

November 20, 1985

TO: Technical File

FROM: Rick P. Summers, Reclamation Hydrologist

RE: Review of Sedimentation Pond, Utah Fuel Co., Skyline Mine,
ACT 007/005 #9

Summary: As the result of a series of NOV's issued concerning the sediment pond and mine water discharging into the pond, an as-built survey of the sediment pond was requested and submitted on November 8, 1985. This drawing (TO-4-D-001) was used as a basis to review the sediment pond and determine the volume of mine water that the pond will currently handle within a 24 hour period.

The objectives of the review are: 1) review current pond volume, 2) evaluate peak flows expected to pond, and 3) evaluate the discharge structure. Following this evaluation, it was determined that the pond contains sufficient volume to treat the 240,000 gpd of mine water that was approved on July 12, 1985.

Peak flow values calculated by the Division were greater than those presented by Skyline (47 vs. 38 cfs for the 10 yr-24 hr event and 78 vs. 65 cfs for the 100 yr-24 hr event). The existing discharge structure was given a cursory review to determine if it will pass the design peak flow adequately. A thorough analysis could not be performed at this time due to inadequate drawings depicting the discharge structure design. Using several assumptions, it was found the the discharge structure may not be currently adequate.

Recommendation: Formalize approval for 240,00 gpd of mine water discharge into the existing sedimentation pond. Provide no comment to operator at this time concerning the peak flow values and the discharge structure design. It is suggested that the discrepencies found in this review are finalized and reviewed during the 5-year permit renewal which will be initiated by this office in 1986 and finalized in 1987.

Technical Body and Support: A memo dated 11-6-85 from Doug Johnson to Ketih Zobell (attached) describes the rational used to determine the original pond volume using the amount of sediment removed (and

the amount remaining in pond) during the recent pond cleanout. I feel a more reasonable approach would be to simply compare surveys of the pond before and after the cleanout operation. Following this line of reasoning, I found that the amount of sediment remaining in the pond is approximately 36,000 cubic feet (operator value was 50,301 cu. ft.). The operators approach yielded an existing pond volume of 351,867 cu. ft. whereas the as-built drawing of the original pond indicated a volume of 337,362 cubic feet. Subtracting the volume of runoff (169,300 cu. ft.) and the required sediment storage volume (135,500 cu. ft.) from the as-built volume yields 32,562 cu. ft. or 243,563.8 gallons which is greater than the approved volume of 240,000 gpd for mine water discharge. The operator's conclusion that 351,971 gallons are available for mine water discharge is questionable.

See attached calculations (4 pages).

cc: Lowell P. Braxton
Wayne Hedberg
Joe Helfrich

DEPARTMENTAL CORRESPONDENCE

Date May 31, 1984

Subject DOG M NOTICE OF VIOLATION N: 84-7-5-2, MAY 8, 1984

To Glen Zumwalt Dep't. _____

From Keith Zobell *KZ* Dep't. Engineering

On May 8, 1984 NOV N: 84-7-5-2 was issued by DOGM as a result of an inspection by Mining Field Specialist, Ken Wyatt. This NOV addresses three issues; (1) Failure to construct sediment control facilities in accordance with the approved design in the M&RP, (2) Failure to treat water discharged from disturbed areas on the underground mine so that it complies with all applicable state and federal water quality laws and regulations, and (3) Failure to construct sediment pond to prevent short-circuiting to the extent possible.

All three of these issues were discussed at the time that the NOV was issued. We felt that we were in full compliance with issues No. 1 & 2 and that issue No. 3 had been discussed with Utah State Dept. of Health and an approved plan of action to correct the deficiency was agreed upon in Sept. 1983.

Since May 8th, we have gathered the following information on the three issues raised in the NOV.

ISSUE NO. 1

On May 11, 1982 the sedimentation pond was surveyed. This survey showed that there is some small differences in configuration and placement of the pond. The major difference is in the slopes on the south side on the pond where the slope is nearly verticle^{sp}. This is a result of the south portion of the pond being in solid rock and the designed slope was not possible or practical in this type of material. The design capacity in the M&RP shows the pond is to contain 345,000 cubic feet. The as built survey shows the actual capacity to be 337,362 cubic feet or 97.8% of the original design capacity. We feel that an earthen structure built within 2.2% of design is acceptable and built as designed. Drawings showing the as built compared with the design are attached and certified by a registered professional Engineer.

