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YANKEE NUCLEAR POWER STATION PILOT EVALUATION REPORT FOR PLANT LICENSE RENEWAL

YANKEE

YANKEE ATOMIC ELECTRIC COMPANY
in cooperation with
THE ELECTRIC POWER RESEARCH INSTITUTE
THE U.S. DEPARTMENT OF ENERGY
and
SANDIA NATIONAL LABORATORIES

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PILOT EVALUATION REPORT

for

PLANT LICENSE RENEWAL

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ABSTRACT

The Yankee Pilot Evaluation Report provides the application of a process for evaluating systems, structures, and components for license renewal. The methodology and criteria used are based on the Nuclear Management Resources Council (NUMARC) Nuclear Plant Life Extension (NUPLEX) "Methodology to Evaluate Plant Equipment for License Renewal." The Pilot Report was prepared as part of the Yankee Lead Plant License Renewal Project which is co-sponsored by the U.S. Department of Energy, the Electric Power Research Institute, and Yankee Atomic Electric Company.

The key objectives of the Yankee Pilot Evaluation Report are to demonstrate through a formalized process that:

- o All systems, structures, and components requiring license renewal evaluation are identified.

- o Any potentially significant age-related degradation is recognized and properly managed, as necessary.

As presented in the report, these objectives have been met. Of the total 78 systems and 46 structures at Yankee, 43 systems and 27 structures were determined to require evaluation for license renewal. The potential for significant age-related degradation and the methods of managing degradation were assessed for the pilot systems and structures.

The components evaluated in the Pilot Evaluation Report are all related to the Safety Injection (SI) System. Included are SI fluid system and I&C components, Emergency Electrical Power System (EEPS) components, and the structural components of the Primary Auxiliary Building (PAB), Diesel Generator Building (DGB), and Battery Room No. 3 Building (B3B).

The areas of the plant evaluated were generally found to be in good condition with no signs of significant degradation. However, as indicated in the report, several components will require further evaluation and some plant programs will need enhancement to better address degradation concerns for license renewal.

The methodology, criteria, and technical justification supporting the evaluation process are provided, as well as examples of specific assessments, checklists, and other supporting information to allow the NRC staff to conclude that the process used is both thorough and technically justified. Because the same evaluation process used for the components presented in the Pilot Evaluation Report is being applied to the plant in general, it should simplify future NRC license renewal reviews.

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1.0 INTRODUCTION

The purpose of this document is to provide the results of a pilot application of the Nuclear Management and Resources Council (NUMARC) Nuclear Plant Life Extension (NUPLEX) "Methodology to Evaluate Plant Equipment for License Renewal,"(1) to Yankee Nuclear Power Station (YNPS) systems, structures, and selected components as part of the Yankee Lead Plant License Renewal Project. This project is co-sponsored by the U.S. Department of Energy, the Electric Power Research Institute, and Yankee Atomic Electric Company. The general objective of the project is to develop, document, and demonstrate the process of nuclear power plant license renewal and life extension for use by other utilities. Yankee's specific goal in conjunction with this objective is to obtain a 20-year renewal license.

YNPS is an 185 MWe, four-loop, Westinghouse-type pressurized water reactor located in Rowe, Massachusetts. YNPS began operating in 1960 and is the oldest operating commercial nuclear power plant. With almost 30 years of operation, YNPS ranks as one of the best operating nuclear power plants, achieving an average lifetime capacity factor of over 74%. The license to operate YNPS expires on July 9, 2000. This makes YNPS the first commercial nuclear power plant in the U.S. to require a license renewal for operation beyond the year 2000. Because of YNPS's long-standing record for operating safely and reliably, a license renewal evaluation is being made to support plant operation beyond the expiration of the current license. A 20-year license renewal period has been selected.

The first step in a license renewal evaluation is to determine the systems, structures, and components susceptible to significant age-related degradation. These systems, structures, and components are further evaluated to determine if they can be safely operated throughout the license renewal period. A component can be considered suitable for use during the renewal period if its failure would not compromise plant safety; or if it is not subject to significant age-related degradation; or if it is subject to

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(1) "Methodology to Evaluate Plant Equipment for License Renewal," Nuclear Management and Resources Council, Inc., U.S. Department of Energy/ Sandia National Laboratories, October 6, 1989.

periodic maintenance, refurbishment, or replacement which effectively manages age-related degradation.

The methodology used to determine which systems, structures, and components are susceptible to significant age-related degradation is based on the "Methodology to Evaluate Plant Equipment for License Renewal," developed under NUMARC NUPLEX sponsorship. A report describing this plant evaluation methodology was forwarded to the NRC in October 1989. The philosophy underlying this methodology initially considers all plant systems, structures, and components as significant and susceptible to age-related degradation. Then, through a series of successive reviews, the number of plant systems, structures, and components requiring further review is reduced. First, on the system/structural level, the initial list of plant systems and structures is reduced to those systems or structures for which degradation is determined potentially significant. Then, on the component level, further review reduces the list of components to those components necessary for the performance of a significant system's or structure's safety function and which have identified aging degradation mechanisms that are not being adequately managed. Such components require further evaluation for operation during the license renewal period.

The remainder of this report is divided into five sections. Section 2 presents a brief overview of the NUMARC NUPLEX methodology. Section 3 discusses the application of the methodology to Yankee plant systems, structures, and components. Each plant system and structure is evaluated for significance and results are presented. This is followed by a discussion of Yankee-specific component evaluation methods. Section 4, "Pilot Application" details the application of the component evaluation methods to components associated with the Safety Injection (SI) System: SI fluid and I&C components, selected Emergency Electrical Power System (EEPS) components, Primary Auxiliary Building (PAB), Diesel Generator Building (DGB), and Battery Room No. 3 Building (B3B) structural components. These components are systematically reviewed for significance, for the ability of existing plant programs to ensure significant component safety functions are properly addressed, and for component susceptibility to age-related degradation. Component evaluation results for each of these components' types are presented. Section 5 presents the overall conclusions.

2.0 METHODOLOGY

The NUMARC NUPLEX "Methodology to Evaluate Plant Equipment for License Renewal" and associated criteria for evaluating systems, structures, and components form the basis for this report. The methodology provides both deterministic and probabilistic approaches to identifying plant systems and structures which contribute to plant safety and, of those, identifying systems and structures for which aging degradation is potentially significant to plant safety. These systems and structures are established as the primary focus of further evaluation. From this list of systems and structures, the methodology describes how to: (1) identify the subset of components that are important to a system's or structure's safety function; (2) identify those components which currently are subject to established effective replacement, refurbishment, or inspection programs; (3) review those remaining components to determine the impacts, if any, of potential age-related degradation. For those components where age-related degradation is a concern, options for resolving such degradation are identified.

The NUMARC NUPLEX methodology consists of two major steps with a series of substeps that progressively focuses the license renewal evaluation. Figure 2.1 summarizes the methodology while Attachment A lists the generic criteria developed by NUMARC NUPLEX as provided in Appendix A to the "Methodology to Evaluate Equipment for License Renewal" report.

Step 1, "Evaluation of All Plant Systems and Structures," reviews all plant systems and structures to determine those that require component-level license renewal evaluation. First, Substep 1a develops a list of systems and structures potentially requiring further license renewal evaluation based upon the system or structure having a role, whether major or minor, in plant safety. Second, Substep 1b determines if degradation of the systems and structures identified in Substep 1a could potentially affect plant safety. Such systems and structures require component-level evaluation for license renewal. The net result, after Substeps 1a and 1b are completed, is the development of a list of systems and structures requiring further component-level evaluation for license renewal.

Step 2, "Evaluation of Components Within Systems and Structures," addresses plant systems and structures that have been determined by Step 1 to require component-level evaluation for license renewal. Each such system and structure is reviewed: Substep 2a identifies components that are important to performance of the system's or structure's safety function; of these, Substep 2b identifies components that are not routinely replaced, refurbished, or subject to detailed inspection; Substep 2c determines if these remaining components are susceptible to age-related degradation which may significantly affect plant safety; and Substep 2d suggests options which can be used to address potentially significant age-related degradation.

Application of this methodology results in a systematic evaluation of all plant systems, structures, and components. The detail of the review increases while progressing through the successive steps. At each step, some equipment not requiring further detailed evaluation may be identified.

A plant-specific application of the NUMARC NUPLEX methodology and associated criteria is presented in Section 3, which follows.

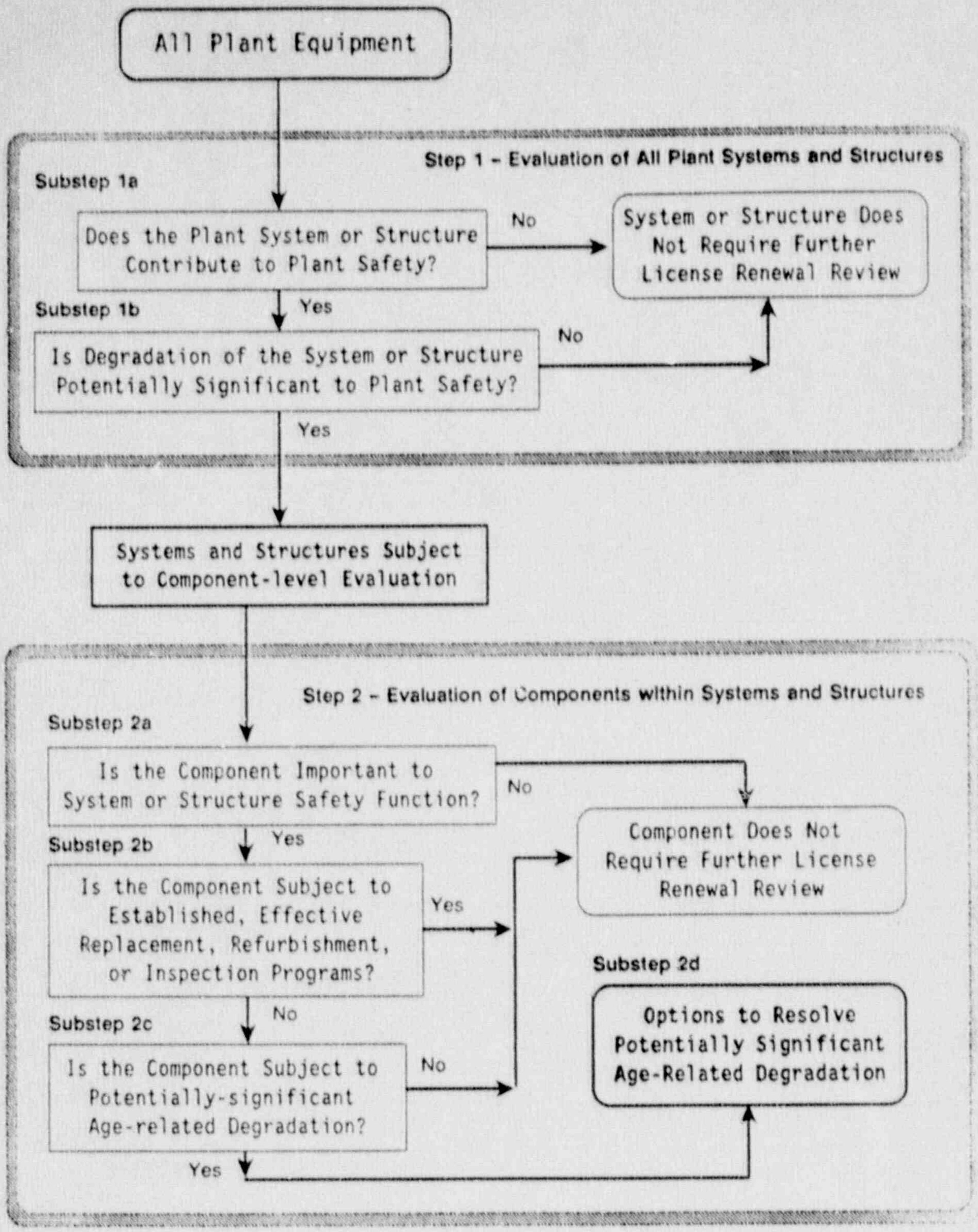


FIGURE 2.1

Methodology to Evaluate Plant Equipment for License Renewal

3.0 EVALUATION OF PLANT SYSTEMS/STRUCTURES/COMPONENTS

All plant systems and structures are first identified. Then, using the NUMARC NUPLEX methodology deterministic criteria, these systems and structures are evaluated to (1) determine if each contributes to plant safety, and (2) of those, determine if their degradation is potentially significant to plant safety and, therefore, require further component-level evaluation.

The systems and structures are initially evaluated using plant-specific criteria to determine if they contribute to plant safety (Figure 2.1, Substep 1a). These criteria are based upon safety classification, licensing commitments, and role in plant Emergency Operating Procedures (EOPs). The systems and structures, which were determined to contribute to plant safety, are then further evaluated to determine if their degradation is potentially significant to plant safety (Figure 2.1, Substep 1b). Again, plant-specific criteria based on radioactive release limits, Main Coolant System or containment leakage limits, and performance or control of plant safety functions are used.

If a system or structure met the requirements of the first set of criteria (Substep 1a), it is passed to the second set for evaluation. If the system or structure meets the second set of criteria (Substep 1b), which is presented in an exclusionary format, it is dispositioned as not requiring further review for license renewal. However, if the system or structure fails the second set of criteria, further component-level evaluation (Step 2) is required.

3.1 Identification of Systems and Structures

A comprehensive list of all plant systems and structures is provided in Attachment B. This list represents the results of a detailed review of plant documentation to ensure that every plant system and structure has been identified an subjected to the plant evaluation process. Plant documents reviewed included the following: FSAR, Systems Training Manual, Appendix R Manual, Fire Hazards Summary Report, flow diagrams and other plant drawings, I&C instrument tag list, and the plant component labeling procedure. A brief description of each system and structure is also provided in Attachment B.

3.2 System and Structural Boundaries

System and structural boundaries are established for evaluation purposes. The boundaries provide a clear demarcation between systems and structures to ensure components are placed into systems or structures in a consistent manner.

Systems are generally defined by plant drawings: electrical one-lines, flow diagrams, etc. Specific boundaries are established, and plant tagging practices are used to establish system components. For license renewal review purposes, system components are categorized into fluid, electrical, and instrument and control systems. Boundary definitions, associated with each category, are used to define the appropriate system for each category.

Structures are defined as any plant building or structure from the soil/structure interface to its external walls and roof, including concrete, structural steel, unit masonry, fire penetration barriers, and cast-in-place equipment anchorages. Lifting equipment, field-fabricated tanks, and supports are also included within the structure review scope. The boundaries are established to ensure that all components are included within either a system or structure.

3.3 Identification of Systems and Structures Which Contribute to Plant Safety

The initial evaluation of systems and structures is to determine if they contribute to plant safety (Figure 2.1, Substep 1a). The evaluation is based on plant-specific criteria developed from Substep 1a of the NUMARC NUPLEX methodology. These criteria are discussed below:

3.3.1 Safety-Related Systems and Structures

The Yankee Safety Classification of Systems Manual was reviewed to identify safety-related systems or structures. If any system or structure contains a component within the Safety Class (SC) boundary designated SC-1, SC-2, SC-3, SC or Requires Quality Assurance (RQA), the system or structure is identified for license renewal review.

3.3.2 Systems Relied Upon or Structures Identified in a Licensing Basis Safety Analysis or Evaluation

Those systems relied upon or structures identified in a licensing basis safety analysis or evaluation are determined from a review of current licensing basis-related documentation. This documentation falls into two categories: controlled documents and submittals addressing regulatory issues. The following five controlled documents were reviewed: FSAR, Technical Specifications, Environmental Qualification (EQ) Manual, Appendix R Manual, and the Fire Hazards Summary Report. Submittals addressing the following nine regulatory issues were also reviewed: seismic, heavy loads, internal and external flooding, rain/snow loads, tornado/wind loads, high energy line breaks, permanent radiation shielding, and station blackout. These controlled documents and submittals were chosen as being representative of the plant's current licensing basis and encompassing the results of a wide spectrum of safety analyses and evaluations. It should not be inferred that these documents and submittals alone represent the plant's entire current licensing basis. Rather, they collectively represent a significant portion of the plant's current licensing basis to ensure the identification of any system or structure which may have a role in plant safety. Details of this review of current licensing basis documentation to identify systems relied upon or structures identified in a licensing basis safety analysis or evaluation are given below:

3.3.2.1 Final Safety Analysis Report (FSAR) Transient/Accident Analysis

The FSAR transient/accident analysis sections were reviewed to identify every system which is intended to mitigate or negate a transient/accident or any system whose failure or misoperation produces an undesirable affect.

3.3.2.2 Technical Specifications

The Technical Specifications were reviewed to identify any systems or structures governed by one or more Technical Specification. If a single component of a system or structure was identified in the Technical Specifications, the system or structure was included.

3.3.2.3 Environmental Qualification (EQ)

The EQ Manual was reviewed to identify systems where one or more of its components required evaluation. The system was included if it contains components which were evaluated for either harsh or mild environments.

3.3.2.4 Appendix R

The Appendix R Manual was reviewed to identify systems and structures governed by this program. Any system or structure with components relied on to achieve an orderly plant shutdown following a fire as part of the Appendix R evaluation was included.

3.3.2.5 Fire Protection

The Fire Hazards Summary Report was reviewed to identify any system or structure with one or more components governed by a fire protection requirement.

3.3.2.6 Seismic

The seismic NRC Safety Evaluation Report and related correspondence were reviewed to identify any system or structure with one or more seismic components.

3.3.2.7 Heavy Loads

The heavy loads correspondence were reviewed to identify plant hoists and lifting equipment evaluated under the topic.

3.3.2.8 Internal Flooding

The internal flooding correspondence were reviewed to identify the plant systems identified as sources of internal flooding or features which mitigate the effects.

3.3.2.9 External Flooding

The external flooding correspondence were reviewed to identify the systems and structures used to mitigate the consequences of external flooding.

3.3.2.10 Rain/Snow

The rain/snow correspondence were reviewed to identify the structures evaluated for rain and snow loads.

3.3.2.11 Tornado/Wind

The tornado/wind correspondence were reviewed to identify systems and structures used to mitigate the effects of tornadoes and high winds.

3.3.2.12 High Energy Line Breaks (HELB)

The HELB correspondence were reviewed to identify systems and structures evaluated as a HELB source or which mitigate the effects.

3.3.2.13 Permanent Radiation Shielding

The FSAR and other documents were reviewed to identify systems and structures used for permanent radiation shielding.

3.3.2.14 Station Blackout

The station blackout submittal were reviewed to identify any system used to cope with a station blackout.

3.3.3 Systems Utilized in Plant EOPs

The plant Emergency Operating Procedures (EOPs) were reviewed to identify systems used by the operator in dealing with plant transients and accidents. The Yankee plant EOPs are based upon the Westinghouse Owners Group Emergency Procedure Guidelines. Systems whose use is explicitly or implicitly called for in the plant EOPs are identified.

3.3.4 Results - Listing of Systems and Structures Which Contribute to Plant Safety

The results of the evaluation to identify plant systems and structures which contribute to plant safety are provided in Attachment C. Documented in Attachment C are the individual responses for each system and structure for the criteria discussed in Sections 3.3.1, 3.3.2, and 3.3.3. Table 3.1 summarizes these results. These first level review (i.e., Substep 1a) results show that 63 out of 78 systems and 33 of 46 structures were identified as being contributors to plant safety. As such, these 63 systems and 33 structures pass on to Substep 1b for further evaluation.

3.4 Identification of Systems and Structures for Which Degradation is Potentially Significant to Plant Safety

A detailed evaluation of the systems and structures which contribute to plant safety is made to determine the potential significance of age-related degradation to plant safety (Figure 2.1, Substep 1b). Age-related degradation of a system or structure is considered potentially significant to plant safety if the failure of the system or structure contributes to increased radiological health and safety risk to the public.

This second-level evaluation is based on criteria associated with exceeding radioactivity release limits, main coolant system or containment leakage limits, and performing or controlling plant safety functions. These criteria represent a plant-specific application of Substep 1b of the NUMARC NUPLEX methodology. Specific details of these criteria are discussed below.

3.4.1 Uncontrolled Radioactive Release

Criterion 1b.1.a of the NUMARC NUPLEX methodology requires that a system or structure be evaluated further if its failure could directly result in a radioactivity release exceeding FSAR or other off-site dose limits. In order to implement this criterion, the Yankee Technical Specification limit for radiological effluent release to the environment was selected as the threshold with the following ground rules: (1) the system/structure in question was assumed to be operating at the allowable Technical Specification radioactivity limit, (2) the system or structural related failure causes a release of its radioactive contents, (3) no other accident or transient is in progress. If Technical Specification radioactive release limits could be exceeded upon system or structure failure, then the system or structure requires component-level evaluation (Step 2). Examples of systems and structures which could potentially cause Technical Specification radioactive release limits to be exceeded are the Main Coolant System, Radioactive Waste Disposal System, Primary Auxiliary Building, and Waste Disposal Building.

3.4.2 Main Coolant System or Containment Leakage

Any system or structure which could cause degradation and failure of either the Main Coolant System or Vapor Container (containment) pressure boundary is considered potentially significant to plant safety (NUMARC NUPLEX Criterion 1b.1.b). Main Coolant System and Vapor Container Technical Specification leakage limits are established as thresholds for YNPS. In application, the potential to exceed the 1 gpm Main Coolant System leakage limit and the potential to breech the containment boundary was assessed for each system and structure contributing to plant safety. Of these, those systems and structures which could cause these limits to be exceeded require component-level review. The Main Coolant System and Vapor Container are obvious examples of a system or a structure which meets this criterion. Other examples of systems meeting this criterion are the Charging and Volume Control System, and the Component Cooling Water System which are included on the basis of their Main Coolant System and Vapor Container penetrations. Other structural examples are the Primary and Secondary Vent Stacks, which, upon failure, could potentially impact upon the Vapor Container.

3.4.3 Performance or Control of Plant Safety Functions

The NUMARC NUPLEX methodology, in Criterion 1b.1.c.1, specifies a generic set of plant safety functions. These are:

1. Reactor Criticality
2. Main Coolant System Integrity
3. Main Coolant System Inventory
4. Main Coolant System Heat Removal
5. Containment Integrity
6. Containment Heat Removal

Any system or structure which is required for the performance of or control of these safety functions require component-level evaluation unless its failure is detectable in a time frame which precludes manual or automatic plant trip (Criterion 1b.1.c.2). For application to YNPS, the safety functions used in the plant EOP status trees, which encompass the above safety functions, are substituted:

1. Subcriticality (S)
2. Core Cooling (C)
3. Heat Sink (H)
4. Integrity (P)
5. Containment (V)
6. Inventory (I)

The status of the plant safety functions have been categorized to define the level of challenge to a particular safety function. Any system which fails to operate or maintain its integrity and causes a safety function to deviate from its normal status or degrade to a less desirable state, or any system required to monitor the status of a safety function and whose failure results in the inability to determine the status of that safety function requires component level review. The degradation of such systems is considered potentially significant to plant safety. Examples of systems which can cause one or more safety functions to deviate from normal or degrade to a less desirable state are the Charging and Volume Control System, the Safety Injection System, and the Boiler Feed System. The Charging and Volume Control System and the Safety Injection System can both affect the subcriticality, core cooling, integrity, and inventory safety functions through their ability to add cold, borated water to the Main Coolant System. The Boiler Feed System directly affects the heat sink safety function (through steam generator feedwater addition) and, to a lesser extent, the integrity and inventory safety functions (through overcooling due to excess feedwater addition).

If the system's failure could result in a safety function status change but the failure is detectable in a time frame which allows for plant shutdown prior to requiring a manual or automatic plant trip, the system can be excluded from the list of systems for which degradation is considered significant to plant safety. Only two examples of such systems were identified in our review. These are the Heating Steam/Condensate System and the Non-Return Valve (NRV) Enclosure Ventilation System. The first system is used to maintain the 125,000 gallon SI tank temperature between 120°F and 130°F, as required by Technical Specifications. The latter system is required to maintain the NRV enclosure temperature above freezing to ensure proper operation of NRV hydraulics. In either case, sufficient time is available to detect failure in these systems to allow credit for corrective action.

3.4.4 Structures Housing Significant Systems

In lieu of applying the plant safety function related criteria (Criteria 1b.1.c.1 and 1b.1.c.2) directly to structures, a separate criterion was established. Structures which housed significant systems, as identified by Criteria in 1.b.1.a, 1.b.1.b, and 1.b.1.c were designated as potentially significant to plant safety and as requiring component level review. This was done to avoid correlating a structure with a particular safety function or set of safety functions.

3.4.5 Results - Listing of Systems and Structures for Which Degradation is Potentially Significant to Plant Safety

The results of the evaluations discussed in Sections 3.4.1 though 3.4.4 are documented in Attachment D for each system and structure identified as a contributor to safety. Degradation of a system or structure is designated potentially significant if any of the above evaluation categories are applicable. Table 3.2 summarizes the results given in Attachment D. Of the 63 systems designated as contributors to plant safety, degradation of 43 are considered significant. Of the 33 structures designated as contributors to plant safety, degradation of 27 are considered potentially significant to plant safety. These systems and structures are subject to further component-level (Step 2) review for license renewal.

It is recognized that other balance of plant systems warrant further review, beyond the scope of license renewal, based on potential transient initiation, personnel safety, or economic considerations. These areas are being reviewed for potential age-related degradation concerns as part of Yankee's overall plant life extension effort. Industry and plant-specific risk studies are being used to focus the review.

For example, the following system and component reviews have been completed or are in progress:

- Station Transformers
- Main Condenser
- Water Treatment System
- Turbine Generator
- Feedwater Heaters

3.5 Component Evaluation

The next step in the methodology is the evaluation of the components within the systems and structures which were designated potentially significant to plant safety in Section 3.4. This component-level evaluation involves several steps. First, all components within the system or structure are identified. For each of these components, subsequent steps address the following questions:

- Is the component important to system or structure safety function?

- Is the component subject to established effective replacement, refurbishment, or inspection programs?

- o Is the component subject to potentially significant age-related degradation?

Components that are important to the system or structure safety function and are not subject to established effective replacement, refurbishment, or inspection programs, and are subject to potentially significant age-related degradation, require further evaluation for license renewal. These evaluations, which will be component-specific, are beyond the scope of this report.

Plant-specific criteria, based on the NUMARC NUPLEX methodology, address the above questions for each component in each of the systems and structures requiring component level evaluation. These criteria are discussed in subsequent sections below.

3.5.1 Components Important to System or Structure Safety Function

Components are designated important to the system or structure safety function unless:

- o The component is normally isolated and does not perform an accident mitigating function.

OR

- o Component failure would not result in either the failure of any individual train within the system or the failure of the entire system to perform its required safety function,

AND

- o Component failure would not reduce the structural support of any other component such that it would not perform its system safety function,

AND

- o Component failure would not physically damage any other component such that it would not perform its system safety function.

Components meeting the above criteria are not important to the system's or structure's safety function. Components failing the above criteria are important to the system's or structure's safety function and require further evaluation as described in Section 3.5.2.

3.5.2 Components Subject to an Established, Effective, Replacement, Refurbishment, or Inspection Program

Components important to the system or structure safety function that are subject to an established effective replacement, refurbishment, or inspection program are identified using the generic criteria given in Step 2b of the NUMARC NUPLEX methodology. Restating the criteria, a component is subject to an established effective replacement, or inspection program, if:

- o The program is documented, approved, and routinely implemented in accordance with plant administrative procedures.
- o The program procedures ensure that all of the component's significant safety functions are properly addressed.
- o The program establishes specific criteria for determining the need for corrective action and requires such action be taken if these criteria are not met.

A review of plant procedures, based on the above criteria, is used to assess the effectiveness of maintenance/surveillance/inspection activities covering the components being evaluated. Applicable procedures, inspection methods used, inspection frequency, replacement frequency, and refurbishment frequency called for by the procedures for each component are entered into a data base.

Components designated important to the system or structure safety function which are not covered by procedures are subject to further evaluation in Section 3.5.3. Components which are covered by procedures are further reviewed as described below.

The specific safety-significant functions are established for each component (or groups of similar components) designated important to the system or structure safety function in Section 3.5.1 above. Examples of component significant safety functions are pressure boundary, operability, etc. The safety-significant functions may be component-specific or have generic applicability.

Using the results of the plant procedures review and/or other supporting information, the ability of the component's program(s) to properly address the safety significant functional requirements identified above is determined. If the component's safety significant functional requirements are properly addressed by existing programs, no further review is required. If not, further evaluation, as described in Section 3.5.3, is required.

Generally, components are subject to the actions contained in several procedures, many of which address more than one component. All procedures associated with a component are reviewed to determine overall effectiveness. It is the extent to which a component's applicable procedure set ensures its safety functions are adequately maintained that determines whether or not the component is subject to an "effective" overall program. Procedures may only partially address the component's identified safety functions (i.e., procedures may adequately address some, but not all, safety functions). Additionally, certain "effective" programs, such as the EQ Program or a defined, periodic replacement program, have been designed to ensure component's continued operability. Components under such programs do not require any further evaluation for license renewal because the basis for such effective programs (e.g., EQ) is mandated by the plant's existing license.

Components with all identified significant safety functions (pressure boundary, operability, etc.) covered by an effective program do not require further evaluation. Conversely, components for which any significant safety function is not adequately maintained by an effective program requires further evaluation as described in Section 3.5.3.

Where a determination was made that further license renewal evaluation of a component is not required based on effective programs, the programs credited will be further reviewed as a separate task to assure the validity of the determination. This will involve a detailed review of the program's attributes relative to the safety functions and specific degradation mechanisms involved.

The effective program conclusion is a judgement of that programs ability of assuring continued functionality of the component during license renewal considering the effects of potential degradation. A negative conclusion does not necessarily infer the inadequacy of current programs, nor does a positive conclusion preclude the necessity for program enhancements.

3.5.3 Components Subject to Potentially Significant Age-Related Degradation

Those components that are important to the system's or structure's safety function and are not subject to an effective replacement/refurbishment/ inspection (RRI) program are now evaluated to determine if they are subject to potentially significant age-related degradation.

A component is considered subject to age-related degradation unless it is established and documented that potentially significant age-related degradation will not occur during the license renewal period.

The potential for significant age-related degradation occurring is assessed for each component that has been identified as necessary to the system safety function and not subject to an effective RRI Program. Such components are evaluated for age-related degradation mechanisms according to their respective discipline area as follows:

Fluid Systems - Fluid system components are evaluated using a computer based expert system, developed by Yankee, called CoDAT. CoDAT is used to determine the degradation mechanisms which are potentially acting on pressure retraining components based on materials and environmental conditions. Further information on CoDAT is provided in Attachment G. Active fluid components (pumps, motor-operated valves, etc.) are also evaluated separately for active degradation mechanisms (wear, galling, etc.) in addition to being evaluated for passive degradation mechanisms using CoDAT.

Instrumentation and Control (I&C) Systems - I&C components are reviewed for the following:

- o Deterioration Shown by General Changes in Electrical Characteristics
- o Corrosion
- o Mechanical Wear
- o Radiation Damage

Electrical Systems - Electrical components are reviewed for the following:

- o Dielectric Breakdown
- o Mechanical Wear
- o Corrosion
- o Radiation Damage

Structural Components - Structural components are evaluated for potentially significant degradation using generic degradation assessments and a focused plant walkdown. Generic degradation assessments are performed for concrete, steel, building protective systems, and equipment support components. The assessments determine the plausible age-related degradation modes, the stressors, and environment required for the degradation mode to be active and how the degradation is manifested. Plant design and construction features are considered to determine the structural components potentially susceptible to age-related degradation. A focused walkdown is then performed to assess actual material conditions and environments to identify which structural components require further evaluation for license renewal.

Only components with identified potentially significant age-related degradation mechanisms require further evaluation for license renewal. The scope of these component evaluations can range from a simple examination to a detailed analysis, depending upon the component and degradation mechanism involved. Component repair, refurbishment, or replacement will be considered, when applicable. These evaluations are beyond the scope of this report.

The discussion presented in Sections 3.5.1, 3.5.2, and 3.5.3 gave an overview of the plant-specific application of the generic plant evaluation methodology for components. Section 4.0, which follows, focuses this overview on a pilot application which consists of an evaluation of SI related system and structural components. This pilot application is intended to demonstrate the use of the methodology and criteria for components within each plant area. The method of implementation, technical bases, and results are provided.

TABLE 3.1

Step 1a Review Results Summary
Systems/Structures Which Contribute to Plant Safety

		Results			
	Total	Safety Class (Yes/No)	Licensing Basis (Yes/No)	Used in EOPs (Yes/No)	Contributes to Plant Safety (Yes/No)
Systems	78	40/38	61/17	45/33	63/15
Structures	46	4/42	33/13	N/A	33/13

TABLE 3.2

Step 1b Review Results Summary
Systems/Structures for Which Degradation is Potentially
Significant to Plant Safety

	Total	Rad Release Limits Exceeded (Yes/No)	MCS or Containment Leakage Exceeded (Yes/No)	Req'd for Perf. of or Control of Safety Functions (Yes/No)	Failure Not Detectable (Yes/No)	Structure Houses Significant System (Yes/No)	Degradation of System/Structure Potentially Significant to Plant Safety (Yes/No)
Systems	63	15/48	18/45	36/27	36/2	N/A	43/20
Structures	33	11/22	8/25	N/A	N/A	23/10	27/6

4.0 PILOT APPLICATION

4.1 Purpose and Scope

The purpose of the pilot study is to demonstrate the application of the component-level plant evaluation methodology for a wide spectrum of plant components representing the four major plant discipline areas: fluid systems, electrical, I&C, and structural. The SI System, which was determined to require component-level evaluation in Section 3.4, is the focal point.

