# Staff Responses to Public Comments on Draft Regulatory Guide DG-1225
# INSTRUMENT LINES PENETRATING THE PRIMARY REACTOR CONTAINMENT
# (Proposed Revision 1 of Regulatory Guide 1.11)

(Public comments have been edited for clarity)

Strategic Teaming and Resource Sharing (STARS) Alliance
Integrated Regulatory Affairs Group
PO Box 1002
Glen Rose TX 76043
(ML093441087)

| Comments | | | NRC Comment Resolution |
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| Originator | DG-1225 Section | Specific Comment | NRC Staff Response |
| STARS-1 | B & C.1 | The following statement is contained on page 3 and is repeated in Regulatory Position C. 1 on page 4: *"Lines connected to instruments that are part of the protection or safety systems are extensions of those systems and should satisfy the requirements for redundancy, independence, and testability for those systems to ensure that they accomplish their functions."* This statement implies that instrument lines should satisfy requirements for redundancy, independence, and testability. However, designs of sensing lines to instruments do not normally have redundant lines going to the same instrument, and if they did, they would not likely be independent. Similarly, testability does not appear to apply to the line connected to the instrument, but rather to the instrument itself or the systems that the instrument supports.<br>The paragraph on page 3 following the above statement discusses providing a higher degree of isolation capability for lines connected only to instruments that are not part of the protection or safety systems. The intent of the guidance appears to be focused on the | The wording was carried forward essentially unchanged from the initial issue of the guidance in 1971. The wording has been changed to more clearly and affirmatively convey that the instrument lines, as part of the system to which the instruments belong, are required to support the systems achieving the design goals of redundancy, independence, and testability. *"Lines connected to instruments that are part of the protection or safety systems are extensions of those systems and should support those systems achieving their requirements for redundancy, independence, and testability to ensure the systems safety functions are accomplished."* |

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| | | capability of the systems supported by the instrument to perform their intended functions, instead of the requirements of the instrument sensing lines.<br>STARS recommends changing the wording to clarify the application of the guidance to the system function supported by the instrument, as follows:<br>*"Lines connected to instruments that are part of the protection or safety systems are extensions of those systems and should ~~satisfy~~ <u>not adversely impact</u> the <u>systems</u>' requirements for redundancy, independence, and testability ~~for those systems~~ to ensure that ~~they~~ <u>the systems supported by the instruments can</u> accomplish their functions."* | |
| STARS-2 | B & C.2.b. | DG-1225, Section B. Discussion, states (also included in Section C. Regulatory Position, item 2b):<br>*"For those instrument lines that are part of the reactor coolant boundary, it is also important to ensure that the rate and the extent of coolant loss from the ruptured component are within the capability of the normal reactor coolant makeup system."*<br>STARS recommends adding underlined words as follows:<br>*"For those instrument lines that are part of the reactor coolant boundary, it is also important to ensure that the rate and the extent of coolant loss from the ruptured component <u>at power</u> are within the capability of the normal reactor coolant makeup system <u>such that reactor trip would be avoided</u>."*<br>Flow though a ruptured instrument line could vary considerably depending on the state of the RCS system fluid. Standard Review Plan 3.6 considers the capability of the normal reactor coolant makeup system only during MODES I and 2. During non-power modes, methods other than normal reactor coolant makeup are allowed. Limiting the design of instrumentation tubing to conditions at power is also acceptable since the length of time at power is much longer than time at non-power (i.e., greatest probability of rupture). | NUREG-0800 Standard Review Plant (SRP) Sections 3.6.1, 3.6.2, 3.6.3 and associated Branch Technical Positions BTP 3-3 and BTP 3-4 do not indicate that the normal reactor coolant makeup system capability is considered only during Modes 1 and 2. The NUREG guidance does define normal plant operating conditions as those that exist during reactor startup, operation at power, hot standby, or reactor cooldown to cold shutdown condition. The wording is the same as that of the initial issue of the RG 1.11 guidance in 1971 except that the term "reactor coolant makeup system" was changed to "normal reactor coolant makeup system." This change was made to clarify that instrument line rupture was not to require ECCS operation to maintain coolant inventory. (Staff recognizes that pumps used for normal charging at some plants may also have a safety related ECCS function.) Similarly, the instrument line rupture should not cause a reactor trip as a result of the loss of coolant inventory, but the recommended wording might be inferred as Staff guidance |

