



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DCS
WASTE WM-24

APR 23 1980

MEMORANDUM FOR: Ross A. Scarano, Chief
Uranium Recovery Licensing Branch

Hubert J. Miller, Section Leader
Uranium Recovery Licensing Branch

FROM: Madonna E. Krug, Project Manager
Uranium Recovery Licensing Branch

SUBJECT: MEETING MINUTES - CYPRUS MINES CORPORATION
PROPOSED HANSEN PROJECT

Place and Date

NRC office in Silver Spring, Maryland, on April 17, 1980.

Attendees

NRC

Madonna E. Krug (Chairperson)
Hubert J. Miller
Eugene A. Trager
Kathleen Hamill
Ronald S. Kaufmann*
Giorgio N. Gnugnoli*
George C. Wu*

Cyprus Mines Corporation

Milt A. Thompson
Ron N. McDaniel
Keith E. Dyas

Wahler Associates

Jack G. Wulff
Dennis Buranek

Wyoming Mineral Corporation

Karl R. Schendel

*Part-time Attendees

Purpose

The meeting between the U. S. Nuclear Regulatory Commission (NRC) staff and Cyprus Mines Corporation representatives with their geotechnical consultants, Wahler Associates, was conducted to review unresolved technical questions concerning the tailings management system for the proposed Hansen Project. These technical concerns must be resolved before the NRC can complete preparation of the environmental assessment of the project.

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Background

The current proposal by Cyprus for tailings management involves the construction of a large, head-of-valley impoundment by constructing a dam with an ultimate height of 183 feet and a maximum crest length of about 3,550 feet, located about one mile east of the mill. The proposed above-grade impoundment is sized to store the tailings produced from processing approximately 20 (10^6) tons of ore over the 13 year life of the uranium mill. The required area for this disposal method is 192 acres. Tailings would be slurried (50% solids) to the disposal area. Excess impoundment liquid would be pumped to a raffinate pond and recycled, thus eliminating the need for evaporation ponds. Cyprus expects that the solids content of the tailings would increase to about 85% after one year.

For seepage control, the proposed impoundment would be lined where previous materials are present. The majority of the bottom surface would consist of the low permeability Echo Park Formation. The Echo Park contains interbedded gray to red-brown siltstone, sandstone, and claystone with conglomerate beds; also present are thin lenses of sand and gravel.

An evaluation of alternative, partially below-grade tailings impoundment systems had been performed by Cyprus at the request of the NRC and presented at the December 17, 1979, meeting. The two alternatives evaluated consist of a series of dams and excavated cells at the same proposed site locations. Both methods provide the total tailings disposal capacity of 10,800 acre-feet, and consist of three cells.

In Alternative 1, the cells would be cut approximately 150' deep. This amount of excavation would allow approximately 65% of the tailings to be disposed below-grade. The heights of the embankments would be 66' to 78' above the original grade. In Alternative 2, the cells would be cut approximately 110' deep. This shallower depth than Alternative 1 would result in the embankments being about 10' higher (i.e., embankment heights would range from 77' to 87' above the original grade). This amount of excavation would allow approximately 50% of the tailings to be disposed below-grade.

Discussion

The meeting participants discussed the proposed tailings management system and alternatives to resolve technical questions and concerns which have evolved during the NRC review since the last meeting with Cyprus on December 17, 1979. The agenda (Enclosure 1) established a

format for discussion. A list of questions (Enclosure 2) was distributed to focus discussion on the information which is needed to complete the NRC's environmental assessment report for the State of Colorado. These questions also identify information required to complete the radiological assessment of the proposed Hansen Project.

H. J. Miller stated that although the NRC review has not been completed a preliminary conclusion is that the single, above-grade impoundment (the primary proposal of Cyprus) would not be recommended to the State of Colorado, pending resolution of groundwater problems, for the following reasons:

1. Reduction of erosion potential of any embankments at the site appears to be possible by reducing height of embankments and steepness of slopes.
2. The multicell versus single cell impoundments allow reclamation "as you go."

