— Nelson's questions
(submitted perched gw study at same time see vol. 4)

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PHILLIPS URANIUM CORPORATION

BOX 26236 4501 INDIAN SCHOOL ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87125

TELEPHONE: 505 265-4481

January 22, 1980

RECEIVED
JAN 23 1980
RADIATION PROTECTION SECTION

Mr. William Fleming
Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87503

Dear Mr. Fleming:

Enclosed for your review and transmittal to NRC is the response of Phillips Uranium Corporation to the March, 1979 request of NRC through their Consultant, Mr. John Nelson, for information regarding our proposed tailings management system. I regret the delay in responding; however, as you are already aware, we had some difficulty in completing the perched water investigation which was requested by Mr. Nelson and Mr. Stewart. You will be glad to find a copy of the report included herewith in response to question No. 2. Submittal of this report also completes our response to the questions posed by Mr. Stewart in his review of our application which I submitted for his review in correspondence dated September 17, 1979.

perched gw

I hope that you receive this information in time to transmit it to the NRC and Mr. Nelson in sufficient time to allow them to review it prior to their impending visit to our site. It would be most advantageous for such to be the case, as it would facilitate discussion of the report during our tour. In addition to PUC personnel, Mr. Jim Tinto of Davy McKee and Mr. Robert Booth of Sergent, Hauskins & Beckwith will be present to answer any questions which might arise.

I trust this information will suffice to allow our application to be accepted by the Division for technical review. If you have any questions or I can be of any further assistance, please do not hesitate to contact me.

Sincerely yours,

Juan R. Velasquez

Juan R. Velasquez

JRV:dq-(RC)

1. The bedrock underlying the tailings impoundment was depicted in Attachment III as having permeabilities ranging from essentially impermeable (<.1 ft./yr.) to 13 ft./yr.:

   a. discuss the areal extent of those areas having a permeability greater than 10^{-7} cm/sec.;

   Response:

   In-place permeability tests were performed at selected intervals in NX core borings in accordance with the U. S. Bureau of Reclamation E-18 Double Packer Method. These tests represented a total of 240 lineal feet of drilling, with depths ranging from 10 to 70 feet.

   Two 10 foot segments had permeabilities of 8.5 to 13 ft. per year. During a review of the boring logs, it was indicated that during drilling, these segments had 100% water recovery. Based on the packer test results, the drill logs and the geotechnical reports, it was concluded that the areal extent of permeabilities, greater than 10^{-7} cm/sec., was very limited. It was also concluded that any geotechnical features which could result in greater permeabilities would be exposed during the excavation of the core trench for the impervious fill materials at the time of construction of the dam. The results of the site soil investigations by Dames & Moore and Sergent, Hauskins & Beckwith (SH&B) indicate that the 4 to 45 feet of alluvial soil mantle covering the site should also provide a natural barrier against under-seepage. —

   b. discuss the availability of a suitable natural liner material, having a permeability of $\leq 10^{-7}$ cm/sec., and applied in three foot layers.

   Response:

   Based on the findings of the geotechnical reports submitted as attachments to the mill source license application, Phillips considers it unnecessary to line the tailings impoundment with compacted clay as presumed by this request. Phillips does not propose to use a clay liner because of the noted presence of over 400 feet of impermeable Mancos shale underlying aquifer. However, it should be noted that during their site soils and foundation investigation, SH&B remolded composite samples of proposed impervious fill materials to 94.5% of the maximum modified proctor density at a moisture content slightly dry of optimum. The co-efficients of permeabilities were 0.075 and 0.197 ft. per year.

$ft/yr \times 10^{-6} \approx cm/sec$

$\therefore .2\ ft/yr \times 10^{-6} = 2 \times 10^{-7}\ cm/sec$

Dames & Moore in their preliminary soil investigation, remolded composite samples to 95% of maximum modified proctor density and reported co-efficients of permeabilities of 0.1 to 0.2 ft. per year. .1 ft/yr = 10^{-7} cm/sec

Therefore, it can be assumed that impervious soils from the site remolded to 95% of maximum modified proctor density will have co-efficients of permeabilities varying from 2×10^{-7} cm/sec. to 10^{-7} cm/sec. Details of the areal extent of these materials are presented in SH&B's report of March 30, 1978.

2. The S. E. corner of section 12 T18N R12W has yielded water from subsurface depths of less than 50 feet. Provide information concerning:

    a. the source of this water;

    b. its extent;

    c. the flow quantity and gradient;

    d. potential of this shallow water for human consumption and/or livestock watering use; and

    e. the source of the ponded water located in the NW corner of section 18, T18N R11W.

