KAISER ENGINEERS

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February 24, 1977

Mr. H. John Abbiss
United Nuclear Corporation
P. O. Box 3951
Albuquerque, New Mexico 87110

Subject: Tailing Disposal System
Church Rock Uranium Project
Job No. 74131-001 File No. 2.02.10

Dear Mr. Abbiss:

The following information and recommendations are provided in response to questions posed by the State of New Mexico, Environmental Improvement Agency with regard to the design and construction of the subject dam, as described in their letter to you, dated February 9, 1977:

1. Dam Design:

The Church Rock dam, as presently designed, will not be built in the same manner as the Homestake Partners dam which recently experienced a failure caused by erosion from a pipeline break. The present design of the Church Rock dam is described in detail in the report titled, "Design of Tailings Disposal System" dated February, 1976 by Kaiser Engineers. This report supercedes the tailings dam design included in the Environmental Impact Report for the Church Rock Uranium Mill, which describes a dam built of tailings, utilizing the centerline method of dam construction.

The present design is shown on the attached cross section sketch and consists of compacted local soils. Tailings material will not be used for construction of the dam except for a 5 ft. layer of drainage material which will be constructed from coarse tailings sand. Tailings material must be used because clean sand or gravel suitable for use in the drainage layer is not available in the area. The dam consists of two sections. The first section consists of a core of relatively impervious clay soil which is placed in the upstream face of the dam. Its function is to minimize the amount of seepage through the dam. The second section consists of sandy soil placed in the downstream face. Its function is to keep the downstream side of the dam dry by allowing the small amount of seepage which passes through the core to drop quickly down into the drainage layer. The structural stability of the dam is

assured by keeping the downstream portion of the dam dry. Diagrams showing the seepage flow path are included in the February, 1976 report.

Design of the dam also includes an earth embankment built from clay soils and located at the toe of the main dam. The toe dam provides a positive separation between the Pipeline Canyon stream and the tailings pond.

2. Dam Construction Procedures:

In order to assure the structural stability of the final dam, the recently completed starter dam will be raised using the same construction techniques and will be supervised by a licensed soils engineer as described in the construction specifications included in the February 1976 report. The responsibilities of the soils engineer would include selection of soils at the on-site borrow pits, technical supervision of earth moving operations, and soil density testing to assure adequate soil compaction.

The design of the dam also includes piezometers consisting of vertical pipes embedded in the downstream face of the dam. These will allow for monitoring the location of the seepage zone and will provide an early warning if problems occur. It is recommended that measurements of these liquid levels be periodically recorded and checked for significant variations.

3. Design of Slurry Pipeline:

Design of the tailings disposal system includes a slurry pipeline through which the solid and liquid wastes are conveyed from the mill and distributed to the disposal pond.

A number of features have already been included in the design of the slurry pipeline to prevent pipe breakage, spillage of tailings material and erosion of earthwork structures. When it is installed, the slurry pipeline will originate at a pump house in the mill area. It will pass through one of three existing culverts under the highway on the northwest side of the tailings dam. At the downstream end of the culvert, the pipeline will be installed in a launder supported on pile bents above the maximum flood level in the Pipeline Canyon stream. The launder slopes downward toward the tailings dam and drains into a concrete sump located between the tailings dam and the toe dam. Thus the liquid and slimes spilled in the event of a pipe break or during maintenance operations in the pipe section over the stream will be prevented from falling into it.

Protection from pipe breakage is also provided by the design of the pipe joints. The use of the type of coupling in which a sleeve with rubber gaskets is compressed against the wall of the pipe, has been rejected. The victaulic type coupling will be used instead. This

coupling requires a circumferential groove cut into the outside of the pipe. Cast fittings are then tightened around the ends of the pipe and are securely locked into the grooves on both sides of the joint, thus preventing the pipe sections from pulling apart.

4. Additional Design Requirements:

In addition to the preventive measures discussed above, an alarm system will be added to the present design of the system. The purpose of this system will be to signal a possible break in the pipeline. This is accomplished by installing a capacitance probe near the discharge end of the pipeline at the tailings pond. In the event of a major pipe break, the probe would sense the loss of liquid at the pipe discharge and activate an audible and visible alarm in the mill repair bay and the pump house.

A second probe will be installed in the concrete sump at the lower end of the tailings launder. This probe would activate separate visible alarms as well as the audible alarms in the mill repair bay and the pump house.

