NUCLEAR ENERGY INSTITUTE

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Mr. Scott F. Newberry
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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop O-12 E5
Washington, DC 20555-0001

Dear Mr. Newberry:

Enclosed is the provisional draft of the Treatment section in the draft NEI guideline, *Risk-Informed Categorization and Treatment of Structures, Systems, and Components.* It is forwarded for your information and review, being an agenda topic for the NRC-NEI meeting on June 27, 2000.

If you have any questions please contact Biff Bradley (202-739-8083, e-mail reb@nei.org), Adrian Heymer (202-739-8094, e-mail aph@nei.org) or me.

Sincerely,

Stephen D. Floyd

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Enclosure

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TREATMENT OF RISK-INFORMED SAFETY CLASS STRUCTURES, SYSTEMS AND COMPONENTS

This section addresses the application of controls and specifications for each of the four RISC SSC categories consistent with the safety-significance.

It is not necessary to modify or change SSC treatment just based on the results of the risk-informed categorization. Before making the decision to adjust treatment requirements, a licensee should first review the existing controls, specifications and SSC performance history, if available. An assessment is made of whether the SSC's past performance or existing treatment provisions (e.g., procurement, engineering specifications, etc.,) provide reasonable assurance that the safety-significant functional requirement(s) identified in the risk-informed evaluation process, or the functions specifically required by regulation or the safety analyses required by regulation will be satisfied. Based on the results of these evaluations, a licensee determines the need to adjust treatment controls consistent with the safety significance of the functional attribute under review.

NRC technical requirements for RISC-1 and RISC-2 SSCs are not changed through the risk-informed activities of implementing Section 50.69 for RISC-1, RISC 2 or RISC-3 SSCs. Also, implementing §50.69 does not change the design engineering specifications. NRC technical requirements are assessed, and where necessary, improved under a separate activity, *Risk-Informing NRC Technical Requirements (Option 3 to SECY 98-300).*

As used in this document, the term design bases relates to the 10 CFR 50.2 definition of design bases. The term "beyond design bases" relates to those functions that are not part of the §50.2 design bases, i.e., the design functions required by regulation. A system's design may be based on power production needs, but since it is available it may also be used to mitigate or prevent a design bases event. The system is not credited in the §50.2 design bases, and therefore the function for the power production component is considered "beyond the [§50.2] design bases." This is an example of where risk-informed, performance-based regulation identifies and emphasizes latent safety enhancements that are already part of the non-regulated design.

Example: the feedwater system is not credited with providing a safety-injection function, yet in some scenarios, which are not part of the §50.2 design bases, the feedwater system can prevent and mitigate core damage.

Risk-Informed Safety Class 1

Risk-Informed Safety Class 1 SSCs are safety-related SSCs that the risk evaluation process has categorized as safety significant.

In general, there is no change to the regulatory treatment for these safety-related, safety-significant SSCs.

In specific instances for a RISC-1 SSC, the risk-evaluation process may identify an additional or different safety-significant function that is a "beyond design bases" function. In such cases, an engineering determination is made on whether the equipment could satisfy this new function. If there is not reasonable assurance that the newly identified function could be satisfied, a licensee has two choices: determine the impact of not crediting the newly identified function, or take action to provide reasonable assurance that the newly identified safety-function will be satisfied.

The identification and satisfaction of "beyond design bases" safety-significant functions enhances the current safety capabilities of the plant. These newly credited functions provide additional safety assurance beyond the current acceptable levels of safety. As such, it is appropriate and acceptable for commercial level controls and practices to be applied to provide reasonable assurance that the "beyond design bases" functions will be satisfied. A licensee should document the basis for determining that the SSC will satisfy the new safety-significant function.

A licensee's monitoring and corrective action program provide the necessary tools for assuring resolution of deficiencies and continuing assurance that the safety-significant functions will be satisfied. In addition, the update of the PRA based on operating experience will provide additional insights into the effectiveness of a licensee's categorization and corrective action programs for RISC-1 SSCs.

RISC-1 SSCs would be subject to §50.59. In addition, for RISC-1 SSCs that have a "beyond design bases" function, a licensee's configuration control program, which includes the §50.59 change control process, is adjusted to include a provision that provides reasonable assurance that RISC-1 safety-significant (including beyond design bases) function(s) will be satisfied following a facility change that involves a RISC-1 SSC. This additional change control provision would remain until the process is changed in response to the implementation of a risk-informed §50.59 process.

The engineering and operations documents associated with RISC-1 SSCs are already included in the scope of controlled documents for the plant. Information and action taken in response to the implementation of §50.69 relating to "beyond design bases" conditions should be documented in the engineering record files.

RISC – 1, Example 1

BWR Containment Vent Valves

Existing safety-related functions include isolation of containment penetrations. The valves are required to close and remain closed under design basis conditions. In adopting §50.69, the risk-informed evaluation process categorized the vent valves as a safety-significant (RISC-1 SSC) because, in addition to the containment isolation function, the valves need to open in specific emergency conditions to control containment pressure to prevent a catastrophic failure of containment. This is a "beyond design bases" function and provides an additional mitigation capability over and above that provided by the design bases. It enhances the protection of public health and safety.