    Response:

    The attached report prepared by SH&B was commissioned to provide the information requested.

    It should be noted for the purposes of clarification, however, that the location of the pond in question is in the northeast quarter of section 13, T18N, R12W.

3. The Environmental Report (PII-6-7) states that three seepage monitoring wells will be installed downdip of the site around the periphery of the tailings dam. Sheet M-316 of Attachment VI indicates that monitoring wells are to be placed along the crest of the final stage of the dam. Elaborate on and document the rationale for the selection of your proposed monitoring program.

    Response:

    Drawing M316 shows a series of monitor wells at the downstream toe of the initial dam called Piezometer Row B. These monitor wells will be raised during the subsequent raising of the dam to its final ultimate height. These wells will be monitored throughout the life of the project to measure any seepage and also as piezometers to measure piezometric levels within the dam structure.

During the excavation for the impervious core trench, at least three water quality monitor wells will be installed downstream of the final dam. The locations for these wells will be determined during the excavation of the core trench to insure the most suitable sites are chosen.

This portion of the monitoring program was left as flexible as possible in order to allow the agency the maximum amount of input into the monitoring system.

4. The sand disposal area is to be enclosed by a system of dikes and ditches, and seepage is to be pumped from the ditch to the slimes pond at a rate of 70 gpm (113 acre/ft/year):

   a. provide water balance diagrams and calculations showing water inputs to and losses from the sands area, and relate these figures to the remainder of the system;

   Response:

   The figures and table on the following page provide the information requested.

   b. discuss more thoroughly the design and construction of the sands disposal area (i.e., permeabilities, surface preparation, cutoffs, etc.).

   Response:

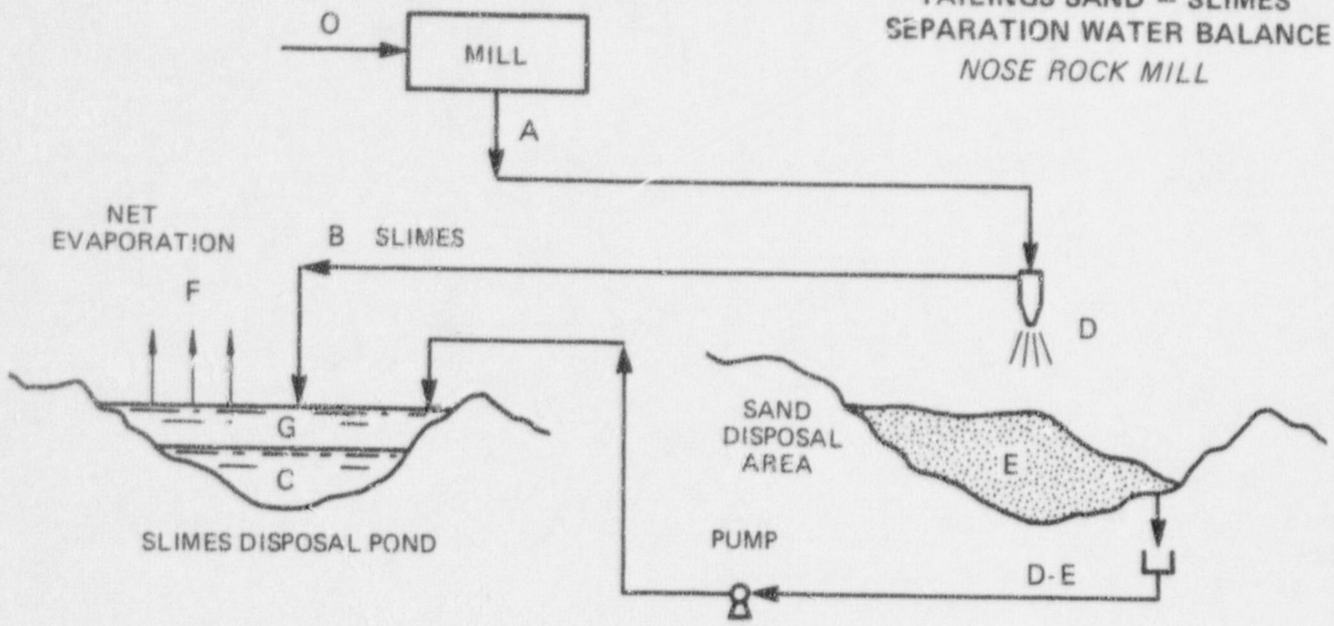
   The sand disposal area covers an area of approximately 250 acres with 210 acres to be used for sand storage. The tailings sands will be deposited in the area at approximately 75% solids at varying rates throughout the life of the project. Assuming the deposition at an average of 1875 dry tons per day and draining to 85% solids, there would be approximately 65 gpm draining to the sump and pumped to the slime-evaporation pond.

