe the method of treatment application and any special structures or facilities to be used

If special structures are to be utilized, submit as "Attachment 31.4.A, 31.4.B" etc., supporting engineering designs and calculations.

31.5 Provide a plan for the periodic maintenance of all sediment structures and discuss the proposed sediment clean-out schedule. Provide information as "Attachment 31.5.A".

See Attachment 31.5.A

31.6 Provide a removal plan for all temporary impoundments. Submit as "Attachment 31.6.A".

See Attachment 31.6.A

32. Diversions

32.1 Is authorization to conduct mining and reclamation operations or to construct mining related facilities within 100 feet of an intermittent or perennial stream being requested? ☐ YES ☒ NO. If "YES", provide the following information for all of the following.

(a) A map showing the location(s) where such authorization is requested, and the proposed disturbance(s)/facility(ies) with an indication of the specific distance to the stream(s). Submit as "Attachment 32.1.A".

(b) Cross-sections and a longitudinal profile of the stream's premining and postmining configuration. Submit as "Attachment 32.1.B".

(c) A description, including maps, plans, drawings, etc., of the specific measures to be taken to protect the stream(s) during the mining and reclamation operation. Submit as "Attachment 32.1.C".

32.2 Will the disturbances referenced in item 32.1 result in the temporary or permanent diversion of an intermittent or perennial stream? ☐ YES ☒ NO. If "YES", provide as "Attachment 32.2.A", the design calculations and other pertinent information to demonstrate compliance with 405 KAR 16:080, Section 2, or 405 KAR 18:080, Section 2, as appropriate.

32.3 Complete the following chart for all diversions:

Diversion Number	Length of Diversion	Design Storm	Type of Channel	Design Velocity	Average Slope	Erosion Control Methods
HF #0 East Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #0 East Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	Rip-rap
HF #0 West Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #0 West Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	Rip-rap
HF #1 North Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #1 North Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	Rip-rap
HF #1 South Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #1 South Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	Rip-rap
HF #2 West Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #2 West Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	Rip-rap

ATTACHMENT 31.5.A

Construction of sediment ponds in accordance with the design plans submitted in this application should greatly reduce the potential for frequent maintenance. Quarterly inspections will be conducted for each facility to ensure that the pond is functioning properly with no stability problems. Any required maintenance will be noted at this inspection and corrected promptly.

Structure clean out is proposed for 100% of sediment capacity as noted on the pond designs submitted in this application. Should this material become necessary to be removed, it will be dipped out using a backhoe or clam shell. Trucks will transport the material to the mine site where it will be mixed with overburden materials and ultimately seeded. The sediment will be tested to determine if it is toxic or not before mixing with overburden material and if test results indicate toxicity, sediment should be de-watered and covered with at least four (4) feet of non-toxic material in the permitted area.

ATTACHMENT 31.6.A

SEDIMENT POND REMOVAL PLAN

The sediment pond removal process will begin by first sampling the water to make sure that the quality is acceptable for discharge. Then the structure will be dewatered by pumping in a controlled manner with appropriate ditches. The exit channel for pumped or drained water will be checked periodically to insure that erosion does not occur and that velocities are reduced as necessary to provide a controlled discharge. Water quality will also be monitored to insure an acceptable effluent is being released.

Once all water has been removed, the earth dam material will be pushed into the pond. Water quality will also be monitored in removed, the earth dam material will be pushed into the pond. After the pond has been completely filled, the area will be graded to match the surrounding contours and natural area grade. Seeding and mulching will then be accomplished in accordance with the revegetation plan and the post-mining land use plan described in the permit package. The revegetation plan should comply with 405 KAR 16/18:200.

Prior to covering the sediment in the pond, it shall be allowed to dry. Testing will then be conducted to determine toxicity. Lime amounts necessary to neutralize the sediment will then be applied if needed. Following lime applications, the sediment will be covered with soil material from the embankment as described previously. Should sediment be required to be dipped out, it will be taken back onto the bench above the pond and spread over the site.

Temporary sediment control measures will be implemented before pond removal begins.

ATTACHMENT 31.6.A (1)

Straw or hay bales will be placed around the lower side of the pond removal area to prevent silt from leaving the site. These shall remain until vegetation is well established.

Effluent limitations will be met according to all state and federal water quality standards. Revegetation will be established in accordance with the revegetation plan included and will adhere to requirements of 405 KAR 16/18:200 and TRM #21.

Drainage corridors between hollowfills and ponds will be examined during annual pond certification inspections. If sediment removal becomes necessary, it will be excavated by hand (shovel and bucket/wheel-barrow) or with a small track-hoe to reduce any disturbances to in-tact riparian corridors. Any excavated materials will then be allowed to dry above sediment structures, tested for toxicity, treated, if necessary, and hauled to the permit area for disposal. A riparian corridor will be established for a minimum of 18 meters or when plantings encounter the undisturbed forest canopy. Plantings will begin within twice the bankful width of the constructed channel centerline. A list of riparian vegetation has been provided. As shown on the post construction profile construction profiles and plan views, Cross-vanes, J-hooks, W-hooks and native bank revampments will provide energy dissipation, create pools and riffles and establish aquatic habitat. A design for each has been provided. Each vane or hook will be constructed of non-toxic rock materials as shown on the plans and indicted on the construction table.

807-0355

ATTACHMENT 31.6.A (2)

Substrate materials will consist of non-toxic material and be of the sizes as represented on the construction table. They will be tamped into the ground to insure stability and consist of a minimum of 6 inches of depth. Post-mine plan views and profiles have been provided. Cross-sections were included in the previous submittal. Stream reconstruction will occur in Tom Fork (Pond 0), Jennie Branch (Pond 1), Blacklick Branch (Ponds 2 and 3), an unnamed tributary to Coal Stone Branch (Pond 4) and an unnamed tributary to Blacksnake Branch (Pond 5).

ATTACHMENT 22.2.A. PAGE 2 OF 6

TABLE I

POSTMINING REVEGETATION PLAN

GROUND COVER

Spring (Feb.15 - May 15)

Species	Rate/Acre
Orchardgrass	10 lbs
Red Clover	6 lbs
Ladino Clover	2 lbs
Annual Ryegrass	5 lbs

Summer (May 15 - Aug. 1)

Species	Rate/Acre
Orchardgrass	10 lbs
Korean Lespedeza	15 lbs
Birdsfoot Trefoil	6 lbs
Alfalfa	12 lbs
Foxtail Millet	12 lbs

Fall (Aug.1 - Oct. 1)

Species	Rate/Acre
Timothy	8 lbs
Ladino Clover	2 lbs
Red Clover	4 lbs
Perennial Ryegrass	10 lbs

Wet or Poorly Drained Areas

Species	Rate/Acre
Redtop	3 lbs
Reed Canarygrass	15 lbs
Alsike Clover	6 lbs

TREE AND SHRUB SPECIES

(October 15 - May 15)

HARD MAST PRODUCERS(ONE SPECIES)

white oak 90 seedlings/acre

CONIFERS (ONE SPECIES)

Virginia Pine 70 seedlings/acre

SHRUBS AND SOFT MAST PRODUCERS (TWO SPECIES)

Redbud 70 seedlings/acre
Green Ash 70 seedlings/acre

MULCH

Type	Rate/Acre
Straw or Hay	1 ½ tons
or	
Hydro-Mulch	*1500 lbs*

NOTE: Double the mulch rate on steep slopes. If seeding is needed during the winter, a temporary grass species will be planted and mulched. The permanent herbaceous seed mixture will be planted as soon as weather permits in the spring.

NOTE: All areas of surface disturbance (196.1 acres) will be planted with a herbaceous ground cover (see Column #1 above) and mulched (Column #2). Trees and shrubs (Column #2) will be added to the herbaceous ground cover in rows and clusters at a minimum of 30 percent of surface disturbance areas, designated as Wildlife Woodland Cover; See the Post Mining Land Use Map, Attachment 21.12.D.

Wildlife Herbaceous Cover Only	=	167.0 Acres
Wildlife Woodland Cover	=	71.6 Acres

ATTACHMENT 22.2.A. PAGE 3 OF 6

TABLE 2

EQUIVALENT REVEGETATION SPECIES

Commonly Proposed Species *	Acceptable Alternative Species	Seeding Rate (lbs/acre)**
Perennial Grasses		
Orchardgrass	Timothy	8
	Switchgrass	10
	Indiangrass	10
	Big or Little Bluestem	5
	Deertongue	12
	Redtop	3
*Fescue is only proposed for use on erosion prone areas.	Red Fescue	10
	Tall Fescue (endophyte-free)*	15
Herbaceous Legumes		
Red Clover and Ladino Clover	White or Alsike Clover	8
	Korean or Kobe Lespedeza	10
	Birdsfoot Trefoil	10
	Alfalfa	12
	Appalow Lespedeza	20
	Sweet Clover	12
Temporary Species		
Annual Ryegrass	Wheat	30
	Foxtail or Japanese Millet	12
	Oats	30
	Sorghum	20
	Soybeans	40
	Cowpeas	40
	Balbo or Winter Rye	30
	Perennial Ryegrass	10

* See Table 1 for commonly proposed species.

** Seeding rates are for Pure Live Seed (PLS). Seed rate of the permanent species can be increased if desired, but do not exceed the seeding rate of the temporary species. Use only the temporary species at the rates shown. If more than one temporary species is used, reduce the seeding rate of each species according to the number used; i.e., for two species use one-half seeding rate of each.

ATTACHMENT 22.2.A. PAGE 4 OF 6

TABLE 3

ALTERNATE TREE AND SHRUB SPECIES

EQUIVALENT HARD MAST PRODUCER SPECIES

Hickory Species*	Native Pecan	Black Walnut
Oak Species*	*(Listed in Appendix A of TRM #21)	

EQUIVALENT CONIFER SPECIES

Eastern Red Cedar	Pitch Pine	Shortleaf Pine
Eastern White Pine		

EQUIVALENT SHRUBS AND SOFT MAST PRODUCERS

Maple Species*	Serviceberry	Dogwood Species*
Hawthorn Species	Autumn Olive	White Ash
Green Ash	Bicolor Lespedeza	Wild Plum
Wild Black Cherry	Common Chokecherry	Crabapple Species
Sumac Species*	American Elder	Sassafras
Viburnum Species	Steeple Bush	Red Mulberry
Burning Bush		

*(Listed in Appendix A of TRM #21)

Note: A minimum of four species of trees and shrubs must be planted in the proposed wooded areas. (See Attachment 21.12.D. for tentative locations of woody areas). At least one hard mast producer (at a minimum rate of 90 seedlings/acre), one conifer (at a minimum rate of 30 seedlings/acre), and two shrub or soft mast producers (at a minimum rate of 30 seedlings/ acre each), will be in the selection of the four species. The total number of seedlings will be planted at a spacing necessary to obtain a stocking rate of 300 trees and shrubs per acre. Since this mine site is relatively small compared to the surrounding forest, a random planting pattern of the four woody species would be adequate for the intended purpose of enhancing the wildlife habitat. In general the woody species will be planted in those areas where survival is most likely to succeed, such as along the edge of the native forest along drainageways, and in areas where the herbaceous ground cover is thin.

ATTACHMENT 22.2.A. PAGE 5 OF 6

TABLE 4a

Benefits to Wildlife of the Recommended Herbaceous Plant Species

PLANT	USES(a)
GRASSES	
Bluestems - *Andropogon spp.*	CHS
Deertongue - *Panicum clandestinum*	HSC
Red fescue - *Festuca rubra*	HSC
Indiangrass - *Sorghastrum nutans*	CHS
Japanese millet - *Echinochloa spp.*	S
Millet (Foxtail) - *Setaria italica*	S
Oats - *Avena sativa*	SH
Orchardgrass - *Dactylis glomerata*	HSC
Redtop - *Agrostis alba*	CHS
Rye - *Secale cereale*	SH
Ryegrass- *Lolium spp.*	HS
Sorghum - *Sorghum spp.*	S
Timothy - *Phleum pratense*	SH
Wheat - *Triticum aestivum*	SH
LEGUMINOUS FORBS	
Alfalfa - *Medicago spp.*	HSC
Appalow lespedeza - *Lespedeza spp.*	CSH
Birdsfoot trefoil - *Lotus corniculatus*	HC
Clovers - *Trifolium spp.*	HS
Cowpea - *Vigna sinebsis*	SH
Common (Kobe) lespedeza - *Lespedeza striata*	SH
	SH
Soybean - *Glycine max*	SH

(a) See bottom of next page (Table 4b) for definitions of uses.

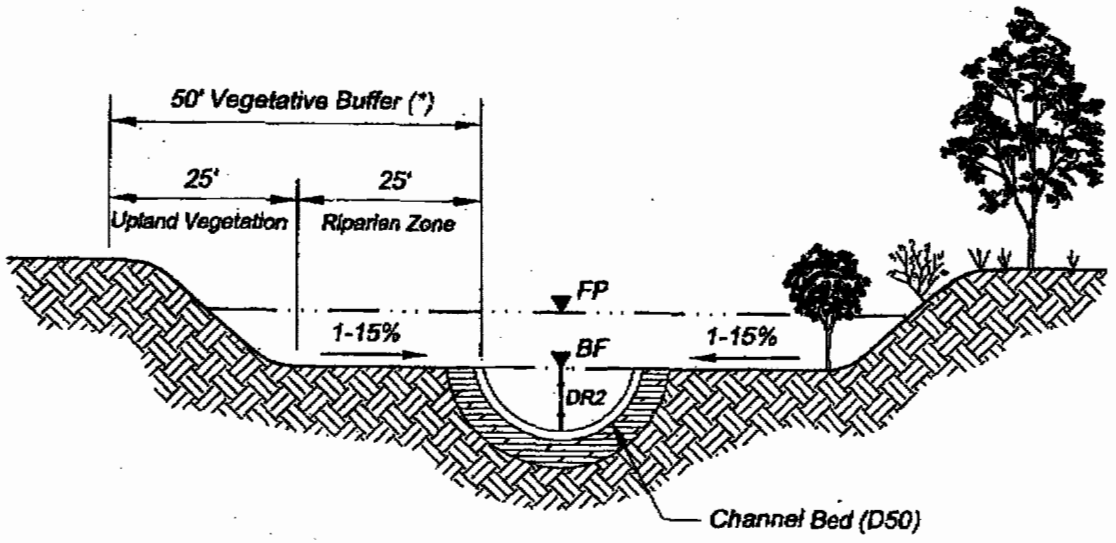
ATTACHMENT 22.2.A. PAGE 6 OF 6

TABLE 4b

Benefits to Wildlife of the Recommended Woody Plant Species

PLANT	USES(a)
HARD MAST PRODUCERS	
Black Walnut - *Juglans nigra*	MBC
Hickory's - *Carya spp.*	MBC
Native Pecan - *Carya illinoinensis*	MBC
Oak's - *Quercus spp.*	MBC
CONIFERS	
East red cedar - *Juniperus virginiana*	CSB
Pines - *Pinus spp.*	
SHRUBS AND SOFT MAST PRODUCERS	
American elder - *Sambucus candensis*	CBS
Autumn olive - *Elaeagnus umbellata*	FBC
Bicolor Lespedeza - *	SHC
Common Chokecherry - *Prunus virginiana*	FBC
Crabapple species - *Malus spp.*	FCB
Gray Dogwood - *Cornus foemina*	FBC
Green ash - *Fraxinus pennsylvanica*	SB
Hawthorn species - *Crataegus spp.*	CFB
Redbud - *Cercis canadensis*	CB
Sassafras - *Sassafras albidum*	BSC
Serviceberry - *Amelanchier laevis*	FCB
Shining sumac - *Rhus copallina*	FBC
Silky Dogwood - *Cornus amonum*	FBC
Sugar maple - *Acer saccharum*	SB
White Ash - *Fraxinus americana*	SB
Wild black cherry - *Prunus serotina*	FBC
Wild plum - *Prunus americana*	FBC

(a) Note: Classification system from "*Revegetation of Kentucky Surface Mined Lands*", 1983. (M) = Mast (Nuts and acorns); (S) = Seeds (as well as dry fruits, grains and achenes); (B) = Browse (bark, buds catkins, whole pods, whole heads of fruits, twigs, and small branches); (C) = Cover; (H) = Herbage or Foliage; and (F) = Fruit. The uses of each plant are arranged in descending order of their overall importance to the targeted wildlife species.



