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CLARK,R.A. Operating Reactors Branch 3

SUBJECT: Forwards response to NRC 810529 safety evaluation re environ qualification of safety-related electrical equipment. per repts

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FLORIDA POWER & LIGHT COMPANY

October 8, 1981
L-81-442

Office of Nuclear Reactor Regulation
Attention: Mr. Robert A. Clark, Director
Operating Reactors Branch #3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Clark:

Re: St. Lucie Unit 1
Docket No. 50-335
Environmental Qualification of
Safety-Related Electrical Equipment

Florida Power & Light has completed its review of the May 29, 1981 NRC Safety Evaluation Report on Environmental Qualification of Safety-Related Electrical Equipment for St. Lucie Unit 1. Our response is attached.

Very truly yours,

Robert E. Uhrig

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/PLP/mbd

cc: Mr. J. P. O'Reilly, Region II
Harold F. Reis, Esquire

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FLORIDA POWER & LIGHT COMPANY

ST. LUCIE UNIT 1

DOCKET NO. 50-335

RESPONSE TO IEB 79-01B SER

SEPTEMBER 30, 1981

ST. LUCIE UNIT 1

RESPONSE TO IEB 79-01B SER

CONTENTS

ST LUCIE UNIT 1

RESPONSE TO IEB 79-01B SER

CONTENTS

ATTACHMENTS

I. INTRODUCTION

On January 17, 1980 the NRC issued Inspection and Enforcement Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment" (hereinafter referred to as IEB 79-01B). IEB 79-01B required responses, affirmed pursuant to 10 CFR 50.54 (f), within 45 and 90 days from receipt of the Bulletin. As discussed below the magnitude of information requested and NRC guidance provided to develop that information, resulted in licensee submittals and staff reviews which have extended beyond the original dates promulgated in IEB 79-01B. This report supplements the original FPL response to IEB 79-01B (submitted via FPL letter L-80-259 dated August 6, 1980) and addresses information identified by NRC Staff in their 79-01B Safety Evaluation Report transmitted to FPL by letter dated May 29, 1981. It is considered to be fully responsive to the Staff areas of concern addressed in the SER. It is our understanding that the Staff will review this supplemental information and advise FPL of the results of such review at a future date, most likely in early 1982. Even though the issues raised by IEB 79-01B are not closed out via formal Staff acceptance, FPL remains convinced that electrical equipment relied upon to mitigate or monitor a high-energy line break in the St Lucie Unit No. 1 plant will operate satisfactorily in the harsh environment to which it is exposed.

The issue of environmental qualification of equipment has consumed many man-years of effort on the part of industry and Staff and has engendered the expenditure of many millions of dollars by FPL. Table 1 is a listing of relevant documents which serves to illustrate the complications and clarifications involved in attempts to resolve this issue with the NRC. Note that the scope of this table excludes the originating document IEB 79-01, which in itself was a sizable undertaking. The final entry tabulated is the NRC/industry four-day meeting on this issue held at Bethesda, Md on July 7 through July 10. Based on the extensive questions and the Staff responses thereto, the issue of environmental qualification to current NRC requirements remains uncertain since Staff has provided clarifications and revisions to the numerous guidance documents on this topic but the Bethesda meeting set forth new NRC guidance and further clarifications.

The regulatory requirements at the time of original design and procurement were to design to satisfy environmental factors. Design does not mean qualification testing. The term design was meant to include an appropriate combination of qualification tests; analyses; Vendor's design, operating and test experience; and use of available literature. Accordingly, qualification tests were not done for some equipment. In some instances the test durations were shorter than the required duration. Even where qualification tests were done, all accident parameters were not necessarily covered in the tests. In some cases, especially for devices located outside containment, no radiation tests were specified; and in accordance with the prevailing industry practice, accelerated preaging tests were not done for most of the equipment.
The lack of qualification tests to current NRC requirements does not provide sufficient justification to disqualify the equipment for its intended function. To demonstrate this, appropriate engineering analyses were

performed to reaffirm the adequacy of the equipment to perform its intended function in the stipulated harsh environment. The methods utilized comply with GDC 4 of Appendix B to 10 CFR 50. Analyses, tests, etc were conducted in accordance with an approved QA program that complies with GDC. For operating plants it would be inappropriate to evaluate test reports and analyses on a generic basis. Plant-specific evaluations are the only appropriate vechile for dispositioning plant-specific qualification methods.

FPL complies with 10 CFR 50 Appendix A General Design Criteria 4 which states "Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents including loss-of-coolant accidents." Engineering analyses, as required, when used in the design review and environmental qualification verification process in lieu of type testing are permitted by GDC 4.

This report, which constitutes the "90-day response" to the May 29, 1981 SER letter, is written recognizing that uncertainties in NRC requirements exist. As indicated on Table 1, FPL has supplemented their final response to IEB 79-01B (L-80-259 of August 6, 1980) with four additional submittals (L-80-363 of October 31, 1980; L-81-42 of February 6, 1981; L-81-61 of April 8, 1981; L-81-255 of June 19, 1981) in an attempt to provide the Staff with sufficient information to complete their review. Table 1 does not reflect the telephone conversations between FPL engineers and the Staff to attempt to clarify Staff concerns. FPL believes the paragraphs below provide general information regarding aspects of environmental qualification mentioned in Sections 3 and 4 of the SER; detailed information of the type we believe will satisfy the NRC are presented in Section II infra and specifically addresses each NRC perceived deficiency for each component. The supplemental information provided by FPL plus the final response (Phase II) to IEB 79-01B constitute our assurance that the St Lucie Unit I equipment is appropriately qualified, and we believe we are fully responsive to the Staff concerns identified in the SER.

As indicated in our main report, submitted in the final Phase II response to IEB 79-01B, we used a "Systems Analysis" approach, as discussed therein, to identify systems, equipment and components which were placed on a "total equipment list" and then reviewed for equipment located in a harsh environment. The total equipment list is in our files; the harsh environment list is the Master List submitted with L-80-259, and each component on that list is shown as qualified on an individual Component Evaluation Sheet (CES) also included with L-80-259. As stated in the report which accompanied FPL's IEB 79-01B response, if engineering analyses were used in qualification review the analysis number was recorded at the bottom of the CES and called out as a "See Note ( )" in the appropriate column of the CES. When engineering analysis (EA) resulted in a complete qualification of the component, a "None" was placed in the outstanding items column, the EA was considered the same as a laboratory test report, and therefore not transmitted with the IEB 79-01B response. If however, the EA resulted in a need for replacement, relocation, or modification etc, a "See Note ( )" was placed in the outstanding items column and it was included with the response to show adequate justification for continued operation. When a "See Note" appeared in the qualified parameter column it meant that the component was qualified for a value equal to or greater than the required value when accompanied by a "None" disposition in the outstanding items column. This fact was explained by FPL employees verbally to NRC reviewers in telecons, i.e. as a method of eliminating redundancy in typing and not to be interpreted that a component is thereby unqualified simply because a "See Note" appears in the parameter column. It is FPL's understanding that this pre-PREER explanation was not used in the review and may have resulted in a larger than otherwise list of deficiencies. Nonetheless, as stated above, we have responded to each NRC identified deficiency for each component.

Use of the "Systems Analysis" approach utilized reference to the following sources of information: a) FSAR; b) Plant Technical Specifications; c) Plant Emergency Operating Procedures and d) facility drawings such as Control Wiring Diagrams, Piping and Instrumentation Diagrams etc. Electrical equipment was considered for inclusion in the total equipment list and Master List regardless of whether it was designated as Class 1E, non-Class 1E, safety-related or not, if during the review it was a potential candidate for inclusion in the total equipment list.

In summary, this report together with FPL's original response to IEB 79-01B provides assurance that electrical equipment required to mitigate or monitor the accidents defined and to place the plant in a safe shutdown condition, will operate in the harsh environment to which it may be exposed. We also feel confident that Attachments 2 and 3 of this report together with FPL's original response to IEB 79-01B provides the level of supplemental technical detail necessary to fully respond to NRC perceived deficiencies. Please note that the following SER response to NRC evaluations is presented in the four-part format requested by the Staff per their slides and discussion during the July 10, 1981 meeting held at Bethesda, Maryland.

TABLE 1

RELEVANT DOCUMENTS CONCERNING NRC IE BULLETIN 79-01B

(* = FPL response)

Item	Date	Document
1)	Jan 14, 1980	IE Bulletin 79-01B and 5 Enclosures
2)	Jan 17, 1980	Revised IE Bulletin 79-01B and 5 Enclosures
3)	Feb 1, 1980	IE Regional Meetings to clarify IEB 79-01B
4)	Feb 29, 1980	IEB 79-01B Supplement Information (Supplement 1)
* 5)	Mar 4, 1980	L-80-65: FPL's scope and schedule for responding to IEB 79-01B
6)	May 23, 1980	Commission Memorandum and Order (CL1-80-21)
* 7)	Jun 2, 1980	L-80-167: FPL submittal of preliminary (Phase I) IEB 79-01B response
8)	Jul 14, 1980	IE Regional Meetings to clarify IEB 79-01B
* 9)	Aug 6, 1980	L-80-259: FPL submittal of final (Phase II) IEB response
10)	Aug 29, 1980	Order for Modification of License (Nov 1, 1980 deadline)
11)	Sep 19, 1980	Revised Order for Modification of License (Nov 1, 1980 deadline)
12)	Sep 30, 1980	IEB 79-01B Supplement 2
13)	Oct 24, 1980	Order for Modification of License (Dec 1, 1980 and June 30, 1982 deadlines)
14)	Oct 24, 1980	IEB 79-01B Supplement 3
*15)	Oct 31, 1980	L-80-363: Supplemental information; response to Aug 29 Order
16)	Nov 26, 1980	Generic letter to ORs, OLs, CPs, clarifying Oct 24 Order

TABLE 1 (Cont'd)

RELEVANT DOCUMENTS CONCERNING NRC IE BULLETIN 79-01B

(* = FPL response)

Item	Date	Document
17)	Dec 18, 1980	IE Technical Evaluation Report (TER)
18)	Jan 19, 1981	Generic letter to ORs, OLs, CPs clarifying Oct 24 Order and 79-01B Supplement 3
*19)	Feb 6, 1981	L-81-42: Supplemental information; response to IEB 79-01B Supplement 3
20)	Mar 10, 1981	Generic Letter to ORs, OLs, CPs clarifying proprietary information
21)	Mar 26, 1981	NRR Staff Preliminary Review of Equipment Evaluation Report (PREER)
*22)	Apr 8, 1981	L-81-61: FPL response to PREER
23)	May 29, 1981	NRC Staff 79-01B Safety Evaluation Report (SER) (90 day response required)
*24)	Jun 19, 1981	L-81-255: FPL response to SER (reference to L-81-61)
*25)	Jun 22, 1981	Petition to Commission for Extension of June 30, 1982 Deadline
26)	Jun 29, 1981	NRC Staff Motion for Leave to Defer Response to Petition
27)	Jul 7-10, 1981	NRC/Industry Meetings to discuss content of SERs

NOTE: Although the SER References A July 3, 1980 FPL letter, that letter applies to FPL's Turkey Point Plants

II. RESPONSE TO NRC EVALUATIONS IN SER SECTIONS 3 AND 4 (BY SER SECTION NO.)

A. (3.1) Completeness of Safety-Related Equipment

Review of the plant Emergency Operating Procedures (EOPs) assured that equipment was identified which was required to achieve a cold shutdown condition, even though the licensed safe shutdown condition for St Lucie Unit 1 is hot standby. Thus assurance exists that a path of cold shutdown equipment has been identified. The system/equipment/components identified in the total equipment list, Master List and CESs discussed in Section I above have been verified to be those required to achieve or support: a) emergency reactor shutdown; b) containment isolation; c) reactor core cooling; d) containment heat removal; e) core residual heat removal; f) prevention of significant release of radioactive material to the environment; and g) support equipment for the above. The systems identified by FPL in their IEB 79-01B submittal thus encompass those system identified by the Staff in Appendix D of the SER.

TMI-related equipment was discussed and supplementary CESs provided as FPL's response to IEB 79-01B Supplement 3, in FPL letter L-81-42 of February 6, 1981. Therefore in response to SER Sections 3.1 and 5.0, to our knowledge FPL's 79-01B submittals contain no "deferred requirements".

A new requirement, not previously identified by the Staff until issuance of the PREER, relates to providing a complete list of all display instrumentation mentioned in the LOCA and HELB emergency procedures. As mentioned above the plant EOPs were reviewed to ensure that the lists and CESs included the proper equipment. Based on the recent NRC SER requirement for an additional specific list, however, we have prepared Attachment 1 for your information.

TMI-related equipment qualification as discussed <u>supra</u>, has been provided to the NRC already via L-81-42 dated February 6, 1981; the SER in section 3.1 states "... post-accident sampling and monitoring and radiation monitoring equipment is closely related to the review of TMI lessons-learned modifications and will be performed in conjunction with that review." We remain awaiting the results of the Staff review of our February 6, 1981 TMI submittal.

B. (3.2) Service Conditions

Section 3.2 of the SER states Staff acceptance of environmental service conditions. As stated in both the preliminary (Phase I) and final (Phase II) FPL responses to IEB-79-01B (L-80-167 of June 2, 1980 and L-80-259 of August 6, 1980 respectively) FPL noted that the Containment Spray System is an automatically initiated system not subject to a disabling single active failure; thus DOR Guideline 4.2.1 is met. Equipment submergence was also addressed as noted on the CESs for equipment inside containment per the DOR Guidelines. Based on the SER, no further action on this section is required.

C. (3.3) Temperature, Pressure and Humidity Conditions Inside Containment

Use of the steam saturation temperature (T_{sat}) at the peak LOCA total pressure was never identified to FPL as an NRC criterion until it was mentioned in the PREER in March 1981. In our response to the PREER, FPL provided justification for use of the FSAR's design basis temperature, and justification that equipment inside containment will perform its intended function as now required by the SER. Those assurances, previously transmitted via L-81-61 in April 1981 are repeated herein as follows:

> "In the PREER, the Staff has suggested that the minimum temperature profile for equipment qualification should include a margin to account for higher than average temperatures that might exist in the upper regions of the containment due to stratification. This is not considered relevant to St Lucie - Unit 1 since; (a) There is no safety related electrical equipment located in the upper regions of the containment (although not stated explicitly in our previous reports, this fact is evident from a review of the CES "Location" item given for each component); (b) Operations of the containment spray system and the containment fan coolers should preclude any concerns over stratification phenomena within the containment; and (c) The temperature criterion used in based on sound analytical methods incorporating conservative licensing assumptions. Furthermore, the pressure and temperature profile utilized in the response to IE Bulletin 79-01B was based on the plant specific analysis presented in Chapter 6 of the Final Safety Analysis Report. This is in full compliance with the definition of "appropriate service conditions" indicated at Section 3.0 and as elaborated upon in Sections 4.0 and 4.1.1 of the guidelines of Enclosure 4 to IE Bulletin 79-01B."

We understand that the Staff position on temperature margin is based on CVTR test data. We note that this data indicates that the stratification phenomena were short-lived and temperatures converged rapidly once the containment spray was operational. As we noted in both the Phase I and Phase II main reports in our response to IEB 79-01B, the St Lucie containment spray system is not subject to a disabling single failure. Containment spray is initiated concurrently with the accident and provides sufficient mixing to preclude stratification.

Secondly, the CVTR data indicate that stratification is applicable to the peak temperature only. We do not believe that the margin required by the Staff is significant in the ranges of temperatures discussed (285F versus 270F) especially in view of the fact that the temperature difference is present for only a few minutes (refer to the LOCA and MSLB temperature history curves in our main report submitted in August 1980). Finally, we note that the licensing conservatisms imposed on the FSAR DBA analyses, particularly in the areas of mass-energy release and heat transfer coefficients, result in worst-case environment scenarios that will never be attained in a realistic case.

Please note that Attachments 2 and 3 to this report provide supplemental technical detail for specific equipment inside containment in response to NRC identified deficiencies such that an additional level of environmental qualification is demonstrated.

D. (3.4) Temperature, Pressure, and Humidity Conditions Outside Containment

Section 3.4 of the SER states Staff acceptance of environmental conditions outside containment. Note that in Attachments 2 and 3, additional supplemental technical detail is provided by FPL for specific outside containment equipment to further demonstrate environmental qualification.

We note for the record that the SER contains an apparent typo: we believe that the "MSLB" should be "HELB" in the following sentence concluding SER Section 3.4:

> "The staff has verified that the parameters identified by the licensee for the MSLB are acceptable."

FPL identified six classes of HELBs outside containment as documented in both our Phase I and Phase II submittals. We note that the temperature assumed for the HELB scenarios were in some cases (MSL, MFW, Auxiliary Steam) physically impossible to achieve since any pressurized heated fluid would flash to saturated steam conditions and not be as severe as postulated. Based on the SER, no further action on these items is required.

E. (3.5) Submergence

In our response to the PREER, FPL provided to staff concerns on submergence inside containment as now required by the SER. That response previously transmitted via L-81-61 in April 1981 is repeated herein as follows:

> "On the subject of submergence, page 4 of the PREER states that 'the licensee identified 9 items for which no documentation was available. The licensee proposes to replace this equipment with components that have sufficient documentation...' A review of our previous submittals indicates that we proposed to replace 6 items that could become submerged. An additional 15 items that could become submerged were analyzed and shown to be qualified or to have completed their necessary safety function prior to becoming submerged."

Submergence outside of containment is a new requirement that appeared for the first time in the SER. It was therefore not addressed in FPL's PREER response. Chapter 3, Section 3.4 of the FSAR discusses water level (flood) design outside containment for those plant areas exterior to the buildings containing safety related equipment. That information which concerns natural phenomena is not repeated here since it does not relate to flooding effects of an HELB in the reactor auxiliary building.

At the July 7-10, 1981 meetings the NRC raised the issue of flooding from moderate energy line break (MELB's). The St Lucie Unit 1 FSAR addressed this flooding concern at Subsection 9.5.1.3.

FPL has concluded that submergence in the St Lucie Unit No. 1 reactor auxiliary building as a result of a high or moderate energy line break is not a harsh environment that affects safety related equipment required to mitigate or monitor that accident or prevent safe shutdown of the plant. The following demonstrates the justification and assurance for this conclusion:

1. FPL has reviewed the appropriate general arrangement and plumbing drawings which show adequate floor drains and sumps in safety related cubicles and hallways.

2. Conservatively sized sumps with duplex sump pumps exist in key areas such as the ECCS pump room area. Hi level alarm is provided both audibly and visually as well as indication lights for the pumps.

3. Watertight doors, curbs, pipe boots, combination missile shield/flood walls, etc. exist throughout the RAB as applicable where safety related equipment is located.

4. FPL review has not discovered any class 1E electrical equipment near floor elevations. Typically, pump motors, switchgear, MCC's etc are mounted upon grouted-in base plates; the motor operated and solenoid valves' sensing elements are in piping systems well above floor level; transmitters, local control stations, junction boxes, etc. are rack or wall mounted; cables are either in cable tray or conduit well above floor level; vertical cable runs are curbed, travel through sleeves, or are sealed by grout, or fire stops.

5. A HELB would normally be mitigated in 60 seconds which is the maximum closure time specified for valve motor operators. Solenoid operated control valves have a much faster response time.

6. It is highly unlikely that during normal plant operation an undetected HELB or MELB would exist for a time duration significant enough to create a flooding condition (given an infinite amount of fluid) in an area where portions of both safety trains of equipment are compromised.

For equipment outside containment the "flood level elevation" item is identified as "N/A" (not applicable) and "submergence" is identified as "not required". For the reasons given above these designations are appropriate and therefore the CES's are left unchanged.

Please note that Attachments 2 and 3 to this report reference this issue in response to NRC identified deficiencies for specific equipment.

