

FINAL

SSER

Task: Allegation A-225

Ref. No.: 4-84-A-06-113

Characterization: The allegation is that a concern regarding the supports for non-safety instrument air piping not meeting guidelines in Regulatory Guide 1.29, was never properly resolved.

Assessment of Allegation: The thrust of the concern is the question of whether guidelines provided in Regulatory Guide (RG) 1.29 were considered during instrument air piping and tubing design and whether the failure of the instrument air piping and tubing, or their supports, could degrade any safety equipment or tubing during a Safe Shutdown Earthquake (SSE).

Regulatory Positions 2 and 3 of Regulatory Guide 1.29 "Seismic Design Classification" Rev. 3, September 1978 and Rev. 1, August 1973, states that non-safety structures, systems, or components whose failure could reduce the functioning of any plant feature to an unacceptable safety level or whose failure could result in incapacitating injury to occupants of the control room, should be designed and constructed so that the SSE would not cause such failure.

Seismic Category I design requirements should extend to the first seismic restraint beyond the defined boundaries. Those portions of structures, systems, or components that form interface between Seismic Category I and non-Seismic Category I features should be designed to Seismic Category I requirements.

Therefore, non-seismic installation is permitted, provided certain design considerations are followed.

From a review of a number of Ebasco drawings, it was confirmed that the Waterford instrument air system is not safety-related and that the tubing/piping is installed as non-seismic in areas with safety-related equipment, such as the auxiliary building and containment building.

A review of the Waterford 3 Final Safety Analysis Report (FSAR) confirms that the instrument air system is not needed for plant safety, and that the proper considerations for R.G. 1.29 and non-seismic installations were included in the design (FSAR Section 9.3.1).

Complete loss of instrument or service air during full power operation or under accident conditions does not reduce the ability of the reactor protective system or the engineered safety features and their supporting systems to safely shut down the reactor or to mitigate the consequences of an accident.

Since the compressed air system serves no safety function, this system is not designed to any safety class or seismic requirements. The portion of instrument air and service air piping and valves penetrating the containment

building is designed to safety class 2 and seismic Category I requirements (refer to Subsection 6.2.4). The containment building instrument air header outer isolation valve is designed to fail closed. The containment service air outer isolation valve is locked closed because no compressed service air is required in the containment during normal plant operation.

Accumulators are provided on those valves where instrument air is required for operation during the safe shutdown of the plant following an accident or to mitigate the consequences of an accident. The accumulators are designed to seismic Category I requirements.

FSAR Section 3.2-1 "Seismic Classification," states:

"The seismic classifications are consistent with the recommendations of Regulatory Guide 1.29, "Seismic Design Classification", August 1973, with a clarification noted in Table 3.2-1 for the reactor coolant pump bearing oil and cooling systems."

"For systems which are partially seismic Category I, the seismic Category I portion includes all components within the seismic boundary and extends to the first seismic restraint beyond the boundary."

"Non-seismic structures, systems and components are those whose failure would not result in the release of significant radioactivity and would not prevent reactor shutdown or degrade the operation of Engineered Safety Feature Systems. Their failure may, however, interrupt power generation."

"The occurrence of adverse interaction between safety and non-safety-related components during SSE events are eliminated by adherence to the following:

- a) Whenever practical, the safety related components are separated from the non-safety-related components to ensure that failure of the non-safety-related component due to a SSE will not result in loss of function to the safety related components.
- b) In those areas where adequate separation is not possible, the non-safety-related components are provided with seismic supports, or barriers are provided between the safety-related and non-safety-related components.

Where only portions of systems are identified as seismic Category I, the boundaries of the seismic Category I portions of the system are shown on the piping and instrument diagrams in appropriate sections of this FSAR."

This information indicates that the guidelines in Regulatory Guide 1.29 were taken into consideration at the time of instrument air piping and tubing design. It is also apparent that the potential for functional degradation of safety equipment or tubing during SSE due to instrument air piping and tubing failure was similarly addressed in the design.

Document Name:
SSER A-225

Requestor's ID:
PATTYN

Author's Name:
Dale Thatcher

Document Comments:

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Assessment of Allegation: The thrust of the concern is the question of whether guidelines provided in Regulatory Guide (RG) 1.29 were considered during instrument air piping and tubing design and whether the failure of the instrument air piping and tubing, or their supports, could physically or degrade any safety equipment or tubing during a Safe Shutdown Earthquake (SSE).

Regulatory Positions 2 and 3 of Regulatory Guide 1.29 "Seismic Design Classification" Rev. 3, September 1978 and Rev. 1, August 1973, states that non-safety structures, systems, or components whose failure could reduce the functioning of any plant feature to an unacceptable safety level or whose failure could result in incapacitating injury to occupants of the control room, should be designed and constructed so that the SSE would not cause such failure.

Seismic Category I design requirements should extend to the first seismic restraint beyond the defined boundaries. Those portions of structures, systems, or components that form interface between Seismic Category I and non-Seismic Category I features should be designed to Seismic Category I requirements.

Therefore, non-seismic installation is permitted, provided certain design considerations are followed.