   In Dames & Moore's report on site evaluation and preliminary geotechnical investigation the insitu alluvial soils in the area are reported to have permeabilities ranging from 0.04 to 1.3 feet per year. In SH&B's report dated March, 1978, insitu permeabilities of overburden soils range from 28 to 3100 ft. per year.

   Based on the insitu permeabilities given by Dames & Moore and SH&B, the low permeabilities of remolded site soils, the shallow depth of the alluvial soils and with the condition

TAILINGS SAND – SLIMES SEPARATION WATER BALANCE

NOSE ROCK MILL



NOTE:

1. NET RESERVOIR EVAPORATION INCLUDES 10 INCH AVERAGE ANNUAL PRECIPITATION.
2. EVAPORATION PER YEAR IS BASED ON THE AVERAGE ESTIMATED POND SURFACE AREA DURING THE YEAR.
3. WATER FROM SAND DISPOSAL AREA IS BASED ON SANDS DRAINING FROM 75% SOLIDS TO 85% SOLIDS.
4. ALL VOLUMES ARE SHOWN IN ACRE-FEET.
5. WATER VOLUMES ARE BASED ON PROJECTED MILLING CAPACITIES AND ULTIMATE TAILINGS DISPOSAL CAPACITIES OVER 20 YEARS OF OPERATION.

1. $A = B + D$

2. $G = [(B - C) + (D - E)] - F$

Year	Dry Tons Solids Per Year	Total Tailings Water Acre-ft	Slime Water Acre-ft	Water Retained in Slimes Acre-ft	Liberated Slime Water	Sand Water Acre-ft	Water Retained in Sand Acre-ft	Water Drained from Sands Acre-ft	Net Evaporation Acre-ft	Year End Water Vol. Acre-ft	Avg. Pond Elev.
	O	A	B	C	B-C	D	E	D-E	F	G	
1	377,500	434.9	365.4	46.3	319.1	69.5	36.8	32.7	200.9	150.9	6402.0
2	627,500	722.9	605.9	76.1	529.8	117.0	61.2	55.8	476.4	260.1	6407.0
3	791,000	923.0	775.5	98.4	677.1	147.5	78.0	69.5	619.8	386.9	6409.0
4	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	700.2	524.2	6411.0
5	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	738.9	622.8	6415.0
6	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	767.6	692.7	6416.0
7	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	792.0	738.2	6417.0
8	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	837.9	737.8	6418.0
9	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	869.5	705.8	6419.0
10	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	881.0	662.3	6420.0
11	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	901.1	598.7	6421.5
12	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	918.3	517.9	6422.5
13	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	921.1	434.3	6422.5
14	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	924.0	347.8	6423.0
15	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	924.0	261.3	6423.0
16	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	924.0	174.8	6424.0
17	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	938.4	73.9	6424.0
18	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	941.2	DRYING	6424.5
19	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	970.6	DRYING	6425.0
20	887,500	1,035.6	870.0	110.4	759.6	165.5	87.6	77.9	970.6	DRYING	6425.0

that no water would be ponded in the sand disposal area, it was concluded that no surface preparation was necessary.

The dikes surrounding the sand disposal area are not designed for impounding the fluids draining from the sand except during a maximum probable storm. All liquid effluents from the sand during normal operations will drain to the pump sump via ditches.

5. Page 5-5 of Attachment VI states that borrow material consists essentially of the alluvial soils in Section 12, T18N R12W... yet page 5-3 of the same attachment presents embankment settlement figures based on a 47-foot thickness of compressible alluvium.

   a. Please clarify your proposal in this regard;

   Response:

   Borrow material will be obtained from the areas delineated in SH&B's report, March 30, 1978, on page 40, section 6.8. These borrow areas are not located within the embankment foundation areas. The embankment will be located in an area that has a maximum depth to weathered rock of forty-seven (47) feet. Section J of drawing number M-315, Revision 2, copy attached, shows the location and depth of the cutoff trench. The centerline of the fourth stage embankment (top of dam El. 6480) will be founded on this forty-seven (47) foot layer of alluvial soils and therefore, was the basis for the settlement analysis.

   b. If stripping is not planned, how will the presence or absence of excessive weathering, faulting, or other conditions which may affect seepage through the upper Menefee formation be demonstrated?