The component evaluation includes all SI fluid system and SI I&C components; selected EEPS components; and PAB, DGB, and B3B structural components. The electrical and structural components included herein are related to the SI System and are provided as a demonstration of the evaluation process. However, it was not intended that all SI-related components be addressed in this report.

The EEPS provides the SI System electrical loads with ac power. The PAB, DGB, and B3B house most of the major SI and EEPS components: high and low head SI pumps, accumulator tank, diesel generators, etc.

For each discipline area, the methods by which components are identified and evaluated are presented along with a summary of the results. Although the component-level plant evaluation methodology provides criteria generically applicable to all components, the implementation of the methodology will differ somewhat for each discipline area. This is necessary to take full advantage of particular surveillance and aging aspects associated with each group of components. For example, I&C components are most likely dispositioned on the basis of plant procedures while structural components are better dispositioned on the basis of generic assessments and plant walkdowns. Fluid system and electrical system comments will most likely be dispositioned on the basis of plant procedures and/or aging-degradation assessments.

Finally, a discussion of the use of generic evaluations for groups of similar plant components is presented. In some instances, it may be advantageous to group components for evaluation rather than treat them individually by system. This grouping may either be by component type or it could be by issue. For example, thermal fatigue is best addressed globally as an issue and then applied to individual components.

4.2 Safety Injection System Fluid Components

4.2.1 Identification of SI Fluid Components

A simplified flow diagram of the SI System is shown in Figure 4.1. Attached to this report is a detailed SI System flow diagram, (FM-83A - "Flow Diagram - Low Pressure and High Pressure Safety Injection,") which was used in developing the SI System fluid component list and identifying SI Fluid System boundaries. Each individual component on the flow diagram is identified by tag number, description of component, line number, and other specific information depending upon whether it is a pipe, valve, instrument, pump, motor, or other component. Three-hundred ninety-two (392) fluid system components were identified and are listed in Attachment E along with component-level review results.

The above process for identifying fluid system components within the SI system is typical of that used for the remaining fluid systems requiring component level review.

4.2.2 Safety Function Review

Each SI fluid component is reviewed using plant-specific criteria based on the NUMARC NUPLEX methodology to determine if the component is important to the system safety function. For Yankee fluid components, the criteria discussed in Section 3.5.1 are augmented by an additional set of criteria which essentially are an interpretation for fluid system components. If any of the following questions can be answered "yes" (assuming that no credit will be taken for other systems which can perform the same safety function(s)), then the component cannot be dispositioned on a functional basis and further evaluation in Section 4.2.4 is required:

- o Can the component's failure prevent subcriticality from being achieved following a scram?

- o Can the component's failure prevent adequate core cooling?

- o Can the component's failure affect the heat sink capabilities?

- o Can the component's failure cause a loss of integrity of the system pressure boundary?

- o Can the component's failure cause a loss of containment integrity?

- o Can the component's failure affect reactor coolant inventory control?

Of the 392 fluid components identified, only 15 were dispositioned in Step 2a as not being important to the SI System safety function. This rather small number of components being dispositioned reflects the importance of the SI System and the conservatism inherent to the criteria being applied.

4.2.3 Effective Program Review

The remaining 377 SI fluid components were then evaluated to determine which are subject to an established, effective replacement, refurbishment, or inspection program. The approach outlined in Section 3.5.2 is used. Fifty-three (53) procedures were identified which deal with SI components to varying degrees. These procedures are listed in Attachment F. The two SI safety system functions that these procedures must address are the pressure boundary function (i.e., integrity of the SI System fluid pressure boundary) and the operability function (i.e., flow path, flow capacity, operability, etc.). Highlights of the effective program review are:

- The high and low pressure safety injection pumps undergo frequent functional testing to demonstrate operability and to detect signs of mechanical wear. Included in the testing are checks/measurements of motor amps, pump vibration, bearing temperatures, proper lubrication, packing and seal leakage, pump performance, and SI System leakage.

- Check valves in the plant were evaluated based on maintenance history and operational requirements. A comprehensive program is currently being implemented to address valves of concern in response to INPO SOER 86-3. This program calls for periodic disassembly and inspection. In addition, SI System check valves are periodically tested for operability during system functional tests.

- Manual valves are routinely checked for external leakage by monitoring for signs of boric acid crystals. This will preclude significant degradation of support steel or adjacent components.

- A commitment to perform motor-operated valve testing using "MOVATS" on critical motor-operated valves will provide additional assurance that the motor-operated valve operability function is maintained.

All pressure boundary function components were conservatively given a degradation review. A review of the 53 procedures for operability function determined that the operability function for 58 of the 70 active components was adequately addressed by these procedures. However, because these 58 components also form part of the SI pressure boundary they require further evaluation. Thus, none of the 377 SI fluid components were dispositioned at this point. As such, all 377 SI fluid components pass on to Section 4.2.4 for further evaluation of potential pressure boundary degradation.

4.2.4 Aging-Degradation Review

The age-related degradation review determines the potential aging degradation mechanisms for a component. To determine the potential degradation mechanisms which may be acting on a specific fluid component, the operating conditions and component materials are compared against the degradation mechanism controlling parameters and their acceptance criteria. A review of industry documents was performed to identify the specific mechanisms applicable to the Yankee fluid systems. A rule-based computer expert system, CoDAT (Component Degradation Assessment Tool), developed by Yankee, is used to review fluid system pressure boundary components for 20 degradation mechanisms organized into 14 groups. Fatigue is not covered by CoDAT but will be evaluated separately. In some cases, component parts are evaluated; i.e., valve stems and discs. A more detailed discussion of CoDAT and the degradation mechanisms that it addresses is given in Attachment G.

Based on the SI System's materials of construction and infrequent operation, significant degradation would not be expected. The results of the review identified only six components of the remaining 377 components as potentially subject to age-related degradation. The potentially significant degradation mechanisms identified by CoDAT are:

- The SI tank is constructed of aluminum which is susceptible to general corrosion if the fluid pH is less than five or greater than nine.

- Buried piping may experience crevice/pitting and Microbiological Influenced Corrosion (MIC).

- The carbon steel shell material of the SI accumulator may be susceptible to general corrosion if not properly coated.

Potential degradation associated with fluid component operational function are not covered by CoDAT but are evaluated separately. They include general wear and mechanical degradation of pumps and motor-operated valves and degradation specific to pump motors and valve operators.

This separate evaluation identified an additional 12 components as requiring further evaluation (based on operability function), bringing the total to 18 components.

4.2.5 Summary - SI Fluid Component Review

SI System fluid components are subject to three reviews: importance to system safety function, effective programs, and age-related degradation with results provided in Attachment E. Of the 392 components of the SI System, 18 will require further evaluation to assure reliability of function during the license renewal period.

4.3 SI System I&C Components

Instrumentation and Controls (I&C) associated with the SI System fall within generic I&C equipment groupings, which include, but are not limited to, the following component groups:

- o Process controllers, transmitters, sensors, switches, gauges
- o Control switches
- o Indicators and recorders
- o Electronic instrumentation

The SI I&C components for which evaluations have been completed are discussed in this section to demonstrate the general process involved with the evaluation of I&C equipment.

4.3.1 Identification of I&C Components

The I&C components associated with the SI System are listed in Attachment H. One hundred sixty-eight (168) SI I&C components have been identified.

4.3.2 Safety Function Review

Each component is reviewed to determine if it is significant to system safety function using the NUMARC NUPLEX criteria, as applicable. Instrumentation required for the following plant-specific requirements are considered significant to system safety function:

- o Regulatory Guide 1.97 (post-accident monitoring)
- o Technical Specifications
- o Safety Class Manual
- o EQ Program
- o Appendix R
- o Safe Shutdown System Instrumentation

Of the 168 SI I&C components, 97 components were determined significant to system safety function. These components are further evaluated to determine if they are subject to an effective program.

An example of SI I&C components identified as significant to the system safety function are the SI hot leg and cold leg flow transmitters, SI-FT-5 and SI-FT-6. These instruments are required for post-accident monitoring because they are relied upon in the EOPs to ensure that proper SI flow rates are established during the recirculation phase and the hot leg injection phase of a large break LOCA. An example of SI I&C components determined not to be significant to system operation are SI loop pressure transmitters and indicators, SI-PT-1 through SI-PT-4 and SI-PI-1 through SI-PI-4. These instruments provide ancillary information only and are not required for post-accident monitoring.

4.3.3 <u>Effective Program Review</u>

Each of the significant SI I&C components evaluated is first reviewed to determine if it is included in the Yankee EQ Program. Four (4) SI I&C components are governed by the Yankee EQ Program. These components are considered subject to an effective program and do not require further evaluation.

The remaining significant 93 I&C components evaluated are further reviewed to determine if they are otherwise subject to an effective program. Specific functional requirements for SI I&C components differ according to application. However, the prime function required of instrumentation and control equipment is operability. In general, SI I&C components have verifiable attributes tied to distinct tolerances for operability. These tolerances are identified in test and calibration procedures. In addition to the criteria given in Section 3.5.2, the attributes of an effective program to assure continued I&C component operability, as applicable, include the following:

- o Cleaning
- o Checking for worn parts
- o Observation
- o Visual inspection
- o Measurement using calibrated test equipment
- o Multipoint calibration

Of the 93 significant SI I&C components not covered by EQ, 50 were determined to be covered by an effective program. Enhancements to existing programs are being considered to increase emphasis on the following:

- o Assessment of component general condition and signs of abnormal operation.

- o Data collection for trending.

An example of SI I&C components subject to an effective program are the hot and cold leg flow transmitters, SI-FT-5 and SI-FT-6. These instruments are included in the EQ Program which is a formal program and was established to ensure component operability. Furthermore, the EQ Program identifies all replacements, refurbishments, and inspections required to maintain operability.

Similarly, SI actuation switches, SI-PS-0238 and SI-PS-0239, were also determined to be subject to an effective program because they are maintained in accordance with OP-4634. This procedure functionally checks and, if necessary, adjusts the trip and reset points. It is performed every 31 days.

4.3.4 Aging-Degradation Review

Of the 97 significant SI I&C components evaluated, 43 have not been demonstrated as being subject to an effective program. These 43 SI I&C components may be subject to aging degradation and will be further evaluated.

4.3.5 Summary - Safety Injection I&C Component Review

One-hundred twenty-five (125) of the 168 SI I&C components evaluated were found to not require further review for license renewal. Seventy-one (71) were dispositioned on the basis of unimportance and fifty-four (54) were dispositioned on the basis of being subject to an effective program. Forty-three (43) SI I&C components will require further evaluation.

4.4 Emergency Electrical Power System

The Emergency Electrical Power System (EEPS) consists of electrical equipment, cabling, busses, breakers, etc., necessary to supply electrical power to essential safeguard loads, including SI equipment, and Safe Shutdown System loads. The EEPS is one of the five electrical subsystems in the plant and is shown in Figure 4.2.

4.4.1 Identification of Components

Identification of the electrical components in the EEPS is required prior to the initiation of component level screening. The objective of this identification process is to gather all electrical components into a data base which can then be used for evaluations. Electrical component identification is based upon a review of plant electrical drawings. Electrical one-lines, selected elementary drawings, and the plant's lighting and power panel manual were used to develop an electrical component data base. This data base includes both the loads (pump motors, valve operators, etc.) and the major electrical components (busses, breakers, etc.) required to deliver power to the loads.

EEPS components identified in the electrical drawing review are evaluated on either an individual or generic basis. A total of 100 EEPS components are evaluated on an individual basis and are listed in Attachment I. Other EEPS components, such as cables, penetrations, relays, terminations, etc., as listed in Table 4.1, will be evaluated generically, along with other such plant equipment. The electrical equipment types subject to generic evaluation are indicated by an asterisk (*) on Table 4.1. The corresponding generic evaluations will be documented in future reports.

4.4.2 Safety Function Review

The function of the EEPS is to provide power to loads. Those EEPS components which are necessary to the system safety function are now identified. Such components require further review. Components are designated necessary to the EEPS safety function unless:

- The component is normally isolated and does not perform an accident mitigating function.

OR

- Component failure would not result in either the failure of any individual train within the system or the failure of the entire system to perform its required safety function,

AND

- Component failure would not reduce the structural support of any other component such that it would not perform its system safety function,

AND

- Component failure would not physically damage any other component such that it would not perform its system safety function.

The results of this review are shown in Attachment I, Column 2A. Components failing the above criteria are important to the system's safety function and are designated by a "yes" in Column 2A. Components meeting the above criteria are not important to the system's safety function (designated by a "no" in Column 2A) and do not require further review for license renewal.

Components were identified as not necessary to the system safety function for the following reasons:

- o Loads not important to system safety function.
- o Component normally disabled.
- o Component used only for maintenance.
- o Components used only during refueling.

For example, Diesel Generator Building (DGB) Unit Ventilator UV-6 was determined not to require further evaluation because it supplies the normal ventilation to the DGB, but is not relied upon in the event of an accident. However, DGB Exhaust Fans SI-PRV-1 and SI-PRV-2 were determined to require further evaluation because they are relied upon to supply DGB ventilation in the event of an accident.

In total, twelve (12) out of the 100 EEPS components individually evaluated do not require further evaluation on the basis of this safety function review.

4.4.3 Effective Program Review

Components necessary to the system safety function that are subject to an established effective replacement, refurbishment, or inspection program are now identified. For electrical components, this includes components covered either by the EQ Program or an effective plant program.

The EQ Program for electrical equipment is an ongoing NRC-required program which, among other things, considers significant types of degradation which can have an effect on the functional capability of equipment. For those components under the EQ Program, aging is effectively managed and further review is not required. Those components are identified by a yes under "Step 2B, EQ" of Attachment I. For example, Manual Throwover Switches, SW-TO-1 and SW-TO-2, both provide capability to change the power supply of an emergency motor control center, and both were found to be necessary to the system safety function under Section 4.4.2. However, since SW-TO-2 is located in a potentially harsh environment and is under the EQ Program, it was determined as being covered under an effective program and not to require further evaluation. However, SW-TO-1, which is located in a mild environment, is not under the EQ Program and was determined to require further evaluation. In total, twenty-three (23) EEPS components do not require further evaluation on the basis of EQ.

In addition to the EQ Program, electrical components may also be subject to an effective replacement or inspection program. The plant procedures applicable to each component were identified in Attachment I under "Step 2B, Plant Procedures." The procedures are further identified in Attachment J. These procedures were reviewed to determine if they were effective. A component is subject to an established effective replacement or inspection program if the applicable procedures, either individually or collectively, meet the criteria given in Section 3.5.2.

Forty (40) EEPS components do not require further evaluation on the basis of being subject to an effective program. These components, along with those under the EQ program, are identified by a "no" under "Step 2B, Component Not Subject to an Effective RRI Program."

A number of components were identified as covered adequately by existing plant procedures. For example, important Motor-Operated Valves (MOVs) are covered because they are subject to periodic functional testing per procedures. If an MOV does not meet its functional requirements (e.g., stroke time), then the MOV must be refurbished (in accordance with a specific MOV repair procedure) so that, when retested, it will meet its functional requirements. To further assure MOV reliability, YNPS plans to implement a testing program in accordance with NRC Generic Letter 89-10 starting in 1990. A Diagnostic Testing System will be used to verify the capability of critical plant MOVs to operate under design conditions. This testing program will include the development of a signature analysis for each MOV. Follow-up testing and trending will be performed as appropriate.

The LPSI and HPSI pump motors are given as another example. These are covered under the EQ Program which analyzes the aging and demonstrates that the motors will be operable for their identified life. In addition, they are functionally tested on a monthly basis.

The review of plant procedures indicated that critical components, in general, are functionally tested on a schedule adequate to demonstrate continued operability. Enhancements to existing programs are being considered to increase emphasis on the following:

- o The use of predictive maintenance.
- o Failure analysis.
- o Trending.

4.4.4 Aging Degradation Review

A component is considered subject to age-related degradation unless it is established and documented that potentially significant age-related degradation will not occur during the license renewal period.

The potential for the occurrence of significant age-related degradation is assessed for each component that has been identified as necessary to the system safety function and not subject to an effective RRI Program. These components are now evaluated for the following age-related degradation mechanisms:

- o Dielectric breakdown.
- o Mechanical wear.
- o Corrosion.
- o Radiation damage.

The results of this review are shown in Attachment I, Step 2C. A yes is indicated under each degradation mechanism for which the component is potentially susceptible. All functionally important components not demonstrated as being subject to program are potentially susceptible to at least one of the aforementioned mechanisms. The rate of degradation due to the particular mechanism is determined by the environmental and service factors, which have yet to be defined. Therefore, no components could be eliminated from further evaluation. These components require further evaluation.

4.4.5 Summary - EEPS Component Review

EEPS component review results are listed in Attachment I. Of the 100 components listed, 75 do not require further evaluation on the basis of either the safety function review (12) or the effective program review (63). The remaining 25 components were all determined susceptible to age-related degradation and require further evaluation. This evaluation is beyond the scope of this report.

4.5 Primary Auxiliary Building/Diesel Generator Building/Battery Room No. 3 Building Structural Review

A majority of the SI System-related components are located either within the PAB, the DGB, or Battery Room No. 3 Building (B3B). The low pressure SI pumps, the high head SI pumps, accumulator, numerous manual and motor-operated valves, and SI piping are located in the DGB. SI piping, manual valves, and motor-operated valves are located within the PAB. SI piping traverses the PAB enroute to the vapor container. Most EEPS components are located within the DGB and B3B. The emergency diesel generators, DG-1, DG-2, and DG-3; Emergency Buses 1, 2, and 3; Emergency Motor Control Center (EMCC)-2; Manual Throwover Switch No. 2; conduit; vertical Sections A and B; and cables are all located with the DGB. EMCC-3 and EMCC-4 are located in B3B. EEPS cables supply loads within the PAB or traverses the PAB. The following sections detail the highlights of the evaluations conducted for these structures.

4.5.1 Identification of Components

Except for components with unique plant equipment identification tags (i.e., tanks) and the structures predesignated for detailed evaluations (i.e., vapor container, reactor support structure, neutron shield tank/reactor support ring, and fire-rated seals), structural components are evaluated generically. Table 4.2 lists the generic structural components for the Yankee plant.

4.5.2 Safety Function Review

Four generic categories of structural components which require evaluation were defined: concrete, structural steel, architectural items, and supports for plant equipment. Table 4.2 lists the generic structural components considered in each of these categories. Table 4.2 also indicates those generic components which are important to the structure's or to the equipment's safety function (i.e., if they were to fail, components within the structure, or the integrity of the structure itself, could be in jeopardy). Some generic structural components were evaluated as not necessary to a structure's safety function. These components are also indicated on Table 4.2.

4.5.3 Effective Program Review

The generic structural components which were identified in Table 4.2 as important to safety are further evaluated to determine if each is subject to an effective program as defined in Section 3.5.2 of this report. The following generic structural components: (1) masonry walls, (2) fire doors, and (3) ISI Program support components (snubbers) were determined to be covered by effective programs. The following discussion provides the basis for this dispositioning.

The Masonry Wall Survey Program presently provides for a detailed inspection each refueling of selected masonry walls. This program is implemented in accordance with plant procedures. Enhancements to the Masonry Wall Program (i.e., expanding the number of masonry walls covered) may be necessary upon completion of the structural evaluation.

Fire doors, including jambs and hardware, are inspected each refueling in accordance with plant procedures. The fire doors necessary to the structure's safety function have been identified in the Yankee Fire Hazards Survey and the Appendix R Manual. The associated plant procedures, with minimal enhancements, constitute an effective program for fire doors.

The Yankee Atomic Inservice Inspection (ISI) Program provides for periodic detailed inspection of selected pipe and equipment support components. The ISI Program, supplemented by supporting and implementing plant procedures, provides an effective program for the generic component "snubbers" identified in the ISI Program.

Based on the demonstrated effectiveness of these programs, further evaluation of the components covered by these programs is not required for license renewal. The remaining structural components will be reviewed for potential degradation as indicated in Table 4.2.

Various other plant procedures are in place to assess material condition of structural components, as well as to take remedial actions when required. These programs, however, did not fully meet the conservative criteria for demonstrated effectiveness. For example, concrete components in the Screenwell House and seal pit are inspected periodically in accordance with plant procedures. It is anticipated that these procedures, with some enhancement, will provide for an effective program for these concrete components.

4.5.4 Aging-Degradation Review

The aging degradation review for structures is performed in two steps. First, a generic assessment of the potential for age-related degradation is performed for each of the following structural component groupings: (a) concrete, (b) structural and miscellaneous steel, (c) architectural items, and (d) support components. These generic assessments form the basis for performing the focused plant walkdown of structural components.

The generic assessments are based upon a literature search of available information to identify plausible age-related degradation modes and their effects. Identified degradation mechanisms are investigated to further identify stressors, environment, manifestation, and mitigating design features and construction methods. All these factors are used to focus the plant walkdown by identifying plant areas which may be susceptible to potentially significant age-related degradation. Attachment K provides the "Generic Assessment of Concrete Structural Components" as an example of the assessment process.

The plant walkdown of structural components was performed by a team of four experienced structural engineers, one from Yankee, two from Stone & Webster Engineering Corporation, and one from Bechtel. The Bechtel representative is also a member of the Bechtel team preparing the industry report on Class I structures. All structures requiring component level screening identified in Attachment D were included in the walkdown.

Preparation for the walkdown was performed in accordance with detailed work instructions. The preparation included review of plant drawings and development of walkdown checklists using the information obtained from the generic assessments.

During the walkdown, focused inspections were performed based on preparation guidance, as well as an overall assessment of material condition and environmental conditions. Inaccessible areas were identified for follow-up evaluation. Attachment L provides sample data sheets used in the walkdowns. Components showing signs of degradation or the potential for degradation due to harsh environmental conditions are documented. These components will be subject to further evaluation to determine the cause and significance of the degradation and assess the need for corrective action.

Walkdown findings and follow-up evaluations will determine the need for and schedule for additional inspection. The walkdown was documented on videotape which can be used as the basis for trending material condition as necessary.

4.5.5 PAB/DGB/B3B Walkdown Results

The walkdown was recently completed, and data gathered is now undergoing review. Preliminary findings for the PAB, DGB, and B3B are discussed below.

At the time of the walkdown, the DGB and B3B roofs were being replaced with a membrane-type roofing system. Portions of the PAB roof were also being replaced with a membrane-type roofing system. The remaining portions of the PAB roof, which are tar and gravel roofs, were determined to be in need of replacement.

The DGB is in very good condition. No significant signs of degradation to either DGB structural concrete or steel were observed. Base plates for two columns were observed not to be fully grouted to foundation concrete. Maintenance requests were initiated to perform the repairs. The initiation of corrosion for some equipment support steel was observed. In particular, support steel and saddles for the SI nitrogen tanks located on the DGB roof are experiencing localized corrosion which will need to be addressed.

The B3B is in excellent condition. No signs of degradation were observed.

The PAB is in very good condition. However, several minor indications of degradation were observed. These include minor cracking, with signs of CaOH leaching, in the wall below the door in south wall due to water intrusion, the initiation of corrosion (minor surface rusting and minor localized pitting) of embedded plates and steel, minor damage to grout for base plate to two columns and one equipment support pedestal, very fine pattern shrinkage cracks on a wall at two locations, and pattern cracking on a portion of the concrete roof exposed to weather.

4.5.6 Summary - DGB/PAB/B3B Structural Review

The focused structural walkdown, supported by the generic component assessments, demonstrated that DGB, PAB, and B3B are not experiencing any significant aging degradation. The results of the walkdown does show the need to address the minor degradation identified. Specific actions being considered for steel and equipment support are the repair of corrosion spots and the improvement of plant maintenance practices regarding the restoration of protective coatings following equipment installation or maintenance. The need for monitoring the observed cracking is also being assessed. The final results of the structural evaluation will be completed in early 1990.

TABLE 4.1

Electrical Component Groupings

Category	Group
Communications	*Annunciators *Phones *Sirens/Horns
Conductors	*Cable *Penetrations *Bus Duct
Control and Protection	*Breakers Capacitors Control Board *Fuse/Holders *Grounding Surge Protection *Shunts Switches *Relays
DC Supply Generators	Batteries Diesels *Heaters Motors Motor/Generator *Solenoids
Power Conversion	Chargers Exciters Inverters
Switchgear	MCC Metal Clad OCB Panels
Terminations	*Lugs *Splices *Terminal Blocks
Transformers	*Dry Liquid Filled Voltage Regulators

*These components will be generically evaluated.

Table 4.2

Generic Structural Components

	Important To Safety Function	Not Subject to Effective Program	Requires Further Evaluation
A. Concrete (Including Reinforcing Steel)			
1. Foundations (Footings, Beams, and Mats)	Y	Y	Y
2. Columns	Y	Y	Y
3. Walls	Y	Y	Y
4. Ground Floor Slabs and Equipment Pads	Y	Y	Y
5. Elevated Floor Slabs	Y	Y	Y
6. Roof Slabs	Y	Y	Y
7. Cast-In-Place Anchors	Y	Y	Y
8. Manholes	Y	Y	Y
9. Duct Banks	Y	Y	Y
10. Grout	Y	Y	Y
11. Concrete Blocks (Shielding)	Y	Y	Y
12. Precast Concrete	Y	Y	Y
13. Fluid Retaining Walls and Slabs	Y	Y	Y
14. Masonry Walls	Y	N	N
15. Post-Installed Anchors (Expansion and Grouted Types)	Y	Y	Y
B. Structural Steel (Including Bolts, Rivets, and Welds)			
1. Base Plates	Y	Y	Y
2. Columns	Y	Y	Y
3. Floor Framing	Y	Y	Y
4. Roof Trusses	Y	Y	Y

*Y = Yes
N = No

Table 4.2
(Continued)

Generic Structural Components

		Important To Safety Function	Not Subject to Effective Program	Requires Further Evaluation
5.	Roof Framing	Y	Y	Y
6.	Vertical Bracing	Y	Y	Y
7.	Horizontal Bracing	Y	Y	Y
8.	Girts	Y	Y	Y
9.	Platform Hangers	Y	Y	Y
10.	Galvanized Steel Frames	Y	Y	Y
11.	Roof Decking	Y	Y	Y
12.	Jet Impingement Barriers	Y	Y	Y
13.	Light Poles	N	-	N
14.	Stainless Steel Liners	Y	Y	Y
15.	Light-Gage Metal Buildings	Y	Y	Y
16.	Floor Grating	N	-	N
17.	Checkered Plate Flooring	N	-	N
18.	Stairs and Ladders	N	-	N
19.	Miscellaneous Frames and Lintels	N	-	N
C.	Architectural Items			
1.	Building Siding	N	-	N
2.	Roofing (Built-Up or Elastometric, Including Insulation, Ballast, and Flashing)	Y	Y	Y
3.	Fire Doors, Jambs, and Hardware	Y	N	N
4.	Access Doors, Jambs, and Hardware	N	-	N
5.	Windows	N	-	N

Table 4.2
(Continued)

Generic Structural Components

		Important To Safety Function	Not Subject to Effective Program	Requires Further Evaluation
6.	Glass and Glazing	N	-	N
7.	Caulking and Sealants	Y	Y	Y
8.	Floor Finishes	N	-	N
9.	Coatings (Including Galvanizing)	N	-	N
10.	Partitions and Ceilings	N	-	N
11.	Furnishings	N	-	N
D.	Equipment Supports			
1.	Structural Steel (Including Bolting, Welds, and Baseplates)	Y	Y	Y
2.	Snubbers	Y	N	N
3.	Spring Supports	Y	Y	Y
4.	Pre-Engineered Pipe Support Items	Y	Y	Y
5.	Light-Gage Metal (i.e., Unistruts)	Y	Y	Y
6.	Post-Installed Anchors (Expansion and Grouted Type)	Y	Y	Y
7.	Grout	Y	Y	Y
8.	Solid Lubricants	Y	Y	Y
9.	Conduits	Y	Y	Y
10.	Electrical Boxes	Y	Y	Y
11.	Raceways	Y	Y	Y
12.	Conduit Clamps	Y	Y	Y
13.	Instrument Racks	Y	Y	Y
14.	Instrument Panels	Y	Y	Y

Table 4.2
(Continued)

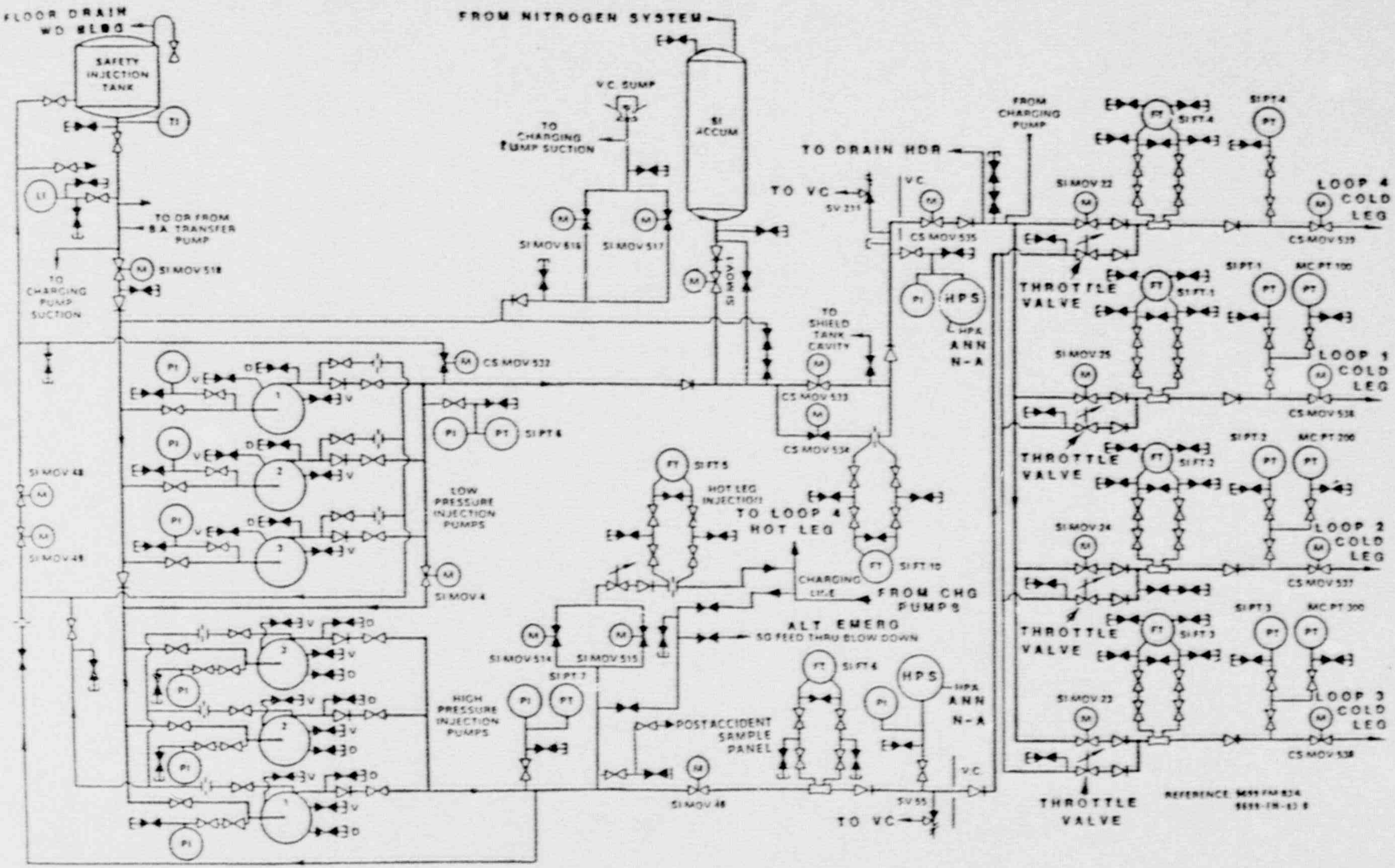
Generic Structural Components

	Important To Safety Function	Not Subject to Effective Program	Requires Further Evaluation
15. Power Panel Boxes	Y	Y	Y
16. Concrete Pedestals	Y	Y	Y
17. Coatings (Including Galvanizing)	N*	-	N

* Note: Vapor container coatings are being evaluated separately.