As a result, it was recommended that Cyprus continue the evaluation of a three cell disposal concept.* However, there are two major problems associated with the three cell, partial below-grade alternatives: (1) on both the west and east sides of the Salt Creek valley site, large, ancient, massive slump block deposits (landslides) have been mapped, and (2) artesian groundwater conditions are present beneath the site at an estimated depth of from 120 feet at the upper portion of the site to 350 feet in the lower portion (on March 25, 1980 the NRC received an analysis of the potential for artesian uplift at the site). Thus, the meeting discussion centered on the information necessary to better characterize the proposed site to determine the extent to which these technical problems might limit below-grade disposal.

As a result of the meeting discussion, Cyprus agreed to provide the information outlined in Enclosure 3. The information would be provided in approximately two weeks to facilitate NRC's review.

(Note: In a telephone conversation after the meeting (on April 21, 1980) between R. N. McDaniel and E. A. Trager additional modifications in the impoundment design were discussed. Although the modifications are closely related to those that

*Additionally, Cyprus plans to examine an alternative involving excavation of one continuous, below-grade impoundment segmented within by embankments constructed from tailings. It appears this method might allow putting the tailings below-grade with substantially less earthwork than with the three cell impoundments.

have and are being considered by Cyprus, it appears they could be used to increase below-grade storage capacity substantially. For example, additional excavation in cells 2 and 3 (with 4:1 cut slopes) would substantially increase the below-grade volume available for storage of tailings. With such excavation the bottom of the impoundment would still be at a large distance from the confined groundwater. In addition, any underdrain system low point would be well defined. A similar modification would be to increase some/all cut slopes from 4:1 to 3:1 (or 3.5:1). Mr. McDaniel agreed that Cyprus would review the possibility of incorporating these changes.)

The current schedule date for providing a final environmental assessment report to the State of Colorado was given at the meeting as June 16, 1980. This mid-June date is dependent upon the amount of time needed by Cyprus to provide the required additional information (Enclosure 3). It is anticipated that another meeting between Cyprus and NRC might be useful after this additional information is provided. The first possible date for such a meeting was estimated by Cyprus to be May 1, 1980.

The list of commitments noted in this report (Enclosure 3) was read and initialed by the senior NRC and Cyprus representatives prior to adjournment.

J. G. Trageser, Jr.

for Madonna E. Krug, Project Manager
Uranium Recovery Licensing Branch
Division of Waste Management

Enclosures:

1. Agenda
2. Specific Questions
3. Commitments by Cyprus for
Additional Information

cc: Mr. Dick Gamewell, State of Colorado
Mr. Milt A. Thompson, Cyprus Mines Corp.
Mr. Todd Delaney, FCHA

AGENDA

- I. Tailings Management System and Alternatives Discussion
 - A. Mode of Tailings Disposal
 - B. Review of Site Characteristics and Disposal Design
 1. Possible Depth of Excavation for Below-Grade Disposal
 - a. Level of Echo Park Formation aquifer
 - b. Artesian uplift conditions
 - c. Landslide potential
 2. Seepage Reduction Alternatives
 - a. Liner design
 - b. Underdrain system
 3. Erosion Potential and Long-Term Stability
 - a. Drainage area
 - b. PMF estimation
 - c. Diversion of drainage (operational and after reclamation)
 - d. Reclamation cover design
- II. Radiological Parameters for Assessment
 - A. Review of Recent Calculations and Results by Cyprus
 - B. Review of Information Submitted
 - C. Determination of Further Information Requirements

