

DESIGN REPORT

Sedimentation Structure

N11-G1

Kayenta Mine

Navajo County, Arizona

PEABODY COAL COMPANY

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**Exhibit 1 - Proposed N11-G, N11-G1, N11-G2, and N11-G3 Sedimentation Ponds**

### Introduction

Sedimentation Structure N11-G1 will be an earthen embankment, designed and constructed by Peabody Coal Company as a temporary sedimentation structure to control runoff and sediment from the proposed N-11 surface mining area at the Kayenta Mine. The location of Structure N11-G1 and its watershed boundary is shown on Drawing No. 85400 (Sheet L-7), and Drawing No. 85405. The site-specific general construction plans are shown on the attached Exhibit 1.

This design report contains information specific to Structure N11-G1 which is located in series with sedimentation structures N11-G, N11-G2, and N11-G3. Mine-wide design, construction, and reclamation information is presented in the "General Report, Kayenta and Black Mesa Mines, Navajo County, Arizona for Peabody Coal Company", December, 1985 (PAP), Chapter 6, Attachment D, Volume 2, along with the methods and results of analyses used for slope stability, hydrology, and hydraulics, and in Chapter 6, Pages 11 to 42, "Sediment and Water Control Facility Plan".

### Inspection

The construction site of Structure N11-G1 was inspected by a Registered Professional Engineer from Peabody Coal Company to ensure that the location was suitable and no adverse conditions existed to prevent the successful construction of the structure. A detailed geotechnical investigation was not performed, rather, the information in Chapter 6, Attachment D was utilized for embankment design. A conservative embankment category of (A-3) with a 27-foot total embankment height was utilized for the design.

### Site Description

#### Land Use

The four N11-G series structures have an 863.0-acre combined drainage area and is located on a tributary to Coal Mine Wash at the Kayenta Mine. The watershed is classified as 29 percent disturbed, 66 percent pinon-juniper and 5 percent sagebrush-grass. Structure N11-G1 has a 13.58-acre drainage area.

## Design Analyses

### General

Structure N11-G1 was designed by a Registered Professional Engineer from Peabody Coal Company. The design was performed in accordance with applicable 30 CFR 780 and 816 regulations of the United States Department of the Interior, Office of Surface Mining (OSM) and included a review of available project files. The most current information contained in the Peabody Coal Company files includes topographic maps developed from aerial photography flown in 1983 and was used in the analyses of the structure.

### Stability

A homogeneous earthen embankment, compacted in lifts to design specifications, and approximately 20 feet wide on top will be constructed. An upstream slope of 3:1 (horizontal to vertical) and a downstream slope of 5:1 were assumed. Based on a total embankment height of 27 feet, these slopes are equal to or flatter than the recommended slopes in Table 3-6, Attachment D, Chapter 6; therefore, the embankment will be stable. The emergency spillway will be a minimum 70-foot wide riprap-lined trapezoidal channel.

### Hydrology

The hydrologic analysis was completed using the computer program SEDCAD+ (see Appendices A, B, and C). Structure N11-G1 is located in series with structures N11-G, N11-G2, and N11-G3. Structure N11-G1 is classified as a low hazard structure. No coal mining activities will occur downstream of the N11-G series embankments. In addition, the mine area is sparsely populated with no one living in the downstream flood plain. The structure will impound less than 20 acre-feet and be less than 20 feet in vertical height from the upstream toe of embankment of the natural stream elevation to the emergency spillway elevation. The four structures have a combined capacity that is greater than 20 acre-feet; therefore, the spillway was analyzed using the 100-year, 6-hour storm for the downstream ponds in series. Structures N11-G, N11-G1, N11-G2, and N11-G3 were conservatively assumed to be full to the emergency spillway at the time of the 100-year storm. The storage capacity requirements of Structure N11-G1 was analyzed using the 10-year, 24-hour storm. The combined ponds in series were conservatively assumed to completely contain the 10-year, 24-hour storm without discharge downstream to Coal Mine Wash; plus, provide adequate sediment storage volume.

The following parameters were used in the hydrologic analysis:

	10-Year	100-Year
	<u>24-Hour Storm</u>	<u>6-Hour Storm</u>
1. Water Course Length, L . . . . .	0.076 mi	0.076 mi
2. Elevation Difference, H . . . . .	30.5 ft	30.5 ft
3. Time of Concentration, Tc . . . . .	0.036 hr	0.036 hr
4. SCS Curve Number . . . . .	81	81
5. Rainfall Depth . . . . .	2.1 in	2.4 in
6. Drainage Area . . . . .	13.58 ac	793.87 ac

Hydraulics

The SEDCAD<sup>+</sup> and Dodson-Trapezoidal Channel computer programs were used to evaluate inflow to the sedimentation structure, outflow from the structure, and the resulting water surface elevations. The 10-year and 100-year storm was routed through Structures N11-G3, N11-G2, and N11-G1 into Structure N11-G as will be the worst case scenario during mining and reclamation. The initial conditions and results of the analysis are summarized in the following N11-G1 hydraulics table:

N11-G1 HYDRAULICS TABLE

	Units	10-Yr, 24-Hr	100-Yr, 6-Hr
	Storm	Storm	Storm
Initial Reservoir Volume Condition		Empty	Full to emergency spillway elevation
Inflow			
Peak Flow	cfs	319.9	602.9
Volume	ac-ft	0.8*	62.5
Storage			
Peak Stage	msl	N/A	6766.3
Emerg. Spillway Elev.	msl	6764.0	6764.0
Peak Storage	ac-ft	N/A	23.4
Storage Capacity	ac-ft	19.1	19.1
Outflow			
Peak Flow	cfs	N/A	578.0
Spillway Elevation	msl	6764.0	6764.0
Embankment Crest Elev.	msl	6770.0	6770.0
Peak Stage	msl	---	6766.3
Freeboard	ft	---	3.7
Emergency Spillway Channel			
Flow Depth	ft	---	2.3
Critical Velocity	fps	---	6.2
Mannings "n"	---	---	0.057
Width	ft	---	70
Outflow Channel			
Slope	%	---	15.0
Normal Velocity	fps	---	9.0
Normal Depth	ft	---	0.9
Mannings "n"	---	---	0.057

\* Inflow volume for the drainage area between structures N11-G2 and N11-G1.

### Emergency Spillway and Outlet Channel

The emergency spillway and outlet channel for N11-G1 will be a trapezoidal channel, the alignment and dimensions are shown on Exhibit 1 and includes with the following dimensions:

Minimum Channel Depth (Spillway) . . . 3.5 ft.

(Outflow) . . . . 2.0 ft.

Channel Length (Spillway) . . . . . 65 ft.

(Outflow) . . . . . 200 ft.

Side Slopes (Horizontal to Vertical) . . 3:1 or flatter

Average Slope (Spillway) . . . . . 0 %

Maximum Slope (Outflow) . . . . . 15 %

A minimum 15-foot long riprapped channel will be constructed beyond the toe of the embankment as a transition into the downstream natural channel.

### Storage Capacity

The impoundment stage-capacity table (see Exhibit 1) is based on the 1983 aerial topographic mapping conducted for Peabody Coal Company. The total storage capacity of Structure N11-G1 is designed to contain approximately 19.14 acre-feet.