ISSUE NO. 2

This issue revolves around the fact that on page 3-25 in volume 2 of the M&RP no mention is made to provide 24 hour retention storage for any mine water. However, on Page 3-42, volume 2 of the M&RP storage capacity for 24-hour retention of mine water is inferred. In both of these instances there appears to be some confusion in typographical errors and in how much the actual disturbed area of the mine site is.

In order to clear up this confusion the entire disturbed area of the mine site was surveyed. This survey excluded the UDOT road with its adjoining cut and fill slopes. This survey showed that the actual disturbed area on the mine site is 31.1 acres. The required volume for providing a theoretical 24-hour retention of the run off is 1.50 inches per acre X 31.1 acres = 169,272 cubic feet. The required volume for sediment storage is .10 ace feet X 31.1 acres = 135,472 cubic feet.

3.2.1 Ponds, Impoundments, and Dams

*Two sedimentation ponds are included in the design of the Skyline Mine plan. Each retention pond has been designed to provide adequate volume for sediment containment and also adequate volume for a theoretical 24-hour detention of runoff resultant of a 24-hour, 10 year rainstorm. The minesite sedimentation pond also contains additional volume to adequately treat mine water discharges. The location and design characteristics for each of these two ponds are described in the following.

Mine Site Sediment Pond

*A detention pond is located at the mine site adjacent to the crushing and truck loading station. It will detain surface runoff from the 31.1 acre disturbed mine site shown on Map 3-8. Precipitation from a 24-hour, 10 year rainstorm is expected to be 2.45 inches. After infiltration, surface runoff from a storm of this intensity should be 1.50 inches, based on the assumption that the land surface will be similar to gravel and dirt roads with SCS runoff curve numbers of about 90.

*The required volume for providing a theoretical detention of the runoff from a 10 year-24 hour storm is estimated as: 1.50 inches per acre x 31.1 acres = 169,340 cubic feet. The required volume for sediment storage is estimated as (0.10 acre-feet) x (31.1 acres) = 135,472 cubic feet. The combined volumes for 24 hour retention and sediment storage equal 304,812 cubic feet. The pond contains a volume of approximately 337,400 cubic feet from the spillway elevation of 8578.6 to a depth of 17 feet. The difference between the total pond volume of 337,400 cubic feet and that required for surface runoff retention of 169,340 cubic feet plus sediment storage of 135,472 cubic feet, leaves 32,588 cubic feet of storage available for retention of potential mine water discharge.

210,000 gpd

map of 11/20
*2437 * 24.50*
DOGM calc.
31,965 ft³
split difference
= 239,114.2
FHS

REPLACES

TEXT

* Denotes change or addition

DEPARTMENTAL CORRESPONDENCE

Date 6 November 1985

Subject Minesite Sedimentation Pond
 To Keith Zobell Dep't. _____
 From Doug Johnson Dep't _____

This memo shall serve to document the volume of the Skyline Minesite sedimentation pond as determined by aerographic methods and actual field surveys.

Early this summer the bottom of the pond was surveyed with a level and rod, accessing the level points by means of a boat. This survey indicated that there was 5346 cubic yards of sediment in the pond. At the end of August and beginning of September the pond was dredged using a dragline. By actual truck count, the material removed was 3483 cubic yards. Subtracting from what was measured in the pond originally, this means that 1863 cubic yards, or 50,301 cubic feet, of sediment could not be removed and was left in the pond.

The pond was flown on September 5, 1985, by Olympus Aerial Survey, Inc., of Salt Lake City. Olympus prepared a topography map of the pond using a two foot contour interval. That map is incorporated in the accompanying drawing, T0-4-D-001. At the time of Olympus' flight, the water remaining in the pond had a surface elevation of 8565.5. The contours shown inside that line on the drawing were arrived at by an actual field survey by Utah Fuel Company utilizing a level and rod, accessing the level points by means of a manbasket.