TYPICAL SECTION
RECONSTRUCTED STREAM CHANNEL VEGETATION

N.T.S.

2537-01CHAS(MAR06)

BIOLOGICAL SYSTEMS CONSULTANTS, INC.	
RESTORED STREAM CHANNEL DETAIL	
[illegible]	
[illegible] & SNAKE HOLLOW	
PROJECT NO. [illegible]	DATE: 03/06

Cross-Vane Structure.

J-Hook Vane.

Native material bank revetment. (*Rosgen, 1993a*)

Native material bank revetment. (*Rosgen, 1993a*)

TYPICAL

CROSS VANE

SCALE: NTS

TYPICAL
"J" HOOK VANE

SCALE: NTS

TYPICAL

"W" VANE

SCALE: NTS

LEGEND

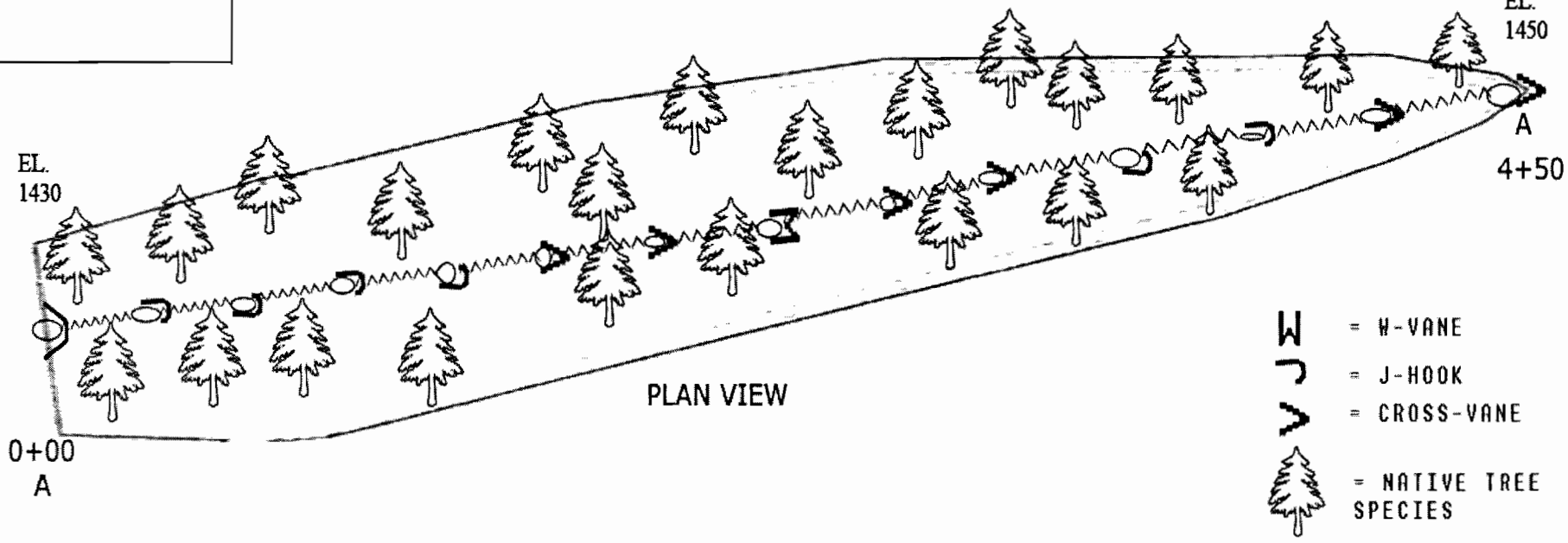
= Pool

^^^^^ = Riffle

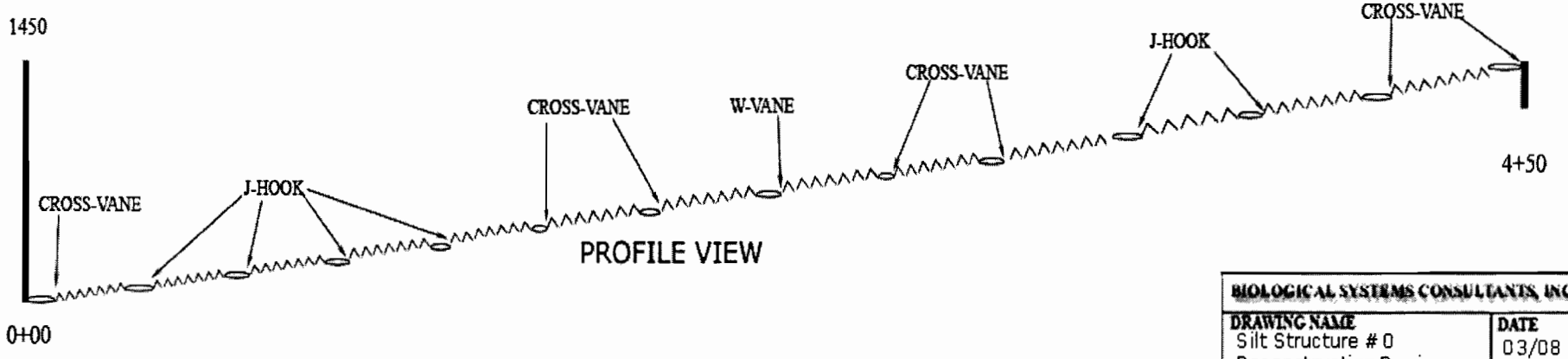
Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #0



ELEVATION



TOE OF DAM ELEVATION 1430'

0' 30' HORIZONTAL SCALE

0' 10' VERTICAL SCALE

Slope Gradient = 4%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 0 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

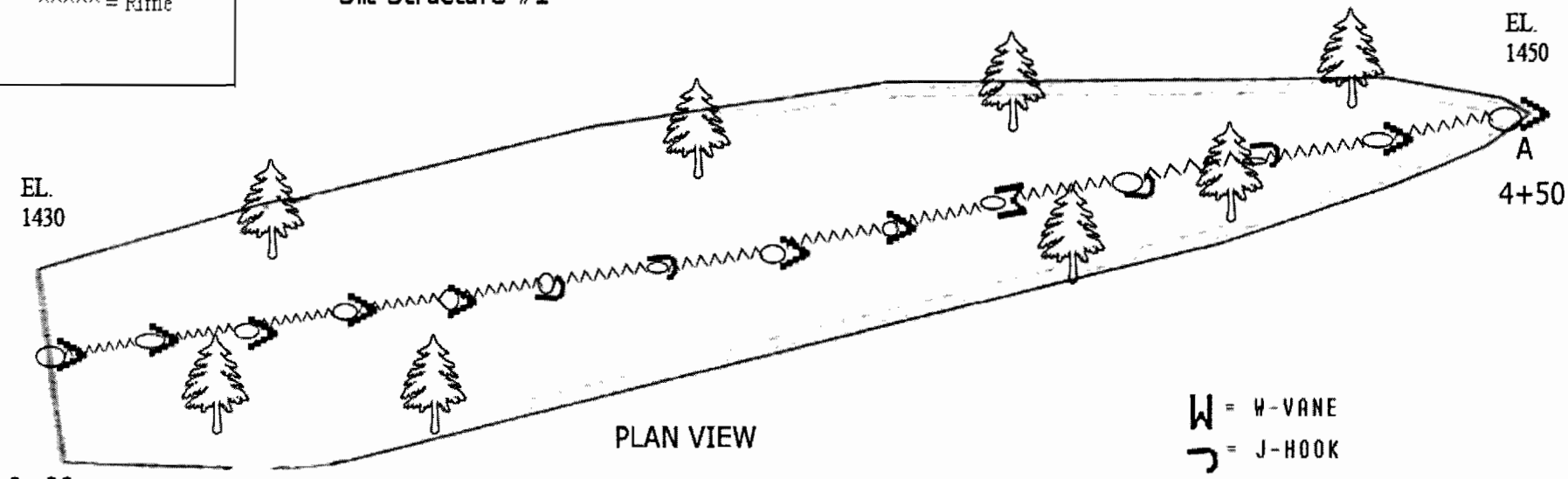
= Pool

^^^^^ = Riffle

Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #1



PLAN VIEW

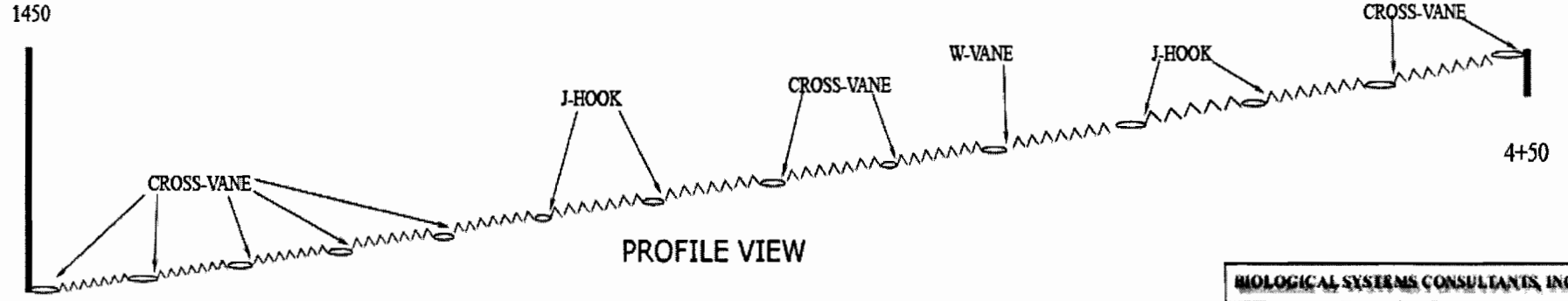
W = W-VANE

= J-HOOK

= CROSS-VANE

= NATIVE TREE SPECIES

ELEVATION



PROFILE VIEW

TOE OF DAM ELEVATION 1430'

0' 30'

HORIZONTAL SCALE

0' 10'

VERTICAL SCALE

Slope Gradient = 4%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 1 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

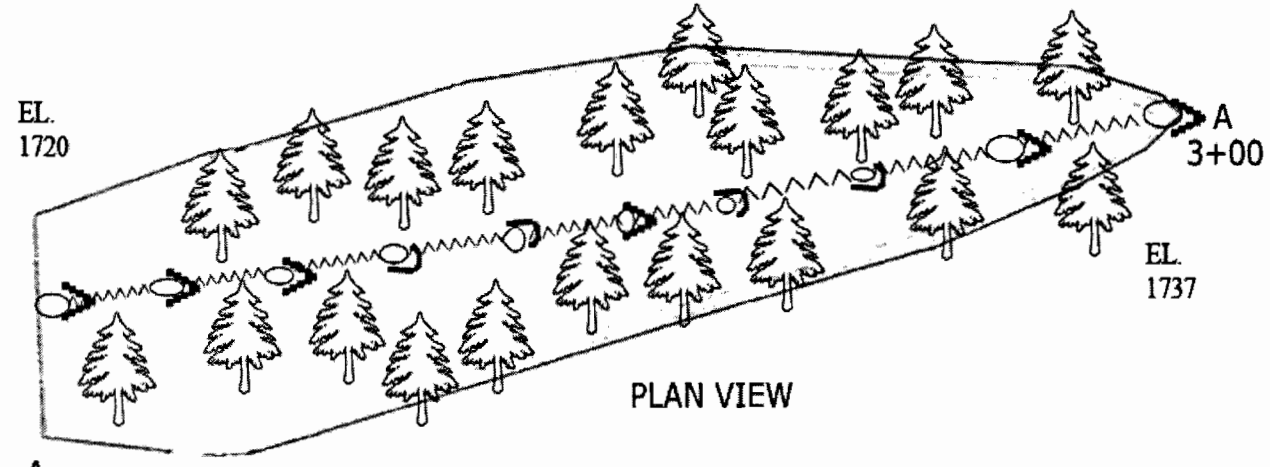
= Pool

^^^^^ = Riffle

Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #2



PLAN VIEW

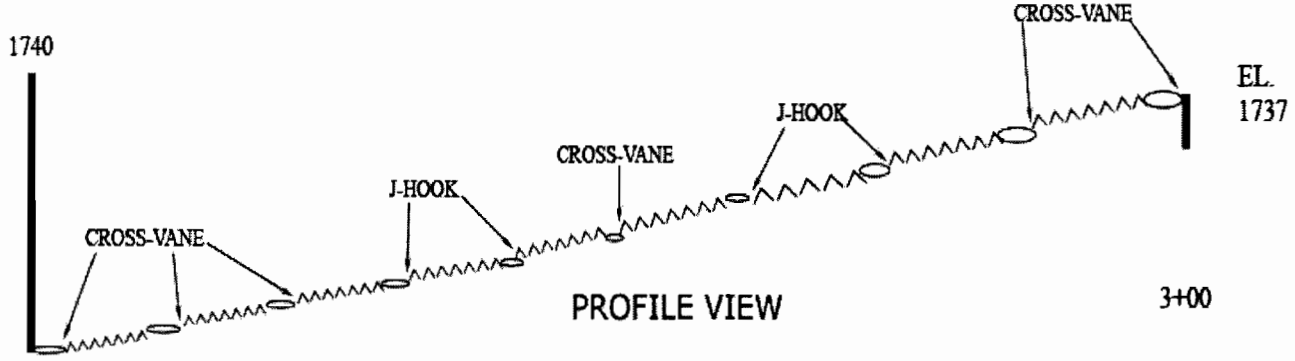
W = W-VANE

J = J-HOOK

> = CROSS-VANE

= NATIVE TREE SPECIES

ELEVATION



PROFILE VIEW

TOE OF DAM ELEVATION 1720'

0' 30' HORIZONTAL SCALE

0' 10' VERTICAL SCALE

Slope Gradient = 6%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 2 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