F. (3.6) Chemical Spray

Section 3.6 of the SER is a one-sentence statement which merely repeats the FSAR chemical concentration and pH ranges. We interpret this, along with the Staff's acceptance stated in Section 3.2, Service Conditions, to imply acceptance of this item also. However, note that in Attachments 2 and 3 additional supplemental technical detail is provided by FP&L for specific equipment to further demonstrate environmental qualification. The effects of spray impingement, ingress, chemical concentration, and long term effects of corrosion as they affect the capability of equipment inside containment to achieve shutdown were considered during the review required to comply with IEB 79-01B. Based on the SER, no further action on this item is required.

G. (3.7) Aging

In our response to the PREER, FPL provided supplemental information to verify and identify the degree of conformance of aging methodology used during the review to state-of-the-art technology as now required by the SER. Those assurances, previously transmitted via L-81-61 in April, 1981 are repeated herein as follows:

> "The methodology employed for thermal aging evaluation proceeded from the specified environmental requirements for the component under consideration, as shown on the Component Evaluation Sheets, and was based on testing data, and/or Arrhenius analysis. Analyses utilized the "weak-link" approach of identifying the most susceptible components of a particular item of equipment, chosen from a component breakdown list, and then determining their behavior under the environmental conditions.
>
> In order to identify which components are most susceptible, we first consulted the table of Appendix C of IEB 79-01B. This is in compliance with NRC directives. Then if necessary, we referred to other references in the literature on thermal aging, such as the EPRI draft report on environmental qualification ("A Review of Equipment Aging Theory and Technology", EPRI RP890-1). This procedure is consistent with the statement made in Appendix C that the table is a partial list of materials, which may be found in a number of power plants."

Our previous submittals have committed to developing a program for periodic replacement of electrical components. It is our belief that this program in conjunction with the periodic testing and inspection requirements imposed by the unit's Technical Specifications adequately addresses aging. In our February 25, 1981 discussions the Staff suggested that a surveillance program for cable may provide some benefit. We noted that this requirement would be in conflict with the Staff's fire protection requirements in that the cables are presently coated with Flamastic."

The basis input for the weak-link analysis was a comprehensive data bank comprising EPRI referenced data, EBASCO referenced data, and Table C-1, Appendix C of the DOR guidelines. Table C-1 was used as a screening criterion. Materials/components not considered potentially susceptible to thermal aging, according to Table C-1, for the 40 year service term were excluded from further consideration and deemed acceptable from the thermal aging standpoint. Material/components considered potentially susceptible to thermal aging were further investigated utilizing EPRI* and EBASCO referenced data. The data consisted of the following: Citations delineating the materials/components tested to thermal aging lifetime failure as a function of temperature, derivable activation energy and log normal slope intercept values, and the referenced documents from which the test data issued. The number of material/component items indexed were no fewer than 220. The references are given in Attachment 4.

As additional guidance, and as a checking device, a parametric study was engaged. The parametric study was invested in a computer program which considered thirteen different accident environment temperature profiles for DBA LOCA and DBA MSLB pertinent to St Lucie Unit #1 as a function of required equipment operability duration (See Attachment 4). The parametric study encompassed the Arrhenius activation energy range and log normal slope intercept range derivable from the references. Activation energies were varied in intervals of .10 ev from 0.2 to 0.5 and .01 ev from 0.5 ev to 1.5 ev; log normal slope intercept values were varied in intervals of 0.5 from 0.5 to 25.

The rationale for the parametric analysis is given in Attachment 4 a sample of the computer output is included in the Attachment.

The parametric analysis provided the insight which led to the derivable conclusion that the fraction of thermal aging lifetime used by the accident temperature profile relative to the combined normal operations and accident temperature profiles ranged from 1% to 10% in the borderline acceptance region of 0.5 to 0.8 ev activation energy for both the long term as well as short term postulated accidents both inside as well as outside containment. Thus in effect the severity of the thermal aging environmental stress factor arising out of a postulated accident is subsumed within the severity of 40 year normal operating conditions. A tabulation of sample derivable results is given below:

*EPRI reference data is given in part by the draft report "A Review of Equipment Aging Theory and Technology EPRI RP890-1.

AccidentTemp Considered	Schedule	Fraction of Thermal Aging Life Used by Accident Modus .5ev	.6ev	.7ev	.8ev
Short-term MSLB	0-1 min @ 400°F 1 min 75 min @ 240°F >75 min @ ambient of 100°F	.0004	.001	.003	.011
Long-term MSLB	0-8 hrs @ 340°F 8 hrs-24 hrs @ 110°F >24 hrs @ ambient of 100°F	.049	.057	.066	.080
Long-term LOCA	0-2 hr @ 270°F 2 hr-22 hr @ 240°F 22 hr-30 day @ 150°F 30 day-1 year @ 110°F >1 year @ ambient of 100°F	.05	.058	.067	.078

Please note that Attachments 2 and 3 to this report provide additional supplemental technical detail or commitments for specific equipment regarding Appendix C of the DOR guidelines, our surveillance program, and maintenance and replacement schedules as applicable in response to NRC identified deficiencies.

H. (3.8) Radiation

In our response to the PREER, FPL provided justification for use of a lower integrated dose and justification that equipment inside containment will perform its intended function as now required by the SER. Those assurances previously transmitted via L-81-61 in April 1981 but apparently unreviewed by the Staff, are repeated herein as follows:

"In the PREER, the Staff has referenced a $4x10^7$ rads guideline for equipment inside containment.

Upon rescrutiny of the DOR guidelines requirements for radiation levels postulated to exist following a LOCA, as reflected in IEB 79-01B, we find no explicit references to a guideline requirement of $4x10^7$ Rads integrated dose inside containment. On the contrary, 'Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors,' which is a subset of IEB 79-01B, indicates under Section 4.1.2, 'Gamma Radiation Doses,' that 'a total gamma dose radiation service condition of $2x10^7$ Rads is acceptable for Class 1E equipment located in general area inside containment'. It also indicates under 'Beta Radiation Doses' that for a 'conservative beta surface dose of 1.4×10^8 Rads', dose reduction credits of 100 can be applied for 70 mils of insulation material and that other appropriate reduction credits can be obtained for additional shielding.

> The gamma and beta contributions were considered in determining radiation dose levels, and appropriate shielding credits were taken within the framework established in IEB 79-01B. In addition, in establishing the integrated dose envelope of values inside containment, we considered other reduction factors, whenever warranted, such as for power level, required time of equipment operability (including margin), and compartment volume. The combination of these dose reduction factors resulted in dose values below the centerline, peak values for many pieces of equipment."

The methodology employed for radiation aging evaluation proceeded from a comparison of the specified radiation exposure with the qualified radiation exposure. Specified radiation exposure values were taken either from the generic FSAR values or from the specific Equipment Dose Map Values. The generic FSAR values envelope the Equipment Dose Map Values. Qualification radiation exposure values were derivable either from test reports or a material/component breakdown analysis. The former qualification values generally satisfied generic FSAR values whereas the latter generally satisfied specific Equipment Dose Map values.

The equipment dose maps were generated on the basis of considering the following contributory factors:

1. Normal Operations Dose - 40 years (γ)
2. Normal Operations Dose - 40 years (β) (for equipment immersed in radioactive fluid)
3. DBA Submersion Cloud Dose (γ)
4. DBA Submersion Cloud Dose (β)
5. DBA Plate Out Dose (γ)
6. DBA Plate Out Dose (β)
7. DBA Direct Shine Dose from Liquid Sources Containing Core Inventory (γ)

8. DBA Immersion Dose (for equipment immersed in fluid containing core inventory) (β)

9. DBA Direct Shine Dose from Ambient Filtrate Sources such as the SBVS and Emergency filters to other equipment (γ)

10. DBA Direct Shine Sump Dose (γ)

11. DBA Direct Shine Sump Dose (β)

12. DBA Immersion Sump Dose (γ)

13. DBA Immersion Sump Dose (β)

14. DBA Direct Shine Dose from Containment Sources to Equipment Outside Containment (γ)

The calculational methodology utilizing these contributory factors was based on a mechanistic model. The calculation assumptions were consistent with those presented in NUREG-0588; and the calculation results were consistent on the conservative side with the nomographic parametric valves presented in Appendix B of the DOR guidelines. The maximum γ containment dose given by the Equipment Dose Maps was 2E + 7 rads as contrasted with 1.5E + 7 rads derivable from the nomographs for the St Lucie Unit 1 plant characteristics.

The equipment dose maps presented over 200 matrix notations. Each matrix notation comprised six valves representing normal operations dose integrated over 40 years, and DBA integrated dose for operability times of 1 day, 30 days, 6 months, and 1 year.

Where test report data was not available, recourse was made to a material/component breakdown analysis.

The bases input for the weak-link analysis was a comprehensive data bank comprising tabular data, prefaced by Table C-1 in Appendix C of the DOR guidelines. Table C-1 was used as a screening criterion. Materials/components not considered potentially susceptible to radiation aging, according to Table C-1 for the 40 year service term were excluded from further consideration and deemed acceptable from the radiation aging standpoint; material/components considered potentially susceptible to radiation aging were further investigated utilizing the Ebasco tabular data. The data consisted of the following:

For each entry delineating the material/component, the radiation damage threshold value (for incipient change) and where appropriate the 10%, 25%, and 50% damage threshold values for various mechanical and electrical properties of the constitutive material/component, as well as commentary on side effects such as hydrogen and chlorine outgasing, embrittlement, etc. The data are derived from references given in attachment. The data bank was used by the reviewer to evaluate the radiation susceptible weak-link material.

The actual analysis however is over 100 pages and is therefore not included. It is retained in our files and we invite the staff to review it with our A/E if they feel this is necessary after considering the above deficiency response material.

Please note that Attachments 2 and 3 to this report provide supplemental technical detail for specific equipment regarding radiation exposure in response to NRC identified deficiencies such that an additional level of environmental qualification is demonstrated.

I. (4.1) Equipment Requiring Immediate Corrective Action

Section 4.1 of the SER states that "...the staff has not identified any safety-related electrical equipment which is not able to perform its intended safety function during the time in which it must operate." This is consistent with Appendix A of the SER which lists no equipment in this category. Based on the SER, no further action on this section is required.

J. (4.2) Equipment Requiring Additional Information and/or Corrective Action

Attachment 2, titled, "Deficiency Matrix", accompanies this report. It is comprised of essentially the SER Appendices B and C which have been reproduced with additional columns added whose headings are identical to the deficiency legend used by the NRC. Attachment 2 presents a dual lineup: On the left-hand side are the SER deficiencies cited for the CES equipment items; on the right-hand side are the corresponding deficiency responses. Each deficiency entry has a related deficiency response symbol entry. These responses are keyed to the individual Component Evaluation Work Sheets. The deficiency response symbol entries refer to deficiency responses presented in Attachment 3. These deficiency responses, when taken singly, represent elaboration and/or complementation of the CES informational support base pertinent to the deficiency cited; when taken collectively, pertaining to each CES equipment item, they constitute a clarification and supplement to the CES equipment item.

The deficiency responses fall into the category of being specifically oriented for each CES equipment item and yet bearing a generic contextual nature. The latter derives from the commonality of deficiencies affecting the ensemble of safety-class equipment. An effort has been made to satisfy the SER review requirements with due consideration of the prior TER review requirements under the presumption that the TER which antedated the SER served as a baseline for the draft of the SER deficiency formulation. This was verified by a collative match-up analysis of the TER and SER. Because the linkage between the TER and the SER was never made explicit to FP&L, neither in the body of the SER, nor at the July 7-10 NRC Bethesda Meeting, it was necessary to develop an interpretation of what the linkage constituted. Consequently,it was necessary to formulate an interpretation of the SER alphabet legend for each deficiency. It is on this fundament that the Deficiency Response Matrix (Attachment 2) and Deficiency Responses (Attachment 3) are presented.

This supplemental information provided by FPL together with the final (Phase II) response to IEB 79-01B constitutes our assurance that St. Lucie Unit 1 equipment is appropriately qualified and we believe it to be of the type that will satisfy the NRC.

K. (4.3) Equipment Considered Acceptable or Conditionally Acceptable

The SER Appendix C identified items with NRC perceived deficiencies identified as related to the topic of aging. As related to aging information, the above discussions at II. J also apply to this section.

III. UPDATED CESs

During FPL's efforts in accumulating additional information and developing responses to the applicable sections of the SER, we did not revise or add any CESs. Several engineering analysis sheets were revised however, and these along with the supplemental deficiency responses have been placed in our documentation files.

IV. PROPOSED CORRECTIVE ACTION

The deficiency legend "RPN" appears on some of the equipment listed in Appendix B of the SER indicating that the Staff considers that an adequate relocation or replacement schedule was not provided. FPL notes that Section 7.0 of the main report which accompanied its IEB 79-01B Phase II submittal dated August 6, 1980 contained a table with an action plan and schedule for the above equipment. That table listed equipment that, after evaluation, had been designated as an "outstanding" item in the appropriate column of the applicable CES. In every case however, justification has been given for continued plant operation. This table has been revised to indicate current action plan status and schedular commitments. It has been labeled Table 2 and is included in this section. The past justifications for continued plant operation remain valid.

Note that FPL has been able to schedule modification or relocation of some equipment during the next refueling, presently scheduled for late 1981. Replacement of equipment such as limit switches and solenoid valves will either: a) be replaced during the next refueling outage following receipt of qualified material or, b) be replaced at the next unscheduled outage pending sufficient duration, manpower, and access considerations. Again, this is dependent upon receipt of qualified equipment or parts.

V JUSTIFICATION FOR CONTINUED OPERATION

FPL concurs with the Staffs' conclusion in Section 6 of the SER which states "The staff has reviewed the qualification of safety-related electrical equipment to the extent defined by this SER and has found no outstanding items which would require immediate corrective action to ensure the safety of plant operation." FPL contends that this SER response together with the FPL's final response to IEB 79-01B provides the adequate documentation required by the NRC to ensure that safety-related electrical equipment is capable of withstanding the harsh environmental service conditions to which they may be subjected.

Table 2

PROPOSED CORRECTIVE ACTIONS

C E S Page No.	ITEM (See Code)	DISPOSITION Replace	Modify/ Relocate	Other	Disposition Schedule Notes
3I-1	T		X		4
2	T		X		4
3	T		X		4
4	T		X		4
5I-3	T		X		4
12I-1	T	X			2
2	T	X			2
3	T	X			2
13I-5	RM			X	3
6	RM			X	3
7	RM			X	3
8	RM			X	3
9	RM			X	3
10	RM			X	3
11	RM			X	3
12	RM			X	3
13	RM			X	3
1M-5 *	LS	X			1,2
7 *	LS	X			1,2
4M-68*	LS	X			1,2
69*	LS	X			1,2
77*	LS	X			1,2
78*	LS	X			1,2
14M-7 *	LS	X			1,2
9 *	LS	X			1,2
11*	LS	X			1,2
17M-4 *	LS	X			1,2
8 *	LS	X			1,2
2M-83	LS	X			1,2
84	LS	X			1,2
87	LS	X			1,2
88	LS	X			1,2
92	LS	X			1,2
93	LS	X			1,2
97	LS	X			1,2
2M-98	LS	X			1,2
3M-57	LS	X			1,2
58	LS	X			1,2

Table 2

PROPOSED CORRECTIVE ACTIONS

C E S Page No.	ITEM (See Code)	DISPOSITION Replace	Modify/ Relocate	Other	Disposition Schedule Notes
1M-50	LS	X			1,2
51	LS	X			1,2
53	LS	X			1,2
54	LS	X			1,2
1M-2	SV	X			1,2
4	SV	X			1,2
6	SV	X			1,2
8	SV	X			1,2
4M-67*	SV	X			1,2
76*	SV	X			1,2
14M-8 *	SV	X			1,2
10*	SV	X			1,2
12*	SV	X			1,2
17M-3 *	SV	X			1,2
7 *	SV	X			1,2
2M-82	SV	X			1,2
80	SV	X			1,2
94	SV	X			1,2
99	SV	X			1,2
3M-56	SV	X			1,2

NOTE:

1. Class 1E NAMCO limit switches and ASCO and AVCO solenoid valves located inside the containment will be replaced as previously reported per IE Bullentin 79-01 (FP&L Letter L-79-181 dated 7/2/79). Items marked with an asterisk indicate their previous commitments. Class 1E NAMCO limit switches and ASCO and AVCO solenoid valves located outside containment have been evaluated on a case-by-case basis. Replacement when called for is predicated upon successful conduit seal qualification. (See CES)

Table 2

PROPOSED CORRECTIVE ACTIONS

2. Will be replaced during a) the next refueling outage following receipt of qualified equipment at Site or b) the next unscheduled outage pending sufficient duration, manpower, and access considerations. (See CES)

3. TMI - NUREG 0578 Item. (See CES)

4. Scheduled for modification or relocation following the 1981 October refueling outage. These items are expected to be completed by January 1982.

<u>CODE</u>

T............TRANSMITTER, ELEMENT, ETC.

LS...........LIMIT SWITCH

SV...........SOLENOID VALVE

RM...........RADIATION MONITORING EQUIPMENT

ATTACHMENT 1

DISPLAY INSTRUMENTATION LIST

The following display instrumentation list was generated from the current St Lucie Unit No. 1 Emergency Operating Procedures which are used for mitigating or monitoring a LOCA and HELB accident. Notice that the list has been grouped into two sections, a) display instrumentation considered essential and therefore required by the operator to bring the plant to safe shutdown and, b) display instrumentation considered non-essential.

FP&L has maintained a continuous requalification program for plant operators at St Lucie Unit No. 1. This is comprised of numerous working weeks of training that are equally spaced on an annual basis. This program includes approximately one week of simulator training. Where non-essential instrumentation environmental qualification can not be assured, FP&L is considering revising the EOPS to further highlight this fact to the operator and further caution him in not depending on its use.

FP&L therefore considers that adequate justification and assurance exists that non-essential display instrumentation called out by the EOPS, should it be exposed to a harsh environment and malfunction, will not mislead the operator. In addition, the Staff should notice that the efforts in identifying shutdown equipment mentioned in the EOPS is also closely related to the similar requirements for TMI, Appendix "R", Regulatory Guide 1.97, Safety Assessment System & Human Factors Engineering tasks which are ongoing tasks.