FIGURE 4.1

SAFETY INJECTION SYSTEM



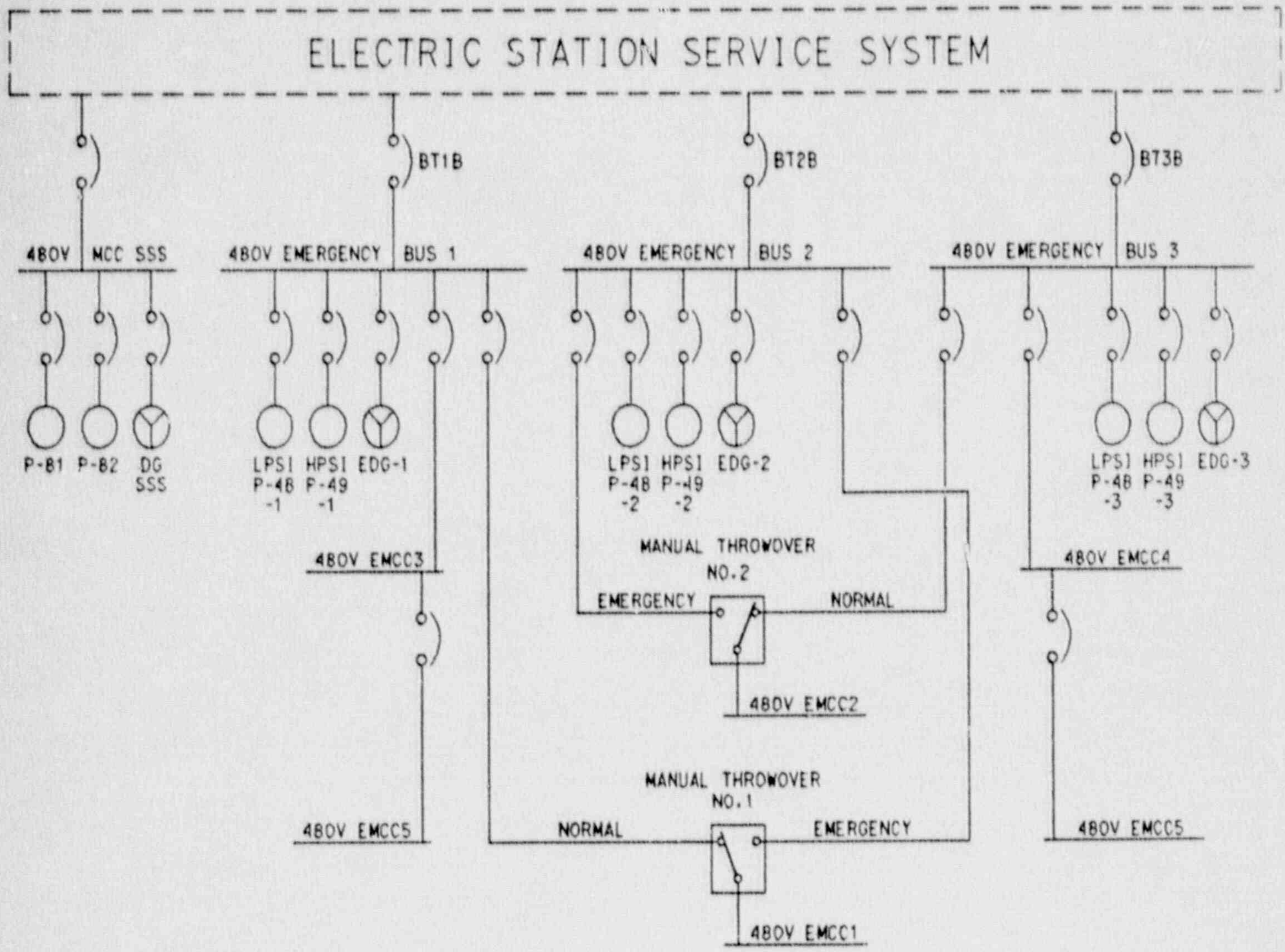


FIGURE 4.2

EMERGENCY ELECTRIC POWER SYSTEM

5.0 CONCLUSIONS

The key objectives of the Yankee Pilot Evaluation Report were to demonstrate through a formalized process that:

- o All systems, structures, and components requiring license renewal evaluation are identified.

- o Assures that any potentially significant age-related degradation is recognized and properly managed, as necessary.

As presented in the report, the objectives have been met. Of the total 78 systems and 46 structures at Yankee, 43 systems and 27 structures were determined to require evaluation for license renewal. The potential for significant age-related degradation and the methods of managing degradation were assessed for the pilot systems and structures. In addition, areas requiring further evaluation or special actions were identified.

The methodology, criteria, and technical justification supporting plant-specific methods of implementing these objectives were provided. A cross section of the plant was evaluated to show the differences in implementation as applied to different discipline areas.

The areas of the plant evaluated were generally found to be in good condition with no signs of significant degradation. However, as indicated in the report, several components will require further evaluation and some plant procedures will need enhancement to better address degradation concerns for license renewal.

Examples of assessments, checklists, and other information supporting the technical bases of the evaluations are provided to allow the NRC staff to conclude that the process used is both thorough and technically justified. Because the same evaluation process used for the components presented in the Pilot Report is being applied to the plant in general, it should simplify future NRC license renewal reviews.

ATTACHMENT A

APPENDIX A

(CRITERIA)

to

NUMARC NUPLEX
"METHODOLOGY TO EVALUATE PLANT EQUIPMENT
FOR LICENSE RENEWAL"

8095R

Step 1. Evaluation of All Plant Systems and Structures

Substep 1a. Does the Plant System or Structure Contribute to Plant Safety?

1a.1. Systems or structures that are identified as being safety-related in a licensing basis document.

OR

1a.2. Systems relied upon or structures identified in a licensing basis safety analysis or evaluation.

OR

1a.3.a Systems utilized in plant emergency operating procedures.

or

1a.3.b Systems taken credit for in a risk assessment if a plant unique risk assessment is available and used.

Substep 1b. Is Degradation of the System or Structure Potentially Significant to Plant Safety?

1b.1.a The system's or structure's failure could not directly result in off-site releases exceeding FSAR or other plant-specific off-site release limits.

and

1b.1.b The system's or structure's failure could not result in reactor coolant pressure boundary or primary containment leakage in excess of technical specification limits.

and

1b.1.c.1 The system or structure is not otherwise required for the performance or control of:

(1) reactor criticality
(2) reactor coolant system integrity, inventory, or heat removal
(3) containment integrity or heat removal

or

1b.1.c.2 Although the system or structure may be required for these functions, the system's or structure's failure is detectable in a time frame which would allow shutdown prior to requiring a manual or automatic plant trip.

OR

1b.2. A plant-unique risk assessment, if available and used, demonstrates that:

1b.2.a The system's or structure's failure does not occur in a sequence that has a core damage frequency greater than or equal to 1×10^{-6} per year or in a sequence that contributes 5% or more to the total estimated core damage frequency.

and

1.b.2.b When the system or structure is assumed to fail due to age-related degradation, the total estimated core damage frequency will not increase by more than a factor of 3 or will not exceed 1×10^{-4} per year.

Step 2. Evaluation of Components Within Systems and Structures

Substep 2a. Is the Component Important to System or Structure Safety Function?

The component is important to system or structure safety function unless:

2a.1. The component is normally isolated and does not perform an accident mitigating function.

OR

2a.2.a Component failure would not result in either the failure of any individual train within the system or the failure of the entire system to perform its required safety function.

and

2a.2.b Component failure would not reduce the structural support of any other component such that it would not perform its system safety function.

and

2a.2.c Component failure would not physically damage any other component such that it would not perform its system safety function.

OR

2a.3. For components within the scope of a plant-unique risk assessment, if available and used, the component is not included in the risk assessment models.

Substep 2b. Is the Component Subject to Established Effective Replacement, Refurbishment, or Inspection Programs?

A component is considered to be subject to an established effective replacement, refurbishment, or inspection program if:

2b.1. The program is documented, approved, and routinely implemented in accordance with plant administrative procedures,

AND

2b.2. The program procedures ensure that all of the component's significant safety functions are properly addressed,

AND

2b.3. The program establishes specific criteria for determining the need for corrective action and requires such action be taken if these criteria are not met.

Substep 2c. Is the Component Subject to Potentially Significant Age-Related Degradation?

The component will be considered subject to potentially significant age-related degradation unless:

2c.1 It is established and documented that potentially significant age-related degradation will not occur during the license renewal period.

OR

2c.2 A plant-unique risk assessment, if available and used, demonstrates that:

2c.2.a When the component is assumed to fail due to age-related degradation, the total core estimated damage frequency will not increase by more than a factor of three or will not exceed 1×10^{-4} per year.

and

2c.2.b When an age-related common-cause failure mechanism is postulated that may cause multiple components to fail (among those which have satisfied Criterion 2c.2.a), those components meet Criterion 2c.2.a when their combined failures are considered as a single event.

Substep 2d. Options to Resolve Potentially Significant Age-Related Degradation.

A variety of options to resolve potentially significant age-related degradation may be appropriate depending upon the component being addressed. Among the options are:

1. Replace the component on a replacement schedule which precludes component age-related degradation from becoming a problem.

2. Demonstrate, by detailed investigation, that age-related degradation of the component will not be significant during the license renewal period.

3. Demonstrate, by a more rigorous analysis, that the potential age-related degradation of the component is not significant to safety.

4. Institute practices which manage component age-related degradation by diagnosing the age-related degradation processes and preventing or mitigating their effect.

ATTACHMENT B

PLANT SYSTEMS AND STRUCTURES LIST

ORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
1	AR	AIR REMOVAL SYSTEM	Piping, valves, pumps and other related equipment associated with removing air and non-condensible gases from the main condenser.
2	AS	AUXILIARY STEAM SYSTEM	Piping, valves, and other related equipment associated with the delivery of steam to the following loads: turbine driven emergency boiler feed pump turbine, small hogger, large hogger, steam jet air ejector, gland steam and building heating steam header and other miscellaneous steam loads.
3	BF	BOILER FEED SYSTEM	Pumps, piping, valves, heat exchangers and other related equipment associated with taking water from the condenser hot well, raising its pressure and temperature, and delivering it to each of the steam generators.
4	BA	BREATHING AIR SYSTEM	A self-contained compressed air system designed to provide breathing air during plant shutdown conditions for work inside the vapor container.
5	CH	CHARGING AND VOLUME CONTROL SYSTEM	Piping, pumps, valves, heat exchangers, tanks and other related equipment associated with controlling main coolant inventory and main coolant chemistry.
6	CF	CHEMICAL FEED SYSTEM	System provided to help minimize corrosion in secondary piping and equipment through the addition of hydrazine and/or morpholine during plant operation. These chemicals are injected downstream of the boiler feed pumps.
7	CS	CHEMICAL SHUTDOWN SYSTEM	Piping, valves, tanks, and related equipment associated with supplying borated water to the LPST, or charging pumps for chemical reactivity control.
8	CW	CIRCULATING WATER SYSTEM	Piping, pumps, valves, heat exchangers and other related equipment associated with taking water from Sherman Pond, passing it through the condenser, and returning it to Sherman Pond; includes the vacuum priming sub-system.
9	CC	COMPONENT COOLING WATER SYSTEM	Piping, valves, pumps, heat exchangers and other related equipment associated with removing heat from various nuclear plant cooling loads (which may contain radioactive fluids) and transferring that heat to the service water system.
10	CA	COMPRESSED AIR SYSTEM	Piping, valves, compressors, filters, receivers, dryers and other related equipment associated with delivering compressed air to control and service air loads.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
11	CO	CORROSION CONTROL SYSTEM	Functions to minimize main coolant system corrosion rates by reducing dissolved oxygen to a minimum value through the addition of hydrazine when the reactor is subcritical and holding this value during power operation by maintaining a hydrogen cover gas in the low pressure surge tank.
12	DW	DEMINERALIZED WATER SYSTEM	Piping, valves, tanks, demineralizer and other related equipment associated with suppling high quality, demineralized water to the primary and secondary systems.
13	EBF	EMERGENCY BOILER FEED SYSTEM	Piping, pumps, valves, tanks and other related equipment associated with providing emergency feedwater to the steam generators via normal and alternate feed flow paths.
14	ES	EXTRACTION STEAM SYSTEM	Piping, valves, heat exchangers and related equipment associated with taking steam from the high pressure and low pressure turbines (extraction points and exhaust) and delivering it to the feedwater heaters, and subsequently draining and cooling the resulting condensate back to the condenser.
15	FS	FIRE DETECTION AND SUPPRESSION SYSTEM	Equipment related to fire detection and suppression, including firewater, halon, and carbon dioxide suppression sub-systems.
16	FD	FLOOR DRAINAGE SYSTEM	Piping system which provides floor drainage flow paths for numerous equipment drains throughout the plant.
17	FO	FUEL OIL SYSTEM	Piping, valves, pumps, storage tanks and related equipment associated with supplying fuel oil to the emergency diesel generators and the auxiliary boilers.
18	GG	GENERATOR GAS	Piping, valves, blowers, heat exchangers, gas storage bottles and related equipment associated with containing, circulating and cooling hydrogen gas within the main generator.
19	SO	GENERATOR SEAL OIL SYSTEM	Piping, valves, pumps, tanks, heat exchangers associated with suppling sealing oil to the main generator labyrinth seals.
20	HC1	HEATING STM/CONDENSATE	Piping, pumps, valves, tanks and related equipment associated with supplying heating steam and returning condensate for various plant loads: safety injection tank heaters, diesel generator building, alternate steam supply to EBF turbine driven pump and space heating loads throughout the plant.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
21	HV	HYDROGEN VENTING SYSTEM	Piping, valves, analyzers and related equipment necessary to monitor and control the post-acccident hydrogen concentration within the vapor container.
22	IG	INERT GAS SYSTEM	Provide nitrogen cover gas to be used primarily during layup to minimize corrosion and for systems using flammable fluids; lubricating oil systems, etc..
23	LO	LUBRICATING OIL SYSTEM	Piping, valves, pumps, tanks, purifiers, coolers and related equipment associated with supplying lubricating oil to the turbine, generator and exciter bearings.
24	MC	MAIN COOLANT SYSTEM	Piping, pumps, valves, steam generators and related equipment associated with circulating pressurized water through the reactor core and transferring the sensible heat gained to the secondary system for conversion to steam.
25	MS	MAIN STEAM SYSTEM	Piping, valves and related equipment associated with conveying steam produced in the steam generators up through the high pressure turbine throttle valves.
26	NS	NITROGEN SYSTEM	Piping, valves, nitrogen supply bottles and related equipment associated with the SI accumulator nitrogen charging system.
27	PW	POTABLE WATER SYSTEM	A well water system which serves water closets, lavatories, drinking and wash fountains, showers and sinks throughout the plant; this system can also be cross-connected to the turbine lube oil coolers.
28	PR	PRESSURE CONTROL AND RELIEF SYSTEM	Piping, valves, pressurizer, pressurizer heaters, pressurizer sprays, and related equipment associated with controlling main coolant system pressure.
29	PU	PURIFICATION SYSTEM	Piping, valves, pumps, coolers/ion exchangers and related equipment associated with cooling and purifying main coolant in the low pressure surge tank and removing soluble and insoluble impurities.
30	WD	RADIOACTIVE WASTE DISPOSAL SYSTEM	Piping, valves, pumps, tanks, coolers, evaporators and related equipment associated with receiving, containing, treating and disposing of all radioactive waste other than separately handled secondary plant low level radioactive wastes.

CORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
31	RF	REFUELING SYSTEM	Piping, valves, pumps and other related equipment associated with refueling operations.
32	SSS	SAFE SHUTDOWN SYSTEM	Piping, valves, pumps, tanks and related equipment associated with providing borated primary make up water to the main coolant system and feedwater to the steam generators in the event other normal and emergency systems are not available.
33	SI	SAFETY INJECTION SYSTEM	Piping, valves, pumps, tanks, accumulators and other related equipment associated with restoring main-coolant inventory following a loss of coolant accident.
34	SA	SAMPLE SYSTEM	Piping, valves, coolers and related equipment associated with primary and secondary system sampling.
35	SDS	SANITARY DISPOSAL SYSTEM	Plant septic system.
36	SW	SERVICE WATER SYSTEM	Piping, pumps, valves, tanks, heat exchangers and other related equipment associated with providing Sherman Pond water for cooling numerous primary and secondary plant equipment.
37	SP	SHIELD TANK CAVITY PURIFICATION SYSTEM	Equipment, pumps, ion exchange resin beds, filters, valves, piping etc., necessary to remove impurities from the main coolant system during shutdown in order to reduce main coolant radioactivity levels and fouling of heat transfer surfaces.
38	SC	SHUTDOWN COOLING SYSTEM	Piping, valves, pumps, heat exchangers and related equipment used to remove decay heat from the main coolant system during extended shutdown periods. Used when main coolant system conditions are below 330 F and 300 PSIG.
39	SF	SPENT FUEL SYSTEM	Pumps, piping, valves, coolers, and related equipment associated with spent fuel pit, and transfer of fuel between the fuel vault, spent fuel pit, and the reactor vessel.
40	TG	TURBINE GENERATOR SYSTEM	Turbine/generator assembly and supporting equipment.
41	VD	VENT AND DRAIN SYSTEM	Piping, valves, tanks and related equipment associated with primary and secondary vents and drains, including the steam generator blowdown system.
42	TW	WATER TREATMENT SYSTEM	Equipment, demineralizers, storage tanks, and related equipment necessary to clarify, filter, and demineralize water and to mix and pump water-conditioning chemicals to the primary and secondary plants; thus

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
			providing reactor grade makeup water to the primary plant and condensate grade makeup water to the secondary plant.
43	HC9	ADMINISTRATION BLDG VENTILATION SYS	Provides air conditioning and ventilation for the admininistration building.
44	AD	AIR DISPOSAL (FILTERED EXHAUST) SYSTEM	Ductwork, fans, filters, dampers and related equipment associated with exhausting potentially contaminated air through the primary vent stack; includes the vapor container ventilation and purge sub-system (used during refueling operations).
45	HC10	BATTERY ROOM NO3 VENTILATION SYSTEM	Fans, ductwork, louvers and related equipment associated with Battery Room No.3 ventilators.
46	H10A	BATTERY ROOMS 1+2 VENTILATION SYSTEM	Provides for hydrogen gas removal during battery charging operations; consists of a single exhaust fan taking suction from each battery room and discharging to outside air through a common exhaust duct.
47	HC5	CONTROL ROOM VENTILATION SYSTEM	Equipment associated with heating or cooling or filtering the control room atmosphere; includes the control room emergency air cleaning system (CREACS).
48	HC11	EDG BUILDING VENTILATION SYSTEM	Fans, dampers, ductwork and related equipment associated with ventilating the diesel generator building.
49	HC6	GAS STORAGE ROOM VENTILATION SYSTEM	Natural draft ventilation system consisting of floor vents, windows and roof louvers.
50	HC7	NRV ENCLOSURE VENTILATION SYSTEM	Exhaust fans, steam unit heaters and related equipment associated with heating/cooling the main steam non-return valve enclosure.
51	HC14	PAB NON-FILTERED VENTILATION SYSTEM	Provides upper level PAB with summer ventilation; consists of a roof-type exhaust fan with supply air entering through window and door openings.
52	HC12	SAFETY INJECTION BLDG VENTILATION SYS	Exhaust fans, motor operated louver and related equipment which function to maintain the safety injection building temperature within acceptable limits.
53	HC13	SCREENWELL PUMPHOUSE VENTILATION SYSTEM	Ventilation system consisting of two centrifugal fans and associated ductwork which can provide outside air, or recirculate pumphouse air, as necessary to maintain acceptable pumphouse temperatures without having to resort to steam heating.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
54	HC8	SERVICE BLDG VENTILATION SYSTEM	All equipment, air conditioning units, ventilators etc, necessary to supply ventilation air and heated air to the service building.
55	HC4	TURBINE BLDG VENTILATION SYSTEM	Natural draft ventilation system consisting of continous roof ventilators and window openings which provide the necessary air changes to maintain turbine building temperature at acceptable levels.
56	VCHCR	VC HEATING, COOLING, AIR RECIRCULATION	Fans, dampers, coolers, heaters, ductwork and related equipment which operate to maintain vapor container atmosphere below limits during normal operation; includes vapor container post-accident air recirculation sub-system.
57	DC	DC DISTRIBUTION SYSTEM	Equipment, batteries, battery chargers, cabling, and related equipment necessary to supply dc electrical power to plant dc electrical loads.
58	DG	DIESEL GENERATOR SYSTEM	Emergency diesel generators and related equipment necessary for supplying emergency ac power to the emergency power system in the event of loss of normal ac power.
59	EEPS	EMERGENCY POWER SYSTEM	Equipment, cabling, busses, breakers, etc., necessary to supply electrical power and control to essential safeguard loads.
60	EGTS	GENERATION AND TRANSMISSION SYSTEM	Equipment necessary to generate and deliver station electrical output to the 115 kv power grid.
61	ESSS	STATION SERVICE SYSTEM	Electrical equipment, cables, breakers, transformers, busses, relays, etc., necessary to distribute normal ac electrical power and control to station loads, the safe shutdown system and the emergency power system.
62	CI	CONTAINMENT ISOLATION SYSTEM	Equipment necessary to isolate the vapor container (VC) if VC pressure equals or exceeds 5 PSIG; includes isolation actuation circuitry, check valves, automatic trip valves, manual valves, and blank flanges, etc..
63	FW	FEEDWATER CONTROL SYSTEM (I&C)	Instrumentation and circuitry associated with main feedwater control.
64	FIDS	FIXED INCORE DETECTION SYSTEM	Equipment, detectors, cabling, etc., necessary to measure and record neutron flux signals at fixed core positions.
65	LM	LEAK MONITORING SYSTEM	Instrumentation and equipment necessary to perform vapor container integrated leak rate testing.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
66	MIDS	MOVABLE INCORE DETECTION SYSTEM	Equipment, detectors, cabling, drive units, transfer devices etc., necessary to operate the moveable incore detectors which function to accumulate neutron flux data at varying core heights for fixed radial core position.
67	NRV	NONRETURN VALVE SYSTEM	Instrumentation and circuitry associated with Main Steam non-return valves and valve isolation logic.
68	NI	NUCLEAR INSTRUMENTATION SYSTEM	Excore equipment, excore detectors, cabling, counters, analyzers power supplies, etc., necessary to provide indication of reactor power level from cold shutdown to fullpower; provides inputs to the reactor protection system.
69	PRM	PROCESS RADIATION MONITORING SYSTEM	Equipment, detectors, cabling, etc., necessary to monitor radioactivity levels in plant process fluids and effluents.
70	RM	RADIATION MONITORING SYSTEM	Area radiation monitoring system consisting of numerous radiation detectors located throughout the plant.
71	RCS	REACTOR CONTROL SYSTEM	Control rod drive mechanisms, control circuitry, position indication instrumentation and related equipment necessary to move control rods in order to control reactivity.
72	RPS	REACTOR PROTECTION SYSTEM	Equipment, circuit breakers, instrument channels, bi-stables, control circuitry and related equipment necessary to initiate a reactor scram (and turbine trip) on unsafe conditions which could cause damage to the reactor core or main coolant pressure boundary.
73	SPDS	SAFETY PARAMETER DISPLAY SYSTEM	Equipment, computers, hardware and software, etc., necessary to take digital/analog plant process parameters and display them in varying formats on monitors located in the main control room.
74	SS	SECURITY SYSTEM	Plant security system.
75	SG	SG BLDN I&C SYSTEM	Miscellaneous instrumentation and related equipment associated with steam generator blowdown.
76	VC	VAPOR CONTAINER MONITORING SYSTEM	Equipment, instrumentation and related equipment necessary to monitor VC temperature, pressure and humidity.
77	EN	ENVIRONMENTAL SYSTEM	Meteorological instrumentation and related equipment primarily mounted on the meteorological tower.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
78	TSC	TECHNICAL SUPPORT CENTER SYSTEM	Electronic equipment servicing the Technical Support Center.
79	AB	ADMINISTRATION BUILDING	Steel-framed masonry building located inside the owner controlled area which houses offices for plant staff.
80	B3B	BATTERY ROOM NO. 3 BUILDING	Reinforced masonry wall structure which houses Battery No.3 and emergency motor control centers.
81	CLP	CAMERA AND LIGHTING POLES	Yard lighting and security camera utility poles.
82	CB	COMPACTOR BUILDING	Masonry structure which houses the low level radioactive waste compactor.
83	DE_R	DECONTAMINATION ROOMS	Radioactive decontamination facility located within service building.
84	DGB	DIESEL GENERATOR BUILDING	Steel frame and masonry wall structure which houses the Emergency Diesel Generators.
85	EPS	EQUIPMENT AND PIPE SUPPORTS	Generic category consisting of equipment and piping supports.
86	FAG	FENCE AND GATES	Provides physical barrier for the owner controlled area.
87	TANK	FIELD FABRICATED TANKS	Generic category consisting of tanks fabricated on site.
88	FWP	FIRE WATER PUMPHOUSE	Pre-fabricated metal building adjacent to the fire water storage tank which houses the diesel driven fire pump.
89	FDN	FOUNDATIONS FOR OUTDOOR TANKS&STACKS	Generic category consisting of foundations for outdoor stacks and tanks.
90	FOTH	FUEL OIL TRANSFER PUMP HOUSE	Structure which houses fuel oil transfer pump.
91	FTCS	FUEL TRANSFER CHUTE STRUCTURE	Reinforced concrete structure which houses the stainless steel fuel transfer chute.
92	GH	GATEHOUSE	Masonry and concrete structure which functions as the security point through which all persons entering the owner controlled area must pass.
93	HBVS	HEATING BOILER VENT STACK	Vents heating boiler exhaust gas to atmosphere.
94	IEP	ION EXCHANGE PIT	Reinforced concrete structure which houses ion exchangers used in the purification system.
95	LHE	LIFTING AND HOISTING EQUIPMENT	Generic category for lifting and hoisting equipment, includes all major lifting devices.

CORD MBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
96	MT	METEOROLOGICAL TOWER	Steel tower which supports meteorological monitoring equipment.
97	NFV	NEW FUEL VAULT	Reinforced concrete and masonry structure used for storage of new fuel.
98	NEUB	NON ESSENTIAL UPS BUILDING	Masonry structure which houses the non-essential uninterruptable power supply.
99	PCA1	PCA STORAGE BUILDING NO. 1	Steel frame masonry wall structure used primarily to store low-level radioactive materials prior to shipping.
100	PCA2	PCA STORAGE BUILDING NO. 2	Steel frame building used primarily for the storage of contaminated tools and equipment.
101	PCAW	PCA WAREHOUSE	Steel frame building used for the storage of low level radioactive waste, waste containers, and contaminated equipment.
102	PMOB	PLANT MODULAR OFFICE BUILDING	Modular office building housing plant support personnel; located inside owner controlled area.
103	PB	POLE BARN	Utility storage building located inside owner controlled area.
104	PAB	PRIMARY AUXILIARY BUILDING	Reinforced concrete and steel frame structure which houses numerous primary related equipment: charging pumps, component cooling pumps and heat exchangers, shutdown cooling pumps and heat exchanger, purification system, etc..
105	PVS	PRIMARY VENT STACK	Steel stack (5' diameter, 130' high) used to vent the exhaust of the filtered ventilation system to atmosphere.
106	RSS	REACTOR SUPPORT STRUCTURE	Reinforced concrete structure and steel-encased concrete columns which supports the nuclear steam supply system (reactor vessel, biological shield, steam generators, etc.) and the polar crane.
107	SLEB	S.L.E. DIESEL GENERATOR BUILDING	Masonry structure adjacent the gatehouse which houses the security lighting emergency diesel generator.
108	SSSB	SAFE SHUTDOWN SYSTEM BUILDING	Reinforced concrete structure which houses the safe shutdown pumps and associated equipment.
109	SH	SCREENWELL HOUSE	Reinforced concrete sub-structure and steel frame superstructure which houses circulating water pumps, service water pumps, motor driven fire pump, travelling screens, sluice gates and other related equipment.
110	SP	SEAL PIT	Reinforced concrete structure that receives circulating water from the condenser and discharges it to Sherman Pond.

CORD NBER	SYSTEM CODE	SYSTEM/STRUCTURE TITLE	SYSTEM/STRUCTURE DESCRIPTION
111	SPVS	SECONDARY PLANT VENT STACK	Vent stack which is used to discharge secondary plant gaseous effluents, i.e., gland steam exhaust, to atmosphere.
112	SB	SERVICE BUILDING	Houses water treatment plant, primary and secondary side machine shops, decontamination rooms, locker rooms and other facilities.
113	SFP	SPENT FUEL PIT	Reinforced concrete structure that provides for underwater storage of spent fuel, spent control rods, and fuel transfer equipment.
114	SFSS	STEAM AND FEEDWATER SUPPORT STRUCTURE	Steel frame structure supporting main steam and feedwater piping between the vapor container and the turbine building.
115	ST-W	STORES WAREHOUSE	Houses plant inventory of spare parts, materials, etc..
116	SEIE	SUPPORTS FOR ELECT/I+C EQUIPMENT	Generic category for electrical and I&C supports.
117	SYS	SWITCH YARD STRUCTURE	Galvanized steel structure which supports oil circuit breakers, disconnects, and provides support for the power lines to Harriman and Cabot Stations.
118	TAB	TRAINING AREA BUILDINGS	One masonry building and one modular-type office building which house the plant training facilities; located outside the owner controlled area.
119	TAS	TRANSFORMER AREA STRUCTURE	Reinforced concrete and steel frame structure which supports the main transformer, the three station service transformers, and associated electrical equipment.
20	TB	TURBINE BUILDING	Steel frame structure which houses most secondary plant equipment, including turbine generator, condenser, condensate pumps, boiler feed pumps, heat exchangers, etc.. The control room and switchgear rooms are located within the turbine building.
21	VC	VAPOR CONTAINER	A nominal 125-foot diameter, vapor tight, steel sphere that houses, but does not support, the reactor support structure and nuclear steam supply system.
22	VEL	VC ELEVATOR ENCLOSURE	Structure which houses elevator to vapor container personnel access hatch.
23	WDB	WASTE DISPOSAL BUILDING	Steel frame building used for processing low level radioactive waste.
24	YACS	YARD AREA CRANE SUPPORT STRUCTURE	Steel frame structure which supports the yard crane.