   Response:

   The presence or absence of excessive weathering, faulting, or other conditions which may affect seepage through the upper Menefee formation will be apparent during the construction of the cutoff trench. The weathered rock which forms the bottom of the cutoff trench will be cleaned and examined by the site soils engineer prior to placement of impervious fill and any detrimental conditions will be removed or corrected.

   c. Delineate borrow areas and present a detailed cross section of the final embankment at the point of maximum dam height.

   Response:

   Borrow areas are delineated in SH&B's report, March, 1978, on page 40, section 6.8. A detailed cross section of the final embankment at the point of maximum dam height is presented as Section F, from the Tailing Disposal Report, October 1978, drawing number M-315, Rev. 2, a copy of which is enclosed herewith and can be found also in Attachment VI of the application.

6. Page 5-5 of Attachment VI discusses the permeability of borrow material:

   a. Provide the results of the permeability tests on which the 0.2 ft/year permeability of the core material is based;

   Response:

   The permeability of 0.2 feet per year for the impervious material is the result of laboratory tests performed on recompacted composite samples by both Dames & Moore and SH&B. Dames & Moore in their preliminary soil investigation report, dated December 28, 1976, page A-6 (Attachment II of the application) tested remolded composite samples of proposed impervious fill material compacted to 95% of maximum modified proctor density and reported coefficients of permeabilities of 0.1 and 0.2 feet per year. SH&B in their report dated March 30, 1978, page B-8 and B-16 (Attachment III of the application) tested remolded composite samples of proposed impervious fill material compacted to 94.5% of the maximum modified proctor density and reported coefficients of permeabilities of .075 and .197 feet per year. Therefore, the maximum permeability of .2 feet per year was used for the recompacted impervious zone material.

   b. Is the embankment "filter" to be graded so as to prevent piping of the core?

   Response:

   There are two zones of material within the embankment that function as filters. The random fill material will act as a filter for the impervious fill material while the sand filter will act as a filter for the random fill material as can be seen on drawing M-315, Rev. 2, copy attached.

   These two zones of material acting as filters meet the design criteria for protective filters as presented in NAVFAC DM-7 Design Manual - Soil Mechanics, Foundations, and Earth Structures.

7. Present the calculations on which the five (5) foot freeboard allowance is based.

   Response:

   Reference No. 10, "Design of Small Dams," Bureau of Reclamation, U. S. Department of Interior, 1973, of the NRC Regulatory

Guide 3.11, NRC Regulatory Guide 3.11, Revision 2, and telephone conversations with the NRC were used in calculating the Design Flood. It was determined that the probable maximum 6-hour storm in the Crownpoint area would be approximately 4 inches. As per the regulatory guide recommendations 40% of a 6-hour maximum probable storm was added to obtain a maximum flood series.

$$4'' \times 1.40 = 5.6'' \text{ maximum flood series}$$

This maximum flood series (5.6") was to be preceded or followed by a 100-year flood. From the Department of Commerce Technical Paper No. 40 (as per Reg. Guide 3.11) a 100-year 6-hour storm would be expected to produce 3 inches of rain. The assumption was made that the 100-year storm precedes MPFS by 4 days. Average evaporation loss per day is 0.1644 inches at 60 inches per year (approximate evaporation rate of site area).

$$4 \text{ days} \times 0.1644'' = 0.6576'' \text{ of evaporation loss in four days}$$

Therefore, total runoff in this MPFS is:

$$5.6'' + 3'' - 0.6576'' = 7.94'' \text{ runoff}$$

The maximum probable precipitation using the maximum probable storm extended to a 24 hour period assuming 100% runoff was estimated using the Bureau of Reclamation reference, "Design of Small Dams," Table I, Page 52. This was estimated to be 8.4 inches. This is greater than the MPFS of 7.94 inches as calculated above so 8.4 inches was used in calculating free-board. Total direct runoff area contributing to the slimes pond is 291.12 acres. The drainage area of the sand disposal site is 251.43 acres and contains an additional ponding area of 9.88 acres.

Total runoff into the slimes pond was calculated to be:

$$291.12 \text{ acres} \times \frac{8.4 \text{ inches}}{12 \text{ inch/foot}} = 203.92 \text{ acre ft.}$$

The total runoff into the sands disposal area was calculated to be:

$$(251.43 \text{ acres} + 9.88 \text{ acres}) \times \frac{8.4 \text{ inches}}{12 \text{ inches/ft.}} = 182.92 \text{ acre ft.}$$

