



PDR

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

December 5, 1978

Docket No.
27-39

Mr. James N. Neel
President and Chief Executive Officer
Nuclear Engineering Company, Inc.
9200 Shelbyville Road
Suite 526
P.O. Box 7246
Louisville, Kentucky 40207

Dear Mr Neel:

We have reviewed your proposed site utilization plan submitted by letter dated September 20, 1978 and expansion area field data submitted by letter dated August 25, 1978. We have identified a generic issue of major concern.

Although data are not conclusive for Trenches 20, 21, 22 and 27, the planned bottom of the remaining trenches (numbers 28-41) appear to be either into hard shale or ten feet or less from shale. It is our position that trench bottoms founded in or near rock formations, such as shale, are unacceptable in humid areas for the following reasons:

1. Water can move readily through fractures in bedrock and traditional permeability testing does not adequately identify rates of flow.
2. Flow paths through the fractured media are undefined with regard to direction and rates. Therefore, modeling of transport is not practicable.
3. Bedrock fractures furnish little opportunity for sorption of radionuclides.
4. If the bedrock is not fractured and forms a relatively impermeable layer, water entering the trench will remain (bathtub effect). Thus, the trench fill will become saturated, leaching of radioactive material will increase, and new pathways (e.g., plant uptake) will be enhanced.

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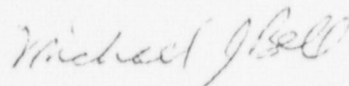
Therefore, a revised site utilization plan is required. Some acceptable buffer between trench bottoms and shale need be considered. Factors affecting the holdup of radionuclides such as the thickness, permeability and ion exchange characteristics must be addressed. Your revised plan must include the rationale and supporting analyses for measures proposed to mitigate the proximity of the shale. Enclosure 1 itemizes additional factors to be considered as you revise your site utilization plan.

Our position is based on our assessment of raw data supplied in your August 25, 1978, filing. A detailed stratigraphy for the entire 188 acres is needed as requested in our August 15, 1978 letter to further confirm our findings. Permeability tests on portions of the expansion area may also be required as well as field tests to establish parameters for materials to be used between the shale and trenches.

In summary, unless you demonstrate site acceptability with additional data and a new site utilization plan, we cannot conclude that the site will adequately contain radionuclides.

Please provide your plans and schedule for resolving this issue. A meeting between NECO and NRC technical staffs to discuss our concerns would be mutually beneficial. We would like to schedule such a meeting before December 22, 1978, if possible.

Sincerely,



Michael J. Bell, Chief
Low-Level Waste Branch
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As stated

GEOTECHNICAL QUESTIONS

1. Along with the revised site utilization plan, provide us with revised estimates of the site's capacity for waste burial, of the quantity of compacted fill material which will be required, and of the quantity of suitable borrow material which is presently available at the site. The following assumptions should be incorporated into your revised estimates unless less conservative assumptions can be justified.
 - (a) Usable trench volumes will be reduced due to the $\frac{1}{2}$:1 interior trench slopes (your previous analysis calculated trench volumes by multiplying trench top area times depth).
 - (b) Trench depths will be reduced due to the presence of hard shale (The staff's position on burial in shale is provided in the cover letter).
 - (c) A utilization factor of 40% rather than 50%. (The 50% figure is based on the Trench 14 information provided in NECO's November 1, 1977 response. The use of earth fill for shielding, which may be required for large trenches, will make a 50% utilization factor difficult to achieve.)
 - (d) Trench bottoms elevations must be at least 10 feet above the groundwater elevation.
 - (e) Permanent slopes will be no steeper than 3:1 (horizontal to vertical). This will increase the amount of compacted fill required for the site and may decrease the available volume of any trench you may propose to construct in the area of proposed Trenches 32 and 33, due to the presence of the road.
 - (f) Wastes will be covered with a volume of fill material equal to 50% of the trench volume.

- (g) A borrow material volume loss (shrinkage) of 10% will occur due to the removal and recompaction operation.
 - (h) Borrow material from the strip mine spoil banks may not be suitable as fill material.
 - (i) All of the material excavated from the trenches may not be suitable fill due to the presence of rocks and sandy material.
2. (a) Revised Section 3.4.2.3 c(8) of the SAR and the control checklist contained in your 9/20/78 response to indicate that areas reworked because of inadequate compaction will be re-tested.
- (b) Revise Section 3.4.3.2.2 B of the SAR and the control checklist contained in your 9/20/78 response to indicate the maximum quantity and size of rock which will be permissible in fill material
- (c) Specify criteria for the area in which rock can be utilized or wasted.
3. Because the heights of permanent fill slopes (from toe to top) will be as great as 45 feet., slopes of 2:1 (horizontal:vertical) for permanent slopes are considered to be too steep for satisfactory long-term maintenance. Natural slopes at the site rarely (if ever) exceed a slope of (3:1) and such slope conditions would be anticipated for the fill after many years. Also, slopes as high as 45 feet and steeper than 3:1 are normally not considered to be easily maintained. Therefore, we will not approve permanent fill slopes at the site steeper than 3:1. A 3:1 slope will also require the placement of additional fill in drainage ways.
- Provide us with an approximate outline of the limits of compacted fill for 3:1 slopes, such as on Figure A17-1 (NECO response dated 9/20/78).
4. Figure 3.4-2 of the SAR indicates that the typical crown height for 70 feet wide trenches is 2½ feet. Revise the SAR to indicate the crown heights on trenches of other widths.

5. Section 3.4.2.3.4 of the SAR states that ditches typically will have a maximum slope of 5% in order to minimize erosion. Specify a minimum slope which will prevent ponding in ditches.
6. Trench locations must be identifiable to achieve effective long term site management. Indicate how the trenches will be properly and permanently located, vertically and horizontally, with permanent markers and provide a commitment to permanently mark each trench within 60 days after the trench is filled.
7. Revise the control checklist, trench design, and boring plan (contained in your 9/20/78 response) to indicate that you will make at least one boring per 20,000 square feet of trench top area, with a minimum of three borings per trench and that you make water readings within 48 hours after completion of drilling in borings without piezometers.
8. In your response to a December 1977 NRC question dated 1/11/78, you indicate that trench cap subsidence appeared to be only a few inches on compacted fill trenches. Monitoring of trench cap settlement should be conducted so that the results can be incorporated into the design of future trenches. Indicate how and when these records will be obtained and how and when they will be used to evaluate trench cap stability and to modify trench cap design.
9. In Section 3.4.3.1.4 (b) of the SAR it is stated that evidence of permeable and/or water bearing soils (non-conforming conditions) in the excavation slopes or the bottom of the excavation will be evaluated by the Project Engineer. Such unsuitable pockets or layers could be located as much as 40 feet below the top of the 1/2:1 interior slope. We note that the subsurface information confirms the presence of some non-conforming permeable soils within proposed excavation slopes. Describe the procedures that NECO will adopt to change these non-conforming conditions to conforming conditions.