ATTACHMENT C

STEP 1a REVIEW RESULTS

SYSTEMS AND STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

ATTACHMENT C
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1a REVIEW RESULTS
SYSTEM/STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	LICENSING BASIS																USED IN EOPS	SYSTEM/ STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)
			SAFETY CLASS	FSAR SECTS 400-415	TECH SPECS	ENVIR QUAL	APP R	FIRE	SEISMIC	HEAVY LOADS	INT FLOOD	EXT FLOOD	RAIN-SNOW (PMP)	TOR-WIND	HELB	PERM RAD SHIELD	STA BLACK OUT	L B I A C S E I N S S		
1	AR	AIR REMOVAL SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	Y	Y
2	AS	AUXILIARY STEAM SYSTEM	Y	Y	Y	N	Y	N	Y	-	N	N	N	Y	Y	N	Y	Y	Y	Y
3	BF	BOILER FEED SYSTEM	Y	Y	Y	N	N	N	Y	-	Y	N	N	Y	Y	N	Y	Y	Y	Y
4	BA	BREATHING AIR SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
5	CH	CHARGING AND VOLUME CONTROL SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	Y	Y	Y	Y	Y	Y
6	CF	CHEMICAL FEED SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
7	CS	CHEMICAL SHUTDOWN SYSTEM	Y	Y	Y	Y	Y	N	N	-	N	N	N	Y	N	Y	Y	Y	Y	Y
8	CW	CIRCULATING WATER SYSTEM	N	N	N	N	N	N	N	-	Y	N	N	N	N	N	N	Y	Y	Y
9	CC	COMPONENT COOLING WATER SYSTEM	Y	N	Y	N	Y	N	Y	-	Y	N	N	N	N	N	N	Y	Y	Y
10	CA	COMPRESSED AIR SYSTEM	Y	N	Y	Y	Y	N	N	-	N	N	N	N	N	N	Y	Y	Y	Y
11	CO	CORROSION CONTROL SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
12	DW	DEMINERALIZED WATER SYSTEM	Y	Y	Y	Y	Y	N	N	-	Y	N	N	Y	N	N	Y	Y	Y	Y
13	EBF	EMERGENCY BOILER FEED SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	N	N	Y	Y	Y	Y
14	ES	EXTRACTION STEAM SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	Y	N	N	Y	N	Y
15	FS	FIRE DETECTION AND SUPPRESSION SYSTEM	Y	N	Y	N	N	Y	Y	-	Y	N	N	Y	N	N	N	Y	Y	Y
16	FD	FLOOR DRAINAGE SYSTEM	N	N	N	N	N	N	N	-	Y	N	N	N	N	N	N	Y	N	Y
17	FO	FUEL OIL SYSTEM	Y	Y	Y	Y	Y	Y	N	-	N	N	N	Y	N	N	Y	Y	Y	Y
18	GG	GENERATOR GAS	N	N	N	N	N	Y	N	-	N	N	N	N	N	N	N	Y	Y	Y
19	SO	GENERATOR SEAL OIL SYSTEM	N	N	N	N	N	Y	N	-	N	N	N	N	N	N	N	Y	N	Y
20	HC1	HEATING STM/CONDENSATE	Y	N	Y	N	N	N	N	-	N	N	N	N	Y	N	N	Y	N	Y
21	HV	HYDROGEN VENTING SYSTEM	Y	Y	Y	Y	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
22	IG	INERT GAS SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
23	LO	LUBRICATING OIL SYSTEM	N	N	N	N	N	Y	N	-	N	N	N	N	Y	N	N	Y	N	Y
24	MC	MAIN COOLANT SYSTEM	Y	Y	Y	Y	Y	Y	Y	-	N	N	N	Y	Y	N	Y	Y	Y	Y
25	MS	MAIN STEAM SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	Y	N	Y	Y	Y	Y

ATTACHMENT C
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1a REVIEW RESULTS
SYSTEM/STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SAFETY CLASS	LICENSING BASIS: FSAR SECTS 400-415	TECH SPECS	ENVIR QUAL	APP R	FIRE	SEISMIC	HEAVY LOADS	INT FLOOD	EXT FLOOD	RAIN-SNOW (PMP)	TOR-WIND	HELB	PERM RAD SHIELD	STA BLACK OUT	LBICS EINS	USED IN EOPS	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)
26	NS	NITROGEN SYSTEM	Y	Y	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
27	PW	POTABLE WATER SYSTEM	N	N	N	N	N	N	N	-	Y	N	N	N	N	N	N	Y	N	Y
28	PR	PRESSURE CONTROL AND RELIEF SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	Y	N	Y	Y	Y	Y
29	PU	PURIFICATION SYSTEM	Y	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	Y
30	WD	RADIOACTIVE WASTE DISPOSAL SYSTEM	Y	Y	Y	N	N	N	N	-	N	N	N	N	Y	N	N	Y	N	Y
31	RF	REFUELING SYSTEM	N	Y	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	N	Y
32	SSS	SAFE SHUTDOWN SYSTEM	N	N	Y	N	Y	N	Y	-	N	Y	N	Y	N	N	N	Y	Y	Y
33	SI	SAFETY INJECTION SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	Y	N	N	Y	Y	Y
34	SA	SAMPLE SYSTEM	Y	N	Y	Y	Y	N	Y	-	N	N	N	N	N	N	N	Y	Y	Y
35	SDS	SANITARY DISPOSAL SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
36	SW	SERVICE WATER SYSTEM	Y	N	Y	N	Y	N	N	-	Y	N	N	N	N	N	Y	Y	Y	Y
37	SP	SHIELD TANK CAVITY PURIFICATION SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
38	SC	SHUTDOWN COOLING SYSTEM	Y	Y	Y	N	Y	N	Y	-	N	N	N	N	Y	N	N	Y	Y	Y
39	SF	SPENT FUEL SYSTEM	N	Y	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	N	Y
40	TG	TURBINE GENERATOR SYSTEM	Y	Y	N	N	Y	N	N	-	N	N	N	Y	N	N	Y	Y	Y	Y
41	VD	VENT AND DRAIN SYSTEM	Y	N	Y	Y	Y	N	Y	-	N	N	N	N	Y	N	Y	Y	Y	Y
42	TW	WATER TREATMENT SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
43	HC9	ADMINISTRATION BLDG VENTILATION SYS	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
44	AD	AIR DISPOSAL (FILTERED EXHAUST) SYSTEM	Y	N	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
45	HC10	BATTERY ROOM NO3 VENTILATION SYSTEM	N	N	N	Y	N	Y	N	-	N	N	N	N	N	N	N	Y	N	Y
46	H10A	BATTERY ROOMS 1+2 VENTILATION SYSTEM	N	N	N	Y	N	Y	N	-	N	N	N	N	N	N	N	Y	N	Y
47	HC5	CONTROL ROOM VENTILATION SYSTEM	N	N	Y	N	N	Y	N	-	N	N	N	N	N	N	Y	Y	Y	Y
48	HC11	EDG BUILDING VENTILATION SYSTEM	N	Y	Y	Y	N	Y	N	-	N	N	N	N	N	N	Y	Y	Y	Y
49	HC6	GAS STORAGE ROOM VENTILATION SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
50	HC7	NRV ENCLOSURE VENTILATION SYSTEM	N	Y	N	N	N	N	N	-	N	N	N	N	N	N	Y	Y	N	Y

ATTACHMENT C
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1a REVIEW RESULTS
SYSTEM/STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SAFETY CLASS	LICENSING BASIS: FSAR SECTS 400-415	TECH SPECS	ENVIR QUAL	APP R	FIRE	SEISMIC	HEAVY LOADS	INT FLOOD	EXT FLOOD	RAIN-SNOW (PMP)	TOR-WIND	HELB	PERM RAD SHIELD	STA BLACK OUT	LB ISSUES	USED IN EOPS	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)
51	HC14	PAB NON-FILTERED VENTILATION SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
52	HC12	SAFETY INJECTION BLDG VENTILATION SYS	N	Y	Y	Y	N	N	N	-	N	N	N	N	N	N	N	Y	Y [1]	Y
53	HC13	SCREENWELL PUMPHOUSE VENTILATION SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
54	HC8	SERVICE BLDG VENTILATION SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
55	HC4	TURBINE BLDG VENTILATION SYSTEM	N	N	N	N	N	Y	N	-	N	N	N	N	Y	N	Y	Y	N	Y
56	VCHCR	VC HEATING, COOLING, AIR RECIRCULATION	Y	Y	Y	Y	N	N	N	-	N	N	N	N	Y	N	N	Y	Y	Y
57	DC	DC DISTRIBUTION SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	N	N	Y	Y	Y	Y
58	DG	DIESEL GENERATOR SYSTEM	Y	Y	Y	Y	Y	N	N	-	N	N	N	Y	N	N	Y	Y	Y	Y
59	EEPS	EMERGENCY POWER SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	N	N	Y	Y	Y	Y
60	EGTS	GENERATION AND TRANSMISSION SYSTEM	N	N	Y	N	N	N	N	-	N	N	N	N	N	N	Y	Y	Y	Y
61	ESSS	STATION SERVICE SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	N	N	Y	Y	Y	Y
62	CI	CONTAINMENT ISOLATION SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	N	N	N	Y	Y	Y	Y
63	FW	FEEDWATER CONTROL SYSTEM (I&C)	Y	Y	N	Y	Y	N	Y	-	N	N	N	Y	Y	N	Y	Y	Y	Y
64	FIDS	FIXED INCORE DETECTION SYSTEM	Y	N	Y	N	N	N	Y	-	N	N	N	N	N	N	Y	Y	N	Y
65	LM	LEAK MONITORING SYSTEM	N	N	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	N	Y
66	MIDS	MOVABLE INCORE DETECTION SYSTEM	Y	N	Y	N	N	N	Y	-	N	N	N	N	N	N	Y	Y	N	Y
67	NRV	NONRETURN VALVE SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	Y	Y	N	N	Y	Y	Y
68	NI	NUCLEAR INSTRUMENTATION SYSTEM	Y	Y	Y	N	Y	N	Y	-	N	N	N	N	N	N	Y	Y	Y	Y
69	PRM	PROCESS RADIATION MONITORING SYSTEM	N	N	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
70	RM	RADIATION MONITORING SYSTEM	Y	N	Y	Y	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
71	RCS	REACTOR CONTROL SYSTEM	Y	Y	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
72	RPS	REACTOR PROTECTION SYSTEM	Y	Y	Y	Y	Y	N	Y	-	N	N	N	N	N	N	Y	Y	Y	Y
73	SPDS	SAFETY PARAMETER DISPLAY SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N
74	SS	SECURITY SYSTEM	N	N	N	N	Y	N	N	-	N	N	N	N	N	N	Y	Y	N	Y
75	SG	SG BLDN I&C SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N

ATTACHMENT C
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1a REVIEW RESULTS
SYSTEM/STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SAFETY CLASS	LICENSING BASIS: FSAR SECTS 400-415	TECH SPECS	ENVIR QUAL	APP R	FIRE	SEISMIC	HEAVY LOADS	INT FLOOD	EXT FLOOD	RAIN-SNOW (PMP)	TOR-WIND	HELB	PERM RAD SHIELD	STA BLACK OUT	LB IA CS EI WS S	USED IN EOPS	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)
76	VC	VAPOR CONTAINER MONITORING SYSTEM	Y	N	Y	Y	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
77	EM	ENVIRONMENTAL SYSTEM	N	N	Y	N	N	N	N	-	N	N	N	N	N	N	N	Y	Y	Y
78	TSC	TECHNICAL SUPPORT CENTER SYSTEM	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	L	N
79	AB	ADMINISTRATION BUILDING	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
80	B3B	BATTERY ROOM NO. 3 BUILDING	N	N	N	-	Y	Y	Y	N	N	N	Y	Y	N	Y	N	Y	-	Y
81	CLP	CAMERA AND LIGHTING POLES	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
82	CB	COMPACTOR BUILDING	N	N	N	-	N	N	N	N	N	N	N	Y	N	N	N	Y	-	Y
83	DE_R	DECONTAMINATION ROOMS	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
84	DGB	DIESEL GENERATOR BUILDING	N	N	N	-	Y	Y	Y	N	Y	N	Y	Y	N	N	N	Y	-	Y
85	EPS	EQUIPMENT AND PIPE SUPPORTS	Y	N	Y	-	Y	Y	Y	N	N	N	N	Y	Y	N	N	Y	-	Y
86	FAG	FENCE AND GATES	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
87	TANK	FIELD FABRICATED TANKS	Y	N	Y	-	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	Y	-	Y
88	FWP	FIRE WATER PUMPHOUSE	N	N	N	-	Y	Y	Y	N	N	N	N	Y	N	N	N	Y	-	Y
89	FDN	FOUNDATIONS FOR OUTDOOR TANKS&STACKS	N	N	N	-	N	N	Y	N	N	N	N	Y	N	N	N	Y	-	Y
90	FOTH	FUEL OIL TRANSFER PUMP HOUSE	N	N	N	-	N	Y	N	N	N	N	N	N	N	N	N	Y	-	Y
91	FTCS	FUEL TRANSFER CHUTE STRUCTURE	N	N	N	-	N	N	Y	N	N	N	Y	Y	N	Y	N	Y	-	Y
92	GH	GATEHOUSE	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
93	HBVS	HEATING BOILER VENT STACK	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
94	IEP	ION EXCHANGE PIT	N	N	N	-	L	N	N	N	N	N	N	N	N	Y	N	Y	-	Y
95	LHE	LIFTING AND HOISTING EQUIPMENT	N	Y	Y	-	N	N	N	Y	N	N	N	N	N	N	N	Y	-	Y
96	MT	METEOROLOGICAL TOWER	N	N	Y	-	N	N	N	N	N	N	N	N	N	N	N	Y	-	Y
97	NFV	NEW FUEL VAULT	N	N	N	-	N	Y	N	N	N	N	N	N	N	N	N	Y	-	Y
98	NEUB	NON ESSENTIAL UPS BUILDING	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
99	PCA1	PCA STORAGE BUILDING NO. 1	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
100	PCA2	PCA STORAGE BUILDING NO. 2	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N

11/29/89
09:22:49

ATTACHMENT C
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1a REVIEW RESULTS
SYSTEM/STRUCTURES WHICH CONTRIBUTE TO PLANT SAFETY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SAFETY CLASS	LICENSING BASIS: FSAR SECTS 400-415	TECH SPECS	ENVIR QUAL	APP R	FIRE	SEISMIC	HEAVY LOADS	INT FLOOD	EXT FLOOD	RAIN-SNOW (PMF)	TOR-WIND	HELB	PERM RAD SHIELD	STA BLACK OUT	LB ISSUES	USED IN EOPS	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)
101	PCAW	PCA WAREHOUSE	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
102	PMOB	PLANT MODULAR OFFICE BUILDING	N	N	N	-	N	Y	N	N	[illegible]	N	N	N	N	[illegible]	N	Y	-	Y
103	PB	POLE BARN	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
104	PAB	PRIMARY AUXILIARY BUILDING	N	N	N	-	Y	Y	Y	N	Y	[illegible]	Y	Y	N	Y	N	Y	-	Y
105	PVS	PRIMARY VENT STACK	N	N	N	-	N	N	Y	N	N	N	N	Y	N	N	N	Y	-	Y
106	RSS	REACTOR SUPPORT STRUCTURE	N	N	Y	-	N	N	Y	N	N	Y	N	N	N	Y	N	Y	-	Y
107	SLEB	S.L.E. DIESEL GENERATOR BUILDING	N	N	N	-	Y	N	N	N	N	N	N	N	N	N	N	Y	-	Y
108	SSSB	SAFE SHUTDOWN SYSTEM BUILDING	N	N	N	-	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	-	Y
109	SH	SCREENWELL HOUSE	N	N	N	-	Y	N	N	N	Y	N	N	N	N	N	N	Y	-	Y
110	SP	SEAL PIT	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
111	SPVS	SECONDARY PLANT VENT STACK	N	[illegible]	N	-	N	N	Y	N	N	N	N	N	N	N	N	Y	-	Y
112	SB	SERVICE BUILDING	N	N	N	-	N	Y	N	N	N	N	N	N	N	N	N	Y	-	Y
113	SFP	SPENT FUEL PIT	N	Y	Y	-	N	Y	Y	N	N	N	Y	Y	N	Y	N	Y	-	Y
114	SFSS	STEAM AND FEEDWATER SUPPORT STRUCTURE	N	N	N	-	Y	N	Y	N	N	N	N	Y	N	N	N	Y	-	Y
115	ST-W	STORES WAREHOUSE	N	N	N	-	N	Y	N	N	N	N	N	N	N	N	N	Y	-	Y
116	SEIE	SUPPORTS FOR ELECT/I+C EQUIPMENT	Y	N	N	-	N	Y	Y	N	N	N	N	Y	N	N	N	Y	-	Y
117	SYS	SWITCH YARD STRUCTURE	N	N	N	-	N	N	N	N	N	N	N	Y	N	N	N	Y	-	Y
118	TAB	TRAINING AREA BUILDINGS	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N	N	-	N
119	TAS	TRANSFORMER AREA STRUCTURE	N	N	N	-	N	Y	N	N	N	N	N	Y	N	N	N	Y	-	Y
120	TB	TURBINE BUILDING	N	N	N	-	Y	Y	Y	N	Y	N	Y	Y	N	Y	N	Y	-	Y
121	VC	VAPOR CONTAINER	Y	Y	Y	-	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	-	Y
122	VEL	VC ELEVATOR ENCLOSURE	N	N	N	-	N	N	Y	N	N	N	N	Y	N	N	N	Y	-	Y
123	WDB	WASTE DISPOSAL BUILDING	N	N	N	-	N	N	N	N	Y	N	Y	N	N	Y	N	Y	-	Y
124	YACS	YARD AREA CRANE SUPPORT STRUCTURE	N	N	N	-	N	N	Y	N	N	N	N	N	N	N	N	Y	-	Y

ATTACHMENT D

STEP 1b REVIEW RESULTS

SYSTEMS AND STRUCTURES
FOR WHICH DEGRADATION IS SIGNIFICANT TO PLANT SAFETY

ATTACHMENT D
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1b REVIEW RESULTS
SYSTEMS/STRUCTURES FOR WHICH DEGRADATION
IS POTENTIALLY SIGNIFICANT TO PLANT SAFETY

10/19/89
12:10:49

EOP SAFETY FUNCTIONS

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)	RAD RELEASE LIMITS EXCEEDED	MAIN COOL OR VC BOUNDARY LEAKAGE	S - SUBCRITICALITY, C - CORE COOLING, H - HEAT SINK, P - INTEGRITY, V - CONTAINMENT, I - INVENTORY: S	C	H	P	V	I	FAILURE *NOT* DETECT-ABLE	STRUCTURE HOUSES SIGNIFICANT SYSTEM	DEGRADATION OF SYSTEM OR STRUCTURE POTENTIALLY SIGNIFICANT TO PLANT SAFETY (STEP 1b)
1	AR	AIR REMOVAL SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
2	AS	AUXILIARY STEAM SYSTEM	Y	N	N	N	N	Y	N	N	N	Y	-	Y
3	BF	BOILER FEED SYSTEM	Y	N	Y	N	N	Y	Y	N	Y	Y	-	Y
4	CH	CHARGING AND VOLUME CONTROL SYSTEM	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	-	Y
5	CS	CHEMICAL SHUTDOWN SYSTEM	Y	N	N	Y	N	N	N	N	N	Y	-	Y
6	CW	CIRCULATING WATER SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
7	CC	COMPONENT COOLING WATER SYSTEM	Y	N	Y	N	Y	N	N	N	N	Y	-	Y
8	CA	COMPRESSED AIR SYSTEM	Y	N	Y	N	N	Y	N	N	N	Y	-	Y
9	DW	DEMINERALIZED WATER SYSTEM	Y	N	N	N	N	Y	N	N	N	Y	-	Y
10	EBF	EMERGENCY BOILER FEED SYSTEM	Y	N	N	N	N	Y	N	N	N	Y	-	Y
11	ES	EXTRACTION STEAM SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
12	FS	FIRE DETECTION AND SUPPRESSION SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
13	FD	FLOOR DRAINAGE SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
14	FO	FUEL OIL SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
15	GG	GENERATOR GAS	Y	N	N	N	N	N	N	N	N	-	-	N
16	SO	GENERATOR SEAL OIL SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
17	HCI	HEATING STM/CONDENSATE	Y	N	N	N	N	N	Y	N	N	N	-	N
18	HV	HYDROGEN VENTING SYSTEM	Y	Y	Y	N	N	N	N	Y	N	Y	-	Y
19	LO	LUBRICATING OIL SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
20	MC	MAIN COOLANT SYSTEM	Y	Y	Y	N	Y	N	Y	Y	Y	Y	-	Y
21	MS	MAIN STEAM SYSTEM	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	-	Y
22	NS	NITROGEN SYSTEM	Y	N	N	N	Y	N	N	N	Y	Y	-	Y
23	PW	POTABLE WATER SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
24	PR	PRESSURE CONTROL AND RELIEF SYSTEM	Y	Y	Y	N	Y	N	Y	Y	Y	Y	-	Y
25	PU	PURIFICATION SYSTEM	Y	Y	N	N	N	N	N	N	N	-	-	Y

ATTACHMENT D
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1b REVIEW RESULTS
SYSTEMS/STRUCTURES FOR WHICH DEGRADATION
IS POTENTIALLY SIGNIFICANT TO PLANT SAFETY

10/31/89
10:38:58

EOP SAFETY FUNCTIONS

S - SUBCRITICALITY, C - CORE COOLING, H - HEAT SINK, P - INTEGRITY, V - CONTAINMENT, I - INVENTORY

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)	RAD RELEASE LIMITS EXCEEDED	MAIN COOL OR VC BOUNDARY LEAKAGE	S	C	H	P	V	I	FAILURE *NOT* DETECT-ABLE	STRUCTURE HOUSES SIGNIFICANT SYSTEM	DEGRADATION OF SYSTEM OR STRUCTURE POTENTIALLY SIGNIFICANT TO PLANT SAFETY (STEP 1b)
26	WD	RADIOACTIVE WASTE DISPOSAL SYSTEM	Y	Y	N	N	N	N	N	N	N	-	-	Y
27	RF	REFUELING SYSTEM	Y	Y	Y	N	N	N	N	N	N	-	-	Y
28	SSS	SAFE SHUTDOWN SYSTEM	Y	N	N	Y	Y	Y	N	N	Y	Y	-	Y
29	SI	SAFETY INJECTION SYSTEM	Y	Y	Y	Y	Y	N	Y	N	Y	Y	-	Y
30	SA	SAMPLE SYSTEM	Y	Y	Y	N	N	N	N	N	N	-	-	Y
31	SW	SERVICE WATER SYSTEM	Y	N	Y	N	Y	Y	N	N	Y	Y	-	Y
32	SC	SHUTDOWN COOLING SYSTEM	Y	Y	Y	N	N	N	N	N	N	-	-	Y
33	SF	SPENT FUEL SYSTEM	Y	Y	N	N	N	N	N	N	N	-	-	Y
34	TG	TURBINE GENERATOR SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
35	VD	VENT AND DRAIN SYSTEM	Y	Y	Y	N	Y	N	N	Y	Y	Y	-	Y
36	AD	AIR DISPOSAL (FILTERED EXHAUST) SYSTEM	Y	Y	Y	N	N	N	N	N	N	-	-	Y
37	HC10	BATTERY ROOM NO3 VENTILATION SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
38	H10A	BATTERY ROOMS 1+2 VENTILATION SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
39	HC5	CONTROL ROOM VENTILATION SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
40	HC11	EDG BUILDING VENTILATION SYSTEM	Y	N	N	Y	Y	Y	N	N	Y	Y	-	Y
41	HC7	MRV ENCLOSURE VENTILATION SYSTEM	Y	N	N	Y	N	Y	Y	N	N	N	-	N
42	HC12	SAFETY INJECTION BLDG VENTILATION SYS	Y	N	N	N	N	N	N	N	Y	Y	-	Y
43	HC4	TURBINE BLDG VENTILATION SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
44	VCHCR	VC HEATING, COOLING, AIR RECIRCULATION	Y	N	N	N	N	N	N	Y	N	Y	-	Y
45	DC	DC DISTRIBUTION SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
46	DG	DIESEL GENERATOR SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
47	EEPS	EMERGENCY POWER SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
48	EGTS	GENERATION AND TRANSMISSION SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
49	ESSS	STATION SERVICE SYSTEM	Y	N	N	Y	Y	Y	Y	Y	Y	Y	-	Y
50	CI	CONTAINMENT ISOLATION SYSTEM	Y	N	Y	N	N	N	N	N	N	-	-	Y

ATTACHMENT D
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1b REVIEW RESULTS
SYSTEMS/STRUCTURES FOR WHICH DEGRADATION
IS POTENTIALLY SIGNIFICANT TO PLANT SAFETY

10/19/89
12:10:49

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)	RAD RELEASE LIMITS EXCEEDED	MAIN COOL OR VC BOUNDARY LEAKAGE	EOP SAFETY FUNCTIONS (S - SUBCRITICALITY, C - CORE COOLING, H - HEAT SINK, P - INTEGRITY, V - CONTAINMENT, I - INVENTORY) S	C	H	P	V	I	FAILURE *NOT* DETECTABLE	STRUCTURE HOUSES SIGNIFICANT SYSTEM	DEGRADATION OF SYSTEM OR STRUCTURE POTENTIALLY SIGNIFICANT TO PLANT SAFETY (STEP 1b)
51	FW	FEEDWATER CONTROL SYSTEM (I&C)	Y	N	N	N	N	Y	Y	N	Y	Y	-	Y
52	FIDS	FIXED INCORE DETECTION SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
53	LM	LEAK MONITORING SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
54	MIDS	MOVABLE INCORE DETECTION SYSTEM	Y	N	N	N	N	N	Y	N	N	-	-	N
55	NRV	NONRETURN VALVE SYSTEM	Y	N	Y	Y	N	Y	Y	N	N	Y	-	Y
56	NI	NUCLEAR INSTRUMENTATION SYSTEM	Y	N	N	Y	N	N	N	N	N	Y	-	Y
57	PRM	PROCESS RADIATION MONITORING SYSTEM	Y	Y	N	N	N	N	N	Y	D	Y	-	Y
58	RM	RADIATION MONITORING SYSTEM	Y	N	N	N	N	N	N	Y	N	Y	-	Y
59	RCS	REACTOR CONTROL SYSTEM	Y	N	N	Y	N	N	N	N	N	Y	-	Y
60	RPS	REACTOR PROTECTION SYSTEM	Y	N	N	Y	Y	N	N	Y	Y	Y	-	Y
61	SS	SECURITY SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
62	VC	VAPOR CONTAINER MONITORING SYSTEM	Y	N	Y	N	N	N	N	N	N	-	-	Y
63	EN	ENVIRONMENTAL SYSTEM	Y	N	N	N	N	N	N	N	N	-	-	N
64	B3B	BATTERY ROOM NO. 3 BUILDING	Y	N	N	-	-	-	-	-	-	-	Y	Y
65	CB	COMPACTOR BUILDING	Y	N	N	-	-	-	-	-	-	-	Y	Y
66	DGB	DIESEL GENERATOR BUILDING	Y	N	N	-	-	-	-	-	-	-	Y	Y
67	EPS	EQUIPMENT AND PIPE SUPPORTS	Y	N	Y	-	-	-	-	-	-	-	Y	Y
68	TANK	FIELD FABRICATED TANKS	Y	Y	N	-	-	-	-	-	-	-	Y	Y
69	FWP	FIRE WATER PUMPHOUSE	Y	N	N	-	-	-	-	-	-	-	Y	Y
70	FDN	FOUNDATIONS FOR OUTDOOR TANKS&STACKS	Y	Y	N	-	-	-	-	-	-	-	Y	Y
71	FOTH	FUEL OIL TRANSFER PUMP HOUSE	Y	N	N	-	-	-	-	-	-	-	Y	Y
72	FTCS	FUEL TRANSFER CHUTE STRUCTURE	Y	Y	Y	-	-	-	-	-	-	-	Y	Y
73	IEP	ION EXCHANGE PIT	Y	Y	N	-	-	-	-	-	-	-	Y	Y
74	LHE	LIFTING AND HOISTING EQUIPMENT	Y	Y	N	-	-	-	-	-	-	-	N	Y
75	MT	METEOROLOGICAL TOWER	Y	N	N	-	-	-	-	-	-	-	N	N

ATTACHMENT B
YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
STEP 1b REVIEW RESULTS
SYSTEMS/STRUCTURES FOR WHICH DEGRADATION
IS POTENTIALLY SIGNIFICANT TO PLANT SAFETY

10/19/89
12:10:49

RECORD NUMBER	SYSTEM CODE	SYSTEM/STRUCTURE	SYSTEM/STRUCTURE CONTRIBUTES TO PLANT SAFETY (STEP 1a)	RAD RELEASE LIMITS EXCEEDED	MAIN COOL OR VC BOUNDARY LEAKAGE	EOP SAFETY FUNCTIONS (S - SUBCRITICALITY, C - CORE COOLING, H - HEAT SINK, P - INTEGRITY, V - CONTAINMENT, I - INVENTORY) S	C	H	P	V	I	FAILURE NOT DETECT-ABLE	STRUCTURE HOUSES SIGNIFICANT SYSTEM	DEGRADATION OF SYSTEM OR STRUCTURE POTENTIALLY SIGNIFICANT TO PLANT SAFETY (STEP 1b)
76	NFV	NEW FUEL VAULT	Y	N	N	-	-	-	-	-	-	-	Y	Y
77	PMOB	PLANT MODULAR OFFICE BUILDING	Y	N	N	-	-	-	-	-	-	-	N	N
78	PAB	PRIMARY AUXILIARY BUILDING	Y	Y	N	-	-	-	-	-	-	-	Y	Y
79	PVS	PRIMARY VENT STACK	Y	N	Y	-	-	-	-	-	-	-	N	Y
80	RSS	REACTOR SUPPORT STRUCTURE	Y	Y	Y	-	-	-	-	-	-	-	Y	Y
81	SLEB	S.L.E. DIESEL GENERATOR BUILDING	Y	N	N	-	-	-	-	-	-	-	N	N
82	SSSB	SAFE SHUTDOWN SYSTEM BUILDING	Y	N	N	-	-	-	-	-	-	-	Y	Y
83	SH	SCREENWELL HOUSE	Y	N	N	-	-	-	-	-	-	-	Y	Y
84	SPVS	SECONDARY PLANT VENT STACK	Y	N	Y	-	-	-	-	-	-	-	N	Y
85	SB	SERVICE BUILDING	Y	N	N	-	-	-	-	-	-	-	N	N
86	SFP	SPENT FUEL PIT	Y	Y	N	-	-	-	-	-	-	-	Y	Y
87	SFSS	STEAM AND FEEDWATER SUPPORT STRUCTURE	Y	N	Y	-	-	-	-	-	-	-	Y	Y
88	ST-W	STORES WAREHOUSE	Y	N	N	-	-	-	-	-	-	-	N	N
89	SEIE	SUPPORTS FOR ELECT/I+C EQUIPMENT	Y	N	N	-	-	-	-	-	-	-	Y	Y
90	SYS	SWITCH YARD STRUCTURE	Y	N	N	-	-	-	-	-	-	-	N	N
91	TAS	TRANSFORMER AREA STRUCTURE	Y	N	N	-	-	-	-	-	-	-	Y	Y
92	TB	TURBINE BUILDING	Y	N	N	-	-	-	-	-	-	-	Y	Y
93	VC	VAPOR CONTAINER	Y	Y	Y	-	-	-	-	-	-	-	Y	Y
94	VEL	VC ELEVATOR ENCLOSURE	Y	N	Y	-	-	-	-	-	-	-	N	Y
95	WDB	WASTE DISPOSAL BUILDINGS	Y	Y	N	-	-	-	-	-	-	-	Y	Y
96	YACS	YARD AREA CRANE SUPPORT STRUCTURE	Y	Y	N	-	-	-	-	-	-	-	Y	Y

ATTACHMENT E

SAFETY INJECTION SYSTEM COMPONENT REVIEW RESULTS

8095R

YANKEE ATOMIC ELECTRIC COMPANY

YNPS LICENSE RENEWAL PROJECT

SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY)		STEP 2B: COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	STEP 2B: COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY)		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
						PB	OP		PB	OP			
SI-V-0725	SI	ISOL. VALVE FOR P-49-3 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0724	SI	ISOL. VALVE FOR P-49-2 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0723	SI	ISOL. VALVE FOR P-49-1 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
1/2"-PRSL-302-34	SI	HPSI-3 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1/2"-PRSL-302-42	SI	HPSI-2 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1/2"-PRSL-302-43	SI	HPSI-1 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
3/4"-PRSL-302-35	SI	HPSI PUMP RECIRC HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0728	SI	ISOL. VALVE FOR HPSI RECIRC. L	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0067	SI	ISOL. VALVE FOR P-48-3 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0066	SI	ISOL. VALVE FOR P-48-2 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0065	SI	ISOL. VALVE FOR P-48-1 RECIRC.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0699	SI	DRAIN VALVE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0984	SI	ISOL. VALVE FOR SI-LT-401	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
2"-CHCH-2502-5	SI	CVCS SUPPLY TO LPSI HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0613	SI	ISOL. VALVE FROM BORIC ACID TK	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0740	SI	BYPASS VALVE FOR SI-FI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-2502-26	SI	BYPASS SI-MOV-515		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0679	SI	PRESS. CONN. HPSI LOOP 3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0681	SI	PRESS. CONN. HPSI LOOP 2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0683	SI	PRESS. CONN. HPSI LOOP 1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0685	SI	PRESS. CONN. HPSI LOOP 4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0722	SI	DRAIN VALVE FOR P-49-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0718	SI	DRAIN VALVE FOR P-49-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0714	SI	DRAIN VALVE FOR P-49-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0647	SI	ISOL. VALVE FOR PASS LINE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY): PB	OP	COMPONENT SUBJECT TO RRFP2R/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY): PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
2"-PRSH-302-19	SI	BYPASS SI-MOV-516		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0702	SI	VENT VALVE FOR CVCS SUPPLY LIN	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0701	SI	ISOL. VALVE FOR AUX FW SUPPLY	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0726	SI	ISOL. VALVE FOR HPSI RECIRC. L	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0621	SI	ISOL. VALVE FOR SI-PT-10	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSL-302-37	SI	LPSI PUMP RECIRC HEADER		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSL-302-39	SI	LPSI PUMP RECIRC HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0611	SI	ISOL VALVE FOR TE-28 HEATING	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
3"-PRSH-2502-2	SI	INJ LOOP 1		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
3"-PRSH-2502-24	SI	HPSI INJ HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
3"-PRSH-2502-3	SI	INJ LOOP 2		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
3"-PRSH-2502-4	SI	INJ LOOP 3		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
3"-PRSH-2502-5	SI	INJ LOOP 4		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
3"-PRSL-152-32	SI	SI-TE-28 HEATER SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0014	SI	ISOL. VALVE FOR SI-MOV-1 BYPAS	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0618	SI	DRAIN VALVE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
3/4"-DRN-2502-18	SI	LPSI INJ HEADER DRAIN		PIPE	NO	YES	NO	-	-	-	-	-	
SI-V-0663	SI	CHECK VALVE FOR LPSI LOOP 1	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0666	SI	CHECK VALVE FOR LPSI LOOP 4	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0036	SI	CHECK VALVE FOR HPSI HEADER	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0665	SI	CHECK VALVE FOR LPSI LOOP 3	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0664	SI	CHECK VALVE FOR LPSI LOOP 2	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0038	SI	DRAIN VALVE FOR SI-PS-10	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0735	SI	ISOL. VALVE FOR SI-PI-31	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0736	SI	ISOL. VALVE FOR SI-PI-31	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	

[illegible]

TRPS LICENSE RENEWAL PROJECT

SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

					STEP 2A	STEP 2B						STEP 2C	
TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	COMPONENT'S SAFETY FUNCTION PB = PRESS BOUND OP = OPERABILITY		COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM PB = PRESS BOUND OP = OPERABILITY		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
						PB	OP		PB	OP			
SI-V-0737	SI	ISOL. VALVE FOR SI-PI-35	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
6"-PRSH-2502-1	SI	LPSI INJ HDR		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0729	SI	DRAIN VALVE FOR SI-PI-30	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0731	SI	DRAIN VALVE FOR SI-PI-34	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0089	SI	ISOL. VALVE FOR SI-PI-34	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0697	SI	CHECK VALVE FOR VC SUMP RECIRC	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
6"-PRSL-152-17	SI	BYPASS SI-MOV-516		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
6"-PRSL-152-18	SI	VC SUMP DISCH TO LPSI		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0710	SI	VENT VALVE FOR P-48-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
6"-PRSL-302-21	SI	LPSI DISCH TO HPSI		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0708	SI	VENT VALVE FOR P-48-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0706	SI	VENT VALVE FOR P-48-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0600	SI	ISOL. VALVE FOR VC SUMP DISCHA	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0051	SI	CHECK VALVE LPSI DISCHARGE TO	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
6"-PRT-302A-1	SI	RECIRC TO SHIELD TK CAVITY		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0623	SI	VENT CONN. LPSI HDR	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSL-152-4	SI	LPSI/HPSI PUMPS SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSL-2502-3	SI	LPSI INJ HDR		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0694	SI	VENT VALVE FOR SI-LI-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0623	SI	DRAIN VALVE FOR SI-FT-10	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
4"-PRSL-152-14	SI	VC SUMP DISCHARGE		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0075	SI	DRAIN VALVE FOR SI-PI-12 AND S	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
3"-PRSH-2502-8	SI	HPSI INJ HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0001	SI	FLOW ELEMENT-LOOP 1 INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0010	SI	FLOW ELEMENT-LPSI INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	