The estimated elevation of the slimes pond at the end of five years including annual evaporation and precipitation is 6416.8 ft.. The pond area is estimated at 140 acres. An addition of 203.78 acre feet (runoff) would cause the pond to rise 1.46 ft. That is,

$$\frac{203.78 \text{ acre ft.}}{149 \text{ acres}} = 1.46 \text{ ft.}$$

Therefore, the slime pond elevation including total direct runoff is:

$$6416.8 \text{ ft.} + 1.5 \text{ ft.} = 6418.3 \text{ ft.}$$

If the water of the ponding area of the sands disposal area were to be added to the slimes pond, it would rise an additional 1.31 ft.. That is:

$$\frac{182.9 \text{ acre ft.}}{140 \text{ acres}} = 1.31 \text{ ft.}$$

Therefore, the maximum possible elevation of the slimes pond at the end of five (5) years operation was calculated to be:

$$6418.3 \text{ ft.} + 1.3 \text{ ft.} = 6419.6 \text{ ft.}$$

In accounting for wave run-up the Stevenson Formula was used.

1) $H = 1.5 \sqrt{F} + 2.5 - \sqrt[4]{F}$ for short fetches ($F<30$ nautical miles)

H = wave height in feet

F (fetch) = horizontal extension of a storms' generating area for waves in nautical miles.

The same formula incorporating wind velocity can be expressed as follows:

2) $H = 0.17 \sqrt{UF} + 2.5 - \sqrt[4]{F}$

H = wave height in feet

F = fetch in statute miles

U = wind velocity in statute miles per hour

The Bureau of Reclamation reference recommends that freeboard be sufficient to prevent overtopping of the dam due to wave action run-up equal to 1.5 times the height of the wave.

Normal freeboard should be based on a wind velocity of 100 miles per hour.

Fetch for the slimes pond was approximated at 3000 ft. (0.568 miles)

1) $H = 1.5 \sqrt{0.568} + 2.5 - \sqrt[4]{0.568}$

$H = 2.76$ ft.

2) $H = 0.17 \sqrt{(100)\ (0.568)} + 2.5 - \sqrt[4]{0.568}$

$H = 2.91$ ft.

If maximum wave height (H) = 2.91 ft. the maximum wave, run-up is equal to:

$2.91 \times 1.5 = 4.35$ ft.

The upstream face of the dam is designed to have a 1 vertical to 2.5 horizontal slope, therefore 1.61 feet of freeboard is required to handle wave run-up.

This 1.61 feet freeboard when added to the maximum possible elevation of the slimes pond, 6419.6 feet, as calculated previously, requires a dam crest minimum elevation of 6421.22 ft.

The dam has a design crest elevation of 6425 ft. Therefore, the actual freeboard during normal operating conditions is:

6425 ft. - 6416.8 ft. = 8.2 ft.

and the true freeboard accounting for maximum possible runoff is:

6425 ft. - 6419.6 ft. = 5.4 ft.

hence the allowance for 5 feet of freeboard.

8. In the reclamation plan:

   a. propose a cover scheme that will attain an attenuation of radon to twice background in both the sand and slimes areas, and provide the data and calculations that were used to demonstrate that level of attenuation:

Response:

The information requested is contained in Section 8.1, pages II-8-1 through II-8-9, Section II, Applicants Environmental Report, of the Mill License Application as amended, May, 1979.

b. discuss the time period required for the slimes area to dry sufficiently to support heavy equipment, and provide data and calculations that demonstrate the capacity of six inches of solidified slimes to support the weight of heavy equipment and ten or more feet of overburden.

Response:

It is not possible to discuss with any certainty the time period required for the slimes area to dry sufficiently to support heavy equipment. It will be totally dependent upon the climatological conditions present in the years immediately following mill shutdown. It is difficult enough with today's meteorological technology available to predict the weather one week in advance. Phillips Uranium Corporation does not propose to predict the weather 20 years in the future. All that can be said is that if in the years immediately after mill shutdown, evaporation of the pond is sufficient to begin the drying process at a point when an approximate six inch crust has formed, reclamation work can begin. This is not to say that the crust by itself will suffice to support the weight of heavy equipment on the cover layer. However, it has been the general consensus of operating uranium producers, in discussing this problem, that once a six inch crust has formed on the surface of their slimes portion of their tailings ponds, they have been able to move onto them pushing sand tailings or borrow material in front of them as they go. Certainly the material breaks through the crust, but the crust has reportedly allowed working areas to be constructed over the slimes. It is erroneous to believe that somehow the six inch crust will support a significant amount of weight on its own and Phillips does not mean to leave that impression. There are no calculations available as requested and such calculations would be meaningless.

B. S.

c. provide a description of the chemical characteristics of the tailings liquids which is to be evaporated (e.g. pH).