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SG 1A LEVEL	LIC-9013A LR-9013A/ 9023A	LT-9013A,	YES	1I1, E4, E1	376
SG 1B LEVEL	LIC-9023A, LR-9013A/ 9023A	LT-9023A	YES	1I1, E4	377
SG 1A LEVEL	LIC-9013B	LT-9013B	YES	1I5, E4, E1	376
SG 1B LEVEL	LIC-9023B	LT-9023B	YES	1I6, E4	377
SG 1A LEVEL	LIC-9013C	LT-9013C	YES	1I9, E4, E1	376
SG 1B LEVEL	LIC-9023C	LT-9023C	YES	1I10, E4	377
SG 1A LEVEL	LIC-9013D	LT-9013D	YES	1I13, E4, E1	376
SG 1B LEVEL	LIC-9023D	LT-9023D	YES	1I14, E4	377
SG 1A PRESS	PI-8013A, PR-8013A/ 8023A	PT-8013A	YES	1I13, E4, E3	378
SG 1B PRESS	PI-8023A, PR-8013A/ 8023A	PT-8023A	YES	1I14, E4, E3	379
SG 1A PRESS	PI-8013B	PT-8013B	YES	1I17, E4, E3	378
SG 1B PRESS	PI-8023B	PT-8023B	YES	1I18, E4, E3	379
SG 1A PRESS	PI-8013C	PT-8013C	YES	1I11, E4, E3	378
SG 1B PRESS	PI-8023C	PT-8023C	YES	1I12, E4, E3	379
SG 1A PRESS	PI-8013D	PT-8013D	YES	1I15, E4, E3	378
SG 1B PRESS	PI-8023D	PT-8023D	YES	1I16, E4, E3	379

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PRZ PRESS	PIA-1102A	PT-1102A	YES	1I33, E4, E3	372
PRZ PRESS	PIA-1102B	PT-1102B	YES	1I34, E4, E3	373
PRZ PRESS	PIA-1102C	PT-1102C	YES	1I35, E4, E3	374
PRZ PRESS	PIA-1102D	PT-1102D	YES	1I36, E4, E3	375
PRZ PREZZ	PIC-1103	PT-1103	YES	1I37, E4, E3, E1	140
PRZ PRESS	PIC-1104	PT-1104	YES	1I38, E4, E3	141
LOOP 1A2 COLD LEG TEMPERATURE	TI-1102A	TE-1112CA	YES	1I17, E4	381
LOOP 1B HOT LEG TEMPERATURE	TI-1102A	TE-1122HA	YES	1I18, E4	381
LOOP 1B1 COLD LEG TEMPERATURE	TI-1102A	TE-1122CA	YES	1I19, E4	381
LOOP 1A HOT LEG TEMPERATURE	TI-1102A	TE-1112HA	YES	1I20, E4	381

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
LOOP 1A1 COLD LEG TEMPERATURE	TI-1102B	TE-1112CB	YES	1I21, E4	382
LOOP 1B2 COLD LEG TEMPERATURE	TI-1102B	TE-1122CB	YES	1I22, E4	382
LOOP 1A HOT LEG TEMPERATURE	TI-1102B	TE-1112HB	YES	1I23, E4	382
LOOP 1B HOT LEG TEMPERATURE	TI-1102B	TE-1122HB	YES	1I24, E4	382
LOOP 1A HOT LEG TEMPERATURE	TI-1102C	TE-1112HC	YES	1I25, E4	383
LOOP 1B HOT LEG TEMPERATURE	TI-1102C	TE-1122HC	YES	1I26, E4	383
LOOP 1A2 COLD LEG TEMPERATURE	TI-1102C	TE-1112CC	YES	1I27, E4	383
LOOP 1B1 COLD LEG TEMPERATURE	TI-1102C	TE-1122CC	YES	1I28, E4, E1	383
LOOP 1A1 COLD LEG TEMPERATURE	TI-1102D	TE-1112CD	YES	1I29, E4	384
LOOP 1B2 COLD LEG TEMPERATURE	TI-1102D	TE-1122CD	YES	1I30, E4	384
LOOP 1B HOT LEG TEMPERATURE	TI-1102D	TE-1122HD	YES	1I31, E4	384
LOOP 1A HOT LEG TEMPERATURE	TI-1102D	TE-1112HD	YES	1I32, E4	384

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SG 1A BLOWDOWN ISOLATION VALVE	R&G LTS	FCV-23-2	YES	1M01, E9, 1M02, E6, E29, E15, 1I39	EMDRAC 8770-5529/319
SG 1A BLOWDOWN ISOLATION VALVE	R&G LTS	FCV-23-4	YES	1M07, E6, 1M08, E3, E9	8770-5529/319
SG 1B BLOWDOWN ISOLATION VALVE	R&G LTS	FCV-23-5	YES	1M03, E9, E6, E29, 1M04, E15, 1I40	8770-5529/319
SG 1B BLOWDOWN ISOLATION VALVE	R&G LTS	FCV-23-6	YES	1M05, E6, 1M06, E3, E1, E9	8770-5529/319

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
HPSI HDR 1A1 FLOW	FR-3323/ 3343	FT-3323	NO	NONE	284
HPSI HDR 1A2 FLOW	FR-3313/ 3333	FT-3313	NO	NONE	284
HPSI HDR 1B1 FLOW	FR-3313/ 3333	FT-3333	NO	NONE	284
HPSI HDR 1B2 FLOW	FR-3323/ 3343	FT-3343	NO	NONE	284
REF. WATER TANK LEVEL	LIS-07-2A	LT-07-2A	NO	NONE	293
REF. WATER TANK LEVEL	LIS-07-2B	LT-07-2B	NO	NONE	294
REF. WATER TANK LEVEL	LIS-07-2C	LT-07-2C	NO	NONE	295
REF. WATER TANK LEVEL	LIS-07-2D	LT-07-2D	NO	NONE	296
HPSI DISCHARGE HDR PRESS	PR-3305/3306	PT-3306	NO	NONE	284
HPSI DISCHARGE AUXILIARY HDR PRESS	PR-3305/3306	PT-3305	NO	NONE	284

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
LOW PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3615	YES	2M72, E6, E9, E29	257
LOW PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3625	YES	2M77, E6, E9, E29, E16, E13	260
LOW PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3635	YES	2M74, E9, E6, E29	263
LOW PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3645	YES	2M79, E6, E9, E29	266
HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3616	YES	2M61, E6, E9, E29, E16, E13	261
HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3626	YES	2M63, E6, E9, E29, E16, E13	258
HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3636	YES	2M65, E6, E9, E29	264
HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3646	YES	2M67, E6, E9, E29	267

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AUXILIARY HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3617	YES	2M51, E6, E9, E29, E16, E13	261
AUXILIARY HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3627	YES	2M53, E6, E9, E29	259
AUXILIARY HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3637	YES	2M55, E6, E9, E29	265
AUXILIARY HIGH PRESS SI FLOW CONTROL VALVE	R&G LTS	HCV-3647	YES	2M57, E6, E9, E29	268
REFUELING WATER TANK VALVE	R&G LTS	MV-07-1A	NO	NONE	297
REFUELING WATER TANK VALVE	R&G LTS	MV-07-1B	NO	NONE	298
SI TANK 1A2 ISOLATION VALVE	R&G LTS	V-3614	YES	2M86, E6, E9, E29, E16, E13, E4, E1	270
SI TANK 1A1 ISOLATION VALVE	R&G LTS	V-3624	YES	2M81, E9, E6, E16, E13, E4, E29, E1	269

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SI TANK 1B1 ISOLATION VALVE	R&G LTS	V-3634	YES	2M91, E9, E6, E8, E16, E29, E4, E1	271
SI TANK 1B2 ISOLATION VALVE	R&G LTS	V-3644	YES	2M96, E9, E6, E16, E8, E4, E1	272
HPSI PUMP DIS-CHARGE VALVE	R&G LTS	V-3653	YES	2M101, E6, E9, E29	276
HPSI PUMP DIS-CHARGE VALVE	R&G LTS	V-3654	NO	NONE	277
HPSI PUMP DIS-CHARGE VALVE	R&G LTS	V-3655	YES	2M102, E6, E9, E29	278
HPSI PUMP DIS-CHARGE VALVE	R&G LTS	V-3656	NO	NONE	279
MINIMUM FLOW ISOLATION VALVE	R&G LTS	V-3659	YES	2M59, E6, E9, E29, E17, E13, E3	244
MINIMUM FLOW ISOLATION VALVE	R&G LTS	V-3660	YES	2M69, E6, E9, E29, E17, E13, E14	245
REC RET LINE DRAIN TO RDT VALVE	R&G LTS	V-3661	NO	NONE	274

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
HP SUCTION CROSSOVER VALVE	R&G LTS	V-3662	YES	2M103, E6, E9, E29	240
HP SUCTION CROSSOVER VALVE	R&G LTS	V-3663	YES	2M104, E6, E9	241
HPSI P 1A	R&G LTS	BKR	YES	2M50, E9, E11, E17, E13, E6	237
HPSI P 1B	R&G LTS	BKR	YES	2M60, E9, E11, E17, E13, E6	238
HPSI P 1C	R&G LTS	BKR	YES	2M70, E9, E11, E17, E13 E6	239
LPSI P 1A	R&G LTS	BKR	YES	2M71, E9, E11, E17, E13, E6	251
LPSI P 1B	R&G LTS	BKR	YES	2M76, E9, E11, E17, E13 E6	252
HPSI P 1A AMMETER	AM/237	CT'S 75/5	NO	NONE	237
HPSI P 1B AMMETER	AM/238	CT'S 75/5	NO	NONE	238

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
HPSI P 1C AMMETER	AM/239	CTS 75/5	NO	NONE	239
LPSI P 1A AMMETER	AM/251	CTS 75/5	NO	NONE	251
LPSI P 1B AMMETER	AM/252	CTS 75/5	NO	NONE	252

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SHUTDOWN COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHUTDOWN COOLING ISOL. VALVE	R&G LIGHTS	V-3651	NO	NONE	253
SHUTDOWN COOLING ISOL. VALVE	R&G LIGHTS	V-3652	NO	NONE	254
SHUTDOWN COOLING ISOL. VALVE	R&G LIGHTS	V-3480	NO	NONE	249
SHUTDOWN COOLING ISOL. VALVE	R&G LIGHTS	V-3481	NO	NONE	250
SHUTDOWN COOLING HEAT EXCH. FLOW VA	R&G LIGHTS	FCV-3651	NO	NONE	274
SHUTDOWN COOLING RETURN LPSI DISCHARGE FLOW VA	R&G LIGHTS	FCV-3306	NO	NONE	274

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SHUTDOWN COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHUTDOWN COOLING RETURN SI DISCH FLOW	FIC-3306	FT-3306	NO	NONE	274

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
BORIC ACID MAKEUP P-1A	R&G LTS	MCC	YES	4M51, E4, E9, E1	174
BORIC ACID MAKEUP P-1B	R&G LTS	MCC	YES	4M71, E4, E9, E14, E13, E29	175
CHARGING PUMP 1A	R&G LTS	BKR	YES	4M50, E4, E9, E25, E13, E6	177
CHARGING PUMP 1B	R&G LTS	BKR	YES	4M70, E4, E9, E17, E13, E6	178
CHARGING PUMP 1C	R&G LTS	BKR	YES	4M79, E4, E9, E17, E13, E6	179
BORIC ACID MAKEUP TANK 1A HTR A	R&G LTS	TIC-2206	NO	NONE	168
BORIC ACID MAKEUP TANK 1A HTR B	R&G LTS	TIC-2207	NO	NONE	169
BORIC ACID MAKEUP TANK 1B HTR A	R&G LTS	TIC-2208	NO	NONE	170
BORIC ACID MAKEUP TANK 1B HTR B	R&G LTS	TIC-2209	NO	NONE	171

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
RCP CONTROL BLEEDUP ISOLATION VALVE	R&G LTS	ISE-01-1	YES	E3, 4M01, E6, E9, E29, E1	159
CHARGING LINE 1B1 VALVE	R&G LTS	ISE-02-1	NO	NONE	176
CHARGING LINE 1A2 VALVE	R&G LTS	ISE-02-2	NO	NONE	176
VCT DISCHARGE VALVE	R&G LTS	V-2501	YES	E9, E6, 4M72, E29, E17, E13	161
RCP BLEEDOFF ISOLATION VALVE	R&G LTS	V-2505	YES	4M64, E9, 4M65, 4M66, E6, E29, E15, E14, E13	159

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
BORIC ACID GRAVITY FEED VALVE	R&G LTS	V-2508	NO	NONE	165
BORIC ACID GRAVITY FEED VALVE	R&G LTS	V-2509	NO	NONE	166
BORIC ACID TANK 1A RECIRCULATING VALVE	R&G LTS	V-2510	NO	NONE	159
BORIC ACID TANK 1A RECIRCULATING VALVE	R&G LTS	V-2511	NO	NONE	159
MAKEUP STOP VALVE	R&G LTS	V-2512	YES	E15, 4M73, E9, 4M74, 4M75 E6, E29	163
MAKEUP BYPASS TO CHARGING PUMP VALVE	R&G LTS	V-2514	NO	NONE	167
LETDOWN STOP VALVE	R&G LTS	V-2515	YES	E3, E13, 4M76, E6, E9, 4M77, 4M78, E29	157
LETDOWN CONT. ISOLATION VALVE	R&G LTS	V-2516	YES	4M67, E6, E9, 4M68, 4M69, E29	157

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
BORON LOAD CONT VALVE	R&G LTS	V-2525	NO	NONE	190

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT SPRAY SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CONT. PRESS	PIS-07-2A	PT-07-2A	YES	7I1, E3,E6, E9, E29	293
CONT. PRESS	PIS-07-2B	PT-07-2B	YES	7I4, E3, E6, E9, E29	294
CONT. PRESS	PIS-07-2C	PT-07-2C	YES	7I6, E3, E6, E9, E29	295
CONT. PRESS	PIS-07-2D	PT-07-2D	YES	717, E6, E9, E29	296
CONT. PRESS	PI-07-4A	PT-07-4A	YES	7I2, E6, E9, E29	296
CONT. PRESS	PR-07-4B/5B	PT-07-4B	NO	NONE	296
CONT. SPRAY VA	R & G LTS	FCV-07-1A	YES	5M02, E6, E9,E29, 5M03,E15	289
CONT. SPRAY VA	R & G LTS	FCV-07-1B	YES	5M02,E6,E9,E29,5M06,E15	289
CAUSTIC SPRAY VA	R & G LTS	ISE-07-1A	NO	NONE	292
CAUSTIC SPRAY VA	R & G LTS	ISE-07-2A	NO	NONE	292

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT SPRAY SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
C S PUMP 1A	R & G LTS	BKR	YES	E27,E11,E9,E17,E13,E6	287
C S PUMP 1B	R & G LTS	BKR	YES	E27,E11,E9,E17,E13,E6	290
CONT. SUMP TEMP	TI-07-5A	TE-07-5A	YES	5I2,E6,E9,E29,E14,E13	296
CONT. SUMP TEMP	TR-07-3B/5B	TE-07-5B	YES	5I2, E6,E9,E29,5I3	296
CONT. AIR TEMP	TI-07-3A	TE-07-3A	YES	7I3,E4,E6,E29	296
CONT. AIR TEMP	TR-07-33/5B	TE-07-3B	YES	7I5,E4,E10	296
C S PUMP SUCTION PRESS	PI-07-5A	PT-07-5A	NO	NONE	289
C S PUMP SUCTION PRESS	PR-07-4B/5B	PT-07-5B	NO	NONE	289

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT SPRAY SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CAUSTIC SPRAY VALVE	R&G LTS	ISE-07-1B	NO	NONE	292
CAUSTIC SPRAY VALVE	R&G LTS	ISE-07-2B	NO	NONE	292
REACTOR SUMP VALVE	R&G LTS	MV-07-2A	YES	E6, E9, 5M01, E29, E25, E13	299
REACTOR SUMP VALVE	R&G LTS	MV-07-2B	YES	E6, E9, 5M04, E29, E25, E13	300

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

WASTE MANAGEMENT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
RDT CONT ISOLATION VALVE	R&G LTS	V-6301	YES	6M50, 6M51, E6, E9, E29, 6M52, E15, E14, E13	563
RDT CONT ISOLATION VALVE	R&G LTS	V-6302	YES	6M56, 6M57, E6, E9, E29, 6M58, E15	563
W. GAS CONT ISOLATION VALVE	R&G LTS	V-6554	YES	E9, 6M53, 6M54, E6, E29, 6M55, E15	564
W. GAS CONT ISOLATION VALVE	R&G LTS	V-6555	YES	6M59, 6M60, E6, E9, E29, 6M61, E15	564
NITROGEN HDR CONT ISOLATION VALVE	R&G LTS	V-6741	YES	6M62, 6M63, E6, E9, E29, 6M64, E15	566

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CONT. AIR RE-CIRCULATING UNIT FAN HVS-1A	R & G LTS	MCC	NO	NONE	307
CONT. AIR RE-CIRCULATING UNIT FAN HVS-1B	R & T LTS	MCC	NO	NONE	303
CONT. AIR RE-CIRCULATING UNIT FAN HVS-1C	R & G LTS	MCC	NO	NONE	309
CONT. AIR RE-CIRCULATING UNIT FAN HVS-1D	R & G LTS	MCC	NO	NONE	310

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
COMPONENT COOLING WATER P 1A	R&G LTS	BKR	NO	NONE	201
COMPONENT COOLING WATER P 1B	R&G LTS	BKR	NO	NONE	205
COMPONENT COOLING WATER P 1C	R&G LTS	BKR	NO	NONE	209
COMPONENT COOLING WATER NORM SUPPLY HDR ISOLATION VALVE	R&G LTS	HCV-14- 8A	NO	NONE	202
COMPONENT COOLING WATER NORM SUPPLY HDR ISOLATION VALVE	R&G LTS	HCV-14-8B	NO	NONE	202
COMPONENT COOLING WATER NORM RETURN HDR ISOLATION VALVE	R&G LTS	HCV-14-9	NO	NONE	202
COMPONENT COOLING WATER NORM RETURN HDR ISOLATION VALVE	R&G LTS	HCV-14-10	NO	NONE	202

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
COMPONENT COOLING WATER TO REACTOR COOLING PUMPS VA.	R&G LTS	HCV-14-1	YES	8M01, E6, E9, E29, 8M02, E15	212
COMPONENT COOLING WATER TO REACTOR COOLING PUMPS VA.	R&G LTS	HCV-14-7	YES	8M09, E6, E9, E29, 8M10, E15	212
COMPONENT COOLING WATER FROM REACTOR COOLING PUMPS VA.	R&G LTS	HCV-14-2	YES	8M03, E6, E9, E29, 8M04, E15	212
COMPONENT COOLING WATER FROM REACTOR COOLING PUMPS VA.	R&G LTS	HCV-14-6	YES	8M07, E6, E9, E29, 8M08, E15	212
CCW FROM SHUTDOWN HEAT EXCHANGER 1A VA.	R&G LTS	HCV-14-3A	NO	NONE	211
CCW FROM SHUTDOWN HEAT EXCHANGER 1B VA.	R&G LTS	HCV-14-3B	NO	NONE	211

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
COMPONENT COOLING WATER DISCHARGE HDR VALVE	R&G LTS	MV-14-1	NO	NONE	204
COMPONENT COOLING WATER DISCHARGE HDR VALVE	R&G LTS	MV-14-2	NO	NONE	208
COMPONENT COOLING WATER SUCTION VALVE	R&G LTS	MV-14-3	NO	NONE	203
COMPONENT COOLING WATER SUCTION VALVE	R&G LTS	MV-14-4	NO	NONE	207
AIR RECIRCULATING COOLER 1A & 1B INLET HDR 1A VALVE	R&G LTS	MV-14-6	YES	8M06, E9, E6, E29, E17, E13	213
AIR RECIRCULATING COOLER 1A & 1B OUTLET HDR 1A VALVE	R&G LTS	MV-14-8	YES	E9, E6, 8M05, E29, E17, E13	214

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AIR RECIRCULATING COOLER 1C & 1D INLET HDR 1B VALVE	R&G LTS	MV-14-5	YES	8M11, E9, E6, E29, E17, E13	215
AIR RECIRCULATING COOLER 1C & 1D OUTLET HDR 1B VALVE	R&G LTS	MV-14-7	YES	8M12, E6, E9, E29, E13	216

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

COOLING WATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
INTAKE COOLING WATER P 1A	R&G LTS	BKR	NO	NONE	832
INTAKE COOLING WATER P 1B	R&G LTS	BKR	NO	NONE	832
INTAKE COOLING WATER P 1C	R&G LTS	BKR	NO	NONE	834
INTAKE COOL WTR NON-EMERG. HDR B ISOL VA	R&G LTS	MV-21-2	NO	NONE	836
INTAKE COOL WTR NON-EMERG HDR A ISOL VA	R&G LTS	MV-21-3	NO	NONE	835
LUBE WRT TO CIRC WTR PUMPS ISOL VA	R&G LTS	MV-21-4	NO	NONE	837

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

FIRE WATER & MAKE-UP SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PRIMARY WATER ISOL. VALVE	R&G LIGHTS	MV-15-1	NO	NONE	849