The calculations for the sediment load entering Structure N11-G1 were made utilizing the Revised Universal Soil Loss Equation with the following parameters:

- |    |                            |       |       |
|----|----------------------------|-------|-------|
| 1. | Rainfall Factor, R         | ..... | 40    |
| 2. | Soil Erodibility Factor, K | ..... | 0.28  |
| 3. | Slope Factor, LS           | ..... | 10.34 |
| 4. | Cover Factor, C            | ..... | 0.46  |
| 5. | Erosion Control Factor, P  | ..... | 0.64  |

The hydrologic analysis gives the storage volume required to treat the 10-year, 24-hour storm, and the remaining storage volume available for storing sediment. Structure N11-G1 does have sufficient storage by itself; however, the structures upstream contributes excess runoff downstream to N11-G1 and N11-G. The combined sediment storage capacity was determined for the four structures in series and the results of the analysis are presented in the following table.

Combined Storage for Structures N11-G3 N11-G2, N11-G1, and N11-G

	N11-G3	N11-G2	N11-G1	N11-G	Combined
Total Storage Capacity	18.61	18.63	19.14	19.69	76.07 ac-ft
10-Year, 24-Hour Storm Inflow	42.58	5.09	0.76	5.33	53.76 ac-ft
Available Sediment					
Storage Capacity	---	---	7.95	14.36	22.31 ac-ft
Sediment Inflow Rate/Yr	5.14	0.89	0.21	1.43	7.67 ac-ft/yr
Sediment Storage Life	---	---	---	---	2.9 yrs

The following appendices and drawing are attached and complete this design report.

Appendix A - Hydrology, Hydraulic, and Sedimentation Calculations

Appendix B - SEDCAD+ (Input and Output) 10-year, 24-hour Storm Event

Appendix C - SEDCAD+ (Input and Output) 100-year, 6-hour Storm Event

Exhibit 1 - Proposed N11-G, N11-G1, N11-G2, and N11-G3 Sedimentation Ponds

APPENDIX A

**HYDROLOGY, HYDRAULIC, AND SEDIMENTATION CALCULATIONS**

N11-G1

Project: N11-G1 Pond

Time of Concentration:

$$\text{Elevation Difference} = 6775.5 - 6745 = 30.5 \text{ ft.}$$

$$\text{Watercourse Length} = 400 \text{ ft.} = 0.076 \text{ mi}$$

$$T_c = [11.9(W.L.)^3/(E.D.)]^{0.385} = 0.036 \text{ hr}$$

SCS Curve Number:

Cover Type	Soil		Area	
	Group	CN	(Acres)	CN*Area
Disturbed	B	86	7.46	641.56
Pinon-Juniper	B	65	3.00	195.00
Pinon-Juniper	D	83	<u>3.12</u>	<u>258.96</u>
			13.58	1095.52

$$\text{Weighted CN} = 1095.52/13.58 = 80.7 = \underline{\text{Use 81}}$$

Drainage Basin Area:

13.58 acres      0.02 sq. miles

SEDCAD Utility - Routing Parameter:

$$K = 0.040 \text{ hr}$$

$$X = 0.309 \text{ hr}$$

Revised USLE Calculations:

Project: N11-G1 Pond

Soil Erodibility Factor:

Soil Type	Soil		Area		K * Area
	Group	K	(Acres)		
3C	D	0.16	1.70		0.272
3D	D	0.15	0.80		0.120
16E	B	0.05	0.60		0.030
42	D	0.16	3.02		0.483
Newly Reclaimed	B	0.38	<u>7.46</u>		<u>2.835</u>
			13.58		3.740

Weighted k = 3.740/13.58 = 0.275 Use 0.28

Slope Factor:

Elev.		Slope		Theta	
Length (ft)	Diff. (ft)	(%)	M	(Degrees)	(L/72.6)^M*[17.2Sin(Theta)-0.55]
500	120	24.00	0.6	13.50	11.03
500	125	25.00	0.6	14.04	11.53
500	95	19.00	0.6	10.76	8.47
					Avg. LS = <u>10.34</u>

Cover and Practice Factors:

Cover Type	Cover (%)	Canopy (%)	Area (Acres)	C	C * Area	P	P * Area
Pinon-Juniper	40	25	6.12	0.14	0.86	1.0	6.12
Newly Reclaimed	--	--	<u>7.46</u>	0.725	<u>5.41</u>	0.336	<u>2.51</u>
			13.58		6.27		8.63

Weighted C = 6.27/13.58 = 0.46

Weighted P = 8.63/13.58 = 0.64

Rainfall Factor: R = 40

Revised USLE Calculations:

$$A = R * K * LS * C * P = \underline{21.17} \text{ Ton/acre}$$

$$A = 40 * 0.28 * 10.34 * 0.46 * 0.64 = 34.09 \text{ tons/acre}$$

Sediment Inflow Rate:

$$DA = 13.58$$

$$SDR = 0.95$$

$$SI = (A * DA * SDR * 94) / 192,400 = \underline{0.21} \text{ ac-ft/yr}$$

TRAPEZOIDAL CHANNEL ANALYSIS  
CRITICAL DEPTH COMPUTATION

August 19, 1993  
N11-G1 POND SPILLWAY 100-YR., 6-HR. STORM

=====

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Flow Rate (cubic feet per second).....	578.0
Manning's Roughness Coefficient (n-value).....	0.0570
Channel Side Slope - Left Side (horizontal/vertical)....	3.00
Channel Side Slope - Right Side (horizontal/vertical)...	3.00
Channel Bottom Width (feet).....	70.0

=====

PROGRAM RESULTS:

DESCRIPTION	VALUE
Critical Depth (feet).....	1.26
Critical Slope (feet per foot).....	0.0
Flow Velocity (feet per second).....	6.21
Froude Number.....	1.000
Velocity Head (feet).....	0.60
Energy Head (feet).....	1.86
Cross-Sectional Area of Flow (square feet).....	93.02
Top Width of Flow (feet).....	77.56

=====

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986  
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092  
(713) 895-8322. A manual with equations & flow chart is available.

SEDCAD+ RIPRAP CHANNEL DESIGN

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N11-G1 POND SPILLWAY 100-YR., 6-HR. STORM

INPUT VALUES:

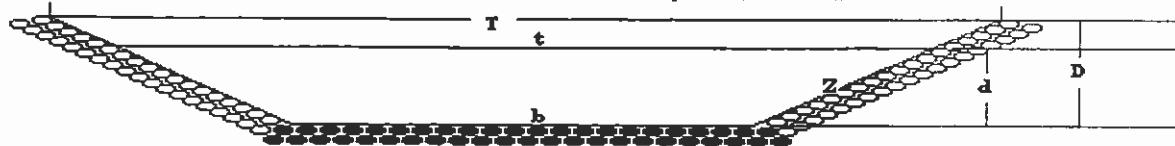
Shape	TRAPEZOIDAL
Discharge	578.03 cfs
Slope	15.00 %
Sideslopes (L and R)	3.00:1      3.00:1
Bottom Width	70.00 feet
Freeboard	1 ft

RESULTS:

Steep Slope Design - PADER Method

Depth	0.88 ft
with Freeboard	1.88 ft
Top Width	75.28 ft
with Freeboard	81.28 ft
Velocity	9.05 fps
Cross Sectional Area	63.87 sq ft
Hydraulic Radius	0.85 ft
Manning's n	0.057
Froude Number	1.73
Dmax	0.938 ft (11.25 in)
D50	0.750 ft ( 9.00 in)
D10	0.250 ft ( 3.00 in)

**SEDCAD+ CHANNEL DESIGN**  
**N11-G1 POND SPILLWAY 100-YR., 6-HR. STORM**



**Riprap - Steep Slope Design - FADER Method**

Discharge	= 578.03 cfs	Depth (d)	= 0.88 (w/ Freeboard: D = 1.88 ft)
Bottom (b)	= 70.00 ft	Top width (t)	= 75.28 (T = 81.28) ft
Side slopes (Z)	= 3.0:1(L) 3.0:1(R)	Velocity	= 9.05 fps
Bed Slope	= 15.00%	Hydraulic Radius	= 0.85 ft
Manning's n	= 0.057	Froude number	= 1.73
		D <sub>max</sub>	= 0.94 ft (12.25 in)
		D <sub>50</sub>	= 0.79 ft (9.00 in)
		D <sub>10</sub>	= 0.25 ft (3.00 in)

**APPENDIX B**

**N11-G1 SEDCAD+ (INPUT AND OUTPUT)**

**10-YEAR, 24-HOUR STORM EVENT**

CIVIL SOFTWARE DESIGN

SEDCAD+ Version 3

N11-G SERIES PONDS 10-YR., 24-HR. STORM

by

Name: JGS

Company Name: PEABODY COAL COMPANY  
File Name: C:\SEDCAD3\K-MINE\N11GR1A

Date: 08-19-1993



Civil Software Design -- SEDCAD+ Version 3.1  
 Copyright (C) 1987-1992. Pamela J. Schwab. All rights reserved.

