APR 02 1993

MEMORANDUM FOR: Frank Gillespie, Director
Program Management, Policy Development,
and Analysis Staff

FROM: Warren Minners, Director
Division of Safety Issue Resolution
Office of Nuclear Regulatory Research

SUBJECT: PROPOSED RESOLUTION OF GENERIC ISSUE 105,
"INTERFACING SYSTEMS LOCA IN LWRS"

In accordance with RES Office Letter No. 3, Rev. 2, enclosed are advance copies of the subject proposed resolution package. The proposed resolution involves no new requirements for licensees. The GI-105 Program did not identify risk from this issue significant enough on an absolute basis or on a cost/benefit basis to warrant any of the backfit options considered in the cost/ benefit analysis of Enclosure 3. Licensees are now participating in the IPE Program, which includes ISLOCA among sequences to be examined. Such participation is considered sufficient to resolve the issue. Information from the ISLOCA Program, promulgated by an Information Notice (cf Encl. 2), would be of use to licensees not yet having completed their IPEs and as a useful check by licensees with completed IPEs. Issuance of the IN, subsequent to the final resolution memorandum, is recommended although the IN is not considered necessary to issue resolution. Also in accordance with RES Office Letter No. 3, Rev 2, for resolutions with no new requirements, the ACRS was requested to respond within one month if review of the resolution by them is desired.

In addition to the proposed resolution package, as transmitted to the ACRS, also enclosed is a draft Standard Review Plan (SRP) section entitled, "ALWR Design Review for Systems Interfacing with the Reactor Coolant System," which was developed during the resolution of this issue. This draft SRP section is provided for your information and use.If you have any questions, please contact Dr. Gary Burdick (492-3812).

Warren Minners, Director
Division of Safety Issue Resolution
Office of Nuclear Regulatory Research

Enclosures:
1. Draft GI-105 Resolution Memorandum - (Pre-Decisional)
2. Draft Information Notice - (Pre-Decisional)
3. Draft Regulatory Analysis (Draft NUREG-1463) - (Pre-Decisional
4. Draft ISLOCA Program Final Report, NUREG/CR-5928 - (Pre-Decisional)
✓ 5. Draft SRP Section for ALWRs

OFFICE:	SAIB/DSIR	SAIB/DSIR:	SAIB/DSIR:	D/DSIR:
NAME :	GBurdick/bgj:	GMazetis :	CAder :	WMinners:
DATE :	4/2/93 :	4/5/93 :	4/5/93 :	4/2/93:

9312220208 931129
PDR NUREG
0933 C PDR

APR 02 1993

DISTRIBUTION:
RES Circ/Chron
DSIR C/F
SAIB R/F
GBurdick
GMazetis
CAder
JMurphy
WMinners
CJHeltemes
EBeckjord
DCS

DRAFT
STANDARD REVIEW PLAN[A]
OFFICE OF NUCLEAR REACTOR REGULATION

X.Y.Z ALWR DESIGN REVIEW FOR SYSTEMS INTERFACING WITH THE REACTOR COOLANT SYSTEM

REVIEW RESPONSIBILITIES

Primary -

Secondary -

I. AREAS OF REVIEW

The interfacing system designs of the ALWRs are reviewed under this standard review plan. This review is necessary to determine if the plant is designed to prevent a loss of coolant accident due to an overpressurization of the interfacing systems.

The interfacing systems of the ALWRs are required to satisfy all of the current LWR regulatory requirements. However, the ALWRs have additional interfacing systems guidelines over that of the current LWR systems. The current requirements are found in the LWR Standard Review Plan or (SRP[1]). Table 1 provides a listing of the sections of the SRP that should be reviewed for the current LWR requirements. The application of the current LWR requirements to the ALWRs was developed after a thorough assessment of selected current designs and review of postulated future interfacing systems design guidelines.[2,3,4] The ALWRs are also provided the following guidance, in order to improve performance and further reduce perceived risk:[2,3,4]

- All systems and subsystems connected to the reactor coolant system which extend outside the primary containment shall be designed to the extent practicable to an ultimate rupture strength at least equal to full RCS pressure.