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
M.S. ISOL VA	R & G LTS	HCV-08-1A	YES	10M01,E15, 10M02,E9,E6, 10M03,10M04,10M05,10M06, 10M07,10M08,E29,E19,E13, E20,10M09	312
M.S. ISOL VA	R & G LTS	HCV-08-1B	YES	10M12,E15,10M13,E9,10M14, 10M16,10M17,10M18,10M19, E29,E13,E19,E20,10M20 E6	315
M. S. ISOL BY-PASS	R & G LTS	MV-08-1A	YES	10M10,E6,E9,E18,E29	311
M.S. ISOL BY-PASS	R & G LTS	MV-08-1B	YES	10M21,E6,E9,E29,E17,E13	314
SG #1A TO AFWP-1C TURBINE VA	R & G LTS	MV-08-13	YES	10M23,E6,E9,E29,E17,E13	652

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SG #1B TO AFWP-1C TURBINE VA	R & G LTS	MV-08-14	YES	10M24,E6,E9,E29,E17,E13	653
AFWP-1C TURBINE VA	R & G LTS	MV-08-03	YES	10M25,E6,E9,10M26	632

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

MAIN FEED WATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
FW P 1A DISCH VA	R&G LTS	MV-09-1	NO	NONE	616
FW P 1B DISCH VA	R&G LTS	MV-09-2	NO	NONE	621
FW P 1A/1B DISCH TO SG1A	R&G LTS	MV-09-7	YES	11M01,E4,E9,E29,E17,E13, E6	614
FW P 1A/1B DISCH TO SG1B	R&G LTS	MV-09-8	YES	11M02,E4,E9,E6,E29,E17, E13	633

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

AUXILIARY FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AUXILIARY FEEDWATER PUMP 1A	R & G LTS	1A MOTOR BREAKER	YES	E12, E9, E11, E17, E13, E6	629
AUXILIARY FEEDWATER PUMP 1B	R & G LTS	1B MOTOR BREAKER	YES	E12, E11, E17, E13, E6, E9	630
AUX. FEEDWATER 1C	SPEED IND VI-09-1	1C TURBINE	YES	E24, 12M05, E6, E9, E29, 12M06, 12M07, 12M12, 12M08, E14, E13	631

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

AUXILIARY FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AUX FWP 1A DISCH. TO S.G 1A	R & G LTS	MV-09-9	YES	12M01, E6, E9, E29,E17 E13	608
AUX FWP 1A DISCH TO S.G 1B	R & G LTS	MV-09-13	YES	12M11, E6, E9, E29, E13 E17	610
AUX FWP 1B DISCH TO S.G. 1B	R & G LTS	MV-09-10	YES	12M02, E6, E9, E29, E13	689
AUX FWP 1B DISCH TO S.G. 1A	R & G LTS	MV-09-14	YES	12M03, E6, E9. E29, E17, E13	611
AUX FWP 1C DISCH TO S.G. 1A	R & G LTS	MV-09-11	YES	12M09, E6, E9, E29, E17, E13	612
AUX FWP 1C DISCH TO S.G. 1B	R & G LTS	MV-09-12	YES	12M10, E6, E9, E29, E17, E13	613

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAMPLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PRIMARY COOL, SAMPLE VA	R&G LTS	V-5200	YES	14M50,E9,14M51,14M52,E6, E29,E26,E13,E15	578
PRIMARY COOL SAMPLE VA	R&G LTS	V-5203	YES	14M61,E9,14M59,14M60,E6 E29,E26,E13,E15	578
PRESSURIZER SURGE SAMPLE VA	R&G LTS	V-5201	YES	14M53,E6,E9,E29,14M54, 14M55,E15	579
PRESSURIZER SURGE SAMPLE VA	R&G LTS	V-5204	YES	14M64,E9,14M62,14M63,E6, E29,E15	579
PRESSURIZER STEAM SAMPLE VA	R&G LTS	V-5202	YES	14M58,E9,14M56,14M57,E6, E29,E14,E13	580
PRESSURIZER STEAM SAMPLE VA	R&G LTS	V-5205	YES	14M67,E9,13M65,14M66,E6, E29,E15	580
RARTICULATE SAMPLE SUCTION VA	R&G LTS	FCV-26-1	YES	14M07,E4,14M08,E6,E15,E3, E13,E9,E29	320
RARTICULATE SAMPLE SUCTION VA	R&G LTS	FCV-26-2	YES	14M01,E6,E9,E29,14M02,E15, E13	320
IODINE SAMPLING SUCTION VA	R&G LTS	FCV-26-4	YES	14M03,E6,E9,E29,14M04,E15	320
SAMPL RETURN SUCTION VA	R&G LTS	FCV-26-6	YES	14M05,E6,E9,E29,14M06,E15	320

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SAMPLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
STEAM GEN 1A BLOWDOWN SAMPLE ISOL VA	R&G LTS	FCV-23-7	YES	14M15,E6,E9,E29,14M16,E15	461
STEAM GEN 1B BLOWDOWN SAMPLE ISOL VA	R&G LTS	FCV-23-9	YES	14M13,E6,E9,E29,14M14,E15	461

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

HYDROGEN CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
UPPER CONT SAMPLE VA	R & G LTS	FSE-27-01	YES	15M01,E3,E13,E4,E6,E9,E1	1197
CONT DOME SAMPLE VA	R & G LTS	FSE-27-02	YES	15M02,E4,E6,E9	1197
LOWER CONT SAMPLE VA	R & G LTS	FSE-27-03 FSE-27-04 FSE-27-05 FSE-27-06	YES	15M03,E4,E6,E9 15M04,E4,E6,E9 15M07,E4,E6,E9,E1 15M08,E4,E6,E9	1197
CONT DOME SAMPLE VA	R & G LTS	FSE-27-07	YES	15M09,E4,E6,E9	1197
PENET 48 SUCT LINE ISO VA	R & G LTS	FS-27-08	YES	15M05,E15,E14,E13,E6,E9	1197
PENET 51 SUCT LINE ISO VA	R & G LTS	FSE-27-09	YES	15M10,E15,E14,E13,E4,E6,E9	1197

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

HYDROGEN CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PENET 51 DISCH LINE ISO VA	R & G LTS	FSE-27-10	YES	15M11,E15,E6,E9	1197
PENET 48 DISCH LINE ISO ISO VA	R & G LTS	FSE-27-11	YES	15M06,E15,E6,E9,E1	1197

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

INSTRUMENT AIR SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
INSTRUMENT AIR ISOL. VALVE	R&G LIGHTS	MV-18-1	YES	16M01,E9,E6,E29,E17, E13	317

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT PURGE SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REACTOR CONT. PURGE EXHAUST FAN HVE-8A	R&G LTS	BKR	NO	NONE	509
REACTOR CONT. PURGE EXHAUST FAN HVE-8B	R&G LTS	BKR	NO	NONE	510
POST ACCIDENT HYDROGEN PURGE FAN A	R&G LTS	MCC	NO	NONE	485
POST ACCIDENT HYDROGEN PURGE FAN B	R&G LTS	MCC	NO	NONE	486

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT PURGE SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REACTOR CONT. PURGE ISOLATION VALVE	R&G LTS	FCV-25-3	YES	17M03, E9, 17M04, E6, E29 E3, E1	511
REACTOR CONT. PURGE ISOLATION VALVE	R&G LTS	FCV-25-5	YES	17M09, E9, 17M10, E6, E29 E15	511
REACTOR CONT. PURGE ISOLATION VALVE	R&G LTS	FCV-25-2	YES	17M05, E9, 17M06, E6, E15 E3	512
REACTOR CONT. PURGE ISOLATION VALVE	R&G LTS	FCV-25-4	YES	17M07, E9, 17M08, E6, E29 E1	512
REACTOR CONT. PURGE ISOLATIN VALVE	R&G LTS	FCV-25-6	YES	17M11, E9, 17M12, E6, E29	512
CONTAINMENT VACUUM RELIEF VALVE	R&G LTS	FCV-25-7	NO	NONE	529
CONTAINMENT VACUUM RELIEF VALVE	R&G LTS	FCV-25-8	NO	NONE	529

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT PURGE SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
HYDROGEN PURGE VALVE	R & G LTS	FCV-25-9	NO	NONE	489
HYDROGRN PURGE VALVE	R & G LTS	FCV-25-10	NO	NONE	488
POST ACCIDENT HYDROGEN PURGE FAN A	R & G LTS	MCC	NO	NONE	485
POST ACCIDENT HYDROGEN PURGE FAN B	R & G LTS	MCC	NO	NONE	486

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTAINMENT VACUUM RELIEF SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CONT VACUUM RELIEF VA	R&G LTS	FCV-25-7	NO	NONE	529
CONT VACUUM RELIEF VA	R&G LTS	FCV-25-8	NO	NONE	529
CONT. DIFF. PRESS TO ANNU-LUS PRESS	PDIS-25-1A	PDT-25-1A	NO	NONE	482
CONT. DIFF. PRESS TO ANNU-LUS PRESS	PDIS-25-1A	PDIS-25-11A	NO	NONE	482
CONT. DIFF. PRESS TO ANNU-LUS PRESS	PDIS-25-1B	PDIS-25-1B	NO	NONE	482
CONT. DIFF. PRESS TO ANNU-LUS PRESS	PDIS-25-1B	PDIS-25-11B	NO	NONE	482

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SHIELD BUILDING VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHLD BLDG TRAIN A HEATER	R&G LTS	MCC 1A6	YES	20V-4,E6,20V-6,E10	1218
SHLD BLDG TRAIN B HEATER	R&G LTS	MCC 1B6	YES	20V-4,E6,20V-6,E10	1222
SHLD BLDG VENT CH A VA	R&G LTS	FCV-25-11	YES	20M01,E6,E9	1176
SHLD BLDG VENT CH B VA	R&G LTS	FCV-25-12	YES	20M02,E6,E9,E29	1177
SHLD BLDG VENT SYSTEM TIE VA	R&G LTS	FCV-25-13	YES	20M03,E6,E9,E29,E16,E1,E28	1178
SHLD BLDG VENT EXH. FAN 6A	R&G LTS	MCC 1A6	YES	20V-1,E4,E9,20V-3,E17,E13, E6,20V-2	513
SHLD BLDG VENT EXH. FAN 6B	R&G LTS	MCC 1B6	YES	20V-1,E4,E9,20V-3,20V-2	516
REAC CONT & SHIELD BLDG DIFF PRESS	PDIS-25-7A	ME-25-1	YES	20V-5,E3,E6,E9,E29	482
REAC CONT & SHIELD BLDG DIFF PRESS	PDIS-25-7B	ME-25-2	YES	20V-5,E15,E6,E9,E29,E1,E4	482

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

SHIELD BUILDING VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHLD BLDG ANNULUS TO OUTSIDE DIFF PRESS	PDIS-25-7A	PDT-25-7A	YES	20I1,E6,E9,E29	482
SHLD BLDG ANNULUS TO OUTSIDE DIFF PRESS	PDIS-25-7B	PDT-25-7B	NO	NONE	482

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

ECCS VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REACTOR AUXILIARY BUILDING EMERGENCY EXHAUST FAN 9A	R&G LTS	MCC	YES	19V-1, E4, E9, E17	503
REACTOR AUXILIARY BUILDING EMERGENCY EXHAUST FAN 9B	R&G LTS	MCC	YES	19V-1, E4, E9, E17, E13, E6	504
REACTOR AUXILIARY BUILDING SUPPLY FAN 4A	R&G LTS	HVE-4A	NO	NONE	505
REACTOR AUXILIARY BUILDING SUPPLY FAN 4A	R&G LTS	HVE-4B	NO	NONE	506

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

ECCS VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHUTDOWN HEAT EXCHANGER ROOM OUTLET A DAMPER TO NORM.SYS,	R&G LTS	D-5A	NO	NONE	466
SHUTDOWN HEAT EXCHANGER ROOM OUTLET B DAMPER TO NORM SYS.	R&G LTS	D-6A	NO	NONE	467
SHUTDOWN HEAT EXCHANGER ROOM OUTLET B DAMPER TO NORM. SYS.	R&G LTS	D-5B	NO	NONE	466
SHUTDOWN HEAT EXCHANGER ROOM OUTLET B DAMPER TO NORM. SYS.	R&G LTS	D-6B	NO	NONE	467
ECCS P. ROOM OUTLET A DAMPER TO NORM. SYS.	R&G LTS	D-9A	NO	NONE	465
ECCS P. ROOM OUTLET B DAMPER TO NORM. SYS.	R&G LTS	D-9B	NO	NONE	465
PIPE TUNNEL DAMPER TO NORM. SYS.	R&G LTS	D-12A	YES	19V-2, E9, E3, 19V-3, E6, E29	466

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

ECCS VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PIPE TUNNEL DAMPER TO NORM. SYS.	R&G LTS	D-12B	YES	19V-2, E9, E3, 19V-3, E6, E29	466
AUXILIARY BUILDING & ECCS ROOM DAMPER	R&G LTS	D-13	YES	19V-2, E9, 19V-3, E6, E29	463
AUXILIARY BUILDING & ECCS ROOM DAMPER	R&G LTS	D-14	YES	19V-2, E9, 19V-3, E6, E29	463
AUXILIARY BUILDING & ECCS ROOM DAMPER	R&G LTS	D-15	YES	19V-2, E9, 19V-3, E6, E29	462
AUXILIARY BUILDING & ECCS ROOM DAMPER	R&G LTS	D-16	YES	19V-2, E9, 19V-3, E6, E29	464

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTROL ROOM AIR CONDITIONING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CHLORINE DE-TECTOR	B-1007A	CL2SM-25-1B	NO	NONE	500
CONT RM SOUTH OAI ISOL VA	R & G LTS	FCV-25-14	YES	21M02,E6,E9,21I2	1170
CONT RM SOUTH OAI ISOL VA	R & G LTS	FCV-25-15	NO	NONE	1171
CONT RM NORTH OAI ISOL VA	R & G LTS	FCV-25-16	YES	21M01,E6,E9,21I1	1172
CONT RM NORTH OAI ISOL VA	R & G LTS	FCV-25-17	NO	NONE	1173
TOILET EXH FAN ISOL VA	R & G LTS	FCV-25-18	NO	NONE	1174
TOILET EXH FAN ISOL VA	R & G LTS	FCV-25-19	NO	NONE	1175

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTROL ROOM AIR CONDITIONING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SUPPLY AIR FLOW NORTH	F1-25-18A	FT-25-18A	NO	NONE	1173
SUPPLY AIR FLOW SOUTH	F1-25-18B	FT-25-18B	NO	NONE	1171
AIR FLOW SW	NONE	FS-25-16A	NO	NONE	490
AIR FLOW SW	NONE	FS-25-16B	NO	NONE	491
CONT RM NORTH DIFF PRESS	PDI-25-14A	PDT-25-14A	NO	NONE	1172
CONT RM SOUTH DIFF PRESS	PDI-25-14B	PDT-25-14B	NO	NONE	1170
CHLORINE DETECTOR	B-1009A	CL2SM-25-1A	NO	NONE	500

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTROL ROOM AIR CONDITIONING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
KITCHEN EXH FAN	R & G LTS	DAMPER MOTOR NORTH	NO	NONE	1182
KITCHEN EXH FAN	R & G LTS	DAMPER MOTOR SOUTH	NO	NONE	1183
INLET DAMPERS	R & G LTS	HVE-13A	NO	NONE	499
INLET DAMPERS	R & G LTS	HVE-13B	NO	NONE	499
AIR COND STATUS HVA - 3A	R & G LTS	MCC 1A6	NO	NONE	492
AIR COND STATUS HVA - 3B	R & G LTS	MCC 1B6	NO	NONE	494
AIR COND STATUS HVA - 3C	R & G LTS	MCC 1AB	NO	NONE	496

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTROL ROOM AIR CONDITIONING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
KITCHEN EXH FAN ISOL VA	R & G LTS	FCV-25-24	NO	NONE	1182
KITCHEN EXH FAN ISOL VA	R & G LTS	FCV-25-25	NO	NONE	1183
INLET DAMPER	R & G LTS	D-18	NO	NONE	499
INLET DAMPER	R & G LTS	D-19	NO	NONE	499
INLET DAMPER	R & G LTS	D-20	NO	NONE	499
INLET DAMPER	R & G LTS	D-21	NO	NONE	499
INLET DAMPER	R & G LTS	D-22	NO	NONE	499

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

CONTROL ROOM AIR CONDITIONING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CONT RM DUCT TEMP 3A STATUS	PNL ACC-3A	THERMOSTAT 3A	NO	NONE	493
CONT RM DUCT TEMP 3B STATUS	PNL ACC-3B	THERMOSTAT 3B	NO	NONE	495
CONT RM DUCT TEMP 3C STATUS	PNL ACC-3C	THERMOSTAT 3C	NO	NONE	497

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

EMERGENCY DIESEL GENERATOR SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
DIS 1A VOLTAGE	VM/954D	4200-120V PT'S	NO	NONE	954
DIS 1A FRE-QUENCY	FM/954	4200-120V PT'S	NO	NONE	954
DIS 1A W-RECORDER	W-REC-954	4200-120V PT'S	NO	NONE	954
DIS 1A AMPERAGE	AM/954D	800/5 CT'S	NO	NONE	954
DIS 1A ENGINE START LIGHT	R & G LTS	RELAY	NO	NONE	957
DIS 1A OUTPUT BKR IND	R & G LTS	BKR	NO	NONE	953
DIS 1A SPEED ADJUST	R & G LTS	RELAY	NO	NONE	958
DIS 1B VOLTAGE	VM/964	4200-120V PT'S	NO	NONE	964
DIS 1B FRE-QUENCY	FM/964	4200-120V PT'S	NO	NONE	964
DIS 1B V-RECORD-ER	W-REC-964	420-120V	NO	NONE	964
DIS 1B AMPERAGE	AM/964 D	800/5 CT'S	NO	NONE	964
DIS 1B ENGINE START LIGHT	R & T LTS	RELAY	NO	NONE	967

DISPLAY INSTRUMENTATION LIST
ESSENTIAL

EMERGENCY DIESEL GENERATOR SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
DIS 1B OUTOUT BKR IND	R & G LTS	BKR	NO	NONE	963
DIS 1B SPEED	R & G LTS	RELAY	NO	NONE	968

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SG 1A LEVEL	LI-9012	LT-9012	YES	NONE	380
SG 1B LEVEL	LI-9022	LT-9022	YES	NONE	380
PRZ LEVEL	LIC-1110X	LT-1110X	YES	NONE	138
PRZ LEVEL	LIC-1110Y	LT-1110Y	YES	NONE	138
PRZ LEVEL	LI-1103	LT-1103	YES	NONE	140
QUENCH TANK LEVEL	LIA-1116	LT-1116	YES	NONE	140
PRZ PRESS	PIC-1100X, PR-1100X	PT-1100X	YES	NONE	97
PRZ PRESS	PR-1100Y, PIC-1100Y	PT-1100Y	YES	NONE	98
QUENCH TANK PRESS	PIA-1116	PT-1116	YES	NONE	141
PRZ HTRS PROP	R&G LTS	P1	YES	NONE	122
PRZ HTRS PROP	R&G LTS	P2	YES	NONE	123
PRZ HTRS BACKUP	R&G LTS	B1	YES	NONE	124
PRZ HTRS BACKUP	R&G LTS	B2	YES	NONE	125
PRZ HTRS BACKUP	R&G LTS	B3	YES	NONE	126
PRZ HTRS BACKUP	R&G LTS	B4	YES	NONE	127
PRZ HTRS BACKUP	R&G LTS	B5	YES	NONE	128
PRZ HTRS BACKUP	R&G LTS	B6	YES	NONE	129
RCS LOOP 1A - 1A1 D/P	PDR-1124W, PDI-1124W	PDT-1124W	YES	NONE	119
RCS LOOP 1A - 1A2 D/P	PDR-1124X, PDI-1124X	PDT-1124X	YES	NONE	119