Existing engineering specifications, plant operations, design analyses, quality controls, and testing programs were reviewed to determine whether the existing controls provide reasonable assurance that the containment vent function will be satisfied. Analyses provided reasonable assurance of the capability of the valves to open under the conditions requiring the venting of containment. No other changes to controls for the valves, operators and the associated supporting equipment (electrical power supplies, air supply & I&C) were made.

The configuration control program, which includes the §50.59 process, was amended to include an evaluation of RISC-1 "beyond design bases" functions to provide reasonable assurance that the safety-significant functions will be satisfied following a change that affects the valves.

The licensee documented its conclusions and its basis for the determination. The existing engineering records and controls (design, procurement, etc.,...) already were included in the list of controlled documents and records for the plant.

RISC – 1, Example 2

PWR Pressurizer PORVs

Existing safety-related functions include pressure-retaining boundary and opening to relieve pressure. In adopting §50.69, the risk-informed evaluation process categorized the PORVs as a safety-significant (RISC-1 SSC) because, in addition to the pressure retaining boundary, the valves can be credited to support "bleed and feed" heat removal capabilities, a "beyond design bases" function. The valve provides an additional method for mitigation and

prevention over and above that for the designed safety-related function. When credited, it provides an enhancement to the protection of public health and safety.
NOTE: Given the availability of safety relief valves, the risk-evaluation process did not identify the pressure relief function as safety-significant.

There is no change in requirements or commitments associated with the pressure-retaining function.

The bleed and feed characteristic is not included in the [§50.2] design bases or credited in the safety analyses. Existing engineering specifications, plant operations, design analyses, quality controls, and testing programs were reviewed to determine whether the existing controls provide reasonable assurance that the "bleed and feed" function will be satisfied. An addition was made to the standard refueling shutdown procedures to exercise the valve. The configuration control process was amended to evaluate changes to provide reasonable assurance that the safety-significant functions will be satisfied following a change that affects the valves.

The configuration control program, which includes the §50.59 process, was amended to include an evaluation of RISC-1 "beyond design bases" functions to provide reasonable assurance that the safety-significant functions will be satisfied following a change that affects the valves.

No other changes were made to controls for the valves and the associated supporting equipment (electrical power supplies & I&C).

The licensee documented its conclusions and its basis for the determination. The existing engineering records and controls (design, procurement, etc.,...) already were included in the list of controlled documents and records for the plant.

RISC – 1, Example 3

<u>Isolation Valves on the Suction Line of the Startup Auxiliary Feedwater Pump</u>

The existing safety-related function for these valves is to close and remain closed after a seismic event to perform this isolation and prevent draining of the safety related water source. The §50.69 risk-informed evaluation process identified an additional safety-significant function. The startup auxiliary feedwater pump is an important source of feedwater following most reactor trips and the isolation valves must be open, and remain open to support the newly identified function.

NOTE: The two safety related isolation valves are provided on the suction line of the startup auxiliary feedwater pump to isolate the seismic designed water source from the non-seismic startup pump. The startup auxiliary feedwater pump is a non-safety-related, non-seismic pump that uses the same water source as the safety related auxiliary feedwater pumps.

Existing maintenance, operating and testing procedures, plus design and procurement specifications were reviewed. The valves were normally tested every quarter. The test procedure was expanded to include a test of the opening function at the same periodicity. Future activities (procurement, maintenance, modifications, etc.) on these valves would be performed in accordance with the current RISC-1 requirements.

The configuration control program, which includes the §50.59 process, was amended to include an evaluation of RISC-1 "beyond design bases" functions to provide reasonable assurance that the safety-significant functions will be satisfied following a change that affects the valves.

The licensee documents its conclusions and its basis for the determination. The existing engineering records and controls (design, procurement, etc.,...) already were included in the list of controlled documents and records for the plant.

Risk-Informed Safety Class 2

RISC–2 SSCs are nonsafety-related SSCs that a Section 50.69 risk-evaluation process has determined to be safety-significant. There are two subcategories:

- RISC-2(1) SSCs are nonsafety-related, "important-to-safety" SSCs that are categorized as safety-significant, and
- RISC-2(2) SSCs are nonsafety-related SSCs that are categorized as safety-significant.

RISC-2(1) SSCs

The existing regulatory requirements and commitments for these nonsafety-related, "important-to-safety," safety-significant SSCs continue to be applied consistent with safety significance.

There is no change in the application of Appendix A to Part 50 for these SSCs. Appendix B to Part 50 already allows for a graded implementation based on safety significance. Regulatory guides define specific quality criteria, a subset of Appendix B for these "important-to-safety" SSCs. As such, there is no need for additional controls beyond those described above.

If a "beyond design bases" safety-significant function is identified by the §50.69 risk-informed evaluation process, a licensee first performs a review of existing controls and SSC performance to determine whether changes are needed to provide reasonable assurance that the "beyond design bases" function is satisfied. If additional controls are needed, they are applied in a manner consistent with the licensee's commercial practices.

For RISC-2(1) SSCs that are associated with a "beyond design bases" function identified by the risk-informed evaluation process, a provision is added to a licensee's configuration control program which includes the §50.59 change control process. This provision requires an evaluation to reasonably assure that the newly identified safety-significant function will be satisfied following a change to facility (equipment or procedures) that affect RISC-2(1) SSCs. This additional control provision is necessary because apart from specific regulations that focus on nonsafety-related SSCs, such as, §50.62 *Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants,* and §50.49 *Environmental qualification of electric equipment important to safety for nuclear power plants,* the current §50.59 process focuses on design bases, not "beyond design bases" functions. This additional change control provision would remain until the process is changed in response to the implementation of a risk-informed §50.59 process.

