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

Docket No. 50-219

AUG 14 1975

Jersey Central Power & Light Company
ATTN: Joseph Ferrars, Jr.
Deputy Attorney General
Division of Law - Room 316
Newark, New Jersey 07102

Gentlemen:

As a result of our review of the geotechnical study relating to the proposed new liquid/solid radwaste building submitted by your letter dated March 6, 1975, we have developed a Regulatory position regarding your proposed foundation design and have identified additional information that is required to complete our review. The position and the additional information required, listed in Enclosure 1, were discussed with your staff at a meeting held in Bethesda on July 24, 1975.

In order to complete our review in a timely manner, we request that you submit responses to the items listed in Enclosure 1 by September 15, 1975.

For your information, the current NRC staff position regarding seismic design requirements for structures housing radioactive waste management systems is stated in Enclosure 2.

Please contact us if there is any additional information needed regarding our request.

Sincerely,

George Lear

George Lear, Chief
Operating Reactors Branch #3
Division of Reactor Licensing

Enclosures:
1. Geotechnical Study
2. Seismic Design Requirements

cc w/enclosures:
See next page

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ENCLOSURE 1

OYSTER CREEK
DOCKET NO. 50-219
GEOTECHNICAL STUDY
PROPOSED RADWASTE AND OFF GAS BUILDINGS

(The following position statements and requests for information relate to JCP&L submittal, March 6, 1975)

324.1 You have not adequately sampled and evaluated the natural deposits directly below the proposed radwaste building. Thirteen borings are shown on figure 1.3.1 at this location. Only two borings (WL 5 W4) of 13 completely sampled the entire subsurface materials of interest in a meaningful way. You have almost ignored the use of the standard penetration test (SPT) sampler in your investigation of the subsurface conditions immediately under the proposed site. Much of the data presented to evaluate liquefaction conditions is based on SPT data. The SPT data that was obtained under the proposed structure clearly shows that liquefaction is a problem in the upper Cohansey sands. In addition you have not considered in this report the fact that adjacent deposits (loose fill) will liquefy and progressive liquefaction towards the radwaste structure may occur.

In addition your investigation of the off gas structure clearly indicates that the Upper Cohansey sand is likely to liquefy during the SSE. Indicate on figure 1.10.3 the results of the SPT data under these structures.

As described in the Oyster Creek Nuclear Unit No. 1 SER and Forked River Nuclear Station Unit 1 SER, geologic consultants, applicant, and the staff concluded that the dense Cohansey sand would be an adequate foundation medium for the Nuclear Units. All Category I foundations required excavation to the dense Cohansey sand. The staff concluded that all major structures will be supported by mat foundations in the Cohansey sands or on backfill that will be compacted to a minimum relative density of 75% and an average relative density of 90% down to the Cohansey sands will be adequate for the Forked River Nuclear Station Unit 1. The applicant proposed to remove the overlying sands and soft organic clays and to found major plant structures on the Cohansey sand or engineered fill compacted to a density equal to that of the Cohansey sand.

(RSP) Unless you can demonstrate that liquefaction, foundation movements, and subsequent settlement conditions are not a risk to radiological safety, all Category I foundations must meet the above requirements.

324.2 You have not provided sufficient evidence to support your conclusions regarding the previous loading of the clay in the Upper Clay Formation. Only one consolidation test is provided for materials under the radwaste building. Provide additional data to support your evaluation of previous loading.

324.3 The clays are described as organic deposits. Organic soils are generally poor foundation materials. Evaluate secondary compression which can be very large for organic soils. Discuss the results of your evaluation.

324.4 The data provided regarding the continuity of the deposits of the sand included in the upper clay is not sufficient. Provide cross sections to show the sand strata in the upper clay. The boring logs do not contain the detailed descriptive terminology required to assess the continuity of these strata. Provide detailed stratigraphic information to support your conclusions that these strata are not continuous.

324.5 Provide copies of boring logs and reports for the proposed Oyster Creek Unit No. 2. Also provide copies of the Casagrande report for this site.

324.6 Based on the boring logs presented we cannot assess the depth of fill encountered. Document your evaluation of the depth of fill encountered and discuss the methods employed.

324.7 The data in table 2.5.2 does not support your statement that undrained shear strength (Su), indicated values of Su between 1 and 2 TSF. The average static triaxial shear and vane shear strength is less than 1 TSF. Explain.

324.8 Discuss the possibility of the groundwater level variations during the life of the plant, and the effect on the liquefaction potential.

324.9 Describe the backfill procedure used to place the fill near boring B2, B5, B9. Explain the reason for the extremely loose condition of this fill.

324.10 Your evaluation of the significant number of cycles in the liquefaction analysis is not consistant with the Lee and Chan data for A av/A max = 0.65. A value of 10 appears more reasonable for the simplified procedure. This higher value will result in an increase in the likelihood of liquefaction for each strata. Evaluate and compare the results based on 5 and 10 cycles. Duplicate the appropriate figures in the report at 10 equivalent stress cycles. Use a C value of 0.57 in all calculations and report the results.

324.11 Less than half of the relative density test data is representative of the radwaste building location. Discuss the justification for using any data other than that obtained at this location. Provide a correlation with SPT data and relative density data.

324.12 Recalculate the uniform shear stress amplitudes given in Table 1.10.3 using 5 cycles for conversion (pg. 52) and report the results.

324.13 Provide the pore pressure, stress, strain, and number of cycles data in graphic format for the cyclic tests used in this evaluation. Provide the factor of safety against 10 percent double amplitude strain.

324.14 Designate a maximum, total, and differential settlement criteria for this structure. Provide a settlement monitoring program for the life of the structure.

ENCLOSURE 2

Seismic Design Requirements for Buildings Housing Radwaste Systems

(1) Define input motion at the foundation of the building housing the radwaste systems. The motion should be defined by normalizing the Regulatory Guide 1.60 spectra to the OBE maximum ground acceleration selected for the plant.

A simplified analysis should be performed to determine appropriate seismic loads and floor response spectra pertinent to the location of the systems; i.e., an analysis of the building by a "several degrees of freedom" mathematical model and the use of an approximate method to generate the floor response spectra for radwaste systems and the seismic loads for the buildings. No time history or dynamic analysis is required.

(2) The simplified method for determination of seismic loads for the building consists of (a) calculation of first several modal frequencies and participation factors for the building, (b) determination of modal seismic loads by item (1) input spectra, and (c) combination of modal seismic loads by the square root of the sum of squares (SRSS) rule.

(3) With regard to generation of floor response spectra for radwaste systems, methods such as the Biggs or other equivalent procedures which give approximate floor response spectra without need for performing a time history analysis may be used.

(4) The load factors and load combinations to be used for the building should be those given in the ACI-318-71 Code. The allowable stresses for steel components should be those given in the AISC Manual of Steel Construction, 7th edition, 1970.

(5) The construction and inspection requirements for the building elements should comply with those stipulated in the AISC or ACI Code as appropriate.

(6) The foundation media of structures housing the radwaste systems should not liquify during the Operating Basis Earthquake.

In lieu of the requirements and procedures defined above, optional shield structures constructed around and supporting the radwaste systems may be erected to protect the radwaste systems from effects of housing structural failure. If this option is adopted, the procedures described above only need to be applied to the shield structures while treating the rest of the housing structures as non-seismic Category I.