Company Name: PEABODY COAL COMPANY  
 Filename: C:\SEDCAD3\K-MINE\N11GR1A User: JGS  
 Date: 08-19-1993 Time: 08:38:04  
 N11-G SERIES PONDS 10-YR., 24-HR. STORM  
 Storm: 2.10 inches, 10 year-24 hour, SCS Type II  
 Hydrograph Convolution Interval: 0.1 hr

=====  
 SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE  
=====

-Hydrology-

JBS SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base- Flow (cfs)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
111 1	714.23	82	F	0.422	0.000	0.000	0.0	42.58	362.87
		Type: Pond			Label: N11-G3	POND			
111 Structure	714.23							42.58	
111 Total IN	714.23							42.58	362.87
111 Total OUT								42.58	324.42
112 1	66.06	86	F	0.029	0.000	0.000	0.0	5.09	65.05
		Type: Pond			Label: N11-G2	POND			
? Structure	66.06							47.68	
112 Total IN	780.29							47.68	337.61
112 Total OUT								47.68	317.80
111 to 112 Routing					0.031	0.307			
113 1	13.58	81	F	0.036	0.000	0.000	0.0	0.76	10.02
		Type: Pond			Label: N11-G1	POND			
113 Structure	13.58							48.43	
113 Total IN	793.87							48.43	319.94
113 Total OUT								48.44	308.90
112 to 113 Routing					0.040	0.309			
114 1	69.11	86	F	0.044	0.000	0.000	0.0	5.33	68.06
		Type: Pond			Label: N11-G	POND			
114 Structure	69.11							53.76	
114 Total IN	862.98							53.76	316.71
114 Total OUT								53.76	308.16
113 to 114 Routing					0.053	0.304			

Civil Software Design -- SEDCAD+ Version 3.1  
Copyright (C) 1987-1992. Pamela J. Schwab. All rights reserved.

Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR1A User: JGS  
Date: 08-19-1993 Time: 08:38:04  
N11-G SERIES PONDS 10-YR., 24-HR. STORM  
Storm: 2.10 inches, 10 year-24 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====

LAST POND ONLY TABLE

=====

J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
Total Contributing Drainage Area: 863.0 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

=====

Riser Diameter (in) -----  
Riser Height (ft) -----  
Barrel Diameter (in) -----  
Barrel Length (ft) -----  
Barrel Slope (%) -----  
Manning's n of Pipe -----  
Spillway Elevation -----  
  
Lowest Elevation of Holes -----  
# of Holes/Elevation -----  
  
Entrance Loss Coefficient -----  
Tailwater Depth (ft) -----  
  
Notch Angle (degrees) -----  
Weir Width (ft) -----  
  
Siphon Crest Elevation -----  
Siphon Tube Diameter (in) -----  
Siphon Tube Length (ft) -----  
Manning's n of Siphon -----  
Siphon Inlet Elevation -----  
Siphon Outlet Elevation -----  
  
Emergency Spillway Elevation 6746.0  
Crest Length (ft) 65.0  
Z:1 (Left and Right) 3 3  
Bottom Width (ft) 80.0

POND RESULTS:

Permanent  
Pool  
(ac-ft)

=====

19.7

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	53.76	316.71
OUT	53.76	308.16

Elevation	Peak Hydrograph Detention Time (hrs)
6747.4	0.13

\*\*\*\*\*

Civil Software Design -- SEDCAD+ Version 3.1  
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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR1A User: JGS  
Date: 08-19-1993 Time: 08:38:04  
N11-G SERIES PONDS 10-YR., 24-HR. STORM  
Storm: 2.10 inches, 10 year-24 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====  
POND INPUT/OUTPUT TABLE  
=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s)1: 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6787.0
Crest Length (ft)	60.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

POND RESULTS:

Permanent  
Pool  
(ac-ft)  
=====

18.6

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	42.58	362.87
OUT	42.58	324.42

Elevation	Peak Hydrograph Detention Time (hrs)
6788.6	0.20

\*\*\*\*\*

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1: 66.1 acres  
Total Contributing Drainage Area: 780.3 acres

#### DISCHARGE OPTIONS:

##### Emergency Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6775.5
Crest Length (ft)	55.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

#### POND RESULTS:

##### Permanent Pool (ac-ft)

=====

18.6

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	47.68	337.61
OUT	47.68	317.80

Elevation	Peak Hydrograph Detention Time (hrs)
6777.1	0.17

\*\*\*\*\*

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1: 13.6 acres  
Total Contributing Drainage Area: 793.9 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6764.0
Crest Length (ft)	65.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

POND RESULTS:

Permanent

	Pool (ac-ft)	
	=====	
	19.1	
	Runoff Volume (ac-ft)	Peak Discharge (cfs)

	IN	48.43	319.94
	OUT	48.44	308.90

	Peak Elevation	Hydrograph Detention Time (hrs)
	6765.5	0.12

\*\*\*\*\*  
J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
Total Contributing Drainage Area: 863.0 acres

#### DISCHARGE OPTIONS:

	Emergency Spillway
Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6746.0
Crest Length (ft)	65.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	80.0

POND RESULTS:

Permanent Pool (ac-ft)	
	=====
	19.7

Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	53.76 316.71
OUT	53.76 308.16

Peak Elevation	Hydrograph Detention Time (hrs)
6747.4	0.13

\*\*\*\*\*

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR1A User: JGS  
Date: 08-19-1993 Time: 08:38:04  
N11-G SERIES PONDS 10-YR., 24-HR. STORM  
Storm: 2.10 inches, 10 year-24 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====  
ELEVATION-DISCHARGE TABLE  
=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s): 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6775.00	0.0	0.0
6775.50	0.0	0.0
6776.00	0.0	0.0
6776.50	0.0	0.0
6777.00	0.0	0.0
6777.50	0.0	0.0
6778.00	0.0	0.0
6778.50	0.0	0.0
6779.00	0.0	0.0
6779.50	0.0	0.0
6780.00	0.0	0.0
6780.50	0.0	0.0
6781.00	0.0	0.0
6781.50	0.0	0.0
6782.00	0.0	0.0
6782.50	0.0	0.0
6783.00	0.0	0.0
6783.50	0.0	0.0
6784.00	0.0	0.0
6784.50	0.0	0.0
6785.00	0.0	0.0
6785.50	0.0	0.0
6786.00	0.0	0.0
6786.50	0.0	0.0
6787.00	0.0	0.0
6787.50	51.4	51.4
6787.80	82.3	82.3
6787.90	102.2	102.2
6788.00	123.6	123.6
6788.50	294.0	294.0
6789.00	468.8	468.8
6789.50	690.1	690.1
6790.00	945.3	945.3
6790.50	1253.4	1253.4
6791.00	1595.1	1595.1

