STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM

DATE: July 30, 1979

TO: For Record

FROM: Gerald W. Stewart

SUBJECT: UNC Tailings Dam Breach

1. Mr. Dan Lopez, State Engineers Office, said that no written reports from the Corps of Engineers had been received by their office. Our office had ~~received~~ nothing either.

2. He noted that the crack in the dam was observed during his visit to the site on 24 and 25 of July. Also commented that a crack in the same area was known in Oct. 1978. On aerial photos the crack was visible and he was informed that it was 8" wide at the road surface of the dam and was ~~across~~ the road (~~perpendicular~~ to the dam face). This crack was filled with bentonite and operations were continued. No report was made to EID on this or any other cracks in the dam.

3. UNC is having Dames and Moore do the geo-testing of material from the dam. This will be in addition to the S H & B analysis and tests.

4. UNC has hired Jacobs Engineering of Calif. as a second consultant (independent of any involvement in the dam design and construction). Jacobs has hired Wahler & Co. for experts in dam design and construction.

5. Kaiser Engineering who did the final design and construction of the starter dam has organized a Board of Inquiry which is completely separate from UNC. This board will have three members; Appolonia (?) of Pittsburgh, Shannon and Wilson, Dames and More.

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MEMORANDUM FOR RECORD

UNC Tailings Dam Breach, July 16, 1979

EID was notified of the UNC tailings dam breach about 0730 on July 16, 1979, by Dr. Ted Brough (EID Milan office). He reported the loss of liquid and opening of the dam. Also he was going to the mill to inspect the site and take samples and photographs. Arrangements were made to have another member of the Milan office go to Gallup to take samples.

A team of four people from EID-Santa Fe departed for the mill site at 0945 July 16, 1979. Al Topp, Jerry Stewart, Tom Buhl and Jim Whiteman (State Engineer's office) formed the four man team. Photographs of the breach area and Rio Puerco were taken. Samples of both water and soil were obtained for analysis.

The following information was obtained from the mill operational people.

1. About 0500 shift personnel drove a vehicle across the tailings dam and did not observe any malfunctioning of the dam or suspicious areas.

2. Between 0610 and 0710 employee observed flow of water through the dam below the top, about midpoint of the dam. Tailings solution and material accumulated in the catchment area below the dam and about 0700 tailings solution flowed over the catchment dam into the arroyo. A small breach (10'-20' wide) of the catchment dam permitted the tailings solution to flow into the arroyo. Some solid material appeared to flow into the arroyo with the tailings solution.

3. UNC instituted a contingency plan for this event using the moving equipment on site and stopped the flow about 0750.

4. The mill was closed down about 0700 by mill management.

5. EID issued an order about 4:00 pm closing mill operations and requiring a report covering the following items:

a. Sequence of events leading to failure

b. Plans for reopening

c. Material spilled estimates
Dam inspection

d. Clean-up operations

6. The following observations and comments reflect the initial reaction to the breach.

a. Failure occurr on the front face with the initial action about 2/3 ofthe way up the front slope.

b. Material and tailings solutions moved out of the dam into the secondary catchment dam.

c. Secondary catchment dam filled and tailings solution overflowed the dam in a water sheet.

d. Secondary catchment dam gave way in about a 15 foot length and the solution and material flowed into the Rio Puerco ~~eteing~~ cutting a channel to the stream bottom.

e. Surge of tailings solution moved downstream passing through Gallup and possibly across the border into Arizona.

f. The tailings slurry was being discharged into the south tailings pond cell. Some cycloning of tailings was being accomplished on the east side of the tailings area.

g. Tailings solution was approximately at the maximum level that would allow meeting the 5' freeboard. Operation with each cell appears to be operated at the same maximum levels and then shifting to another cell.

h. The mill was probably operating at its maximum capacity based on pond operation.

i. The mill was preparing for the next lift of the dam and earth moving equipment was in the area and had been operating in and around the dam area.

j. At the failed end of the dam there was a cut in the hillside apparently for part of the abutment for the new lift.

k. Clay material from the dam core was strewn about in the breached area and toward the catchment dam. Larger chunks (boulder size) of the compacted clay were scattered throughout the breach and about halfway to thecatchment dam. Chunks were very solid, almost rock-like in hardness.

l. Loss of liquid from the pond apparently undercut the dam roadway and did not overtop the dam. The top 15 to 20 feet of the dam dropped into the liquid cut channel.

m. Flow of tailings material appeared to be only from one small part of the south end of the dam at the abutement area.

n. Initial on site estimate of liquid loss varied between 200-300 acre-feet.

o. Center dikes dividing the tailings pond into the sections were intact and there did not appear to be any communication between the ponds.

p. There had been some settling of the dam in the middle section which had tobe built up to keep the 5' freeboard. According to Whiteman (State Engineer's office) and Booth (S, H &B) this could be expected for this type of dam.

q. In building the dam lift, an area of the dam for a drainage blanket was authorized to use cycloned tailings sands. These had been deposited at the base of the dam. About 2 weeks ago a wet area (thought to be from sands drainage) developed at the south end downstream base of the dam. This was dragged out by earthmoving equipment to a dry condition. Equipment tracks in the area at the base of the dam appeared to be more recent than 2 weeks ago.

r. Considerable reaction was observed between the tailings liquid (pH of 1-1.5)and the dam material. This was manifested by considerable off gassing(bubbling) activity. This was observed downstream at 5 PM, Rt. 566 bridge, with a significant reaction still rapidly proceeding with considerable bubbling and gas release (gas was probably carbon dioxide).

s. Dr.Brough (EID Milan Office) was directed to obtain soil samples each1/2 mile downstream from the breached area to Rt. 566 bridge, and at the state line.

t. Booth (SH&B) stated that no monuments were placed in the initial dam section. Therefore there was no checks that could be made for dam movement.

u. Photos do not indicate a water line on the tailings sands at the dam. The tailings solution must have been above the junction of the sands and the dam which could indicate less than the 5' freeboard (no measurements could be made at that time). Beyond the south end abutement, the water line was clearly shown and considerably above the tailings sands.

7. Team departed the mill site at 4:30 p.m.