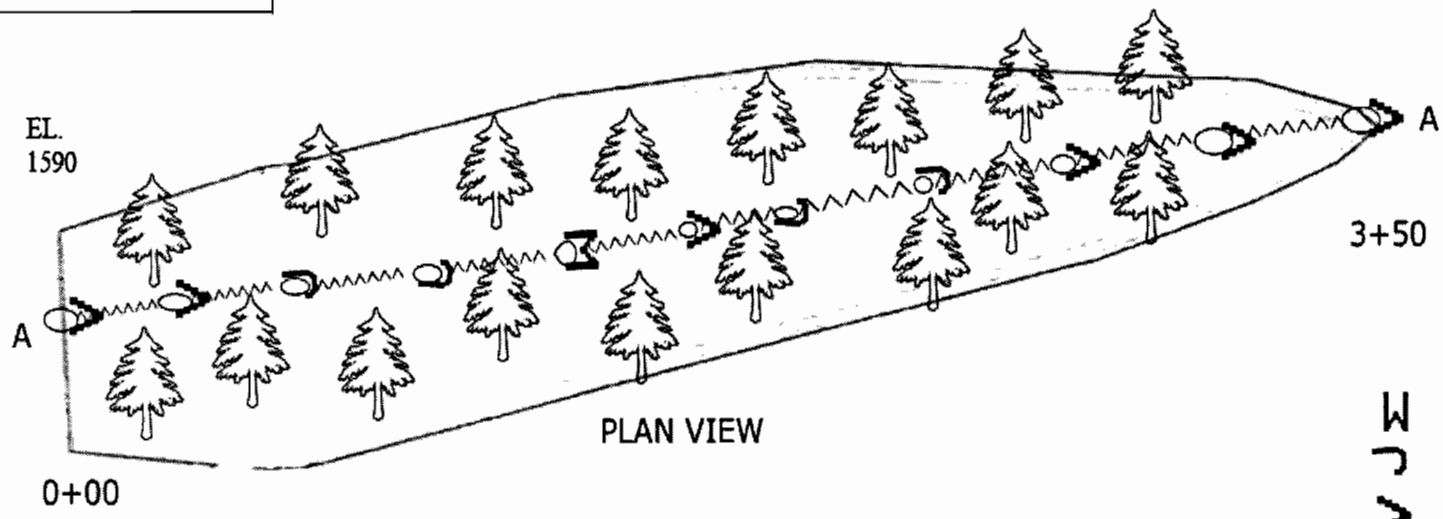
=Pool

^^^^^ = Riffle

Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #3



PLAN VIEW

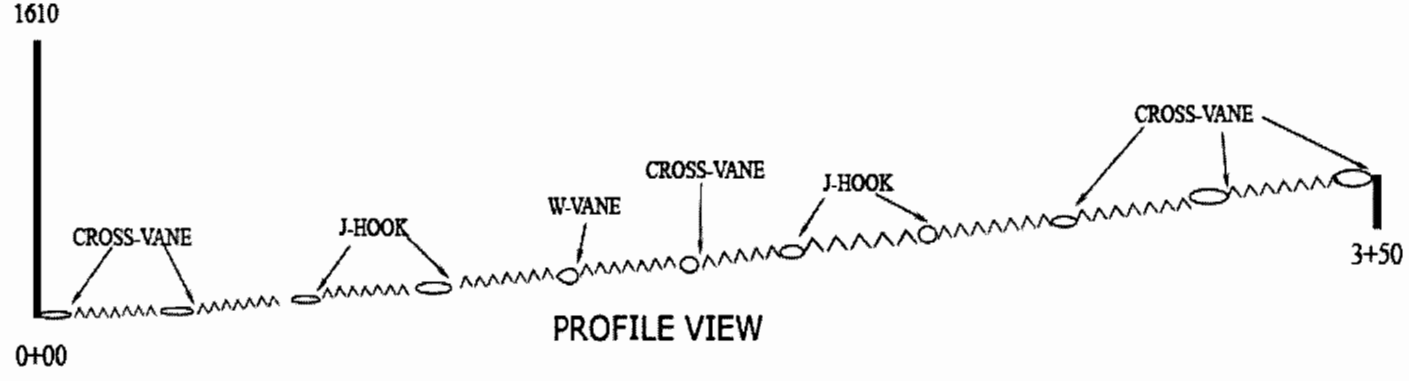
W = W-VANE

J = J-HOOK

V = CROSS-VANE

= NATIVE TREE SPECIES

ELEVATION



PROFILE VIEW

TOE OF DAM ELEVATION 1590'

0' 30'

HORIZONTAL SCALE

0' 10'

VERTICAL SCALE

Slope Gradient = 3%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 3 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

=Pool

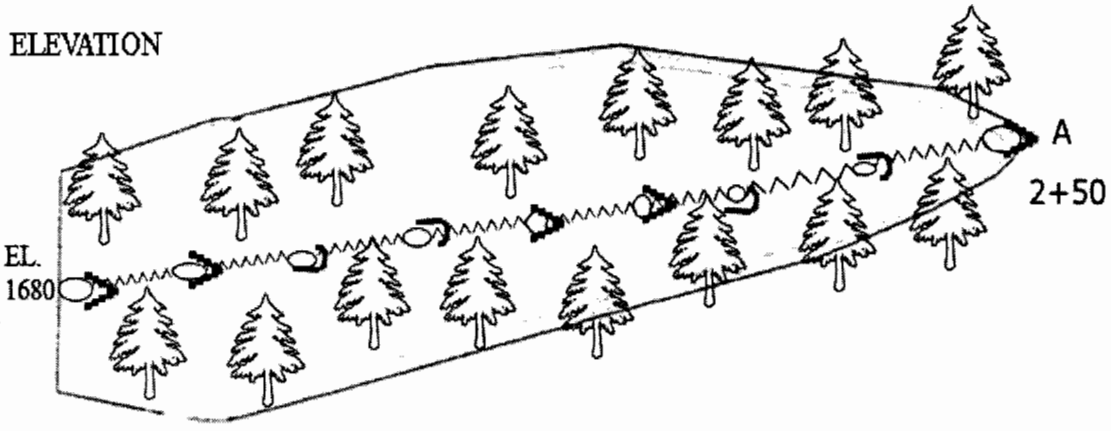
^^^^^ = Riffle

Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #4

ELEVATION



PLAN VIEW

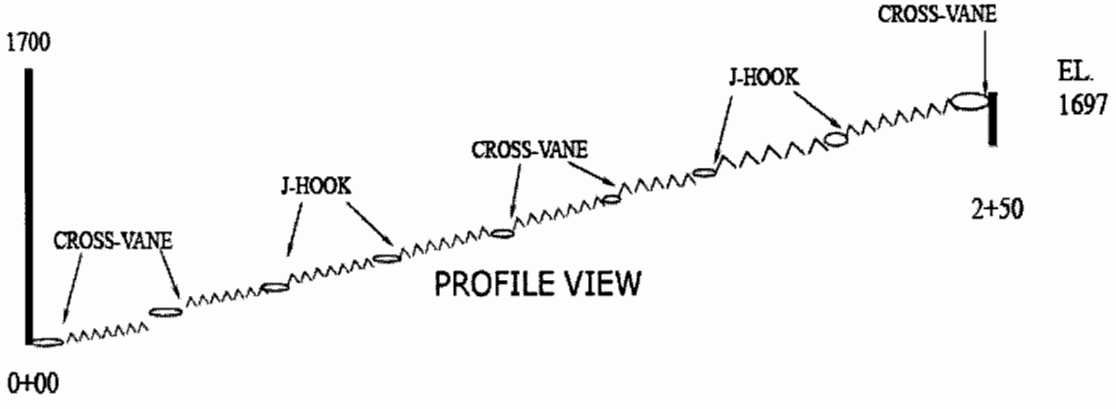
EL.
1697

W = W-VANE

J = J-HOOK

> = CROSS-VANE

= NATIVE TREE SPECIES



PROFILE VIEW

TOE OF DAM
ELEVATION
1680'

0' 30'

HORIZONTAL SCALE

0' 10'

VERTICAL SCALE

Slope Gradient = 6%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 4 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

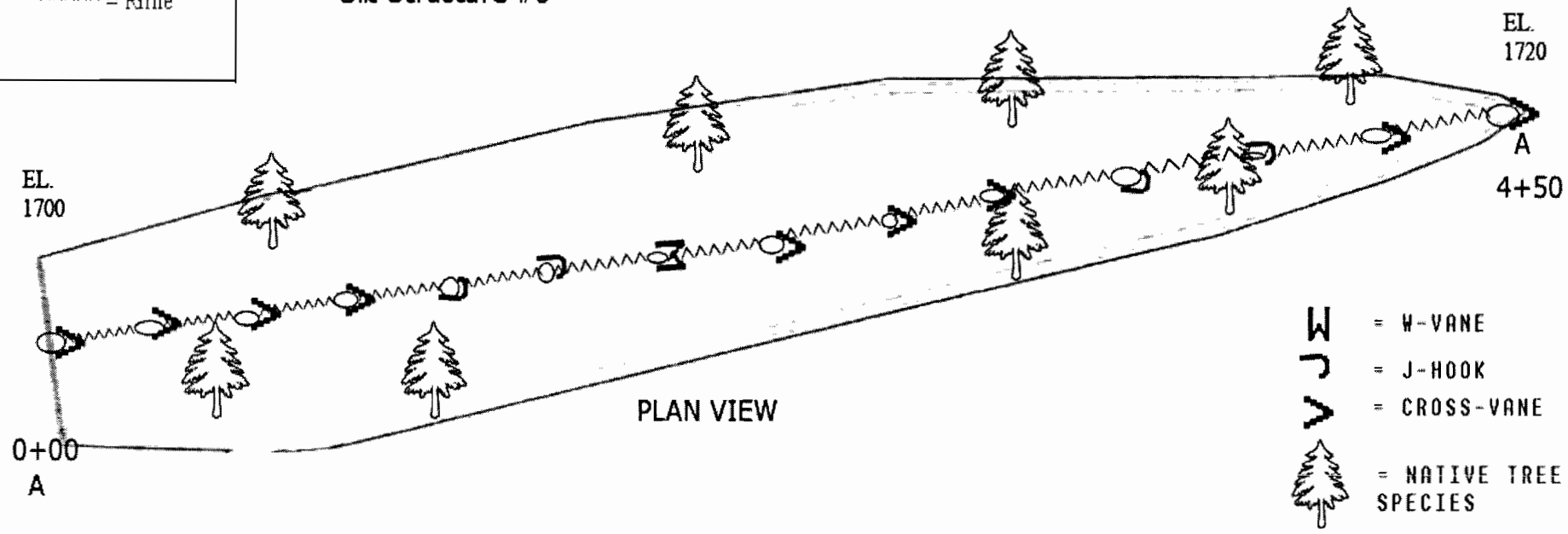
= Pool

= Riffle

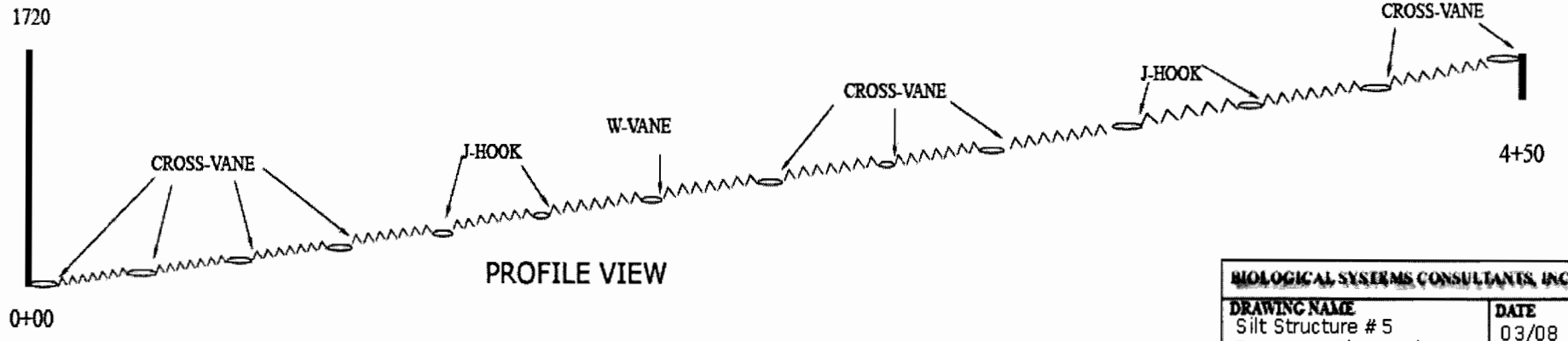
Permit # 807-0355

Anticipated Stream Reconstruction Design

Silt Structure #5



ELEVATION



TOE OF DAM ELEVATION 1700'

0' 30' HORIZONTAL SCALE

0' 10' VERTICAL SCALE

Slope Gradient = 5%

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Silt Structure # 5 Reconstruction Design		DATE: 03/08
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

ATTACHMENT 31.6.B

"STREAM RESTORATION PLAN"

Permit Application No. 807-0355

Prepared for:
Logos Engineering, LLC
Manchester, Kentucky

&

Nally & Hamilton Enterprises, Inc.
Bardstown, Kentucky

PREPARED BY:
James Robinson

Biological Systems Consultants, Inc.
SouthEast Archaeology
P.O. Box 54954
Lexington, KY 40555
Phone: (859) 263-4142

Existing profiles of the proposed sediment ponds would not illustrate the natural stream conditions. As shown on the Habitat parameter summary sheets, the proposed pond locations have been impacted from previous mining on the proposed coal removal areas. Habitat scores are low and conductivity readings elevated. Therefore, a reference stream was selected from the natural stream structure illustration. All reference to Moore Creek should be removed from the application as Blacksnake Branch, adjacent to the site, and illustrated on the attached location map was used to determine the natural stream characteristics.

The actual permit number has been identified on all applicable drawings.

A construction table has been provided that includes (1) the stream and water slope (2) the rock size for reconstruction (3) the pool and riffle lengths and depths and stream width and the (4) target sinuosity value. These parameters were those as derived at from the included Rosgen Stream assessment for Blacksnake Branch, the actual stream survey station to station data sheets and stream profile and cross-sections of reference stream.

Construction and reclamation for the embankment and pool area will be performed as follows:

The prominent reference stream mitigation structure design was developed from actual surveys and the stream profile. This structure will be built, sequentially, across the embankment and pool area to tie the upstream corridor with the downstream corridor. The dimensions, as shown on the proposed stream structure profile and cross-section, and those variables outlined on the construction table, will restore the reclaimed area to

mimic those which should have naturally existed prior to any watershed disturbances. An adequate number of structures, relative to the disturbances, will be built. For example, a 320 foot pond would require that eight (40) foot structures be built cover that distances.

A map has been provided to illustrate the location of Blacksnake Branch. All Moore Creek reference should be withdrawn from the application.

All reference from Moore Creek should be removed from the stream restoration plan as it is not part of the mining proposed. Moore Creek was originally selected as a reference stream for the project but has been removed as Blacksnake Branch is adjacent to the project area. Moore Creek has no relation to the application and should be removed. As stated previously, the proposed mine site was mined, pre-law, and the outslope method of spoil disposal was used and no sediment ponds constructed. This resulted in sedimentation, alteration of drainage patterns, elevated conductivities and alteration of the natural stream morphology such as pool/riffle ratios, substrate materials, eroded conditions modifying bankful depths and widths and impacts to aquatic habitat. In consideration of these impacts to Tom Fork, Jennie Branch, Blacklick Branch and the unnamed tributaries of Coal Stone Branch and Blacksnake Branch an undisturbed watershed was surveyed to determine the naturally existing stream conditions and morphology. This undisturbed channel was Blacksnake Branch. It provides natural stream conditions which should exist in an unmined or disturbed watershed. The stream conditions of Blacksnake Branch were, therefore, applied to be reconstructed in the stream reconstruction areas.

As stated previously, no disturbances are proposed in Blacksnake Branch. It has been selected to represent stream conditions which should exist in unmined areas.