From a review of a number of Ebasco drawings, it was confirmed that the Waterford instrument air system is not safety-related and that the tubing/piping is installed as non-seismic in areas with safety-related equipment, such as the auxiliary building and containment building.

A review of the Waterford 3 Final Safety Analysis Report (FSAR) confirms that the instrument air system is not needed for plant safety, and that the proper considerations for R.G. 1.29 and non-seismic installations were included in the design (FSAR Section 9.3.1).

Complete loss of instrument or service air during full power operation or under accident conditions does not reduce the ability of the reactor protective system or the engineered safety features and their supporting systems to safely shut down the reactor or to mitigate the consequences of an accident.

Since the compressed air system serves no safety function, this system is not designed to any safety class or seismic requirements. The portion of instrument air and service air piping and valves penetrating the containment

- Reference: Attachment 1. Regulatory Guide 1.29, "Seismic Design Classification;" Rev. 3 and Rev. 1
- Attachment 2. Copy of B-430; sht x-23, sht 1 of 3
- Attachment 3. WSES-FSAR-Unit-3, Section 3.2, "Classification of Structures, Components and Systems"
- Attachment 4. WSES-FSAR-Unit-3, Section 9.3.1 "Compressed Air System"
- Attachment 5. WSES-FSAR-Unit-3, Question No. 211.19 (3.5.1.2)

Prepared by	<u>Dale Thatcher</u>	<u> </u> Date
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The NRC staff also queried LP&L regarding the possibility of gravity missiles, from the failure of non-seismic instrument air piping and tubing physically degrading any safety equipment or tubing in the containment building during a SSE. In response to this question, LP&L identified a number of design criteria, procedures and controls which have been implemented, or were to be implemented, to avoid damage to safety-related equipment from potential gravity missiles inside the containment building. These included:

- 1) Structural steel inside the containment building is designed for a SSE.
- 2) Electrical equipment including cable trays and conduit, inside the containment building is seismically supported, except for lighting and communications conduit. A verification will be performed in the field to ensure that a failure does not endanger safe shutdown equipment.
- 3) The only H&V duct inside the containment building not seismically supported is located in the containment sump pump compartment where no safety-related equipment is located. All other H&V ducts and equipment are seismically supported to prevent gravity missiles.
- 4) Non-seismically classified support piping has been routed away from safety-related equipment. A verification will be performed in the field after installation of equipment and piping.

The staff requested that LP&L provide documentation of the field verification of the above controls. From the additional information provided, it appeared that the follow-on verification was performed (inside the containment and the auxiliary and fuel handling buildings); however, it was not clear to the staff what specific non-seismic equipment (including the instrument air system) was verified. The staff could not determine if the issue of the air system's physical failure was adequately considered.

Based on the information provided from the field verification (walkdown), it appeared that insufficient documentation was included in the walkdown to draw a conclusion that the physical failure of the air system was adequately considered.

This issue could have some safety significance, but based on the previous walkdown the applicant should show that the safety significance is minor. This allegation also has generic implications because other non-seismic equipment (other than the air system) will also need to be addressed. This issue shall be addressed prior to exceeding 5% power.

Potential Violations: None

Actions Required: Applicant will be required to provide assurance that the non-seismic equipment (including the the air system) will not physically degrade any safety equipment or tubing during SSE. This action shall be completed on a schedule acceptable to the NRC staff.

building is designed to safety class 2 and seismic Category I requirements (refer to Subsection 6.2.4). The containment building instrument air header outer isolation valve is designed to fail closed. The containment service air outer isolation valve is locked closed because no compressed service air is required in the containment during normal plant operation.

Accumulators are provided on those valves where instrument air is required for operation during the safe shutdown of the plant following an accident or to mitigate the consequences of an accident. The accumulators are designed to seismic Category I requirements.

FSAR Section 3.2-1 "Seismic Classification," states:

"The seismic classifications are consistent with the recommendations of Regulatory Guide 1.29, "Seismic Design Classification", August 1973, with a clarification noted in Table 3.2-1 for the reactor coolant pump bearing oil and cooling systems."

"For systems which are partially seismic Category I, the seismic Category I portion includes all components within the seismic boundary and extends to the first seismic restraint beyond the boundary."

"Non-seismic structures, systems and components are those whose failure would not result in the release of significant radioactivity and would not prevent reactor shutdown or degrade the operation of Engineered Safety Feature Systems. Their failure may, however, interrupt power generation."

"The occurrence of adverse interaction between safety and non-safety-related components during SSE events are eliminated by adherence to the following:

- a) Whenever practical, the safety related components are separated from the non-safety-related components to ensure that failure of the non-safety-related component due to a SSE will not result in loss of function to the safety related components.
- b) In those areas where adequate separation is not possible, the non-safety-related components are provided with seismic supports, or barriers are provided between the safety-related and non-safety-related components.

Where only portions of systems are identified as seismic Category I, the boundaries of the seismic Category I portions of the system are shown on the piping and instrument diagrams in appropriate sections of this FSAR."

