VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 6, 1980

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Serial No. 510
NO/JTR:smv
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Dear Mr. Denton:

NORTH ANNA UNIT 1
MULTIPLE STRUCTURE ARS CONCERN

Licensee Event Report LER/RO 80-034/01T-0 submitted by the Virginia Electric and Power Company informed the NRC that several lines in the low head and high head safety injection systems installed at North Anna Unit 1 had not been analyzed for the effects of fluid temperature below 70°F. The subject lines transport water from the Refueling Water Storage Tank (RWST) to the Reactor Coolant System cold legs during the injection phase of the Emergency Core Cooling System (ECCS) operation. Under certain conditions, these lines would be exposed to temperatures in the 40-50°F range. To verify adequate design of the pipe supports and equipment nozzles/supports in the affected piping sections, the pipe stress analyses were rerun using the revised temperature conditions. Review of the new nozzle loads on the low head safety injection pumps revealed the load on pump 1-SI-P-1B exceeded the pump vendor's allowable load. In order to reduce nozzle loads to within the allowable, it was necessary to modify the function of some supports on the affected lines.

During discussions of this problem with the NRC staff on May 30, 1980, the NRC expressed a concern regarding the Amplified Response Spectra (ARS) curves used as a basis of analyses when a piping system is subjected to more than one ARS such as when the piping system traverses multiple building structures and contains piping supports from both structures. The original design basis selection of ARS for application to bounded piping problems was based upon a case by case evaluation process. This evaluation considered the potential sets of response spectra which might be applicable to the piping, the particular geometry and support configuration of the piping itself, and the analyst's knowledge and experience of anticipated or predicted piping responses. This selection, by its nature, involved a comparison of the ARS curves themselves. Our evaluation, during the past several days, has confirmed that this judgmental selection process was applied on a wide scale, was effective, and produced conservative results when compared with the licensing requirements. We believe

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that this was a reasonable and proper design basis for this era plant. Regulatory guidance in this area was not available until 1975 and there were no FSAR questions or comments on this item following the FSAR submittal of 1973.

Our efforts since May 30 have included a compilation and examination of all pipe stress problems between buildings as well as those pipe stress problems involving piping runs between the containment internal and external structures. Some stress analyses were performed by consultants other than Stone & Webster (S&W) under contract to S&W. These problems are also part of the examination. Attachment 1 provides a list of the 68 stress problems involved.

In order to determine the effect of using an enveloped ARS curve on the piping systems and supports outside of the containment, several sample stress problems on key safety-related systems were reanalyzed using an enveloped curve. The problems were representative since at least one problem was reanalyzed for each building combination traversed by a critical system. Additionally, an evaluation was made of other key piping runs outside of containment as well as key piping runs inside of containment with supports on both the containment internal and external structures. This evaluation considered the actual ARS curves used, modes of response, frequencies of systems, and the resulting responses. The results of this evaluation and reanalysis are summarized in Attachment 2. To date, this effort has found no system, piping supports, or nozzles that are not operable.

Following our telephone discussions of June 3, 1980, and acknowledging our obligation to continue our efforts in this area, we propose a multi-phase plan to address NRC concerns. The sequence of events includes detailed engineering review of all piping problems subject to potential effect of more than one set of response spectra (Phase I) and calculational evaluation of these problems or of those localized problem areas, where necessary, to demonstrate suitability of design (Phase II).

Phase I

The effort designated as Phase I consists of an engineering review and evaluation of all problems identified in Attachment 1 not already so evaluated (Attachment 2), thus completing all piping problems subject to the original expressed concern. This effort will commence immediately. Piping located both inside and outside of containment will be included. Additionally, this effort will also include an evaluation of the multiple ARS effect on small bore piping systems. This effort will then provide a comprehensive assessment of the effect of potential enveloping procedures should they be applied to the unit.

The evaluation will consider the original design basis, i.e., design basis code allowables, original support design loads and material allowables, vendor equipment allowables, design margin, etc., as a means to determine potential effect of enveloping criteria.

Results of the evaluation will be categorized as follows:

Category A problems consist of those which the evaluation has indicated would not be subject to increased responses beyond the capability of the piping, piping supports and equipment nozzles, and are thus not in doubt as far as adequacy of the piping or supports is concerned. Problems falling into this category will require no additional effort beyond the documented engineering evaluation activity.

Category B problems will consist of those problems where the engineering evaluation indicates that a determination cannot be made without further, more detailed evaluation and/or analysis which will be done in Phase II.