A licensee's monitoring and corrective action programs provide the necessary tools for assuring resolution of deficiencies and continuing assurance that the safety-significant functions will be satisfied. In addition, the update of the PRA based on operating experience will provide additional insights into the effectiveness of a licensee's categorization and corrective action programs for RISC-2(1) SSCs.

10 CFR Part 21 does not apply to RISC-2(1) SSCs because they are not "basic components."

The engineering and operations documents for RISC-2(1) SSCs already are included in the scope of controlled documents for the plant. Information and action taken in response to the implementation of §50.69 relating to "beyond design bases" conditions should be documented in the engineering record files.

RISC-2(1) Example 1

Alternate AC Gas Turbine Generators (GTGs): Prior to the implementation of 50.69 the GTGs were considered "important to safety", but were not categorized as safety-related. They were included in the scope of the maintenance rule. They were recognized as safety significant because of their role in the mitigation of station blackout events

The §50.69 risk-informed categorization process identified the following function as safety-significant: Start and load by local operator action within one hour of the start of a station blackout event (maintenance of vital auxiliaries). This is consistent with the existing design function for this system.

The §50.65 monitoring program established performance criteria based on all failures, not just maintenance preventable functional failures. No changes to performance monitoring were required.

An evaluation of the existing controls determined the quality assurance requirements of Regulatory Guide 1.155 (August 1988), Appendix A have been applied to this system. The current equipment performance demonstrates that the existing controls have been adequate to maintain the safety-significant function. No changes were made to the existing controls.

Alternate AC requirements are included in the scope of §50.59. No additional configuration control processes needed to be established.

The licensee documented its conclusions and its basis for the determination. The existing engineering records and controls (design, procurement, etc.,...) already are included in the list of controlled documents and records for the plant.

RISC-2(2) SSCs

RISC-2(2) SSCs are subject to the following requirements:

- 10 CFR 50.65,
- A monitoring program that provides reasonable assurance that the safety-significant functions identified in the risk-informed evaluation process will be satisfied, i.e., a program that takes into account failures associated with safety-significant functions, not just maintenance preventable functional failures.
- Commercial level controls and specifications, as determined by the licensee that provide reasonable assurance that the safety-significant functions identified by the risk-evaluation process are satisfied. Such programs shall include a change control provision to require an evaluation to determine whether there is reasonable assurance that the newly identified safety-significant function will be satisfied following a change to the facility (equipment or procedures) that affect RISC-2(2) SSCs.
- A performance-based reporting program that is linked to a failure to satisfy the monitoring program's performance criteria.

For most licensees, the monitoring program established by the maintenance rule should be sufficient to satisfy the monitoring requirement. The maintenance rule requires licensees to monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that such structures, systems, and components are capable of fulfilling their intended [safety] functions.

Appendix A to Part 50 does not apply to RISC-2(2) SSCs. These SSCs are governed by §50.65 and a licensee's §50.69 monitoring program, which for many licensees would be the same as its 10 CFR 50.65 monitoring program. The controls and design specifications are to commercial level standards. Through the monitoring and corrective action requirements of §50.65 there is reasonable assurance that the (safety) functions have been, and will continue to be, satisfied. In general, licensees' current processes and controls for RISC-2 SSCs that are reflected in the satisfaction of §50.65 are sufficient to satisfy the requirements of §50.69.

For these (RISC-2(2)) SSCs deficiencies are resolved and, as necessary, improvements are made under the licensee's commercial corrective action program. Monitoring under §50.65, and if necessary §50.69, provides reasonable assurance that the safety-significant functions will be satisfied. These commercial programs include similar elements to the Appendix B to Part 50 program, covering design, configuration control, procurement, corrective action, testing, and special processes. In addition, the update of the PRA based on operating experience will provide additional insights into the effectiveness of a licensee's categorization and corrective action program for RISC-2(2) SSCs.

Where necessary, the configuration control program, which includes the §50.59 change process, is supplemented by the need to perform an evaluation to provide reasonable assurance that the safety-significant functions will be satisfied following a facility change that affects a RISC-2(2) SSC. This additional change control provision would remain until the process is changed in response to the implementation of a risk-informed §50.59 process.

In general, existing licensee commercial controls and practices for the balance-of-plant (BOP) activities and equipment are sufficient. These controls are similar to the Appendix B quality controls and are dispersed throughout the licensee's documentation; in department orders, procedures, and training programs. Changes to controls and specifications for RISC-2(2) SSCs are documented and are included in the list of controlled documents and programs. Appendix A to this guideline provides examples of the type of activities included in such programs.

For seismic and other environmental attributes identified by the risk-informed evaluation process, a licensee would evaluate the ability of the SSC to satisfy the

identified safety-function using a commercial standard of assurance, i.e., standard balance-of-plant criteria: an engineering specification and review to determine that the SSC will operate satisfactorily under the specified environmental conditions. Vendor specifications or licensee analyses should be sufficient, and generally testing would not be required.