6791.50	1969.6	1969.6
6792.00	2376.3	2376.3
*****		

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1: 66.1 acres  
Total Contributing Drainage Area: 780.3 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6765.00	0.0	0.0
6765.50	0.0	0.0
6766.00	0.0	0.0
6766.50	0.0	0.0
6767.00	0.0	0.0
6767.50	0.0	0.0
6768.00	0.0	0.0
6768.50	0.0	0.0
6769.00	0.0	0.0
6769.50	0.0	0.0
6770.00	0.0	0.0
6770.50	0.0	0.0
6771.00	0.0	0.0
6771.50	0.0	0.0
6772.00	0.0	0.
6772.50	0.0	0.0
6773.00	0.0	0.0
6773.50	0.0	0.0
6774.00	0.0	0.0
6774.50	0.0	0.0
6775.00	0.0	0.0
6775.50	0.0	0.0
6776.00	52.9	52.9
6776.30	84.7	84.7
6776.40	104.8	104.8
6776.50	126.4	126.4
6777.00	295.9	295.9
6777.50	474.4	474.4
6778.00	699.1	699.1
6778.50	959.9	959.9
6779.00	1269.7	1269.7
6779.50	1613.0	1613.0
6780.00	1989.2	1989.2
*****		

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1: 13.6 acres  
Total Contributing Drainage Area: 793.9 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)

6745.00	0.0	0.0
6745.50	0.0	0.0
6746.00	0.0	0.0
746.50	0.0	0.0
6747.00	0.0	0.0
6747.50	0.0	0.0
6748.00	0.0	0.0
6748.50	0.0	0.0
6749.00	0.0	0.0
6749.50	0.0	0.0
6750.00	0.0	0.0
6750.50	0.0	0.0
6751.00	0.0	0.0
6751.50	0.0	0.0
6752.00	0.0	0.0
6752.50	0.0	0.0
6753.00	0.0	0.0
6753.50	0.0	0.0
6754.00	0.0	0.0
6754.50	0.0	0.0
6755.00	0.0	0.0
6755.50	0.0	0.0
6756.00	0.0	0.0
6756.50	0.0	0.0
6757.00	0.0	0.0
6757.50	0.0	0.0
6758.00	0.0	0.0
6758.50	0.0	0.0
759.00	0.0	0.0
759.50	0.0	0.0
6760.00	0.0	0.0
6760.50	0.0	0.0
6761.00	0.0	0.0
6761.50	0.0	0.0
6762.00	0.0	0.0
6762.50	0.0	0.0
6763.00	0.0	0.0
6763.50	0.0	0.0
6764.00	0.0	0.0
6764.50	49.9	49.9
6764.80	79.9	79.9
6764.90	99.6	99.6
6765.00	120.9	120.9
6765.50	292.1	292.1
6766.00	463.3	463.3
6766.50	681.1	681.1
6767.00	930.8	930.8
6767.50	1237.2	1237.2
6768.00	1577.2	1577.2
6768.50	1950.1	1950.1
6769.00	2355.2	2355.2
6769.50	2792.2	2792.2
6770.00	3260.8	3260.8

J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1:

69.1 acres

Total Contributing Drainage Area: 863.0 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6730.00	0.0	0.0
6730.50	0.0	0.0
6731.00	0.0	0.0
6731.50	0.0	0.0
6732.00	0.0	0.0
6732.50	0.0	0.0
6733.00	0.0	0.0
6733.50	0.0	0.0
6734.00	0.0	0.0
6734.50	0.0	0.0
6735.00	0.0	0.0
6735.50	0.0	0.0
6736.00	0.0	0.0
6736.50	0.0	0.0
6737.00	0.0	0.0
6737.50	0.0	0.0
6738.00	0.0	0.0
6738.50	0.0	0.0
6739.00	0.0	0.0
6739.50	0.0	0.0
6740.00	0.0	0.0
6740.50	0.0	0.0
6741.00	0.0	0.
6741.50	0.0	0.0
6742.00	0.0	0.0
6742.50	0.0	0.0
6743.00	0.0	0.0
6743.50	0.0	0.0
6744.00	0.0	0.0
6744.50	0.0	0.0
6745.00	0.0	0.0
6745.50	0.0	0.0
6746.00	0.0	0.0
6746.50	57.0	57.0
6746.80	91.1	91.1
6746.90	113.6	113.6
6747.00	137.8	137.8
6747.50	332.5	332.5
6748.00	526.5	526.5
6748.50	772.9	772.9
6749.00	1054.6	1054.6
6749.50	1399.5	1399.5
6750.00	1781.4	1781.4
6750.50	2199.2	2199.2
6751.00	2652.0	2652.0
6751.50	3139.4	3139.4
6752.00	3660.9	3660.9

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR1A User: JGS  
Date: 08-19-1993 Time: 08:38:04  
N11-G SERIES PONDS 10-YR., 24-HR. STORM  
Storm: 2.10 inches, 10 year-24 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====  
ELEVATION-AREA-CAPACITY-DISCHARGE TABLE  
=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s)1: 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

SW#1: Emergency Spillway

Elev	Stage	Area	Capacity	Discharge
	(ft)	(ac)	(ac-ft)	(cfs)
6775.00	0.00	0.65	0.00	0.00
6775.50	0.50	0.70	0.34	0.00
6776.00	1.00	0.75	0.70	0.00
6776.50	1.50	0.81	1.09	0.00
77.00	2.00	0.87	1.51	0.00
77.50	2.50	0.93	1.96	0.00
6778.00	3.00	0.99	2.44	0.00
6778.50	3.50	1.05	2.95	0.00
6779.00	4.00	1.11	3.49	0.00
6779.50	4.50	1.18	4.06	0.00
6780.00	5.00	1.25	4.67	0.00
6780.50	5.50	1.34	5.32	0.00
6781.00	6.00	1.44	6.01	0.00
6781.50	6.50	1.53	6.75	0.00
6782.00	7.00	1.64	7.55	0.00
6782.50	7.50	1.74	8.39	0.00
6783.00	8.00	1.85	9.29	0.00
6783.50	8.50	1.96	10.24	0.00
6784.00	9.00	2.07	11.25	0.00
6784.50	9.50	2.19	12.31	0.00
6785.00	10.00	2.31	13.44	0.00
6785.50	10.50	2.44	14.62	0.00
6786.00	11.00	2.58	15.88	0.00
6786.50	11.50	2.72	17.21	0.00
6787.00	12.00	2.87	18.61	0.00
6787.50	12.50	3.02	20.08	51.43
6787.80	12.80	3.11	21.00	82.28
6787.90	12.90	3.14	21.31	102.22
6788.00	13.00	3.17	21.62	123.60
6788.50	13.50	3.33	23.25	294.02
8.59	13.59	3.33	23.55	324.42
6,89.00	14.00	3.49	24.95	468.83
6789.50	14.50	3.65	26.74	690.08
6790.00	15.00	3.82	28.61	945.29
6790.50	15.50	4.00	30.56	1253.36

Peak Stage

6791.00	16.00	4.18	32.61	1595.08
6791.50	16.50	4.37	34.74	1969.59
6792.00	17.00	4.56	36.98	2376.33

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1:	66.1 acres
Total Contributing Drainage Area:	780.3 acres

SW#1: Emergency Spillway

Elev	Stage	Area (ft)	Capacity (ac)	Discharge (ac-ft)
------	-------	--------------	------------------	----------------------

