

INSPECTION REPORT

J28-SL Sewage Lagoon

Temporary Impoundment Structure

Kayenta Mine

Navajo County, Arizona

For

PEABODY WESTERN COAL COMPANY



Revised 03/07/00

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## INTRODUCTION

Sewage Lagoon Structure J28-SL is an earthen embankment, consisting of four partially incised cells which make-up the J28-SL impoundment. The structure was designed and constructed in approximately 1983 by Peabody Western Coal Company as a temporary impoundment structure to contain sewage wastewater at the Kayenta Mine. The location of Structure J28-SL and its watershed boundary are shown on Exhibit 1, Drawing No. 85400 (Sheet M-9), Drawing No. 85405, and Drawing No. 85408. The site-specific general construction plans are shown on the attached Exhibit 1.

This inspection report contains information specific to Structure J28-SL. Mine-wide design, construction, and reclamation information is presented in the "General Report, Kayenta and Black Mesa Mines, Navajo County, Arizona, for Peabody Western 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 49, "Sediment and Water Control Facility Plan" and "Sedimentation Ponds and Impoundments" sections.

## SYSTEM OPERATION

Sewage waste disposal at J28-SL consists of a very typical sewage lagoon treatment system whereby wastewater gravity flows into the upper cell or Pond (A). Once Pond A is filled, wastewater flows through an overflow weir trough and manhole into the next pond (Pond B), and so on, until it reaches Pond D. Waste is prevented from discharging from the ponds by elevated berms surrounding the lagoon system. Historically, only Pond A holds waste water, while Ponds B, C, and D hold minimal water or are dry. This report demonstrates that J28-SL Impoundment has the capacity to contain the 100-Year, 6-Hour Storm with no discharge. As such, no remedial work will be required for this structure.

## INSPECTION

The J28-SL site was inspected in December 1999 by a Registered Professional Engineer from Peabody Western Coal Company to assure that the existing structure is stable and no adverse conditions exist for this structure. A detailed geotechnical investigation was not performed, rather, the information in Chapter 6, Attachment D was utilized for embankment design to assure that the existing embankment configuration is stable.

## SITE DESCRIPTION

### LAND USE

The tributary area for structure J28-SL is limited to the ponds surface, basin, and crest. The total watershed area is 5.0 acres and is located in a small tributary of Moenkopi Wash. MSHA Dam, J16-A, is located downstream of the J28-SL structure.

## DESIGN ANALYSES

### GENERAL

Structure J28-SL was designed under the supervision of a Registered Professional Engineer from Peabody Western Coal Company. The design was performed in accordance with applicable 30 CFR 780 and 816 regulations of the United States Department of Interior, Office of Surface Mining (OSM) and included a review of available project files. The most current information contained in the Peabody Western Coal Company files includes topographic maps developed from aerial photography flown in 1993 and 1997 for Peabody Western Coal Company and was used in the analyses of the structure.

### STABILITY

Structure J28-SL is a category A-3 embankment. The structure consists of four partially incised impoundments (labeled Ponds A, B, C, & D). The slopes are approximately 3.0:1 (horizontal to vertical). Based on a maximum pond depth of 11 feet, these slopes are equal to or flatter than the recommended "worst case" embankment/foundation condition slopes in Table 3-6, Attachment D, Chapter 6; therefore, the side slopes will be stable.

## HYDROLOGY

The hydrologic analysis was completed using the computer program SEDCAD4 (see Appendices A and B).

