DESIGN REPORT

Sedimentation Structure

N11-G2

Kayenta Mine

Navajo County, Arizona

PEABODY COAL COMPANY

~~COF~~
DELET.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
18782
JAMES GARY
SCHLENVOGT
Date Signed.....
ARIZONA, U.S.A.

SEP 08 1993

DESIGN REPORT

Sedimentation Structure

N11-G2

Kayenta Mine

Navajo County, Arizona

PEABODY COAL COMPANY

TABLE OF CONTENTS

Introduction

Sedimentation Structure N11-G2 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-G2 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-G2 which is located in series with sedimentation structures N11-G, N11-G1, 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-G2 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 24-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-G2 has a 66.1-acre drainage area.

Design Analyses

General

Structure N11-G2 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 24 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-G2 is located in series with structures N11-G, N11-G1, and N11-G3. Structure N11-G2 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-G2 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 24-Hour Storm	100-Year 6-Hour Storm
1.	Water Course Length, L	0.057 mi	0.057 mi
2.	Elevation Difference, H	22 ft	22 ft
3.	Time of Concentration, Tc	0.029 hr	0.029 hr
4.	SCS Curve Number	86	86
5.	Rainfall Depth	2.1 in	2.4 in
6.	Drainage Area	66.06 ac	780.29 ac

Hydraulics

The SEDCAD+ 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-G2 hydraulics table:

N11-G2 HYDRAULICS TABLE

	Units	10-Yr, 24-Hr Storm	100-Yr, 6-Hr Storm
Initial Reservoir Volume Condition		Empty	Full to emergency spillway elevation
Inflow			
Peak Flow	cfs	337.6	630.5
Volume	ac-ft	5.1*	61.5
Storage			
Peak Stage	msl	N/A	6777.8
Emerg. Spillway Elev.	msl	6775.5	6775.5
Peak Storage	ac-ft	N/A	24.4
Storage Capacity	ac-ft	18.6	18.6
Outflow			
Peak Flow	cfs	N/A	598.7
Spillway Elevation	msl	6775.5	6775.5
Embankment Crest Elev.	msl	6780.0	6780.0
Peak Stage	msl	---	6777.8
Freeboard	ft	---	2.2
Emergency Spillway Channel			
Flow Depth	ft	---	2.3
Critical Velocity	fps	---	6.3
Mannings "n"	---	---	0.056
Width	ft	---	70
Outflow Channel			
Slope	%	---	14.0
Normal Velocity	fps	---	9.1
Normal Depth	ft	---	0.9
Mannings "n"	---	---	0.056

*Inflow volume for the drainage area between structures N11-G3 and N11-G2.

Emergency Spillway and Outlet Channel

The emergency spillway and outlet channel for N11-G2 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 Width	70 ft.
Channel Length (Spillway)	55 ft.
(Outflow)	180 ft.
Side Slopes (Horizontal to Vertical) . .	3:1 or flatter
Average Slope (Spillway)	0 %
Maximum Slope (Outflow)	14 %
Spillway Elevation	6775.5

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-G2 is designed to contain approximately 18.63 acre-feet.

The calculations for the sediment load entering Structure N11-G2 were made utilizing the Revised Universal Soil Loss Equation with the following parameters:

1. Rainfall Factor, R 40
2. Soil Erodibility Factor, K 0.38
3. Slope Factor, LS 7.84
4. Cover Factor, C 0.72
5. Erosion Control Factor, P 0.34

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-G2 does have sufficient storage by itself; however, the structure upstream contributes excess runoff downstream to N11-G2, 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-G2

Project: N11-G2 Pond

Time of Concentration:

Elevation Difference = 6787 - 6765 = 22 ft.

Watercourse Length = 300 ft. = 0.057 mi

Tc = [11.9(W.L.)^3/(E.D.)]^0.385 = 0.029 hr

SCS Curve Number:

Cover Type	Soil Group	CN	Area (Acres)	CN*Area
Disturbed	B	86	65.39	5623.5
Pinon-Juniper	D	83	0.67	55.6
			66.06	5679.1

Weighted CN = 5679.1/66.06 = 85.97 = Use 86

Drainage Basin Area:

66.06 acres 0.10 sq. miles

SEDCAD Utility - Routing Parameter:

K = 0.031 hr

X = 0.307 hr

Revised USLE Calculations:

Project: N11-G2 Pond

Soil Erodibility Factor:

Soil Type	Soil Group	K	Area (Acres)	K * Area
3C	D	0.16	0.10	0.016
3D	D	0.15	0.57	0.086
Newly Reclaimed	B	0.38	65.39	24.848
			66.06	24.950

Weighted k = 24.950/66.06 = 0.38

Slope Factor:

Length (ft)	Elev. Diff (ft)	Slope (%)	M	Theta (Degrees)	LS (L/72.6)^M*[17.2Sin(Theta)-0.55]
700	118	16.86	0.6	9.57	9.00
750	120	16.00	0.6	9.09	8.80
900	125	13.89	0.6	7.91	8.23
500	65	13.00	0.6	7.41	5.31
				Avg. LS =	7.84

Cover and Practice Factors:

Cover Type	Cover (%)	Canopy (%)	Area (Acres)	C	C * Area	P	P * Area
Pinon-Juniper	40	25	0.67	0.14	0.09	1.0	0.67
Newly Reclaimed	--	--	65.39	0.725	47.41	0.336	21.97
			66.06		47.50		22.64

Weighted C = 47.50/66.06 = 0.72

Weighted P = 22.64/66.06 = 0.34

Rainfall Factor : R = 40

Revised USLE Calculations:

A = R * K * LS * C * P

A = 40 * 0.38 * 7.84 * 0.72 * 0.34 = 29.17 tons/acre

Sediment Inflow Rate:

DA = 66.06

SDR = 0.95

SI = (A * DA * SDR * 94)/192,400 = 0.89 acre-feet/year

TRAPEZOIDAL CHANNEL ANALYSIS
CRITICAL DEPTH COMPUTATION

August 19, 1993
N11-G2 POND SPILLWAY 100-YR., 6-HR. STORM

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Flow Rate (cubic feet per second).....	598.7
Manning's Roughness Coefficient (n-value).....	0.0560
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).....	1.29
Critical Slope (feet per foot).....	0.0[illegible]
Flow Velocity (feet per second).....	6.2[illegible]
Froude Number.....	1.000
Velocity Head (feet).....	0.61
Energy Head (feet).....	1.90
Cross-Sectional Area of Flow (square feet).....	95.30
Top Width of Flow (feet).....	77.74

==========

SEDCAD+ RIPRAP CHANNEL DESIGN

N11-G2 POND SPILLWAY 100-YR.,6-HR. STORM

INPUT VALUES:

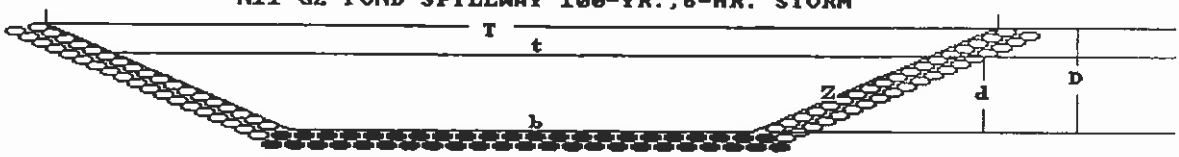
Shape	TRAPEZOIDAL	
Discharge	598.74 cfs	
Slope	14.00 %	
Sideslopes (L and R)	3.00:1	3.00:1
Bottom Width	70.00 feet	
Freeboard	1 ft	

RESULTS:

Steep Slope Design - PADER Method

Depth	0.91 ft
with Freeboard	1.91 ft
Top Width	75.44 ft
with Freeboard	81.44 ft
Velocity	9.08 fps
Cross Sectional Area	65.95 sq ft
Hydraulic Radius	0.87 ft
Manning's n	0.056
Froude Number	1.71
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-G2 POND SPILLWAY 100-YR.,6-HR. STORM



Riprap - Steep Slope Design - PADER Method

Discharge	= 598.74 cfs		Depth (d)	= 0.91	w/ Freeboard: (D = 1.91) ft
Bottom (b)	= 70.00 ft		Top width (t)	= 75.44	(T = 81.44) ft
Side slopes (Z)	= 3.0:1(L) 3.0:1(R)		Velocity	= 9.08 fps	
Bed Slope	= 14.00 %		Hydraulic Radius	= 0.87 ft	
Manning's n	= 0.056		Froude number	= 1.71	

Dmax = 0.94 ft (11.25 in)
D50 = 0.75 ft (9.00 in)
D10 = 0.25 ft (3.00 in)