6765.00	0.00	1.26	0.00	0.00
6765.50	0.50	1.30	0.64	0.00
6766.00	1.00	1.35	1.30	0.00
6766.50	1.50	1.39	1.99	0.00
6767.00	2.00	1.44	2.69	0.00
6767.50	2.50	1.48	3.42	0.00
6768.00	3.00	1.53	4.17	0.00
6768.50	3.50	1.57	4.95	0.00
6769.00	4.00	1.62	5.75	0.00
6769.50	4.50	1.67	6.57	0.00
6770.00	5.00	1.72	7.42	0.00
6770.50	5.50	1.78	8.29	0.00
6771.00	6.00	1.83	9.20	0.00
6771.50	6.50	1.89	10.13	0.00
6772.00	7.00	1.95	11.08	0.00
6772.50	7.50	2.00	12.07	0.00
6773.00	8.00	2.06	13.09	0.00
6773.50	8.50	2.12	14.13	0.00
6774.00	9.00	2.19	15.21	0.00
6774.50	9.50	2.25	16.32	0.00
6775.00	10.00	2.31	17.46	0.00
6775.50	10.50	2.38	18.63	0.00      Stage of SW#1
6776.00	11.00	2.45	19.84	52.93
6776.30	11.30	2.49	20.58	84.69
6776.40	11.40	2.50	20.83	104.81
6776.50	11.50	2.51	21.08	126.38
6777.00	12.00	2.58	22.35	295.90
6777.06	12.06	2.58	22.51	317.80      Peak Stage
6777.50	12.50	2.65	23.66	474.42
6778.00	13.00	2.72	25.00	699.12
6778.50	13.50	2.79	26.38	959.88
6779.00	14.00	2.86	27.80	1269.66
6779.50	14.50	2.94	29.25	1613.03
6780.00	15.00	3.01	30.73	1989.17

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1:	13.6 acres
Total Contributing Drainage Area:	793.9 acres

SW#1: Emergency Spillway

Elev	Stage (ft)	Area (ac)	Capacity (ac-ft)	Discharge (cfs)
6745.00	0.00	0.46	0.00	0.00
6745.50	0.50	0.48	0.24	0.00
6746.00	1.00	0.50	0.48	0.00
6746.50	1.50	0.53	0.74	0.00
6747.00	2.00	0.55	1.01	0.00
6747.50	2.50	0.57	1.29	0.00
6748.00	3.00	0.60	1.58	0.00
6748.50	3.50	0.62	1.89	0.00
6749.00	4.00	0.65	2.21	0.00
6749.50	4.50	0.67	2.54	0.00
6750.00	5.00	0.70	2.88	0.00
6750.50	5.50	0.73	3.24	0.00
6751.00	6.00	0.75	3.61	0.00
6751.50	6.50	0.78	3.99	0.00
6752.00	7.00	0.81	4.39	0.00
6752.50	7.50	0.84	4.80	0.00
6753.00	8.00	0.87	5.23	0.00
6753.50	8.50	0.90	5.67	0.00
6754.00	9.00	0.93	6.12	0.00
6754.50	9.50	0.96	6.60	0.00
6755.00	10.00	0.99	7.08	0.00
6755.50	10.50	1.02	7.59	0.00
6756.00	11.00	1.06	8.11	0.00
6756.50	11.50	1.09	8.65	0.00
6757.00	12.00	1.13	9.20	0.00
6757.50	12.50	1.17	9.78	0.00
6758.00	13.00	1.20	10.37	0.00
6758.50	13.50	1.24	10.98	0.00
6759.00	14.00	1.28	11.61	0.00
6759.50	14.50	1.32	12.26	0.00
6760.00	15.00	1.36	12.93	0.00
6760.50	15.50	1.41	13.63	0.00
6761.00	16.00	1.45	14.34	0.00
6761.50	16.50	1.50	15.08	0.00
6762.00	17.00	1.55	15.84	0.00
6762.50	17.50	1.60	16.63	0.00
6763.00	18.00	1.65	17.44	0.00
6763.50	18.50	1.70	18.28	0.00
6764.00	19.00	1.75	19.14	0.00
6764.50	19.50	1.80	20.03	49.94
6764.80	19.80	1.83	20.57	79.90
6764.90	19.90	1.84	20.75	99.64
6765.00	20.00	1.85	20.94	120.85
6765.50	20.50	1.91	21.88	292.14
6765.55	20.55	1.91	21.97	308.90
6766.00	21.00	1.97	22.85	463.27
6766.50	21.50	2.04	23.85	681.09
6767.00	22.00	2.10	24.89	930.79
6767.50	22.50	2.17	25.95	1237.15
6768.00	23.00	2.23	27.05	1577.21
6768.50	23.50	2.30	28.19	1950.10
6769.00	24.00	2.37	29.36	2355.23
6769.50	24.50	2.44	30.56	2792.22
6770.00	25.00	2.51	31.80	3260.82

Stage of SW#1

Peak Stage

## N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
 Total Contributing Drainage Area: 863.0 acres

## SW#1: Emergency Spillway

Elev	Stage	Area (ac)	Capacity (ac-ft)	Discharge (cfs)
6730.00	0.00	0.56	0.00	0.00
6730.50	0.50	0.60	0.29	0.00
6731.00	1.00	0.65	0.60	0.00
6731.50	1.50	0.70	0.94	0.00
6732.00	2.00	0.75	1.30	0.00
6732.50	2.50	0.80	1.69	0.00
6733.00	3.00	0.85	2.10	0.00
6733.50	3.50	0.91	2.54	0.00
6734.00	4.00	0.96	3.01	0.00
6734.50	4.50	1.02	3.50	0.00
6735.00	5.00	1.08	4.03	0.00
6735.50	5.50	1.10	4.58	0.00
6736.00	6.00	1.13	5.13	0.00
6736.50	6.50	1.15	5.70	0.00
6737.00	7.00	1.18	6.29	0.00
6737.50	7.50	1.20	6.88	0.00
6738.00	8.00	1.23	7.49	0.00
6738.50	8.50	1.25	8.11	0.00
6739.00	9.00	1.28	8.74	0.00
6739.50	9.50	1.30	9.39	0.00
6740.00	10.00	1.33	10.04	0.00
6740.50	10.50	1.37	10.72	0.00
6741.00	11.00	1.42	11.42	0.00
6741.50	11.50	1.46	12.14	0.00
6742.00	12.00	1.51	12.88	0.00
6742.50	12.50	1.56	13.65	0.00
6743.00	13.00	1.60	14.44	0.00
6743.50	13.50	1.65	15.25	0.00
6744.00	14.00	1.70	16.09	0.00
6744.50	14.50	1.75	16.95	0.00
6745.00	15.00	1.80	17.84	0.00
6745.50	15.50	1.85	18.75	0.00
6746.00	16.00	1.91	19.69	0.00
6746.50	16.50	1.96	20.66	56.97
6746.80	16.80	2.00	21.26	91.15
6746.90	16.90	2.01	21.46	113.64
6747.00	17.00	2.02	21.66	137.79
6747.44	17.44	2.02	22.55	308.16
6747.50	17.50	2.07	22.68	332.49
6748.00	18.00	2.13	23.73	526.50
6748.50	18.50	2.19	24.81	772.87
6749.00	19.00	2.24	25.92	1054.65
6749.50	19.50	2.30	27.05	1399.52
6750.00	20.00	2.36	28.22	1781.39
6750.50	20.50	2.43	29.42	2199.15
6751.00	21.00	2.50	30.65	2652.01
6751.50	21.50	2.58	31.92	3139.41
6752.00	22.00	2.65	33.23	3660.94