Stream Survey Data Sheet
Stream Name:_Blacksnake Branch #2____

Date:___12/06/07___ 807-0355

(El._1590_) Station__0+00 To Station_1+10 (El.__1606___)		%	(L)	(AW)	(MD)	(AD)
	Pool	40	3	3	.4	.3
	Riffle	60	6	6	.2	.1
	Run					

(El._1606_) Station_1+10_ To Station_2+20 (El._1619_)		%	(L)	(AW)	(MD)	(AD)
	Pool	20	3	4	.5	.3
	Riffle	80	12	5	.2	.1
	Run					

(El._1619__) Station_2+20_ To Station_2+92 (El._1638_)		%	(L)	(AW)	(MD)	(AD)
	Pool	10	3	4	.4	.2
	Riffle	90	20	5	.2	.1
	Run					

(El._____) Station_____ To Station_____ (El._____)		%	(L)	(AW)	(MD)	(AD)
	Pool					
	Riffle					
	Run					

L= Length AW= Average Width MD= Maximum Depth AD= Average Depth

Stream Survey Data Sheet
Stream Name:Blacksnake Refrence Stream_

Date:__10-11-07__ 807-0355

(El.1552) Station_0+00_ To Station 1+26_ (El._1556_)		%	(L)	(AW)	(MD)	(AD)
	Pool	25	6	3-4	0.5	0.5
	Riffle	75	15	1.5	0.25	0.15
	Run					

(El 1556_) Station_1+26_ To Station2+04_ (El._1561)		%	(L)	(AW)	(MD)	(AD)
	Pool					
	Riffle	100	78	12	0.8	0.2
	Run					

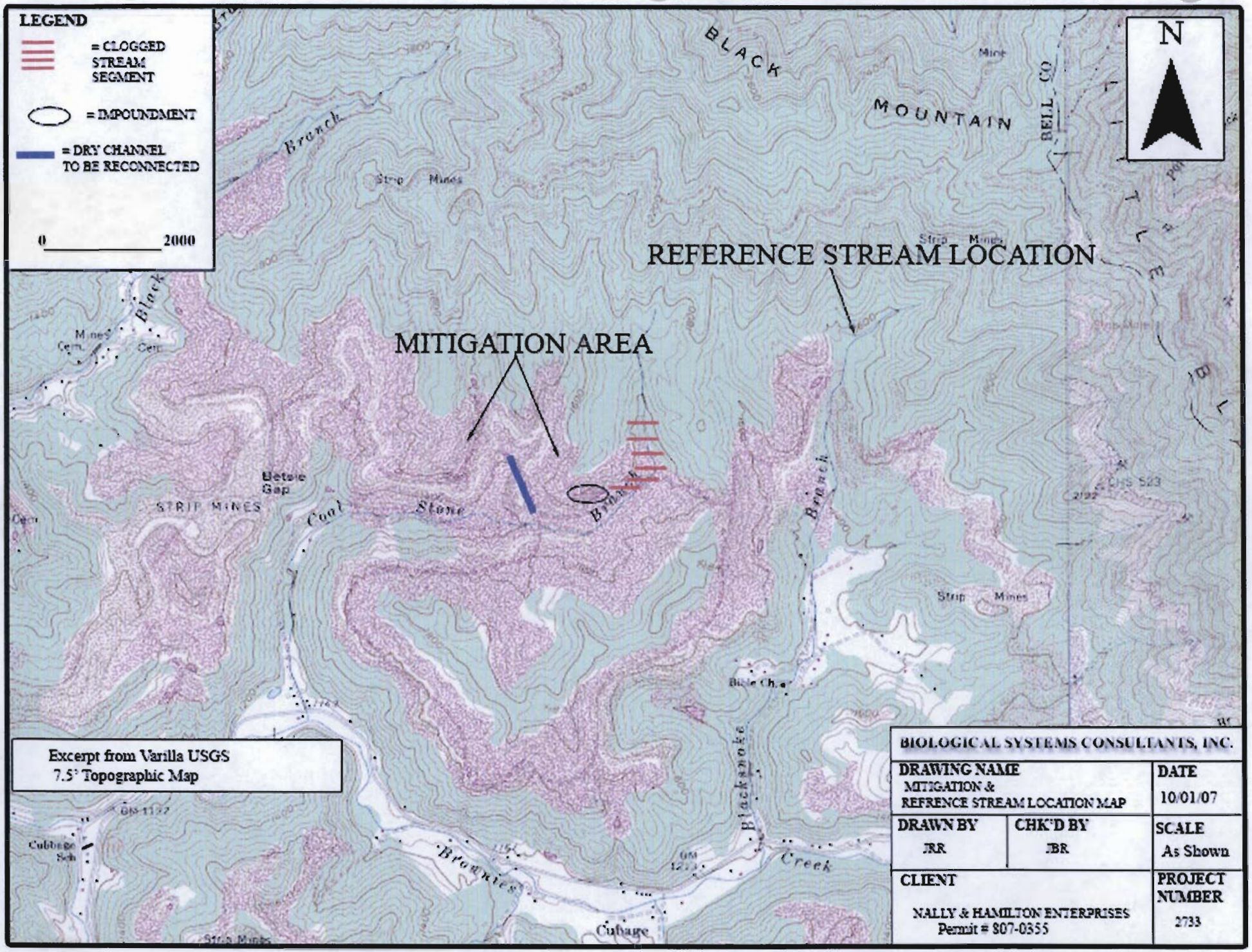
(El._1561) Station_2+04 To Station_2+74 (El._1572_)		%	(L)	(AW)	(MD)	(AD)
	Pool	30	3	7	0.75	0.5
	Riffle	70	11	2.25	0.3	0.3
	Run					

(El. 1572_) Station_2+74 To Station_3+44 (El._1585)		%	(L)	(AW)	(MD)	(AD)
	Pool	20	4	6	0.75	0.5
	Riffle	80	12	3	0.25	0.1
	Run					

L= Length AW= Average Width MD= Maximum Depth AD= Average Depth

Stream Survey Data Sheet
Site: Blacksnake Branch / 807-0355

Area at Bankfull, A (bkf), ft^2	49
Width at Bankfull, W(bkf), ft.	14
Width Flood Prone Area, W (fpa), ft.	14
Mean Depth at Bankfull, D(bkf)= A(bkf)/W(bkf), ft.	3.5
Entrenchment Ratio, ER=W(fpa)/W(bkf), ft./ft.	1.0
Width to Depth Ratio, W/D=W(bkf)/D(bkf), ft./ft.	4.0
Length of Channel Thalweg, L(tw), ft.	344
Length of Valley, L(valley), ft.	400
Sinuosity, K=L(tw)/L(valley), ft./ft.	1.16
Average Slope of Channel, %	6-9
D16 Particle Size (mm)	8
D35 Particle Size (mm)	24
D50 Particle Size (mm)	96
D84 Particle Size (mm)	312
D95 Particle Size (mm)	1024
Rosgen Stream Type	**A2**


LEGEND
= CLOGGED STREAM SEGMENT
= IMPOUNDMENT
= DRY CHANNEL TO BE RECONNECTED
0
2000
N
BLACK MOUNTAIN
BELL CO
REFERENCE STREAM LOCATION
MITIGATION AREA
Black Branch
Mines
Cem.
Betsie Gap
STRIP MINES
Coal
Stone
Branch
Strip Mines
Blackstone
Creek
Brownies
Cubage
Excerpt from Varilla USGS 7.5' Topographic Map
BIOLOGICAL SYSTEMS CONSULTANTS, INC.
DRAWING NAME
MITIGATION & REFRENCE STREAM LOCATION MAP
DATE
10/01/07
DRAWN BY
JRR
CHK'D BY
JBR
SCALE
As Shown
CLIENT
NALLY & HAMILTON ENTERPRISES
Permit # 807-0355
PROJECT NUMBER
2733

			Station ID: 807-0355		
Habitat Parameter		Reach 5 Fill 4	Reach 5 Pond 4	Reach 6 Fill 5	Reach 6 Pond 5
1. Epifaunal Substrate		0	12	0	7
2. Embeddedness		2	10	0	10
3. Velocity/Depth Regime		0	9	0	8
4. Sediment Deposition		0	11	0	8
5. Channel Flow Status		0	0	0	0
6. Channel Alteration		0	12	0	10
7. Frequency of Riffles		0	14	0	12
8. Bank Stability					
	Left	5	4	0	6
	Right	5	4	0	7
9. Vegetative Protective					
	Left	9	8	0	8
	Right	9	8	0	8
10. Riparian Width					
	Left	9	8	0	9
	Right	9	8	0	9
11.Total		48	108	0	102
11.S.C.		180	180		
12. PH			.	.	.
13. Distance					
Pond(T)			250		500
Mining(T)					
Fill(P)		167		n/a	
.					
Impacts					
.		Mining	Mining		Minings
.		Roads	Roads		Roads
Canopy%		80%	85%	85%	85%
			Beech/Maple		Beech/Oak/Maple

			Station ID: 807-0355 - Reaches 3/4		
Habitat Parameter		Reach 3 Fill 2	Reach 3 Pond 2	Reach 4 Fill 3	Reach 4 Pond 3
1. Epifaunal Substrate		13	14	2	12
2. Embeddedness		9	14	6	12
3. Velocity/Depth Regime		12	14	2	4
4. Sediment Deposition		7	11	9	12
5. Channel Flow Status		0	0	0	3
6. Channel Alteration		10	10	15	16
7. Frequency of Riffles		15	15	16	16
8. Bank Stability					
	Left	6	6	8	7
	Right	7	8	8	7
9. Vegetative Protective					
	Left	7	8	9	9
	Right	7	8	9	9
10. Riparian Width					
	Left	9	9	9	9
	Right	9	9	9	9
11.Total		111	126	102	125
11.S.C.		180	180	280	280
12. PH			.	.	.
13. Distance					
Pond(T)			300		350
Mining(T)					
Fill(P)		351		45	
.					
Impacts					
.		Mining	Mining		Minings
.		Roads	Roads		Roads
Canopy%		80%	75%	85%	85%
.		Poplar/Maple/Oak	Poplar/Sycamore	Maple/Hickory	Beech/Sourwood
.			Hickory	Oak	Oak/Sycamore
.					
.					

			Station ID: 807-0355		
Habitat Parameter		Reach 1 Fill 0	Reach 1 Pond 0	Reach 2 FIll 1	Reach 2 Pond 1
1. Epifaunal Substrate		0	4	2	11
2. Embeddedness		2	3	1	14
3. Velocity/Depth Regime		0	5	0	9
4. Sediment Deposition		2	4	2	10
5. Channel Flow Status		0	10	0	12
6. Channel Alteration		4	15	6	14
7. Frequency of Riffles		15	16	15	15
8. Bank Stability					
	Left	8	5	5	7
	Right	8	5	5	6
9. Vegetative Protective					
	Left	6	7	7	8
	Right	6	7	7	8
10. Riparian Width					
	Left	8	9	8	8
	Right	8	9	8	8
11.Total		67	99	66	140
11.S.C.			590		290
12. PH			.	.	.
13. Distance					
Pond(T)			450		450
Mining(T)					
Fill(P)		n/a		305	
.					
Impacts					
.		Mining	Mining		Minings
.		Roads	Roads		Roads
Canopy%		80%	80%	80%	80%
.		Poplar/Maple	Poplar/Maple	Poplar/Maple	Poplar/Maple
.		Birch	Locust	Red Bud	

RESTORED STREAM CHANNEL SCHEDULE

807-0355

RECONSTRUCTED STREAM CHANNEL	GENERAL INFORMATION									
	STREAM TYPE	LENGTH (FT)	AVG. SLOPE (%)	W (FT)	WV (FT)	D16 (mm)	D35 (mm)	D50 (mm)	D84 (mm)	D95 (mm)
All Ponds / <10%	A2	All	6-9%	14	14	8	24	96	312	1024

	RIFFLE				POOL				STREAM GEOMETRY			
RIFFLE POOL RATIO	LR (FT)	DR1 (FT)	DR2 (FT)	DR3 (FT)	LP (FT)	DP1 (FT)	DP2 (FT)	DP3 (FT)	ML (FT)	RC (FT)	SR %	S
3:1-10:1	7.0-30	3.1	3.25	3.1	3.0-10.0	3.1	3.5	3.1	N/A	N/A	25	1.16

NOTES: W=BANKFILL WIDTH WV=MINIMUM VALLEY FLOOR WIDTH D50=MEDIAN STONE SIZE
ML=MEANDER LENGTH RC=RADIUS OF CURVATURE BW=BELT WIDTH S=SINUOSITY
LR=RIFFLE WIDTH DR1 thru DR3=RIFFLE DEPTHS SR=RIFFLE SLOPE LP=POOL LENGTH DP1 thru DP3=POOL DEPTHS

LEGEND

CO = Cobble
GR = Gravel
SA= Sand
SI = Silt
LB = Large Boulder
SB = Small Boulder
BR = Bedrock
^^^^^ = **Riffle**
= Step-pool
= Bedrock
= Pool

NALLY & HAMILTON ENTERPRISES
Permit # 807-0355
Blacksnake Branch Reference Stream
Segment Existing Profile

0' 40 Horizontal SCALE

0' 20' Vertical SCALE

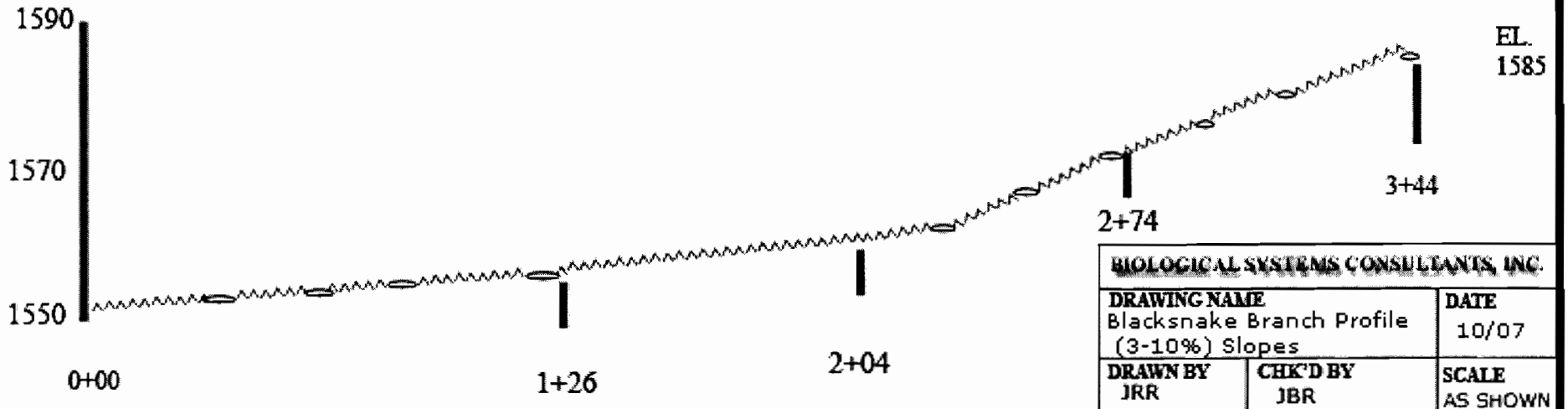
ELEVATION

Riffle Substrate %
GR=20
CO=35
SB=40
SA/SI=5

Pool Substrate %
SB=30 GR=30
CO=25
SA/SI=15

NOTES:

1)Riparian Corridor=Beech/Sycamore
2)Water Slope = 25%
3)Slope Gradient = 9%
4) Overall Riffle/Pool Ratio 3:1



BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Blacksnake Branch Profile (3-10%) Slopes		DATE: 10/07
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

LEGEND

CO = Cobble
GR = Gravel
SA= Sand
SI = Silt
LB = Large Boulder
SB = Small Boulder
BR = Bedrock
^^^^^ = **Riffle**
= Step-pool
= Bedrock
= Pool

NALLY & HAMILTON ENTERPRISES
Permit # 807-0355
Blacksnake Branch Reference Stream
Segment Existing Profile