Phase I can be accomplished in approximately one month. Our anticipated completion date is July 15, 1980.

Phase II

The evaluation procedure required for Phase II problems would typically consist of a computer reanalysis of the problem and detailed evaluation of pipe stresses, support loads and equipment nozzles. Support evaluations and possible reanalyses of existing designs would be done as well as reevaluation of the resulting equipment loads against existing vendor supplied allowables. Potentially, it may be necessary to submit revised equipment loads to vendors for a determination of acceptability.

Where necessary, the detailed evaluation procedure would be supplemented by additional engineering studies, or evaluations, which would provide justification of the original designs. Such additional studies might include, but not be limitied to, the introduction of Independent Support Methods of ARS (utilizing, for example, the NUPIPE-CDC program) in order to calculate the multi-support effect on a particular problem. In any event, the Phase II effort would justify the existing plant piping designs against a potentially imposed enveloping criteria for selecting amplified response spectra on an engineering basis.

At this time, it is difficult to predict the exact number of problems falling into the Phase II effort, but we believe that a minimum of two months would be required for Phase II. Therefore, our target date for completing Phase II is September 15, 1980.

If at any time during the detailed Phase I and II effort, results obtained clearly show that a design of a particular piping system or support cannot be justified against the concept of multiple structure ARS input, the system will be reviewed per Technical Specifications requirements and appropriate action taken.

As the result of multiple structure ARS concerns on North Anna 1, we have reviewed the situation with regard to our other operating plants, Surry Units 1 and 2 and North Anna 2.

In the seismic analysis of Category I piping for Surry Units 1 and 2 where the piping is within one building, the ARS of the mass point above the highest elevation of the support point of the piping was used. Where the piping is supported by two separate buildings, it was analyzed for the envelope of the ARS of the appropriate elevations of the two buildings. For the containment building, the internal structure and the containment shell were treated as two separate buildings and the enveloping procedure applied for the purpose of the response spectra analysis of piping.

On North Anna Unit 2, the same approach was used as on North Anna Unit 1. Due to the similarity of the units and the design methods used, the conclusions resulting from the evaluations completed thus far on Unit 1 apply to Unit 2. If in the detailed Phase I and Phase II effort on Unit 1 discussed above a design of a piping system or support cannot be justified against the concept of multiple structure ARS, the system will be promptly evaluated on Unit 2 in this regard and the Unit 2 Technical Specification will be followed.

Please let us know if you have any questions or comments on the above. As we proceed, we would be happy to discuss our progress on this matter with you at any time. In any event, we plan to submit a final detailed report upon completion of this effort.

Very truly yours,

B. R. Sylvia
Manager - Nuclear Operations

JTR/smv:C4

Attachments

cc: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Mr. S. A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
Region II

ATTACHMENT 1

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 101A | Main Steam | Main Steam to Turbine | Containment-MSVH-Service | S&W | Containment |
| 101B | Main Steam | Main Steam from "A" Generator | Containment-Internal/External | S&W | Internal |
| 101C | Main Steam | Main Steam from "B" Generator | Containment-Internal/External | S&W | Internal |
| 101D | Main Steam | Main Steam from "C" Generator | Containment-Internal/External | S&W | Internal |
| 102A | Feedwater | Feedwater to "A" Steam Generator | Containment-Internal/External | S&W | Internal |
| 102B | Feedwater | Feedwater to "B" Steam Generator | Containment-Internal/External | S&W | Internal |
| 102C | Feedwater | Feedwater to "C" Steam Generator | Containment-Internal/External | S&W | Internal |
| 102D | Feedwater | Feedwater to Generators | Containment-MSVH-Service | S&W | Containment |
| 103B | Component Cooling | Supply to "B" RHR Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 103C | Component Cooling | Return from "A" RHR Heat Exchanger | Containment-Internal/External | S&W | External |
| 103D | Component Cooling | Return from "A" RCP | Containment-Internal/External | S&W | Internal |