Response:

The tailings liquid will contain the following chemical constituents:

Elements	mg/l unless otherwise noted
TDS	<64300
Na	953
K	147
Mg	403
Ca	565
Ba	<1
Ra 226	402 ± 17 pCi/l
Ra 228	30000 ± 299 pCi/l
Va	<1
Cr	5
Mo	32
Mn	51
U_3O_8	166
Fe	5650
Co	<1
Ni	<1
Cu	3.6
Ag	<0.1
Zn	30
Cd	<2
Hg	0.0024
B	<0.1
Al	3600
SiO_2	1580
Pb	<1
NO_3	0.3
NH_3	34
P	1.6
As	0.09
SO_4	61000
Se	1.2
F	12.3
Cl	1120
CN	<0.0002
Phenols	<0.001

d. in the event the toe drain system becomes plugged, what are the potential impacts of the water contained in the reclaimed tailings on the stability of the embankment.

Response:

The toe drain system will be established over the entire length of the embankment with a designed permeability of approximately 30,000 feet per year. By following recommended filter design criteria and maintaining strict construction control the possibility of the toe drain system becoming plugged is very remote. However, assuming the toe drain system became plugged the permeability of the random fill material which forms the major portion of the embankment is approximately 250 feet per year. This is approximately 1000 times the permeability of the impervious zone material and would act as a filter drain with respect to the impervious zone. Therefore, the phreatic surface within the embankment which could effect the stability would remain approximately at the same location as if the toe drain system was operating. Also due to the impermeability of the impervious zone material, we do not expect this zone to become saturated. The elimination of the inflow of water to the pond after the termination of mill operations will result in a reduction in the head of water that the impervious zone will experience and therefore, reduce any possible seepage upon abandonment.

e. discuss the potential for disruption of the cover of the slimes area due to settlement as the moisture from the reclaimed tailings is lost.

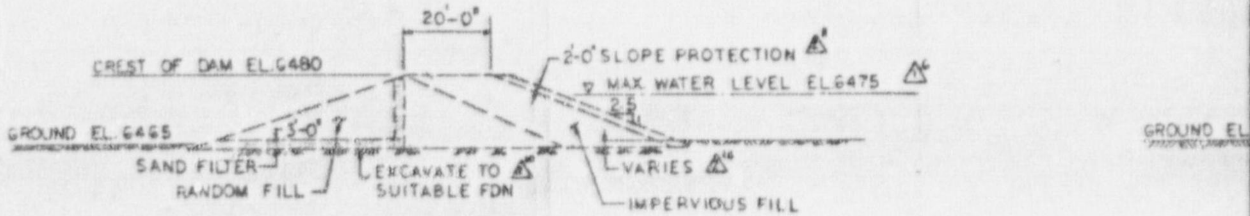
Response:

The potential for disruption of the cover due to settlement as moisture from the tailings is lost is in large part dependent upon the amount of moisture present in the slimes at the time of reclamation. Both the time at which reclamation begins and the amount of moisture present in the slimes at the time of reclamation is dependent upon the evaporation rate. It is safe to assume that not all of the moisture in the slimes could ever be evaporated off because the buildup of salts in the slimes solution will at some point cause evaporation to cease. It is also safe to assume that as a result after reclamation is complete, moisture will be encapsulated between the bottom of the disposal area and the cover placed in the reclmation process. The bottom of the pond has been demonstrated to be "essentially impermeable." The clay core of the dam has been designed to be "essentially impermeable". It is, therefore, considered unlikely that moisture would escape through either the bottom pond or the side of the dam. It is conceivable and perhaps likely that moisture may move through the cover material at some unknown rate, some distance. The potential is certainly present. However, to attempt a prediction without the knowledge of the conditions which will be present at the time of and subsequent to reclamation is speculative at best and will not lend much to the evaluation of the feasibility of the reclamation program as proposed by Phillips. This is one of the reasons why we must continue to reserve our right to change the reclamation program proposed as new information comes to the forefront. Phillips can only commit to a final reclamation plan once the conditions present at the time of reclamation are known. Phillips is confident that the theory of the proposed program is sound but is hesitant to speculate on the particulars which might be encountered at the time of reclamation.

f. propose a final reclamation program which is designed to meet the performance objective of eliminating the need for an on-going monitoring and maintenance program (include grading, topsoiling, revegetation and/or rip rapping, etc.).

Response:

The information requested is contained in Section 8.1, pages II-8-1 through II-8-9, Section II, Applicants Environmental Report of the Mill License Application as amended, May, 1979.