APPENDIX C

N11-G1 SEDCAD+ (INPUT AND OUTPUT)

100-YEAR, 6-HOUR STORM EVENT

CIVIL SOFTWARE DESIGN

SEDCAD+ Version 3

N11-G SERIES PONDS 100-YR., 6-HR. STORM

by

Name: JGS

Company Name: PEABODY COAL COMPANY  
File Name: C:\SEDCAD3\K-MINE\N11GR2A

Date: 08-19-1993



Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR2A User: JGS  
Date: 08-19-1993 Time: 08:38:44  
N11-G SERIES PONDS 100-YR., 6-HR. STORM  
Storm: 2.40 inches, 100 year- 6 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====  
SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE  
=====

-Hydrology-

JBS SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base- Flow (cfs)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
111 1	714.23	82	F	0.422	0.000	0.000	0.0	55.07	666.89
		Type: Pond			Label: N11-G3 POND				
111 Structure	714.23							55.07	
111 Total IN	714.23							55.07	666.89
111 Total OUT								55.07	606.49
112 1	66.06	86	F	0.029	0.000	0.000	0.0	6.40	118.51
		Type: Pond			Label: N11-G2 POND				
112 Structure	66.06							61.47	
112 Total IN	780.29							61.47	630.50
112 Total OUT								61.47	598.74
111 to 112 Routing					0.031	0.307			
113 1	13.58	81	F	0.036	0.000	0.000	0.0	0.99	19.43
		Type: Pond			Label: N11-G1 POND				
113 Structure	13.58							62.46	
113 Total IN	793.87							62.46	602.88
113 Total OUT								62.46	578.03
112 to 113 Routing					0.040	0.309			
114 1	69.11	86	F	0.044	0.000	0.000	0.0	6.69	123.99
		Type: Pond			Label: N11-G POND				
114 Structure	69.11							69.15	
114 Total IN	862.98							69.15	601.20
114 Total OUT								69.15	579.43
113 to 114 Routing					0.053	0.304			

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR2A User: JGS  
Date: 08-19-1993 Time: 08:38:44  
N11-G SERIES PONDS 100-YR., 6-HR. STORM  
Storm: 2.40 inches, 100 year- 6 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====

LAST POND ONLY TABLE

=====

J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
Total Contributing Drainage Area: 863.0 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

=====

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6746.0
Crest Length (ft)	65.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	80.0

POND RESULTS:

Permanent  
Pool  
(ac-ft)

=====

19.7

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	69.15	601.20
OUT	69.15	579.43

Elevation	Peak Hydrograph Detention Time (hrs)
6748.1	0.11

\*\*\*\*\*

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR2A User: JGS  
Date: 08-19-1993 Time: 08:38:44  
N11-G SERIES PONDS 100-YR., 6-HR. STORM  
Storm: 2.40 inches, 100 year- 6 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====

POND INPUT/OUTPUT TABLE

=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s)1: 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

=====

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6787.0
Crest Length (ft)	60.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

POND RESULTS:

Permanent  
Pool  
(ac-ft)

=====

18.6

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	55.07	666.89
OUT	55.07	606.49

Elevation	Peak Hydrograph Detention Time (hrs)
6789.3	0.18

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1: 66.1 acres  
Total Contributing Drainage Area: 780.3 acres

#### DISCHARGE OPTIONS:

##### Emergency Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6775.5
Crest Length (ft)	55.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

#### POND RESULTS:

##### Permanent Pool (ac-ft)

=====

18.6

	Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN	61.47	630.50
OUT	61.47	598.74

Elevation	Peak Hydrograph Detention Time (hrs)
6777.8	0.15

\*\*\*\*\*

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1: 13.6 acres  
Total Contributing Drainage Area: 793.9 acres

DISCHARGE OPTIONS:

Emergency  
Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6764.0
Crest Length (ft)	65.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	70.0

POND RESULTS:

Permanent

	Pool (ac-ft)
	=====
	19.1
	Runoff Peak Volume Discharge
	(ac-ft) (cfs)

	IN 62.46 602.88
	OUT 62.46 578.03

	Peak Hydrograph Elevation Detention Time
	(hrs)

	6766.3 0.11
--	-------------

\*\*\*\*\*  
J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
Total Contributing Drainage Area: 863.0 acres

#### DISCHARGE OPTIONS:

##### Emergency Spillway

Riser Diameter (in)	----
Riser Height (ft)	----
Barrel Diameter (in)	----
Barrel Length (ft)	----
Barrel Slope (%)	----
Manning's n of Pipe	----
Spillway Elevation	----
Lowest Elevation of Holes	----
# of Holes/Elevation	----
Entrance Loss Coefficient	----
Tailwater Depth (ft)	----
Notch Angle (degrees)	----
Weir Width (ft)	----
Siphon Crest Elevation	----
Siphon Tube Diameter (in)	----
Siphon Tube Length (ft)	----
Manning's n of Siphon	----
Siphon Inlet Elevation	----
Siphon Outlet Elevation	----
Emergency Spillway Elevation	6746.0
Crest Length (ft)	65.0
Z:1 (Left and Right)	3 3
Bottom Width (ft)	80.0

POND RESULTS:

Permanent Pool (ac-ft)	
	=====
19.7	

Runoff Volume (ac-ft)	Peak Discharge (cfs)
IN 69.15	601.20
OUT 69.15	579.43

Peak Elevation	Hydrograph Detention Time (hrs)
6748.1	0.11

\*\*\*\*\*

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR2A User: JGS  
Date: 08-19-1993 Time: 08:38:44  
N11-G SERIES PONDS 100-YR., 6-HR. STORM  
Storm: 2.40 inches, 100 year- 6 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====

ELEVATION-DISCHARGE TABLE

=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s)1: 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6775.00	0.0	0.0
6775.50	0.0	0.0
6776.00	0.0	0.0
6776.50	0.0	0.0
6777.00	0.0	0.0
6777.50	0.0	0.0
6778.00	0.0	0.0
6778.50	0.0	0.0
6779.00	0.0	0.0
6779.50	0.0	0.0
6780.00	0.0	0.0
6780.50	0.0	0.0
6781.00	0.0	0.0
6781.50	0.0	0.0
6782.00	0.0	0.0
6782.50	0.0	0.0
6783.00	0.0	0.0
6783.50	0.0	0.0
6784.00	0.0	0.0
6784.50	0.0	0.0
6785.00	0.0	0.0
6785.50	0.0	0.0
6786.00	0.0	0.0
6786.50	0.0	0.0
6787.00	0.0	0.0
6787.50	51.4	51.4
6787.80	82.3	82.3
6787.90	102.2	102.2
6788.00	123.6	123.6
6788.50	294.0	294.0
6789.00	468.8	468.8
6789.50	690.1	690.1
6790.00	945.3	945.3
6790.50	1253.4	1253.4
6791.00	1595.1	1595.1

6791.50	1969.6	1969.6
6792.00	2376.3	2376.3

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1: 66.1 acres  
Total Contributing Drainage Area: 780.3 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6765.00	0.0	0.0
6765.50	0.0	0.0
6766.00	0.0	0.0
6766.50	0.0	0.0
6767.00	0.0	0.0
6767.50	0.0	0.0
6768.00	0.0	0.0
6768.50	0.0	0.0
6769.00	0.0	0.0
6769.50	0.0	0.0
6770.00	0.0	0.0
6770.50	0.0	0.0
6771.00	0.0	0.0
6771.50	0.0	0.0
6772.00	0.0	0.
6772.50	0.0	0.0
6773.00	0.0	0.0
6773.50	0.0	0.0
6774.00	0.0	0.0
6774.50	0.0	0.0
6775.00	0.0	0.0
6775.50	0.0	0.0
6776.00	52.9	52.9
6776.30	84.7	84.7
6776.40	104.8	104.8
6776.50	126.4	126.4
6777.00	295.9	295.9
6777.50	474.4	474.4
6778.00	699.1	699.1
6778.50	959.9	959.9
6779.00	1269.7	1269.7
6779.50	1613.0	1613.0
6780.00	1989.2	1989.2