---

a. USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be reviewed periodically, as appropriate to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C., 20555.

TABLE 1
STANDARD REVIEW PLAN Sections That May be Affected by ISLOC Considerations

ITEM	SECTION NO.	TITLE
1	3.6.1	Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside of the Containment
2	3.9.6	Inservice Testing of Pumps and Valves
3	3.11	Environmental Design of Mechanical and Electrical Equipment
4	5.2.2	Over Pressure Protection
5	5.2.4	Reactor Coolant Pressure Boundary Inservice Inspection and Testing
6	5.3.2	Pressure Temperature Limits
7	5.4.6	Reactor Core Isolation Cooling System
8	5.4.7	Residual Heat Removal System (RHR)
9	5.4.8	Reactor Water Cleanup System
10	6.3.1.3	Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents
11	7.5	Information Systems Important to Safety
12	7.6	Interlock Systems Important to Safety
13	9.3.3	Equipment and Floor Drainage Systems
14	13.2	Training
15	13.5	Operating and Maintenance Procedures

- For those interfacing systems or subsystems which do not meet the full reactor coolant system ultimate rupture strength guidelines, the plant designer shall determine by evaluation that the degree and quality of isolation or reduced severity of the potential pressure challenges are low enough to preclude an interfacing system LOCA.

- Each of the high to low pressure interfaces shall include the following protection measures:

  (a) The capability for leak testing the pressure isolation valves,

  (b) Valve position indication that is available in the main control room even when isolation valve operators are deenergized, and

  (c) High-pressure alarms to warn the control room operators when the rising RCS pressure approaches the design pressure of the attached low-pressure systems and the isolation valves are not closed.

An additional element of guidance is provided for the passive ALWR BWRs. This criterion is expressed as follows:[2,4]

- The Reactor Water Clean Up System design pressure shall be at least as high as that of the Reactor Pressure Vessel.

Additional guidance elements for the evolutionary ALWR BWRs are:[2,4]

- An inboard testable check valve and an outboard motor-operated valve are to be used on the DHR injection lines. High pressure piping and valves are to be used through the outboard isolation valve. To protect the low pressure piping upstream of the outboard pressure isolation valves pressure interlocks are to be provided.

- Check valves shall be testable to verify free movement of the valve disk.

- Relief valves are to be provided in the low pressure pump discharge piping. These relief valves are to be designed to protect against over-pressure due to back-leakage from the reactor's coolant system.

- The portions of the DHR system which connect directly to the reactor coolant system shall be designed to an ultimate rupture strength at least equal to the full RCS pressure.

  (note: The ultimate rupture strength guidelines applies to those portions of the system that extend outside of the containment. This is an additional guideline applied to the components of the DHR system that would be normally designed for low pressure operation in the current LWRs.)

- Interlocks are to be provided as follows:

  (a) A two-way interlock so that it is not possible to have an open shut-down connection to the vessel in any given loop whenever the pool suction, pool discharge valve, or wetwell spray valves are open in the same loop.

  (b) Redundant interlocks to prevent opening the shutdown connections to and from the vessel whenever the pressure is above the shutdown range with increasing pressure causing closure of these valves;

  (c) Redundant interlocks preventing opening or closing the shutdown suction connection to the vessel in any loop and discharge to radwaste whenever a low reactor level signal is present.

An additional guidance element for the passive PWRs is:[2,4]

- The Passive Decay Heat Removal System design pressure shall be that of the full Reactor Coolant System pressure.

Additional guidance elements for evolutionary PWRs are:[2,4]

- The RHR shall be designed for a pressure of 900 psig and a temperature of 400#F and employ a minimum of Schedule 40 piping.

- Relief valves shall be provided to ensure that RHR design pressure will not be exceeded due to the most limiting event. The plant designer is to define the most limiting event based on a review of experience with over pressure transients during RHR operation, including inadvertent startup of the safety injection system, startup of the reactor coolant pumps with coolant in the steam generators above average reactor coolant system temperature, etc.

- Interlocks shall be provided for the RHR suction isolation valves to prevent the valves from opening in the event reactor coolant system pressure exceeds RHR design pressure. An interlock which automatically closes the isolation valves on high pressure is not to be provided.