Should a licensee need to establish new performance criteria or controls, a review should be performed to establish the performance history record and to assure the correct controls are in place. As applicable, the review may include:

(i) PRA assumptions and conclusions;
(ii) Performance history;
(iii) Maintenance history;
(iv) Record of deficiencies;
(v) Existing work practices, procedures, and quality controls;
(vi) Material certification, tests or analyses;
(vii) Procurement history;
(viii) Engineering and procurement specifications.

NOTE: For many licensees, the review of the PRA functions and assumptions should provide sufficient information. The performance of safety functions by nonsafety-related SSCs to prevent or mitigate conditions, which are "beyond design bases" events, is included in PRAs based on various justifications. The availability of a nonsafety-related SSC to potentially perform a "beyond design bases" safety-significant function is based on consultation with design or systems engineering groups. Generally, if engineering judgement is used, the PRA uses success criteria on SSC performance to evaluate whether the SSC can provide the function under the service conditions required. Uncertainty in this judgment is compensated by assigning a probability of failure to the SSC performance. In general, engineering judgment is based on operating history or knowledge of SSC or similar equipment performance under conditions, which may approximate to those represented by the PRA, e.g., a previous unusual event involving water passage through valves whose usual service conditions involve steam flow. External data sources such as IDCOR, NRC research publications, Licensee Event Reports (LERs), and the Institute of Nuclear Power Operations (INPO) reports may be consulted to determine if there is a precedent showing the SSC can perform as needed. Although these techniques are not as rigorous as traditional engineering specifications and testing, they provide reasonable assurance for the low probability service conditions being considered.

Based on the above information, a licensee can determine the optimum and practical performance criteria that will provide reasonable assurance that the safety-significant functions defined in the risk-informed evaluation process are satisfied. Also, such a review documents the controls and specifications that

provide reasonable assurance that the additional safety-significant functions will be satisfied.

If the documentation associated with these SSCs is not included in the scope of controlled documents for the plant, the information and action taken in response to the implementation of §50.69 relating to "beyond design bases" conditions should be documented in the engineering record files which become controlled documents.

10 CFR Part 21 does not apply to RISC-2(2) SSCs because they are not "basic components."

RISC – 2(2) Example 1

Instrument Air System: Prior to the implementation of 50.69, the Instrument Air system was categorized as nonsafety-related and not "important to safety". The system was included in the scope of the Maintenance Rule as a "trip initiator." The §50.69 risk-informed evaluation process identified trip initiation as a safety significant function that is not included in the design bases of the facility. The risk-informed evaluation process identified a potential improvement to the safety profile of the plant that is beyond the design bases of the facility. The implementation of §50.69 enhanced the protection of public health and safety.

A review was performed of the current performance monitoring for this system. The current performance criteria monitored this system at the plant level and considered all failures of the system. This monitoring was determined appropriate for the safety significant function identified during the risk-informed evaluation. The current system performance was reviewed and found to be acceptable, so no additional controls were imposed.

The configuration control process was amended to include an evaluation of changes made to the Instrument Air system to provide reasonable assurance that changes to the system would continue to satisfy the performance criterion.

The conclusions and its basis for the determination were documented. The existing engineering records and controls (design, procurement, etc.,...) were added to the list of controlled documents and records for the plant.

RISC – 2(2), Example 2

BWR Feedwater Pumps: In a BWR, prior to the implementation of §50.69, the feedwater pumps were categorized as nonsafety-related SSCs, yet were included in the scope of the maintenance rule. In adopting §50.69, the risk-informed evaluation process categorized the feedwater pumps as safety-

significant (RISC-2(2) SSCs) because they can be used to prevent and mitigate potential core damage events in scenarios that are not included in the design bases. These pumps provide additional methods for mitigation over and above the designed safety systems. When credited, they provide an enhancement to the protection of public health and safety.

The risk-informed evaluation identified the following functions as safety significant:

1. Pressure boundary, and
2. Water injection into reactor pressure vessel.

The pumps are already included in the maintenance rule monitoring program. However, the licensee established the performance criteria based on only maintenance preventable functional failures, not on safety-significant failures. As a result, the licensee developed new performance criteria and controls for §50.69 implementation that also encompass the performance monitoring criteria for the maintenance rule. The licensee reviewed the following documentation:

- PRA assumptions and conclusions associated with the feedwater pumps;
- Performance history,;
- Maintenance history;
- Record of deficiencies;
- Existing work practices, procedures, and quality controls;
- Procurement history; and
- Engineering and procurement specifications.

Based on these reviews new performance criteria were established. No changes to the controls for these pumps were necessary to provide assurance that the safety significant functional requirements would be satisfied. The basis was that the performance credited in the PRA to inject water was the same as the performance of the pumps to satisfy their function during normal operation. The performance is confirmed during pre-operational startup testing and continuously during normal operation. Existing testing, monitoring and corrective action practices provide reasonable assurance that the injection credited in the PRA will be available.

The configuration control program, which includes the §50.59 process, was amended to require an evaluation to reasonably assure that the "beyond design bases" functions of the will be satisfied.

The existing engineering records and procedural controls (vendor manuals, procurement specifications, maintenance schedules and procedures) already were included in the list of controlled documents for the plant.

RISC-2(2) Example 3

PWR Nonsafety-Related 4kv AC Power Buses: In a PWR, prior to the adoption of §50.69, several 4kv power buses were categorized as nonsafety-related, yet were included in the scope of §50.65. In adopting §50.69, the risk-informed evaluation process categorized these 4kv AC power buses as safety-significant RISC-2(2). The bases for this determination was that these power sources may be used in "beyond design bases" configurations to prevent and mitigate an accident by providing power to components that could be used as an alternative method to safely shutdown the plant (e.g., use of condensate pumps as an alternate injection path for "beyond design bases" events).