SECTION D/313
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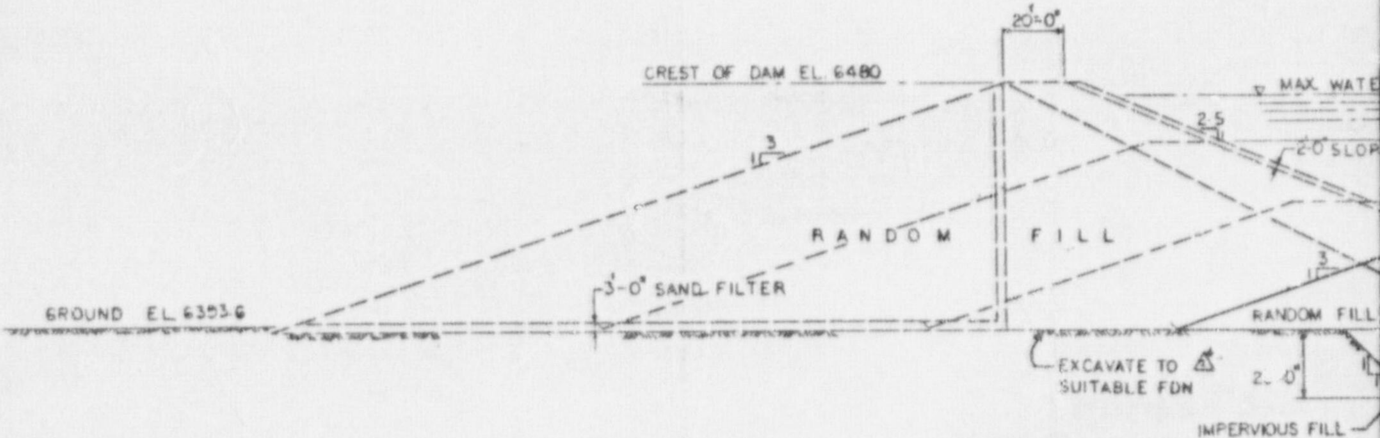
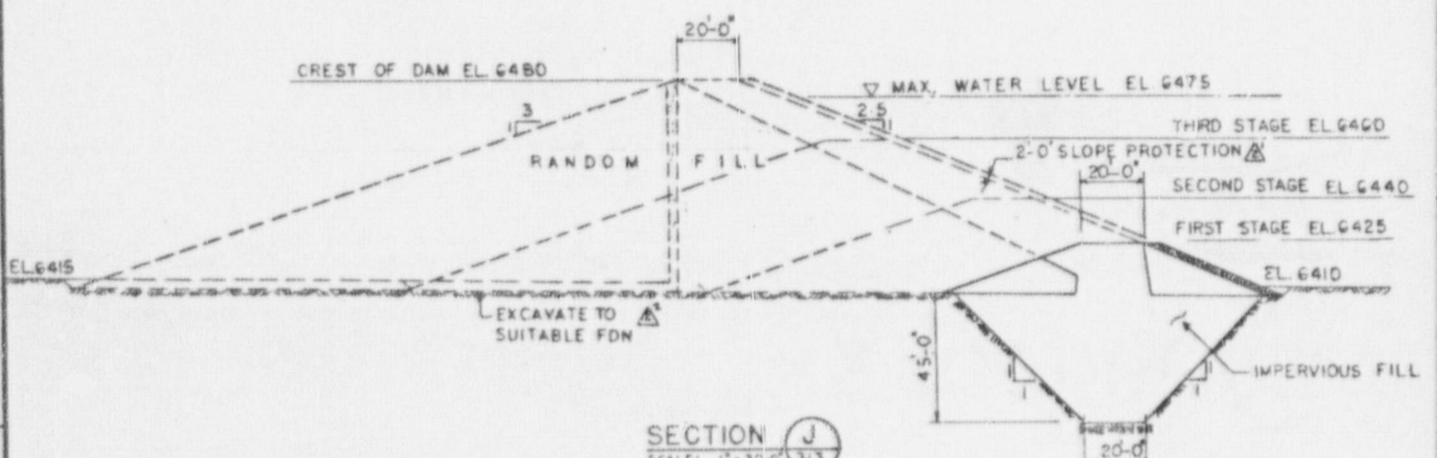