- The portions of the RHR which connect directly to the RCS shall be designed to ensure that ultimate rupture strength will not be exceeded at full reactor coolant system pressure.

  (note: The ultimate rupture strength guidelines applies only to those portions of the system that extend outside of the containment. This is an additional guideline applied to the RHR system's components that would be normally designed for low pressure operation in the current LWRs.)

The ALWR interfacing system guidelines are in addition to and do not replace or weaken the existing LWR requirements.[2] The above guidelines are clarified for the reviewer in Section III of this Standard Review Plan.

II. ACCEPTANCE CRITERIA

In order for the applicants design to be acceptable, the ALWR's interfacing systems are required to satisfy all of the current Light Water Reactor regulatory requirements.[2,3,4] The ALWRs should also satisfy the additional guidelines given in Section I of this standard review plan.

Other interfacing system designs may also be acceptable to the NRC staff and the Commission. These alternate interfacing system designs should satisfy the intent of the additional ALWR guidelines in SECY-90-016. The alternate interfacing system designs must satisfy all of the current LWR design criteria. The ALWR design alternatives may be acceptable, since as noted in SECY-90-016 for some low-pressure systems attached to the RCS it may not be practical or necessary to provide a higher system ultimate pressure capability for the entire low-pressure system.

The NRC staff considers alternate design approaches, such as inclusion of pressure relief valves in low-pressure system piping as acceptable. It must be demonstrated by the applicant that for each low pressure interface the degree and quality of isolation ensures the safety of the low pressure interfacing systems or components. Sufficient pressure relief and the piping of the relief discharge back to the primary containment are possible considerations for judging the isolation adequate. These designs are acceptable as long as sufficient consideration is given to relief capacity, effluent conservation, possible defeat of PIV interlocks and relief valve reliability.

III. REVIEW PROCEDURES

1. Introduction

This section provides the review for procedure to the ALWRs interfacing systems with respect to Section I of this SRP. The review is composed of two segments. The first segment consists of determining those interfacing systems that meet the current regulatory requirements and also satisfy the ultimate rupture strength criteria. The second segment of the review consists of assessing those systems which do not meet the ultimate rupture strength criteria.

The purpose of the current LWR interfacing system regulatory requirements is to assure and provide an acceptable level of isolation capability with respect to ISLOCAs, in particular those outside containment. The additional ultimate upture strength criteria imposed on the ALWRs is designed to eliminate the excontainment ISLOCA events from the risk profile. The ALWR's interfacing systems must be reviewed to determine which interfacing systems meet the following two conditions.

- The systems and subsystems that meet the current regulatory requirements for LWRs

- The systems and subsystems connected to the reactor coolant system which extend outside the primary containment that are designed to an ultimate rupture strength equal to full RCS pressure and meet the additional guidelines of Section I of this SRP.[a]

The interfacing systems that meet both of these guidelines can be eliminated from further review.

Those interfacing systems or systems components that are not designed for the full RCS pressure ultimate rupture strength criteria must be further evaluated. For these low pressure rated interfacing systems it must be shown that the following is valid.

- The plant designer determined by evaluation that the degree and quality of isolation or reduced severity of the potential pressure challenges are low enough to preclude an interfacing system LOCA.

The review of the plant designer's interfacing system safety evaluation must include an assessment of the five phases of an ISLOCA scenario. These five phases are:[5,6]

1. Pressure isolation valve initiating events, (hardware faults, human errors, test and maintenance procedures or combinations of these items)

2. Pressure induced failure or rupture of the interfacing system

3. Rupture detection and diagnosis

4. Isolation of the rupture

5. Mitigation.

The above five phases are described in detail in References 5 and 6. Items 4 and 5 from the above list concern the conservation of the effluent and indirect environmental damage to high and low pressure injection systems. The

---

a. Note: The ASME has been requested to provide a uniform criteria for the selection of the ultimate rupture strength. This criteria was not available in time for publication of this draft document.

isolation of the rupture results in the termination of the LOCA and reduces the potential for core damage due to loss of pump suction. ISLOCA isolation also reduces the environmental effects of the ISLOCA and increases the likelihood of successful operation of redundant injection trains. This action can result in the mitigation of the auxiliary building's environmental effects of the ISLOCA and can provide some radiological relief.