Structure J28-SL is classified as a low hazard, Class A, structure (see Drawing No. 85408). In addition, the mine area is sparsely populated with no one living in the downstream floodplain. Each impoundment structure contains less than 20 acre-feet and is less than 20 vertical feet in depth. The J28-SL structure does not have a designed emergency spillway; however, adequate storage will be maintained in the lowest pond (Pond D) in the four pond series above the normal operating level to contain the storm run-off from the 100-year, 6-hour storm event, with no discharge through the Pond D overflow trough. To assure that adequate storm water storage volume is available, the maximum operating water level in Pond D will be maintained at or below elevation 6806.3. It is not anticipated that all ponds in the system will fill, however, if this happens, waste will be pumped from the last pond and held in a holding tank for proper disposal. Chapter 6 contains PWCC's dewatering equipment list and dewatering plan, etc. As stated previously, only Pond A has been noted to hold water in the past. The system is conservative since it assumes that Ponds A, B, & C are full at the time of the design storm event.

The following parameters were used in the hydrologic analysis:

		<u>100yr-6hr Storm</u>
1.	Water Course length, L	0.004 mi.
2.	Elevation Difference, H	0.6 ft
3.	Time of Concentration, T <sub>c</sub>	0.005 hr
4.	SCS Curve Number	95
5.	Rainfall Depth, 100-year, 6-hour storm	2.4 in
6.	Drainage Area	5.0 acres

The cumulative storage capacity for all four ponds, as measured from the bottom of each pond to the invert of their overflow troughs, is shown below.

Pond A	ac-ft	2.79
Pond B	ac-ft	0.53
Pond C	ac-ft	0.41
Pond D	ac-ft	3.12
<hr/>		
Total	ac-ft	6.85

The SEDCAD4 computer program was used to evaluate inflow to the impoundment structure. The initial conditions and results of the analysis for Pond D are summarized in the following table (supporting calculations are presented in Appendices A and B).

J28-SL POND D HYDROLOGY TABLE

	Units	100-Yr, 6-Hr Storm
<hr/> Initial Reservoir Volume Condition		Full to 6806.3
Inflow		
Peak Flow	cfs	12.2
Volume	ac-ft	0.78
Storage (Pond D)		
Peak Stage	msl	6807.8
Operational Elev.	msl	6806.3
Peak Op. Level Capacity	ac-ft	2.33
Pond D Storage Capacity	ac-ft	3.12
Storage Available for Stormwater	ac-ft	1.38
Top of Impoundment	msl	6809.8
Minimum Freeboard	ft	1.0

Notes: The Peak Operational Level Capacity figure reflects available pond storage up to the defined Operational Elevation of Pond D, the lowest pond in the four pond series. As indicated on the above table, Pond D will have 1.38 ac-ft of capacity always available for stormwater. The required runoff capacity is 0.78 ac-ft. (100-year, 6-hour storm).

#### INLET AND OUTLET STRUCTURES

Waste water gravity flows into Pond A of Structure J28-SL through a pipe from the adjacent Kayenta Mine Facilities. An overflow trough has been installed in each Pond to allow wastewater to discharge from Pond to Pond. An emergency overflow trough, manhole, and 6" diameter PVC discharge pipe are installed in Pond D's outlet; however, since 1983, no discharge has occurred. The discharging system is shown graphically on Exhibit 1.

\* \* \*

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

APPENDIX A	Hydrology Calculations
APPENDIX B	SEDCAD4 (Input and Output) 100-Year, 6-Hour Storm Event
Exhibit # 1	J28-SL Temporary Sewage Lagoon Structure

**APPENDIX A**  
**Hydrology Calculations**



**PEABODY WESTERN COAL COMPANY  
CALCULATED HYDROLOGIC DATA**

**PROJECT: J28 AREA**

**STRUCTURE: J28 Sewage Lagoon**

**TIME OF CONCENTRATION:**

Start Elevation (ft) = 6839.4  
End Elevation (ft) = 6838.8  
Elevation Difference, E (ft) = 0.6

Watercourse Length (ft) = 20  
Watercourse Length, L (mi) = 0.004

$T_c = (11.9L^3/E)^{0.385} =$  0.005 hours

**ROUTING PARAMETERS:**

Between structure routing parameters were calculated using the SCS Upland Method in SEDCAD4. Input and output parameters are shown on the SEDCAD4 printouts in Appendices C.

