

Docket No.: 50-412

SEP 22 1983

Mr. Earl J. Woolever
Vice President, Nuclear Construction
Duquesne Light Company
Robinson Plaza Building No. 2, Suite 210
PA Route 60
Pittsburgh, Pennsylvania 15205

Dear Mr. Woolever:

Subject: Beaver Valley Unit 2 Safety Review Requests for Additional Information

On May 18, 1983, your application for an operating license for Beaver Valley Power Station, Unit 2 (BVPS-2) was docketed. The NRC staff is currently reviewing your application, including the Final Safety Analysis Report (FSAR).

During the course of our review of your FSAR the enclosed comments on Section 1.9, "Standard Review Plan Conformance Evaluation," (Enclosure 1) were generated. The Structural and Geotechnical Engineering Branch "Requests for Additional Information" were transmitted to you in an earlier letter (September 19, 1983). While addressing those requests, the enclosed comments should be considered.

Should you have any questions concerning the enclosed requests please contact the Licensing Project Manager, Lisamarie Lazo (301) 492-7791.

Sincerely,
Original signed by:
Harry Reed

for
George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing

Enclosure:
Request for Additional
Information

cc w/encl:
See next page

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ENCLOSURE

REVIEW COMMENTS ON BEAVER VALLEY 2 STANDARD
REVIEW PLAN DIFFERENCES
BY
STRUCTURAL ENGINEERING SECTION

SRP Section
3.3.1.II.3

With respect to the definition of wind loading, the Beaver Valley 2 plant referred to ASCE Paper No. 3269 for derivation of wind pressure on structures. The pertinent SRP Section 3.3.1 Revision 2, however, considers the ANSI A 58.1 code as the acceptable base document for defining wind loads.

The applicant should demonstrate that the wind load definition and procedures from ASCE Paper No. 3269 are as conservative as those of the ANSI A 58.1 code.

3.7.1.II.1a

The applicant stated that design response spectra were not derived using Regulatory Guide 1.60 guidelines but were in accordance with Section 2.5 and response to question 3.15 of the Beaver Valley 2 FSAR.

SRP Section 3.7.1, Revision 1 states that site specific response spectra may be used if they are developed from and consistent with the information on seismic environment at the site provided in SRP Section 2.5.2. Therefore, the deviation is acceptable subject to the approval of Geoscience Branch.

3.7.1.II.2

The damping values proposed for equipment and piping of Beaver Valley 2 are more conservative than those of the Regulatory Guide 1.61 for both 1/2 SSE and SSE. Specifically, for reinforced concrete, the 1/2 SSE damping value used is more conservative than that of the Regulatory Guide 1.61, whereas, the damping values used for other components are the same as those of the Guide. Therefore, the damping values used in Beaver Valley 2 are acceptable.

3.7.2.II.6

The Beaver Valley 2 design is based on consideration of two-dimensional earthquake effects. The applicant stated that the guidelines to base designs on three-dimensional earthquake effects were not in effect when Beaver Valley 2 was designed and its construction permit issued.

Current SRP Section 3.7.2, Rev. 1 states that the three components of earthquake motion should be considered in the seismic response analysis of structures, systems and components. The applicant should either provide necessary analyses to show that the current SRP Section 3.7.2 provisions are met or justify the deviation with respect to the consideration of the three components earthquake motion.

3.7.2.II.5

Beaver Valley 2 design response spectra are developed based on the response only in the direction of input motion. Coupling between orthogonal directions of response is not considered. Also, Beaver Valley 2 uses a two-directional input-motion criterion without consideration of the statistical independency among different input time histories.

The applicant should provide support documents to demonstrate that the Category I structures are reasonably symmetric as was claimed in Amendment 1, therefore, coupling in structural response between mutually orthogonal axes of structures is indeed insignificant. Moreover, the statistical independency of the input motions used in the analysis should be considered in order to comply with the current SRP Section 3.7.2 provision.