0' 40' Horizontal SCALE

0' 40' Vertical SCALE

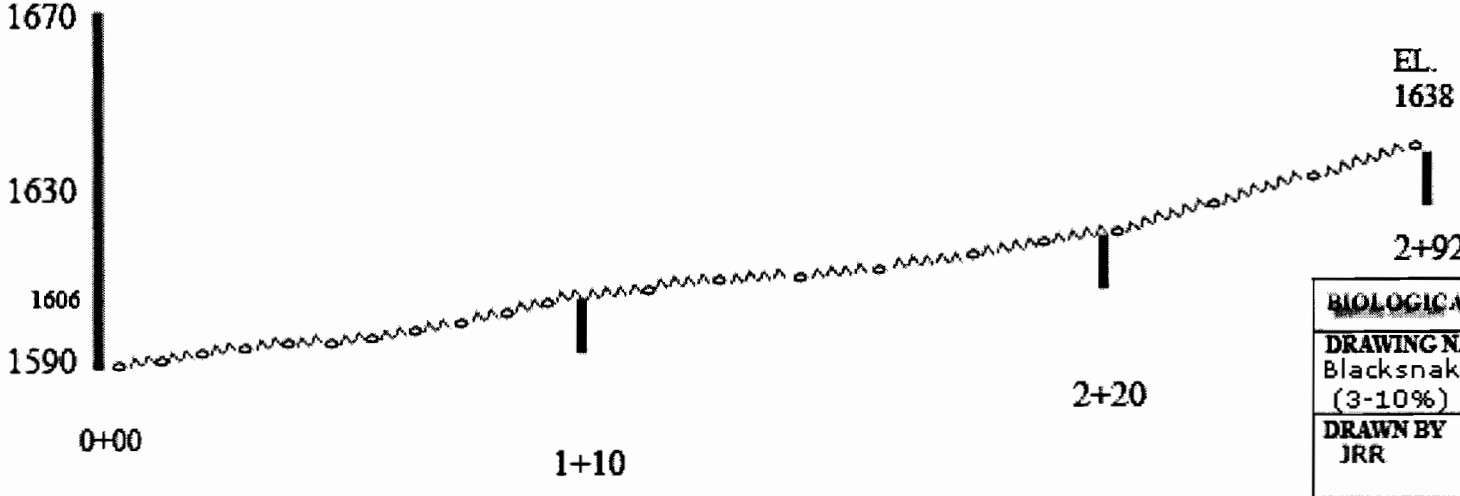
ELEVATION

Riffle Substrate %
GR=20
CO=30
SB=40
SA/SI=5
LB =5

Pool Substrate %
SB=30 GR=30
CO=25
SA/SI=15

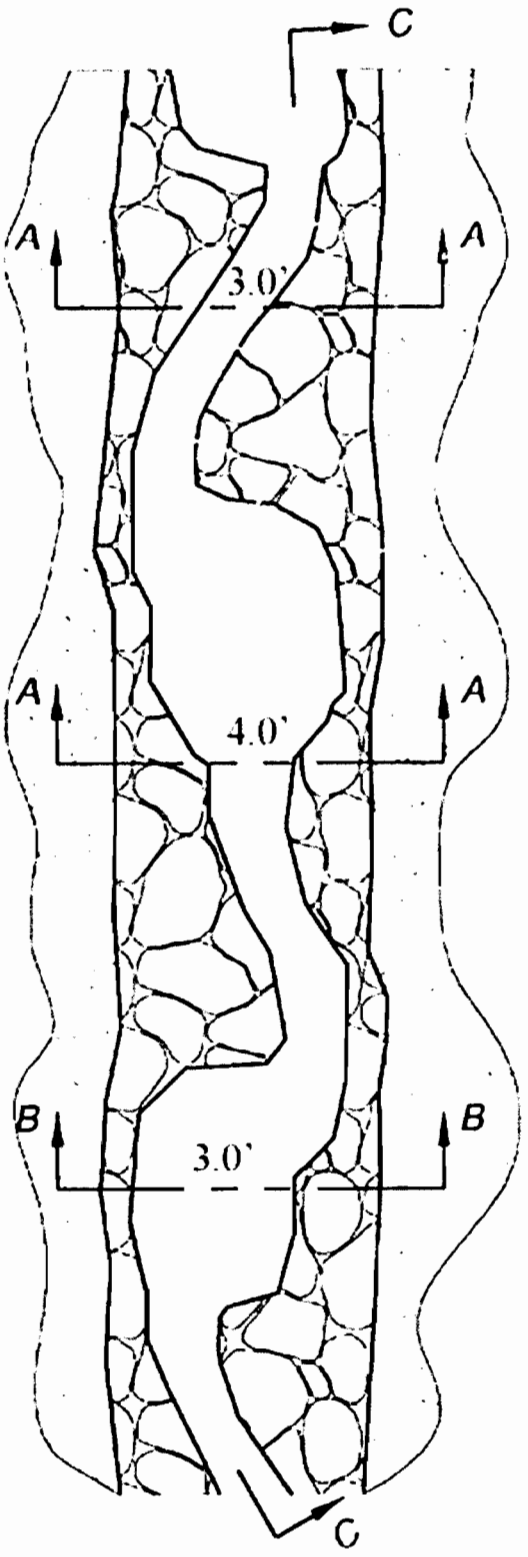
NOTES:

1)Riparian Corridor=Beech/Oak/Maple
2)Water Slope = 25%
3)Slope Gradient - 9%
4) Overall Riffle/Pool Ratio 3:1

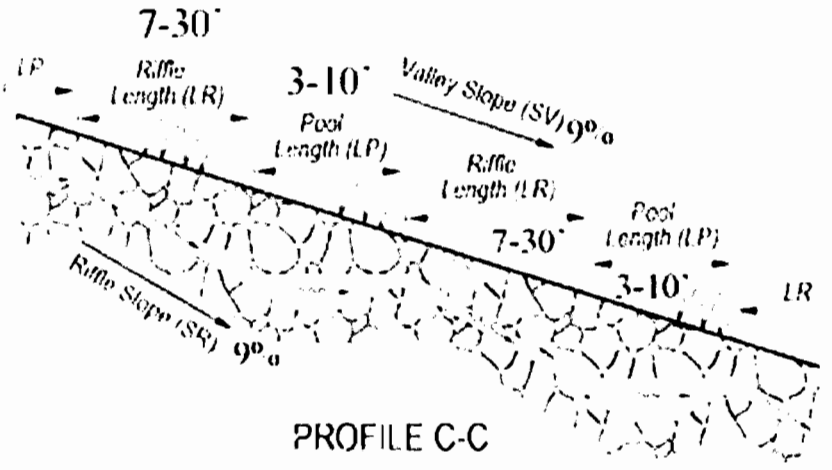


BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME: Blacksnake Branch Profile (3-10%) Slopes		DATE: 10/07
DRAWN BY: JRR	CHK'D BY: JBR	SCALE: AS SHOWN
CLIENT: NALLY & HAMILTON ENT. PERMIT # 807-0355		PROJECT NUMBER: 2733

Blacksnake Branch
Reference Stream
Proposed Mitigation Design
10-40' Structure Dimensions



PLAN VIEW(3-10% SLOPES)
N.T.S



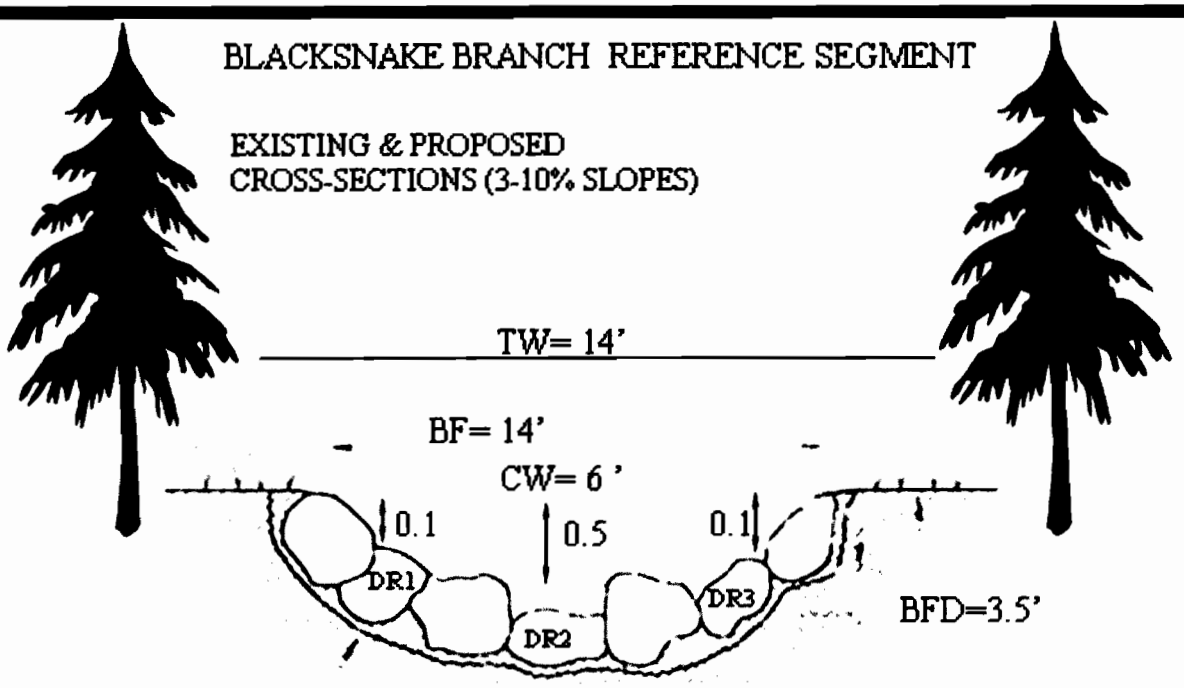
PROFILE C-C
N.T.S

RIFFLE/POOL SEQUENCE DETAIL
A CHANNEL 3-10% VALLEY SLOPES
N.T.S

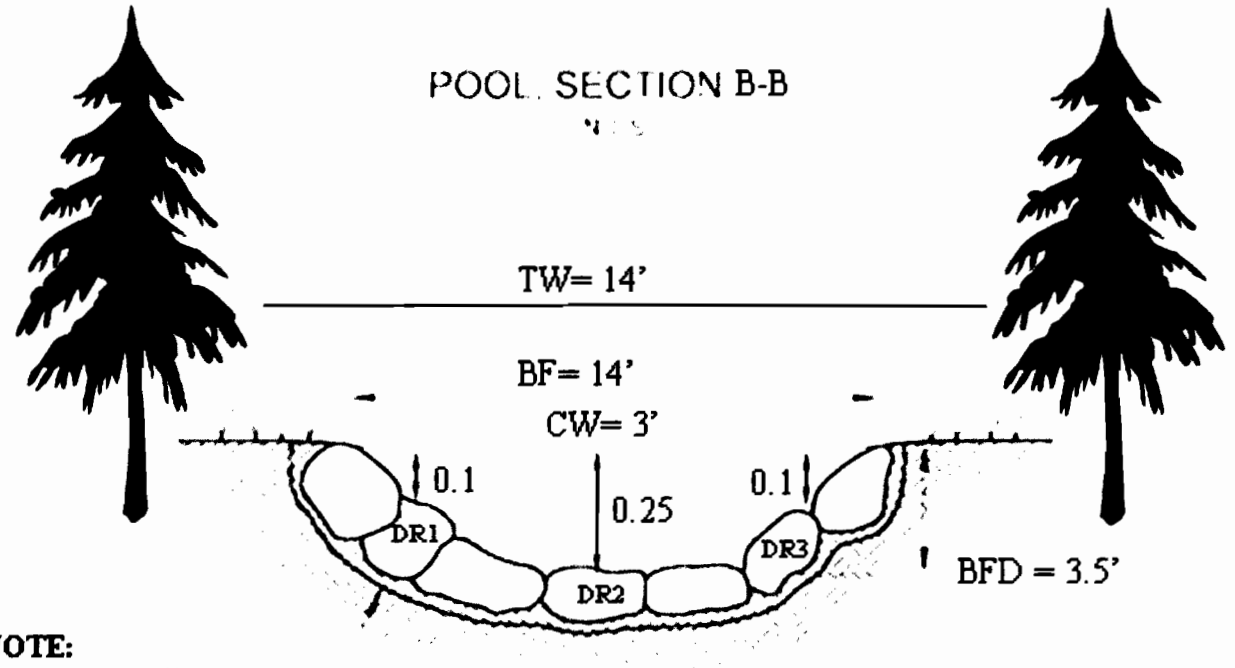
BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME BLACKSNAKE BR 3-10% RIFFLE POOL PLAN VIEW		DATE [illegible]
DRAWN BY JRR	CHK'D BY JBR	SCALE N.T.S
CLIENT NALLY & HAMILTON ENT PERMIT = 807-0355		PROJECT NUMBER 2733

BLACKSNAKE BRANCH REFERENCE SEGMENT

EXISTING & PROPOSED
CROSS-SECTIONS (3-10% SLOPES)



POOL SECTION B-B
N T S



NOTE:
ALL MEASUREMENTS
ARE IN FEET'

RIFFLE SECTION A-A
N T S

LEGEND
BF = Bankfull Width
CW = Water Width
DR = Water Depth
BFD = Bankfull Depth
TW = Total Width

BIOLOGICAL SYSTEMS CONSULTANTS, INC.		
DRAWING NAME Reference Stream Cross-sections 3-10% Slopes		**DATE** 1-07
DRAWN BY' JRR	**CHK'D BY'** JRR	**SCALE** N T S
CLIENT NALLY & HAMILTON ENT. PERMIT # 807-0355		**PROJECT NUMBER** 2733

Diversion Number	Length of Diversion	Design Storm	Type of Channel	Design Velocity	Average Slope	Erosion Control Methods
HF #2 East Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	Rip-rap
HF #2 East Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	" "
HF #3 North Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #3 North Face	1073	100 yrs.	Trapezoidal	29.65 fps	505	" "
HF #3 South Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #3 South Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	" "
HF #4 West Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #4 West Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	" "
HF #4 East Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #4 East Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	" "
HF #5 West Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #5 West Face	1073	100 yrs.	Trapezoidal	29.65 fps	50%	" "
HF #5 West Top	1714	100 yrs.	Trapezoidal	40.0 fps	1%	" "
HF #5 East Face	1073	100 yrs.	Trapezoidal	29.65 fps	50 %	" "
Road 1 - 26	1720	25 yrs.	V-bottom	5.26 fps	18%	Rip-rap
DD #1 - 84	987	25 yrs.	V-bottom	4.84 fps	1%	Vegetated Channel
DD #29A	987	25 yrs.	V-bottom	48.4 fps	1%	" "

32.4 Are any of the proposed diversions to be retained as permanent facilities? ☐ YES ☒ NO. If "YES", List the identification numbers of those diversions.
Additionally, provide as "Attachment 32.4.A", detailed designs cross-sections, calculations, and drawings for each proposed diversion ditch to demonstrate compliance with 405 KAR 16:080 or 18:080, Section 1, as appropriate.

See Attachment 32.4.A - 32.4.B

33. Transportation Facilities Plan

33.1 Describe the transportation plan for the proposed permit area. The plan shall include a discussion of road maintenance, appropriate maps, cross-sections, and specifications for each road width, gradient, surface, cut, fill embankment, culvert, bridge, drainage ditch, and drainage structure. Submit the description as "Attachment 33.1.A".

See Attachment 33.1.B (3)

33.2 Are roads for which construction began prior to January 18, 1983, proposed for use within the permit area? ☐ YES ☒ NO. If "YES", clearly identify the extent of such roads on the MRP Map and submit the information required to demonstrate compliance with 405 KAR 8:030, Section 25, or 405 KAR 8:040, Section 25 as appropriate. Submit the information as "Attachment 33.2.A".

33.3 Will conveyors and/or rail systems be located within the proposed permit area? ☐ YES ☒ NO. If "YES" submit a description as "Attachment 33.3.A" and show on the MRP Map.