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| | | | that operators avoid tripping the reactor when responding to an instrument line rupture event. The recommended change was not incorporated. |
| STARS-3 | B & C.2.d. | DG-1225, Section B. Discussion, states (also similarly included in Section C. Regulatory Position, item 2d): "Because the likelihood of such a rupture is assumed to be high, the system is designed to result in calculated radiation doses from just such an instrument line failure during normal operation being substantially below the guidelines of 10 CFR Part 100, "Reactor Site Criteria" (Ref. 2) and GDC 19, "Control Room."<br><br>STARS recommends making the following changes:<br>*"Because the likelihood of such a rupture is assumed to be high, the system is designed to result in calculated radiation doses from just such an instrument line failure during normal operation being substantially below less than the guidelines of 10 CFR Part ~~100~~ 50 Appendix I, ~~"Reactor Site Criteria" (Ref. 2) and GDC 19, "Control Room.~~ Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."*<br>The probability of a rupture is high and is consistent with the frequency of events categorized as PC-1 and PC-2 (ANSI / ANS 18.2) and is similar to the limits of 10 CFR 50 Appendix I. The limits of 10 CFR Part 100 are much higher than 10 CFR 50 Appendix I since they consider events of low probability with much greater consequence. These evaluations should use nominal plant and site parameters. Dose assessment should be based on realistic estimates. | ANSI/ANS-51.1-83, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants", (and similarly for ANSI/ANS-52.1 for boiling water plants) were incorporated into ANSI/ANS-18.2-74. These standards identify plant conditions (PC) corresponding to best estimate frequency of occurrence. PC-1 corresponds to normal operation (expect to occur each year) and PC-2 corresponds to a frequency of once in 10 years or more often. The appendix B of these standards discusses the basis for the plant condition criteria. In section B2, dose limits are discussed and indicate PC-1 and PC-2 dose criteria are addressed by 10 CFR 50 Appendix I with doses from all events in these plant condition categories summed and best-estimate dose models and meterology used. Also stated is that the other plant condition categories have the dose limit applied to individual events and dose consequences calculated using conservative dose models and meterology. No specific failure probability is assumed for instrument lines, but more than once in 10 years appears higher than originally contemplated. An instrument line failure event is at the border of PC-2 and PC-3. Changing the approach to determining dose consequences was not contemplated and the likely impact of a guidance change to the different methodology |

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| | | | was not evaluated. The existing guidance results in calculated values that are compared to that which would be allowable in case of PC-3, -4, or -5 event. Although no specific numerical acceptance value has been provided, calculated dose values of less than or near ten percent of the 10 CFR 100 guidelines have generally been found acceptable. The recommended change was not incorporated. |
| STARS-4 | B. | DG-1225, Section B. Discussion, page 3 contains a list of four actions to provide assurance that, for instrument lines without an isolation valve inside containment, the lines from the containment out to and including the outside valve retains its integrity during normal reactor operation and under accident conditions.<br><br>STARS recommends adding a fifth action to this list to provide additional emphasis to component level design for post accident environmental conditions, as follows:<br>1. locating the valve as close to containment as practical,<br>2. adopting a conservative approach in the design of this section of the line,<br>3. implementing suitable quality assurance provisions, and<br>4. performing suitable visual inservice inspections.<br>5. consider issues associated with environmental qualification, jet impingement and missile generation. | The four provisions listed from the Discussion Section B are incorporated into the regulatory positions. The discussion section is provided for explanation and regulatory positions are contained in a separate section. The proposed additional discussion section list action "5" is not directly replicated in a regulatory position. However, Regulatory Position #5 does address consideration of the jet impingement and missile generation concerns in a more general manner regarding the instrument lines potential effect on one another. Also, this regulatory guide does not override the guidance of Reg Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants", Reg Guide 1.151, "Instrument Sensing Lines", and requirements of 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants", regarding environmental qualification. The recommended change was not incorporated. |