The designer's interfacing system evaluation must estimate the failure probability associated with the low pressure interfacing system design. This evaluation should consider the five scenario phases listed above. The results of the designers evaluation must indicate that the low-pressure interfacing system failure probability is similar to that obtained by designing the system to an ultimate rupture strength equal to the design pressure of the reactor coolant system.

The staff review of the interfacing systems in which it was not practical or necessary to design to an RCS pressure ultimate rupture strength, is based on the guidelines of Section I of this SRP that address this contingency and assessment of each of the five phases of an ISLOCA scenario. The following subsections are intended to provide the basis for review of alternatively designed interfacing systems with respect to each of these phases.

2. ISLOCA Sequences and Initiating Events

The review of the low-pressure interfacing systems designs includes an assessment of the events that can lead to interfacing system overpressurization. This review is based on the causes of the overpressurization incidents that have occurred in LWR systems. These incidents have occurred at both domestic and foreign BWRs and PWRs. Over 20 domestic events have been identified as possible precursors to an ISLOCA event.[5,7] The interfacing systems review in this section provides a basis for the elimination of these type of events from further consideration.

An assessment of the BWR & PWR interfacing system overpressurization incidents has been made.[5,6] This assessment indicates that the following items were contributors to the incidents:

- Human Error during System Mode Changes
- Motor and check valves mispositioned or leaking
- Testing and maintenance actions:
    - Conflict between protection of low pressure systems and ECCS valve operational testing
- Lack of EOPs to cover interfacing system overpressurization events for all operational modes
- Diagnosis failure (instrumentation and procedures).

he reviewer must verify that these types of events have been adequately addressed by the applicants low-pressure interfacing system evaluation.

The causes of the overpressurization events can be grouped as follows:[5,6] (a) human errors, (b) hardware failures, and (c) testing and maintenance procedures. Human errors can combine with hardware failures and faulty testing and maintenance procedures to increase the likelihood of an ISLOCA event. The reviewer must verify that pressure isolation failure events in each group do not contribute significantly to the ISLOCA risk. The elimination of these items as significant contributors to ISLOCA risk may be more difficult than designing an interfacing system to an ultimate rupture stress that results from exposure to full RCS pressure and temperature.

2.1 Pressure Isolation Valve Testing Review

The review of the ALWR's PIV testing procedures must consider several effects. The reviewer must determine that the low pressure interfacing system design evaluations consider the contributing effects of human errors to interfacing system isolation failure and trade-offs between valve mispositioning errors and interfacing system (ECCS) reliability. The PIV testing review serves to increase safety injection system reliability and to reduce the potential for hardware failure, i.e., leaking PIVs, and pressure isolation valve misalignments.

Human errors, during testing of pressure isolation valves, have been shown to contribute to ISLOCA sequences[5] and ISLOCA precursor events that have occurred.[7] Pressure Isolation Valve (PIV) testing has two effects on the reliability of the interfacing systems. PIV testing increases the valve availability and identifies failed valves. Valve availability increases with frequent test intervals since the probability of valve failure on demand increases between maintenance and test intervals. PIV testing reduces the exposure time and thus increases the availability. Even though testing increases the availability of the PIV, it increases the frequency of valve misalignment. The misalignment of the PIVs can result in RCS leakage through a misseated or open check valve. PIV testing improves the availability of the safety injection system but at the same time can increase the frequency of the ISLOCA events. A desirable goal for the plant's low pressure interfacing system testing is to minimize the overall risk by the proper selection of valve testing frequencies and procedures. The staff reviewer should determine if this goal has been met.