These nonsafety-related 4kv buses are already included in the monitoring program for the maintenance rule. Both unavailability and reliability (in terms of safety functional failures) performance criteria are included in the §50.65 monitoring program. The licensee's maintenance rule performance criteria are based on all failures, not just on those related to maintenance preventable functional failures. No additional monitoring was needed to provide reasonable assurance that the safety function would be satisfied. In view of the history in satisfying the maintenance rule performance criteria, no additional controls were needed.

Future modifications or repairs to these 4kv AC power buses would be performed under the existing documented procedural control (commercial/balance-of-plant controls and processes). The configuration control program, which includes the §50.59 process, was amended to require an evaluation to reasonably assure that the "beyond design bases" functions of the will be satisfied for a change to a RISC-2(2) SSC.

The configuration control program, which includes the §50.59 process, was amended to require an evaluation to reasonably assure that the "beyond design bases" functions of the will be satisfied.

The existing engineering records and procedural controls (vendor manuals, procurement specifications, maintenance schedules and procedures) already were included in the list of controlled documents for the plant.

RISC-2(2) Example 4

PWR Normal Chilled Water System: In a PWR, prior to the adoption of §50.69, normal chilled water (NCW) system was categorized as nonsafety-related and was included in the scope of the maintenance rule. In adopting §50.69, the risk-informed evaluation process identified (IDP decision) the NCW as safety-significant RISC-2(2) because this system could fail safety-related components that rely on normal HVAC systems as an alternate to emergency HVAC systems for operability.
NOTE: The NCW system is modeled in the plant PRA, yet based solely on the PRA, the system would not be categorized as safety-significant (there are no safety-significant components associated with this system).

The NCW system is already included in the monitoring program for the maintenance rule. Both unavailability and reliability (in terms of safety functional failures) performance criteria are included in the §50.65 program. The maintenance rule performance criteria are based on all failures, not just on those related to maintenance preventable functional failures. No additional monitoring is needed to provide reasonable assurance that the safety function would be satisfied.

In view of the history in satisfying the maintenance rule performance criteria, no additional controls were needed.

Future modifications or repairs to the NCW would be performed under the existing documented procedural control (commercial/balance-of-plant controls and processes). The configuration control program, which includes the §50.59 process, was amended to require an evaluation to reasonably assure that the "beyond design bases" functions of the will be satisfied for changes to RISC-2(2) SSCs.

The existing engineering records and procedural controls (vendor manuals, procurement specifications, maintenance schedules and procedures) already were included in the list of controlled documents for the plant.

Risk-Informed Safety Class 3

RISC-3 SSCs are safety-related SSCs that have been categorized as not being safety-significant under the risk-informed evaluation methodology and that are directly and specifically referenced in a regulation or in a licensee's safety analyses (FSAR Chapter 15 analyses) required by regulation.

These SSCs are the subject of the following licensing commitment that supercedes all previous RISC-3 SSC commitments.

- The application of a commercial level performance monitoring program or, where monitoring is not appropriate or practical, appropriate commercial level controls to provide reasonable assurance that the SSC functional requirements, that are directly and specifically referenced or described in a regulation, or in the assumptions and conclusions of the plant specific safety analyses required by regulation, will be satisfied.

No other regulatory commitments are applicable to these SSCs.

The monitoring program should be sufficient to provide reasonable assurance that the functions directly referenced in the regulations, or directly and specifically referenced in the safety analyses required by regulation, will be satisfied. Prior to the adoption of §50.69, RISC-3 SSCs, being safety-related, would have been subject to the maintenance rule. For many licensees, whose §50.65 performance criteria were established based on safety functional failures and not just maintenance preventable failures, monitoring against the performance criteria for implementing §50.65 should be sufficient to satisfy §50.69 RISC-3 requirement.

If a licensee has established §50.65 performance thresholds solely based on maintenance preventable functional failures, then new functionality criteria would need to be established. The criteria are set by first determining the specific regulatory functional requirement or safety analyses function. A review is then performed of the following documentation:

- The applicable regulation(s) and regulatory guidance document(s),
- PRA assumptions and conclusions,
- Performance history;
- Maintenance history;
- Record of deficiencies,

The licensee then establishes functional criteria for the SSC that when satisfied provide reasonable assurance that the functions required by the specific regulation, or the plant specific safety analyses required by regulation will be satisfied. A comparison of the SSCs performance history against the new functional criteria should be made.

For a failure to satisfy a functional criterion, the licensee takes corrective consistent with its program for resolving deficiencies in commercial (BOP) equipment. Monitoring and the licensee's corrective action program provide the necessary tools for assuring resolution of deficiencies and continuing assurance that the functions required by regulation will be satisfied. In addition, the update of the PRA based on operating experience will provide additional insights into the effectiveness of the categorization and the licensee's corrective action program for RISC-3 SSCs.