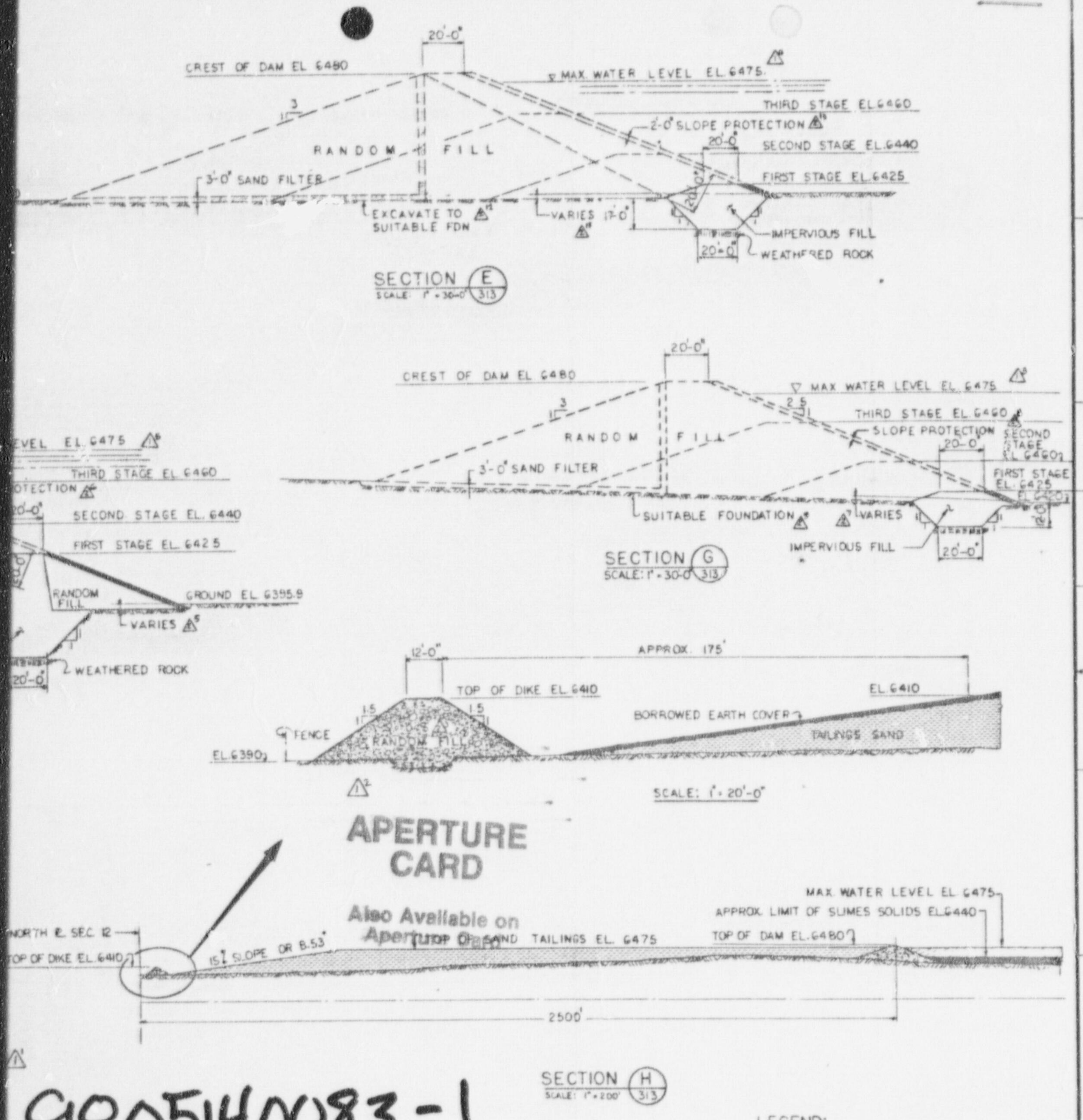
SECTION F/313 MAX. SECTION
SCALE: 1" = 30'-0"



SECTION J/313
SCALE: 1" = 30'-0"

NO.	DESCRIPTION	BY	CK.	APPROVED	DATE
A	ISSUED FOR APPROVAL				
0	ISSUED FOR CONSTRUCTION				
1	SEC ADDED REV EL AS SHOWN				
	ADDED "EXCAVATE TO", REV RIPRAP TO SLOPE PROTECTION, 3'-0" TO VARIES				

NO.	DESCRIPTION	BY	CK.	APPROVED	DATE



APERTURE CARD

Also Available on Aperture Card

9805140083-1

LEGEND:

— — — FUTURE CONSTRUCTION

——— INITIAL CONSTRUCTION

ISSUED FOR CONSTRUCTION

PHILLIPS URANIUM CORPORATION
NOSE ROCK MILL
CROWNPOINT NEW MEXICO

WESTERN KNAPP ENGINEERING
A DIVISION OF ARTHUR G. McKEE & CO.
SAN MATEO CALIFORNIA

TAILING AREA
DAM CROSS SECTIONS
AND DETAILS

SCALE AS SHOWN
DWG. NO. UD-9 AREA 60
SHEET NO. M-315 REVISION 2