**SCS CURVE NUMBER:**

Cover Type	Soil Group	Curve Number	Area (acres)	CN*Area
Disturbed		95	5	475
TOTAL:			5	475

Weighted CN = Total CN\*Area/ Total Area = 95

**DRAINAGE BASIN AREA:**

5.0 Acres

## J28 SL SEWAGE LAGOON, POND A

Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)
6,829.10	0.010	0.000
6,829.60	0.128	0.029
6,830.00	0.310	0.114
6,830.10	0.314	0.145
6,830.60	0.336	0.307
6,831.10	0.359	0.481
6,831.60	0.382	0.666
6,832.10	0.406	0.863
6,832.60	0.431	1.073
6,833.10	0.456	1.294
6,833.60	0.483	1.529
6,834.10	0.510	1.777
6,834.60	0.542	2.040
6,835.10	0.574	2.319
6,835.60	0.586	2.609
6,835.90	0.594	2.786
6,836.10	0.621	2.907
6,836.60	0.688	3.234
6,837.10	0.759	3.596
6,837.60	0.834	3.994
6,837.90	0.880	4.251

## **J28 SL SEWAGE LAGOON, POND B**

Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)
6,819.70	0.010	0.000
6,820.00	0.260	0.032
6,820.70	0.285	0.223
6,821.70	0.322	0.526
6,822.70	0.361	0.867
6,823.70	0.403	1.249
6,824.70	0.447	1.673
6,825.00	0.460	1.809
6,825.70	0.483	2.139
6,826.70	0.518	2.639
6,827.70	0.553	3.175
6,828.70	0.590	3.746
6,829.50	0.620	4.230

## **J28 SL SEWAGE LAGOON, POND C**

Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)
6,808.90	0.010	0.000
6,809.90	0.249	0.103
6,810.00	0.290	0.130
6,810.90	0.324	0.406
6,811.90	0.363	0.749
6,812.90	0.405	1.133
6,813.90	0.449	1.560
6,814.90	0.495	2.032
6,815.00	0.500	2.082
6,815.90	0.532	2.546
6,816.90	0.569	3.097
6,817.90	0.608	3.685
6,818.90	0.647	4.313
6,819.70	0.680	4.844

**J28 SL SEWAGE LAGOON, POND D**Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)
6,799.30	0.010	0.000
6,799.80	0.144	0.032
6,800.00	0.240	0.070
6,800.30	0.251	0.144
6,800.80	0.269	0.274
6,801.30	0.288	0.413
6,801.80	0.308	0.562
6,802.30	0.329	0.721
6,802.80	0.339	0.888
6,803.30	0.350	1.061
6,803.80	0.360	1.238
6,804.30	0.371	1.421
6,804.80	0.427	1.620
6,805.00	0.450	1.708
6,805.30	0.461	1.844
6,805.80	0.481	2.080
6,806.30	0.501	2.325
6,806.80	0.521	2.581
6,807.30	0.541	2.846
6,807.80	0.560	3.121
6,808.30	0.584	3.407
6,808.80	0.610	3.706
6,809.30	0.627	4.015
6,809.80	0.650	4.334

## APPENDIX B

### SEDCAD4 (Input and Output) 100-Year, 6-Hour Storm Event

**PEABODY WESTERN**  
**KAYENTA MINE**  
**J28 SL SEWAGE LAGOON**

*100-year, 6-hour*

DJK

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## ***General Information***

### ***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.400 inches



## Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Sewage Lagoons

#1

Null

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	5.000	5.000	12.19	0.78

***Structure Detail:***

*Structure #1 (Null)*

*Sewage Lagoons*

Need Map

## ***Subwatershed Hydrology Detail:***

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	5.000	0.005	0.000	0.000	95.000	F	12.19	0.778
$\Sigma$		5.000						12.19	0.778