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**CASTLE
GATE**
COAL COMPANY

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DIVISION OF
OIL, GAS & MINING

July 9, 1987

FILE COPY

Mr. Lowell Braxton
Division of Oil, Gas and Mining
3 Triad Center
Suite 350
Salt Lake City, UT 84180-1203

RE: Pond 007 Spillway Modification

Dear Mr. Braxton:

Enclosed are calculations and drawings which justify the modification of Pond 007 into a drop inlet. As you recall pond 007 was 13,000 cubic feet in deficit for a 10 yr/24 hr storm event pond volume.

Pursuant to UMC 817.49(i), I propose modifying the existing 24" trickle tube into a 24" drop inlet. The drop inlet at elevation 96.0 will raise the pond volume to correct the deficit in pond 007. These design details demonstrate that the pond has adequate volume to treat the runoff from a 10 yr/24 hr storm event and safely pass a peak flow from a 25 yr, 24 hr precipitation event.

This submittal is paged to insert into Chapter III of the Mid Term Permit Review revised MRP. When approved, pages 11, 12 and 13 can be removed and these new pages inserted into the MRP.

The following responses address Mr. Dave Cline's concerns in a memo dated March 31, 1987.

STATEMENT: Contour drawing of Pond 007 was not adequate to determine stage storage relationship of Pond because contour lines 96, 98 and 100 do not connect.

RESPONSE: Exhibit 11.4 has been revised to close contours 96, 98, 100.

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STATEMENT: A stage volume curve with supporting calculations should be submitted.

RESPONSE: Castle Gate Coal calculated the volume at elevation 96.0 to be 35,500 FT. and is shown on Exhibit 11.4. Castle Gate calculated this volume by using the standard end-area method.

STATEMENT: Castle Gate must submit a more detailed design for spillway. . . The following information must be submitted:

- 1) Stage discharge curve.
- 2) Elevations of spillway crest, riser and barrel spillway outlet, maximum water elevation.
- 3) Manning N, Ke Kf Kp values.

RESPONSE:

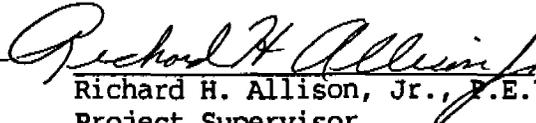
- 1) A stage discharge curve is not needed as the design is calculated using peak discharge. This is a more conservative method as storage is not taken into consideration in determining head.
- 2) See Exhibit 11.4.
- 3) See page 12 of this submittal.

STATEMENT: Pond 008 does not meet requirements of UMC 817.46. Therefore Castle Gate Coal must submit information listed above for Pond 007.

RESPONSE: Conversations with Mr. Dave Cline, since this memo was written, indicate that Pond 007 deficit of 2,200 cubic feet falls with acceptable design parameters for a structure of this size. Raising the spillway elevation by 3" would not be necessary and therefore, the present structure is adequate.

Castle Gate Coal will proceed with modification of Pond 007 as soon as approval is given by your office.

Sincerely,


Richard H. Allison, Jr., P.E.
Project Supervisor

RHA:dbw

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Pond 007

Pond 007 collects drainage from the old substation/storage area, the No. 4 portal facilities, a portion of the maintenance facilities, sub-basins HC 10, and HC 18, which could not be diverted. Table 3.3-2 is a summation of the required capacities.

Pond 007 with drop inlet has a constructed capacity of 35,500 ft³. This is the required capacity for a 10 year storm plus sediment storage. This basin is an excavated structure, shot partly out of solid rock.

Pond 007 discharges into Pond 008. A spillway is proposed to conduct excess flow. Designs are shown on Exhibit 3.3-5 Peak flow from drainage areas HC-10, HC-18 and 7.0 acres of disturbed area.

<u>Design</u>	<u>Q=CiA</u>
C = 0.30 for HC - 10 and HC - 18	
C = 0.45 for disturbed area (D.A.)	
i for Tc = 5 min. = 3.12 in./hr.	
A = HC - 10 - 6.2 ac.	
HC - 18 - 1.5 ac.	
D.A. - 7.0 ac.	
Q = D.A. - 9.8 cfs	
HC - 10 - 5.8 cfs	
HC - 18 - <u>1.4 cfs</u>	
TOTAL 17 cfs needed	

POND 007

Discharge Structure Design

The following calculations are based on the methodology found in Chapters 3 and 6 of the U.S. Soil Conservation Field Manual. The structure modifications are shown on Exhibit 11.4.

1. Determined the required Q from a 25 year/24 hour precipitation event:

From Section 3.1 page 10 of the MRP the required Q for the drop inlet design is 17 C.F.S.

2. Determine head required to pass 17 C.F.S. at Crest Elevation 96.0:

On page 57 of Chapter VII of the MRP Figure 7-3C is the S.C.S. Chart for determining inlet proportions and required head over inlet. A 24" drop inlet with .6 FT. of head over the crest elevation will pass the required 17 C.F.S.

3. Determine if existing 24" C.M.P. will pass the required 17 C.F.S. given the following:

$$Q_h = 17 \text{ C.F.S.}$$

$$h_h = .6 \text{ FT.}$$

$$H = 96.0 - 83.1 = 12.9 + .6 = 13.5 \text{ FT.}$$

$$N = \text{Mannings Coefficient} = .024 \text{ (Table 3-1 SCS Manual)}$$

$$K_p = .0423 \text{ FT./FT. of Pipe (Exhibit 3-4 of SCS Manual)}$$

$$K_m = K_e + K_{90} = .5 + .9 = 1.4 \text{ (Exhibit 3-8 of SCS Manual)}$$

$$a = 3.14 \text{ sq. ft. (x-section area of pipe)}$$

L = 281' (Exhibit 11.4 of M.R.P.)

and from the continuity principle

(eq. 3-12)

$$Q = a \sqrt{\frac{2gH}{1+K_m+K_pL}} = Q_{24" \text{ Pipe}} = 27.15 \text{ C.F.S.}$$

where Q = discharge-cfs
a = pipe area-sq.ft.
g = acceleration of gravity-ft/sec.²
H = elevation head differential-ft.
K_m = coefficient of minor losses
K_p = pipe friction coefficient
L = pipe length-ft.

$Q_p < Q_{24" \text{ pipe}}$ Therefore existing 24" pipe is adequate to pass the required 17 C.F.S.

4. Determine Elevation of freeboard:

Elevation of inlet...	96.0
plus elevation of head of water...	.6'
Elevation of water during 25 yr/24 hr storm event...	96.6
Freeboard required...	2.0
Required top of embankment elevation...	98.6

The top of the existing embankment is 99.0 FT. (From Exhibit 11.4). Therefore, the existing embankment is adequate for the drop inlet spillway. A diversion, in the form of a concrete slotted box culvert, is proposed for Pond 007. Design characteristics are shown on Figure 3.3-2.

Pond 008

Pond 008 has a drainage area which includes the maintenance area, Dog Flat storage site, the warehouse storage area, HC 12 and HC 13. Table 3.3-3 is a summation of the required capacities.

Pond 008 has a constructed capacity of 35,500 ft.³, which is what is needed to contain the 10 year event. Pond

008 is partially excavated and has an embankment.

Drainage from under sized Pond 007 is divered to Pond 008. A spillway is proposed to direct excess runoff to proposed Pond 009. The spillway, designed to pass the 25 year storm form the drainage areas of both Pond 007 and Pond 008 (see Exhibit 3.3-6 B for design detail).