3. ISLOCA Interfacing System Rupture Probability

The reviewer must determine if the designer has made every effort to reduce the level of pressure challenge to all systems and subsystems connected to the

RCS.[a] When it is not practicable to do otherwise,[a] it is possible that parts of the interfacing systems of the ALWRs may be designed for low pressure and low temperature operation.[2,3] The designer must defend the decision to design a low pressure rated interfacing system. The interfacing system must be designed such that the degree of isolation is sufficient to preclude an ISLOCA event.[2,3]

The low pressure interfacing system components can include valves, piping, gasket-flanged connections, heat exchangers and its tube sheets. The designer's evaluation must consider all of these components. The extra strength guidelines and/or systems evaluations placed on the ALWRs are designed to eliminate leaks due to overpressurizations of the interfacing systems.

The use of components that do not meet the ultimate rupture strength design limits for full RCS pressure must be justified on a case by case basis why a lesser design limit is acceptable.[8] The justification, must be based upon engineering feasibility analysis and not solely on risk benefit trade-offs. There must be a demonstration of compensating isolation capability for those interfaces where acceptable justification on the impracticability of full RCS pressure capacity has been provided.[8] The reviewer must determine if these conditions are met.

The reviewer must determine that the interfacing systems that have not been designed to withstand full RCS pressure do provide for the following:

1. The capability for leak testing the pressure isolation valves

2. Valve position indication that is available in the control room when isolation valve operators are deenergized

3. High pressure alarms that warn the control room operators when the RCS pressure approaches the design pressure of the attached low-pressure systems and the isolation valves are opened.

In addition to the above guidelines the reviewer must verify that the plant has satisfied the minimum following interfacing system guidelines. The guidelines are a function of the plant type and are in addition to the above three listed items.

The additional guidance for the passive ALWR BWRs is:[2,4]

- The Reactor Water Clean Up system design pressure shall be at least as high as that of the reactor pressure vessel.

---

a. This exemption is specifically excluded in certain situations as described in the following sections. For example, the SRP contains explicit guidance that the RWCU in passive ABWRs and the passive DHR system in passive APWRs shall be designed to full RCS pressure.

he additional guidance elements for the evolutionary ALWR BWRs are:[2,4]

- An inboard testable check valve and an outboard motor-operated valve are to be used on the DHR injection lines. High pressure piping and valves are to be used through the outboard isolation valve. The pressure interlocks are to protect low pressure piping upstream of the outboard isolation valves.

- The check valves shall be testable to verify free movement of the valve disk.

- Relief valves are to be provided in the low pressure pump discharge piping. These relief valves are to be designed to protect against over-pressure caused by back-leakage from the reactor coolant system.

- The portions of the DHR system which connect directly to the reactor coolant system shall be designed to an ultimate rupture strength at least equal to the full RCS pressure. This guideline applies to those portions of the DHR system that extend outside of the containment and that would have been normally designed for low pressure operation in the current LWRs.

- Interlocks are to be provided as follows:

  (a) A two-way interlock is to be provided. This interlock is to prevent the possibility of having an open shut-down connection to the vessel in any given loop whenever the pool suction, pool discharge valve, or wetwell spray valves are open in the same loop;

  (b) Redundant interlocks are to be provided to prevent opening the shutdown connections to and from the vessel. These interlocks are operational whenever the pressure is above the shutdown range. An increase in the RCS pressure above the shutdown range causes closure of these valves;

  (c) Redundant interlocks are to be provided to prevent opening or closing the shutdown suction connection to the vessel in any loop and also to prevent discharge to radwaste. These redundant interlocks are operational whenever a low reactor water level signal is present.

The additional guidance for the passive PWRs is:[2,4]

- The Passive Decay Heat Removal System design pressure shall be that of the full Reactor Coolant System pressure.

The additional guidance elements for the evolutionary PWRs are:[2,4]

- The RHR shall be designed for a pressure of 900 psig and a temperature of 400#F and employ a minimum of Schedule 40 piping.

- Relief valves shall be provided to ensure that RHR design pressure will not be exceeded due to the most limiting event. The plant designer is to define the most limiting event based on a review of experience with over pressure transients during RHR operation, including inadvertent startup of the safety injection system, startup of the reactor coolant pumps with coolant in the steam generators above average reactor coolant system temperature, etc.

- Interlocks shall be provided for the RHR suction isolation valves to prevent the valves from opening in the event reactor coolant system pressure exceeds RHR design pressure. An interlock which automatically closes the isolation valves on high pressure is not to be provided.