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 103E | Component Cooling | Return from "B" RHR Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 103F | Component Cooling | Return from "C" RCP | Containment-Internal/External | S&W | Internal |
| 103G | Component Cooling | Supply to "B" RCP | Containment-Internal/External | S&W | Internal |
| 103J | Component Cooling | Supply to "A" RHR Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 103K | Safety Injection | Cold Leg Injection | Containment-Internal/External | S&W | Internal |
| 103R | Safety Injection | Cold Leg Injeccion | Containment-Internal/External | S&W | Internal |
| 103AC | Safety Injection | Hot Leg Injection | Containment-Internal/External | S&W | Internal |
| 103AE | Safety Injection | Hot Leg Injection | Containment-Internal/External | S&W | Internal |
| 103AM | Component Cooling | Supply to "C" RCP | Containment-Internal/External | S&W | Internal |
| 103AN | Component Cooling | Supply to "A" RCP | Containment-Internal/External | S&W | Internal |
| 103AP | Component Cooling | Return from "B" RCP | Containment-Internal/External | S&W | Internal |
| 104A | Low Head Safety Injection | Pump Discharge to Containment | Containment-Safeguards | S&W | *Containment/ Safeguards |

* Used containment horizontal and safeguards vertical

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 104D | Recirc. Spray | Outside Pump A Discharge | Containment-Safeguards | S&W | Containment |
| 104F | Residual Heat Removal | Pump Back to RWST after an Outage | Containment-Safeguards | S&W | Containment |
| 104G | Quench Spray | Flow to Spray Header-B Pump | Containment-Safeguards | S&W | Containment |
| 104H | Quench Spray | Flow to Spray Header-A Pump | Containment-Safeguards | S&W | Containment |
| 105F | Service Water | Supply Recirc. Spray Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 105G | Service Water | Return from Recirc. Spray Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 105H | Service Water | Flow from the Containment Recirc. Spray Heat Exchanger | Containment-MSVH | S&W | Containment |
| 105J | Service Water | Flow to the Containment Recirc. Spray Heat Exchanger | Containment-MSVH | S&W | Containment |
| 107B | Safety Injection | Low Head to High Head Cross Connect | MSVH-Safeguards | S&W | MSVH |

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 107C | Quench Spray | Pump Discharge to Containment-B Pump | MSVH-Safeguards | S&W | MSVH |
| 107D | Quench Spray | Pump Discharge to Containment-A Pump | MSVH-Safeguards | S&W | MSVH |
| 111B | Safety Injection | Low Head to High Head Cross Connect A Pump | MSVH-Auxiliary | S&W | Auxiliary |
| 111C | Safety Injection | Low Head to High Head Cross Connect B Pump-RWST Suction | MSVH-Auxiliary | S&W | MSVH |
| 111N | Safety Injection | Hot Leg Injection | Containment-Auxiliary | S&W | Containment |
| 111Q | Safety Injection | Discharge of Boron Injection Tank | Containment-Auxiliary | S&W | Containment |
| 111S | Safety Injection | Hot Leg Injection | Containment-Auxiliary | S&W | Containment |
| 114B | Quench Spray | "B" Pump Discharge to Spray Header | Containment-Internal/External | S&W | External |
| 114D | Recirc. Spray | "D" Heat Exchanger to Spray Header | Containment-Internal/External | S&W | External |
| 114E | Quench Spray | "A" Pump Discharge to Spray Header | Containment-Internal/External | S&W | External |

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 114F | Recirc. Spray | "A" Outside Pump to "D" Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 114G | Recirc. Spray | "B" Outside Pump to "C" Heat Exchanger | Containment-Internal/External | S&W | Internal |
| 114K | Recirc. Spray | "B" Cooler to Spray Header | Containment-Internal/External | S&W | External |
| 114L | Recirc. Spray | "A" Heat Exchanger to Spray Header | Containment-Internal/External | S&W | External |
| 114M | Recirc. Spray | "C" Heat Exchanger to Spray Header | Containment-Internal/External | S&W | External |
| 118A | Component Cooling | Supply to RCP C | Containment-Auxiliary | S&W | Envelope |
| 118B | Component Cooling | Supply to RCP A and B | Containment-Auxiliary | S&W | Auxiliary |
| 118C | Component Cooling | Supply Header to Containment | Containment-Auxiliary | S&W | Auxiliary |
| 118D | Component Cooling | Return Header to Containment | Containment-Auxiliary | S&W | Auxiliary |
| 118E | Component Cooling | Return from RCP A and B | Containment-Auxiliary | S&W | Auxiliary |
| 118F | Component Cooling | Return from RCP C | Containment-Auxiliary | S&W | Auxiliary |