YNPS LICENSE RENEWAL PROJECT

SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY)		COMPONENT SUBJECT TO REPAIR/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY)		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
						PB	OP		PB	OP			
SI-FE-0002	SI	FLOW ELEMENT-LOOP 2 INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0003	SI	FLOW ELEMENT-LOOP 3 INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0004	SI	FLOW ELEMENT-LOOP 4 INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0005	SI	FLOW ELEMENT-FLOW TO CVCS		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FE-0006	SI	FLOW ELEMENT - HPSI INJ HDR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-FI-0010	SI	FLOW IND-LPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FI-0005	SI	FLOW IND-FLOW TO CVCS		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0001	SI	FLOW TRANS-LOOP 1 INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0010	SI	FLOW TRANS-LPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0002	SI	FLOW TRANS-LOOP 2 INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0003	SI	FLOW TRANS-LOOP 3 INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0004	SI	FLOW TRANS-LOOP 4 INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0005	SI	FLOW TRANS-FLOW TO CVCS		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-FT-0006	SI	FLOW TRANS-HPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-HLS-0219	SI	HIGH LEVEL SWITCH-TK-28		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-LI-0002	SI	LEVEL IND-TK-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LIT-0401	SI	LEVEL IND TRANS-TK-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LLS-0001	SI	LEVEL SWITCH-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LLS-0002	SI	LEVEL SWITCH-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LLS-0220	SI	LOW LEVEL SWITCH-TK-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LLS-0003	SI	LEVEL SWITCH-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LLS-0004	SI	LEVEL SWITCH-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LS-0006	SI	LEVEL SWITCH ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LT-0001	SI	LEVEL TRANS-TK-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LT-000[illegible]	SI	LEVEL TRANSMITTER-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-LT-0004	SI	LEVEL TRANS-ACCUMULATOR		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-LTS-0223	SI	LOW TEMP SWITCH-TE-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-PI-0010	SI	PRESSURE IND-HPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0011	SI	PRESSURE IND-LPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0012	SI	PRESSURE IND-LPSI DISCH HEADER		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0013	SI	PRESSURE IND-HPSI DISCH HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0030	SI	PRESSURE IND-LPSI-1 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0031	SI	PRESSURE IND-HPSI-1 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0032	SI	PRESSURE IND-LPSI-2 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0033	SI	PRESSURE IND-HPSI-2 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0034	SI	PRESSURE IND-LPSI-3 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0035	SI	PRESSURE IND-HPSI-3 DISCH		INST	NO	YES	NO	-	-	-	-	-	
SI-PI-0006	SI	PRESSURE IND-LPSI DISCH HEADER		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0007	SI	PRESSURE IND-HPSI DISCH HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PI-0008	SI	PRESSURE IND-ACCUMULATOR PRESS		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PS-0010	SI	PRESS SWITCH-HPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PS-0011	SI	PRESS SWITCH-LPSI INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0001	SI	PRESS TRANS-LOOP 1 INJ HEADER		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0002	SI	PRESS TRANS-LOOP 2 INJ DHR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0003	SI	PRESS TRANS-LOOP 3 INJ BDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0004	SI	PRESS TRANS-LOPP 4 INJ HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0006	SI	PRESS TRANS-LPSI DISCH BDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-PT-0007	SI	PRESS TRANS-HPSI DISCH HDR		INST	YES	YES	NO	YES	NO	NO	YES	NO	
SI-TI-0001	SI	TEMP IND-TE-28		INST	YES	YES	NO	NO	NO	NO	YES	NO	
SI-TIS-0223	SI	TEMP IND SWITCH-TE-28		INST	YES	YES	NO	YES	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

					STEP 2A	STEP 2B						STEP 2C	
					COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	COMPONENT'S SAFETY FUNCTION (PB : PRESS BOUND, OP : OPERABILITY)		COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB : PRESS BOUND, OP : OPERABILITY)		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE		PB	OP		PB	OP			
TK-2P	SI	SAFETY INJECTION TANK	SHELL	TK	YES	YES	NO	NO	NO	NO	YES	YES	YES-PB
AC-2	SI	SI ACCUMULATOR TANK	SHELL	TK	YES	YES	NO	NO	NO	NO	YES	YES	YES-PB
AC-2	SI	SI ACCUMULATOR TANK	CLADDING	TK	YES	YES	NO	NO	NO	NO	YES	YES	YES-PB
CS-MOV-0532	SI	ISOL. VALVE FOR TK-2B RECIRC.	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
CS-MOV-0533	SI	ISOL. VALVE FOR LPSI HDR	BODY	GOV	YES	YES	YES	YES	NO	YES	YES	NO	
CS-MOV-0534	SI	ISOL. VALVE FOR CS-MOV-0533 BY	BODY	GOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
CS-MOV-0535	SI	ISOL. VALVE FOR LPSI HDR.	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
CS-MOV-0536	SI	ISOL. VALVE FOR LOOP 1 SI HDR	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
CS-MOV-0537	SI	ISOL. VALVE FOR LOOP 2 SI HDR	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
CS-MOV-0538	SI	ISOL. VALVE FOR LOOP 3 SI HDR	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
CS-V-0532A	SI	TK-2B ISOL. VALVE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0603	SI	SAMPLE CONN. ISOL. VALVE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0604	SI	TK-2B ISOL. VALVE	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0605	SI	ISOLATION VALVE FOR SI-LI-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0606	SI	DRAIN VALVE FOR SI-LI-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0607	SI	VENT VALVE FOR SI-LI-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0608	SI	VENT VALVE FOR LPSI HDR.	BODY	V	NO	YES	NO	-	-	-	-	-	
CS-V-0616	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0617	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0621	SI	CHECK VALVE FOR LPSI HDR	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
CS-V-0622	SI	CHECK VALVE FOR LPSI HDR	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
CS-V-0641	SI	ISOL. VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0643	SI	ISOL. VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0645	SI	SAMPLE CONN. & TEMP LEVEL	BODY	V	NO	YES	NO	-	-	-	-	-	
[illegible]	SI	SAMPLE CONN. & TEMP LEVEL	BODY	V	NO	YES	NO	-	-	-	-	-	

TMPS LICENSE RENEWAL PROJECT

SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
CS-V-0647	SI	ISOL. VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0648	SI	ISOL. VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0649	SI	ISOL. VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0650	SI	ISOL. VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0651	SI	ISOL. VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0652	SI	ISOL. VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0653	SI	ISOL. VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0654	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0655	SI	DRAIN VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0656	SI	DRAIN VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0657	SI	DRAIN VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0658	SI	DRAIN VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0660	SI	ISOL. VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0661	SI	ISOL. VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0662	SI	ISOL. VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0663	SI	ISOL. VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0664	SI	ISOL. VALVE FOR SI-PT-1 AND MC	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0665	SI	ISOL. VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0666	SI	ISOL. VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0667	SI	ISOL. VALVE FOR SI-PT-2 AND MC	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0668	SI	ISOL. VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0669	SI	ISOL. VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0670	SI	ISOL. VALVE FOR SI-PT-3 AND MC	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0671	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0672	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATLY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
CS-V-0673	SI	ISOL. VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-V-0675	SI	DRAIN VALVE FOR SI-PT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0676	SI	DRAIN VALVE FOR SI-FT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0687	SI	ISOL. VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0688	SI	ISOL. VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0689	SI	BYPASS VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0690	SI	VENT VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0691	SI	DRAIN VALVE FOR SI-FI-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0692	SI	VENT VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0693	SI	DRAIN VALVE FOR SI-PT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0695	SI	VENT VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0696	SI	DRAIN VALVE FOR SI-PT-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0698	SI	VENT VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0699	SI	DRAIN VALVE FOR SI-PT-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0704	SI	ISOL. VALVE FOR NC-PT-100	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0705	SI	DRAIN VALVE FOR NC-PT-100	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0706	SI	ISOL. VALVE FOR NC-PT-200	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0707	SI	DRAIN VALVE FOR NC-PT-200	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0708	SI	ISOL.VALVE FOR NC-PT-300	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
CS-V-0709	SI	DRAIN VALVE FOR NC-PT-300	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-MOV-0001	SI	ISOL. VALVE FOR AC-2 FROM LPSI	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0004	SI	ISOL. VALVE FOR CROSS-TIE BETW	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0022	SI	LPSI LOOP 4 ISOL. VALVE	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
SI-MOV-0023	SI	LPSI LOOP 3 ISOL. VALVE	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
SI-MOV-0024	SI	LPSI LOOP 2 ISOL. VALVE	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

					STEP 2A	STEP 2B						STEP 2C	
					COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	COMPONENT'S SAFETY FUNCTION PR = PRESS BOUND OP = OPERABILITY		COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATLY ADDRESSED BY RRI PROGRAM PR = PRESS BOUND OP = OPERABILITY		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE		PR	OP		PR	OP			
SI-MOV-0025	SI	LPSI LOOP 1 ISOL. VALVE	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
SI-MOV-0046	SI	ISOL. VALVE FOR HPSI HEADER	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0048	SI	ISOL. VALVE FOR SI PUMP RECIRC	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0049	SI	ISOL. VALVE FOR SI PUMP RECIRC	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0514	SI	ISOL. VALVE IN BYPASS LINE FOR	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0515	SI	ISOL. VALVE FOR CVCS/HPSI SUPP	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0516	SI	ISOL. VALVE FOR VC SUMP RECIRC	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0517	SI	ISOL. VALVE FOR SI-MOV-BYPASS	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-MOV-0518	SI	ISOL. VALVE FOR TK-28 SUPPLY T	BODY	MOV	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0002	SI	CHECK VALVE AC-2 DISCHARGE LIN	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0003	SI	CHECK VALVE FOR LPSI HEADER	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0005	SI	ISOL. VALVE FOR P-48-1 SUCTION	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0006	SI	ISOL. VALVE FOR P-48-2 SUCTION	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0007	SI	ISOL. VALVE FOR P-48-3 SUCTION	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0008	SI	ISOL. VALVE FOR P-48-1 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0009	SI	ISOL. VALVE FOR P-48-2 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0010	SI	ISOL. VALVE FOR P-48-3 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0011	SI	CHECK VALVE FOR P-48-1 DISCHAR	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0012	SI	CHECK VALVE FOR P-48-2 DISCHAR	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0013	SI	CHECK VALVE FOR P-48-3 DISCHAR	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0014	SI	CHECK VALVE FOR HPSI HEADER	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0018	SI	CHECK VALVE FOR SI LOOP 3	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0019	SI	CHECK VALVE FOR SI LOOP 4	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0020	SI	CHECK VALVE FOR SI LOOP 2	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0021	SI	CHECK VALVE FOR SI LOOP 1	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
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SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

					STEP 2A	STEP 2B						STEP 2C	
					COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	COMPONENT'S SAFETY FUNCTION PB = PRESS BOUND OP = OPERABILITY		COMPONENT SUBJECT TO REFURB/REPLACE & INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM PB = PRESS BOUND OP = OPERABILITY		COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE		PB	OP		PB	OP			
SI-V-0026	SI	VENT VALVE FOR SI-LT-401	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0027	SI	ISOL. VALVE FOR P-49-1 SUCTIO	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0028	SI	ISOL. VALVE FOR P-49-2 SUCTIO	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0029	SI	ISOL. VALVE FOR P-49-3 SUCTIO	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0030	SI	CHECK VALVE FOR P-49-1 DISCHAR	BODY	CHE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0031	SI	CHECK VALVE FOR P-49-2 DISCHAR	BODY	CHE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0032	SI	CHECK VALVE FOR P-49-3 DISCHAR	BODY	CHE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0033	SI	ISOL. VALVE FOR P-49-1 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0034	SI	ISOL. VALVE FOR P-49-2 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0035	SI	ISOL. VALVE FOR P-49-3 DISCHAR	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0037	SI	ISOL. VALVE FOR SI-LLS-1,-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0038	SI	ISOL. VALVE FOR SI-LLS-3,-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0039	SI	ISOL. VALVE FOR SI-LLS-1,-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0040	SI	ISOL. VALVE FOR SI-LLS-3,-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0043	SI	VENT CONNECTION AC-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0044	SI	ISOL. VALVE FOR SI-PI-8	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0047	SI	DRAIN VALVE FOR PASS LINE	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0050	SI	DRAIN VALVE FOR AC-2 SUPPLY/DI	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0055	SI	HPSI HDR OVER PRESSURE PROTECT	BODY	SV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
SI-V-0061	SI	ISOL. VALVE FOR SI-LT-401	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0070	SI	ISOL. VALVE FOR SI-PI-8	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0071	SI	DRAIN VALVE FOR SI-LLS-1,-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0072	SI	DRAIN VALVE FOR SI-LS-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0073	SI	ISOL. VALVE FOR SI-PI-13 AND 5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
[illegible]	SI	ISOL. VALVE FOR SI-PI-1[illegible] AND 5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY): PB	STEP 2B: COMPONENT'S SAFETY FUNCTION: OP	STEP 2B: COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	STEP 2B: COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY): PB	STEP 2B: COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM: OP	STEP 2B: COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-V-0076	SI	ISOL. VALVE FOR SI-PS-10	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0077	SI	ISOL. VALVE FOR SI-PI-11 AND S	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0078	SI	DRAIN VALVE FOR SI-LLS-3,-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0080	SI	ISOL. VALVE FOR SI-LT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0081	SI	VENT VALVE FOR SI-LT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0083	SI	ISOL. VALVE FOR SI-LT-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0085	SI	ISOL. VALVE FOR SI-LS-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0086	SI	ISOL. VALVE FOR AC-2 INSTR.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0087	SI	ISOL. VALVE FOR SI-PI-30	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0088	SI	ISOL. VALVE FOR SI-PI-32	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0090	SI	DRAIN VALVE FOR SI-PI-13 AND S	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0091	SI	DRAIN VALVE FOR P-48-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0092	SI	DRAIN VALVE FOR P-48-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0093	SI	DRAIN VALVE FOR P-48-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0094	SI	DRAIN VALVE FOR SI-PI-11 AND S	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0095	SI	ISOL. VALVE FOR SI-PI-31	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0096	SI	ISOL. VALVE FOR SI-PI-33	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0097	SI	ISOL. VALVE FOR SI-PI-35	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-SV-0211	SI	LPSI HDR OVER PRESSURE PROTECT	BODY	SV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
SI-V-0599	SI	ISOL. VALVE FOR VC SUMP DISCHA	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0620	SI	ISOL. VALVE FOR SI-PT-10	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0622	SI	VENT VALVE FOR SI-PT-10	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0645	SI	THROTTLE VALVE FOR CVCS/HPSI S	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0646	SI	CHECK VALVE FOR CVCS/HPSI SUPP	BODY	CHK	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0654	SI	ISOL. VALVE FOR SI-LT-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATLY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-V-0655	SI	ISOL. VALVE FOR SI-LI-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0656	SI	ISOL. VALVE FOR SI-LI-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0657	SI	ISOL. VALVE AC-2 INSTR.	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0658	SI	DRAIN VALVE FOR SI-LI-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0659	SI	DRAIN VALVE FOR SI-LI-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0660	SI	VENT VALVE FOR SI-LI-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0661	SI	DRAIN VALVE FOR SI-LS-6	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0667	SI	CHECK VALVE FOR HPSI LOOP 1	BODY	CKE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0668	SI	CHECK VALVE FOR HPSI LOOP 2	BODY	CKE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0669	SI	CHECK VALVE FOR HPSI LOOP 3	BODY	CKE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0670	SI	CHECK VALVE FOR HPSI LOOP 4	BODY	CKE	YES	YES	YES	YES	NO	YES	YES	NO	
SI-V-0671	SI	THROTTLE VALVE FOR HPSI LOOP 1	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0672	SI	THROTTLE VALVE FOR HPSI LOOP 2	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0673	SI	THROTTLE VALVE FOR HPSI LOOP 3	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0674	SI	THROTTLE VALVE FOR HPSI LOOP 4	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0675	SI	TEST CONN. LOOP 2	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0676	SI	TEST CONN. LOOP 2	BODY	V	NO	YES	NO	-	-	-	-	-	
SI-V-0689	SI	ISOL. VALVE FOR SI-PI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0690	SI	ISOL. VALVE FOR SI-PI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0691	SI	VENT VALVE FOR SI-PI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0692	SI	DRAIN VALVE FOR SI-PI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0693	SI	DRAIN VALVE FOR SI-LI-4	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0695	SI	DRAIN VALVE FOR VC SUMP RECIRC	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0696	SI	DRAIN VALVE FOR VC SUMP RECIRC	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
SI-V-0697	SI	STOP CHECK VALVE TK-2A	BODY	CKE	YES	YES	YES	YES	NO	YES	YES	NO	

[illegible]
VYPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO /LINE NO	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY): PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATLY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY): PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-V-0700	SI	ISOL. VALVE FOR CVCS SUPPLY TO	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0705	SI	VENT VALVE FOR P-48-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0707	SI	VENT VALVE FOR P-48-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0709	SI	VENT VALVE FOR P-48-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0711	SI	VENT VALVE FOR P-49-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0712	SI	VENT VALVE FOR P-49-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0713	SI	DRAIN VALVE FOR P-49-1	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0715	SI	VENT VALVE FOR P-49-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0716	SI	VENT VALVE FOR P-49-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0717	SI	DRAIN VALVE FOR P-49-2	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0719	SI	VENT VALVE FOR P-49-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0720	SI	VENT VALVE FOR P-49-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0721	SI	DRAIN VALVE FOR P-49-3	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0727	SI	DRAIN VALVE FOR SI PUMP RECIRC	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0730	SI	DRAIN VALVE FOR SI-PI-32	BODY	V	NO	YES	NO	-	-	-	-	-	
SI-V-0732	SI	DRAIN VALVE FOR SI-PI-31	BODY	V	NO	YES	NO	-	-	-	-	-	
SI-V-0733	SI	DRAIN VALVE FOR SI-PI-33	BODY	V	NO	YES	NO	-	-	-	-	-	
SI-V-0734	SI	DRAIN VALVE FOR SI-PI-35	BODY	V	NO	YES	NO	-	-	-	-	-	
SI-V-0738	SI	ISOL. VALVE FOR SI-FI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
SI-V-0739	SI	ISOL. VALVE FOR SI-FI-5	BODY	V	YES	YES	NO	NO	NO	NO	YES	NO	
P-48-1	SI	LOW PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-1	SI	LOW PRESSURE SI PUMP	SHAFT	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-1	SI	LOW PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-1	SI	LOW PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

YNPS LICENSE RENEWAL PROJECT

SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

TAG NO./LINE NO.	SYSTEM CODE	DESCRIPTION	PART NAME	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT'S SAFETY FUNCTION (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT SUBJECT TO REFURB/REPLACE OR INSPECT (RRI) PROGRAM	COMPONENT'S SAFETY FUNCTION ADEQUATELY ADDRESSED BY RRI PROGRAM (PB = PRESS BOUND, OP = OPERABILITY) PB	OP	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
P-49-1	SI	HIGH PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-2	SI	LOW PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-2	SI	LOW PRESSURE SI PUMP	SHAFT	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-2	SI	LOW PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-2	SI	HIGH PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-2	SI	HIGH PRESSURE SI PUMP	SHAFT	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-2	SI	HIGH PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-3	SI	LOW PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-3	SI	LOW PRESSURE SI PUMP	SHAFT	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-48-3	SI	LOW PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-3	SI	HIGH PRESSURE SI PUMP	CASING	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-3	SI	HIGH PRESSURE SI PUMP	SHAFT	P	YES	YES	YES	YES	NO	YES	YES	NO	
P-49-3	SI	HIGH PRESSURE SI PUMP	IMPELLER	P	YES	YES	YES	YES	NO	YES	YES	NO	
CS-V-0700	SI	CS-V-700	BODY	V	YES	YES	NO	YES	NO	NO	YES	NO	
CS-MOV-0539	SI	ISOL. VALVE FOR LOOP 4 SI HDR	BODY	MOV	YES	YES	YES	YES	NO	NO	YES	NO	YES-OP
1/2"-PRSH-902-29	SI	HPSI-3 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1/2"-PRSH-902-30	SI	HPSI-2 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1/2"-PRSH-902-31	SI	HPSI-1 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1"-PRSL-302-36	SI	HPSI PUMP RECIRC HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1"-PRSL-302-38	SI	LPSI-3 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1"-PRSL-302-40	SI	LPSI-2 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
1"-PRSL-302-41	SI	LPSI-1 RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
10"-PRSL-152-2	SI	TK-28 DISCH TO PUMPS		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
10"-PRSL-152A-1	SI	TK-28 DISCH TO PUMPS		PIPE	YES	YES	NO	YES	NO	NO	YES	YES	YES-PB
2"-PF-152A-1	SI	TK-28 SUPL FROM BORIC ACID PUM		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM FLUID COMPONENT REVIEW RESULTS

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						PB	OP		PB	OP			
2"-PRSH-2502-18	SI	HPSI SUPL TO CVCS		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-2502-25	SI	HPSI INJ LOOP 3		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
2"-PRSH-2502-26	SI	HPSI INJ LOOP 2		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
2"-PRSH-2502-27	SI	HPSI INJ LOOP 1		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
2"-PRSH-2502-28	SI	HPSI INJ LOOP 4		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
2"-PRSH-902-13	SI	HPSI-3 DISCH		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-15	SI	HPSI-2 DISCH		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-16	SI	HPSI-1 DISCH		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-17	SI	CVCS/HPSI SUPPLY/DISCH		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-21	SI	CVCS SUPL TO HPSI HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-23	SI	AUX FEED SUPL		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSH-902-32	SI	HPSI RECIRC		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2"-PRSL-302-24	SI	BYPASS CS-MOV-533		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
2 1/2"-PRSL-302A-26	SI	TK-28 HEATER RETURN		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
3"-PRSL-302-45	SI	BYPASS SI-MOV-1		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
3"-PRSL-302-5	SI	ACCUMULATOR FILL LINE		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
3"-PRSL-302A-5	SI	ACCUMULATOR FILL LINE		PIPE	YES	YES	NO	NO	NO	NO	YES	YES	YES-PB
4"-CH-152A-3	SI	TK-28 SUPL TO CVCS PUMPS		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
4"-PRSH-2502-10	SI	INJ LOOP 1		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
4"-PRSH-2502-11	SI	INJ LOOP 4		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
4"-PRSH-2502-14	SI	HPSI INJ HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
4"-PRSH-2502-8	SI	INJ LOOP 3		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
4"-PRSH-2502-9	SI	INJ LOOP 2		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
4"-PRSH-902-12	SI	HPSI DISCH HDR		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
4"-PRSL-302-7	SI	HPSI-1 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM PLR:b COMPONENT REVIEW RESULTS

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4"-PRSL-302-8	SI	HPSI-2 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
4"-PRSL-302-9	SI	HPSI-3 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-152-10	SI	LPSI-1 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-152-11	SI	LPSI-2 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-152-12	SI	LPSI-3 SUPL		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-152-13	SI	VC SUMP DISCH TO LPSI		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	
6"-PRSL-302-19	SI	LPSI-3 DISCH		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-302-22	SI	LPSI-2 DISCH		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-302-23	SI	LPSI-1 DISCH		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-302-44	SI	VC SUMP DISCH TO LPSI		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
6"-PRSL-302-6	SI	LPSI DISCH TO HPSI		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSH-2502-6	SI	LPSI INJ HDR		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSL-302-3	SI	LPSI INJ HDR		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSL-302A-3	SI	LPSI DISCH HDR		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
8"-PRSL-302-20	SI	LPSI HEADER		PIPE	YES	YES	NO	YES	NO	NO	YES	NO	
2 1/2"-SI-152A-A	SI	TO SI SYSTEM		PIPE	YES	YES	NO	NO	NO	NO	YES	NO	

ATTACHMENT F

SI SYSTEM APPLICABLE PROCEDURES LIST

YANKEE ATOMIC ELECTRIC COMPANY
YNPS - PLRA
PLANT PROCEDURE SUMMARY REPORT - SPECIFIC SYSTEM CODE - SI

Procedure No.	Rev. No.	Title	General Class	Specific Class	System Codes
AP-5356	4	IST PUMP AND VALVE PROGRAM	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	SI,MS,AS,BF,CC,CH,CS,DW,EBF,EFW,HC,HV,MC,MR,PR,SA,SW,VD,WCRD,ERPS,RSSS
ISI-PROGRAM					SI,SC,MC,CR,FW,MS
OP-4200	14	MAIN COOLANT SYSTEM LEAK INSPECTION OR ISI PRESSURE TEST	SURVEILLANCE VOL. I	OPERATIONS	SI,VD,CH,CS,MC,SV,SA,SC,PR,HC,ERPS,RSSS
OP-4203	17	MONTHLY VALVE & VC PENETRATION CHECK	SURVEILLANCE VOL. I	OPERATIONS	SI,MS,AR,AS,BA,BF,CA,CC,CP,CH,CI,CS,DW,EBF,FW,HC,HV,LM,MC,PR,PU,SA,SC,SW,VC,VG,WC,WD,ERPS,RSSS
OP-4204	27	TEST OR OPERATION OF THE SAFETY INJECTION PUMPS AND DETERMINATION OF ECCS SUBSYSTEM LEAKAGE	SURVEILLANCE VOL. I	OPERATIONS	SI,ERPS
OP-4205	12	SAFETY INJECTION SYSTEM OPERATION CHECK	SURVEILLANCE VOL. I	OPERATIONS	SI,CH,CS,ERPS,RSSS
OP-4206	14	FLOW TEST OF TWO HPSI PUMPS	SURVEILLANCE VOL. I	OPERATIONS	SI
OP-4208	12	FLOW TEST OF TWO LPSI PUMPS	SURVEILLANCE VOL. I	OPERATIONS	SI,ERPS
OP-4212	20	VAPOR CONTAINER INSPECTION	SURVEILLANCE VOL. I	OPERATIONS	SI,PR,ERPS
OP-4213	7	OPERATIONAL TEST OF BORON INJECTION, ECCS FLOW, AND CIS VALVES	SURVEILLANCE VOL. I	OPERATIONS	SI,MS,CH,PR,ERPS,RSSS
OP-4235	2	INSERVICE INSPECTION LEAK TEST OF LOW PRESSURE SAFETY INJECTION CHECK VALVE CS-V-621	SURVEILLANCE VOL. I	OPERATIONS	SI,CS
OP-4274	3	IN-SERVICE INSPECTION FLOW TEST OF THE SAFETY INJECTION SYSTEM VALVES	SURVEILLANCE VOL. I	OPERATIONS	SI,ERPS
OP-4517	14	SURVEILLANCE OF MOTOR OPERATED VALVES	SURVEILLANCE VOL. I	MAINTENANCE	SI,MS,CS,CH,DW,PU,VD,SA,PR,WCR,EFW,MC,SC,SW,WC,CC,ERPS,RSSS
OP-4518	8	TRAVEL TIME OF MOTOR OPERATED VALVES-MASTER LIST	SURVEILLANCE VOL. I	MAINTENANCE	SI,MS,CS,CH,DW,PU,VD,SA,PR,WCR,EFW,MC,SC,SW,WC,CC,ERPS,RSSS
OP-4586	0	INSERVICE TESTING OF THE VAPOR CONTAINER RECIRCULATION LINE CHECK VALVE SI-V-697	SURVEILLANCE VOL. I	MAINTENANCE	SI
OP-4587	1	INSERVICE TESTING OF THE SAFETY INJECTION ACCUMULATOR DISCHARGE CHECK VALVE SI-V-2	SURVEILLANCE VOL. I	MAINTENANCE	SI
OP-4609	16	SAFETY INJECTION ACTUATION SIGNAL, (SIAS), CHANNELS FUNCTIONAL TEST, SENSOR CALIBRATION AND TOTAL SIAS BYPASS OPERABILITY TEST	SURVEILLANCE VOL. I	INSTRUMENTATION	SI,SW,HC,VG,CH,SA,PR,AS,MS,DC
OP-4615	7	SAFETY INJECTION ACCUMULATOR LEVEL SWITCH OPERATIONAL CHECK AND CHECK OF FUNCTIONS PERFORMED BY LEVEL SWITCHES	SURVEILLANCE VOL. I	INSTRUMENTATION	SI,ERPS
OP-4619	6	CALIBRATION OF THE HPSI PUMP TIME DELAY RELAYS	SURVEILLANCE VOL. I	INSTRUMENTATION	SI
OP-4622	1	FUNCTIONAL TEST OF THE ACCUMULATOR NITROGEN PRESSURE REGULATING VALVES (SI-PR-58, SI-PR-59, SI-PR-402)	SURVEILLANCE VOL. I	INSTRUMENTATION	SI

YANKEE ATOMIC ELECTRIC COMPANY
YNPS - FLEX
PLANT PROCEDURES SUMMARY REPORT - SPECIFIC SYSTEM CODE - SI

Procedure No.	Rev. No.	Title	GENERAL CLASS	SPECIFIC CLASS	SYSTEM CODES
OP-4630	10	ACCUMULATOR TIME DELAY ACTUATION VERIFICATION	SURVEILLANCE VOL. I	INSTRUMENTATION	SI
OP-4631	14	S.I. HOT LEG INJECTION FLOW CHANNEL (SI-F-5) CALIBRATION	SURVEILLANCE VOL. I	INSTRUMENTATION	SI
OP-4634	13	SAFETY INJECTION ACTUATION HIGH CONTAINMENT PRESSURE SENSORS (SI-PS-278 AND SI-PS-239) FUNCTIONAL TEST	SURVEILLANCE VOL. I	INSTRUMENTATION	SI
OP-4636	6	OPERABILITY TESTING OF THE ACCUMULATOR TRIP VALVES SI-TV-604, SI-TV-605 AND SI-TV-606	SURVEILLANCE VOL. I	INSTRUMENTATION	SI
OP-5101	13	MAINTENANCE OF MOTOR OPERATED VALVE NO. _____	MAINTENANCE	GENERAL PLANT	SI,MS,CS,CH,DW,PU,VD,SA,PR,WCB,RFW,WC,SC,SW,WC,CC,ERPS,RSSS
OP-5267	3	ENVIRONMENTAL EQUIPMENT QUALIFICATION/PREVENTATIVE MAINTENANCE OF BAILING CONTROL ACTUATORS NO._____	MAINTENANCE	PRIMARY AUXILIARY SYSTEMS AND EQUIPMENT	SI
OP-5268	3	ENVIRONMENTAL QUALIFICATION INSPECTION AND MAINTENANCE OF SAFETY INJECTION BUILDING ROOF FAN MOTORS - SI-FRV-1 & SI-FRV-2	MAINTENANCE	PRIMARY AUXILIARY SYSTEMS AND EQUIPMENT	SI
OP-5151	9	MAINTENANCE OF HPSI PUMPS OR MOTORS, P49 OR DISCHARGE CHECK VALVE SI-V-30,31,32	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	SI
OP-5152	10	MAINTENANCE OF LPSI PUMPS AND/OR MOTORS, P48,1,2,3 AND/OR PUMP DISCHARGE CHECK VALVES SI-V-11, SI-V-12, SI-V-13	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	SI,ERPS
OP-5758	2	INSPECTION, TESTING AND MAINTENANCE OF GOULD STARTER, BREAKER AND CONTACTOR	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	RBF,MS,PR,SI,SSS,VD,ERPS
OP-5764	9	DISCONNECTING OF ECCS MOV'S AND SHUTDOWN COOLING MOV'S	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	SI,SC,CS,ERPS,RSSS
OP-5765	6	RECONNECTION OF ECCS MOTOR OPERATED VALVE NO. _____ OR SHUTDOWN COOLING VALVE NO. _____	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	SI,SC,CS,ERPS,RSSS
OP-5766	0	DISCONNECTING/RECONNECTING OF ECCS/SI-MOV-22,23,24, AND 25 BREAKER FROM EMCC-2	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	SI,ERPS
OP-6116	5	CALIBRATION OF SAFETY RELATED PRESSURE INDICATORS	INSTRUMENTATION	PRIMARY PLANT	SI,MS,RBF,FS,WS,SSS
OP-6219	4	MAINTENANCE OF ROSEMOUNT 1153A TRANSMITTERS	INSTRUMENTATION	PRIMARY PLANT	SI,PR,WC,FW,VC
OP-6351	3	BORIC ACID MIX TANK LEVEL INSTRUMENTATION SI-L-221 CALIBRATION	INSTRUMENTATION	PRIMARY AUXILIARY INSTRUMENTS	SI
OP-6453	9	CALIBRATION OF THE SI TANK HIGH AND LOW LEVEL ALARM SWITCHES (SI-HLS-213/SI-LLS-220)	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6454	9	SAFETY INJECTION TANK (TK-25) HIGH/LOW TEMPERATURE INDICATING ALARM SWITCH (SI-TIS-223) CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-645[illegible]	10	SAFETY INJECTION ACCUMULATOR SAFETY VALVE SETPOINT CHECK	INSTRUMENTATION	REACTOR SAFEGUARD	SI

YANKEE ATOMIC ELECTRIC COMPANY
YNPS - PLEX
PLANT PROCEDURE SUMMARY REPORT - SPECIFIC SYSTEM CODE - SI

Procedure No.:	Rev. No.	Title	GENERAL CLASS	SPECIFIC CLASS	SYSTEM CODES
OP-6457	11	REPAIR AND ADJUSTMENT OF LPSI ACCUMULATOR PRESSURE REGULATING VALVE SI-PR-58 (SI-PR-53) (SI-PR-602)	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6461	7	HPSI PUMP DISCHARGE HEADER PRESSURE CHANNEL (SI-P-7) CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6462	7	LPSI-PUMP DISCHARGE HEADER PRESSURE CHANNEL (SI-P-6) CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6463	8	SI ACCUMULATOR LEVEL CHANNELS CALIBRATION (SI-L-3 & SI-L-4)	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6464	5	LPSI ACCUMULATOR PRESSURE CHANNEL SI-P-5 CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6465	7	SAFETY INJECTION TANK PNEUMATIC LEVEL CHANNEL SI-L-401 CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6466	3	SI TANK ELECTRONIC LEVEL CHANNEL CALIBRATION SI-L-1	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6467	6	SI LOOP PRESSURE CHANNELS CALIBRATION SI-P-1, 2, 3, 4	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6468	6	LPSI HEADER FLOW CHANNEL (SI-F-10) CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6469	8	HPSI HEADER FLOW CHANNEL (SI-F-6) CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6470	7	SAFETY INJECTION LOOP FLOW CHANNEL CALIBRATION SI-F-1, 2, 3, 4	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6471	5	HPSI PUMP AMMETER CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6472	7	LPSI PUMP AMMETER CALIBRATION	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6476	3	CALIBRATION OF LPSI ACCUMULATOR ALARM PRESSURE SWITCHES	INSTRUMENTATION	REACTOR SAFEGUARD	SI
OP-6552	6	SAFETY INJECTION BUILDING TEMPERATURE SWITCHES (SI-TS-1 THRU 4) CALIBRATION	INSTRUMENTATION	MISCELLANEOUS	SI

ATTACHMENT G

BRIEF DESCRIPTION
OF
COMPONENT DEGRADATION ASSESSMENT TOOL (CoDAT)

8095R

TABLE OF CONTENTS

ATTACHMENT G

Brief Description of Component Degradation Assessment Tool (CoDAT)

1.0 INTRODUCTION

To automate the degradation mechanism review process, Yankee developed an expert system which is used to review fluid system pressure boundary components. The expert system is called CoDAT (Component Degradation Assessment Tool) and performs a detailed evaluation of Yankee plant fluid system pressure boundary components.