- The portions of the RHR system that connect directly to the RCS shall be designed to ensure that ultimate rupture strength will not be exceeded at full reactor coolant system pressure. This guideline applies to those portions of the RHR system that extend outside of the containment and that would have been normally designed for low pressure operation in the current LWRs.

4. ISLOCA Location Detection and Diagnosis

The reviewer must determine that the ALWR has the necessary instrumentation and the correct procedures to detect and diagnose an interfacing system LOCA in the low pressure interfacing system piping. This assessment is necessary so that leaks can be efficiently isolated.

In order to enhance the ability of the operators to detect and diagnosis an ISLOCA event in the low pressure interfacing system piping, the ALWRs are being requested to have the following additional instrumentation:[2,3,4]

1. A pressure isolation valve position indication that is available in the main control room. The indication is functional even when the isolation valve operators are deenergized, and

2. Alarms to warn control room operators; The alarms activate when the RCS pressure approaches the design pressure of the attached low-pressure systems and the pressure isolation valves are not closed.

The reviewer must determine that the above guidelines are met. In addition the reviewer must determine that procedures are in place to efficiently detect and diagnose overpressurizations in the RCS low-pressure interfacing systems.

A successful review of the detection and diagnostic procedures is important. The successful review indicates that the operators can reduce ISLOCA risk when they are utilizing the requested instrumentation. The ISLOCA detection and iagnostic procedures are required to reduce the likelihood of and/or preclude an interfacing system LOCA event[5] from threatening the core. The procedures are required in order to implement the procedure to isolate an interfacing system LOCA that occurs outside of the containment boundary.

Analyses of owner's group and plant specific procedures indicates that detection and diagnostic procedures can substantially reduce risk.[9,10,11,12,13] Good procedures assist in providing efficient means to detect and diagnose interfacing system leaks.[5,11,12,13] The procedures should be part of the designers interfacing system safety evaluation in order to meet the additional ALWR interfacing system guidelines. The reviewer must review the interfacing system ISLOCA detection and diagnosis procedures as part of the reviewer's assessment of the design.

5. ISLOCA Break Isolation and Equipment Separation

The reviewer must assess the designer's low-pressure interfacing system evaluation to determine if the isolation guideline is met. This guideline is:

- The plant designer must determine by evaluation that the degree and quality of isolation or reduced severity of the potential pressure challenges are low enough to preclude an interfacing system LOCA.

The isolation guideline refers to break isolation and also to separation of redundant interfacing equipment from the environmental effects of an ISLOCA. The ability to isolate the break and the equipment separation must be sufficient to prevent core damage from occurring from a loss of coolant accident that occurs outside containment. The reviewer must determine that these items have been adequately addressed by the designer.

The reviewers must determine that emergency operating procedures are in place to isolate interfacing system ruptures. The isolation procedures allow the operators to make effective use of this extra isolation ability.[5] The procedures along with the additional interfacing system isolation guidelines can be used by the designer to show that the ISLOCA core damage events can be precluded from ALWRs.

The reviewer must determine that the designer has demonstrated for each low pressure interface that the degree and quality of isolation justifies the safety of the low pressure interfacing systems and components. The justification of adequate isolation can extend to the adequacy of pressure relief and piping of the relief discharge flows back to the primary containment.[6] Other items that can be considered in judging the adequacy of isolation include but are not limited to: system interlocks, automatic system isolation on the detection of an ISLOCA, high availability redundant pressure isolation valves, check valves to prevent reverse flow, leak detection equipment, ISLOCA rupture isolation procedures.