5. Operational Requirements:

A tailings launder has not been included in the present design of the tailings pipeline between the concrete sump at the toe dam and the crest of the tailings dam. This area of the disposal system cannot be provided with a permanent launder since the dam will be periodically raised, requiring relocation of the structure. It is recommended that as part of the operating procedure, a temporary but substantial structure such as a launder be maintained in this area to prevent erosion of the face of the tailings dam. In the event of a pipe break, the spillage in this area will be prevented from reaching the Pipeline Canyon stream by the toe dam.

It is also recommended that similar structures be used to protect the face of the dam under piping used to pump seepage from the drainage layer back into the tailings pond at the southwest corner.

After the tailings pipeline passes over the crest of the dam, it will parallel the dam and distribute tailings into the pond. The coarsest particles of sand will settle out first as the slurry flows toward the interior of the pond. This will form a substantial beach which should be used to support the tailings pipeline in order to keep it a safe distance away from the crest of the dam. In the event of a pipe break, the flow of material will not endanger the dam but would, instead, be distributed into the pond in a manner similar to normal spigotting operations until the flow is stopped and the pipeline is repaired.

Finally, it is recommended that surveillance be provided by inspecting the pipeline once per eight hour shift and by patrolling the entire dam area.

6. Public Health Hazard from a Dam Break:

The dam design features and preventive measures described above will preclude the possibility of a dam break. It is our belief; therefore, that it is not necessary to take any additional action to contain spillage from a break at the Church Rock dam or assess the effect of the type of break which may occur with a dam built from uncompacted tailings.

Very truly yours,

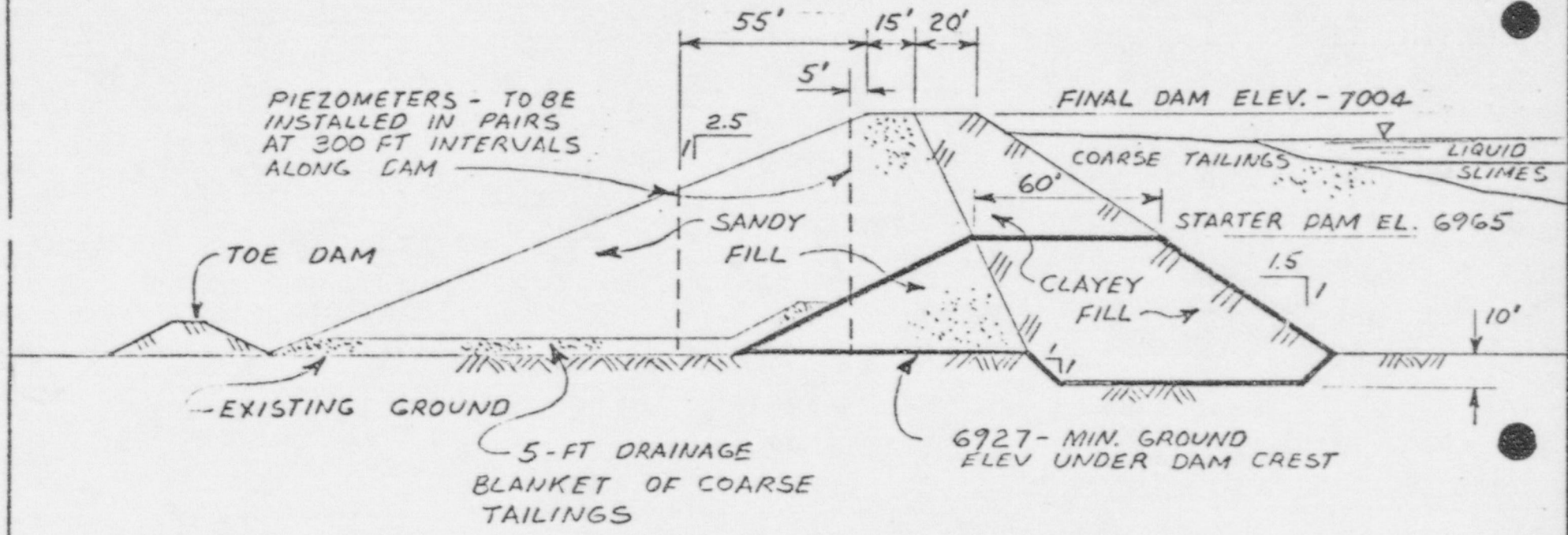
C. L. Milliken
Project Manager

CLM:MJ:ls

Enclosure

cc: D. D. Turberville
G. A. Swanquist
D. J. Smith
G. W. Holman
S. M. Haddad
Mike Jones