33.4 Does the applicant propose to use alternate specifications for any road or portions of road within the permit area? ☐ YES ☒ NO. If "YES", describe the specification to be modified and provide required justification. Submit as "Attachment 33.4.A".

33.5 Describe the measures to be used to ensure that interests of the public are protected if a waiver to conduct surface disturbances within 100' from the right-of-way of any public road or to relocate a public road is being requested. Submit this description as "Attachment 33.5.A".

N/A

34. Air Pollution Control Plan

34.1 For proposed permit area, describe the fugitive dust control plan to be employed during site preparation, mining, and reclamation. When required, provide an air quality monitoring program and locate monitoring station(s) on the MRP Map. Submit this information as "Attachment 34.1.A".

See Attachment 34.1.A

HOLLOWFILL DIVERSION DITCH MAXIMUM
DESIGN WORKSHEET

HOLLOWFILL	FLOW
HF#0	143.46 cfs
HF#1	464.67 cfs
HF#2	353.43 cfs
HF#3	116.04 cfs
HF#4	103.54 cfs
HF#5	208.68 cfs

MAXIMUM INFLOW 464.67 cfs

FROM 100YR. 24 HR. HOLLOWFILL FLOW

SUBWATERSHEDS CORRESPONDS TO POND SUBWATERSHEDS
SEE POND SUBWATERSHED MAP

I, [signature] (signature) 12575 (registration no.) 04/06/07 (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

807-0355

I, [signature] 12575 04/06/07
(registration no.) (date)

hereby certify in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

HOLLOWFILL FACE DITCH MAXIMUM DESIGN

Material: RIP RAP

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
5.00	2.0:1	2.0:1	50.0	0.0400	0.30			40.0

	w/o Freeboard	w/ Freeboard
Design Discharge:	464.67 cfs	
Depth:	1.82 ft	2.12 ft
Top Width:	12.26 ft	13.46 ft
Velocity:	29.65 fps	
X-Section Area:	15.67 sq ft	
Hydraulic Radius:	1.194	
Froude Number:	4.62	

807-0355

Trapezoidal Channel
Equal Side Slopes
Channel Lining: RIP RAP

I, _____ 12575 04/06/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

100 YR-24 HR HF#0 FLOW

SUBWATERSHEDS CORRESPOND TO POND SUBWATERSHEDS, SEE POND SUBWATERSHED MAP

WOODSON ASHER

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

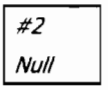
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#2	==>	End	0.000	0.000	HF#0 SS#0



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#2	41.700	41.700	143.46	12.96

Structure Detail:

Structure #2 (Null)

HF#0

SS#0

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	7.400	0.038	0.043	0.448	74.000	S	26.36	2.121
	2	5.000	0.026	0.056	0.444	79.000	M	19.67	1.645
	3	4.200	0.028	0.074	0.440	79.000	M	16.52	1.382
	4	4.300	0.025	0.037	0.450	86.000	F	18.84	1.682
	5	6.200	0.138	0.052	0.445	75.000	S	11.58	1.829
	6	14.600	0.027	0.020	0.433	75.000	S	53.14	4.306
	Σ	**41.700**						**143.46**	**12.965**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	3. Short grass pasture	40.08	200.00	499.00	5.060	0.027
		8. Large gullies, diversions, and low flowing streams	25.52	160.00	627.00	15.150	0.011
#2	**1**	**Time of Concentration:**					**0.038**
#2	2	3. Short grass pasture	42.08	210.00	499.00	5.180	0.026
#2	**2**	**Time of Concentration:**					**0.026**
#2	3	3. Short grass pasture	36.07	180.00	499.00	4.800	0.028
#2	**3**	**Time of Concentration:**					**0.028**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	30.06	150.00	499.00	5.480	0.025
#2	**4**	**Time of Concentration:**					**0.025**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	1.00	4.98	498.00	1.000	0.138
#2	**5**	**Time of Concentration:**					**0.138**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	50.00	249.50	499.00	7.070	0.019
		8. Large gullies, diversions, and low flowing streams	50.00	310.00	620.00	21.210	0.008
#2	**6**	**Time of Concentration:**					**0.027**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	8. Large gullies, diversions, and low flowing streams	23.50	530.00	2,255.00	14.540	0.043
#2	**1**	**Muskingum K:**					**0.043**
#2	2	8. Large gullies, diversions, and low flowing streams	20.55	570.00	2,774.00	13.590	0.056

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	**2**	**Muskingum K:**					**0.056**
#2	3	8. Large gullies, diversions, and low flowing streams	17.17	570.00	3,319.00	12.430	0.074
#2	**3**	**Muskingum K:**					**0.074**
#2	4	8. Large gullies, diversions, and low flowing streams	26.43	550.00	2,081.00	15.420	0.037
#2	**4**	**Muskingum K:**					**0.037**
#2	5	8. Large gullies, diversions, and low flowing streams	21.37	560.00	2,620.00	13.860	0.052
#2	**5**	**Muskingum K:**					**0.052**
#2	6	8. Large gullies, diversions, and low flowing streams	13.37	110.00	823.00	10.960	0.020
#2	**6**	**Muskingum K:**					**0.020**

100 YR-24 HR HF#1 FLOW

SUBWATERSHEDS CORRESPOND TO POND SUBWATERSHEDS, SEE POND SUBWATERSHED MAP

WOODSON ASHER

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#4	==>	End	0.000	0.000	HF#1
Null	#5	==>	#4	0.038	0.447	SS#18-A

	#5
	Null
#4	
Null	

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	8. Large gullies, diversions, and low flowing streams	22.40	440.00	1,964.00	14.19	0.038
#5	**Muskingum K:**					**0.038**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#5	12.700	12.700	55.63	4.97
#4	130.900	143.600	464.67	42.27

Structure Detail:

Structure #5 (Null)

SS#18-A

Structure #4 (Null)

HF#1

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)
#5	1	12.700	0.041	0.000	0.000	86.000	F	55.63	4.969
	Σ	**12.700**						**55.63**	**4.969**
#4	1	60.900	0.087	0.083	0.443	73.000	S	212.19	16.946
	2	13.800	0.030	0.049	0.442	69.000	S	43.63	3.391
	3	15.000	0.034	0.072	0.435	74.000	S	53.44	4.298
	4	15.000	0.032	0.070	0.436	79.000	M	59.01	4.936
	5	16.900	0.213	0.070	0.436	75.000	S	29.55	4.984
	6	9.300	0.023	0.014	0.434	75.000	S	33.85	2.743
	Σ	**143.600**						**464.67**	**42.268**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	1. Forest with heavy ground litter	46.09	230.00	499.00	1.710	0.081
		8. Large gullies, diversions, and low flowing streams	54.94	300.00	546.00	22.230	0.006
#4	**1**	**Time of Concentration:**					**0.087**
#4	2	3. Short grass pasture	44.09	220.00	499.00	5.310	0.026
		8. Large gullies, diversions, and low flowing streams	35.97	100.00	278.00	17.990	0.004
#4	**2**	**Time of Concentration:**					**0.030**
#4	3	3. Short grass pasture	40.08	200.00	499.00	5.060	0.027
		8. Large gullies, diversions, and low flowing streams	28.85	120.00	416.00	16.110	0.007
#4	**3**	**Time of Concentration:**					**0.034**
#4	4	3. Short grass pasture	38.08	190.00	499.00	4.930	0.028
		8. Large gullies, diversions, and low flowing streams	35.97	100.00	278.00	17.990	0.004
#4	**4**	**Time of Concentration:**					**0.032**
#4	5	5. Nearly bare and untilled, and alluvial valley fans	24.05	120.00	499.00	4.900	0.028
		8. Large gullies, diversions, and low flowing streams	26.28	200.00	761.00	15.370	0.013
#4	**5**	**Time of Concentration:**					**0.213**
#4	6	5. Nearly bare and untilled, and alluvial valley fans	1.00	4.98	498.00	1.000	0.138
		8. Large gullies, diversions, and low flowing streams	1.00	8.20	820.00	3.000	0.075
#4	**6**	**Time of Concentration:**					**0.023**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	1	5. Nearly bare and untilled, and alluvial valley fans	24.05	120.00	499.00	4.900	0.028
		8. Large gullies, diversions, and low flowing streams	26.28	200.00	761.00	15.370	0.013
#5	**1**	**Time of Concentration:**					**0.041**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	8. Large gullies, diversions, and low flowing streams	19.27	760.00	3,943.00	13.170	0.083
#4	**1**	**Muskingum K:**					**0.083**
#4	2	8. Large gullies, diversions, and low flowing streams	18.82	440.00	2,338.00	13.010	0.049
#4	**2**	**Muskingum K:**					**0.049**
#4	3	8. Large gullies, diversions, and low flowing streams	14.62	440.00	3,010.00	11.470	0.072
#4	**3**	**Muskingum K:**					**0.072**
#4	4	8. Large gullies, diversions, and low flowing streams	14.93	440.00	2,948.00	11.580	0.070
#4	**4**	**Muskingum K:**					**0.070**
#4	5	8. Large gullies, diversions, and low flowing streams	14.93	440.00	2,948.00	11.580	0.070
#4	**5**	**Muskingum K:**					**0.070**
#4	6	8. Large gullies, diversions, and low flowing streams	13.79	80.00	580.00	11.140	0.014
#4	**6**	**Muskingum K:**					**0.014**

100 YR-24 HR HF#2 FLOW

SUBWATERSHEDS CORRESPOND TO POND SUBWATERSHEDS, SEE POND SUBWATERSHED MAP

WOODSON ASHER

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

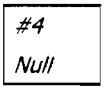
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#4	==>	End	0.000	0.000	HF#2



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.00	0.000
#4	**Muskingum K:**					**0.000**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#4	100.400	100.400	353.43	28.32

Structure Detail:

Structure #4 (Null)

HF#2

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)
#4	1	60.900	0.081	0.047	0.448	73.000	S	212.19	16.946
	2	8.200	0.028	0.024	0.447	74.000	S	29.21	2.350
	3	7.300	0.028	0.024	0.447	74.000	S	26.01	2.092
	4	6.800	0.040	0.032	0.442	74.000	S	24.22	1.949
	5	10.500	0.040	0.010	0.479	74.000	S	37.41	3.009
	6	3.300	0.089	0.024	0.447	75.000	S	12.01	0.973
	7	3.400	0.019	0.007	0.440	75.000	S	12.37	1.003
	Σ	**100.400**						**353.43**	**28.321**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	1. Forest with heavy ground litter	58.12	290.00	499.00	1.920	0.072
		8. Large gullies, diversions, and low flowing streams	46.11	320.00	694.00	20.370	0.009
#4	**1**	**Time of Concentration:**					**0.081**
#4	2	3. Short grass pasture	52.10	260.00	499.00	5.770	0.024
		8. Large gullies, diversions, and low flowing streams	25.32	60.00	237.00	15.090	0.004
#4	**2**	**Time of Concentration:**					**0.028**
#4	3	3. Short grass pasture	52.10	260.00	499.00	5.770	0.024
		8. Large gullies, diversions, and low flowing streams	25.32	60.00	237.00	15.090	0.004
#4	**3**	**Time of Concentration:**					**0.028**
#4	4	3. Short grass pasture	32.06	160.00	499.00	4.530	0.030
		8. Large gullies, diversions, and low flowing streams	27.54	160.00	581.00	15.740	0.010
#4	**4**	**Time of Concentration:**					**0.040**
#4	5	3. Short grass pasture	32.06	160.00	499.00	4.530	0.030
		8. Large gullies, diversions, and low flowing streams	27.54	160.00	581.00	15.740	0.010
#4	**5**	**Time of Concentration:**					**0.040**
#4	6	5. Nearly bare and untilled, and alluvial valley fans	1.00	3.23	323.00	1.000	0.089
#4	**6**	**Time of Concentration:**					**0.089**
#4	7	5. Nearly bare and untilled, and alluvial valley fans	50.00	249.50	499.00	7.070	0.019
		8. Large gullies, diversions, and low flowing streams	50.00	27.50	55.00	21.210	0.000
#4	**7**	**Time of Concentration:**					**0.019**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	8. Large gullies, diversions, and low flowing streams	23.95	600.00	2,505.00	14.680	0.047
#4	**1**	**Muskingum K:**					**0.047**
#4	2	8. Large gullies, diversions, and low flowing streams	22.54	280.00	1,242.00	14.240	0.024
#4	**2**	**Muskingum K:**					**0.024**
#4	3	8. Large gullies, diversions, and low flowing streams	22.54	280.00	1,242.00	14.240	0.024
#4	**3**	**Muskingum K:**					**0.024**
#4	4	8. Large gullies, diversions, and low flowing streams	18.42	280.00	1,520.00	12.870	0.032
#4	**4**	**Muskingum K:**					**0.032**
#4	5	9. Small streams flowing bankfull	18.42	280.00	1,520.00	38.620	0.010
#4	**5**	**Muskingum K:**					**0.010**
#4	6	8. Large gullies, diversions, and low flowing streams	22.54	280.00	1,242.00	14.240	0.024
#4	**6**	**Muskingum K:**					**0.024**
#4	7	8. Large gullies, diversions, and low flowing streams	17.39	60.00	345.00	12.510	0.007
#4	**7**	**Muskingum K:**					**0.007**

100 YR-24 HR HF#3 FLOW

SUBWATERSHEDS CORRESPOND TO POND SUBWATERSHEDS, SEE POND SUBWATERSHED MAP

RICHARD HUBBARD

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

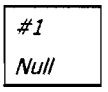
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	HF#3



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	31.100	31.100	116.04	9.57

Structure Detail:

Structure #1 (Null)

HF#3

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)
#1	1	3.900	0.026	0.032	0.448	69.000	S	12.33	0.958
	2	5.700	0.030	0.038	0.445	74.000	S	20.31	1.633
	3	7.700	0.026	0.035	0.447	79.000	M	30.29	2.534
	4	3.900	0.023	0.038	0.445	86.000	F	17.08	1.526
	5	3.500	0.106	0.038	0.445	75.000	S	12.74	1.032
	6	6.400	0.032	0.011	0.435	75.000	S	23.29	1.888
	Σ	**31.100**						**116.04**	**9.571**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	42.08	210.00	499.00	5.180	0.026
#1	**1**	**Time of Concentration:**					**0.026**
#1	2	3. Short grass pasture	44.09	220.00	499.00	5.310	0.026
		8. Large gullies, diversions, and low flowing streams	30.42	80.00	263.00	16.540	0.004
#1	**2**	**Time of Concentration:**					**0.030**
#1	3	3. Short grass pasture	42.08	210.00	499.00	5.180	0.026
		8. Large gullies, diversions, and low flowing streams	32.26	10.00	31.00	17.030	0.000
#1	**3**	**Time of Concentration:**					**0.026**
#1	4	5. Nearly bare and untilled, and alluvial valley fans	34.07	170.00	499.00	5.830	0.023
		8. Large gullies, diversions, and low flowing streams	32.26	10.00	31.00	17.030	0.000
#1	**4**	**Time of Concentration:**					**0.023**
#1	5	5. Nearly bare and untilled, and alluvial valley fans	1.00	3.85	385.00	1.000	0.106
#1	**5**	**Time of Concentration:**					**0.106**
#1	6	5. Nearly bare and untilled, and alluvial valley fans	50.00	249.50	499.00	7.070	0.019
		8. Large gullies, diversions, and low flowing streams	5.00	16.60	332.00	6.700	0.013
#1	**6**	**Time of Concentration:**					**0.032**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	23.80	410.00	1,723.00	14.630	0.032
#1	**1**	**Muskingum K:**					**0.032**
#1	2	8. Large gullies, diversions, and low flowing streams	21.20	410.00	1,934.00	13.810	0.038
#1	**2**	**Muskingum K:**					**0.038**
#1	3	8. Large gullies, diversions, and low flowing streams	22.74	410.00	1,803.00	14.300	0.035
#1	**3**	**Muskingum K:**					**0.035**
#1	4	8. Large gullies, diversions, and low flowing streams	21.20	410.00	1,934.00	13.810	0.038
#1	**4**	**Muskingum K:**					**0.038**
#1	5	8. Large gullies, diversions, and low flowing streams	21.20	410.00	1,934.00	13.810	0.038
#1	**5**	**Muskingum K:**					**0.038**
#1	6	8. Large gullies, diversions, and low flowing streams	14.31	70.00	489.00	11.350	0.011
#1	**6**	**Muskingum K:**					**0.011**