6. Operator Actions to Mitigate the ISLOCA Source Term and Thermohydraulic Effects

The additional guidelines added to the design of the ALWR's interfacing systems will preclude the occurrence of the ISLOCA events that lead to core damage. As a result, there are no additional guidelines added to the interfacing design for the operations crew to mitigate the thermohydraulic and source terms aspects of an ISLOCA event.[2,3,4]

In the assessment of the low pressure interfacing systems designs, the reviewer may take into consideration emergency operations procedures that allow the operator to mitigate the thermohydraulic and source term aspects of an ISLOCA event. These considerations can be applied to the review of the designer's evaluation of the low-pressure interfacing systems. The designer's evaluation of the low-pressure interfacing systems must demonstrate that the quality of isolation or reduced severity of the potential pressure challenges are low enough to preclude an interfacing system LOCA. Operator actions, based on emergency operation procedures, required to mitigate an ISLOCA event should be part of the designer's low-pressure interfacing system evaluation.

IV. EVALUATION FINDINGS

The reviewer must verify that sufficient information has been provided to conduct the review. The results of his review must support conclusions of the following type:

> The review of the ALWR plant design for prevention against postulated interfacing system ruptures caused by RCS overpressurization included all interfacing systems connected to the RCS that extend outside of the containment. The review of these systems for the ______________ plant included layout drawings, piping and instrumentation diagrams, valve and leak testing procedures, ultimate rupture strength, and operational procedures along with descriptive information.
>
> The staff concludes that the facility design for prevention against postulated interfacing system ruptures due to RCS overpressurization outside the containment is acceptable and meets the guidelines of this SRP and all of the current LWR design requirements.[1,2,3]

These conclusions are intended to be included in the staff's safety evaluation report for the specific facility being licensed.

V. IMPLEMENTATION

The following paragraph is intended to provide guidance and information to applicants and licensees regarding the NRC's staff plans for using this SRP section.

xcept in those cases in which the applicant proposes an acceptable .lternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

VI. REFERENCES

1. "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants", NUREG-0800, U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, July 1981.

2. J. M. Taylor, "Evolutionary Light Water Reactor Certification Issues and Their Relationships to Current Regulatory Requirements", pages 8 to 9, SECY-90-016, U.S. Nuclear Regulatory Commission, January 12, 1990.

3. Memorandum: S. J. Chilk to J. M. Taylor, "SECY-90-016 - Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationships to Current Regulatory Requirements," Staff Requirements Memorandum, June 26, 1990, U.S. Nuclear Regulatory Commission, Public Document Room, NUDOCS/AD Microfilm Address: 54573-323 to 54573-327.

4. "ALWR - Advanced Light Water Reactor Utility Requirements Document - Evolutionary and Passive Plants," NP-6780, Rev. 2 and 3, Electric Power Research Institute, Palo Alto, Ca., November and December 1991.

5. W. J. Galyean and D. I. Gertman, "Assessment of ISLOCA Risk - Methodology and Application to a Babcock and Wilcox Nuclear Power Station," NUREG/CR-5604, May 1991.

6. W. J. Galyean, et al., "ISLOCA Research Program Final Report," NUREG/CR-5928, April 1993 (estimated).

7. E. T. Burns, V. M. Anderson, M. M. Offerle and K. Mohammadi, "Interfacing System Isolation Experience Review," NSAC-155, Nuclear Safety Analysis Center, Electric Power Research Institute, Palo Alto, Ca., August 1991.

8. Correspondence: D. M. Crutchfield to E. E. Kintner, "Clarification of Issues for Evolutionary Advanced Light Water Reactors (ALWRS)," U.S. Nuclear Regulatory Commission, Project No. 669, May 6, 1991.

9. Combustion Engineering Owner's Group, "Emergency Procedure Guidelines", CEN-152, Revision 3, 1987.

10. Westinghouse Owner's Group, "Emergency Response Guidelines", July 1987.

11. W. J. Galyean et al., "Intersystem LOCA Risk Assessment: Methodology and Results", 19th U.S. NRC - International Water Reactor Safety Information Meeting, Bethesda, MD, October 28-30, 1991.

12. D. L. Kelly, J. L. Auflick and L. N. Haney, "Assessment of ISLOCA Risks - Methodology and Application to a Westinghouse Four Loop Ice Condenser Plant," NUREG/CR-5744, May 1992.

13. D. L. Kelly, J. L. Auflick and L. N. Haney, "Assessment of ISLOCA Risks - Methodology and Application to a Combustion Engineering Plant," NUREG/CR-5745, May 1992.