Where monitoring is inappropriate or impractical, existing commercial controls and procedures are used to provide reasonable assurance that the required function will be satisfied. A review of procurement specifications, existing work controls and practices would be performed. Full compliance with Appendix B to Part 50 is not necessary or required because RISC-3 SSCs are of low or no safety-significance. Appendix B allows for a graded approach consistent with safety significance. A licensee's commercial control programs are sufficient. In general, commercial programs have similar elements to Appendix B, with less emphasis on documentation and process, but more emphasis on performance. Appendix A provides an example of a commercial level control program.

As appropriate, controls, monitoring criteria, procedures and work practices are adjusted, as determined by the licensee, to take into account operating experiences and plant deficiencies. Documentation would be at a level commensurate with commercial equipment and activities.

As appropriate, environmental attributes, e.g., water immersion, seismic, fire, or harsh environment, are included in procurement specifications for replacement parts. In such cases condition monitoring and inspection would be sufficient for issues such as, seismic two-over-one conditions for RISC-3 SSCs. Standard commercial controls, practices and qualification procedures, are sufficient, i.e., vendor specifications or licensee analyses should be sufficient, and generally testing would not be required. Vendor activities and procedures would be reviewed through the licensee's commercial vendor audit program.

Under Option 2, RISC-3 the functional design bases would not be changed. However, because of the low safety-significance, a licensee that selects to adopt 10 CFR 50.55a in the implementation of §50.69 has the option of applying alternative methods providing that there is reasonable assurance that the functions credited in the safety analyses or in the applicable regulations will be satisfied.

10 CFR Part 21 does not apply to RISC-3 SSCs because the failure of a SSC which is not safety-significant could not result in a substantial safety hazard, the governing criteria in defining the scope of SSCs subject to Part 21.

10 CFR 50.59 would continue to apply to RISC-3 SSCs.

For safety-related SSCs that are categorized as RISC-3, yet are not directly referenced in a regulation or directly and specifically referenced in the safety analyses required by regulation, the licensee has the option of reclassifying these as RISC-4 SSCs on completion of a §50.59 evaluation.

RISC-3 SSC Example 1

Low Pressure Core Spray System

Prior to the adoption of §50.69, the Low Pressure Core Spray system was categorized as safety-related and was included in the scope of the maintenance rule. In adopting §50.69, the risk-informed evaluation process classified the system as RISC-3 because of redundancy of under realistic success criteria with LPCI.

The licensee's maintenance rule monitoring program established performance criteria based on all functional failure modes, not just on those associated with maintenance preventable functional failures. As a result, the licensee adopted the same functional performance thresholds. A licensing commitment (part of the general commitment for RISC-3 SSCs) was made to monitor the LPCS trains to the same functional criteria as established by the maintenance rule. This single commitment superceded all previous commitments associated with this system.

The program controls were adjusted to make them consistent with the licensee commercial (BOP) activities.

The licensee selected §50.55a as one of the regulations adopted as part of the §50.69 implementation. As a result, the licensee developed an alternative testing, inspection, repair and replacement programs for the system which superceded the ASME Section XI and ASME O&M requirements. No other changes were made to the engineering or procurement specifications.

Subsequent to the adoption of §50.69, the system required replacement components. Replacement parts were procured to the same design engineering specifications using commercial controls and procedures. Procurement documentation included a manufacturer's certification relating to the ability of the pump to satisfy the functional performance requirements. The repairs and post-maintenance testing were carried out in accordance with commercial balance-of-plant procedures.

RISC-3 SSC Example 2

Electrical Power Supply System for Containment Spray System

Prior to the adoption of §50.69, the electrical system for the Containment Spray system was categorized as safety-related and was included in the scope of the maintenance rule. In adopting §50.69, the risk-informed evaluation process categorized the system as RISC-3.

In developing the performance criteria for the maintenance rule, the licensee included electrical distribution systems as a supporting element for each

train. The licensee adopted the same maintenance rule performance criteria for its RISC-3 monitoring program.

With the exception of the pump motor and power cabling, the electrical system is located outside of containment in a mild environment.

For the pump-motors and cabling, work controls and procedures were changed to commercial practices. Qualification and documentation to 10 CFR 50.49 requirements and standards are not required, but documented vendor specifications and, where necessary, analyses are performed to provide reasonable assurance that the equipment will operate in the anticipated operational environment.

In regard to the breakers and motor control switchgear, work continues to be performed using the same controls and procedures as prior to the adoption of §50.69, i.e., safety-related procedures and controls.

For spare parts, manufacturer specifications supported, where necessary, with analyses that provide reasonable assurance that the spare parts satisfy the engineering and procurement specification is sufficient. Part 21 is not applicable to the cabling and motor because they are of low safety-significance and a failure could not present a substantial safety hazard.

The §50.59 change control process still applies.

RISC-3 SSC Example 3

Hydrogen Recombiners

Prior to the adoption of §50.69, the hydrogen recombiners for a PWR with a large, dry containment was categorized as safety-related and was included in the scope of the maintenance rule because they are safety-related SSCs. (The PRA and maintenance rule expert panel deliberations classified these SSCs as low risk-significant). In adopting §50.69, the risk-informed evaluation process classified the hydrogen recombiners as RISC-3 because their loss would not impact the plant risk profile in terms of CDF or LERF. Additionally, loss of this function would not have impacted the plant safety functions, nor would it have contributed to a credible core damage or a release of fission products.

The licensee's maintenance rule monitoring program established performance criteria based on all failure modes, not just on those associated with maintenance preventable functional failures. As such, the licensee adopted the same functional criteria for §50.69.