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| 118G | Component Cooling | Return from Recirc. Air Cooling | Containment-Auxiliary | S&W | Auxiliary |
| 118H | Component Cooling | Supply to Recirc. Air Cooling | Containment-Auxiliary | S&W | Auxiliary |
| 118K | Component Cooling | Main Supply to Unit 2 Containment | Containment-Auxiliary | S&W | Auxiliary |
| 118N | Component Cooling | Main Return from Unit 2 Containment | Containment-Auxiliary | S&W | Auxiliary |
| 121A | Component Cooling | Supply to Fuel Pool Heat Exchanger | Fuel-Auxiliary | S&W | Fuel |
| 121B | Component Cooling | Return from Fuel Pool Heat Exchanger | Fuel-Auxiliary | S&W | Auxiliary |
| 121E | Containment Vacuum | Line to Air Ejector Used in Startup | Containment-Auxiliary | S&W | Containment |
| SSR-7 SA-7223 | Seal Injection | Injection to "A"-RCP | Containment-Internal/External | Contract | Envelope of Interior |
| SSR-7 SA-7209 | Seal Injection | Injection to "B"-RCP | Containment-Internal/External | Contract | Envelope of Interior |
| SSR-7 SA-7198 | Seal Injection | Injection to "C"-RCP "C" RCP | Containment-Internal/External | Contract | Envelope of Interior |

ATTACHMENT 1 (Continued)

LIST OF MULTI-STRUCTURE PROBLEMS

NORTH ANNA UNIT 1

| Problem No. | System | Function | Buildings | Analysis Responsibility | ARS Curve Used |
|---|---|---|---|---|---|
| SSR-7<br>SA-7236 | Seal Injection | Manifold to "A", "B" "C" RCP | Containment-Auxiliary | Contract | Containment |
| SSR-8<br>SA-7217 | Seal Return | Combined return "A", "B", "C" RCP | Containment-Internal/External | Contract | Envelope of Interior |
| SSR-8<br>SA-7234 | Seal Return | Combined return "A", "B", "C" RCP | Containment-Internal/External | Contract | Containment |
| SSR-11 | Charging | Piping upstream of Regenerative Heat Exchanger | Containment-Internal/External | Contract | Envelope |
| SSR-14 | Letdown | Piping downstream of Regenerative Heat Exchanger | Containment-Internal/External | Contract | Envelope |

ATTACHMENT 2

SAMPLE PROBLEMS OUTSIDE CONTAINMENT

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 104A | Safey Injection | One of six initial sample problems outside the containment. Reran problem with envelope curves. Preliminary review shows all pipe stresses and pipe supports and equipment loads are such that system operability is maintained. |
| 104D | Recirculation Spray | One of six initial sample problems outside the containment. Reran problem with envelope curves. Preliminary review shows all pipe stresses, pipe supports and equipment are within allowables. |
| 105J/105H | Service Water | Problem No. 105J was one of six initial sample problems outside the containment. Review of system frequencies show that the curve used in analyses envelopes the other possible curve for all system frequencies. Therefore, no computer re-analysis with an enveloped ARS was required. The same evaluation results apply to Problem No. 105H. |
| 107B | Safety Injection | One of six initial sample problems outside the containment. Reran problem with envelope curves. Preliminary review shows all pipe stresses and pipe supports loads are such that system operability is maintained. |
| 111C | Safety Injection | One of six initial sample problems outside the containment. Reran problem with envelope curves. Preliminary review shows all pipe stresses and pipe supports loads are such that system operability is maintained. |

ATTACHMENT 2 (Continued)

SAMPLE PROBLEMS OUTSIDE CONTAINMENT

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 111Q | Safety Injection | One of six initial sample problems outside the containment. Reran problem with envelope curves. Preliminary review shows all pipe stress and pipe supports are within allowable. |

ATTACHMENT 2 (Continued)

EVALUATION RESULTS - INSIDE CONTAINMENT PROBLEMS

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 101B<br>101C<br>101D | Main Steam | In each of the three cases, no piping frequencies fall within the portion of the curve subject to the Hz peak effect of the external structure. Two system fundamental modes exist in the area of 6.5 Hz, but these can be clearly and distinctly attributed to response of the steam generator. These steam generator modes cannot be excited by the external structure, and the effect of these modes in the vicinity of the containment penetration is negligible. |
| 102A<br>102B<br>102C | Feedwater | Detailed review indicates the presence of similar system generator modes as in the main steam case, which cannot be excited by the external structure. There is a single mode in the area of 9 Hz which falls into the range of possible external structure excitation. A detailed review of this mode's potential contribution indicates that predicted responses due to a postulated envelope situation would be minimal, perhaps on the order of a one to five percent increased in seismic response. |
| 103K | Safety Injection | The system frequencies were reviewed and found to be of values such that the curve used envelopes the other possible curve for the frequencies in question. |
| 105G | Service Water | The system fundamental frequency is greater than 10 Hz. Therefore, the curve used envelopes the other possible curve. |