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
RCS LOOP 1B - 1B1 D/P	PDR-1124Y, PDI-1124	PDT-1124Y	YES	NONE	119
RCS LOOP 1B - 1B2 D/P	PDR-1124Z, PDI -1124Z	PDT-1124Z	YES	NONE	119
RCP 1A1 D/P	PDR-1110, PDI-1110	PDT-1110	YES	NONE	119
RCP 1A2, D/P	PDR-1112, PDI-1112	PDT-1112	YES	NONE	119
RCP 1B1, D/P	PDR-1120 PDI-1120	PDT-1120	YES	NONE	119
RCP 1B2	PDR-1122, PDI-1122	PDT-1122	YES	NONE	119
PRZ SPRAY VA	R&G LTS	PCV-1100E	YES	M50, M51, E9, E29, E6	130
PRZ SPRAY VA	R&G LTS	PCV-1100F	YES	M53, M54, E6, E9, E29	130
RELIEF VALVE	R&G LTS	V-1402	YES	NONE	117
RELIEF VALVE	R&G LTS	V-1404	YES	NONE	117
PRZ RELIEF ISOLATION VALVE	R&G LTS	V-1403	YES	NONE	118
PRZ RELIEF ISOLATION VALVE	R&G LTS	V-1405	YES	NONE	120

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PZR QUENCH TANK TEMPERATURE	TIA-1116	TE-1116	YES	NONE	135
LOOP 1A HOT LEG TEMPERATURE	TI-1111X, TR-1111X/1121X	TE-1111X	YES	1I47, E10	TMI/136
LOOP 1A2 COLD LEG TEMPERATURE	TIC-1111Y	TE-1111Y	YES	1I41, E1, E4	TMI/136
LOOP 1B2 COLD LEG TEMPERATURE	TIC-1121Y	TE-1121Y	YES	1I42, E1, E4	TMI/137
LOOP 1A1 COLD LEG TEMPERATURE	TI-1115, TR-1115/1125	TE-1115	YES	1I48, E3, E10	TMI/136
LOOP 1B HOT LEG TEMPERATURE	TI-1121X, TR-1111X/1121X	TE-1121X	YES	1I54, E10	TMI/137
LOOP 1B1 COLD LEG TEMPERATURE	TI-1125, TR-1115/1125	TE-1125	YES	1I49, E3, E10	TMI/137
SPRAY LINE TEMPERATURE	TIA-1103	TE-1103	YES	NONE	133
SPRAY LINE TEMPERATURE	TIA-1104	TE-1104	YES	NONE	133
SURGE LINE TEMPERATURE	TIA-1105	TE-1105	YES	NONE	134

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
PRZ RELIEF LINE TEMPERATURE	TIA-1106	TE-1106	YES	NONE	134
PRZ SAF VA V 1200 DISCH TEMPERATURE	TIA-1107	TE-1107	YES	NONE	134
PRZ SAF VALVE V 1201 DISCH TEMPERATURE	TIA-1108	TE-1108	YES	NONE	135
PRZ SAF VALVE V 1202 DISCH TEMPERATURE	TIA-1109	TE-1109	YES	NONE	135
PRZ WATER PHASE TEMPERATURE	TI-1101	TE-1101	YES	NONE	133
REACTOR COOLANT PUMP 1A1	R&G LTS	RCP-1A1	YES	NONE	101
REACTOR COOLANT PUMP 1A2	R&G LTS	RCP-1A2	YES	NONE	109
REACTOR COOLANT PUMP 1B1	R&G LTS	RCP-1B1	YES	NONE	105
REACTOR COOLANT PUMP 1B2	R&G LTS	RCP-1B2	YES	NONE	113
REACTOR COOLANT PUMP AMMETER 1A1	AM/101	CTS-800/5	YES	NONE	101
REACTOR COOLANT PUMP AMMETER 1A2	AM/109	[illegible]	YES	NONE	109

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REACTOR COOLANT PUMP 1B1 AMMETER	AM /105	CTS-800/5	YES	NONE	105
REACTOR COOLANT PUMP 1B2 AMMETER	AM /113	CTS-800/5	YES	NONE	113
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-1	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR /411
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-2	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR/413
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-3	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR/415
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-4	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR/417
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-5	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR/412

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

REACTOR COOLANT SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-6	NO	NONE	ESS. R&G LTS ARE LOCATED ON REACTOR TRIP SWITCHGEAR/ 414
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-7	NO	NONE	ESS. R&G LTS ARE LOCATED ON REAC-TOR TRIP SWITCH-GEAR/416
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-8	NO	NONE	ESS. R&G LTS ARE LOCATED ON REAC-TOR TRIP SWITCH-GEAR/418
REACTOR TRIP BKR STATUS IND	R&G LTS	TCB-9	NO	NONE	ESS. R&G LTS ARE LOCATED ON REAC-TOR TRIP SWITCH-GEAR/419
SG 1A RCS FLOW	PDI-1101A	PDT-1111A	YES	NONE	385
SG 1B RCS FLOW	PDI-1101A	PDT-1121A	YES	NONE	385
SG 1A RCS FLOW	PDI-1101B	PDT-1111B	YES	NONE	386
SG 1B RCS FLOW	PDI-1101B	PDT-1121B	YES	NONE	386
SG 1A RCS FLOW	PDI-1101C	PDT-1111C	YES	NONE	387
SG 1B RCS FLOW	PDI-1101C	PDT-1121C	YES	NONE	387
SG 1A RCS FLOW	PDI-1101D	PDT-1111D	YES	NONE	388
SG 1B RCS FLOW	PDI-1101D	PDT-1121D	YES	NONE	388

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

SAFETY INJECTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
LPSI PUMP DISC HDR PRESS	PI-3307	PT-3307	NO	NONE	273
HPSI PUMP DISCH AUX HDR PRESS	PI-3308	PT-3308	YES	2I1,E6,E9,E29	273
HPSI PUMP DISCH AUX HDR PRESS	PI-3309	PT-3309	YES	2I2,E6,E9,E29	273
SIS REC RET FLOW	FI-3305	FT-3305	NO	NONE	273
HP SI HDR FLOW	FI-3311	FT-3311	NO	NONE	280
LP SI HDR FLOW	FI-3312	FT-3312	NO	NONE	280
HP SI HDR FLOW	FI-3321	FT-3321	NO	NONE	281
LP SI HDR FLOW	FI-3322	FT-3322	NO	NONE	281
HP SI HDR FLOW	FI-3331	FT-3331	NO	NONE	282
LP SI HDR FLOW	FI-3332	FT-3332	NO	NONE	282
HP SI HDR FLOW	FI-3341	FT-3341	NO	NONE	283
LP SI HDR FLOW	FI-3342	FT-3342	NO	NONE	283
SI TANK 1A2 LEVEL	LIA-3311	LT-3311	YES	NONE	280
SI TANK 1A1 LEVEL	LIA-3321	LT-3321	YES	NONE	281
SI TANK 1B1 LEVEL	LIA-3331	LT-3331	YES	NONE	282
SI TANK 1B2 LEVEL	LIA-3341	LT-3341	YES	NONE	283

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

SAFETY INJECTION

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SI TANK 1A2 INSTR & CHECK VA LEAKAGE DRAIN TO RWT	R&G LTS	HCV-3618	YES	2M87,2M88,E9,2M89,E6,E3,E1	280
SI TANK 1A1 INSTR & CHECK VA LEAKAGE DRAIN TO RWT	R&G LTS	HCV-3628	YES	2M84,2M83,2M82,E6,E3,E1, 2M86, E9,E29,E16,E13, E4.	281
SI TANK 1B1 INSTR & CHECK VA LEAKAGE DRAIN TO RWT	R&G LTS	HCV-3638	YES	2M31,2M93,E6,E9,E29,2M94, E3,E13	282
SI TANK 1B2 INSTR & CHECK VA LEAKAGE DRAIN TO RWT	R&G LTS	HCV-3648	YES	2M97,2M98,E6,E9,E29,2M99, E3	283

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

SHUTDOWN COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
SHUTDOWN HT EXCHANGER 1A OUTLET TEMP	TI-3303X	TE-3303X	YES	3I1, E6, E9, E29	TMI/275
SHUTDOWN HT EXCHANGER 1B OUTLET TEMP	TI-3303Y	TE-3303Y	YES	3I3, E6, E9, E29	TMI/275
SHUTDOWN COOLING HT EXCH INLET TEMP	TR-3351	TE-3351X	YES	3I2, E6, E9, E29	TMI/275
ST LOW PRESS HDR TEMPERATURE	TR-3351	TE-3351Y	YES	3I4, E6, E9, E29	TMI/275
SHUTDOWN HT. EXCHANGER 1A PRESS	PI-3303X	PT-3303X	NO	NONE	273
SHUTDOWN HT. EXCHANGER 1B PRESS	PI-3303Y	PT-3303X	NO	NONE	273

DISPLAY INSTRUMENTATION LIST
NON- ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
DEMINERALIZED WATER FLOW	RECORDER	FT-2210X	NO	NONE	192
BORIC ACID FLOW	RECORDER	FT-2210Y	NO	NONE	192
LETDOWN FLOW	FIA-2202	FT-2202	NO	NONE	152
CHARGING FLOW	FIA-2212	FT-2212	YES	4I6, E6, E9, E29	150
BORIC ACID TANK 1A LEVEL	LIA-2206	L-2206	NO	NONE	155
BORIC ACID TANK 1B LEVEL	LIA-2208	L-2208	NO	NONE	155
RCP CONTROLLED BLEEDOFF PRESS	PIA-2215	PT-2215	YES	NONE	150
INTERM PRESS LETDOWN TEMP	TIC-2223	TE-2223	NO	NONE	151
ION EXCHANGER BYPASS TEMPER-ATURE	TIC-2224	TE-2224	NO	NONE	152

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

CHEMICAL VOLUME CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
LETDOWN TEMP REG HT EXCH TUBE OUTLET	TIC-2221	TE-2221	YES	NONE	150
CHARGING TEMPERATURE	TI-2229	TE-2229	YES	NONE	150
LETDOWN THROTTLE VALVE	R&G LTS	LCV-2110P	NO	NONE	158
LETDOWN THROTTLE VALVE	R&G LTS	LCV-2110Q	NO	NONE	158
LETDOWN PRESS CONTROL VALVE	R&G LTS	PCV-2201P	NO	NONE	151
LETDOWN PRESS CONTROL VALVE	R&G LTS	PCV-2201Q	NO	NONE	151
AUXILIARY SPRAY VALVE	R&G LTS	ISE-02-3	YES	NONE	189
AUXILIARY SPRAY VALVE	R&G LTS	ISE-02-4	YES	NONE	189
REACTOR MAKEUP WATER FLOW	R&G LTS	FCV-2210X	NO	NONE	163
BORIC ACID FLOW	R&G LTS	FCV-2210Y	NO	NONE	163

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

CONTAINMENT SPRAY SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
NA OH FLOW	FI-07-02, FR-07-02	FT-07-02	NO	NONE	291
C. S. HDR A FLOW	FI-07-1A	FT-07-1A	NO	NONE	293
C. S. HDR B FLOW	FI-07-1B	FT-07-1B	NO	NONE	294
C. S. HDR A PRESS	PIS-07-3A	PT-07-3A	NO	NONE	293
C. S. HDR B PRESS	PIS-07-3B	PT-07-3B	NO	NONE	294

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CCW FLOW THRU HDR A	FIS-14-1A	FT-14-1A	NO	NONE	217
CCW FLOW THRU HDR B	FIS-14-1B	FT-14-1B	NO	NONE	218
CCW FROM LET-DOWN HEAT EX-CHANGE FLOW	FIS-14-6	FT-14-6	NO	NONE	218
RCP A SEAL COOLER HX TUBE LEAK DETECTION	R&G LTS	HCV-14-11-1A1	NO	NONE	93
RCP A SEAL COOLER HX TUBE LEAK DETECTION	R&G LTS	HCV-14-11-1A2	NO	NONE	93
RCP B SEAL COOLER HX TUBE LEAK DETECTION	R&G LTS	HCV-14-11-1B1	NO	NONE	94
RCP B SEAL COOLER HX TUBE LEAK DETECTION	R&G LTS	HCV-14-11 1B2	NO	NONE	94

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

COMPONENT COOLING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
COMPONENT COOLING WATER SURGE TANK INLET VALVE	NONE	LCV-14-1	NO	NONE	211
CCW FROM SHUTDOWN HEAT EXCHANGER 1A FLOW	FIS-14-10A	FT-14-10A	NO	NONE	217
CCW FROM SHUTDOWN HEAT EXCHANGER 1B FLOW	FIS-14-10B	FT-14-10B	NO	NONE	218
CCW HEAT EXCHANGER 1A OUTLET PRESS	PIS-14-8A	PT-14-8A	NO	NONE	217
CCW HEAT EXCHANGER 1B OUTLET PRESS	PIS-14-8B	PT-14-8B	NO	NONE	218
COMPONENT COOLING WATER SURGE TANK VENT VALVE	NONE	RCV-14-1	NO	NONE	211

DISPLAY INSTRUMENTATION LIST
NON- ESSENTIAL

Cooling Water System

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
INTAKE COOLING WATER P 1A AMMETER	AM/832	CTS 150/5	NO	NONE	832
INTAKE COOLING WATER P 1B AMMETER	AM/833	CTS 150/5	NO	NONE	833
INTAKE COOLING WATER P 1C AMMETER	AM/834	CTS 150/5	NO	NONE	834

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
STEAM FLOW SG #1A	F1-08-1A	FT-08-1A	YES	NONE	695
STEAM FLOW SG #1B	F1-08-1B	FT-08-1B	YES	NONE	695
STEAM FLOW SG #1A	FEEDWATER REG S RACK 1A	FT-8011	YES	NONE	619
STEAM FLOW SG #1B	FEEDWATER REG S RACK 1B	FT-8012	YES	NONE	624

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REHTR 1A1 M.S. BLOCK VA	R & G LTS	MV-08-4	NO	NONE	700
REHTR 1A1 M.S. BLOCK VA	R & G LTS	MV-08-5	NO	NONE	701
REHTR 1A2 M.S. BLOCK VA	R & G LTS	MV-08-6	NO	NONE	702
REHTR 1A2 M.S. BLOCK VA	R & G LTS	MV-08-7	NO	NONE	703
REHTR 1B1 M.S. BLOCK VA	R & G LTS	MV-08-8	NO	NONE	704
REHTR 1B1 M.S. BLOCK VA	R & G LTS	MV-08-9	NO	NONE	705
REHTR 1B2 M.S. BLOCK VA	R & G LTS	MV-08-10	NO	NONE	706
REHTR 1B2 M.S. BLOCK VA	R & G LTS	MV-08-11	NO	NONE	707

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
S.G. ATM. STM. DUMP 1A	PIC-08-1A	HCV-08-2A	YES	E6, E9, E29	603
S.G. ATM. STM DUMP 1B	PIC-08-1B	HCV-08-2B	YES	NONE	603

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

MAIN STEAM SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
STM. DUMP TO COND. VA	R & G LTS	PCV-8802	NO	NONE	749
STM DUMP TO COND. VA	R & G LTS	PCV-8803	NO	NONE	749
STM. DUMP TO COND. VA	R & G LTS	PCV-8804	NO	NONE	750
STM. DUMP TO COND. VA	R & G LTS	PCV-8805	NO	NONE	750

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

AUXILIARY FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AUX. FW FLOW HDR A	FI-09-2A	FT-09-2A	YES	12I1. E6, E9, E29	601
AUX. FW FLOW HDR B	FI-09-2B	FT-09-2B	YES	12I2, E6, E9, E29	601
AUX. FW FLOW HDR C	FI-09-2C	FT-09-2C	YES	12I3, E6, E9, E29	602
FWP 1A AMMETR	AM/629	CTS 75/5	NO	NONE	629
FWP 1B AMMETR	AM/630	CTS 75/5	NO	NONE	630

DISPLAY INSTRUMENTATION LIST
NON- ESSENTIAL

MAIN FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
FW FLOW TO SG 1A	DATA PROCESSOR	FT-09-3A1	NO	NONE	1186
FW FLOW TO SG 1A	DATA PROCESSOR	FT-09-3A2	NO	NONE	1186
FL FLOW TO SG 1A	DATA PROCESSOR	FT-09-3A3	NO	NONE	1186
FW FLOW TO SG 1B	DATA PROCESSOR	FT-09-3B1	NO	NONE	1187
FL FLOW TO SG 1B	DATA PROCESSOR	FT-09-3B2	NO	NONE	1187
FL FLOW TO SG 1B	DATA PROCESSOR	FT-09-3B3	NO	NONE	1187
FW FLOW	FIC-9011	FT-9011	NO	NONE	619
FW FLOW	FIC-9021	FT-9021	NO	NONE	624
SG 1A DOWN-COMER	LIC-9005	LT-9005	YES	NONE	619
SG 1B DOWN-COMER	LIC-9006	LT-9006	YES	NONE	624

DISPLAY INSTRUMENTATION LIST

NON-ESSENTIAL

AUXILIARY FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AUX FW PRESS HDR A	PI-09-8A	PT-09-8A	NO	NONE	601
AUX FW PRESS HDR B	PI-09-8B	PT-09-8B	NO	NONE	601
AUX FW PRESS HDR C	PI-09-8C	PT-09-8C	NO	NONE	602

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

AUXILIARY FEEDWATER SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
COND. TO STORAGE TANK	R & G LTS	LCV-12-5	NO	NONE	741

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

TURBINE SYS TEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOF COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
TROTTLE VA	R & G LTS	T1	NO	NONE	713
GOVERNOR VA	R & G LTS	G1	NO	NONE	713
TROTTLE VA	R & G LTS	T3	NO	NONE	713
GOVERNOR VA	R & G LTS	G3	NO	NONE	713
TROTTLE VA	R & G LTS	T2	NO	NONE	713
GOVERNOR VA	R & G LTS	G2	NO	NONE	713
TROTTLE VA	R & G LTS	T4	NO	NONE	713
GOVERNOR VA	R & G LTS	G4	NO	NONE	713
REHEAT VA	R & G LTS	1RL	NO	NONE	718
REHEAT VA	R & G LTS	1RR	NO	NONE	718
REHEAT VA	R & G LTS	2RL	NO	NONE	718
REHEAT VA	R & G LTS	2 RR	NO	NONE	718
INTERCEPT VA	R & G LTS	1IL	NO	NONE	718
INTERCEPT VA	R & G LTS	1IR	NO	NONE	718
INTERCEPT VA	R & G LTS	2IL	NO	NONE	718
INTERCEPT VA	R & G LTS	2IR	NO	NONE	718

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

RADIATION MONITORING SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AREA RADIATION MONITOR CH. 14	RR-26-1C	RE-26-14	NO	NONE	445
AREA RADIATION MONITOR CH. 22	RR-26-1C	RE-26-22	NO	NONE	445
PROCESS RADIATION CH. 28	RR-26-1D	RE-26-28	YES	13I11	447
PROCESS RADIATION CH. 29	PR-26-1D	RE-26-29	YES	13I12	447
PROCESS RADIATION CH. 30	PR-26-1D	RE-26-30	YES	13I13	447
PROCESS RADIATION CH. 35	PR-26-1D	RE-26-35	NO	NONE	452

DISPLAY INSTRUMENTATION LIST
NON- ESSENTIAL

HYDROGEN CONTROL SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
REAC AUX BLDG MAIN EXH FAN	R & G LTS	BKR	NO	NONE	501
REAC AUX BLDG MAIN EXH FAN	R & G LTS	BKR	NO	NONE	502

DISPLAY INSTRUMENTATION LIST
NON- ESSENTIAL

CONTAINMENT PURGE SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
HYDROGEN PURGE SYS. HUMIDITY	MI-25-3	ME-25-3	NO	NONE	483