A licensing commitment (part of the general commitment for RISC-3 SSCs) was made to monitor the hydrogen recombiners to the same functional criteria as that established by §50.65. This single commitment superceded all previous commitments.

Program controls were adjusted to make them consistent with standard balance-of-plant activities. Electrical controls and work practices were adjusted to those of the licensee's commercial (BOP) programs up to the first isolation device. For spare parts, manufacturer certification that the spare parts satisfy the engineering and procurement specification is sufficient. Part 21 is not applicable because the SSCs are of low safety-significance and a failure of the SSC could not present a substantial safety hazard.

Following the issuance of a final rule on §50.44, which deleted the requirement for hydrogen recombiners in large-dry containments, the licensee performed a §50.59 to reclassify these SSCs as RISC-4.

Risk-Informed Safety Class 4

Risk-Informed Safety Class 4 SSCs are categorized as not being safety-significant and are not safety-related. These SSCs are not subject to NRC regulations[1].

NOTE: This category of SSCs is included in the scope of NRC oversight programs to the extent that a failure of a RISC 4 SSC degrades a safety-significant (RISC 1 or RISC 2) structure, system or component to the extent that the associated safety-significant function cannot be satisfied.

[1] This category of SSCs is included in the scope of NRC oversight programs if a failure of a RISC 4 structure, system or component resulted in a failure of a safety-significant functional requirement.

APPENDIX A

EXAMPLE OF TYPICAL COMMERCIAL, BALANCE-OF-PLANT QUALITY PROGRAM FOR RISK-INFORMED SAFETY CLASS 2, 3 AND 4 STRUCTURES, SYSTEMS AND COMPONENTS

Organizational Functions

Accountability, Responsibility and Organization

The general authorities, responsibilities and accountabilities for personnel engaged in power plant activities shall be established. To the extent necessary, specific responsibilities shall be established to assure the accomplishment of company, and plant goals and performance criteria.

Goals and performance criteria shall be established commensurate with the importance of the service, structure, system, component, process or function. Personnel shall be aware of their responsibilities for assuring that goals and performance criteria are met, and for recommending changes to assure the accomplishment of company and site goals and performance criteria.

Performance Expectations for Personnel

Performance expectations and standards shall be defined early in a process. These expectations shall be accomplished by satisfying performance criteria, supported by education, experience, supervision, training, instructions, procedures, policies, and other methods as deemed appropriate. Personnel are responsible for performing their activities consistent with these expectations and established company and industry standards, where appropriate. When applicable, personnel shall propose recommendations to refine work process to achieve expectations and resolve deficiencies.

Work activities, plans and procedures shall be based on input from appropriate levels of the work force using, when appropriate cross-functional teams to assess, prepare, install and test modification packages or new designs. The varying requirements of associated technical disciplines and work activities shall take into account personnel safety, work environment, and worker proficiency (education, training and experience). The completion of work activities shall be monitored, and work schedules and logic adjusted, to achieve power production goals.

Process Control

Identification of Required Processes

Work processes and functions that affect the safety significant functions and their attributes, regulatory requirements, and power production activities shall be identified.

Procedures and Instructions

Work activities shall be performed under controlled conditions defined by work procedures or instructions at a level of detail commensurate with the complexity, the proficiency of the worker, and personnel safety, taking into account education, training and experience. Controls shall include the provision to allow personnel to stop the process, and through the corrective and preventative action programs, change the controls, or processes, in order to satisfy the performance criteria and achieve the power production goals. Work procedures and instructions shall provide for consistency in the implementation of the work to provide adequate confidence of meeting the performance criteria. The need for written and approved procedures shall be determined based upon complexity, importance to the safety significant functions and attributes, power production goals, and personnel safety.

Identification of Performance Criteria

Specific performance criteria shall be determined early in the process. Work instructions and procedures shall indicate specific performance criteria commensurate with the importance of the activity. The criteria shall be based on industry codes or standards, specific work procedures, company and unit goals, or instructions and, where applicable, shall incorporate appropriate tolerances.

Assessments

Management is responsible for overseeing the assessment program.

A program for assessments, including self-assessments, shall be established and implemented to provide adequate assurance that the performance criteria are being achieved and are effective. The type, frequency and degree of specificity of assessments shall be determined by the importance to the safety significant functions and attributes and the performance history of structures, systems, components, or the work activity being evaluated.

Assessments may be in the form of reviews, monitoring, tests, surveillances, inspections, audits or examinations, as appropriate. These assessments shall be performed by line organizations or personnel, by management or by independent internal or external organizations or groups. The importance to the safety-significant function, the power production function, performance history, and personnel safety shall determine the degree of management, and if warranted,

independent managerial and technical oversight. Personnel performing assessments shall be qualified through training, work experience, or certification.

Assessments of suppliers, including external support organizations, and manufacturers shall be performed at frequencies determined by procurement requirements, the suppliers performance history, or the performance history of the product. These suppliers' assessments shall assure that the products and services are being undertaken in accordance with a quality plan that will satisfy the requirements of procurement specifications and orders.

Corrective and Preventative Action

Measures shall be established to monitor plant performance and take appropriate action to resolve anticipated deviations or deficiencies that could impact the safety significant functions and attributes, power production goals or personnel safety.

