

REBrowning

JUN 17 1981

rainfall. Acceptable wave runup calculation methods are given in "Shore Protection Manual," U. S. Army Coastal Engineering Research Center, 1977, and Army Corps of Engineers ETL 1110-2-221, "Wave Runup and Setup on Reservoir Embankments." In addition, exterior slope protection in areas exposed to surface runoff, must be addressed.

4. **Stability Analysis** - The stability of all pond slopes cut out of in situ soils or constructed of compacted fill must be analyzed in accordance with Regulatory Guide 3.11.
5. **Earthwork Construction** - Details of the quality control and assurance of the earthwork construction associated with the ponds must be submitted. Include information on foundation preparation, properties of embankment materials, fill placement conditions (lift thickness, compaction criteria, moisture control), and field testing frequencies.
6. **Leak Detection System** - Provide the gradation and permeability of the material forming the layer in which the leak detection pipes are placed. The subgrade should be at least two orders of magnitude less permeable than the leak detection layer. Provide the details of a testing program to be used to demonstrate the effectiveness of the system. The tests should be performed prior to the installation of the liner and should be of sufficient scope to permit the evaluation of rate, volumes, and direction of seepage movement in the leak detection system. The leak detection layer should extend up the slopes under the entire liner, in order to direct all leakage to the detection system. This is not shown on the construction drawings. Provide drawing details showing bedding, thickness, subgrade slopes and pipe sizes. In addition, provide details of a proposed plan of action in the event that leakage is detected in a pond.
7. **Synthetic Liner** - A report should be submitted outlining your proposed quality assurance program regarding installation details and properties of the proposed synthetic liner, testing requirements for field seams, compatibility of the liner with the waste product, methods of installation, subgrade preparation, and the qualifications of the individuals who will perform the installation and testing. For synthetic liners without soil covers, a discussion of methods that will be used to control damage due to ice must be included. In addition, methods for control of liner billowing should be discussed.

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8. Perimeter Fence - Provide the height of the "sheep tight fence" shown on the project drawings.
9. Monitoring Program - Provide the details of the downgradient monitoring program that will be utilized. We require that a program be developed which assures routine periodic sampling of the groundwater environment.

During our review of the North and South Leuenberger evaporation ponds as part of the R&D License review, discussions with you were conducted by telephone and at meetings, and requests for additional information were transmitted to you by letter. Based on your knowledge of our requirements for these ponds and the fact that the East and West ponds and embankments are much larger, much time could have been saved if your application had included more than a mere description of the proposed pond system.

If you have any questions regarding these matters, please contact Mr. Daniel Gillen of my staff at (301) 427-4103.

Sincerely,

Original Signed by:
J. J. Linehan

John J. Linehan, Section Leader
Operating Facilities Section I
Uranium Recovery Licensing Branch
Division of Waste Management

Enclosure:
As stated

6/12/81 -- MAG II

OFFICE	WMUR	WMUR	WMUR	WMUR		
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DATE	6/15/81	6/15/81	6/15/81	6/15/81		

STAFF BRANCH POSITION ON
EXPLORATIONS FOR DESIGN AND EVALUATION OF
URANIUM MILL TAILINGS RETENTION SYSTEMS

Summary

This Branch position has been formulated to reduce problems similar to the type that have developed in investigations for several uranium mill tailing retention projects. The position describes minimum requirements on spacing, depth and sampling for explorations that are necessary to provide an adequate design and evaluation base for a retention embankment.

Proposed Staff Position

At least one boring should be drilled per 250 ft. length along axis of retention structure and at critical locations perpendicular to the axis to establish geological sections and groundwater conditions. Additional borings at closer spacing are required where:

1. Geologic site conditions are non-uniform
2. Cavities or foundation discontinuities of engineering significance are present
3. Important abutment or transition conditions require close definition
4. Construction is to be attempted over hydraulically deposited fill materials

The depth of borings should be deep enough to permit evaluation of the potential for deep soil stability problems and of underseepage. Generally borings should extend a depth into the natural soils at least equal to the height of the ultimate embankment section. A minimum of 15 ft. into natural soils should be required for small retention structures. Borings may be terminated after coring 10 ft. into sound rock if continuity of this formation is known from previous reconnaissance and explorations. Borings should not be terminated in weak or highly compressible or loose soils.

Disturbed sampling of soils in borings at the recommended 250 ft. spacing should be with split-spoon sampler and hammer and conducted in conformance with the Standard Penetration Test Procedure (ASTM D 1568-67). Generally split-spoon sampling of soils should be at regular intervals not to exceed 5 ft. in depth and at changes in strata. Samples should be accurately described according to the Unified Soil Classification System. Visual sample details should be reported on boring logs giving stratification thicknesses and

sequence. Continuous sampling with depth (split-spoon or alternating with cone penetrometer or undisturbed) should be performed in at least two strategically located borings. Where undisturbed sampling is required, the undisturbed samples should be at least 3 inches in diameter. Undisturbed samples should be obtained with a suitable fixed piston-type, thin-wall tube sampler (ASTM D 1587-67) or method that yields undisturbed samples of equivalent quality. Samplers which use a drive hammer to assist in the recovery of an undisturbed sample are not acceptable.

Groundwater levels should be observed in borings at the time explorations are made. Observation of groundwater conditions should be recorded over a sufficient period to permit the groundwater depths and range of seasonal fluctuations to be established.