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

SHIELD BUILDING VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
AIRBORNE RADIOACTIVITY DIFF PRESS	PDIS-25-3	PDT-25-3	NO	NONE	481
AIRBORNE RADIOACTIVITY DIFF PRESS	PDIS-25-4	PDT-25-4	NO	NONE	481
AUX BLDG DIFF PRESS	PDIS-25-5A	PDT-25-5A	NO	NONE	481
AUX BLDG DIFF PRESS	PDIS-25-5B	PDT-25-5B	NO	NONE	481
SHLD BLDG DIFF PRESS	PDIS-25-8A	PDT-25-8A	NO	NONE	481
SHLD BLDG DIFF PRESS	PDIS-25-8B	PDT-25-8B	NO	NONE	481
CONT TO ANNULUS DIFF PRESS A	PDI-25-15A	PDT-25-15A	NO	NONE	517

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

SHIELD BUILDING VENTILATION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
CONT TO ANNULUS DIFF PRESS B	PDI-25-15B	PDT-25-15B	NO	NONE	517

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

GENERATOR-DISTRIBUTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
GENERATOR BREAKERS IND	R&G LTS	BKR-IE OCB	NO	NONE	886
GENERATOR BREAKERS IND	R&G LTS	BKR-IM OCB	NO	NONE	886
START UP TRANSF 1A-1 BKR IND	R&G LTS	BKR 1A-1	NO	NONE	904
START UP TRANSF 1A-2 BKR IND	R&G LTS	BKR 1A-2	NO	NONE	906
START UP TRANSF 1B-1 BKR IND	R&G LTS	BKR 1B-1	NO	NONE	905
START UP TRASF 1B-2 BKR IND	R&G LTS	BKR 1B-2	NO	NONE	907
UNIT AUX TRANSF 1A-1 BKR IND	R&G LTS	BKR 1A-1	NO	NONE	912
UNIT AUX TRANSF 1A-2 BKR IND	R&G LTS	BKR 1A-2	NO	NONE	914
UNIT AUX TRANSF 1B-1 BKR IND	R&G LTS	BKR 1B-1	NO	NONE	913

DISPLAY INSTRUMENTATION LIST
NON-ESSENTIAL

GENERATOR-DISTRIBUTION SYSTEM

PARAMETER	DISPLAY INSTRUMENT	SENSOR	LOOP COMPONENT IN HARSH ENVIRONMENT YES/NO	APPLICABLE CES SHEETS	NOTES/CWD NO.
UNIT AUX TRANSF 1B-2 BKR IND	R&G LTS	BKR 1B-2	NO	NONE	915

ATTACHMENT 2
DEFICIENCY MATRIX

Appendix B

Equipment Requiring Additional Information
and/or Corrective Action
(Category 4.2)

LEGEND:

R - Radiation
T - Temperature
QT - Qualification time
RT - Required time
P - Pressure
H - Humidity
CS - Chemical spray
A - Material aging evaluation, replacement schedule, ongoing equipment surveillance
S - Submergence
M - Margin
I - HELB evaluation outside containment not completed
QM - Qualification method
RPN - Equipment relocation or replacement, adequate schedule not provided
EXN - Exempted equipment justification inadequate
SEN - Separate effects qualification justification inadequate
QI - Qualification information being developed
RPS - Equipment relocation or replacement schedule provided

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Reactor Coolant [1M–]																
Limit Switch/1	National Acme/ EA08021100	I-FCV-23-3	T,P,QM,A		4a		4a			2		4a				
Solenoid Valve/2	ASCO/831665	SE-20	QM,T,A,RPN													REPLACE—SEE SECTION IV
Limit Switch/3	National Acme/ EA08021100	HSE-33	T,P,A,QM		4a		4a			2		4a				
Solenoid Valve/4	ASCO/831665	SE-20	T,P,A,RPN,QM													REPLACE—SEE SECTION IV
Limit Switch/5	National Acme/ EA08021100	HSE-33	T,P,A,CS,RPN,R													REPLACE—SEE SECTION IV
Solenoid Valve/6	ASCO/831665	SE-20	T,CS,QM,RPN,A,QT													REPLACE—SEE SECTION IV
Limit Switch/7	National Acme/ EA08021100	HSE-33	T,CS,QM,RPN,A,P,H													REPLACE—SEE SECTION IV

BY H. Bondach DATE 8/31/81

CHKD. BY: John [illegible] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution												COMMENTS
				R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	
Solenoid Valve/8	ASCO/831665	I-FCV-23-4	T,R,QM,A,RPN,CS													REPLACE – SEE SECTION IV
Limit Switch/50	National Acme/ EA08021100	PCV-1100-E	T,P,R,QM,RPN,A													REPLACE – SEE SECTION IV
Limit Switch/51	National Acme/ EA08021100	PCV-1100-E	T,P,R,QM,RPN,A,CS													REPLACE – SEE SECTION IV
Limit Switch/53	National Acme/ EA08021100	PCV-1100-F	T,P,R,QM,RPN,A,CS													REPLACE – SEE SECTION IV
Limit Switch/54	National Acme/ EA08021100	PCV-1100-F	T,P,R,QM,RPN,A,CS													REPLACE – SEE SECTION IV
Sys: Safety Injection [2M–]																
Motor/50	GE/5K811052C37	HPSI Pmp 1A	T,P,A,QM,EXN		3		3			2		3		13		
Motor Operator/51	Limitorque/SMB-00-10	HCV-3617	A,QM							2		1a				
Motor Operator/53	Limitorque/SMB-00-10	HCV-3627	A,QM							2		1a				
Motor Operator/55	Limitorque/SMB-00-10	HCV-3637	A,QM							2		1a				
Motor Operator/57	Limitorque/SMB-00-10	HCV-3647	A,QM							2		1a				
Motor Operator/59	Limitorque/SMB-00-7½	V-3659	A,QM							2		1a				
Motor/60	GE/5K811052C37	HPSI Pmp 1B	T,P,A,QM,EXN		3		3			2		3		13		
Motor Operator/61	Limitorque/SMB-00-10	HCV-3616	A,QM							2		1a				
Motor Operator/63	Limitorque/SMB-00-10	HCV-3626	A,QM							2		1a				
Motor Operator/65	Limitorque/SMB-00-10	HCV-3636	A,QM							2		1a				
Motor Operator/67	Limitorque/SMB-00-10	HCV-3646	A,QM							2		1a				
Motor Operator/69	Limitorque/SMB-00-7½	HCV-3660	A,QM							2		1a				
Motor/70	GE/5K811052C37	HPSI Pmp 1C	R,T,P,A,QM,EXN	5c	3		3			2		5c		13		
Motor/71	Westinghouse/70F57882	LPSI Pmp 1A	R,T,P,A,QM,EXN	5b	3		3			2		5b		13		
Motor Operator/72	Limitorque/SMB-0-25	HCV-3635	A,QM							2		1a				

BY W. Badack DATE 8/31/81

CHKD. BY John Haughtaling DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	R	T	OT	P	H	CS	A	S	OM	RPN	EXN	QI	RT	COMMENTS
Motor Operator/74	Limitorque/SMB-0-25	HCV-3615	A,OM							2		1a					
Motor/76	Westinghouse/70F57882	LPSI Pmp 1B	R,T,P,A,OM,EXN	5b	3		3			2		5b		13			
Valve Operator/77	Limitorque/SMB-0-25	HCV-3625	A,OM							2		1a					
Valve Operator/79	Limitorque/SMB-0-25	HCV-3645	A,OM							2		1a					
Valve Operator/81	Limitorque/SMB-1-60	HCV-3624	A,OM							2		1a					
Solenoid/82	ASCO/8302C72RF	HCV-3628	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Limit Switch/83	National Acme/D2400X-2	HVC-3628	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Limit Switch/84	National Acme/D2400X-2	HVC-3628	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Motor Operator/86	Limitorque/SMB-1-60	V-3614	A,OM							2		1a					
Limit Switch/87	National Acme/D2400X-2	HCV-3618	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Limit Switch/88	National Acme/D2400X-2	HCV-3618	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Solenoid Valve/89	ASCO/8302C27RF	HCV-3618	A,T,P,R,OM,RPN,CS														REPLACE- SEE SECTION IV
Motor Operator/91	Limitorque/SMB-1-60	V-3634	A,OM							2		1a					
Limit Switch/92	National Acme/D2400X-2	HCV-3638	T,P,R,OM,A,RPN,CS														REPLACE-SEE SECTION IV
Limit Switch/93	National Acme/D2400X-2	HCV-3638	T,P,R,OM,A,RPN,CS														REPLACE-SEE SECTION IV
Solenoid/94	ASCO/8302C27RF	HCV-3638	T,P,R,OM,A,RPN,CS														REPLACE- SEE SECTION IV
Motor Operator/96	Limitorque/SMB-1-60	V-3644	A,OM							2		1a					
Limit Switch/97	National Acme/D2400X-2	HCV-3648	T,P,R,OM,A,RPN,CS														REPLACE- SEE SECTION IV
Limit Switch/98	National Acme/D2400X-2	HCV-3648	T,P,R,OM,A,RPN,CS														REPLACE-SEE SECTION IV
Solenoid/99	ASCO/8302C27RF	HCV-3648	T,P,R,OM,A,RPN,CS														REPLACE- SEE SECTION IV
Motor Operator/101	Limitorque/SMB-00-10	V-3653	A,OM							2		1a					
Motor Operator/102	Limitorque/SMB-00-10	V-3655	A,OM							2		1a					

BY: H. Baidach DATE 8/31/81

CHKD BY John Haughtelty DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Motor Operator/103	Limitorque/SMB-000-5	V-3662	A,QM							2		1a				
Motor Operator/104	Limitorque/SMB-000-5	V-3663	A,QM							2		1a				
Sys: Shutdown Cooling [3M-]																
Solenoid Valve/01	ASCO/HT8316815	I-HCV-14-3A	T,H,A,QM,R	5d	3			3		2		5d				
Limit Switch/02	National Acme/D2400X-R	HSE-14-3A	R,T,H,A,QM	5d	3			3		2		5a				
Solenoid Valve/03	ASCO/HT80773	SE-14-3B	T,H,A,QM,R	5d	3			3		2		5d				
Limit Switch/04	National Acme/D2400X-R	HSE-14-3B	T,P,H,A,QM,R,EXN	5a	3		3	3		2		5a		13		
Motor Operator/50	Limitorque/SMB-1-40	V-3481	A,QM							2		1a				
Motor Operator/51	Limotorque/SMB-1-40	V-3651	A,QM							2		1a				
Limit Switch/52	ASCO/8302B26RU	FCV-3306	R,T,H,A,QM,QT	7a	3	14b		3		2		7a				"LIMIT SWITCH" SHOULD BE "SOLENOID VALVE"
Limit Switch/53	ASCO/D2400X-2	FCV-3306	R,T,P,H,A,QM	7a	3		3	3		2		7a				"ASCO" SHOULD BE "NAMCO"
Limit Switch/54	ASCO/D2400X-2	FCV-3306	R,T,P,H,A,QM	7a	3		3	3		2		7a				"ASCO" SHOULD BE "NAMCO"
E/P Transducer/55	Fisher Controls/546	FCV-3306	QT,A,QM			14b				2		5e				
Solenoid Valve/56	ASCO/8302C27RF	V-3661	T,P,R,H,A,QM,RPN													REPLACE-SEE SECTION IV
Limit Switch/57	National/Acme/D2400X-2	V-3661	T,P,R,H,A,QM,RPN													REPLACE-SEE SECTION IV
Limit Switch/58	National/Acme/D2400X-2	V-3661	T,P,R,H,A,QM,RPN													REPLACE-SEE SECTION IV
Motor Operator/59	Limitorque/SMB-1-40	V-3480	A,QM							2		1a				
Motor Operator/60	Limitorque/SMB-1-40	V-3652	A,QM							2		1a				
Solenoid Valve/61	ASCO/8302C27RF	HCV-3657	R,T,P,H,A,QM,QT	5d	3	14b	3	3		2		5d				
Limit Switch/62	National Acme/D-2400X-2	HCV-3657	R,T,P,H,A,QM	5a	3		3	3		2		5a				
Limit Switch/63	National Acme/D-2400X-2	HCV-3657	R,T,P,H,A,QM	5a	3		3	3		2		5a				
E/P Transducer/64	Fisher Controls/3590	HCV-3657	R,T,P,H,A,QM,QT	5e	3	14b	3	3		2		5e				
Sys: CVCS [4M-]																
Solenoid Valve/01	Target Rock/74Q-004	I-SE-01-1	A,QM							2		1d				

BY [signature] DATE 8/31/81
CHKD BY [signature] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	OI	COMMENTS
Solenoid Valve/73	ASCO/8302C27R	V-2512	T,P,H,A,QM,QT		3	14b	3	3		2		3				
Limit Switch/74	National Acme/D-2400X-R	V-2512	R,T,P,H,A,QM	5a	3		3	3		2		5a				
Limit Switch/75	National Acme/D-2400X-R	V-2512	T,P,H,R,A,QM	5a	3		3	3		2		5a				
Solenoid Valve/76	ASCO/8302C27RF	V-2515	T,P,H,R,A,CS,S, RPN													REPLACE-SEE SECTION IV
Limit Switch/77	National Acme/EA170-31100	V-2515	T,P,H,R,A,CS,S, RPN													REPLACE-SEE SECTION IV
Limit Switch/78	National Acme/EA170-31100	V-2515	T,P,H,R,A,CS,S, RPN													REPLACE-SEE SECTION IV
Motor/79	Westinghouse/6808102G53	Chg Pmp 1C	T,P,H,A,QM,R,EXN	5b	3		3	3		2		5b		13		
Sys: Containment Spray [5M—]																
Motor Operator/01	Limitorque/SMB-00-10	I-MV-07-2A	A,QM							2		1a				
Limit Switch/02	National Acme/EA 17022100	I-FCV-07-1A	T,P,H,A,QM,EXN,R	5a	3		3	3		2		5a		13		
Solenoid Valve/03	ASCO/831665	FSE-07-1A	T,P,H,A,QT,QM,R	5d	3	14b	3	3		2		5d				
Motor Operator/04	Limitorque/SMB-00-10	I-MV-07-2B	A,QM							2		1a				
Limit Switch/05	National Acme/EA 17022100	I-FCV-07-1B	T,P,H,A,QM,EXN,R	5a	3		3	3		2		5a		13		
Solenoid Valve/06	ASCO/831665	FSE-07-1B	T,R,A,QM	5d	3					2		5d				
Solenoid Valve/07	ASCO/832185	LSE-07-11A	QT,R,T,A,QM	5d	3	14b				2		5d				
Limit Switch/08	National Acme/D1200G-1	I-LCV-07-11A	QT,R,T,A,QM	7a	3	14b				2		7a				
Solenoid Valve/09	ASCO/832185	LSE-07-11B	QT,R,T,A,QM	5d	3	14b				2		5d				
Limit Switch/10	National Acme/D1200G-1	I-LCV-07-11B	QT,R,T,A,QM	7a	3	14b				2		7a				
Sys: Waste Management [6M—]																
Limit Switch/50	National Acme/D2400X-STSR	V6301	R,QT,T,P,H,A,QM	5a	3	14b	3	3		2		5a				
Limit Switch/51	National Acme/D2400X-ST	V6301	T,P,H,A,QM,R,QT	5a	3	14b	3	3		2		5a				

BY H. Bandach DATE 8/31/81
CHKD BY John [illegible] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	OT	P	H	CS	A	S	QM	RPM	EXN	OI	COMMENTS
Solenoid Valve/52	ASCO/FT8321A5	V6301	T,A,QM		3					2		5d				
Limit Switch/53	National Acme/D-2400X	V6554	R,A,QM	5a						2		5a				
Limit Switch/54	National Acme/D-2400X	V6554	R,A,QM	5a						2		5a				
Solenoid Valve/55	ASCO/LB8320A22	V6554	T,R,H,A,QM	5d	3			3		2		5d				
Limit Switch/56	National Acme/D-2400XST-SR	V6302	R,A,QM	5a						2		5a				
Limit Switch/57	National Acme/D-2400XST-SR	V6302	R,A,QM	5a						2		5a				
Solenoid Valve/58	ASCO/FT8321A5	V6302	T,R,H,A,QM,EXN	5d	3			3		2		5d		13		
Limit Switch/59	National Acme/D-2400X	V6555	R,A,QM	5a						2		5a				
Limit Switch/60	National Acme/D-2400X	V6555	R,A,QM	5a						2		5a				
Solenoid Valve/61	ASCO/LB 8320A22	V6555	T,R,H,A,QM	5d	3			3		2		5d				
Limit Switch/62	National Acme/D-2400X-2	V6741	R,A,QM	5a						2		5a				
Limit Switch/63	National Acme/D-2400X-2	V6741	R,A,QM	5a						2		5a				
Solenoid Valve/64	ASCO/8302C27R	V6741	T,R,H,A,QM	5d	3			3		2		5d				
Sys: Component Cooling [8M—]																
Limit Switch/01	National Acme/D2400X-R	I-HCV-14-1	R,A,QM	5a						2		5a				
Solenoid Valve/02	ASCO/HT8316B15	HSE-14-1	T,R,H,A,QM	5d	3			3		2		5d				
Limit Switch/03	National Acme/D2400X-R	I-HCV-14-2	R,A,QM	5a						2		5a				
Solenoid Valve/04	ASCO/HT8316B15	HSE-14-2	T,R,H,A,QM	5d	3			3		2		5d				
Motor Operator/05	Limitorque/SMB-000-2	I-MV-14-8	A,QM							2		1a				
Motor Operator/06	Limitorque/SMB-000-2	I-MV-14-6	A,QM							2		1a				
Limit Switch/07	National Acme/D2400X-R	I-HCV-14-6	T,P,H,A,QM,R,EXN	5a	3		3	3		2		5a		13		
Solenoid Valve/08	ASCO/HT8316B15	HSE-14-6	T,H,A,QM,R,EXN	5d	3			3		2		5d		13		

BY H. Bardach DATE 8/31/81

CHKD BY John Dougherty DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Limit Switch/09	National Acme/D2400X-R	I-HCV-14-7	R,A,QM	5a						2		5a				
Solenoid Valve/10	ASCO/HT8316B15	HSE-14-7	T,R,H,A,QM	5d	3			3		2		5d				
Motor Operator/11	Limitorque/SMB-000-2	I-MV-14-5	A,QM							2		1a				
Motor Operator/12	Limitorque/SMB-00-2	I-MV-14-7	A,QM							2		1a				
Sys: Cooling Water Sys [9M—]																
Motor Operator/01	Limitorque/SMB-000-5	I-MV-15-1	T,QT,QM,H,A		3	14b		3		2		5e				
Sys: Main Steam [10M—]																
Limit Switch/02	Honeywell Microswitch/ DTF2-RN	LS-9 through 15 for I-HCV-08-1A	T,QT,QM,H,A		4b	4b		4b		2		4b				
Solenoid Valve/03	ASCO/HT8316C47	7A & 7B for I-HCV-08-1A	T,QT,QM,H,A		4b	4b		4b		2		4b				
Solenoid Valve/04	ASCO/HI8316C15	I-HCV-08-1A	T,QT,QM,H,A		4b	4b		4b		2		4b				
Solenoid Valve/01	ASCO/HT281/04	5A & 5B for I-HCV-08-1A	T,QT,QM,H,A		4b	4b		4b		2		4b				
Limit Switch/05	National Acme/D2400X-2SR	LS-1 & 2 for I-HCV-08-1A	T,QT,QM,A		4b	4b				2		4b				
Limit Switch/06	National Acme/D2400X-2	LS-3 for I-HCV-08-1A	T,QT,QM,A		4b	4b				2		4b				
Solenoid Valve/07	ASCO/HT8320A102	T5AP,T5BP,T7AP,T7BP for I-HCV-08-1A	T,QT,QM,A		4b	4b				2		4b				
Pressure Switch/08	United Electric/9844358 Type J302	PS-5A,5B,7A,7B & 6 for I-HCV-08-1A	T,QT,QM,A		4b	4b				2		4b				
Test Panel/09	Schutte & Koerting/III	B-1317 for I-HCV-08-1A	T,QT,QM,A		4b	4b				2		4b				
Solenoid Valve/12	ASCO/HT8211C4	5A & 5B for I-HCV-08-1B	T,QT,QM,A		4b	4b				2		4b				