The volume of the pond using north-south cross sections is calculated as 301,566 cubic feet. Adding back in the 50,301 cubic feet of sediment not able to be removed gives a total actual volume of the pond of 351,867 cubic feet. The volume available for treatment of mine water is calculated as follows:

See memo 8/11/84
 inch 1, design 345,000.0
 Actual 337,362.0

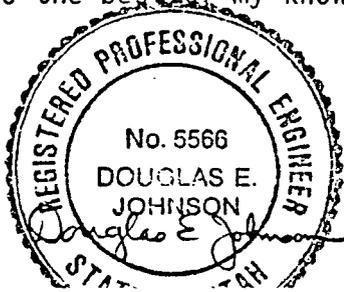
301,566	337,362	
50,301	-301,566	sed. left
<u>351,867</u>	<u>35,796.0</u>	
Total Volume of Pond	351,867	5/84 memo.
10 yr 24 hr Precipitation Event	-169,340	2 orig. volume
Sediment Storage	-135,472	
Available for Mine Water	47,055 cu.ft.	actual
x 7.48	32,550.0	gallons
351,971 gallons	243,474.0	gallons

RECEIVED

NOV 08 1985

DIVISION OF OIL
GAS & MINING

I certify that the referenced surveys and calculations are true and accurate to the best of my knowledge.



Douglas E. Johnson
 Douglas E. Johnson, P.E.
 Utah Registration 5566

Evaluate discharge structure:

Assumptions: references: DWG: ST 4D 010, 1-204-C (6-5-84), 1-207-C (6-22-82)

DIA. RISER = 48" = 4' Manning's n-value = 0.024
 (horizontal pipe)

DIA. horizontal = 30" = 2.5' Total ht. * = 11.1'

Ht. RISER = 10.42' gravity constant = 32.2 ft/sec²

Length of horizontal * = 65'

Entrance Coef. orifice =

$K_c = 1.0$

$K_b = 0.5$

$K_{f\text{ pipe}} = 2.04$

* NOTE: These inputs are largely estimates scaled from referenced drawings, better plans are needed to get precise values for Total ht. & length of horizontal. Also discharge condition at outlet into 72" bypass pipe was not evaluated.

Stage (ft. above inlet)	Q weir (cfs)	Q orifice (cfs)	Q pipe (cfs)
0	0	0	0
1	91.57	61.52	60.21
2	118.95	87.00	62.99
3	221.04	106.55	65.65
4	486.39	123.03	68.20
4.9 existing			70.42
5		137.55	70.61
6		150.68	73.05
7		162.75	75.35
8			77.59
9			79.76
10			81.88

NOTE: elev. of decant = 8577.1' + 0.9 proposed rise = 8578.0
 available head elevation: 8582.0 (pt. where flooding of loadout occurs).
 Thus, stage available = 4.0'

As-built of Sediment Pond in 6/54

reference: DWG 1-234-C (Revised 6-5-54) (1"=50')

Elev	Area (in ²)	Area (ft ²)	Volume (ft ³)	Volume ac-ft	Volume (cfs)
TOE Assume (8560')	5.49	13,725.0	361,023.75	8.29	2,700,457.65
High Water Assume elev 8577.1 (ft)	11.40	28,500			

Difference in Vols:

$$\text{Vol}_{\text{current}} - \text{Vol}_{6/54} = 333,122.4 - 361,023.75 \text{ ft}^3$$

$$= -27,901.35 \text{ ft}^3$$

Conclusions:

Summary Table:

	DOGMA* (ft ³)	Skyline (ft ³)	reference
Current volume (11/85)	333,122.4	301,566 ²⁾	1) 11/6/84 D. Johnson memo
As-built volume (6/54)	361,023.75	337,362 ²⁾	2) Memo: Zobe (to Zumbard) ^{May 31, 1984}
10yr-24hr volume	169,964.78	169,272.0 ³⁾	3) May 31, 1984 memo Zobe (to Zumbard)
Sediment Volume (3-yr. organic vol.)	137,214.0 ⁴⁾	135,471.6 ⁴⁾	4) 0.175/acre disturbed
10yr-24hr event	46.50 cfs	38 cfs ⁵⁾	
100yr-24hr event	77.17 cfs 75.71 cfs ⁶⁾	65 cfs ⁵⁾	6) using skyline inputs. 5) March 27, 1980 submitted in response to ACR Item 7
25yr-24hr event	58.52 cfs	not calculated by skyline.	
T _c (hrs)	0.0823 hr ⁷⁾		7) T _c calc using PEAK Program @ DOGM offices

* All DOGM column values calculated on 11/15/85.

Sediment Pond Drainage Calculations

Inputs & Assumptions

INPUT	DOGMA	Skyline	reference
Area =	137.21 m ² = 31.5 ac	31.1 ac	1) DWG No 1-101-e 2) PGM Digitized
Ppt 10-24 =	2.45 in.	2.45 in.	3) 5/31/84 memo Zobell to Zummel
CN =	90	89.97	1) Richardson et al. Clear Crk Sta. 1A) Ppt 3-25 revised 4/28/80. q mRP.
Hydr. length =	16.5" = 1650 ft.	Not found	2) Backcalculated, Given Q=2.44, P=24
Average Slope =	45.38%	Not found	3) DWG No. 1-101-C (Red 6/59) (1"=100')
Ppt 100yr-24hr	3.65	3.6	
Ppt 25yr-24hr	2.92	* not done	

Assume SCS Type II distribution.

Slope Calculation:

elev. contour	Length (in)	Length (ft)
8550	5.9	590
8575	13.4	1340
8600	19.85	1985
8625	28.4	2840
8650	37.1	3710
8675	42.7	4270
8700	47.2	4720
8725	27.6	2760
8750	19.3	1930
8775	7.6	760
Σ		24,905.00 ft.

30,

$$\% \text{ slope} = \left[\frac{(\text{contour interval})(\text{length of contours})}{(\text{Area in ft}^2)} \right] 100$$

$$= \left[\frac{(25' \times 24,905.0 \text{ ft})}{(31.5 \text{ ac})(43560 \text{ ft}^2/\text{ac})} \right] 100$$

$$= 0.45 = 45.38\% \text{ slope}$$

Reference

P. 7-11
National
Handbook
for Water
Data Acquisition
(U.S.G.S,
1977)

Project: Skyline sediment Pond

Date: Nov 15, 1985

Reviewer: R. Summers, Hydrology

- Objectives: 1) Review current pond volume (i.e. following recent sediment pond cleanout).
 2) evaluate peak flows expected to pond.
 3) evaluate discharge structure.

Reference: DWG. No. TO-4-D-001, 1" = 20', Nov. 8th, 1985
 (Current Pond Volume)

Elev.	Area in ²	Area (ft ²)	Mean Area (ft ²)	Volume (ft ³)	Cumul. Vol.	Comment
8559.2	0	0	1698.0 ft ²	1358.4	1.0	
8560	8.49	3396.0		7,032.0	14,064	1358.4
8562	26.67	10,668.0	12,424.0	24,848.0	15,422.4	
8564	35.45	14,160.0	15,288.0	30,576.0	40,270.4	
8566	40.99	16,396.0	17,236.0	34,472.0	70,846.4	
8568	45.19	18,076.0	19,096.0	38,192.0	105,318.4	
8570	50.29	20,116	20,852.0	41,704.0	143,510.4	
8572	53.97	21,588.0	22,584.0	45,168.0	185,244.4	
8574	58.95	23,580.0	24,720.0	49,440.0	230,382.4	
8576	64.65	25,860	26,650.0	53,300.0	279,822.4	
8577.1	68.60	27,440.0	28,084.0	56,168.0	333,122.4	MAX STOR
8578	71.82	28,728.0	29,772.0	59,544.0	387,290.4	
8580	77.04	30,816.0			448,834.4	

50, @ 8577.1' (MAX water elev.),
 storage = 333,122.4 ft³ = 7.65 AK-FT