APPENDIX B

N11-G2 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

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

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

Peak Elevation	Hydrograph Detention Time (hrs)
6747.4	0.13

****

Civil Software Design -- SEDCAD+ Version 3.1

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

Peak Elevation	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

Peak Elevation	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

****

Civil Software Design -- SEDCAD+ Version 3.1

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)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
777.00	0.0	0.0
777.50	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
89.00	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	0.0
6772.50	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	0.0
6776.30	84.7	52.9
6776.40	104.8	84.7
6776.50	126.4	104.8
6777.00	295.9	126.4
6777.50	474.4	295.9
6778.00	699.1	474.4
6778.50	959.9	699.1
6779.00	1269.7	959.9
6779.50	1613.0	1269.7
6780.00	1989.2	1613.0
		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
6746.50	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
6759.00	0.0	0.0
6759.50	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	0.0
6764.80	79.9	49.9
6764.90	99.6	79.9
6765.00	120.9	99.6
6765.50	292.1	120.9
6766.00	463.3	292.1
6766.50	681.1	463.3
6767.00	930.8	681.1
6767.50	1237.2	930.8
6768.00	1577.2	1237.2
6768.50	1950.1	1577.2
6769.00	2355.2	1950.1
6769.50	2792.2	2355.2
6770.00	3260.8	2792.2
		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	0.0
6741.50	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	0.0
6746.80	91.1	57.0
6746.90	113.6	91.1
6747.00	137.8	113.6
6747.50	332.5	137.8
6748.00	526.5	332.5
6748.50	772.9	526.5
6749.00	1054.6	772.9
6749.50	1399.5	1054.6
6750.00	1781.4	1399.5
6750.50	2199.2	1781.4
6751.00	2652.0	2199.2
6751.50	3139.4	2652.0
6752.00	3660.9	3139.4
		3660.9

****

Civil Software Design -- SEDCAD+ Version 3.1

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 (ft)	Area (ac)	Capacity (ac-ft)	Discharge (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	
6777.00	2.00	0.87	1.51	0.00	
6777.50	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	Stage of SW#1
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	
6788.59	13.59	3.33	23.55	324.42	Peak Stage
6789.00	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	

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 (ft)	Area (ac)	Capacity (ac-ft)	Discharge (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	
6777.06	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	Stage of SW#1
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	Peak Stage
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	

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 (ft)	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	Stage of SW#1
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	Peak Stage
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-G2 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

Civil Software Design -- SEDCAD+ Version 3.1

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			

Civil Software Design -- SEDCAD+ Version 3.1

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

Peak Elevation	Hydrograph Detention Time (hrs)
6748.1	0.11

****

Civil Software Design -- SEDCAD+ Version 3.1

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

Peak Elevation	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

Peak Elevation	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 Volume (ac-ft)	Peak Discharge (cfs)
IN	62.46	602.88
OUT	62.46	578.03

Peak Elevation	Hydrograph 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

****

Civil Software Design -- SEDCAD+ Version 3.1

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
77.00	0.0	0.0
77.50	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
39.00	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	0.0
6772.50	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	0.0
6776.30	84.7	52.9
6776.40	104.8	84.7
6776.50	126.4	104.8
6777.00	295.9	126.4
6777.50	474.4	295.9
6778.00	699.1	474.4
6778.50	959.9	699.1
6779.00	1269.7	959.9
6779.50	1613.0	1269.7
6780.00	1989.2	1613.0
		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
6746.50	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
6759.00	0.0	0.0
6759.50	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.[illegible]
6741.50	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	0.0
6746.80	91.1	57.0
6746.90	113.6	91.1
6747.00	137.8	113.6
6747.50	332.5	137.8
6748.00	526.5	332.5
6748.50	772.9	526.5
6749.00	1054.6	772.9
6749.50	1399.5	1054.6
6750.00	1781.4	1399.5
6750.50	2199.2	1781.4
6751.00	2652.0	2199.2
6751.50	3139.4	2652.0
6752.00	3660.9	3139.4
		3660.9

Civil Software Design -- SEDCAD+ Version 3.1

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 (ft)	Area (ac)	Capacity (ac-ft)	Discharge (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	
6777.00	2.00	0.87	1.51	0.00	
6777.50	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	Stage of SW#1
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	
6789.00	14.00	3.49	24.95	468.83	
6789.31	14.31	3.49	26.06	606.49	Peak Stage
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	

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 (ft)	Area (ac)	Capacity (ac-ft)	Discharge (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)	
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	Stage of SW#1
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	Peak Stage
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	

****

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

SW#1: Emergency Spillway

Elev	Stage (ft)	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	Stage of SW#1
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	Peak Stage
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	

****