100 YR-24 HR HF#4 FLOW

SUBWATERSHEDS CORRESPOND TO POND SUBWATERSHEDS, SEE POND SUBWATERSHED MAP

WOODSON ASHER

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

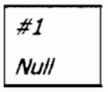
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	HF#4



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	26.500	26.500	103.54	8.73

Structure Detail:

Structure #1 (Null)

HF#4

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)
#1	1	4.000	0.029	0.027	0.448	74.000	S	14.25	1.146
	2	4.000	0.025	0.035	0.444	79.000	M	15.73	1.316
	3	6.200	0.024	0.034	0.444	86.000	F	27.16	2.426
	4	2.200	0.015	0.022	0.450	86.000	F	9.64	0.861
	5	3.400	0.112	0.032	0.446	75.000	S	12.37	1.003
	6	6.700	0.022	0.008	0.431	75.000	S	24.38	1.976
	Σ	**26.500**						**103.54**	**8.728**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	38.08	190.00	499.00	4.930	0.028
		8. Large gullies, diversions, and low flowing streams	28.57	20.00	70.00	16.030	0.001
#1	**1**	**Time of Concentration:**					**0.029**
#1	2	3. Short grass pasture	52.10	260.00	499.00	5.770	0.024
		8. Large gullies, diversions, and low flowing streams	44.12	60.00	136.00	19.920	0.001
#1	**2**	**Time of Concentration:**					**0.025**
#1	3	5. Nearly bare and untilled, and alluvial valley fans	48.10	240.00	499.00	6.930	0.020
		8. Large gullies, diversions, and low flowing streams	36.50	100.00	274.00	18.120	0.004
#1	**3**	**Time of Concentration:**					**0.024**
#1	4	5. Nearly bare and untilled, and alluvial valley fans	50.89	200.00	393.00	7.130	0.015
#1	**4**	**Time of Concentration:**					**0.015**
#1	5	5. Nearly bare and untilled, and alluvial valley fans	1.00	4.04	404.00	1.000	0.112
#1	**5**	**Time of Concentration:**					**0.112**
#1	6	5. Nearly bare and untilled, and alluvial valley fans	50.00	249.50	499.00	7.070	0.019
		8. Large gullies, diversions, and low flowing streams	50.00	145.50	291.00	21.210	0.003
#1	**6**	**Time of Concentration:**					**0.022**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	23.58	340.00	1,442.00	14.560	0.027
#1	**1**	**Muskingum K:**					**0.027**
#1	2	8. Large gullies, diversions, and low flowing streams	20.00	340.00	1,700.00	13.410	0.035
#1	**2**	**Muskingum K:**					**0.035**
#1	3	8. Large gullies, diversions, and low flowing streams	20.18	340.00	1,685.00	13.470	0.034
#1	**3**	**Muskingum K:**					**0.034**
#1	4	8. Large gullies, diversions, and low flowing streams	25.79	320.00	1,241.00	15.230	0.022
#1	**4**	**Muskingum K:**					**0.022**
#1	5	8. Large gullies, diversions, and low flowing streams	21.90	360.00	1,644.00	14.030	0.032
#1	**5**	**Muskingum K:**					**0.032**
#1	6	8. Large gullies, diversions, and low flowing streams	12.66	40.00	316.00	10.670	0.008
#1	**6**	**Muskingum K:**					**0.008**

100 YR-24 HR HF#5 FLOW

WOODSON ASHER

Logos Engineering
P. O. Box 350
Manchester, KY 40962

Phone: 606-598-6746
Email: logosengineering@alltel.net

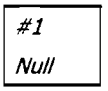
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	6.300 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	HF#5



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	72.300	72.300	208.68	23.02

Structure Detail:

Structure #1 (Null)

HF#5

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)
#1	1	30.100	0.135	0.045	0.450	73.000	S	53.12	8.376
	2	3.900	0.027	0.041	0.441	79.000	M	15.34	1.283
	3	6.300	0.032	0.049	0.438	79.000	M	24.78	2.073
	4	10.600	0.026	0.054	0.436	86.000	F	46.43	4.147
	5	8.600	0.026	0.032	0.445	86.000	F	37.67	3.365
	6	5.500	0.138	0.049	0.438	75.000	S	10.27	1.622
	7	7.300	0.022	0.032	0.445	75.000	S	26.57	2.153
	Σ	**72.300**						**208.68**	**23.019**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	22.04	110.00	499.00	1.180	0.117
		8. Large gullies, diversions, and low flowing streams	31.98	370.00	1,157.00	16.960	0.018
#1	**1**	**Time of Concentration:**					**0.135**
#1	2	3. Short grass pasture	52.10	260.00	499.00	5.770	0.024
		8. Large gullies, diversions, and low flowing streams	21.98	40.00	182.00	14.060	0.003
#1	**2**	**Time of Concentration:**					**0.027**
#1	3	3. Short grass pasture	36.07	180.00	499.00	4.800	0.028
		8. Large gullies, diversions, and low flowing streams	39.34	120.00	305.00	18.810	0.004
#1	**3**	**Time of Concentration:**					**0.032**
#1	4	5. Nearly bare and untilled, and alluvial valley fans	36.07	180.00	499.00	6.000	0.023
		8. Large gullies, diversions, and low flowing streams	21.98	40.00	182.00	14.060	0.003
#1	**4**	**Time of Concentration:**					**0.026**
#1	5	5. Nearly bare and untilled, and alluvial valley fans	48.10	240.00	499.00	6.930	0.020
		8. Large gullies, diversions, and low flowing streams	20.13	60.00	298.00	13.460	0.006
#1	**5**	**Time of Concentration:**					**0.026**
#1	6	5. Nearly bare and untilled, and alluvial valley fans	1.00	4.98	498.00	1.000	0.138
#1	**6**	**Time of Concentration:**					**0.138**
#1	7	5. Nearly bare and untilled, and alluvial valley fans	50.00	249.50	499.00	7.070	0.019
		8. Large gullies, diversions, and low flowing streams	50.00	119.00	238.00	21.210	0.003

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	**7**	**Time of Concentration:**					**0.022**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	25.83	640.00	2,478.00	15.240	0.045
#1	**1**	**Muskingum K:**					**0.045**
#1	2	8. Large gullies, diversions, and low flowing streams	17.89	340.00	1,900.00	12.690	0.041
#1	**2**	**Muskingum K:**					**0.041**
#1	3	8. Large gullies, diversions, and low flowing streams	15.93	340.00	2,134.00	11.970	0.049
#1	**3**	**Muskingum K:**					**0.049**
#1	4	8. Large gullies, diversions, and low flowing streams	15.02	340.00	2,263.00	11.620	0.054
#1	**4**	**Muskingum K:**					**0.054**
#1	5	8. Large gullies, diversions, and low flowing streams	21.04	340.00	1,616.00	13.760	0.032
#1	**5**	**Muskingum K:**					**0.032**
#1	6	8. Large gullies, diversions, and low flowing streams	15.93	340.00	2,134.00	11.970	0.049
#1	**6**	**Muskingum K:**					**0.049**
#1	7	8. Large gullies, diversions, and low flowing streams	21.04	340.00	1,616.00	13.760	0.032
#1	**7**	**Muskingum K:**					**0.032**

HOLLOWFILL TOP DITCH MAXIMUM DESIGN

Material: RIP RAP

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
5.00	2.0:1	2.0:1	1.0	0.0400	0.30			40.0

	w/o Freeboard	w/ Freeboard
Design Discharge:	464.67 cfs	
Depth:	4.65 ft	4.95 ft
Top Width:	23.58 ft	24.78 ft
Velocity:	7.00 fps	
X-Section Area:	66.39 sq ft	
Hydraulic Radius:	2.576	
Froude Number:	0.74	

ATTACHMENT 32.4.B

ROAD DITCH MAXIMUM DESIGN

ROAD DITCH 15 "RD15"

INPUT

RUNOFF COEFF "C"=	0.15
INTENSITY "I"=	7.45
DRAINAGE AREA "A"=	32.34
LENGTH "L"	2520
HEIGHT "H"	800

OUTPUT

Q25=CIA=	36.14 cfs
ADDITIONAL FLOW=	0.00 cfs
TOTAL FLOW=	36.14 cfs
Tc=	5.047

MANNING'S EQ.	Q=CIA
	Tc = 0.0078(L^1.5/H^0.5)^0.770

I, _____ 12575 _____ 4/6/07
(signature) (registration no.) (date)
hereby certify, in accordance with 405 KAR 7:040E, Section 10, that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405. (Affix engineer's seal)

MAXIMUM DESIGN ROAD DITCH

Material: Shales and hardpans

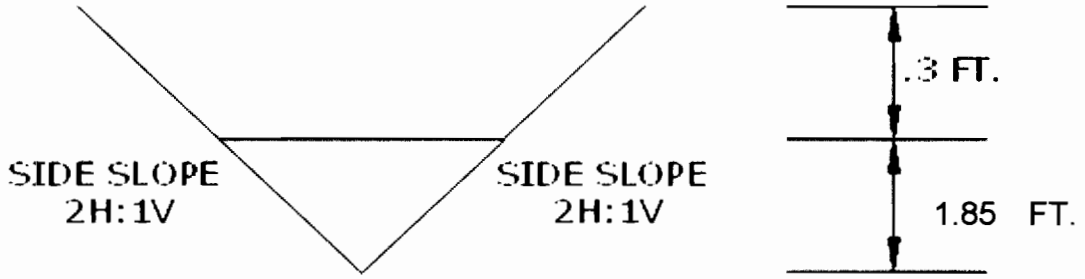
Triangular Channel

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.0:1	2.0:1	1.0	0.0250	0.30			6.0

	w/o Freeboard	w/ Freeboard
Design Discharge:	36.14 cfs	
Depth:	1.85 ft	2.15 ft
Top Width:	7.41 ft	8.61 ft
Velocity:	5.26 fps	
X-Section Area:	6.87 sq ft	
Hydraulic Radius:	0.829	
Froude Number:	0.96	

ROAD DITCH DESIGN

DITCH# RD 15



SCALE: NOT TO SCALE

12575 (registration no.) 4/6/07 (date)

in accordance with 405 KAR 7:040E, Section 10, that
correct as determined by accepted engineering
includes all the information required of it by KRS
KAR Title 405. (Affix engineer's seal)

ROAD CULVERT MAXIMUM DESIGN

WATER SHED DW - 14,15

INPUT	
RUNOFF COEFF "C"=	0.15
INTENSITY "I"=	7.45
DRAINAGE AREA "A"=	58.68
LENGTH "L"	2520
HEIGHT "H"	800

OUTPUT		
Q25=CIA=	65.57	cfs
ADDITIONAL FLOW=	0.00	cfs
TOTAL FLOW=	65.57	cfs
Tc=	5.047	

MANNING'S EQ.	Q=CIA
	Tc = 0.0078(L^1.5/H^0.5)^0.770

MAXIMUM ROAD CULVERT DESIGN

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
102.00	1.00	0.0150	5.50	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 42 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 65.57 cfs

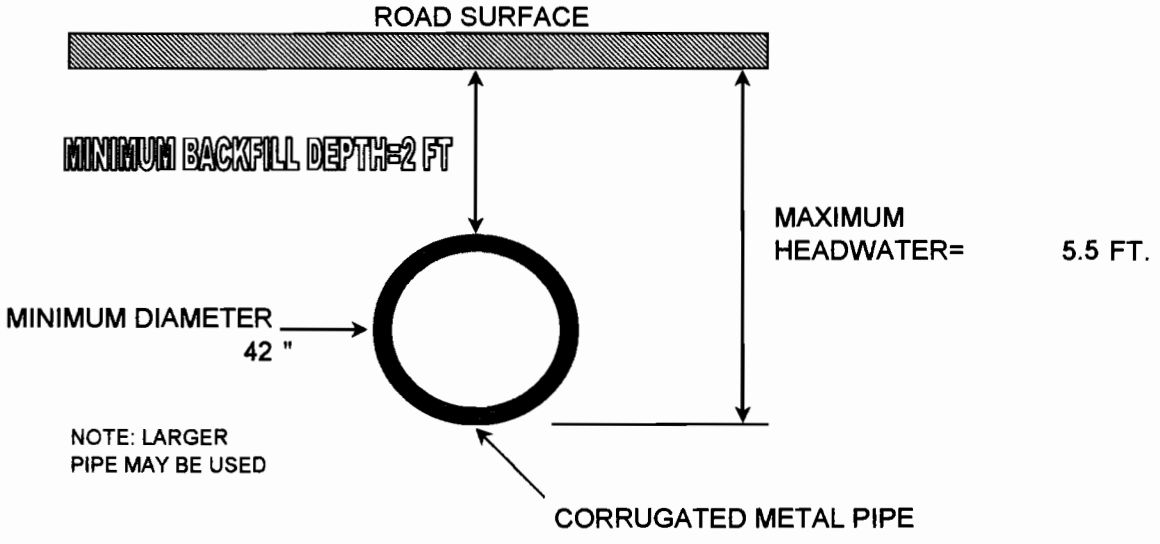
Maximum Headwater = 5.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (36 in)	**Discharge (cfs) (42 in)**	Discharge (cfs) (45 in)
0.55	2.56	**2.99**	3.20
1.10	7.25	**8.46**	9.06
1.65	13.32	**15.53**	16.64
2.20	20.50	**23.91**	25.62
2.75	28.65	**33.42**	35.81
3.30	37.66	**43.94**	47.07
3.85	45.71	**55.36**	59.32
4.40	52.64	**65.63**	72.47
4.95	58.74	**74.62**	82.43
5.50	64.27	**82.64**	91.95
6.05	69.36	**89.93**	100.58
6.60	74.10	**96.69**	108.52
7.15	78.56	**103.00**	115.92
7.70	82.78	**108.95**	122.88
8.25	86.58	**114.59**	129.46

CULVERT DESIGN

CULVERT# C-6



I, _____ 12575 4/6/07
(signature) (registration no.) (date)

hereby certify, in accordance with 405 KAR 7:040, [illegible] that this document is correct as determined by accepted practices and includes all the information required of it by KRS chapter 270 and KAR Title 405. (Affix engineer's seal)

ATTACHMENT 33.1.A

Transportation Facilities Plan

The haul road to be used on this operation is existing. The appropriate documentation is attached. Some upgrading and repair will be necessary though road location will not change.

During the operation the haul road will be properly maintained to ensure safe, passable conditions. The surface will be covered with durable rock, well compacted, to minimize rutting. Ditches will be kept open and free of debris. All ditches and embankments that are redisturbed will be seeded to prevent erosion. The surface and the shoulders will be repaired as required to maximize safety. A water truck will be utilized to minimize dust when necessary and provide safe sight distances along the access road.