Information from other operating plants experience and industry reports related to age degradation of fluid components were used to form the basis for CoDAT.

2.0 DEGRADATION MECHANISMS

Eighteen groups (28 specific) of degradation mechanisms were identified that could cause fluid components to degrade. The 28 degradation mechanisms do not include abnormal stressors from such initiators as improper welding techniques, torquing, cleaning, maintenance, etc.

The degradation mechanisms that could affect fluid systems were selected from an EPRI report titled, Component Life Estimation: LWR Structural Materials Degradation Mechanisms, NP-5461 and from operating plant experiences. Not all of the mechanisms listed in the EPRI report were applicable to the Yankee operating environment.

Of the 18 degradation mechanism groups applicable to Yankee, the 14 groups evaluated by CoDAT are listed in Table 1.

3.0 INFORMATION SOURCES

After determining the degradation mechanisms which could be applicable to the Yankee environment, a search was performed to gain further knowledge related to the controlling parameters of each. The search produced a list of information sources which were found to be helpful in predicting degradation of a fluid component. This information was used to develop the rules employed by CoDAT for assessing the 14 degradation mechanism groups mentioned above.

4.0 DEGRADATION MECHANISMS AND CONTROLLING PARAMETERS

EPRI Report NP-5461 describes the possible degradation mechanisms for fluid systems. Most of the degradation mechanisms have controlling parameters which are effective in predicting fluid component degradation. Approximately 50 controlling parameters were determined to be effective in predicting fluid component degradation.

4.1 General or Uniform Corrosion

General or uniform corrosion occurs to some extent in all metals. However, recent studies done for EPRI (reference EPRI Report No. NP-5461) indicate that certain material groups are not significantly affected by general corrosion for the extension period. The materials that may be affected are listed below:

Carbon Steel
Ferritic Stainless Steels
Martensitic Stainless Steels
Inconel (Wastage)
Cast Iron
Low Alloy Steels
Aluminum

General or uniform corrosion is characterized by the uniform thinning of a pressure boundary wall to the point where the component's material allowable stress level is exceeded. However, unlike all other forms of corrosion, its rate of progress can be predicted so that exceeding a component's allowable stress is rarely encountered. General corrosion can lead to other forms of corrosion which are not uniform in nature. One such mechanism is erosion/corrosion.

4.2 Erosion/Corrosion

Erosion/corrosion is an increase in metal loss due to the relative movement between the process fluid and the metal surface. It is influenced by the rate of general corrosion of the metal surface and is characterized in appearance by grooves, gullies, rounded holes, and valleys and usually exhibits a directional pattern.

4.3 Two-Phase Erosion

Two-phase erosion, like erosion/corrosion, is the result of relative motion between the component material and the process fluid. However, in two-phase erosion, the liquid portion of the process fluid is often accelerated to very high velocities by the vapor portion and therefore causes more severe deterioration of the material.

4.4 Microbiologically-Influenced Corrosion

The corrosion rate of a material can be accelerated by microbiological activity due to the severely corrosive environment produced by their waste products. The most common bacteria associated with Microbiologically-Influenced Corrosion (MIC) are sulfate reducers, sulfur, iron, and manganese oxidizers. Although stagnant areas are most susceptible (for sulfate reducers), components and piping experiencing bulk fluid velocities exceeding 10 ft/sec have experienced MIC because of localized low flow areas.

Although MIC is usually restricted to systems which contain river, lake, potable, or seawater, MIC has been found in fluid systems which are normally filled with demineralized or distilled water because of contamination during pressure testing of the system or inappropriate alignments with contaminated systems.

4.5 Intergranular Stress Corrosion Cracking

Intergranular Stress Corrosion Cracking (IGSCC) occurs in austenitic stainless steels when carbide molecules are formed through the combination of chromium and carbon atoms near the grain boundary. The formation of these molecules depletes the chromium concentration around the grain boundary and reduces the material's resistance to localized corrosive attack. The cracking process, as the name implies, proceeds along the material grain boundaries. Improper welding and/or cooling can produce IGSCC. Corrosive environments, such as process fluids containing halogens, can accelerate IGSCC.

4.6 Transgranular Stress Corrosion Cracking

Transgranular Stress Corrosion Cracking (TGSCC) is caused by the aggressive attack of halogens on a sensitized austenitic stainless steel component. TGSCC results in cracking that proceeds across the material grain boundaries through slip planes. Another form of TGSCC occurs when copper alloys are exposed to an environment containing ammonia. This type of TGSCC can produce cracking, pitting, and/or grooving, and is prevalent in feedwater heaters containing admiralty brass tubes.

4.7 Irradiation Assisted Stress Corrosion Cracking

Irradiation Assisted Stress Corrosion Cracking (IASCC) is very similar to IGSCC, except that all that is necessary to result in IASCC is a high neutron fluence in an oxygenated water environment. Austenitic stainless steel is the only material which is susceptible to IASCC.

4.8 Intergranular Attack

Intergranular attack results in a localized corrosion near or adjacent to the grain boundaries. Knifeline attack, which is one form of intergranular attack, is caused by impurities in the component material or a concentration or depletion of alloying elements near the material grain boundaries. This degradation mechanism usually only attacks stabilized, austenitic stainless steels. Another form of intergranular attack is called weld decay. This mechanism is very similar to knifeline attack except that any cracking experienced is located in the weld.

4.9 Crevice and Pitting Corrosion

Crevice or pitting corrosion results in extreme localized corrosion in stagnant or low flow areas. Crevice corrosion, as the name implies, occurs in tight crevices, such as those formed between a flange face and a gasket. Pitting corrosion, on the other hand, is caused by an impurity concentration which sets up small galvanic cells and produces a harsh environment that otherwise may not be severe. The impurity concentration may be caused by alternate wetting and drying on the component's surface or by precipitation of a chemical species.

4.10 Thermal Embrittlement

Thermal embrittlement of materials results in a significant reduction of the material's notch toughness. For metals, there are several types of thermal embrittlement: 885°F embrittlement of cast austenitic stainless steels, temper embrittlement, strain aging embrittlement, quench-age embrittlement, and blue brittleness. The type of embrittlement which may be experienced is dependent upon the material, special conditioning of the material, fabrication methods, and the operating temperatures experienced by the component.

4.11 Irradiation Embrittlement

Irradiation embrittlement occurs because of long-term exposure to neutron radiation. This embrittlement process also causes a decrease in the material's toughness.

4.12 Hydrogen Embrittlement

Hydrogen embrittlement occurs as a result of atomic hydrogen (produced during any corrosion process) becoming trapped within a material's lattice structure. The trapped hydrogen prevents plane slippage and, thereby, decreases the toughness of the material.

4.13 Selective Leaching

Selective leaching is the result of one element of an alloy being removed by a corrosion process. The most common forms of selective leaching are graphitization and dezincification.

Graphitization occurs when the iron matrix from a component fabricated from gray cast iron is removed during a corrosion process. This leaching process removes the iron leaving behind the insoluble graphite which has essentially no strength. This process usually takes several decades. However, under certain conditions (i.e., buried piping under severe soil conditions), it can occur much more rapidly.

Dezincification describes a process whereby zinc is selectively removed from brass components. It occurs most often in copper alloys which contain over 20% zinc.

4.14 Galvanic Corrosion

In a general way, all corrosion depends upon galvanic action. However, this review will be limited to the galvanic action that takes place when small differentials exist between the solution potential of adjacent materials. Galvanic corrosion can happen rapidly in process fluids which have a high conductivity, such as seawater. In higher quality water, where the conductivity is much lower, the process may still occur, but it will affect a much smaller area and take longer to occur.

5.0 DATA BASE REQUIREMENTS

The identified controlling parameters form the basis for a component data base which CoDAT accesses to identify degradation mechanisms which may be present. Each fluid system evaluated is broken into components (piece parts, if necessary), and appropriate data entered for the parameters identified.

6.0 CoDAT RESULTS

Once CoDAT accesses and analyzes a fluid component's operating and environmental characteristics, a list of potential aging degradation mechanisms is output for each component or part being evaluated.

CoDAT is presently undergoing a verification and validation process which is scheduled to be completed early in 1990. The results must, therefore, be considered preliminary. Calculations forming the bases of the degradation review, however, have been completed.

TABLE 1

Fluid Component Degradation Mechanisms Evaluated By CoDAT

General or Uniform Corrosion
Erosion/Corrosion
Two Phase Erosion
Microbiologically-Influenced Corrosion
Intergranular Stress Corrosion Cracking
Transgranular Stress Corrosion Cracking
Irradiation-Assisted Stress Corrosion Cracking
Intergranular Attack
- Knifeline Attack
- Weld Decay

Crevice/Pitting Corrosion
Thermal Embrittlement
- 885°F Embrittlement
- Strain Age Embrittlement
- Blue Brittleness
- Temper Brittlement
- Quench Age Embrittlement

Irradiation Embrittlement
Hydrogen Embrittlement
Selective Leaching
- Dezincification
- Graphitization

Galvanic Corrosion

ATTACHMENT H

SAFETY INJECTION SYSTEM
TYPICAL I&C COMPONENT
REVIEW RESULTS

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM I&C COMPONENT REVIEW RESULTS

TAG NO.	SYSTEM CODE	DESCRIPTION	CLASS	LOOP	GROUP	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: EQ	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: PLANT PROC	STEP 2B: COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-EA-0001	SI	EB-SQ-UQA-27/1A VOLTAGE MONITOR	6	0001	VOLT	EA	YES	NO	NONE	YES	YES	YES
SI-EA-0002	SI	EB-SQ-UQA-27/2A VOLTAGE MONITOR	6	0002	VOLT	EA	YES	NO	NONE	YES	YES	YES
SI-EA-0003	SI	EB-SQ-UQA-27/3A VOLTAGE MONITOR	6	0003	VOLT	EA	YES	NO	NONE	YES	YES	YES
SI-FI-0001	SI	LOOP #1 SI FLOW	ST	0001	EM	FI	YES	NO	OP-6470	NO	-	-
SI-FI-0002	SI	LOOP #2 SI FLOW	ST	0002	EM	FI	YES	NO	OP-6470	NO	-	-
SI-FI-0003	SI	LOOP #3 SI FLOW	ST	0003	EM	FI	YES	NO	OP-6470	NO	-	-
SI-FI-0004	SI	LOOP #4 SI FLOW	ST	0004	EM	FI	YES	NO	OP-6470	NO	-	-
SI-FI-0005	SI	SI HOT LEG INJECTION FLOW	SPT	0005	EM	FI	YES	NO	OP-4631	NO	-	-
SI-FI-0006	SI	HPSI HEADER FLOW INDICATOR	SPT	0006	EM	FI	YES	NO	OP-6469	NO	-	-
SI-FI-0010	SI	LPSI FLOW INDICATOR HEADER FLOW	NO	0010		FI	NO	NO	OP-6468	-	-	-
SI-FT-0001	SI	LOOP #1 SI FLOW TRANSMITTER	ST	0001	PTE	FT	YES	NO	OP-6470	NO	-	-
SI-FT-0002	SI	LOOP #2 SI FLOW TRANSMITTER	ST	0002	PTE	FT	YES	NO	OP-6470	NO	-	-
SI-FT-0003	SI	LOOP #3 SI FLOW TRANSMITTER	ST	0003	PTE	FT	YES	NO	OP-6470	NO	-	-
SI-FT-0004	SI	LOOP #4 SI FLOW TRANSMITTER	ST	0004	PTE	FT	YES	NO	OP-6470	NO	-	-
SI-FT-0005	SI	SI HOT LEG INJECTION FLOW TRANSMITTER	SEPT	0005	PTE	FT	YES	YES	OP-4631 OP-6219	NO	-	-
SI-FT-0006	SI	HPSI HEADER FLOW TRANSMITTER	SEPT	0006	PTE	FT	YES	YES	OP-6469	NO	-	-
SI-FT-0010	SI	LPSI FLOW TRANSMITTER HEADER FLOW	NO	0010		FT	NO	NO	OP-6468	-	-	-
SI-HLLA-0001	SI	SI TANK HI/LO LEVEL ALARM	SPT	0001	EI	HLLA	YES	NO	OP-6466	NO	-	-

YANKEE ATOMIC ELECTRIC COMPANY
YNPS LICENSE RENEWAL PROJECT
SAFETY INJECTION SYSTEM I&C COMPONENT REVIEW RESULTS

TAG NO	SYSTEM CODE	DESCRIPTION	CLASS	LOOP	GROUP	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: EQ	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: PLANT PROC	STEP 2B: COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
SI-HLS-0006	SI	ACCUMULATOR REFERENCE LEG TEL-TALE, SI LEVEL TRANSMITTER	NO	0006		HLS	NO	NO	OP-6463 OP-4615	-	-	-
SI-HLS-0219	SI	SI TANK MCB PANALARM HIGH LEVEL SWITCH	ST	0219	PSW	HLS	YES	NO	OP-6451	NO	-	-
SI-HLS-0228	SI	HI LEVEL SWITCH	NO	0228		HLS	NO	NO	OP-6351	-	-	-
SI-II-0001	SI	LPSI PUMP #1 AMMETER	NB	0001	METER	II	NO	NO	OP-6472	-	-	-
SI-II-0002	SI	LPSI PUMP #2 AMMETER	NB	0002		II	NO	NO	OP-6472	-	-	-
SI-II-0003	SI	LPSI PUMP #3 AMMETER	NB	0003		II	NO	NO	OP-6472	-	-	-
SI-II-0004	SI	HPSI PUMP #1 AMMETER	NB	0004	METER	II	NO	NO	OP-6471	-	-	-
SI-II-0005	SI	HPSI PUMP #2 AMMETER	NB	0005	METER	II	NO	NO	OP-6471	-	-	-
SI-II-0006	SI	HPSI PUMP #3 AMMETER	NB	0006	METER	II	NO	NO	OP-6471	-	-	-
SI-KS-0001	SI	TIME DELAY RELAY EB-TDC-62/1A-5A	SCT	0001	RELAY	KS	YES	NO	OP-4618	YES	YES	YES
SI-KS-0002	SI	TIME DELAY RELAY EB-TDC-62/2A-5B	SCT	0002	RELAY	KS	YES	NO	OP-4618	YES	YES	YES
SI-KS-0003	SI	TIME DELAY RELAY EB-TDC-62/3A-5C	SCPT	0003	RELAY	KS	YES	NO	OP-4618	YES	YES	YES
SI-LI-0001	SI	SI LEVEL INDICATOR	SPT	0001	EM	LI	YES	NO	OP-6466	NO	-	-
SI-LI-0002	SI	SI TANK LEVEL INDICATOR LOWER PAB	NB	0002		LI	NO	NO	OP-6216	-	-	-
SI-LI-0003	SI	SI ACCUMULATOR LEVEL INDICATOR	SPT	0003	EM	LI	YES	NO	OP-6463	NO	-	-
SI-LI-0004	SI	SI ACCUMULATOR LEVEL INDICATOR	ST	0004	EM	LI	YES	NO	OP-6463	NO	-	-
SI-LI-0221	SI	BAMT LEVEL INDICATOR	NB	0221		LI	NO	NO	OP-6351	-	-	-
SI-LI-0401	SI	SI TANK LEVEL INDICATOR	NB	0401		LI	NO	NO	OP-6465	-	-	-
SI-LIT-0401	SI	SI TANK PNEUMATIC LEVEL CHANNEL INDICATOR/TRANSMITTER	NO	0401		LIT	NO	NO	OP-6465	-	-	-

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SI-LLLA-0001	SI	SI TANK LOW-LOW LEVEL ALARM (B/S)	SPT	0001	EI	LLLA	YES	NO	OP-6466	NO	-	-
SI-LLS-0001	SI	ACCUMULATOR LOW WATER LEVEL SWITCH	SPT	0001	PSW	LLS	YES	NO	OP-4615	NO	-	-
SI-LLS-0002	SI	ACCUMULATOR LOW WATER LEVEL SWITCH	ST	0002	PSW	LLS	YES	NO	OP-4615	NO	-	-
SI-LLS-0003	SI	ACCUMULATOR LOW WATER LEVEL SWITCH	SPT	0003	PSW	LLS	YES	NO	OP-4615	NO	-	-
SI-LLS-0004	SI	ACCUMULATOR LOW WATER LEVEL SWITCH	ST	0004	PSW	LLS	YES	NO	OP-4615	NO	-	-
SI-LLS-0220	SI	SI TANK MCB PANALARM LOW LEVEL	ST	0220	PSW	LLS	YES	NO	OP-6451	NO	-	-
SI-LLS-0227	SI	MINIMUM LEVEL SWITCH	NO	0227		LLS	NO	NO	OP-6351	-	-	-
SI-LR-0221	SI	BAMT TANK LEVEL RECORDER	NO	0221		LR	NO	NO	OP-6351	-	-	-
SI-LT-0001	SI	SI TANK LEVEL TK-28 TRANSMITTER	SPT	0001	PTE	LT	YES	NO	OP-6466	NO	-	-
SI-LT-0003	SI	SI ACCUMULATOR LEVEL TRANSMITTER	SPT	0003	PTE	LT	YES	NO	OP-6463	NO	-	-
SI-LT-0004	SI	SI ACCUMULATOR LEVEL TRANSMITTER	ST	0004	PTE	LT	YES	NO	OP-6463	NO	-	-
SI-LT-0221	SI	BAMT TANK LEVEL TRANSMITTER	NO	0221		LT	NO	NO	OP-6351	-	-	-
SI-MOV-0001	SI	ACCUMULATOR OUTLET ISOLATION VALVE	SPT	0001	VALVE	MOV	YES	NO	OP-4615	YES	YES	YES
SI-P/S-0005	SI	SI HOT LEG POWER SUPPLY	ST	0005	SUP	P/S	YES	NO	OP-4631	NO	-	-
SI-P/S-0006	SI	HPSI HEADER FLOW TRANSMITTER	SPT	0006	SUP	P/S	YES	NO	OP-6469	NO	-	-
SI-P/S-0007	SI	HPSI HEADER FLOW TRANSMITTER	SPT	0007	SUP	P/S	YES	NO	OP-6461	YES	YES	YES
SI-P/S-0100	SI	SI ACCUMULATOR PRESSURE (ONE OF FIVE LOADS ON THIS POWER SUPPLY)	ST	0100	SUP	P/S	YES	NO	OP-6464	YES	YES	YES

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SI-P/S-0200	SI	POWER SUPPLY SF UNIT	ST	0200	SUP	P/S	YES	NO	NONE	YES	YES	YES
SI-P/S-0300	SI	POWER SUPPLY RF UNIT 5 (SIP)	ST	0300	SUP	P/S	YES	NO	NONE	YES	YES	YES
SI-P/S-0400	SI	POWER SUPPLY VF	ST	0400	SUP	P/S	YES	NO	NONE	YES	YES	YES
SI-PI-0001	SI	LOOP #1 SI PRESSURE	NB	0001		PI	NO	NO	OP-6467	-	-	-
SI-PI-0001-A	SI	LOOP #1 MC PRESSURE INDICATOR	NB	0001-A		PI	NO	NO	OP-6467	-	-	-
SI-PI-0001-B	SI	LOOP #1 SI PRESSURE	NB	0001-B		PI	NO	NO	OP-6467	-	-	-
SI-PI-0002	SI	LOOP #2 SI PRESSURE	NB	0002		PI	NO	NO	OP-6467	-	-	-
SI-PI-0002-A	SI	LOOP #2 SI PRESSURE INDICATOR	NB	0002-A		PI	NO	NO	OP-6467	-	-	-
SI-PI-0002-B	SI	LOOP #2 SI PRESSURE INDICATOR	NB	0002-B		PI	NO	NO	OP-6467	-	-	-
SI-PI-0003	SI	LOOP #3 SI PRESSURE INDICATOR	NB	0003		PI	NO	NB	OP-6467	-	-	-
SI-PI-0003-A	SI	LOOP #3 MC PRESSURE INDICATOR	NB	0003-A		PI	NO	NO	OP-6467	-	-	-
SI-PI-0003-B	SI	LOOP #3 SI PRESSURE INDICATOR	NB	0003-B		PI	NO	NO	OP-6467	-	-	-
SI-PI-0004	SI	LOOP #4 SI PRESSURE INDICATOR	NB	0004		PI	NO	NO	OP-6467	-	-	-
SI-PI-0004-A	SI	LOOP #4 MC PRESSURE INDICATOR	NB	0004-A		PI	NO	NO	OP-6467	-	-	-
SI-PI-0004-B	SI	LOOP #4 SI PRESSURE INDICATOR	NB	0004-B		PI	NO	NO	OP-6467	-	-	-
SI-PI-0005	SI	SI ACCUMULATOR PRESSURE INDICATOR	ST	0005	EM	PI	YES	NO	OP-6464	NO	-	-
SI-PI-0006	SI	LPSI PUMP DISCHARGE PRESSURE INDICATOR	NB	0006		PI	NO	NO	OP-6462	-	-	-
SI-PI-0007	SI	HPSI PUMP DISCHARGE PRESSURE	SP	0007		PI	YES	NO	OP-6461	NO	-	-

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SI-PI-0009	SI	ACCUMULATOR PRESSURE INDICATOR	ST	0008	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0010	SI	HPSI HEADER CHECK VALVE PRESSURE	NB	0010		PI	NO	NO	NONE	-	-	-
SI-PI-0011	SI	LPSI HEADER CHECK VALVE PRESSURE	NB	0011		PI	NO	NO	NONE	-	-	-
SI-PI-0012	SI	LOW PRESSURE SI HEADER	ST	0012	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0013	SI	HIGH PRESSURE SI PRESSURE INDICATOR	ST	0013	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0020	SI	N2 REGULATED PRESSURE TO ACCUMULATOR #1 HEADER	ST	0020	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0021	SI	N2 REGULATED PRESSURE TO ACCUMULATOR #2 HEADER	ST	0021	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0022	SI	N2 REGULATED PRESSURE TO ACCUMULATOR #3 HEADER	ST	0022	PGP	PI	YES	NO	OP-6216	NO	-	-
SI-PI-0028	SI	ACCUMULATOR 1000 N2 SUPPLY TO TRIP VALVES	NB	0028		PI	NO	NO	NONE	-	-	-
SI-PI-0029	SI	ACCUMULATOR 5000 N2 SUPPLY TO RELIEF VALVES	NB	0029		PI	NO	NO	OP-6216	-	-	-
SI-PI-0030	SI	#1 LPSI SUCTION PUMP PRESSURE INDICATOR	NB	0030		PI	NO	NO	NONE	-	-	-
SI-PI-0031	SI	#1 HPSI SUCTION PUMP PRESSURE INDICATOR	NB	0031		PI	NO	NO	NONE	-	-	-
SI-PI-0032	SI	#2 LPSI SUCTION PUMP PRESSURE INDICATOR	NB	0032		PI	NO	NO	NONE	-	-	-
SI-PI-0033	SI	#2 HPSI SUCTION PUMP PRESSURE INDICATOR	NB	0033		PI	NO	NO	NONE	-	-	-
SI-PI-0034	SI	#3 LPSI SUCTION PUMP PRESSURE INDICATOR	NB	0034		PI	NO	NO	NONE	-	-	-
SI-PI-0035	SI	#3 HPSI SUCTION PUMP PRESSURE INDICATOR	NB	0035		PI	NO	NO	NONE	-	-	-
SI-PP-0058	SI	#2 HEADER PRESSURE	ST	0058	VALVE	PP	YES	NO	OP-4622	YES	YES	YES

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SI-PR-0059	SI	#1 HEADER PRESSURE REDUCER TO ACCUMULATOR	ST	0059	VALVE	PR	YES	NO	OP-4622	YES	YES	YES
SI-PR-0602	SI	#3 HEADER PRESSURE REDUCER TO ACCUMULATOR	ST	0602	VALVE	PR	YES	NO	OP-4622	YES	YES	YES
SI-PR-0613	SI	ECCS ACCUMULATOR 500 LBS N2 SYSTEM BOTTLE PRESSURE REGULATOR	G	0613	VALVE	PR	YES	NO	NONE	YES	YES	YES
SI-PR-0614	SI	ECCS ACCUMULATOR 500 LBS N2 SYSTEM BOTTLE PRESSURE REGULATOR	G	0614	VALVE	PR	YES	NO	NONE	YES	YES	YES
SI-PS-0007	SI	ACCUMULATOR HIGH PRESSURE SWITCH	ST	0007	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0010	SI	HPSI HEADER CHECK VALVE LEAK ALARM	NO	0010		PS	NO	NO	NONE	-	-	-
SI-PS-0011	SI	LPSI HEADER CHECK VALVE LEAK ALARM	NO	0011		PS	NO	NO	NONE	-	-	-
SI-PS-0020	SI	LOW N2 PRESSURE SWITCH #3 SUPPLY HDR	ST	0020	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0021	SI	HIGH N2 PRESSURE SWITCH #3 SUPPLY HDR	ST	0021	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0022	SI	LOW N2 PRESSURE SWITCH #2 SUPPLY HDR	ST	0022	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0023	SI	HIGH N2 PRESSURE SWITCH #2 HEADER	ST	0023	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0024	SI	LOW N2 PRESSURE SWITCH #1 SUPPLY HEADER	ST	0024	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0025	SI	HIGH N2 PRESSURE SWITCH #1 SUPPLY HEADER	ST	0025	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0026	SI	100 LB N2 SUPPLY TO TRIP VALVE HIGH PRESSURE SER	NO	0026		PS	NO	NO	OP-6476	-	-	-
SI-PS-0027	SI	N2 LOW PRESSURE SWITCH FOR 100 LB N2 SUPPLY TO TRIP VALVES	NO	0027		PS	NO	NO	OP-6476	-	-	-

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SI-PS-0028	SI	500 LB N2 SUPPLY TO SAFETY VALVE HIGH PRESSURE SWITCH	ST	0028	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0029	SI	500 LB N2 SUPPLY TO SAFETY VALVE LOW PRESSURE SWITCH	ST	0029	PSW	PS	YES	NO	OP-6476	NO	-	-
SI-PS-0030	SI	N2 LEAK ALARM FOR SI-TV-0608 PRESS SWITCH (2 LB INCREASING PRESSURE)	NO	0030		PS	NO	NO	OP-6476	-	-	-
SI-PS-0238	SI	HIGH PRESSURE SI ACTUATION	SCT	0238	PSW	PS	YES	NO	OP-4634	NO	-	-
SI-PS-0239	SI	SI ACTUATION SWITCH	SCT	0239	PSW	PS	YES	NO	OP-4634	NO	-	-
SI-PT-0001	SI	LOOP #1 SI PRESSURE	NO	0001		PT	NO	NO	OP-6467	-	-	-
SI-PT-0002	SI	LOOP #2 SI PRESSURE	NO	0002		PT	NO	NO	OP-6467	-	-	-
SI-PT-0003	SI	LOOP #3 PRESSURE TRANSMITTER	NO	0003		PT	NO	NO	OP-6467	-	-	-
SI-PT-0004	SI	LOOP #4 SI PRESSURE TRANSMITTER	NO	0004		PT	NO	NO	OP-6467	-	-	-
SI-PT-0005	SI	SI ACCUMULATOR PRESSURE TRANSMITTER	ST	0005	PTE	PT	YES	NO	OP-6464	NO	-	-
SI-PT-0006	SI	LPSI PUMP PRESSURE TRANSMITTER	NO	0006		PT	NO	NO	OP-6462	-	-	-
SI-PT-0007	SI	HPSI PRESSURE TRANSMITTER	SP	0007	PTE	PT	YES	NO	OP-6461	NO	-	-
SI-SOV-0045	SI	CLOSES SI-TV-0608 LOW ACCUMULATOR LEVEL	G	0045	VALVE	SOV	YES	NO	OP-4615	YES	YES	YES
SI-SOV-0046	SI	TRIPS SI-TV-0604,0605,0606 N2 ACCUMULATOR	G	0046	VALVE	SOV	YES	NO	OP-4636	YES	YES	YES
SI-SOV-0047	SI	N2 TO ACCUMULATOR SI-TV-604,605,606	G	0047	VALVE	SOV	YES	NO	OP-4636	YES	YES	YES
SI-SOV-0056	SI	ACCUMULATOR SAFETY VALVE	ST	0056	VALVE	SOV	YES	NO	OP-4615	YES	YES	YES

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SI-SOV-0057	SI	ACCUMULATOR SAFETY VALVE SOV	ST	0057	VALVE	SOV	YES	NO	OP-4615	YES	YES	YES
SI-SOV-0639	SI	ACCUMULATOR SAFETY VALVE SOV	ST	0639	VALVE	SOV	YES	NO	OP-4615	YES	YES	YES
SI-SOV-0640	SI	ACCUMULATOR SAFETY VALVE SOV	ST	0640	VALVE	SOV	YES	NO	OP-4615	YES	YES	YES
SI-SQ-0005	SI	SI HOT LEG SQUARE ROOT EXTRACTOR	ST	0005	EI	S/Q	YES	NO	OP-4631	NO	-	-
SI-SQ-0006	SI	HPSI HEADER FLOW SQUARE ROOT EXTRACTOR	ST	0006	EI	S/Q	YES	NO	OP-6469	NO	-	-
SI-SV-0001	SI	SI ACCUMULATOR RELIEF VALVE	ST	0001	VALVE	SV	YES	NO	OP-4615 OP-6456	YES	YES	YES
SI-SV-0002	SI	SI ACCUMULATOR RELIEF VALVE	ST	0002	VALVE	SV	YES	NO	OP-4615 OP-6456	YES	YES	YES
SI-SV-0609	SI	SI ACCUMULATOR RELIEF VALVE	ST	0609	VALVE	SV	YES	NO	OP-4615 OP-6456	YES	YES	YES
SI-SV-0684	SI	5000 N2 BOTTLE RELIEF VALVE	G	0684	VALVE	SV	YES	NO	NONE	YES	YES	YES
SI-SV-0688	SI	PRESSURE RELIEF FOR 5000 N2 SYSTEM	G	0688	VALVE	SV	YES	NO	NONE	YES	YES	YES
SI-TCV-0205	SI	SI TANK HEAT EXCHANGER STEAM TEMP CONTROL	G	0205	VALVE	TCV	YES	NO	NONE	YES	YES	YES
SI-TCV-0314	SI	SI TANK TEMP CONTROL VALVE	G	0314	VALVE	TCV	YES	NO	NONE	YES	YES	YES
SI-TD-0062-1	SI	SI-TD-62-1 RELAY	G	0062-1	RELAY	R	YES	NO	OP-4618	YES	YES	YES
SI-TD-0062-2	SI	SI-TD-62-2 RELAY	G	0062-2	RELAY	R	YES	NO	OP-4618	YES	YES	YES
SI-TD-0062-3	SI	SI-TD-62-3 RELAY	G	0062-3	RELAY	R	YES	NO	OP-4618	YES	YES	YES
SI-TDC-0001	SI	ACCUMULATOR TIME DELAY RELAY	G	0001	RELAY	TDC	YES	NO	OP-4630	YES	YES	YES
SI-TDC-0002	SI	ACCUMULATOR TIME DELAY RELAY	G	0002	RELAY	TDC	YES	NO	OP-4630	YES	YES	YES

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SI-TDC-0803	SI	ACCUMULATOR TIME DELAY RELAY	6	0803	RELAY	TDC	YES	NO	OP-4630	YES	YES	YES
SI-TDC-0804	SI	ACCUMULATOR TIME DELAY RELAY	6	0804	RELAY	TDC	YES	NO	OP-4630	YES	YES	YES
SI-TI-0220	SI	TEMP INDICATOR BORIC ACID MIX TANK	NO	0220		TI	NO	NO	NONE	-	-	-
SI-TI-0223	SI	SI TANK TEMP	ST	0223	PGT	TI	YES	NO	NONE	YES	YES	YES
SI-TIS-0223	SI	SI TANK TK-28 HIGH/LOW TEMP INDICATING ALARM SWITCH	ST	0223	PSW	TIS	YES	NO	OP-6454	NO	-	-
SI-TS-0801	SI	CONTROLS PRV-1 POWER ROOF VENTILATOR VIA EMCC 03 - ASSOCIATED DAMPERS	SE	0801	PSW	TS	YES	YES	OP-6853	NO	-	-
SI-TS-0802	SI	CONTROLS PRV-2 POWER ROOF VENTILATOR - ASSOCIATED DAMPERS VIA EMCC 04	SE	0802	PSW	TS	YES	YES	OP-6853	NO	-	-
SI-TS-0803	SI	CONTROLS UV-1 UNIT VENTILATOR	NO	0803		TS	NO	NO	OP-6853	-	-	-
SI-TS-0804	SI	SI BLDG HIGH TEMP ALARM	NO	0804		TS	NO	NO	OP-6853	-	-	-
SI-TV-0604	SI	N2 TRIP VALVE 01 HDR TO ACCUMULATOR	ST	0604	VALVE	TV	YES	NO	OP-4636	YES	YES	YES
SI-TV-0605	SI	N2 TRIP VALVE 02 HDR TO ACCUMULATOR	ST	0605	VALVE	TV	YES	NO	OP-4636	YES	YES	YES
SI-TV-0606	SI	N2 TRIP VALVE 03 HDR TO ACCUMULATOR	ST	0606	VALVE	TV	YES	NO	OP-4636	YES	YES	YES
SI-TV-0608	SI	N2 SHUTOFF TO ACCUMULATOR ON LOW LEVEL	ST	0608	VALVE	TV	YES	NO	OP-4615	YES	YES	YES
SI-VM-0001	SI	01 LPSI VIBRATION MONITOR	NB	0001		VM	NO	NO	NONE	-	-	-
SI-VM-0001-A	SI	01 LPSI VIBRATION CH X MOTOR PICKUP	NB	0001-A		VM	NO	NO	NONE	-	-	-
SI-VM-0001-B	SI	01 LPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0001-B		VM	NO	NO	NONE	-	-	-