BY N. Bardach DATE 8/31/81
CHKD BY John [illegible] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC- IDENTIFIED] Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Limit Switches/13	Honeywell Microswitch/ DTF-2RN	LS-8 through 15 for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Solenoid Valves/14	ASCO/HT8316C47	7A & 7B for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Solenoid Valves/15	ASCO/HT8316815	4 for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Limit Switches/16	National Acme/D2400X-25R	LS-1 & 2 for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Limit Switch/17	National Acme/D2400X-2	LS-3 for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Solenoid Valves/18	ASCO/HT8320AV02	T5AP,T5BP,T7AP,T7BP for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Pressure Switches/19	United Electric/9844-358 Type J302	PS-5A,5B,7A, & 7B for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Test Panel/20	Schutte & Koerting/III	B-1318 for I-HCV-08-18	A,QM,T,QT		4b	4b				2		4b				
Local Starter/26	Allen Bradley/	Starter for I-HV-08-3	A,QM,T,QT		4b	4b				2		4b				
System: Aux Feedwater [12M—]																
Local Control Panel/05	Air Pax Tack Pak/FSS-989	B-102B	A,QM,T,QT		4b	4b				2		4b				
Local Test Station/06	Square D Co/KYC-2	B-1665	A,QM,T,QT		4b	4b				2		4b				
Signal Converter/08	Woodward/8M78617-1 & 2	B-103B	A,QM,T,QT		4b	4b				2		4b				
Contactors/08	Allen Bradley/	--	A,QM,Q,QT		4b	4b				2		4b				"Q" IS NOT IN LEGEND; ASSUMED TO BE "T"
Solenoids/12	Byron Jackson/	--	A,QM,T,QT		4b	4b				2		4b				
System: Sampling System [14M—]																
Limit Switches/01	National Acme/E170-11100	I-FCV-26-2	A,QM,T,H,R,EXN	5a	3			3		2		5a		13		
Solenoid Valve/02	ASCO/HT8302B26U	I-FCV-26-2	A,QM,QT,T,R	5d	3	14a				2		5d				

BY H. Bardach DATE 8/31/81

CHKD. BY [signature] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No:)	[NRC- IDENTIFIED] Deficiency	Resolution													COMMENTS
				R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	RT	
Limit Switches/03	National Acme/E170-11100	I-FCV-26-4	EXN,T,H,R,QM,A	5a	3			3		2		5a		13			
Solenoid Valve/04	ASCO/HT8302B26U	I-FCV-26-4	EXN,T,H,R,QM,A	5d	3			3		2		5d		13			
Limit Switches/05	National Acme/E170-11100	I-FCV-26-6	EXN,T,H,R,QM,A	5a	3			3		2		5a		13			
Solenoid Valve/06	ASCO/HT8302B26U	FSE-26-6	A,QM,T,R,EXN	5d	3					2		5d		13			
Limit Switches/07	National Acme/EA170-11100	I-FCV-26-1	RPN,T,P,R,CS,QM,A														REPLACE-SEE SECTION IV
Solenoid Valve/08	ASCO/HT8302B26U	I-FCV-26-1	RPN,T,P,R,CS,QM,A														REPLACE-SEE SECTION IV
Limit Switches/09	National Acme/EA170-11100	I-FCV-26-3	RPN,T,P,R,CS,QM,A														REPLACE-SEE SECTION IV
Solenoid Valve/10	ASCO/HT8302B26U	FSE-26-3	RPN,T,P,R,CS,QM,A														REPLACE-SEE SECTION IV
Limit Switches/11	National Acme/EA170-11100	I-FCV-26-5	RPN,T,P,R,CS,QM,A														REPLACE-SEE SECTION IV
Solenoid Valve/12	ASCO/HT8302B26U	FSE-26-5	RPN,R,T,QT,P,H,CS														REPLACE-SEE SECTION IV
Limit Switches/13	National Acme/EA170-21100	I-FCV-23-9	T,P,H,A,QM,QI,RT, QT		3	14a	3	3		2		5a			15	16	
Solenoid Valve/14	ASCO/8321A5	I-FCV-23-9	P,H,A,QM				3	3		2		5d					
Limit Switch/15	National Acme/EA170-21100	I-FCV-23-7	T,P,H,A,QM		3		3	3		2		5a					
Solenoid Valve/16	ASCO/8321A5	I-FCV-23-7	P,H,A,QM				3	3		2		5d					
Solenoid Valve/50	ASCO/8320A20	V5200	P,H,A,QM				3	3		2		7a					
Limit Switch/51	National Acme/SAI-P35	V5200	T,P,H,A,QM		3		3	3		2		5a					
Limit Switch/52	National Acme/SAI-P35	V5200	T,P,H,A,QM		3		3	3		2		5a					
Solenoid Valve/53	ASCO/8320A20	V5201	P,H,A,QM				3	3		2		7a					
Limit Switch/54	National Acme/SAI-P35	V5201	T,P,H,A,QM		3		3	3		2		5a					
Limit Switch/55	National Acme/SAI-P35	V5201	T,P,H,A,QM		3		3	3		2		5a					
Limit Switch/56	National Acme/SAI-P35	V5202	T,P,H,A,QM		3		3	3		2		5a					
Limit Switch/57	National Acme/SAI-P35	V5202	T,P,H,A,QM		3		3	3		2		5a					

BY W. Bardach DATE 8/31/81

CHKD. BY John Dougherty DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPM	EXN	QI	COMMENTS
Solenoid Valve/58	ASCO/8320A20	V5202	P,H,A,QM				3	3		2		7a				
Limit Switch/59	National Acme/SAI-P35	V5203	T,P,H,A,QM		3		3	3		2		5a				
Limit Switch/60	National Acme/SAI-P35	V5203	T,P,H,A,QM		3		3	3		2		5a				
Solenoid Valve/61	ASCO/8320A20	V5203	P,H,A,QM				3	3		2		7a				
Limit Switch/62	National Acme/SAI-P35	V5204	T,P,H,A,QM		3		3	3		2		5a				
Limit Switch/63	National Acme/SAI-P35	V5204	T,P,H,A,QM		3		3	3		2		5a				
Solenoid Valve/64	ASCO/HT8320A20	V5204	P,H,A,QM				3	3		2		7a				
Limit Switch/65	National Acme/SAI-P35	V5205	T,P,H,A,QM		3		3	3		2		5a				
Limit Switch/66	National Acme/SAI-P35	V5205	T,P,H,A,QM		3		3	3		2		5a				
Solenoid Valve/67	ASCO/8320A20	V5205	P,H,A,QM				3	3		2		7a				
Sys: Hydrogen Control [15M—]																
Solenoid Valve/01	Valcor/P/N V52600-515	I-FSE-27-1	A,S,QM							2	12c	1b				
Solenoid Valve/02	Valcor/P/N V52600-515	I-FSE-27-2	A,S,QM							2	12c	1b				
Solenoid Valve/03	Valcor/P/N V52600-515	I-FSE-27-3	A,S,QM							2	12c	1b				
Solenoid Valve/04	Valcor/P/N V52600-515	I-FSE-27-4	A,S,QM							2	12c	1b				
Solenoid Valve/05	Circle Seal/N77326	I-FSE-27-8	T,P,H,A,QM,R,QT	7a	3	14b	3	3		2		7a				
Solenoid Valve/06	Circle Seal/N77326	I-FSE-27-11	T,P,H,A,QM,R,QT	7a	3	14b	3	3		2		7a				
Solenoid Valve/07	Valcor/P/N 52600-515	I-FSE-27-5	A,S,QM							2	12c	1b				
Solenoid Valve/08	Valcor/P/N 52600-515	I-FSE-27-6	A,S,QM							2	12c	1b				
Solenoid Valve/09	Valcor/P/N 52600-515	I-FSE-27-7	A,S,QM							2	12c	1b				
Solenoid Valve/10	Circle Seal/N77326	I-FSE-27-09	T,P,H,A,QM,R,QT	7a	3	14b	3	3		2		7a				
Solenoid Valve/11	Circle Seal/N77326	I-FSE-27-10	T,P,H,A,QM,R,QT	7a	3	14b	3	3		2		7a				

BY [signature] DATE 8/31/81

CHKD BY [signature] DATE 8/5/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Inst. Air [6M—]																
Motor Operator/01	Limitorque/SMB-000-2	I-MV-18-1	A,QM							2		1a				
Sys: Containment Purge [7M—]																
Solenoid Valve/01	Auto Valve Corp/C5439	I-FCV-25-1	A,QM							2		5f				
Limit Switches/02	National Acme/D2400X-R	ZS-25-2 & ZS-25-3 for I-FCV-25-1	T,P,H,A,QM		3		3	3		2		5a				
Solenoid Valve/03	AVCO/C5439	SE-25-4	T,P,H,A,QM,R,QT, RPN													REPLACE-SEE SECTION IV
Limit Switches/04	National Acme Co/D2400X	ZS-25-6 and ZS-25-7	T,P,H,A,QM,R,QT, RPN													REPLACE-SEE SECTION IV
Solenoid Valve/05	AVCO/C5439	SE-25-3	A,QM							2		3c				
Limit Switches/06	National Acme/D2400X-P	ZS-25-4 -ZS-25-5	T,P,H,A,QM		4d		3f	3f		2		4d				
Solenoid Valve/07	AVCO/C5439	SS-25-6	T,P,H,A,QM,R,QT, RPN													REPLACE-SEE SECTION IV
Limit Switches/08	National Acme/D2400X	ZS-25-8 ZS-25-9	T,P,H,A,QM,R,QT, RPN													REPLACE-SEE SECTION IV
Solenoid Valve/09	AVCO/C5439	SS-27-7	A,QM							2		3c				
Limit Switches/10	National Acme/D2400X	ZS-25-10 ZS-25-11	T,P,H,A,QM		4d		3f	3f		2		4d				
Solenoid Valve/11	AVCO/C5439	SE-25-8	A,QM							2		5a				
Limit Switches/12	National Acme/EA170-4110 D2400X-R	ZS-25-12 ZS-25-13	T,P,H,A,QM		3		3	3		2		5a				
Sys: Containment Vacuum Relief [8M—]																
Solenoid Valve/01	ASCO/HT8516B15	SE-25-10	P,H,A,QM				3f	3f		2		3a				
Limit Switches/02	National Acme/EA170-11302	ZS-25-14 ZS-25-15	P,H,A,QM				3f	3f		2		3g				
Solenoid Valve/03	ASCO/HT8316C15	SE-25-11	P,H,A,QM				3f	3f		2		3a				
Limit Switches/04	National Acme/EA170-11302	ZS-25-16 ZS-27-17	P,H,A,QM				3f	3f		2		3g				

BY H. Bardick DATE 8/31/81
CHKD BY John [illegible] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Shield Bldg Vent [20M—]																
Motor Operator/01	Limitorque/SMB-000-2	I-FCV-25-11	A,QM							2		1a				
Motor Operator/02	Limitorque/SMB-000-2	I-FCV-25-12	A,QM							2		1a				
Motor Operator/03	Limitorque/SMB-000-2	I-FCV-25-13	A,QM							2		1a				
Sys: Containment Room A/C [21M—]																
Motor Operator/01	Limitorque/SMB-000	I-FCV-25-16	A,QM							2		1a				
Motor Operator/02	Limitorque/SMB-000	I-FCV-25-14	A,QM							2		1a				
Sys: Reactor Coolant [1I—]																
Level Transmitter/1	Fischer & Porter/ 1302495	LT-9013A	A,QM							2		1c				
Level Transmitter/2	Fischer & Porter/ 1302495KB-NS	LT-9023A	A,QM							2		1c				
Pressure Transmitter/3	Fischer & Porter/ 50EP1041BCNS	PT-9013A	A,QM							2		1c				
Pressure Transmitter/4	Fischer & Porter/ 50EP1041BCNS	PT-8023A	A,QM							2		1c				
Level Transmitter/5	Fischer & Porter/ 1302495KB-NS	LT-9013B	A,QM							2		1c				
Level Transmitter/6	Fischer & Porter/ 1302495KB-NS	LT-9023A	A,QM							2		1c				
Pressure Transmitter/7	Fischer & Porter/ 50EP1041BCNS	PT-8013B	A,QM							2		1c				
Pressure Transmitter/8	Fischer Porter/ 50EP1041BCNS	PT-8023B	A,QM							2		1c				
Level Transmitter/9	Fischer & Porter/ 1302495	LT-9013C	A,QM							2		1c				
Level Transmitter/10	Fischer & Porter/ 1302495KBNS	LT-9023C	A,QM							2		1c				

BY H. Burdick DATE 8/31/81
CHKD BY John Haughtaling DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	R	T	QT	P	H	CS	A	S	QM	RPM	EXN	QI	COMMENTS
Pressure Transmitter/11	Fischer & Porter/ 50EP1041BCXA-NS	PT-8013C	A,QM							2		1c				
Pressure Transmitter/12	Fischer & Porter/ 50EP/0418CXA-NS	PT-8023C	A,QM							2		1c				
Level Transmitter/13	Fischer & Porter/ 1302495KBNS	LT-9013C	A,QM							2		1c				
Level Transmitter/14	Fischer & Porter/ 1302495KB	LT-9023C	A,QM							2		1c				
Pressure Transmitter/15	Fischer & Porter/ 50EP1041BCXA-NS	PT-8013C	A,QM							2		1c				
Pressure Transmitter/16	Fischer & Porter/ 50EP1041BCXA-NS	PT-8023C	A,QM							2		1c				
Temperature Element/17	Rosemount/104VC	TE-1112CA	T,P,H,CS,R,A,QM, QT	6a					6a	2		6a				
Temperature Element/18	Rosemount/104VC	TE-1122HA	T,P,H,CS,R,A,QM, QT	6a					6a	2		6a				
Temperature Element/19	Rosemount/104VC	TE-1122CA	T,P,H,CS,R,A,QM, QT	6a					6a	2		6a				
Temperature Element/20	Rosemount/104VC	TE-1112HA	T,P,H,CS,R,A,QM, QT	6a					6a	2		6a				
Temperature Element/21	Rosemount/104VC	TE-1112CB	T,P,H,CS,R,A,QM, QT	6a					6a	2		6a				
Temperature Element/22	Rosemount/104VC	TE-1122CB	T,P,H,CS,R,A,QM QT	6a					6a	2		6a				
Temperature Element/23	Rosemount/104VC	TE-1112HB	T,P,H,CS,R,A,QM QT	6a					6a	2		6a				
Temperature Element/24	Rosemount/104VC	TE-1122HB	T,P,H,CS,R,A,QM QT	6a					6a	2		6a				
Temperature Element/25	Rosemount/104VC	TE-1112HC	T,P,H,CS,R,A,QM QT	6a					6a	2		6a				
Temperature Element/26	Rosemount/104VC	TE-1122HC	T,P,H,CS,R,A,QM QT	6a					6a	2		6a				

BY H Badack DATE 8/31/81

CHKD BY John Haughtley DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Motor/50	Westinghouse/6808102G53	Chg Pmp 1A	T,P,H,A,QM,EXN,R	5b	3		3	3		2		5b		13		
Motor/51	GE/5K256AK1016	Boric Acid Pump 1A	T,P,H,A,QM,EXN,R	7a	3		3	3		2		7a		13		
Heater A/52	Chromalox/SE-48	1A Heater 0A	T,P,H,A,QM,EXN,R	7a	3		3	3		2		7a		13		
Heater A/53	Chromalox/SE-48	1A Heater 0B	T,P,H,Q,QM,EXN,R	7a	3		3	3		2		7a		13		"Q" IS NOT IN LEGEND; ASSUMED TO BE "A"
Heater A/54	Chromalox/SE-48	1A Heater 0C	T,P,H,Q,QM,EXN,R	7a	3		3	3		2		7a		13		"Q" IS NOT IN LEGEND; ASSUMED TO BE "A"
Heater B/55	Chromalox/SE-48	1A Heater 0A	T,P,H,Q,QM,EXN,R	7a	3		3	3		2		7a		13		"Q" IS NOT IN LEGEND; ASSUMED TO BE "A"
Heater B/56	Chromalox/SE-48	1A Heater 0B	T,P,H,Q,QM,EXN,R	7a	3		3	3		2		7a		13		"Q" IS NOT IN LEGEND; ASSUMED TO BE "A"
Heater B/57	Chromalox/SE-48	1A Heater 0C	T,P,H,Q,QM,EXN,R	7a	3		3	3		2		7a		13		"Q" IS NOT IN LEGEND; ASSUMED TO BE "A"
Heater B/58	Chromalox/SE-48	1B Heater 0A	T,P,H,A,QM,EXN,R	7a	3		3	3		2		7a		13		1
Heater A/59	Chromalox/SE-48	1B Heater 0B	T,P,H,A,QM,R	7a	3		3	3		2		7a				
Heater A/60	Chromalox/SE-48	1B Heater 0C	T,P,H,A,QM,R	7a	3		3	3		2		7a				
Heater B/61	Chromalox/SE-48	1B Heater 0A	T,P,H,A,QM,R	7a	3		3	3		2		7a				
Heater B/62	Chromalox/SE-48	1B Heater 0B	T,P,H,A,QM,R	7a	3		3	3		2		7a				
Heater B/63	Chromalox/SE-48	1B Heater 0C	T,P,H,A,QM,R	7a	3		3	3		2		7a				
Solenoid Valve/64	ASCO/8302C27RF	V-2505	T,P,H,A,QM,R	5d	4c		4c	4c		2		4c				
Limit Switch/65	National Acme/D-2400X-2	V-2505	T,P,H,A,QM,R	5a	4a		4a	4a		2		4a				
Limit Switch/66	National Acme/D-2400X-2	V-2505	T,P,H,A,QM,R	5a	4a		4a	4a		2		4a				
Solenoid Valve/67	ASCO/8302C27RF	V-2516	T,P,H,R,CS,QM,QI S,RPN													REPLACE-SEE SECTION IV
Limit Switch/68	National Acme/EA170-31100	V-2516	T,P,H,R,CS,QM,QI S,RPN													REPLACE-SEE SECTION IV
Limit Switch/69	National Acme/EA170-31100	V-2516	T,P,H,R,CS,QM,QI, S,RPN													REPLACE-SEE SECTION IV
Motor/70	Westinghouse/6808102G53	Chg Pmp 1B	T,P,H,A,QM,EXN,R	5b	3		3	3		2		5b		13		
Motor/71	GE/5K256AK1016	Boric Acid Pmp 1B	T,P,H,A,QM,EXN,R	7a	3		3	3		2		7a		13		
Motor Operator/72	Limitorque/SMB-00-5	V-2501	A,QM							2		1a				

REV NO.	BY/DATE	CH/DATE
1	JH 9-23-81	JB 9-23-81

BY N. Bardach DATE 8/31/81

CHKD BY [signature] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Temperature Element/27	Rosemount/104VC	TE-1112CC	R,T,QT,P,H,CS, A,QM	6a					6a	2		6a				
Temparature Element/28	Rosemount/104VC	TE-1122CC	R,T,QT,P,H,CS, A,QM	6a					6a	2		6a				
Temperature Element/29	Rosemount/104VC	TE-1112CD	R,T,QT,P,H,CS, A,QM	6a					6a	2		6a				
Temperature Element/30	Rosemount/104VC	TE-1122CD	R,T,QT,P,H,CS, A,QM.	6a					6a	2		6a				
Temperature Element/31	Rosemount/104VC	TE-1112HD	R,T,QT,P,H,CS, A,QM	6a					6a	2		6a				
Temperature Element/32	Rosemount/104VC	TE-1122HD	R,T,QT,P,H,CS, A,QM	6a					6a	2		6a				
Pressure Transmitter/33	Fischer & Porter/ 50EP1041	PT-1102A	A,QM,QT			14c				2		1c				
Pressure Transmitter/34	Fischer & Porter/ 50EP1041BCNS	PT-1102B	A,QM,QT			14c				2		1c				
Pressure Transmitter/35	Fischer & Porter/ 50EP1041ACNS	PT-1102C	A,QM,QT			14c				2		1c				
Pressure Transmitter/36	Fischer & Porter/ 50EP1041BCNS	PT-1102D	A,QM,QT			14c				2		1c				
Pressure Transmitter/37	Fischer & Porter/ 50EP1041BCNS	PT-1103D	A,QM,QT			14c				2		1c				
*Pressure Transmitter/38	Foxboro/E11GM	PT-1104	R,H,P,T,QT, A,QM	6d				6d		2		6d				
Pressure Switch/39	United Elec Controls/ J302-8756-1	PS-23-3	R,H,P,T,QT, A,QM	7a	3e	14d	3e	3e		2		3e				
Pressure Switch/40	United Elec Controls/ J302-8756-1	PS-23-5	R,H,P,T,QT, A,QM	7a	3e	14d	3e	3e		2		3e				
Temperature Element/41	Rosemount/104-1696-1	TE-1111Y	R,T,QT,P,H,CS, A,QM	6b					6b	2		6b				

*See Attachment 1: Foxboro letter (3/12/81), "Potential Deficiency Affecting Foxboro Transmitter," for corrective active.