SPECIFIC QUESTIONS

I. Tailings Management System and Alternatives Discussion

1. Identify the number and location of the groundwater monitoring holes for the Echo Park Formation aquifer at the tailings site.
2. What is the level of the groundwater at each hole identified in item #1? What variation is estimated for seasonal water level changes?
3. What drill logs are available for the holes identified in item #1 to document the groundwater levels?
4. Has a contour map showing the top of the confined aquifer been prepared?
5. The artesian uplift calculations show that the two below-grade alternatives do not meet a safety factor of 2. Have the critical depths been calculated for each of the three disposal cells?
6. Have alternatives other than the addition of overburden of counteract the uplift pressure been considered? These alternatives would include a reconfiguration of the excavations or dewatering.
7. What significant technical problems would be associated with dewatering the aquifer until sufficient tailings overburden would be placed in the cells? What treatment of the water would be necessary? Can the water be used at the mill for process water? What costs would be associated with interim aquifer dewatering? What is the estimated rate of dewatering the aquifer below the site?

8. Has characterization of the extent of landslide potential resulting from excavation been performed? What references and documentation are available to substantiate the potential? What calculations and estimations have been performed to establish the critical depth of excavation?
9. Has an underdrain system been considered to reduce seepage and provide structural stability after reclamation?
10. Has a contour map definition of the drainage area for the 3-cell disposal design been prepared? How was the 925 acres of drainage area calculated?
11. Has a PMF for each subdrainage point been estimated for the 3-cell disposal design for evaluating erosion potential?
12. What contouring and final slopes are proposed for the reclamation cover to reduce erosion potential? A topographic map of the final surface cover will be needed for review. The map should include the identification of all drainage divides for contributing drainage areas of concern.

II. Radiological Parameters

1. Clarify:

- a) Operational time and amount of ore processed by mill
 - b) Operational time and sequence for tailings cells
2. Verify dust control factors (p. 4, Att. B)
 3. Provide tailings cell location, volume, surface area (locations relative to base of yellowcake dryer stack) (Att. C).
 4. Clarify U activity in tailings (Att. D).
 5. Revise source location data (locations relative to base of yellowcake dryer stack) (Att. E).
 6. Revise receptor location data; outline restricted area fence on topographic map (locations relative to base of yellowcake dryer stack) (Att. F).
 7. Revise population distribution data (sectors centered on direction axes and population in each sector non-incremental); verify nearest resident. (Att. G).
 8. Revise meteorological data (relative data, add wind speed class 1 to 2, combine stability class F & G) (Att. H).
 9. Clarify grazing data for fraction of feed:
 - a) Pasture grazing
 - b) Stored stock grazing (p. 5)
(a + b = 1)

Commitments by Cyprus for Additional Information

1. Pumping tests will be conducted at the site to estimate the dewatering effort for temporarily depressurizing aquifer.
2. A contour map will be supplied to show the level of saturation zone for the Echo Park Formation.
3. The landslide potential will be further characterized.
4. If necessary, additional groundwater holes will be drilled to further characterize the site and supply information obtained from them. Cyprus will review with NRC on an informal basis the tests to be run to avoid any later problems about the scope of the program.
5. An estimate of the seasonal variations to the Echo Park groundwater level will be provided.
6. All the E-logs for the Echo Park groundwater, including geophysical logs, will be provided. Copies will be given to Fred C. Hart Associates (FCHA) and the NRC (including information previously given just to FCHA).
7. Further evaluation of using underdrains, i.e., the evaluation of the amenability of tailings to such draining.
8. The specific liner design will be provided (i.e., the program for inspection of the bottom of the impoundment to assure adequate confining materials and what steps will be taken to plug or line areas of high hydraulic conductivity that are discovered, such as fractures and sand lenses).
9. A contour map for the drainage area of the 3 cell design will be provided.
10. The Probable Maximum Flood (PMF) for the 3 cell design, as it would affect erosion on the reclaimed surface, will be calculated.
11. The water balance for the 3 cell design will be provided.
12. A topographic map of the final reclamation cover will be provided. The map will include the identification of all drainage divides and areas which will be protected by riprap, etc.
13. Documentation of all changes to the radiological parameters, as discussed during the meeting, will be provided.