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SI-VM-0002	SI	#2 LPSI VIBRATION MONITOR	NB	0002		VM	NO	NO	NONE	-	-	-
SI-VM-0002-A	SI	#2 LPSI VIBRATION MONITOR CH X MOTOR PICKUP	NB	0002-A		VM	NO	NO	NONE	-	-	-
SI-VM-0002-B	SI	#2 LPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0002-B		VM	NO	NO	NONE	-	-	-
SI-VM-0003	SI	#3 LPSI VIBRATION MONITOR	NB	0003		VM	NO	NO	NONE	-	-	-
SI-VM-0003-A	SI	#3 LPSI VIBRATION MONITOR CH X MOTOR PICKUP	NB	0003-A		VM	NO	NO	NONE	-	-	-
SI-VM-0003-B	SI	#3 LPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0003-B		VM	NO	NO	NONE	-	-	-
SI-VM-0004	SI	#1 HPSI VIBRATION MONITOR	NB	0004		VM	NO	NO	NONE	-	-	-
SI-VM-0004-A	SI	#1 HPSI VIBRATION MONITOR CH X MOTOR PICKUP	NB	0004-A		VM	NO	NO	NONE	-	-	-
SI-VM-0004-B	SI	#1 HPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0004-B		VM	NO	NO	NONE	-	-	-
SI-VM-0005	SI	#2 HPSI VIBRATION MONITOR	NB	0005		VM	NO	NO	NONE	-	-	-
SI-VM-0005-A	SI	#2 HPSI VIBRATION MONITOR CH X MOTOR PICKUP	NB	0005-A		VM	NO	NO	NONE	-	-	-
SI-VM-0005-B	SI	#2 HPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0005-B		VM	NO	NO	NONE	-	-	-
SI-VM-0006	SI	#3 HPSI VIBRATION MONITOR	NB	0006		VM	NO	NO	NONE	-	-	-
SI-VM-0006-A	SI	#3 HPSI VIBRATION MONITOR CH X MOTOR PICKUP	NB	0006-A		VM	NO	NO	NONE	-	-	-
SI-VM-0006-B	SI	#3 HPSI VIBRATION MONITOR CH Y PUMP PICKUP	NB	0006-B		VM	NO	NO	NONE	-	-	-

ATTACHMENT I

EMERGENCY ELECTRICAL POWER SYSTEM (EEPS)
COMPONENT REVIEW RESULTS
REVIEW RESULTS

YANKEE ATOMIC ELECTRIC [illegible]
YNPS LICENSE RENEWAL PROJECT
EMERGENCY ELECTRICAL POWER SYSTEM COMPONENT REVIEW RESULTS

TAG NO	SYSTEM CODE	DESCRIPTION	CATAGORY	TYPE	APPLICATION	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: EQ	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: PLANT PROC	COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: COMPONENTS POTENTIAL AGE DEGRADATION MECHANISMS: DIE	WEAR	CORR	RAD	POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
ACB-BT-1B	EEPS	480V EBUS-1 TO BUS-6-3 TIE ACB	CTRL & PROT	BREAKER	480V POWER	ACB	YES	NO	OP-4251 OP-4506	NO	-	-	-	-	-	NO
ACB-BT-2B	EEPS	480V EBUS-2 TO BUS-4-1 TIE ACB	CTRL & PROT	BREAKER	480V POWER	ACB	YES	NO	OP-4251 OP-4506	NO	-	-	-	-	-	NO
ACB-BT-3B	EEPS	480V EBUS-3 TO BUS-5-2 TIE ACB	CTRL & PROT	BREAKER	480V POWER	ACB	YES	NO	OP-4251 OP-4506	NO	-	-	-	-	-	NO
SW-TO-1	EEPS	MANUAL THROWOVER SW NO 1 100A	CTRL & PROT	SWITCH	480V TRANSFER	BKR	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
SW-TO-2	EEPS	MANUAL THROWOVER SW NO 2 100A	CTRL & PROT	SWITCH	480V TRANSFER	BKR	YES	YES	OP-5812	NO	-	-	-	-	-	NO
FN-9-1	EEPS	CONTROL ROOM EMERGENCY AIR CLEANING FAN	LOAD	MOTOR	FAN	MTR	YES	NO	OP-5758 OP-5756	YES	YES	YES	NO	YES	YES	YES
FN-9-2	EEPS	CONTROL ROOM EMERGENCY AIR CLEANING	LOAD	MOTOR	FAN	MTR	YES	NO	OP-5758 OP-5756	YES	YES	YES	NO	YES	YES	YES
SI-PRV-1	EEPS	DGB ROOF EXH FAN (EMERGENCY)	LOAD	MOTOR	FAN	MTR	YES	YES	OP-5268 OP-5756	YES	YES	YES	NO	YES	YES	YES
SI-PRV-2	EEPS	DGB ROOF EXH FAN (EMERGENCY)	LOAD	MOTOR	FAN	MTR	YES	YES	OP-5268 OP-5756	YES	YES	YES	NO	YES	YES	YES
SSS-AF-5	EEPS	SSS BUILDING VENT FAN	LOAD	MOTOR	FAN	MTR	NO	-	-	-	-	-	-	-	-	NO
UV-6	EEPS	DGB UNIT VENTILATOR (NORMAL)	LOAD	MOTOR	FAN	MTR	NO	-	-	-	-	-	-	-	-	NO
EDG-LVRE-1	EEPS	EDG-1 DIESEL LOUVER MOTORS	LOAD	MOTOR	LOUVER	MTR	YES	NO	OP-5350 OP-4287	NO	-	-	-	-	-	NO
EDG-LVRE-2	EEPS	EDG-2 DIESEL LOUVER MOTORS	LOAD	MOTOR	LOUVER	MTR	YES	NO	OP-5350 OP-4287	NO	-	-	-	-	-	NO

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EDG-LVRE-3	EEPS	EDG-3 DIESEL LOUVER MOTORS	LOAD	MOTOR	LOUVER	MTR	YES	NO	OP-5358 OP-4287	NO	-	-	-	-	-	NO
P-48-1	EEPS	LOW PRESSURE SAFETY INJ PP 1	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 OP-4288 AP-5356 OP-4274 OP-5352 OP-4285	NO	-	-	-	-	-	NO
P-48-2	EEPS	LOW PRESSURE SAFETY INJ PP 2	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 AP-5356 OP-4288 OP-4274 OP-5352 OP-4285	NO	-	-	-	-	-	NO
P-48-3	EEPS	LOW PRESSURE SAFETY INJ PP 3	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 AP-5356 OP-4288 OP-4274 OP-5352 OP-4285	NO	-	-	-	-	-	NO
P-49-1	EEPS	HIGH PRESSURE SAFETY INJ PP 1	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 OP-4286 AP-5356 OP-4274 OP-5351 OP-4285	NO	-	-	-	-	-	NO
P-49-2	EEPS	HIGH PRESSURE SAFETY INJ PP 2	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 AP-5356 OP-4286 OP-4274 OP-5351 OP-4285	NO	-	-	-	-	-	NO
P-49-3	EEPS	HIGH PRESSURE SAFETY INJ PP 3	LOAD	MOTOR	PUMP	MTR	YES	YES	OP-4284 AP-5356 OP-4286 OP-4274 OP-5351 OP-4285	NO	-	-	-	-	-	NO
P-81	EEPS	SSS SECONDARY MAKE-UP PUMP	LOAD	MOTOR	PUMP	MTR	YES	NO	OP-4253	NO	-	-	-	-	-	NO

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P-82	EEPS	SSS PRIMARY MAKE-UP PUMP	LOAD	MOTOR	PUMP	MTR	YES	NO	OP-5758 OP-4253	NO	-	-	-	-	-	NO
SI-A-8	EEPS	SSS PRIMARY MAKE-UP PUMP AGITATOR	LOAD	MOTOR	PUMP	MTR	YES	NO	NONE	YES	YES	YES	NO	YES	YES	YES
CH-MOV-0522	EEPS	MOTOR OPERATED VALVE CH-MOV-522	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4203 OP-4233 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CH-MOV-0523	EEPS	MOTOR OPERATED VALVE CH-MOV-523	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518 OP-4517 OP-5101 OP-4217	NO	-	-	-	-	-	NO
CH-MOV-0524	EEPS	MOTOR OPERATED VALVE CH-MOV-524	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4203 AP-5356 OP-4200 OP-4233 OP-4518 OP-4517 OP-5101 OP-4217	NO	-	-	-	-	-	NO
CS-MOV-0532	EEPS	S I LP RECIRC	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4205 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CS-MOV-0533	EEPS	MOTOR OPERATED VALVE CS-MOV-533	LOAD	MOTOR	VALVE	MTR	YES	NO	AP-5356 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CS-MOV-0534	EEPS	BY-PASS VALVE	LOAD	MOTOR	VALVE	MTR	NO	-	-	-	-	-	-	-	-	NO
CS-MOV-0535	EEPS	LPSI PATH ISO VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	OP-4200 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO

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CS-MOV-0536	EEPS	LOOP FILL VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4208 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CS-MOV-0537	EEPS	LOOP FILL VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4208 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CS-MOV-0538	EEPS	LOOP FILL VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4208 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
CS-MOV-0539	EEPS	LOOP FILL VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4208 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
EBF-MOV-0555	EEPS	EMER BOILER FEED VALVE	LOAD	ROTOR	VALVE	MTR	YES	NO	AP-5356 OP-4517 OP-4211	NO	-	-	-	-	-	NO
EBF-MOV-0556	EEPS	EMER BOILER FEED VALVE	LOAD	ROTOR	VALVE	MTR	YES	NO	AP-5356 OP-4517 OP-4211	NO	-	-	-	-	-	NO
EBF-MOV-0557	EEPS	EMER BOILER FEED VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	AP-5356 OP-4203 OP-4517 OP-5758 OP-4211	NO	-	-	-	-	-	NO
MS-MOV-0659	EEPS	ATMS STM DUMP VV	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
MS-MOV-0670	EEPS	ATMS STM DUMP VV	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518	NO	-	-	-	-	-	NO

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									OP-4517 OP-5758 OP-5101							
MS-MOV-0681	EEPS	ATMS STM DUMP VV	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518 OP-4517 OP-5101 OP-5758	NO	-	-	-	-	-	NO
MS-MOV-0692	EEPS	ATMS STM DUMP VV	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
PR-MOV-0512	EEPS	PZR RELIEF BLOCK VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4272 OP-4241 OP-4232 OP-4263 AP-5356 OP-4208 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
PR-MOV-0558	EEPS	PRESSURIZER VENT VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	OP-4203 AP-5356 OP-4208 OP-4518 OP-4517 OP-5758 OP-5101 OP-4262	NO	-	-	-	-	-	NO
PR-MOV-0560	EEPS	PRESSURIZER VENT VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	AP-5356 OP-4208 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101 OP-4262	NO	-	-	-	-	-	NO
SI-MOV-08[illegible]1	EEPS	ACCUMULATOR ISOL	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4615 AP-5356	NO	-	-	-	-	-	NO

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									OP-4203 OP-4518 OP-4517 OP-5101							
SI-MOV-0004	EEPS	S I HP-LP TIE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 OP-4203 OP-4518 OP-4517 OP-5101 OP-4205	NO	-	-	-	-	-	NO
SI-MOV-0022	EEPS	LOOP 4 FILL BLOCK	LOAD	MOTOR	VALVE	MTR	NO	-	-	-	-	-	-	-	-	NO
SI-MOV-0023	EEPS	LOOP 3 FILL BLOCK	LOAD	MOTOR	VALVE	MTR	NO	-	-	-	-	-	-	-	-	NO
SI-MOV-0024	EEPS	LOOP 2 FILL BLOCK	LOAD	MOTOR	VALVE	MTR	NO	-	-	-	-	-	-	-	-	NO
SI-MOV-0025	EEPS	LOOP 1 FILL BLOCK	LOAD	MOTOR	VALVE	MTR	NO	-	-	-	-	-	-	-	-	NO
SI-MOV-0046	EEPS	S I DISCHARGE HDR BLOCK VV	LOAD	MOTOR	VALVE	MTR	YES	YES	AP-5356 OP-4203 OP-4518 OP-4517 OP-5101 OP-4205	NO	-	-	-	-	-	NO
SI-MOV-0048	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	AP-5356 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
SI-MOV-0049	EEPS	S I LP RECIRC	LOAD	MOTOR	VALVE	MTR	YES	NO	AP-5356 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO
SI-MOV-0524	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	AP-5356 OP-4233 OP-4203 OP-4518 OP-4517	NO	-	-	-	-	-	NO

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									OP-5758 OP-5101							
SI-MOV-0515	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	AP-5356 OP-4233 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
SI-MOV-0516	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 AP-5356 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
SI-MOV-0517	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	AP-5356 OP-4233 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
SI-MOV-0518	EEPS	SAFETY INJECTION VALVE	LOAD	MOTOR	VALVE	MTR	YES	NO	OP-4233 AP-5356 OP-4203 OP-4518 OP-4517 OP-5758 OP-5101	NO	-	-	-	-	-	NO
VD-MOV-0559	EEPS	REACTOR VENT VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	OP-4203 AP-5356 OP-4518 OP-4517 OP-5758 OP-5101 OP-4262	NO	-	-	-	-	-	NO
VD-MOV-0561	EEPS	REACTOR VENT BLOCK VALVE	LOAD	MOTOR	VALVE	MTR	YES	YES	OP-4262 AP-5356 OP-4203 OP-4518 OP-4517 OP-5101	NO	-	-	-	-	-	NO

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EDG-SOV-0001	EEPS	EDG-1 DIESEL FUEL SOLENOID	LOAD	SOLENOID	VALVE	SOV	YES	NO	OP-4207	NO	-	-	-	-	-	NO
EDG-SOV-0002	EEPS	EDG-2 DIESEL FUEL SOLENOID	LOAD	SOLENOID	VALVE	SOV	YES	NO	OP-4207	NO	-	-	-	-	-	NO
EDG-SOV-0003	EEPS	EDG-3 DIESEL FUEL SOLENOID	LOAD	SOLENOID	VALVE	SOV	YES	NO	OP-4207	NO	-	-	-	-	-	NO
INV-1	EEPS	VITAL INVERTER #1	PWR CONVERT	INVERTER	120V AC POWER	INV	YES	NO	OP-4250 OP-5806	NO	-	-	-	-	-	NO
INV-2	EEPS	VITAL INVERTER #2	PWR CONVERT	INVERTER	120V AC POWER	INV	YES	NO	OP-4250 OP-5808	NO	-	-	-	-	-	NO
EMCC-1	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
EMCC-2	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	YES	OP-5812	NO	-	-	-	-	-	NO
EMCC-3	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	NO	OP-5758 OP-5812	NO	-	-	-	-	-	NO
EMCC-4	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	NO	OP-5812 OP-5758	NO	-	-	-	-	-	NO
EMCC-5	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	NO	OP-5758	NO	-	-	-	-	-	NO
EMCC-6	EEPS	480V MOTOR CONTROL CENTER	SWITCHGEAR	MCC	480V POWER	MCC	YES	NO	OP-5758	NO	-	-	-	-	-	NO
MCC-SSS	EEPS	480V MOTOR CONTROL CENTER SAFE SHUTDOWN BLDG	SWITCHGEAR	MCC	POWER DISTR	MCC	YES	NO	OP-5758	NO	-	-	-	-	-	NO
MCC-VERT-A	EEPS	480V VERTICAL SECTION	SWITCHGEAR	MCC	POWER DISTR	MCC	YES	YES	OP-5812	NO	-	-	-	-	-	NO
MCC-VERT-B	EEPS	480V VERTICAL SECTION	SWITCHGEAR	MCC	POWER DISTR	MCC	YES	YES	OP-5812	NO	-	-	-	-	-	NO
EBUS-1	EEPS	480V EMER BUS 1	SWITCHGEAR	METAL CLAD	480V POWER	SWGR	YES	YES	OP-4207 OP-5812 OP-4584	NO	-	-	-	-	-	NO

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EBUS-2	EEPS	480V EMER BUS 2	SWITCHGEAR	METAL CLAD	480V POWER	SWGR	YES	YES	OP-4251 OP-4586 OP-5812 OP-4287	NO	-	-	-	-	-	NO
EBUS-3	EEPS	480V EMER BUS 3	SWITCHGEAR	METAL CLAD	480V POWER	SWGR	YES	YES	OP-4586 OP-5812 OP-4287	NO	-	-	-	-	-	NO
FM-CAB-B	EEPS	NUCLEAR INSTRUMENTATION CAB B	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-1R	EEPS	MCB PNL 1R VB-1 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-2R	EEPS	MCB PNL 2R VB-2 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-3R	EEPS	MCB PNL 3R VB-1 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-4R	EEPS	MCB PNL 4R VB-1 AND VB-2 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-6R	EEPS	MCB PNL 6R VB-1 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-7R	EEPS	MCB PNL 7R VB-1 AND VB-2 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
MCB-8R	EEPS	MCB PNL 8R VB-1 LOADS	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PAM-CAB-A	EEPS	MCB POST ACCIDENT MONITORING CAB A	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PAM-CAB-B	EEPS	POST ACCIDENT MONITORING CAB B	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-FCC	EEPS	FEEDWATER CONTROL CABINET	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-SI	EEPS	SI PANEL	SWITCHGEAR	PANEL	CONTROL PNL	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-WT-EXT	EEPS	WATER TREATMENT CONTROL PANEL EXT	SWITCHGEAR	PANEL	CONTROL PNL	PNL	NO	-	-	-	-	-	-	-	-	NO

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YNPS LICENSE RENEWAL PROJECT
EMERGENCY ELECTRICAL POWER SYSTEM COMPONENT REVIEW RESULTS

TAG NO	SYSTEM CODE	DESCRIPTION	CATAGORY	TYPE	APPLICATION	COMPONENT CODE	STEP 2A: COMPONENT IMPORTANT TO SYSTEM SAFETY FUNCTION (STEP 2A)	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: EQ	STEP 2B: COMPONENT SUBJECT TO REFURB REPLACEMENT OR INSPECTION (RRI) PROGRAM: PLANT PROC	STEP 2B: COMPONENT NOT SUBJECT TO AN EFFECTIVE RRI PROGRAM (STEP 2B)	STEP 2C: COMPONENTS POTENTIAL AGE DEGRADATION MECHANISMS: DIE	WEAR	CORR	IRAD	STEP 2C: POTENTIAL AGE DEGRADATION MECHANISMS IDENTIFIED (STEP 2C)	WARRANTS FURTHER EVALUATION
PNL-3A	EEPS	120/240 VAC DIST PNL	SWITCHGEAR	PANEL	POWER DISTR	PNL	NO	-	-	-	-	-	-	-	-	NO
PNL-3B	EEPS	120/240 VAC DIST PNL	SWITCHGEAR	PANEL	POWER DISTR	PNL	NO	-	-	-	-	-	-	-	-	NO
PNL-4A	EEPS	120/240 VAC DIST PNL	SWITCHGEAR	PANEL	POWER DISTR	PNL	NO	-	-	-	-	-	-	-	-	NO
PNL-4B	EEPS	120/240 VAC DIST PNL	SWITCHGEAR	PANEL	POWER DISTR	PNL	NO	-	-	-	-	-	-	-	-	NO
PNL-A	EEPS	DISTRIBUTION CABINET A (FOR INSTRUMENTATION)	SWITCHGEAR	PANEL	POWER DISTR	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-DG-1	EEPS	DIESEL GEN AUXILIARY DISTRIBUTION CABINET	SWITCHGEAR	PANEL	POWER DISTR	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-SSS	EEPS	SSS DISTRIBUTION PANEL	SWITCHGEAR	PANEL	POWER DISTR	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-VB-1	EEPS	VITAL BUS DISTRIBUTION PANEL #1	SWITCHGEAR	PANEL	POWER DISTR	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
PNL-VB-2	EEPS	VITAL BUS DISTRIBUTION PANEL #2	SWITCHGEAR	PANEL	POWER DISTR	PNL	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES
XFMR-SSS	EEPS	SSS DIST XFMR 45KVA 3Ø	TRANSFORMER	DRY	POWER DISTR	XFMR	YES	NO	NONE	YES	YES	YES	YES	YES	YES	YES

ATTACHMENT J

EMERGENCY ELECTRICAL POWER SYSTEM (EEPS)
APPLICABLE PROCEDURES LIST

8095R

YANKEE ATOMIC ELECTRIC COMPANY
YNPS - PTPR
PLANT PROCEDURE SUMMARY REPORT - SPECIFIC SYSTEM CODE - EBPS

Procedure No.:	Rev. No.	Title:	GENERAL CLASS	SPECIFIC CLASS	SYSTEM CODES
AP-5356	4	IST PUMP AND VALVE PROGRAM	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	SI,MS,AS,BF,CC,CR,CS,DW,EBF,EFW,HC,HV,MC,MR,PR,SA,SW,VD,WCBD,EBPS,RSSS
OP-4200	14	MAIN COOLANT SYSTEM LEAK INSPECTION OR ISI PRESSURE TEST	SURVEILLANCE VOL. I	OPERATIONS	SI,VD,CR,CS,MC,SV,SA,SC,PR,HC,EBPS,RSSS
OP-4203	37	MONTHLY VALVE & VC PENETRATION CHECK	SURVEILLANCE VOL. I	OPERATIONS	SI,MS,AR,AS,BA,BF,CA,CC,CF,CR,CT,CS,DW,EBF,FW,HC,HV,LW,MC,PR,PU,SA,SC,SW,VC,VD,WC,WD,EBPS,RSSS
OP-4204	37	TEST OR OPERATION OF THE SAFETY INJECTION PUMPS AND DETERMINATION OF ECCS SUBSYSTEM LEAKAGE	SURVEILLANCE VOL. I	OPERATIONS	SI,EBPS
OP-4205	12	SAFETY INJECTION SYSTEM OPERATION CHECK	SURVEILLANCE VOL. I	OPERATIONS	SI,CR,CS,EBPS,RSSS
OP-4207	24	SURVEILLANCE OF THE STATION POWER DC & AC DISTRIBUTION SYSTEMS AND THE EMERGENCY DIESEL GENERATORS	SURVEILLANCE VOL. I	OPERATIONS	DG,DC,EBPS
OP-4208	12	FLOW TEST OF TWO LPSI PUMPS	SURVEILLANCE VOL. I	OPERATIONS	SI,EBPS
OP-4211	26	EMERGENCY FEEDWATER SYSTEM OPERABILITY TEST	SURVEILLANCE VOL. I	OPERATIONS	EBF,EBPS,RSSS
OP-4217	17	CHARGING SYSTEM OPERABILITY TEST	SURVEILLANCE VOL. I	OPERATIONS	CR,EBPS,RSSS
OP-4223	13	NO. ____ SERVICE WATER PUMP OPERABILITY TEST	SURVEILLANCE VOL. I	OPERATIONS	SW,EBPS
OP-4232	20	VAPOR CONTAINER INSPECTION	SURVEILLANCE VOL. I	OPERATIONS	SI,PR,EBPS
OP-4233	7	OPERATIONAL TEST OF BORON INJECTION, ECCS FLOW, AND CIS VALVES	SURVEILLANCE VOL. I	OPERATIONS	SI,MS,CR,PR,EBPS,RSSS
OP-4241	8	SUPPLEMENTAL LOCKED VALVE LIST	SURVEILLANCE VOL. I	OPERATIONS	PR,SC,EBPS
OP-4250	6	OPERABILITY OF THE 120 VOLT A.C. VITAL BUS	SURVEILLANCE VOL. I	OPERATIONS	EBPS
OP-4251	7	INDEPENDENT CIRCUIT AND EMERGENCY MCC ACB INTERLOCK OPERABILITY	SURVEILLANCE VOL. I	OPERATIONS	EBPS
OP-4253	4	SSS OPERABILITY TEST	SURVEILLANCE VOL. I	OPERATIONS	SSS,EBPS
OP-4262	2	OPERABILITY TEST OF THE MAIN COOLANT SYSTEM VENTS	SURVEILLANCE VOL. I	OPERATIONS	MC,PZR,EBPS
OP-4263	4	EMERGENCY POWER SUPPLY TESTS FOR PR-MOV-512 AND PRESSURIZER HEATERS	SURVEILLANCE VOL. I	OPERATIONS	PR,EBPS
OP-4272	3	ACCIDENT MONITORING INSTRUMENTATION CHANNEL CHECK	SURVEILLANCE VOL. I	OPERATIONS	PR,MC,VC,EBF,EBPS
OP-4274	3	IN SERVICE INSPECTION FLOW TEST OF THE SAFETY INJECTION SYSTEM VALVES	SURVEILLANCE VOL. I	OPERATIONS	SI,EBPS
OP-4516	11	INSPECTION OF ECCS CIRCUIT BREAKER NO.	SURVEILLANCE VOL. I	MAINTENANCE	EBPS
OP-4517	14	SURVEILLANCE OF MOTOR OPERATED VALVES	SURVEILLANCE VOL. I	MAINTENANCE	SI,MS,CS,CR,DW,PU,VD,SA,PR,WCR,EFW,HC,SC,SW,MC,CC,EBPS,RSSS

YANKEE ATOMIC ELECTRIC COMPANY

YNPS - [illegible]

PLANT PROCEDURE SUMMARY CHART - SPECIFIC SYSTEM CODE - RRPS

Procedure No.	Rev. No.	Title	GENERAL CLASS	SPECIFIC CLASS	SYSTEM CODES
OP-4518	8	TRAVEL TIME OF MOTOR OPERATED VALVES-MASTER LIST	SURVEILLANCE VOL. I	MAINTENANCE	SI,MS,CS,CH,BW,PU,VD,SA,PR,WCB,SFW,WC,SC,SW,MC,CC,RRPS,RSSS
OP-4615	7	SAFETY INJECTION ACCUMULATOR LEVEL SWITCH OPERATIONAL CHECK AND CHECK OF FUNCTIONS PERFORMED BY LEVEL SWITCHES	SURVEILLANCE VOL. I	INSTRUMENTATION	SI,RRPS
OP-5101	13	MAINTENANCE OF MOTOR OPERATED VALVE NO. ____	MAINTENANCE	GENERAL PLANT	SI,MS,CS,CH,BW,PU,VD,SA,PR,WCB,SFW,WC,SC,SW,MC,CC,RRPS,RSSS
OP-5250	10	INSPECTION AND/OR MAINTENANCE OF THE DIESEL GENERATOR SYSTEM NO. ____	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	DG,RRPS
OP-5252	10	MAINTENANCE OF LPSI PUMPS AND/OR MOTORS, P48,1,2,3 AND/OR PUMP DISCHARGE CHECK VALVES SI-V-11, SI-V-12, SI-V-13	MAINTENANCE	REACTOR SAFEGUARDS, SYSTEMS AND EQUIPMENT	S[illegible]RPS
OP-5758	2	INSPECTION, TESTING AND MAINTENANCE OF GOULD STARTER, BREAKER AND CONTACTOR	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	RBF,MS,PR,SI,SSS,VD,RRPS
OP-5764	5	DISCONNECTING OF ECCS MOV'S AND SHUTDOWN COOLING MOV'S	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	SI,SC,CS,RRPS,RSSS
OP-5765	6	RECONNECTION OF ECCS MOTOR OPERATED VALVE NO. ____ OR SHUTDOWN COOLING VALVE NO. ____	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	SI,SC,CS,RRPS,RSSS
OP-5766	0	DISCONNECTING/RECONNECTING OF ECCS/SI-MOV-22,23,24, AND 25 BREAKER FROM MCC-1	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	[illegible],RRPS
OP-5808	3	INSPECTION AND MAINTENANCE OF VITAL BUS INVERTER 1 AND 2	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	RRPS
OP-5812	5	MOTOR CONTROL CENTERS AND RELATED EQUIPMENT E.Q. QUALIFICATION, INSPECTION AND MAINTENANCE	MAINTENANCE	ELECTRICAL SYSTEMS AND EQUIPMENT	RRPS

ATTACHMENT K

A GENERIC ASSESSMENT OF CONCRETE STRUCTURAL COMPONENTS

8095R

YAEC 1701

A GENERIC ASSESSMENT OF CONCRETE STRUCTURAL COMPONENTS FOR THE LICENSE EXTENSION PROJECT

November 8, 1989

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DISCLAIMER OF RESPONSIBILITY

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ABSTRACT

This study evaluates the plausible modes of degradation of concrete and anchorages to concrete and evaluates the potential significance of the degradation modes for the structures at Yankee Nuclear Power Station (YNPS).

The results of this study are that there are no locations that are susceptible to the following degradation modes for concrete and reinforcing steel:

1. Fatigue
2. Chemical reactions of aggregates
3. Drying and carbonation shrinkage
4. Thermal effects
5. Microbiological-Induced Corrosion (MIC)

The following modes of degradation may be significant for some, but not all, of the concrete structures:

1. Corrosion of embedded metals
2. Freeze-thaw damage
3. Exposure to aggressive chemicals
4. Leaching of calcium hydroxide
5. Abrasion
6. Degradation of anchorages to concrete due to the following:
    - Corrosion
    - Deterioration of adjacent concrete
    - Vibratory loadings

An inspection program in accordance with the American Concrete Institute guides and practices (ACI 201.1R, 207.3R, and 224.1R) will provide assurance that the above six potentially significant degradation modes are monitored and controlled.

The only locations where radiation exposure may be significant are the Spent Fuel Pit (SFP) and the Reactor Support Structure (RSS) concrete adjacent to the Neutron Shield Tank (NST). The potential and significance of this degradation mode will be evaluated in future reports.

The potential for degradation of concrete at YNPS from exposure to groundwater or river water is insignificant. Chemistry tests of these waters performed during construction and again in 1988 and 1989 show only negligible concentrations of chlorides and sulfates.

<u>TABLE OF CONTENTS</u>

1.0 INTRODUCTION

This document provides a generic assessment of the plausible modes of degradation of concrete, including embedded metals, and anchorages to concrete for structures at the Yankee Nuclear Power Station (YNPS).

The plausible modes of degradation were identified from a review of the literature. Each of the plausible modes of degradation is evaluated on a generic basis to identify the stressors and environment required for the degradation to be active, how the degradation is manifested, and the design features and construction methods used at Yankee Nuclear Power Station (YNPS) to mitigate the potential for significant age-related degradation. The areas of the plant potentially susceptible to age-related degradation are then identified. Finally, the requirements of an effective inspection program are identified.

2.0 DESCRIPTION OF COMPONENTS

The generic concrete structural components necessary to the function of the structures at YNPS consist of the following. Concrete includes the reinforcing steel, as well as the cement, aggregate, and mixing water.

- o Foundations (Footings, Beams, and Mats)
- o Columns
- o Walls
- o Ground Floor Slabs and Equipment Pads
- o Elevated Floor Slabs
- o Roof Slabs
- o Precast Concrete Beams and Slabs
- o Manholes
- o Duct Banks
- o Fluid Retaining Walls and Slabs
- o Masonry Walls
- o Concrete Blocks (Shielding)
- o Grout
- o Cast-in-Place Anchors
- o Post-Installed Anchors (Expansion and Grouted Types)
- o Embedded Metals (Castings, Weldments, Pipes, and Conduit)

3.0 EVALUATION OF PLAUSIBLE MODES

The plausible age-related modes of degradation of concrete components for structures were identified from a review of the literature (see Section 6.0, References) and are as follows:

- o Fatigue
- o Corrosion of Embedded Metals
- o Irradiation Exposure
- o Exposure to Elevated Temperatures
- o Abrasion, Including Erosion
- o Leaching of Calcium Hydroxide
- o Exposure to Aggressive Chemicals
- o Freeze-Thaw Damage
- o Chemical Reactions of Aggregates
- o Thermal Effects
- o Drying and Carbonation Shrinkage
- o Microbiological-Induced Corrosion
- o Vibratory Loading on Anchorages to Concrete

3.1 Fatigue

3.1.1 Description

Fatigue is a process of progressive permanent internal structural change in a material subjected to repetitive cycles of stress. Fatigue strength of concrete has received considerable attention due to the adoption of ultimate strength design procedures and the use of higher strength material. The effects of fatigue and the considerations for design are discussed in Reference (n).

The fatigue strength of concrete is essentially the same whether the mode of loading is tension, compression, or flexure, and is roughly about 55% of static strength for 10^7 cycles. For design, a conservative modified Goodman diagram is used. Use of this design method is discussed, in detail, in Reference (n).

3.1.2 Significance to Structures

Fatigue of reinforcing steel is not a significant degradation mode at the stress levels (24 ksi maximum), stress range (stress fluctuation), and stress cycling to which it is subjected. The lowest stress range known to have caused failure was associated with 1.25×10^6 cycles of loading and a stress range of 21 ksi (from 17.5 ksi to 38.5 ksi), Reference (h).

Reinforced concrete at YNPS was designed in accordance with ACI 318-56 and American Standard Building Code A58.1-1955, Reference (o). The design codes limit the maximum permissible stress levels such that fatigue is insignificant for concrete and embedded metals.