3.7.2.II.4

Beaver Valley 2 design responses are not developed by enveloping the results from a half-space analysis and a finite element analysis for soil-structure interaction and is in accordance with the provisions of an earlier version of SRP (i.e., NUREG - 75/087 SRP 3.7.2).

The current SRP Section 3.7.2 Rev, 1 states that two modeling methods for implementing the soil-structure interaction analysis should be adopted. They are the half-space and finite boundaries approaches. The applicant should perform needed analyses to generate responses which envelope the results of both methods for the design of Category I structures, systems and components, or justify the deviation from the SRP provision.

3.7.3.II.7

The SRP specifies that closely spaced modes be combined in accordance with Regulatory Guide 1.92. The applicant stated that the Westinghouse methods were used for combining closely spaced modes. The applicant should provide technical data to show the equivalency of the above two approaches or justify the deviation.

- 3.7.3.II.2 h The SRP requires that each non-category I system shall be designed to be isolated from any Category I system by either a constraint or barrier, or should be remotely located with regard to the seismic Category I system. If it is not feasible or practical to isolate the Category I system, adjacent non-category I systems should be analyzed according to the same seismic criteria as applicable to the Category I system. The applicant stated that for non-category I piping which is not attached to Category I piping systems, the non-category piping is qualified only for the seismic event associated with the faulted plant condition. The applicant should provide information to demonstrate that the SRP provision is met or justify the deviation.
- 3.7.3.II.2 l It is our understanding that items pertaining to conduits will be addressed later by the applicant via FSAR amendment. The staff will review this item at a later date.
- 3.8.1.II.2 The applicant did not use the ASME Section III Div. 2 code provisions (ACI 359) pertaining to load combinations, design allowables, materials, quality control and special construction techniques for the Beaver Valley 2 design. Instead, the applicant used the applicable provisions contained in the ACI 318-71 code. The applicant is requested to demonstrate that the requirements of the ASME Section III Div. 2 code are met or identify and justify the deviations.
- 3.8.1.II.2 The applicant appears to have taken some exceptions to the provisions of Regulatory Guides 1.10, 1.19, 1.55 and 1.94. Deviations from these Regulatory Guides should be clearly identified and justified.
- 3.8.1.II.4j For Beaver Valley 2 plant, the ultimate capacity analysis of concrete containment has not been performed. The applicable SRP Section states that an analysis should be performed to determine the ultimate capacity of the containment. The applicant is requested to perform such an analysis.
- 3.8.2 The structural acceptance criteria (design limits and loading combinations) used for Beaver Valley 2 plant are consistent with the provisions of the NUREG-75/087 (an earlier version SRP now superseded) which differ from those of the current SRP (July 1981 version). The applicant is requested to provide comparisons to demonstrate that the current SRP requirements are complied with. Deviations identified by the comparison should be justified.

- 3.8.1.II.2 The SRP specifies that internal structures of containment should be designed in accordance with the requirements of ACI-349 code as augmented by Regulatory Guide 1.142. The Beaver Valley 2 internal concrete structures were designed using the ACI 318-71 code. The applicant should identify and justify the deviations of its internal structural design from the applicable requirements of the ACI-349 as amended by Regulatory Guide 1.142.
- 3.8.4.II.2 The applicant took some exceptions to the provisions of Regulatory Guides 1.10, 1.55, 1.69, 1.94, 1.115, 1.142, 1.143. Deviations from these Regulatory Guides should be identified and justified by the applicant.
- 3.8.4.II.2
3.8.5.II.2 The SRP specifies that Category I structures and Category I structure foundations shall be designed in accordance with the requirements of the ACI-349 code as amended by Regulatory Guide 1.142. The Beaver Valley 2 Category I structures and foundations were designed using the provisions of the ACI-318-71 code. The applicant should identify and justify the deviations of the Category I structural design from the applicable requirements of the ACI-349 code as amended by Regulatory Guide 1.142.
- 3.8.4.II.3 The applicant stated that loads, load combinations, and structural criteria used in Beaver Valley 2 are not in complete agreement with SRP Section 3.8.4.
- The applicant should identify the deviations of the loads, load combinations and structural design criteria used in Beaver Valley 2 with those of the SRP Section 3.8.4, and justify the deviations.
- 3.8.4.II.8 The applicant did not address masonry walls in FSAR Section 3.8.4 due to the fact that Beaver Valley 2 plant does not have any safety-related concrete masonry walls. This is acceptable.
- 3.8.3.II.4d The applicant is requested to provide design reports for future structural design audit work covering Beaver Valley 2 plant Category I structures. The report should be submitted before the structural audit described in the SRP Sections 3.8.3.

