

<i>HISTORICAL INFORMATION</i>

QUESTION 221.1

The following information and commitments relative to a Loose Parts Monitoring Systems (LPMS) for the Susquehanna Steam Electric Station are required.

The LPMS manufacturer's sensitivity specifications shall be provided. The LPMS must be operational and capable of recording vibration signals for signature analysis at the time of initial startup testing.

A description of the monitoring equipment including location and basis for alarm settings shall be provided in the FSAR. Anticipated major sources of internal and external noise must be provided along with plans to minimize these sources. A description of precautions taken to insure the operability of the LPMS after operational basis earthquakes is required. A detailed discussion of the operator training program for operation of the LPMS, planned operating procedures, and record keeping procedures is required. Signature analysis records must be utilized and maintained for an appropriate period (e.g., three years).

RESPONSE:

We are unaware of any LPMS acceptable to the staff that has been proven in operation. Although we continue to monitor product developments in this area for possible consideration, we have no plans at this time to incorporate a LPMS due to the unavailability of an effective system.

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SSES-FSAR

QUESTION 221.2

Section 4.4 contains no discussion of crud and its effect on CPR and core pressure drop. Provide the assumptions used for amount of crud in design calculations and the sensitivity of CPR and core pressure drop to variations in the amount of crud present. Also provide data supporting the assumption on crud thickness and discuss how crud build-up in the core would be detected.

RESPONSE:

FSAR Subsection 4.4.2.11 has been added to provide this information.

SSES-FSAR

QUESTION 221.3

The GEXL data base (for the approved correlation) is for 7x7 and 8x8 one water rod bundles. No substantial data base has been provided to support the 8x8, two water rod design. The GEXL correlation must be demonstrated to be applicable to the new 8x8 design, by comparison to applicable data, prior to issuance of an operating license for Susquehanna. Alternatively, the MCPR limit may be increased by 0.05 to accommodate GEXL uncertainties.

RESPONSE:

FSAR Subsection 4.4.2 has been updated to provide this information.

SSES-FSAR

QUESTION 221.4

You state on page 4.4-6 that "There is reasonable assurance, therefore, that the calculated flow distribution throughout the core is in close agreement with the actual flow distribution of an operating reactor." Does this refer specifically to Susquehanna calculations? What operating reactor was used for the data comparison?

RESPONSE:

FSAR Subsection 4.4.2.5 has been updated to provide this information.

SSES-FSAR

QUESTION 221.5

Your flow distribution discussion does not address uncertainties on the flow distribution or the effect of channel flow uncertainty, coupled with other uncertainties on the MCPR uncertainty. Also, Table 4.4-6 does not address flow distribution uncertainties. Provide this information.

RESPONSE:

FSAR Subsection 4.4.2.9 has been updated to provide this information.

SSES-FSAR

QUESTION 221.6

Page 4.4-17 states "Analytical models of the individual flow paths were developed as an independent check of the tests. When using these models for hydraulic design calculations, nominal drawing dimension are used." Provide the assumptions and equations comprising the model and a comparison of model predictions with data.

RESPONSE:

FSAR Subsection 4.4.4.5.2 provides the required information.

SSES-FSAR

QUESTION 221.7

What fraction of the fuel bundle flow is "water rod flow"?

RESPONSE:

FSAR Subsection 4.4.4.5.2 has been updated to provide this information.

SSES-FSAR

QUESTION 221.8

Page 4.4-18 of the FSAR states that "the nominal expected bypass flow fraction is approximately 10 percent." What is the calculated bypass flow fraction for Susquehanna and what is its uncertainty?

RESPONSE:

FSAR Subsection 4.4.4.5.1 has been updated to provide this information.

SSES-FSAR

QUESTION 221.9

What is the name of the computer program cited in this Section 4.4.4.5? Provide references which document the code.

RESPONSE:

The digital computer program used for thermal hydraulic analysis is a General Electric proprietary code which has not been documented in the form of a Licensing Topical Report to the NRC.

SSES-FSAR

QUESTION 221.10

You state that the stability analyses performed in Section 4.4.4.6.6 and for Figure 4.4-6, were performed "at the most limiting condition that occurs at the end-of-cycle, with power peaked to the bottom of the core. . . ." Indicate which cycle is being referred to (i.e., first, second, or equilibrium). If it is other than equilibrium, provide results for the end of equilibrium cycle or justify why the results presented represent worst-case conditions. Provide the power profile and the void reactivity coefficient used for the analysis.

RESPONSE:

FSAR Subsection 4.4.4.6.6 has been revised to provide this information.

SSES-FSAR

QUESTION 221.11

In discussing the FABLE code on page 4.4-23, you state that "As new experimental or reactor operating data are obtained, the model is refined to improve its capability and accuracy." This means that comparison of old versions of the model with data, as given in Figure 4.4-4, are meaningless for Susquehanna if it has been analyzed with an updated version. Are the comparisons of the model with data, as given in Figure 4.4-4, are meaningless for Susquehanna if it has been analyzed with an updated version. Are the comparisons of the model with data, as given in Figure 4.4-4, based on the same version of the model as was used for Susquehanna? If not, provide comparisons using the Susquehanna model. In addition, provide a description of the code or reference a prior licensing submittal (other than the KAPL reports on STABLE).

RESPONSE:

FSAR Subsection 4.4.4.6.5. has been revised to provide this information.

SSES-FSAR

QUESTION 221.12

On page 4.4-23, the REDY code is referenced as the model used to perform system stability calculations. You also state that the model is periodically refined as new experimental or reactor operating data are obtained. Is the version of REDY used for Susquehanna described in NEDO-10802? If not, describe the changes.

RESPONSE:

FSAR Subsection 4.4.4.6.4 has been revised to provide this information.

SSES-FSAR

QUESTION 221.13

BWR applications have traditionally included operational design guidelines for decay ratios and damping factors used in stability analyses. These design guides have been omitted from your discussion of stability. Are operational design guidelines no longer applicable? If not, explain why.

RESPONSE:

FSAR Subsection 4.4.4.6.3 has been provided to include this information.

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QUESTION 221.14

Your response to Q221.1 is unacceptable. The staff believes that the state-of-the-art has progressed such that effective LPM systems can be installed in commercial LWRs. The rationale for this is documented in draft Regulatory Guide 1.133 (Loose-Part Detection Program for the Primary System of Light-Water-Cooled-Reactors). Additional rationale clarifying the staff position can also be found in a letter, Vassallo to J.E. Mecca (Puget Sound Power and Light Company) "Skagit Nuclear Power Project, Units 1 & 2" dated July 20, 1978 (Docket Nos. 50-522/523) available in the NRC public document room. A number of LWR's, including BWR's, at the same stage of licensing as Susquehanna, have committed to the installation of a LPM system. In addition, it is required by the staff that a LPM system be installed and operational prior to startup of the reactor. Therefore, please provide the information requested in Q221.1.

RESPONSE:

The Susquehanna SES Loose Parts Monitoring System is discussed in Subsections 7.7.1.12 and 7.7.2.12.

<i>HISTORICAL INFORMATION</i>

SSES-FSAR

QUESTION 221.15

Table 4.4-6 describes uncertainties used in the statistical analysis which is performed to establish the fuel cladding integrity safety MCPR limit. Provide a discussion of and reference where possible the experimental data bases used to derive the uncertainty values listed. In particular, describe the applicability of these values to the 8x8, two-water rod assembly design.

RESPONSE:

FSAR Subsection 4.4.2.9 references the required information.