Enclosure



TAILINGS DISPOSAL DAM

TYPICAL SECTION

SCALE 1" = 50'

CHURCH ROCK URANIUM MILL JOB NO 74131 KAISER ENGINEERS 2/25/77

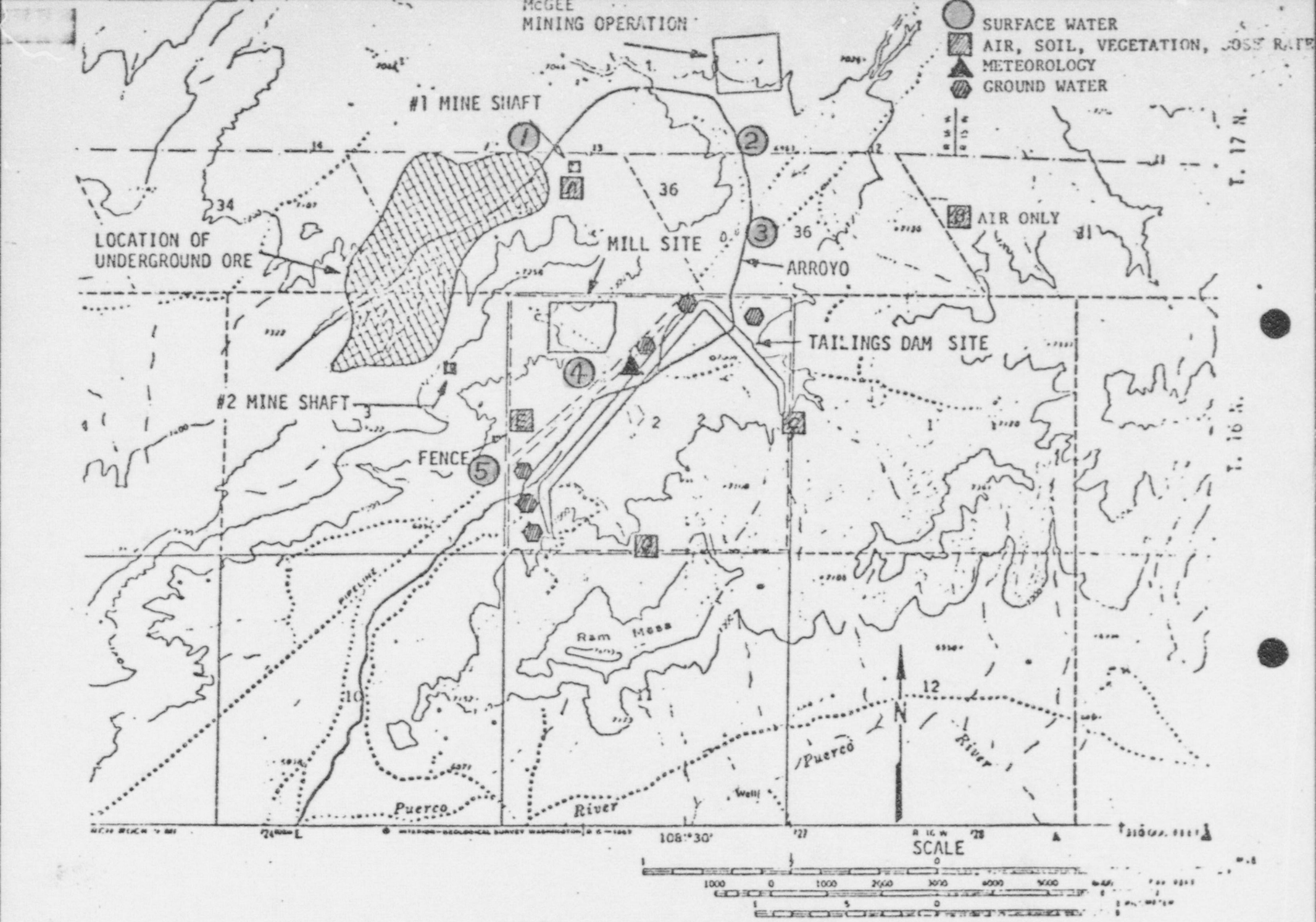


FIGURE 1. ENVIRONMENTAL SAMPLING SITES