This information indicates that the guidelines in Regulatory Guide 1.29 were taken into consideration at the time of instrument air piping and tubing design. It is also apparent that the potential for functional degradation of safety equipment or tubing during SSE due to instrument air piping and tubing failure was similarly addressed in the design.

The NRC staff also queried LP&L regarding the possibility of gravity missiles, from the failure of non-seismic instrument air piping and tubing physically degrading any safety equipment or tubing in the containment building during a SSE. In response to this question, LP&L identified a number of design criteria, procedures and controls which have been implemented, or were to be implemented, to avoid damage to safety-related equipment from potential gravity missiles inside the containment building. These included:

- 1) Structural steel inside the containment building is designed for a SSE.
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- 3) The only H&V duct inside the containment building not seismically supported is located in the containment sump pump compartment where no safety-related equipment is located. All other H&V ducts and equipment are seismically supported to prevent gravity missiles.
- 4) Non-seismically classified support piping has been routed away from safety-related equipment. A verification will be performed in the field after installation of equipment and piping.

The staff requested that LP&L provide documentation ^{FOR} ~~of on the~~ field verification of the above controls. From the additional information provided, it appeared that the follow-on verification was performed (inside the containment and the auxiliary and fuel handling buildings); however, it was not clear to the staff what specific non-seismic equipment (including the instrument air system) was verified. The staff could not determine if the issue of the air system's physical failure was adequately considered.

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This issue could have some safety significance, but based on the previous walkdown the applicant should show that the safety significance is minor. This allegation also has generic implications because other non-seismic equipment (other than the air system) will also need to be addressed. This issue shall be addressed prior to exceeding 5% power.

Potential Violations: None

Actions Required: Applicant will be required to provide assurance that the non-seismic equipment (including the the air system) will not physically degrade any safety equipment or tubing during SSE. This action shall be completed prior to exceeding 5% power.

- Reference: Attachment 1. Regulatory Guide 1.29, "Seismic Design Classification;" Rev. 3 and Rev. 1
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	Team Leader	Date
Reviewed by:	_____	_____
	Site Team Leader	Date
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	Task Management	Date

FINAL SSER ROUTING

A 225

Revision :	0	1	2	3
Denny Crutchfield	<i>[Signature]</i>	<i>RMC 6/14</i>		
Jim Gagliardo	✓	<i>11/6/14</i>	FINAL	

OK

FINAL SSER ROUTING

A 225

Revision :	0	1	2	3
Denny Crutchfield				
✓ Jim Gagliardo	<i>[Signature]</i>			

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Rev p.3

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Actions Required: Applicant will be required to provide assurance that the non-seismic equipment (including the the air system) will not physically degrade any safety equipment or tubing during SSE. This action shall be completed ~~prior to exceeding 5% power.~~

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Prepared by	_____	_____
	Dale Thatcher	Date
Reviewed by:	_____	_____
	Team Leader	Date
Reviewed by:	_____	_____
	Site Team Leader	Date
Approved by:	_____	_____
	Task Management	Date

heat number upon proper request from the document reviewers. There is no objective evidence of EBASCO personnel being denied access to Mercury records. Although this allegation may have existed prior to and at the time of the allegation, access was not a current problem and QA records were acceptable.

5. Allegation A-98. The allegation is that Mercury Authorized Nuclear Inspectors (ANIs) were off limits to reviewers. The six EBASCO document reviewers interviewed, who were on site at the time of this allegation, agreed they had ready access to Mercury ANIs. There is no objective evidence that the reviewers were denied access to the ANIs, although this situation may have existed prior to or during the allegation. Mercury ANIs were not available on site to be interviewed by the NRC staff.
6. Allegation A-98. The allegation is that there are no procedures for review of documents. The NRC staff reviewed the following procedures and found them to be adequate for review of documents: EBASCO Procedure QAI No. 9, "Review and Handling of Construction-Installation Records," original issue dated October 31, 1979, current revision issued April 20, 1983; EBASCO Procedure QAI No. 9A, "Documentation Statusing Review Instruction," dated December 13, 1982; Tompkins-Beckwith Procedure TBP-20, "QA Records Turnover," dated February 7, 1983; and Mercury Company Procedure QPC-3010, "Quality Assurance Records Control," original issue dated September 7, 1978, current revision issued November 1, 1978.

Additionally contractors' documentation packages were reviewed by the NRC staff and generally found acceptable; see Allegations A-143, A-150, A-162, and A-163.

The NRC staff has determined that these six allegations have neither safety significance nor generic implication.

Potential Violations: None.

Actions Required: None.

References

1. EBASCO Procedure QAI No. 9, "Review and Handling of Construction-Installation Records," dated April 20, 1983.
2. EBASCO Procedure QAI No. 9a, "Documentation Statusing Review Instructions," dated December 13, 1982.
3. Tompkins-Beckwith Procedure TBP-20, "QA Records Turnover," dated February 7, 1983.
4. Mercury Company Procedure No. QPC-3010, "Quality Assurance Records Control," dated November 1, 1978.
5. EBASCO NCR W3-6943.

Statement Prepared By:

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Reviewed By:

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Task Management

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