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1: 13.6 acres  
Total Contributing Drainage Area: 793.9 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
-----------	--------------------------	-----------------------

6745.00	0.0	0.0
6745.50	0.0	0.0
6746.00	0.0	0.0
'46.50	0.0	0.0
6747.00	0.0	0.0
6747.50	0.0	0.0
6748.00	0.0	0.0
6748.50	0.0	0.0
6749.00	0.0	0.0
6749.50	0.0	0.0
6750.00	0.0	0.0
6750.50	0.0	0.0
6751.00	0.0	0.0
6751.50	0.0	0.0
6752.00	0.0	0.0
6752.50	0.0	0.0
6753.00	0.0	0.0
6753.50	0.0	0.0
6754.00	0.0	0.0
6754.50	0.0	0.0
6755.00	0.0	0.0
6755.50	0.0	0.0
6756.00	0.0	0.0
6756.50	0.0	0.0
6757.00	0.0	0.0
6757.50	0.0	0.0
6758.00	0.0	0.0
6758.50	0.0	0.0
'59.00	0.0	0.0
59.50	0.0	0.0
6760.00	0.0	0.0
6760.50	0.0	0.0
6761.00	0.0	0.0
6761.50	0.0	0.0
6762.00	0.0	0.0
6762.50	0.0	0.0
6763.00	0.0	0.0
6763.50	0.0	0.0
6764.00	0.0	0.0
6764.50	49.9	49.9
6764.80	79.9	79.9
6764.90	99.6	99.6
6765.00	120.9	120.9
6765.50	292.1	292.1
6766.00	463.3	463.3
6766.50	681.1	681.1
6767.00	930.8	930.8
6767.50	1237.2	1237.2
6768.00	1577.2	1577.2
6768.50	1950.1	1950.1
6769.00	2355.2	2355.2
6769.50	2792.2	2792.2
6770.00	3260.8	3260.8

J1, B1, S4  
N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1:

69.1 acres

Total Contributing Drainage Area: 863.0 acres

Elevation	Emergency Spillway (cfs)	Total Discharge (cfs)
6730.00	0.0	0.0
6730.50	0.0	0.0
6731.00	0.0	0.0
6731.50	0.0	0.0
6732.00	0.0	0.0
6732.50	0.0	0.0
6733.00	0.0	0.0
6733.50	0.0	0.0
6734.00	0.0	0.0
6734.50	0.0	0.0
6735.00	0.0	0.0
6735.50	0.0	0.0
6736.00	0.0	0.0
6736.50	0.0	0.0
6737.00	0.0	0.0
6737.50	0.0	0.0
6738.00	0.0	0.0
6738.50	0.0	0.0
6739.00	0.0	0.0
6739.50	0.0	0.0
6740.00	0.0	0.0
6740.50	0.0	0.0
6741.00	0.0	0.
6741.50	0.0	0.1
6742.00	0.0	0.0
6742.50	0.0	0.0
6743.00	0.0	0.0
6743.50	0.0	0.0
6744.00	0.0	0.0
6744.50	0.0	0.0
6745.00	0.0	0.0
6745.50	0.0	0.0
6746.00	0.0	0.0
6746.50	57.0	57.0
6746.80	91.1	91.1
6746.90	113.6	113.6
6747.00	137.8	137.8
6747.50	332.5	332.5
6748.00	526.5	526.5
6748.50	772.9	772.9
6749.00	1054.6	1054.6
6749.50	1399.5	1399.5
6750.00	1781.4	1781.4
6750.50	2199.2	2199.2
6751.00	2652.0	2652.0
6751.50	3139.4	3139.4
6752.00	3660.9	3660.9

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Company Name: PEABODY COAL COMPANY  
Filename: C:\SEDCAD3\K-MINE\N11GR2A User: JGS  
Date: 08-19-1993 Time: 08:38:44  
N11-G SERIES PONDS 100-YR., 6-HR. STORM  
Storm: 2.40 inches, 100 year- 6 hour, SCS Type II  
Hydrograph Convolution Interval: 0.1 hr

=====  
ELEVATION-AREA-CAPACITY-DISCHARGE TABLE  
=====

J1, B1, S1  
N11-G3 POND

Drainage Area from J1, B1, S1, SWS(s)1: 714.2 acres  
Total Contributing Drainage Area: 714.2 acres

SW#1: Emergency Spillway

Elev	Stage	Area	Capacity	Discharge
	(ft)	(ac)	(ac-ft)	(cfs)
6775.00	0.00	0.65	0.00	0.00
6775.50	0.50	0.70	0.34	0.00
6776.00	1.00	0.75	0.70	0.00
6776.50	1.50	0.81	1.09	0.00
77.00	2.00	0.87	1.51	0.00
77.50	2.50	0.93	1.96	0.00
6778.00	3.00	0.99	2.44	0.00
6778.50	3.50	1.05	2.95	0.00
6779.00	4.00	1.11	3.49	0.00
6779.50	4.50	1.18	4.06	0.00
6780.00	5.00	1.25	4.67	0.00
6780.50	5.50	1.34	5.32	0.00
6781.00	6.00	1.44	6.01	0.00
6781.50	6.50	1.53	6.75	0.00
6782.00	7.00	1.64	7.55	0.00
6782.50	7.50	1.74	8.39	0.00
6783.00	8.00	1.85	9.29	0.00
6783.50	8.50	1.96	10.24	0.00
6784.00	9.00	2.07	11.25	0.00
6784.50	9.50	2.19	12.31	0.00
6785.00	10.00	2.31	13.44	0.00
6785.50	10.50	2.44	14.62	0.00
6786.00	11.00	2.58	15.88	0.00
6786.50	11.50	2.72	17.21	0.00
6787.00	12.00	2.87	18.61	0.00
6787.50	12.50	3.02	20.08	51.43
6787.80	12.80	3.11	21.00	82.28
6787.90	12.90	3.14	21.31	102.22
6788.00	13.00	3.17	21.62	123.60
6788.50	13.50	3.33	23.25	294.02
79.00	14.00	3.49	24.95	468.83
6,89.31	14.31	3.49	26.06	606.49
6789.50	14.50	3.65	26.74	690.08
6790.00	15.00	3.82	28.61	945.29
6790.50	15.50	4.00	30.56	1253.36

Peak Stage

6791.00	16.00	4.18	32.61	1595.08
6791.50	16.50	4.37	34.74	1969.59
6792.00	17.00	4.56	36.98	2376.33

\*\*\*\*\*

J1, B1, S2  
N11-G2 POND

Drainage Area from J1, B1, S2, SWS(s)1: 66.1 acres  
Total Contributing Drainage Area: 780.3 acres

SW#1: Emergency Spillway

Elev	Stage	Area	Capacity	Discharge
(ft)	(ac)	(ac-ft)		(cfs)