ATTACHMENT 2 (Continued)

EVALUATION RESULTS - INSIDE CONTAINMENT PROBLEMS

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 114B | Quench Spray | Several modes could be potentially affected by the interior structure peak but the modal responses were in areas of the pipe system that could only be excited by the external structure. |
| 114D | Recirc. Spray | The system frequencies were reviewed and found to be of values such that the curve used envelopes the other possible curve for the frequencies in question. |
| 114E | Quench Spray | A review of the modes of the problem indicated that only 1 mode occurred with significant increased response potential for the curve not used. Local load increases are expected but function will be maintained. The vertical curve used envelopes the other possible curve. Relatively low stresses exist in the area of modal response. |
| 114K | Recirc. Spray | The system frequencies were reviewed and found to be of values such that the curve used envelopes the other possible curve for the frequencies in question. |
| 114L | Recirc. Spray | The system frequencies were reviewed and found to be of values such that the curve used envelopes the other possible curve for the frequencies in questions. |
| 114M | Recirc. Spray | The system frequencies were reviewed and found to be of values such that the curve used envelopes the other possible curve for the frequencies in question. |

ATTACHMENT 2 (Continued)

EVALUATION RESULTS - LINES OUTSIDE CONTAINMENT

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 101A | Main Steam | The three main steam leads are treated individually for seismic analysis and as a joint problem for thermal expansion and for combined loads analysis. The leads are very similar but not exactly identified in geometry and in location of pipe supports. Reactor containment external ARS were used in the analysis. Review of one of the three leads shows that 2 modes fall into areas subject to increased acceleration due to MSVH peaks and loads will therefore increase. Preliminary review of the potential increases indicates that the system will maintain operability. Review of the two remaining leads is continuing. |
| 102D | Feedwater | The three feedwater leads outside of containment are treated independent for seismic analysis and as a joint problem for thermal expansion for combined loads analysis. The leads are very similar but not exactly identical in geometry and in location of pipe supports. Reactor containment external ARS were used in the analysis. Preliminary review indicates that the load increases are expected but the system is complex and the effect of such increases cannot be reasonably determined. Priority effort is underway to complete this more detailed review. |
| 104F | Residual Heat Removal | The containment building external structure ARS was used for analysis. The responses of the modes which are not enveloped by that ARS are not expected to increase sufficiently so as to significantly increase total response. Changes in support loads and stresses are expected to be minimal. |

ATTACHMENT 2 (Continued)

EVALUATION RESULTS - LINES OUTSIDE CONTAINMENT

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
|---|---|---|
| 104G | Quench Spray | The containment external structure ARS was used for the analysis. Although some modal response could increase as a result of the application of enveloped ARS, the low level of response in the present analysis indicates that total support loading would not increase significantly and that stress levels would remain acceptable. |
| 104H | Quench Spray | The ARS used for the analysis is for containment external structure. This problem was rerun, using an ARS envelope of the containment and Safeguard building. As a result, the maximum stress increased minimally while the increase in resultant support loads was well within acceptable margins. |
| 107C | Quench Spray | All supports except the last anchor on the Safeguard wall are connected to the Main Steam Valve House. The present analysis uses the Main Steam Valve House ARS, but review of potential changes due to use of an enveloped curve indicates that expected changes are minimal. |
| 107D | Quench Spray | All supports except the last anchor on the Safeguard wall are connected to the Main Steam Valve House. The present anlaysis uses the Main Steam Valve House ARS, but review of potential changes due to use of an enveloped curve indicates that expected changes are minimal. |

ATTACHMENT 2 (Continued)

EVALUATION RESULTS - LINES OUTSIDE CONTAINMENT

STATUS AS OF JUNE 6, 1980

| Problem No. | System | Status |
| --- | --- | --- |
| 111B | Safety Injection | Both the Valve House and the Auxiliary building ARS were separately used for analysis. The results from the more severe Valve House curve were used for all supports except for two located at the opposite end of the system away from the Valve House anchor. Since only the anchor is located in the Valve House, the system response is controlled by the Auxiliary building. While further evaluation of a possible curve enveloping will be required, it is expected that supports would be within the functional range and stresses will be within faulted limits. |
| 111N | Safety Injection | The system is bounded on one end by an anchor attached to the Reactor Containment external structure and on the other end by a containment penetration. Since there are no other supports and since the containment external structure ARS was used in the analysis, no enveloping of ARS is required. |