CERTIFICATION OF CONSTRUCTION

Nally & Hamilton Enterprises, Inc.
(coal company name)

I, J. D. Miller (signature), 24,487 (registration no.), 2/12/07 (date),

hereby certify, in accordance with 405 KAR 7:040E, Section 10, that with respect to the following facility,

(check one)

- ☐ sedimentation pond
- ☐ excess spoil disposal fill
- ☐ temporary water impoundment
- ☐ permanent water impoundment
- ☒ road
- ☐ coal processing waste bank
- ☐ coal processing waste dam
- ☐ coal processing waste impoundment

facility # Road Section "A" on permit # 807-0333

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

b) The construction has been performed in accordance with accepted construction practices; and

c) (check one)

☐ the facility has been constructed in accordance with the design approved by the department.

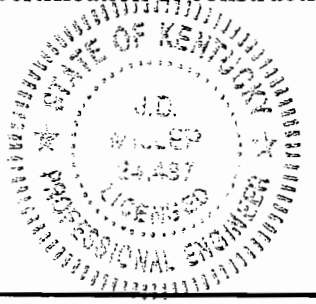
☒ the facility has been constructed in accordance with the design approved by the department except for minor deviations described in the attachment which will not adversely affect the performance of the facility nor render the facility in violation of KRS Chapter 350 or KAR Title 405.

(check one)

☐ This is a certification of construction to date and a description of the current phase of construction is attached.

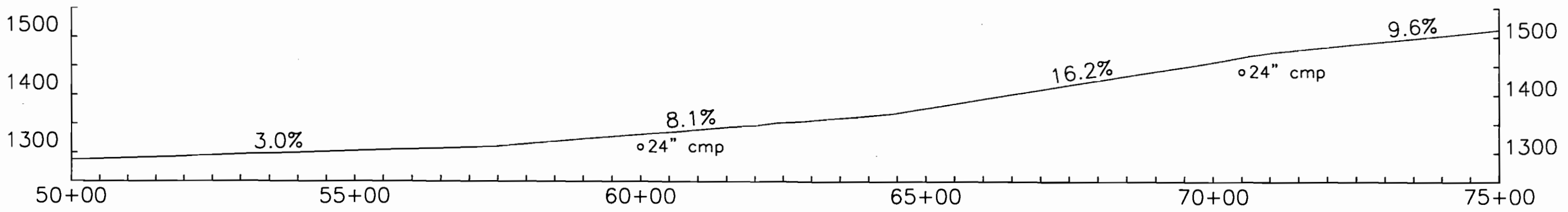
☒ This is a final certification of construction and as-built drawings are attached.

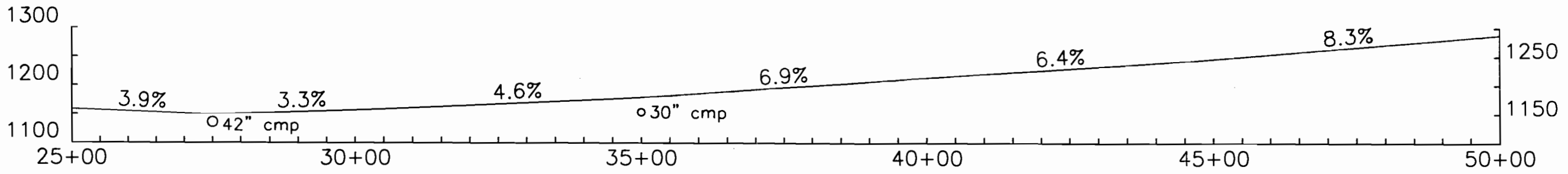
Engineer's seal

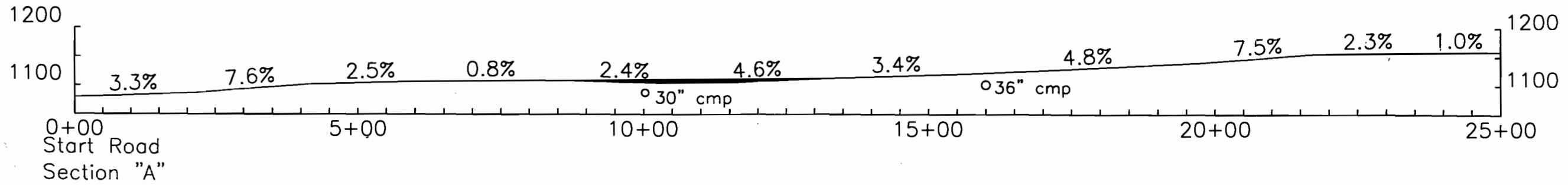


Attachment "A"
NALLY & HAMILTON ENTERPRISES, INC.
Permit No. 807-0333
Road Section "A" – List of Minor Deviations

1. The road width averages around 35-45 ft.
2. The overall grade of the road is approximately 7.6%.
3. There are sections of the road that are > 15% but a grade variance was granted for this road and the as-built is similar to the proposed road.







STATE OF KENTUCKY
J.D. MILLER 24,487 LICENSED PROFESSIONAL ENGINEER

I, J.D. Miller (Name) 24,487 (Lic. #) 2/12/07 (Date)

Hereby certify, in accordance with 405 KAR 7:04E, Section 10 that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405.

Drawn by: JDM	02-12-2007	Scale: 1"=200'

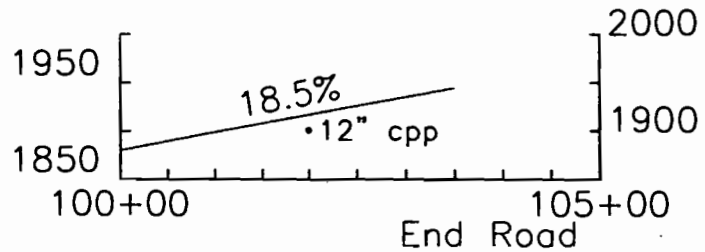
Nally & Hamilton Enterprises, Inc.
P.O. Box 2323
London, Kentucky 40741
Ph: (606) 878-1500 Fax: (606) 878-5880

807-0333 Chesnut Flats

Road Section "A"

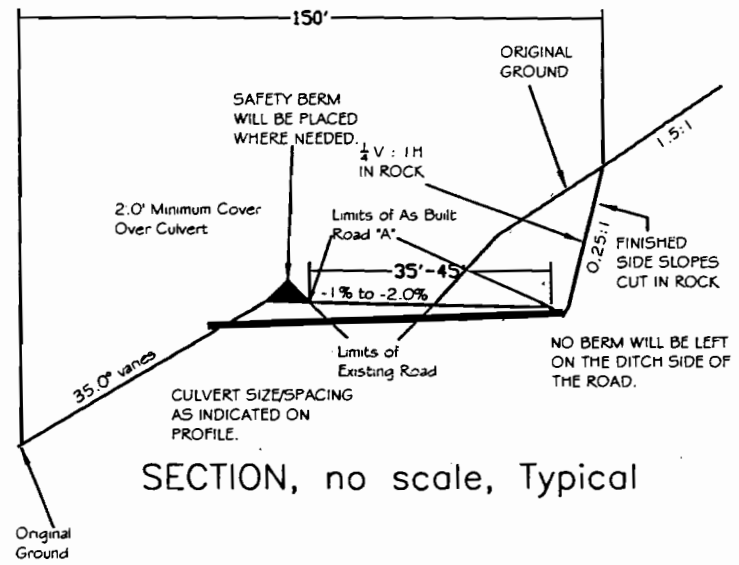
As Built Drawing

Profile p.#1

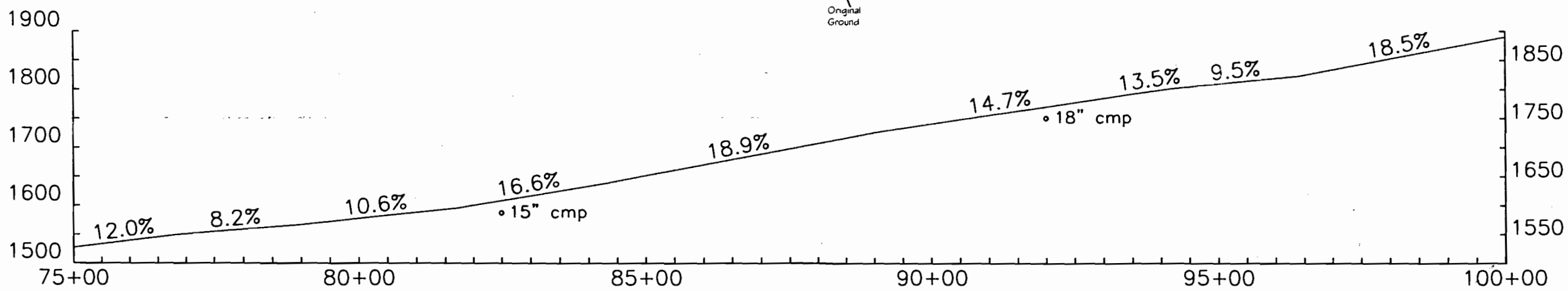


End Road Section "A" @ permitted area for 807-0342

Overall Road Grade is approximately 7.6%
Rise = 786 ft
Run = 10350 ft



SECTION, no scale, Typical



STATE OF KENTUCKY
J.D. MILLER
24,487
LICENSED PROFESSIONAL ENGINEER

I, J.D. Miller, 24,487, 2/12/07
Name, Lic. #, Date

Hereby certify, in accordance with 405 KAR 7:04E, Section 10 that this document is correct as determined by accepted engineering practices and includes all the information required of it by KRS Chapter 350 and KAR Title 405.

Drawn by: JDM	2-12-2007	Scale: 1"=200'

Nally & Hamilton Enterprises, Inc.
P.O. Box 2323
London, Kentucky 40741
Ph: (606) 878-1500 Fax: (606) 878-5880

807-0333 Chesnut Flats
Road Section "A"
As Built Drawing
Profile p.#2

ATTACHMENT 34.1.A

The only potential source of air pollution would come from fugitive dust created from excessive use of equipment roads or haul roads. Obviously, this would be a problem during dry periods. Equipment haul roads are usually relatively short and speeds are slow. Therefore, excessive amounts of fugitive dust are unlikely.

Coal haul roads are also relatively short and are traveled at low speeds. Excessive dust from these roads is only expected during coal hauling which is only periodically.

Control of dust is easily accomplished by regular spraying with water. A tank truck, regular truck, or even a front end loader can dampen the road to alleviate any dust problem that might occur.

Air pollution monitoring is not expected to be necessary since negligible air quality effects are expected.

35. Subsidence Control

35.1 If this is an application which includes underground or auger mining, provide as "Attachment 35.1.A", the information required to demonstrate compliance with 405 KAR 8:040, Section 26.

See Attachment 35.1.A

35.2 Does the proposed method of operation include standard room and pillar mining? [X] NO [ ] YES. If "YES", describe the thickness and engineering properties of clays and soft rock located immediately above and below the coal seam(s) to be mined. If none exists, briefly describe the stratum immediately above and below all coal seams to be mined with this method. Submit description and related information as "Attachment 35.2.A".

35.3 If this application is for a surface mine, indicate if any portion of the proposed permit area have been "undermined". [ ] YES [X] NO. If "YES", provide a map showing the extent of the underground workings, and describe the potential affects subsidence may have on structures such as dams, coal waste disposal areas, fills and other such structures. Submit this information as "Attachment 35.3.A".

36. Applicant/Authorized Agent Signature

36.1 The undersigned, being first duly sworn, states that he/she has read all the information provided in Form MPA-03, Technical Information for a Mining Permit, of this application and has found it to be true and correct. The undersigned further acknowledges that any information provided or omitted herein for the purpose of defrauding or misleading the Natural Resources and Environmental Protection Cabinet may result in criminal charges being instituted pursuant to applicable state laws.

Applicant Company Name **Nally & Hamilton Enterprises, Inc.**

Name of Applicant or Agent Whose Signature Appears Below **Stephen Hamilton**

Signature of Applicant or Agent* Stephen Hamilton

Date of signature 04-26-07

Subscribed and sworn to before me by **Stephen Hamilton**,

This the 26th Day of April, 20 07.

Notary Public Brenda Sester

My Commission Expires 10-16-2009 State in which Commissioned **Kentucky**

*NOTE: If a signer is other than president or secretary of a corporation, attach a notarized copy of power of attorney, or resolution of board of directors which grants signer the legal authority to represent the applicant in this application. (Does not apply to a single proprietorship or partnership.)

ATTACHMENT 35.1.A

Subsidence Survey Relating to Auger Mining

The augering associated with the operation is not expected to affect lands above the area through surface subsidence. Reconnaissance of the small area above the auger mining revealed no structures, dwellings, streams, water impoundments, grazing lands, agricultural or silvicultural production areas, and no aquifers or potential water suppliers. The mining area is located on the hillside just above the valley floor with only a sparse stand of trees above the auger area. The area has been previously logged and does not contain any areas defined as renewable resource land as outlined in the regulations.


Tejay
Balkan
Insull
Oaks
Tom
Betsie
Fork
Branch
Campbell
Branch
Blacksnake
Branch
Blacksnake
Branch
Wilder
Br
Jennie
Branch
Branch
Blacklick
Jackson Knob
Strip Mines
Tipple
Mine
HAUL RD. "A"
HAUL RD. "B"
HAUL RD. "C"
HAUL RD. "D"
HAUL RD. "E"
PERMIT# 807-0339
PERMIT# 807-0342
BELL CO
HARLAN CO
DIP 0.84° NE
STRIKE S 41° E
SW009
SW004
HFS 0
HFS 1
HFS 2
HFS 3
HFS 4
HFS 5
Nally & Hamilton Enterprises Inc.
PO Box 157 Bardstown, KY 4004
SCALE AS DRAWN 1"=400'
LOCATION IN DETAIL NEAREST NAMED STREAM AND/OR NEAREST IDENTIFIED PUBLIC ROAD INTERSECTION
APPLICATION NUMBER 807-0355
COUNTY BELL
QUADRANGLE Balkin, Varilla
LATITUDE 36° 45' 28.06"
MAP SCALE 1"=400'
CONTOUR INTERVAL 40 FT.
DATE SUBMITTED 04/30/2007
LONGITUDE 83° 31' 47.22"
MRP/ERI MAP
PERMIT BOUNDARY
COAL CROP LINE
PREVIOUS MINED AREAS
ADJACENT PERMITS
CULVERT (HAUL ROAD(S))
EXPLOSIVES STOR. AREA
DIVERSION DITCH
GEOLOGIC SAMPLE POINT
TOPSOIL STORAGE AREA
SURFACE WATER MONITORING POINT
GROUND WATER MONITORING POINT
KPEDES WATER MONITORING POINT
UNDERGROUND MINE ENTRANCE
CONTOUR METHOD
SEAM ELEVATION ACRES
HARLAN 1960-2040 566.46
KELLIOKA-DARBY 2120-2200 217.78
* DOES NOT EFFECT TOTAL ACREAGE
AUGER-HIGHWALL
HARLAN KELLIOKA-DARBY 1960-2200 340.34
UNDERGROUND MINING
AREA METHOD
SPOIL STORAGE AREA(S)
IS CORRECT AS DETERMINED BY ACCEPTED ENGINEERING PRACTICES AND INCLUDES ALL
THE INFORMATION REQUIRED OF IT BY KRS CHAPTER 350 AND KAR TITLE 405.
SIGNED (NOTARY PUBLIC)
MY COMMISSION EXPIRES 03/29/2010
SUBSCRIBED AND SWORN TO BEFORE AS THIS 26th DAY OF June 2007
SIGNED (REGISTERED ENGINEER)
REGISTRATION NUMBER 12575
STATE OF KENTUCKY
DON R. ROBERTS
12,575
LICENSED PROFESSIONAL ENGINEER
ENGINEERING PROVIDED BY:
LOGOS ENGINEERING
MANCHESTER, KY PHONE:(606) 598-6746