- 3.8.3.II.2 The applicant remarked that the ASME Boiler and Pressure Vessel Code is not applicable to the internal structures of Beaver Valley 2 plant. Therefore, the ASME Boiler and Pressure Vessel Code, Section III, was not used for Beaver Valley 2 plant internal structures. The applicant is requested to provide justifications for not using the ASME Boiler and Pressure Vessel Code, Section III requirements, as specified in SRP Section 3.8.3 to Beaver Valley 2 plant internal structures.
- 3.8.3.II.2 The applicant took some exceptions to the provisions of Regulatory Guides 1.10, 1.15, 1.55 and 1.142. Deviations from these Regulatory Guides should be identified and justified by the applicant.
- 3.8.4.II.4f The design of spent fuel racks will be reviewed by the staff for acceptability using the requirements of Appendix D to SRP Section 3.8.4.
- 3.8.5.II.2 The applicant took some exceptions to the provisions of Regulatory Guides 1.10, 1.19, 1.55, 1.94, 1.136 and 1.142. Deviations from these Regulatory Guides should be provided by the applicant for staff review.
- 3.8.5.II.4f The applicant only considered two-dimensional earthquake in determining overturning moments for structural foundations. Yet the current SRP requires that the three components of the earthquake response should be combined in accordance with the SRP Section 3.8.5 provisions. The applicant is requested to perform analyses to show that the SRP Section 3.8.5 provisions are satisfied although only two-dimensional earthquake effects were considered in the analysis.

BEAVER VALLEY POWER STATION, UNIT 2
DOCKET NO. 50-412
GEOTECHNICAL ENGINEERING SECTION REVIEW
COMMENTS ON DIFFERENCES FROM THE SRP

SRP Section No. 2.5.4

Title: Stability of Subsurface Materials and Foundations

According to SRP Section 2.5.4, the static and dynamic engineering properties of soil and rock strata underlying the site and backfill materials are to be supported by representative field and laboratory test data provided by the applicant.

The applicant has stated that laboratory testing was not performed on samples of the in situ sands and gravels within the main plant area since it was not possible to obtain undisturbed samples from the boring investigations due to the gravel content of the soils. While grain size analyses, in-place density tests and compaction tests were performed on compacted backfill material, laboratory tests were not made to determine the engineering strength properties of the backfill material.

The applicant has estimated the static and dynamic properties of the insitu foundation sands and gravels at the site using empirical correlations of engineering properties determined by test borings and geophysical testing. The applicant states that suitable undisturbed sampling of the in situ coarse sands and gravels was a problem and that samples could not be reliably

obtained. In recognition of this sampling problem with the coarse granular soils, the staff will not require additional laboratory testing if, in our detailed FSAR review, we find the empirical correlations to be reasonable and acceptable. We have noted, however, that it does not appear that the applicant has considered the variation of shear modulus and damping values of the subsurface materials with strain in the soil-structure interaction analyses. Such variation should be considered even while using the empirical correlations mentioned above. The applicant should perform parametric studies of the effects of the uncertainties in the engineering properties on the structural responses, etc. by varying shear modulus and damping by ± 50 percent. The applicant will be required to provide the basis for not determining the engineering strength properties of backfill materials by laboratory testing where reliable test samples were more readily available.