Measures shall be established to assure that deviations from the prescribed performance criteria are identified and communicated to the appropriate levels of management, in a timely manner. Controls and processes shall be available to stop work while the appropriate level of management resolves a deviation or concern. Satisfactory accomplishment of corrective actions shall be confirmed.

Evaluation of Deviations

Documented deviations from the performance criteria shall be evaluated commensurate with the importance to the safety significant functions and attributes, the power production goals, and personnel safety. This evaluation should consider the cause of the deviation, the significance and extent of the defect or deficiency in the work activity, with input from the appropriate personnel associated with the activity in which the deviation was identified. For deviations with personnel safety implications, management shall review the results of the evaluations and actions shall be taken and documented to minimize the potential of recurrence.

Resolution of Deviations

Documented deviations shall be resolved by the responsible organizations to an extent, and in a manner, that is consistent with the importance of the structure, system, component or activity. Activities associated with correcting deviations shall continue until the performance criteria have been satisfied, or until appropriate levels of management justify and authorize changes to the original performance criteria.

Examples of Typical Program Elements in a Commercial Control Program

Introduction

Many plants do not have a specific procedure of program labeled "commercial quality program." Rather, such programs and procedures are disseminated in numerous plant programs and procedures. When combined together, as a whole, these program elements assure that the proposed commercial treatment of SSCs provide reasonable assurance that the RISC-2 and
RISC-3 required (safety and regulatory) functions will be satisfied. . These programs are currently in place, and provide an effective means of addressing the special treatment controls for RISC-2 and RISC-3 SSCs. In many instances, such programs and procedures are a subset of the more formal 10 CFR 50, Appendix B quality programs

The following element summaries are examples of the type of programs and procedures that are included in a licensee's work control program for balance-of-plant equipment.

I. Maintenance Rule Program

Implements the Maintenance Rule at the station, including SSC scoping and monitoring, classifying SSC performance in accordance with criteria and goals, ensuring proper corrective actions when performance criteria are not met, and periodically evaluating overall program performance.

Note: The maintenance rule program provides a basis for the performance monitoring program for RISC-3 SSCs

II. Corrective Action Program

Establishes the measures to be taken to assure the conditions adverse to quality (e.g., failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances) are promptly corrected. For conditions adverse to quality, this program establishes measures to provide reasonable assurance that the cause of the condition is determined, and that corrective action is taken in a timely and accurate manner consistent with safety significance and power production requirements. The program provides for the resolution of overdue corrective action through escalation to higher levels of management, and for the trending of deviating conditions.

III Preventive Maintenance (PM) Program

Establishes the requirements and guidelines for the development and implementation of preventive maintenance to ensure plant equipment is maintained at a quality level to perform its intended function. The program includes the identification, maintenance, and scheduling of PM on permanent installed plant equipment, equipment in storage, and maintenance equipment.

IV Design Change Program

Establishes the process for managing the preparation, implementation, and where necessary, the licensing of design changes to SSCs. It defines the controls necessary to ensure safe implementation of station design changes. As necessary and appropriate, post-modification testing is performed to determine or verify the capability of a modified SSC to meet specified functional design requirements and design bases.

The design change process for RISC-2 SSCs includes a provision for assessing and managing the change in risk from equipment design changes.

V Procurement Program

Procurement of SSCs is controlled by administrative procedures that implement quality assurance program elements for procurement and materials management consistent with safety and power generation. As necessary, and consistent with the safety-significance or power production requirement, the program includes: vendor surveillance audits and maintenance of approved vendor lists, receipt inspection, materials verification activities, and special handling and storage procedures.

VI Procedure Program

This program applies to technical and administrative procedures and includes the necessary processes to maintain procedure quality. The program further establishes the processes for 1) the development, review, and approval of new procedures, procedure revisions, procedure changes and procedure deletions, 2) review and approval of vendor procedures, and 3) performance of periodic procedure reviews.

VII PRA Update Program

This program incorporates a feedback process to update the PRA on frequency determined by circumstances, but not to exceed 36 months. Where appropriate and necessary, the update incorporates applicable "state-of-the-art" changes relative to

PRA technology, as well as plant design changes that would affect the PRA and have been implemented since the last update.

VIII Work Control

This program provides the process for identifying, controlling, and documenting work activities, including implementing design changes, at the station. The program ensures that the processing of work requests and work order tasks supports the completion of work in a safe, timely and efficient manner such that safe and reliable plant operation is optimized.

IX Work Planning and Scheduling

This program provides the requirements and guidelines for planning and scheduling maintenance and other work activities to optimize plant operational safety, reliability and availability. The program addresses the planning and scheduling of the following activities:

Corrective, preventive, and pre-determined (i.e., planned or repetitive) maintenance

On-line maintenance

Periodic testing

Installation of design change packages

X Configuration Control Program

Manages and controls changes (procedural and equipment) to the facility to assure the plant configuration and practices correctly reflect the approved design and licensing documentation.

XI Examples of Other Programs

Other programs that also promote reasonable assurance and reliability that specific RISC-2 and RISC-3 SSCs will adequately perform their function(s) include:

- Secondary Piping Inspection and Replacement Program (includes condensate and feedwater systems, etc. subject to flow-assisted corrosion)
- Diesel Generator Reliability Program (includes AAC diesel)
- Technical Requirements Manual (Fire Protection/Appendix R equipment, AAC equipment, snubbers, etc.)