6765.00	0.00	1.26	0.00	0.00
6765.50	0.50	1.30	0.64	0.00
6766.00	1.00	1.35	1.30	0.00
6766.50	1.50	1.39	1.99	0.00
6767.00	2.00	1.44	2.69	0.00
6767.50	2.50	1.48	3.42	0.00
6768.00	3.00	1.53	4.17	0.00
6768.50	3.50	1.57	4.95	0.00
6769.00	4.00	1.62	5.75	0.00
6769.50	4.50	1.67	6.57	0.00
6770.00	5.00	1.72	7.42	0.00
6770.50	5.50	1.78	8.29	0.00
6771.00	6.00	1.83	9.20	0.00
6771.50	6.50	1.89	10.13	0.00
6772.00	7.00	1.95	11.08	0.00
6772.50	7.50	2.00	12.07	0.00
6773.00	8.00	2.06	13.09	0.00
6773.50	8.50	2.12	14.13	0.00
6774.00	9.00	2.19	15.21	0.00
6774.50	9.50	2.25	16.32	0.00
6775.00	10.00	2.31	17.46	0.00
6775.50	10.50	2.38	18.63	0.00      Stage of SW#1
6776.00	11.00	2.45	19.84	52.93
6776.30	11.30	2.49	20.58	84.69
6776.40	11.40	2.50	20.83	104.81
6776.50	11.50	2.51	21.08	126.38
6777.00	12.00	2.58	22.35	295.90
6777.50	12.50	2.65	23.66	474.42
6777.78	12.78	2.65	24.40	598.74      Peak Stage
6778.00	13.00	2.72	25.00	699.12
6778.50	13.50	2.79	26.38	959.88
6779.00	14.00	2.86	27.80	1269.66
6779.50	14.50	2.94	29.25	1613.03
6780.00	15.00	3.01	30.73	1989.17

\*\*\*\*\*

J1, B1, S3  
N11-G1 POND

Drainage Area from J1, B1, S3, SWS(s)1: 13.6 acres  
Total Contributing Drainage Area: 793.9 acres

SW#1: Emergency Spillway

Elev	Stage (ft)	Area (ac)	Capacity (ac-ft)	Discharge (cfs)
7745.00	0.00	0.46	0.00	0.00
7745.50	0.50	0.48	0.24	0.00
6746.00	1.00	0.50	0.48	0.00
6746.50	1.50	0.53	0.74	0.00
6747.00	2.00	0.55	1.01	0.00
6747.50	2.50	0.57	1.29	0.00
6748.00	3.00	0.60	1.58	0.00
6748.50	3.50	0.62	1.89	0.00
6749.00	4.00	0.65	2.21	0.00
6749.50	4.50	0.67	2.54	0.00
6750.00	5.00	0.70	2.88	0.00
6750.50	5.50	0.73	3.24	0.00
6751.00	6.00	0.75	3.61	0.00
6751.50	6.50	0.78	3.99	0.00
6752.00	7.00	0.81	4.39	0.00
6752.50	7.50	0.84	4.80	0.00
6753.00	8.00	0.87	5.23	0.00
6753.50	8.50	0.90	5.67	0.00
6754.00	9.00	0.93	6.12	0.00
6754.50	9.50	0.96	6.60	0.00
6755.00	10.00	0.99	7.08	0.00
6755.50	10.50	1.02	7.59	0.00
6756.00	11.00	1.06	8.11	0.00
6756.50	11.50	1.09	8.65	0.00
6757.00	12.00	1.13	9.20	0.00
6757.50	12.50	1.17	9.78	0.00
6758.00	13.00	1.20	10.37	0.00
6758.50	13.50	1.24	10.98	0.00
6759.00	14.00	1.28	11.61	0.00
6759.50	14.50	1.32	12.26	0.00
6760.00	15.00	1.36	12.93	0.00
6760.50	15.50	1.41	13.63	0.00
6761.00	16.00	1.45	14.34	0.00
6761.50	16.50	1.50	15.08	0.00
6762.00	17.00	1.55	15.84	0.00
6762.50	17.50	1.60	16.63	0.00
6763.00	18.00	1.65	17.44	0.00
6763.50	18.50	1.70	18.28	0.00
6764.00	19.00	1.75	19.14	0.00
6764.50	19.50	1.80	20.03	49.94
6764.80	19.80	1.83	20.57	79.90
6764.90	19.90	1.84	20.75	99.64
6765.00	20.00	1.85	20.94	120.85
6765.50	20.50	1.91	21.88	292.14
6766.00	21.00	1.97	22.85	463.27
6766.26	21.26	1.97	23.38	578.03
6766.50	21.50	2.04	23.85	681.09
6767.00	22.00	2.10	24.89	930.79
6767.50	22.50	2.17	25.95	1237.15
6768.00	23.00	2.23	27.05	1577.21
6768.50	23.50	2.30	28.19	1950.10
6769.00	24.00	2.37	29.36	2355.23
6769.50	24.50	2.44	30.56	2792.22
6770.00	25.00	2.51	31.80	3260.82

Stage of SW#1

Peak Stage

## N11-G POND

Drainage Area from J1, B1, S4, SWS(s)1: 69.1 acres  
 Total Contributing Drainage Area: 863.0 acres

## SW#1: Emergency Spillway

Elev	Stage	Area (ac)	Capacity (ac-ft)	Discharge (cfs)
6730.00	0.00	0.56	0.00	0.00
6730.50	0.50	0.60	0.29	0.00
6731.00	1.00	0.65	0.60	0.00
6731.50	1.50	0.70	0.94	0.00
6732.00	2.00	0.75	1.30	0.00
6732.50	2.50	0.80	1.69	0.00
6733.00	3.00	0.85	2.10	0.00
6733.50	3.50	0.91	2.54	0.00
6734.00	4.00	0.96	3.01	0.00
6734.50	4.50	1.02	3.50	0.00
6735.00	5.00	1.08	4.03	0.00
6735.50	5.50	1.10	4.58	0.00
6736.00	6.00	1.13	5.13	0.00
6736.50	6.50	1.15	5.70	0.00
6737.00	7.00	1.18	6.29	0.00
6737.50	7.50	1.20	6.88	0.00
6738.00	8.00	1.23	7.49	0.00
6738.50	8.50	1.25	8.11	0.00
6739.00	9.00	1.28	8.74	0.00
6739.50	9.50	1.30	9.39	0.00
6740.00	10.00	1.33	10.04	0.00
6740.50	10.50	1.37	10.72	0.00
6741.00	11.00	1.42	11.42	0.00
6741.50	11.50	1.46	12.14	0.00
6742.00	12.00	1.51	12.88	0.00
6742.50	12.50	1.56	13.65	0.00
6743.00	13.00	1.60	14.44	0.00
6743.50	13.50	1.65	15.25	0.00
6744.00	14.00	1.70	16.09	0.00
6744.50	14.50	1.75	16.95	0.00
6745.00	15.00	1.80	17.84	0.00
6745.50	15.50	1.85	18.75	0.00
6746.00	16.00	1.91	19.69	0.00
6746.50	16.50	1.96	20.66	56.97
6746.80	16.80	2.00	21.26	91.15
6746.90	16.90	2.01	21.46	113.64
6747.00	17.00	2.02	21.66	137.79
6747.50	17.50	2.07	22.68	332.49
6748.00	18.00	2.13	23.73	526.50
6748.11	18.11	2.13	23.96	579.43
6748.50	18.50	2.19	24.81	772.87
6749.00	19.00	2.24	25.92	1054.65
6749.50	19.50	2.30	27.05	1399.52
6750.00	20.00	2.36	28.22	1781.39
6750.50	20.50	2.43	29.42	2199.15
6751.00	21.00	2.50	30.65	2652.01
6751.50	21.50	2.58	31.92	3139.41
6752.00	22.00	2.65	33.23	3660.94