3.2 Corrosion of Embedded Metals

3.2.1 Description

Corrosion of embedded metal has been studied in considerable detail and depth. References (j) and (k) provide a summary of the studies.

The majority of the embedded metal is the reinforcing steel. Other embedded metals include carbon and stainless steel piping, structural embedments (plates, anchor bolts, and strap anchors), conduit for electrical cables, and grounding (copper) cables. Corrosion of reinforcing steel due to stray electrical currents has been identified as a degradation mechanism.

Corrosion of carbon steel, reinforcement and embedded items, not only affect the ability of the steel to carry load, but also causes deterioration of the concrete due to severe expansion stresses imposed as a result of volumetric changes.

Concrete's high alkalinity (pH >12.5) provides an environment which serves to protect the steel from corrosion. Corrosion occurs when aggressive ions, most notably chloride, cause a reduction in pH to below 10 and dissolved oxygen is available for the electrochemical reaction. Ions of sulfate and carbonate can also be aggressive. However, these have low solubility in the high calcium environment and, thus, have a low availability to reduce the pH.

Therefore, this degradation mechanism requires the presence of aggressive ions, the presence of oxygen, and the presence of cracks or permeable concrete with intermittent wetting and drying.

3.2.2 Manifestation

The corrosion products produced have a volume approximately eight times that of the original metal. The development of these corrosion products subject the concrete to tensile stress, eventually leading to hairline cracking, followed in time by rust staining, spalling, and more severe cracking. These actions will expose more reinforcing steel and concrete to further deterioration. A loss of bond between the concrete and reinforcing steel will occur along with a reduction in bar cross-section. The degradation associated with reinforcing steel corrosion is most prominently displayed in concrete bridge decks and parking facilities, given the abundant use of deicing salts.

3.2.3 Significance to Structures

Corrosion of reinforcing steel due to stray electrical currents has been identified as a potential degradation mechanism, References (c), (j), and (u). However, this mechanism is not significant at YNPS since the reinforcing steel is not used for grounding of plant equipment or for lightning protection. Steel structures and plant equipment are grounded by means of direct connections to the station grounding grid. The potential for corrosion of embedded metal due to induced currents in electrical duct banks is also not significant. This mechanism requires both a direct current and a sodium or calcium chloride electrolyte, Reference (j). As discussed below, it is very unlikely that the necessary electrolyte, significant concentrations of chlorides in solution, exist in the concrete for duct banks.

It is very unlikely that a significant concentration of chlorides is present in the concrete due to mixing water. Chloride concentrations of less than 500 ppm are considered not significant, Reference (z). An analysis of the Sherman Pond water, used as the mixing water, performed in the 1950's, Reference (h), showed only 2 ppm to 8 ppm chlorides as NaCl. This concentration is insignificant. In addition, the only admixture permitted in the Specification, Reference (f), was Darex AEA.

Corrosion of embedded metals from exposure to groundwater or river water is also insignificant. This is based on the results of water chemistry analyses performed in December 1988 and August 1989, References (s) and (aa). The maximum chloride concentration was only 11 ppm.

Corrosion of carbon steel, reinforcement, and embedded items can occur from spills or leakage of acidic fluids. Corrosion of embedded metals requires permeable concrete or the presence of cracks and the presence of both oxygen and aggressive ions. Aggressive ions may be introduced from spills or leakage of acidic process fluids. Aggressive ions may also be introduced from leakage of acid rainwaters through damaged roofing systems. This mechanism is significant to structural integrity only if left unchecked. Good housekeeping practices to assure that spills and leakages are cleaned up in a timely manner, that joints are tight and properly caulked and sealed, and that cracks in fluid containment areas are sealed will mitigate the potential for this mechanism. Maintenance of the roofing systems, roof drains, and yard drainage will mitigate the potential for damage due to acid rain.

The corrosion potential of embedded copper materials is considered extremely low and of no significance unless they are exposed to ammonia, Reference (j). Only in the water treatment area are sufficient amounts of ammonia handled such that, in the event of a spill, this mechanism could occur.

The corrosion potential of embedded stainless steel materials is considered very low and of no significance unless they are exposed to chlorides, Reference (j). With good housekeeping practices, there are no areas of the plant subject to this degradation mode. The chloride concentrations in plant system fluids are kept very low to minimize corrosion of piping and equipment. Therefore, if spills are cleaned up in a timely manner, this mechanism is not significant.

3.3 Extreme Environments

3.3.1 Exposure to Elevated Temperatures

3.3.1.1 Description

Exposure of concrete to elevated temperatures can result in reduced compressive strength, modulus of elasticity, and shielding ability. The effects of elevated temperature exposure have been reported in the literature, References (a), (b), (c), and (d).

The results of studies and experiments show the following:

- o At temperature exposures below 150°F, degradation of concrete, mechanical, and shielding properties is not significant.

- o At temperature exposures between 180°F and 212°F, degradation of mechanical properties should not exceed 15%, and degradation of shielding properties will be insignificant unless the time of exposure is many years.

At very high temperatures, surface scaling and cracking may be exhibited. Otherwise, there are no observable characteristics due to exposure to elevated temperatures.

3.3.1.2 Significance to Structures

Generally, the concrete at YNPS is not exposed to temperatures above 150°F. By design, all hot pipes are installed in sleeve penetrations to limit temperature exposure. Therefore, hot pipe penetrations are not significant.

The concrete at the Turbine-Generator (T-G) pedestal-to-turbine interface is not normally subjected to temperatures above 150°F. The machine is insulated and is supported such that an air gap exists to provide the necessary cooling. The T-G pedestal is a massive structure, subject to only very low stress levels. The compressive stress was limited to 400 psi, Reference (o). Therefore, this mechanism is not significant for the pedestal.

The only location that may be of concern is the concrete immediately adjacent to the neutron shield tank due to the potential for gamma heating, which will be evaluated in a separate report.

3.3.2 Irradiation Exposure

3.3.2.1 Description

Concrete can undergo changes in properties if exposure to neutron and/or gamma radiation exceeds certain levels. The effects of neutron irradiation are documented in the literature, References (a), (b), (c), (d), and (g). The effect of gamma irradiation was reported by Hilsdorf, Kroop, and Koch (Reference (g)).

Existing experimental data related to the effects of radiation on the mechanical properties of concrete allow some general statements. Compressive strength and modulus of elasticity of concrete do not begin to experience reductions until exposure exceeds a neutron fluence of 10^{19} n/cm^2. This reduction is believed to be primarily due to radiation exposure, with some small part due to the temperature rise associated with exposure. Reductions in tensile strength occur at the same exposure level, but are more pronounced than the reductions in compressive strength as exposure increases. Reductions in tensile strength are relevant concerns because of implied reductions in cross-section shear capacity, not because there is a need for tensile capacity directly to resist tensile section forces. Typically, reinforcing steel is provided to resist all tensile cross-section force, with no reliance on concrete tensile strength. Reductions in tensile strength may also affect the pullout strength of anchors. Reduction in compressive and tensile strength of concrete exposed to gamma radiation up to 10^{10} rads is practically nil, Reference (g).

3.3.2.2 Significance to Structures

Radiation damage to concrete is not readily observable. YNPS was designed to minimize exposure of concrete to neutron and gamma irradiation. The reactor pressure vessel is surrounded (radially and at the bottom) by the neutron shield tank. The only concrete components for which this mechanism may be significant are those exposed to gamma radiation above 10^{10} rads or neutron radiation above $10^{19} n/cm^2$.

3.4 Aggressive Environments

3.4.1 Freeze-Thaw Damage

3.4.1.1 Description

The repeated action of freeze-thaw cycles can cause damage to hardened concrete. This damage is characterized by scaling, cracking, and spalling. Freeze-thaw damage has been extensively studied and is discussed in References (b), (c), and (j).

Freeze-thaw can affect both the cement paste and the aggregates causing expansion forces. The cement paste can fail when the concrete is critically saturated (when greater than 91% of the water accessible voids are filled with water, Reference (j)) and exposed to ambient temperatures below 28°F. If absorptive aggregates are used, and the concrete is in a continuously wet environment, the concrete may fail if the coarse aggregate becomes saturated.

This mechanism is not significant unless both of the following environmental conditions exist:

- o Exposure to temperatures of 28°F or less.

- o Exposure to sufficient water so that the concrete can become nearly saturated.

3.4.1.2 Significance to Structures

This mechanism is significant to the structural integrity only if left unchecked. Freeze-thaw damage is significant to structures in that it is progressive and can result in corrosion of reinforcement or undermining of supports for structures or equipment. Concrete that contains air entrainment is less susceptible to this mechanism, Reference (j). Good housekeeping practices to assure timely removal of ice, snow, and rainwater will mitigate the potential for this mechanism.

Foundations are generally not susceptible to freeze-thaw damage. If water is allowed to pond and freeze at grade beams, damage could occur. However, the potential for this is mitigated by site grading which provides for a positive slope to drain the water away from foundating grade beam.

3.4.2 Exposure to Aggressive Chemicals

3.4.2.1 Description

Concrete being highly alkaline (pH >12.5) is degraded by acids. Sulfates of potassium, sodium, and magnesium may attack concrete depending on the concentration present in soils and/or groundwater. Spills or leakage from the plant process systems also may be sufficiently acidic as to cause concrete degradation.

Sulfate attack can produce significant expansive stresses within the concrete leading to cracking, spalling, and strength loss. Once established, these conditions allow further exposure to aggressive solutions. Acid rain can be a source for sulfate attack. Areas adjacent to industrial plants which contribute to the sulfur-based acid rain phenomenon are more susceptible to this form of chemical attack.

Acid attack can increase porosity and permeability of concrete, reduce its alkaline nature at the surface of the attack, reduce strength, and render the concrete subject to further deterioration. Acid attack is characterized initially by efflorescence, deposits of salts formed on a surface, and later by scaling.

3.4.2.2 Significance to Structures

It is very unlikely that sulfates are present in the concrete due to mixing water. Analyses of Sherman Pond water, used as the mixing water, performed in the 1950's, Reference (h), showed only a trace (i.e., less than 10 ppm) of sulfates (ppm as SO_4). This concentration is considered negligible as it relates to attack on concrete, Reference (e).

Degradation of concrete from exposure to groundwater or river water is insignificant. This is based on the results of water chemistry analyses performed in December 1988 and August 1989, References (s) and (aa). The maximum sulfate concentration was only 18 ppm. Sulfate concentrations below 150 ppm are considered negligible, Reference (e).

Exposure to aggressive chemicals may be a potential degradation mechanism for concrete components which are subject to acidic or alkaline spills or leakage from plant process systems. Exposure to aggressive chemicals is significant to structural integrity only if left unchecked. Good housekeeping practices to assure that spills and leakages are cleaned up in a timely manner, that joints are tight and properly caulked and sealed, and that cracks in fluid containment areas are sealed will mitigate the potential for this mechanism.

Acid rainwaters can cause degradation of concrete. If these waters are allowed to accumulate, the aggressive ions, sulfates, can concentrate in cracks or improperly prepared joints. Acid rain is not significant to walls since the flushing action of the rain will prevent concentration of the aggressive ions. Only a thin surface layer would be affected and this is not significant to the function of the concrete components. The potential for this mechanism is mitigated by good housekeeping practices to assure that roofing is kept in good condition and that cracks, if any, in containment areas are sealed.

Boric acid generally has only negligible effects on concrete, Reference (r). However, it can make the concrete more susceptible to erosion. The only area of the plant potentially susceptible to erosion from boric acid leakage, which cannot be readily observed, is the reactor support structure concrete adjacent to the neutron shield tank. This will be evaluated in a separate report.

3.4.3 Leaching of Calcium Hydroxide

3.4.3.1 Description

In concrete structures containing cracks, improperly treated construction joints or areas of porous concrete, water may enter and pass through. As water passes through the concrete, it dissolves (leaches) some of the calcium hydroxide (lime).

When most of the calcium hydroxide has been leached away, other cementitious constituents become exposed to chemical decomposition, eventually leaving behind silica and alumina gels with little or no strength. The water's aggressiveness or ability to leach calcium hydroxide depends on its dissolved salt content and its temperature. Water, either from rain or melting snow, can leach lime from concrete. This leaching action of the water must be that of water passing through the concrete, since water that merely passes over it will not cause significant leaching, Reference (d).

Leaching of calcium hydroxide is evidenced on concrete that is alternatively wetted and dried. The white salt deposits that are left on the surface of the concrete are a solution of water, free lime from the concrete, and carbon dioxide that has been absorbed from the air. The leachate from the concrete is nearly colorless until the carbon dioxide is absorbed and the material dries as a white deposit.

Leaching of calcium hydroxide does, however, have a beneficial effect in healing of hairline cracks formed during construction. This process is known as "autogenous healing" and is discussed in detail in Reference (u). In the presence of moisture and absence of tensile stress, it closes dormant cracks.

Healing occurs through the carbonation of calcium hydroxide in the cement paste by carbon dioxide, which is present in the surrounding air and water. Calcium carbonate and calcium hydroxide crystals precipitate, accumulate, and grow within the cracks. The crystals interlace and twine, producing a mechanical bonding effect, which is supplemented by a chemical bonding between adjacent crystals and between the crystals and the surfaces of the paste and the aggregate. As a result, some of the tensile strength of the concrete is restored across the cracked section, and the crack may become sealed.

3.4.3.2 Significance to Structures

Leaching of calcium hydroxide is significant only if left unchecked. This mechanism requires both the presence of cracks or porous concrete and an aggressive fluid flowing through the concrete. As discussed in Sections 3.2.3 and 3.4.2.2, the ground and river waters at YNPS are not aggressive. Therefore, this mechanism is not significant for below grade concrete. For above grade concrete, good housekeeping practices to monitor cracks to assure that they are dormant and sealed or if active are properly caulked and sealed against water intrusion will mitigate the potential for this mechanism.

3.4.4 Abrasion

3.4.4.1 Description

Abrasion is the surface wear of concrete by rubbing and friction. Abrasion of floors and pavements results from traffic or the movement of equipment directly on the concrete surfaces. Abrasion (erosion) can also occur from the impact from a flowing stream of water.

Abrasion in hydraulic structures is caused by cavitation or the transport of solids along the surface (Reference (m)). Cavitation abrasion is characterized by pitting and is not common at velocities of less than 40 fps. However, for closed conduits, cavitation damage can occur at velocities as low as 25 fps at abrupt changes in slope or curvature.

Abrasion resulting from traffic or the transport of solids (silt, sand, and gravel) is characterized by a worn surface appearance. Erosion from the impact of a flowing stream of water is characterized initially by peeling (the breaking away of the thin flakes of mortar) and in the latter stages by scaling (loss of mortar and exposure of coarse aggregate).

3.4.4.2 Significance to Structures

The effects of abrasion are significant only if left unchecked. The effects of this mechanism are readily observable and repairs can be made.

Good work practices mitigate the potential for abrasion to floors and pavements. These include assuring that equipment is not dragged across floors, and that heavy equipment is moved on rollers or pneumatic tires.

The potential for erosion due to the impact of water streams is mitigated by piping equipment drains to floor drainage systems and flashing of scuppers to direct the fluids away from the concrete.

The potential for abrasion in hydraulic structures will be evaluated in a separate report. The significance of this mechanism will be determined considering geometric arrangement, flow velocities, and inspection procedures.

3.5 Chemical Reactions of Aggregates

3.5.1 Description

A number of deleterious chemical reactions can produce concrete cracking. These are generally related to the concrete aggregates, and include the following:

- o Alkali-silica reaction. Also known as alkali-aggregate reaction.
- o Cement-aggregate reaction.
- o Expansive alkali-carbonate reaction.

The deterioration mechanisms and the locations (sources) of the problem aggregates are discussed in References (b), (c), (d), and (j).

3.5.1.1 Alkali-Silica Reaction

The alkali-silica reaction can cause expansion and cracking of concrete structures. Active silica in the presence of potassium or sodium hydroxide forms an alkali-silica complex which can expand by the imbibition of water. When the alkali concentration is low, calcium hydroxide, derived from the cement, forms a nonexpansive calcium-alkali-silica complex. When the concentration is high, an expansive alkali-silica complex is formed.

In the United States, the problem aggregates generally occur in the Western half (Reference (j)) and the reaction occurs in the early life of the structure.

Alkali-silica reaction is characterized by map cracking. Petrographic examination would usually show a zone depleted in or free of calcium hydroxide surrounding the aggregate, Reference (v).

3.5.1.2 Cement-Aggregate Reaction

The cement-aggregate reaction requires a reactive aggregate containing siliceous minerals, a concentration of alkalies in the cement that produce a high pH and abundant hydroxyl, and the presence of an environment that causes severe drying conditions. The aggregates susceptible to this mechanism generally come from the Nebraska, Kansas, and Wyoming areas, Reference (j). This mechanism also requires severe drying condition, such as to cause a net migration of alkali to the surface of the concrete. This environmental condition does not exist at YNPS. This mechanism is, therefore, not significant to YNPS.

3.5.1.3 Expansive Alkali-Carbonate Reaction

The expansive alkali-carbonate reaction occurs between some dolomitic limestone aggregate containing clay minerals and the alkalies in the cement. Where the concrete has a constantly renewable supply of moisture, dedolomization can occur, leading to exposure of the clay minerals and their swelling.

Concrete affected by this mechanism is characterized by map cracking and the general absence of silica gel exudations at cracks. Additional signs of the severity of the reaction are closed expansion joints and crushing of the adjacent concrete. Petrographic examination would show rim growth on the aggregate and a highly carbonated paste adjoining the aggregate, Reference (v).

3.5.2 Significance to Structures

The alkali-silica reaction and the expansive alkali-carbonate reaction require susceptible aggregates and the presence of water.

An inspection of the Screenwell was performed in 1975, Reference (w). The concrete was found to be in excellent condition both above and below water. No evidence of spalling was found even after 15 years of operation. An inspection of the concrete moat for Tanks TK-31 and TK-32 was performed in 1989. This moat collects rainwater and normally contains 4 to 12 inches of water. The grade slab was in very good condition with no evidence of cracking or distress at the joints abutting the piers or walls, Reference (x).

After 30 years of service without any indication of degradation due to this mechanism, it is concluded that the structures at YNPS are not subject to significant age-related degradation due to chemical reactions of aggregates.

3.6 Drying and Carbonation Shrinkage

The effects of drying and carbonation shrinkage occur early in the life of the concrete due to loss of moisture. With proper mix design and curing procedures, this mechanism is not significant.

The two factors in mix design which affect shrinkage are the Water-Cement (W/C) ratio and cement content. A low W/C and a lean mix are desirable. A review of Reference (f) shows that mixes having low W/C and being slightly rich were specified for YNPS.

A review of Reference (i) shows that the concrete was to be protected so as to prevent loss of moisture for at least seven days. Thus, the factors affecting shrinkage were considered in the design. The specified mixes have a low W/C ratio, and a long curing time was specified to account for the slightly rich mixture. Therefore, this mechanism is not significant.

3.7 Thermal Effects

The thermal effects as related to cement hydration occur very early in the life of the concrete. Buildup of heat occurs in the first few days while the concrete is relatively plastic. The degradation occurs after the concrete has obtained a certain amount of rigidity and the cooling process tends to set up tensile stressed at the cooler outer surfaces. Thermal effect resulting from cement hydration are primarily of concern with massive concrete structures.

With proper placing and curing procedures, the thermal effects of cement hydration are not significant. At YNPS, this potential was considered in the design. A review of Reference (i) shows that protection from rapid cooldown of the outer surfaces was provided by specifying that concrete surfaces be prevented from going below 50°F, and that concrete be placed only when the concrete temperature was between 50°F and 90°F. Thus, the thermal effect of cement hydration was considered in the construction of the plant and does not need to be re-evaluated for life extension.

3.8 Anchorage to Concrete

3.8.1 Description

Steel embedments are used to transmit loads from steel structures and equipment to the reinforced concrete.

The types of embedments or anchors are as follows:

1. Pre-installed anchors such as bolts, studs, and straps.

2. Post-installed anchors such as expansion shell, wedge, undercut, and grouted type anchors.

Anchorage to concrete has been studied by ACI Committee 355 and others. Reference (p) discusses this subject in considerable detail. The three factors which affect the performance of the anchorage embedments are improper installation, the presence of vibratory loading, and the anchor type.

Pre-installed anchors have excellent survivability to vibratory loading, Reference (p). The only degradation mechanisms which affect pre-installed anchors are corrosion and deterioration of the concrete within which it is embedded.

Post-installed anchors, except for the undercut type, are subject to age-related degradation from vibratory loading. Expansion shell and grouted-type anchors are particularly susceptible to this mechanism. Wedge-type anchors generally perform well under vibratory loadings. The initial effect of vibratory loading on post-installed anchors is a loss of prestress. Corrosion and deterioration of the concrete within which the post-installed anchors are embedded are the two other degradation mechanisms.

3.8.2 Significance to Structures

3.8.2.1 Corrosion

Corrosion of anchorages to concrete is significant only if left unchecked. The high alkalinity (pH >12.5) of the concrete provides an environment which serves to protect the embedded portions of the anchors. Corrosion of projecting portions of anchors is readily observable and any corrosion can be mitigated by cleaning and painting.

3.8.2.2 Deterioration of Adjacent Concrete

Deterioration of concrete adjacent to anchorages is characterized by cracking and spalling. The effects of this mechanism can be evaluated by a visual inspection. Soundings taken from light blows of a hammer can be used to further evaluate the effects of this mechanism.

3.8.2.3 Vibratory Loading

The effect of vibratory loading is significant only for expansion shell and grouted-type anchors. The initial effect of this mechanism is loss of prestress and then loosening of the anchor. Loss of prestress can be determined from a bolt torque test. The installation of expansion anchors on pipe supports was the topic of IE Bulletin No. 79-02. In compliance with this bulletin, YNPS in 1979 performed inspections (J.O. No. 79-107) of supports for safety class piping. As a result of these inspections, many expansion shell (Red Head) anchors were replaced with wedge-type (Hilti) anchors. Grouted-type anchors were found to be acceptable when subjected to bolt torque test.

3.9 Microbiological-Induced Corrosion

3.9.1 Description

Microbiological-Induced Corrosion (MIC) is caused by corrosive secretions of micro-organisms. The MIC mechanism begins with the fermentation of raw sewage which generates methane and H_2S gases. These react with water to produce acids which then condense above the water line. This process lowers the pH of the concrete to levels favorable to growth of bacteria. These bacteria, in turn, secrete sulfuric and carbonic acids, which further attack the concrete. This results in deep pitting and spalling of the concrete.

3.9.2 Significance to Structures

This mechanism requires water contaminated with sewage and elevated temperatures necessary to promote fermentation. Since this environment is not present for any structure at YNPS, this mechanism is not significant.

4.0 SUSCEPTIBLE PLANT AREAS

4.1 Potentially Significants Degradation Modes

The potentially significant age-related degradation modes are as follows:

- o Corrosion of embedded metals
- o Exposure to elevated temperatures
- o Irradiation exposure
- o Freeze-thaw damage
- o Exposure to aggressive chemicals
- o Leaching of calcium hydroxide
- o Abrasion
- o Degradation of anchorages to concrete

4.2 Irradiation Exposure

Degradation due to irradiation requires gamma exposure above 10^{10} rads or neutron exposure above $10^{19} n/cm^2$, see Section 2.3.2. The only concrete which may be exposed to gamma irradiation above 10^{10} rads is the interior surface of the SFP and the RSS concrete immediately adjacent to the NST. The only concrete which may be exposed to neutron irradiation above $10^{19} n/cm^2$ is the RSS concrete immediately adjacent to the NST.

The potential significance of irradiation to the RSS and SFP concrete will be evaluated in separate reports.

4.3 Exposure to Elevated Temperatures

Degradation due to elevated temperature requires long-term exposure to temperatures above 150°F. As discussed in Section 2.3.1, the only location that may be of concern is the concrete immediately adjacent to the NST due to the potential for gamma heating. The potential and significance of gamma heating of RSS concrete will be evaluated in a separate report.

4.4 Abrasion

Abrasion is the result of mechanical wear from traffic or the impact of a flowing stream of water or erosion due to cavitation of hydraulic structures. The only structures which may be subject to significant degradation due to erosion are the Screenwell and the seal pit.

Floor slabs in most of the structures may be subject to degradation due to traffic or the impact of a flowing stream of water. However, the effects of abrasion due to mechanical wear are readily observable long before they become significant. Good material handling and housekeeping practices are all that is required to mitigate the potential for this mechanism.

4.5 Exposure to Aggressive Chemicals

Exposure to aggressive chemicals is significant to structural integrity only if left unchecked. The areas of the plant susceptible to this mechanism are certain concrete floors and sumps since these may come into contact with acidic or alkaline process fluids from spills or leakage.

Concrete roof slabs may be susceptible to degradation due to acid rain if the roofing system is allowed to degrade, thereby subjecting the roof slabs to these acidic waters. Concrete basins which collect and store rainwater may also be susceptible to degradation if cracks are not properly sealed.

The ion exchange pit may also be susceptible to this mechanism, since it contains water for shielding. The shield tank cavity portion of the RSS and the SFP are lined with stainless steel and, thus, are not susceptible to this mechanism. The potential for degradation of the stainless steel liners is evaluated in a separate report.

The RSS concrete immediately adjacent to the NST may be susceptible to this mechanism due to leakage of shield tank cavity water.

4.6 Freeze-Thaw Damage

Degradation due to freezing and thawing requires exposure temperatures below 28°F and saturated concrete or the presence of cracks exposed to water. The plant areas susceptible to this mechanism are as follows:

- o Piers located outside buildings
- o Horizontal projections from walls where water and ice can accumulate
- o Roof slabs, if roofing has deteriorated, or they are not protected
- o Wall areas near scuppers or where water overflows
- o Duct banks at grade level

4.7 Leaching of Calcium Hydroxide

Degradation due to leaching of calcium hydroxide requires cracks and water passing through the concrete. The water may come from process fluids or rain, snow, and ice. The following areas of the plant are susceptible to this mechanism if the concrete is cracked:

- o All areas susceptible to freeze-thaw damage
- o The ion exchange pit
- o The Screenwell and the seal pit
- o The containment moat for TK-31 and TK-32
- o Sumps and manholes

4.8 Corrosion of Embedded Metals

Degradation due to corrosion of embedded metals requires permeable concrete or the presence of cracks and the presence of both oxygen and aggressive ions. The following areas of the plant are susceptible to this mechanism:

- o All areas susceptible to freeze-thaw damage
- o Floors and sumps that come into conduct with aggressive chemicals
- o The ion exchange pit
- o The Screenwell and the seal pit

- The containment moat for TK-31 and TK-32
- Manholes

4.9 Degradation of Anchorages to Concrete

4.9.1 Corrosion

All anchorages to concrete are subject to corrosion. However, since concrete has a high pH, corrosion will first occur at the interface of the anchor to the grout or steel attachments. The effects of this mechanism can be evaluated by a visual inspection of the anchor and the surrounding concrete.

4.9.2 Deterioration of Adjacent Concrete

Degradation of anchors to concrete due to this mechanism results from overstressing or damage to concrete from corrosion of embedded metals, freeze-thaw damage, exposure to aggressive chemicals, or leaching of calcium hydroxide. Expansion shell and wedge-type anchors are susceptible to this mechanism. Cost-in-place, undercut, and grouted-type anchors are susceptible to this mechanism only when overloaded or when concrete degradation is in an advanced stage.

4.9.3 Vibration Loading

Wedge-type anchors (Red Head and Star Slug-in) are susceptible to this mechanism only when they are used for support of piping, equipment, or platforms that vibrate during plant operations.

5.0 INSPECTION

5.1 Inspection Program

The purpose of an inspection program is to identify any changes in the condition of the concrete or concrete properties which may affect the integrity of the structure and its future serviceability. Any changes can then be evaluated, and corrective actions can then be made if required. Guidance for evaluation of concrete in existing structures for service conditions has been developed by the American Concrete Institute (ACI), References (q), (t), and (u). Frequency of inspections is to be based on safety significance and rates of identified likely modes of degradation.

Guidelines for inspection of water-control structures associated with nuclear power plants are contained in Regulatory Guide 1.176, Reference (y).

5.2 Significance to Structures

An inspection program which provides for a condition survey in accordance with Reference (t) and evaluations in accordance with References (q) and (u) will provide assurance that the potential for significant degradation due to the following modes is monitored:

- o Corrosion of embedded metals
- o Freeze-thaw damage
- o Exposure to aggressive chemicals
- o Leaching of calcium hydroxide
- o Abrasion
- o Deterioration of anchorages to concrete

6.0 REFERENCES

(a) ACI Special Publication SP-34, "Concrete for Nuclear Reactors."

(b) NUREG/CR-4652, "Concrete Component Aging and its Significance Relative to Life Extension of Nuclear Power Plants."

(c) "Concrete Deterioration Inspection System for Extending the Operating Life of Nuclear Power Plants Applied to Surry Unit One," Interim Report, Virginia Polytechnic Institute, July 1987.

(d) "Pressurized Water Reactor Containment Structures License Renewal Industry Report," Nuclear Management and Resources Council, Inc., August 1989.

(e) ACI 318-83, "Building Code Requirements for Reinforced Concrete."

(f) Specification YS-312, "Specification for Ready-Mixed Concrete for Yankee Atomic Electric Plant."

(g) Hilsdorf, H. R., Kroop, J., and Koch, H. J., "The Effects of Nuclear Radiation on the Mechanical Properties of Concrete," Douglas McHenry International Symposium on Concrete and Concrete Structures, American Concrete Publications SP-55, 1978.

(h) Specification YS-98, "Specification for Steam Turbine Generator."

(i) Specification YS-315, "Specification for Concrete Construction and Floor Finish."

(j) ACI 201.2R-77, "Guide to Durable Concrete," Reaffirmed 1982.

(k) ACI 222R-85, "Corrosion of Metals in Concrete."

(l) NRC Letter NYR 87-142, "NUREG-0825, Section 4.11, Seismic Design Considerations," dated July 16, 1987.

(m) ACI 210R-87, "Erosion of Concrete in Hydraulic Structures."

(n) ACI 215R-74, "Considerations for Design of Concrete Structures Subjected to Fatigue Loading," Revised 1986.

(o) Specification YS-200, "Summary of Design Conditions."

(p) ACI SP-103-87, "Anchorage to Concrete," G. B. Hasselwande, Editor.

(q) ACI 207.3R-79, "Practice for Evaluation of Concrete in Existing Massive Structures for Service Conditions."

(r) ACI 515.1R-79, "A Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete," Revised 1985.

(s) Memo CH 89-01, M. P. Hedges to J. T. McCumber, "Sulfate and Chloride Concentrations for PLEX Evaluations SR No. 88-382," dated January 3, 1989.

(t) ACI 201.1R-68 (Revised 1984), "Guide for Making a Condition Survey of Concrete in Service."

(u) ACI 224.1R-84, "Cause, Evaluation, and Repair of Cracks in Concrete Structures."

(v) ASTM C856-83, "Standard Practice for Petrographic Examination of Hardened Concrete."

(w) Letter, D. Robinson (Southport Marine, Inc.) to P. Laird (YNPS), "Report of Inspection of Intake Chambers and Intake Pipe," dated November 19, 1975.

(x) Memo YRP 1072/89, N. A. Labrecque to J. K. Thayer/B. L. Drawbridge, "Repair of Concrete Piers for TK-31 and TK-32," dated July 27, 1989.

(y) USNRC Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated With Nuclear Power Plants." March 1978.

(z) Prasad, N. and R. Orr, "Concrete Degradation Monitoring and Evaluation," NUREG CP-0100, March 1989.

(aa) Memo CH 89-24, M. P. Hedges to T. J. McCumber, "Sulfate and Chloride Concentrations for PLEX Evaluation SR 88-382," dated August 4, 1989.

ATTACHMENT L

SAMPLE STRUCTURAL WALKDOWN DATA SHEETS

ATTACHMENT A

Plant Structure Description Form

Title: DIESEL GENERATOR BUILDING **Code:** DGB

Description: Steel frame single story building which houses diesel generators, 480V switchgear, high pressure and low pressure safety injection system. Nitrogen storage tanks supported on steel framing above roof. Accumulator tank encl. is situated at one corner of the building.

Arrangement Drawings:
Machine Location - 9699-FM-81A
Plans & Elevations/Cross Sections - 9699-FA-19A, 20A, 21A
Foundation Plans & Dets, Sht. 1, 2 & 3 - 9699-FC-63A, 63B, 63C
Plan & Detail, Sht. 1, 2 - 9699-FS-25A, 25B
Conduit Drawings - 9699-FE-58A, 58B, 58BA 58BB, 58C
Safety Injection Water Piping - 9699-FP-46E, 46F, 46G

Notes: New Roof - EDCR-86-308
Building is in excellent condition with only minor degradation identified. Some grout is not up tight under 2 column base plates and some rusting was evident on the nitrogen storage support structure on roof and on conduit supports at ceiling of accumulator tank enclosure.

Preparer: P. F. McHale **Date:** 10/18/89
Walkdown By: N. Labrecque, P. McHale and H. Chander 10/18/89

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ATTACHMENT B

Walkdown Data Sheet

1. Structure: (45) DGB Diesel Generator Building

2. Component Group: Concrete

3. Component Type: Ground floor slabs and equip. foundations

4. Potentially Significant Age-Related Degradation? ____ NO __X__ YES

5. Indications of Degradation? ____ NO __X__ YES

   Describe: Some minor cracking in various locations.

   Some minor cracking in slabs within diesel gen. cubicles.

6. Harsh Environment? ____ NO ____ YES

   Describe:

7. Remarks: Equip. pads ok.

   Cracks of shrinkage type and of no structural significance.

Preparer: P. F. McHale Date: 10/23/89

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