BY N. Bardsch DATE 8/31/81

CHKD BY John Haughtaly DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPM	EXN	QI	COMMENTS
Temperature Element/42	Rosemount/104VC	TE-1121Y	R,T,QT,P,H,CS, A,QM	6a	→	→	→	→	6a	2		6a				
Temperature Element/47	Rosemount/104-1696-1	TE-1111X	R,T,QT,P,H,CS, A,QM,	6b	→	→	→	→	6b	2		6b				
Temperature Element/48	Rosemount/104AFV-1	TE-1115	A,QM,QT			14j				2		1k				
Temperature Element/49	Rosemount/104VC	TE-1125	A,QM,R,T,QT,P,H, CS	6a	→	→	→	→	6a	2		6a				
Temperature Element/54	Rosemount/104VC	TE-1121X	A,QM,R,T,QT,P,H, CS	6a	→	→	→	→	6a	2		6a				
Sys: Safety Injection [2I—]																
Pressure Transmitter/1	Fischer & Porter 50EP1041BC	PT-3308	A,QM,R,T,QT,P,H	1c	3	14b	3	3		2		1c				
Pressure Transmitter/2	Fischer & Porter 50EP1041BC	PT-3309	A,QM,R,T,QT,P,H	1c	3	14b	3	3		2		1c				
Sys: Shutdown Cooling [3I—]																
Temp Element Transmitter/1	Rosemount/104MD36BR/ 44HRGA-C5	TE/TT-3303X	T,P,H,A,QM,QT,R													RELOCATION OF TRANSMITTER PORTION (ELECTRONICS) TO A NON-HARSH ENVIRONMENT
Temp Element Transmitter/2	Rosemount/104MD36BR/ 442-RG-A	TE/TT-3351X	T,P,H,A,QM,QT,R													RELOCATION OF TRANSMITTER PORTION (ELECTRONICS) TO A NON-HARSH ENVIRONMENT
Temp Element Transmitter/3	Rosemount/104MD36BR/ 442HRGA-C5	TE/TT-3303Y	T,P,H,A,QM,QT,R													RELOCATION OF TRANSMITTER PORTION (ELECTRONICS) TO A NON-HARSH ENVIRONMENT
Temp Element Transmitter/4	Rosemount/104MD36BR/ 442A-RG-A	TE/TT-3351Y	T,P,H,A,QM,QT,R													RELOCATION OF TRANSMITTER PORTION (ELECTRONICS) TO A NON-HARSH ENVIROMENT
Sys: CVCS [4I—]																
P/D Indicator Switch/2	ITT Barton/288A-16004	PDIS-02-1	A,S,QM,CS,QT			14e			11a	2	12a	10a				
Pressure Transmitter/5	Fischer & Porter 50EP1041BC	PT-2212	T,P,H,A,QM,R,QT	1c	3	14b	3	3		2		1c				
Flow Transmitter/6	Fischer & Porter 10B2496PB	FT-2212	T,P,H,A,QM,R,QT	1c	3	14b	3	3		2		1c				

BY H Bardack DATE 8/31/81
CHKD BY [signature] DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	NRC-IDENTIFIED Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Containment Spray [5I-]																
Temperature Element/1	Rosemount/88-102-42	TE-07-5A	R,QT,T,P,H,A,QM	14h	→	→	→	14h		2		14h				
Temperature Element/2	Rosemount/88-102-42	TE-07-5B	R,QT,T,P,H,A,QM	14h	→	→	→	14h		2		14h				
Temperature Transmitter/3	Rosemount/442ARGA330F-05-ONI	TT-07-5B	QT,T,R,H,A,QM													RELOCATION OF TRANSMITTER PORTION(ELECTRONICS) TO A NON-HARSH ENVIRONMENT
Sys: Containment Cooling [7I-]																
Pressure Transmitter/1	Fischer & Porter/ 50EN1071BCX ANS	PT-07-2A	A,QM,QT			14c				2		1c				
Pressure Transmitter/2	Fischer & Porter 50EP1071	PT-07-4A	R,QT,T,P,H,A,QM	1c	3	14c	3	3		2		1c				
Pressure Transmitter/4	Fischer & Porter/ 50EN1071BCXANS	PT-07-2B	A,QM,QT			14c				2		1c				
Pressure Transmitter/6	Fischer & Porter/ 50EN1071BCXANS	PT-07-2C	A,QM,QT			14c				2		1c				
Pressure Transmitter/7	Fischer & Porter/ 50EN1071BCXANS	PT-07-2D	A,QM,QT			14c				2		1c				
Temperature Element/3	Rosemount/RI-88-120-17	TE-07-3A	A,QM,QT			14g				2		1g				
Temperature Element/5	Rosemount/RI-88-120-17	TE-07-3B	A,QM,QT			14g				2		1g				
Sys: Component Cooling [8I-]																
Flow Indicator Switch/1	ITT Barton/288A	FIS-14-12A	A,QM,QT			14f				2		14f				
Flow Indicator Switch/2	ITT Barton/288A	FIS-14-12B	A,QM,QT			14f				2		14f				
Flow Indicator Switch/3	ITT Barton/288A	FIS-14-12C	A,QM,QT			14f				2		14f				

BY N Bardad DATE 8/31/81
CHKD BY John Hangfeltz DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPM	EXN	QI	COMMENTS
Flow Indicator Switch/4	ITT Barton/288A	FIS-14-120	A,QM,QT			14c				2		14c				
Sys: Aux Feedwater [12I-]																
Flow Transmitter/1	Fischer & Porter/ 10B2495JBAABAB	FT-09-2A	T,P,H,A,QM,QT													RELOCATE TO A NON-HARSH ENVIRONMENT
Flow Transmitter/2	Fischer & Porter/ 10B2495JBAABAB	FT-09-2B	T,P,H,A,QM,QT													RELOCATE TO A NON-HARSH ENVIRONMENT
Flow Transmitter/3	Fischer & Porter/ 10B2495JBAABAB	FT-09-2C	T,P,H,A,QM,QT													RELOCATE TO A NON-HARSH ENVIRONMENT
Sys: Radiation Monitoring [13I-]																
Radiation Monitor/1	Victoreen/857-3	RE-26-3	A,QM,QT,R,CS	2a 7a		2a			11b	2		2a 7a				
Radiation Monitor/2	Victoreen/857-3	RE-26-4	A,QM,QT,R,CS	2a 7a		2a			11b	2		2a 7a				
Radiation Monitor/3	Victoreen/857-3	RE-26-5	A,QM,QT,R,CS	2a 7a		2a			11b	2		2a 7a				
Radiation Monitor/4	Victoreen/857-3	RE-26-6	A,QM,QT,R,CS	2a 7a		2a			11b	2		2a 7a				
Stack Monitor Cabinet/5	Victoreen/-	--	RPS,R,T,QT,P,H, QM,A													TMI COMMITMENT TO INSTALL RADIATION MONITORS FOR POST ACCIDENT MONITORING - SEE SECTION IV
Flow Recorder/6	Bailey Meter/50-731150A2AA1	FR-26-1	RPS,R,T,QT,P,H, QM,A													" "
Flow Converter/7	Teledyne Power Converter/ADC-2	FY-26-1	RPS,R,T,QT,P,H, QM,A													" "
Flow Square Root Extractor/8	RIS/XSL1356-47228	FF-26-1	RPS,R,T,QT,P,H, QM,A													" "
Flow Totalizer/9	Veeder Root/BJ-177	FQ-26-1	RPS,R,T,QT,P,H, QM,A													" "
Flow Transmitter/10	Deleayne Hastings Raydist/6KX	FT-26-1	RPS,R,T,QT,P,H, QM,A													" "
Radiation Detector/11	Victoreen/843-20	RE-26-28	RPS,R,T,QT,P,H, QM,A													" "
Radiation Detector/12	Victoreen/843-20	RE-26-29	RPS,R,T,QT,P,H, QM,A													" "

BY [illegible signature] DATE 8/4/81
CHKD BY [illegible signature] DATE 8/5/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
				Resolution												
Radiation Detector/13	Victoreen/843-20	RE-26-30	RPS,R,T,QT,P,H, QM,A													TMI COMMITMENT TO INSTALL RADIATION MONITORS FOR POST ACCIDENT MONITORING. SEE SECTION IV
Sys: Hydrogen Control [15I—]																
Hydrogen Recombiner/1	Westinghouse/	1-A	A,QM,QT			1f				2		1f				
Hydrogen Recombiner/2	Westinghouse/	1-B	A,QM,QT			1f				2		1f				
Sys: Containment Purge [17I—]																
D/P Indicator Switch/1	ITT Barton/288A	PDIS-25-2A	A,QM,QT			14b				2		14b				
Sys: Containment Vacuum I [18I—]																
D/P Transmitter/1	Rosemount/1152DP-3A-22PB	PDT-25-13A	A,QM,QT			14b				2		14b				
D/P Transmitter/2	Fischer & Porter/10B2495KB	PDT-25-1A	T,P,H,A,QM,QT		3	14b	3	3		2		14b				
D/P Transmitter/3	ITT Barton/288A	PDIS-25-11A	A,QM,QT			14b				2		14b				
Sys: Shield Bldg Vent [20I—]																
D/P Transmitter/1	Fischer & Porter/10B2495KB	PDT-25-7A	QT,T,P,H,A,QM		3	14b	3	3		2		14b				
Sys: Control Room A/C [21I—]																
Temperature Switch/1	United Elec/6AS	TS-16-1A1	QT,T,P,H,A,QM,R	6c	→	→	→	6c		2		10a				
Temperature Switch/2	United Elec/6AS	TS-08-7B1	QT,T,P,H,A,QM,R	6c	→	→	→	6c		2		10a				
Sys: Containment Cooling [7V—]																
Motors/1	Westinghouse/HSW2	HV5-1A,B,C & D	A,QM							2		1e				
Sys: ECCS Vent [19V—]																
Motor/1	Westinghouse/TBDP	HVE-9A & 9B	A,QM,H					3		2		1e				
Motor Operator/2	Barber-Colman/HA-418	D-12A,B,13,14,15 & 16	A,QM,H,P				3	3		2		10b				

BY *H Bardeck* DATE 8/31/81

CHKD BY *John Haughtaty* DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
				Resolution												
Limit Switches/3	NAMCO/EA-170-11100	ZS-25-48 & 49 ZS-25-50 & 51 ZS-25-52A & 52B ZS-25-53A & 53B ZS-25-54A & 54B ZS-25-55A & 55B ZS-25-56A & 56B ZS-25-57A & 57B ZS-25-58A & 58B ZS-25-59A & 59B	H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM H,A,QM					3		2		5a				
Sys: Shield Bldg Vent [20V--]																
Motor/1	Westinghouse/TBDP	HVE 6A & 6B	H,A,QM					3b		2		7a				
Motor Operator/2	Barber Coleman/MP-471-001	D-23 & D-24	P,H,A,QM				3b	3b		2		7a				
Flow Switch/3	PEECO/NP-F	FS-25-15A & B	P,H,A,QM				3b	3b		2		7a				
Heating Coils/4	INDEECO/G-77	EHC-HVE-6A1, A2, B1, B2	P,H,A,QM				3b	3b		2		7a				
Moisture Indication Transmitters/5	Chem Research Corp./ Hydrocon-1	ME-25-1 & 2 MI-25-1 & 2	P,H,A,QM				3b	3b		2		7a				
Thermocouple/6	Gordon Co/404-2111-TH2757-250	TE-25-37 through 48	P,H,A,QM				3b	3b		2		7a				
System: Common Elec [E--]																
Elec Penetration Assemblies/1	Gulf General Atomic/ELD	Pent A-1; B-1 through 10; C-1, 4, 5, 7, 8, 10; D-1 through 9; E-1, 3, 5, 7, 9 & 10	A,S,QM,CS						11c	2	12b	10a				
Elec Penetration Assemblies/2	Conax/7348-1000-01 7310-10000-01	C-3, 6 & D-10	A,S,QM,CS						11c	2	12d	10a				
Electrical Cable/4	Raychem/Flamtrol	D2-4, 5 & 9; D-10-33, 41, 50, 52, 53, 60 & 61	S,A,QM,CS						11c	2	12e	10a				

BY H Bardack DATE 8/31/81
CHKD BY John Hoinghelly DATE 8/31/81

APPENDIX B (Continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	Resolution R	T	OT	P	H	CS	A	S	QM	RPM	EXN	QI	COMMENTS
Electrical Cable/6	Cerro Wire & Cable/ Firewall III	02-8; 03-3, 5, 7, 8, 9, 10, 11, 12; 04-2, 6, 7; 010-31, 33, 40, 42, 43, 44 & 51	A,QM							2		1h				
Push Button Station Enclosure/8	Square D Co/KYC-4 Series A	C10-2	OT,T,P,H,R,CS, A,QM	4f					4f	2		4f				
Electrical Cable/9	General Cable (PIRELLI)/ cross-linked polyethylene, with PVC jacket	01-5, 7; 02-2, 4, 5, 7, 8, 10; 03-3, 5, 6, 7, 8, 9, 10, 11, 12; 04-2, 6, 7	S,A,QM,CS						11c	2	12f	14j				
Electrical Cable/10	Continental Wire & Cable (Anaconda)	04-14, 05-2	S,A,QM							2	12f	1j				
Electrical Cable/11	Okonite Co	01-5, 7; 02-2; 010-5; 010-6	S,A,QM							2	12f	1j				
Motors/12	GE/GEK 811043A21	Aux F.W. Pmps/ 1A & 1B	A,QM							2		8b				
Terminal Blocks/ 14 & 15	GE/EB-5, CR151D101, 102, CR2960-SY139C30	P11-2, 3, 36 & 97	A,QM,T		4b					2		4b				
Push Button Stations/ 16, 17, 18, 25	GE/Various	See Licensees's Report	A,QM,T		4e					2		4e				
Indicating Light/ 19, 20, 26	GE & Square D Co/Various	See Licensee's Report	A,QM,T		4b					2		4b				
Aux Relay/24	GE/12 HGA-11J52	C12-7	A,QM,T		4b					2		4b				
Motors/27	GE/5K6336XC237A	CSP-1A & 1B	A,QM							2		3d				
Electrical Pent Assembly/28	Amphenol/PLEP-1 and ELEP-2	PLEP-1, ELEP-1	A,QM,CS						11c	2		1j				
Electrical Cable/29	Rome Cable (CYPRUS)	03-3, 10, 11, 12; 04-6 & 04-7	A,S,QM,T,P,CS		10a		10a		10a	2	12f	10a				

BY H. Bardach DATE 8/31/81
CHKD BY John Hoerz[illegible] DATE 8/31/81

APPENDIX C

Equipment Considered Acceptable
or Conditionally Acceptable
(Category 4.3)

LEGEND:

Designation for Deficiency

R - Radiation
T - Temperature
QT - Qualification time
RT - Required time
P - Pressure
H - Humidity
CS - Chemical spray
A - Material aging evaluation, replacement schedule, ongoing equipment surveillance
S - Submergence
M - Margin
I - HELB evaluation outside containment not completed
QM - Qualification method
RPN - Equipment relocation or replacement, adequate schedule not provided
EXN - Exempted equipment justification inadequate
SEN - Separate effects qualification justification inadequate
QI - Qualification information being developed
RPS - Equipment relocation or replacement schedule provided

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	Resolution R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Main Steam [JOM-]																
Motor Operator/10	Limitorque/SMB-00	I-MV-08-1A	A							2						
Motor Operator/21	Limitorque/SMB-00	I-MV-08-1B	A							2						
Motor Operator/23	Limitorque/SMB-00	I-MV-08-13	A							2						
Motor Operator/24	Limitorque/SMB-00	I-MV-08-14	A							2						
Motor Operator/25	Limitorque/SMB-00	I-MV-08-03	A							2						
Sys: Main Feedwater [IIM-]																
Motor Operator/01	Limitorque/SB-4	I-MV-09-7	A							2						
Motor Operator/02	Limitorque/SB-4	I-MV-08-8	A							2						

BY H. Bardach DATE 8/31/81
CHKD BY John Haughtaling DATE 8/31/81

APPENDIX C (continued)

Equipment Description/CES#	Manufacturer/ Model Number	Component No. (Plant ID No.)	[NRC-IDENTIFIED] Deficiency	R	T	QT	P	H	CS	A	S	QM	RPN	EXN	QI	COMMENTS
Sys: Auxiliary Feedwater [12M–]																
Motor Operator/01	Limitorque/SMB-000	I-MV-08-9	A							2						
Motor Operator/02	Limitorque/SMB-000	I-MV-08-10	A							2						
Motor Operator/03	Limitorque/SMB-00	I-MV-08-14	A							2						
Motor Operator/09	Limitorque/SMB-000	I-MV-08-11	A							2						
Motor Operator/10	Limitorque/SMB-000	I-MV-08-12	A							2						
Motor Operator/11	Limitorque/SMB-00	I-MV-08-13	A							2						
Sys: Common Elec (E) [E–]																
Heat Shrink Splices/3	Raychem/Thermofit WCSF-N	Various splices	A							2 8a						
Electrical Cable/5	BIW/13-C composite cable, silicone and crossed-linked polyethylene insulation with CSPE jacket	D10-17	A							2						
Motors/12	GE/GEK811043A21	Aux FW Pump 1A & 1B	A							2						

BY N. Bardach DATE 8/31/81

CHKD BY John Hampstatz DATE 8/31/81

ATTACHMENT 3

ATTACHMENT 3

Response 1a

Two test reports document the environmental qualification of the equipment specified on the System Component Evaluation Work Sheet (hereafter referred to as CES sheet). The test reports are denoted on the CES sheet as Franklin Institute Report, F-C 3441, September 1972 and Limitorque Corporation Report, Project No. 600456. The full titles of these test reports are "Qualification Test of Limitorque Valve Operators in a Simulated Reactor Containment Post-Accident Steam Environment" and "Qualification Type Test Report - Limitorque Valve Actuators for PWR Service" respectively. Both test reports indicate that aging simulation testing was conducted prior to LOCA simulation testing.

The Franklin Institute Report reflects a test schedule of radiation aging (200 megarads) and exposure to a steam/chemical environment preceding 30-day steam exposure. The Limitorque Corporation Report indicates that aging simulation which comprised thermal and radiation aging exposure preceded LOCA simulation testing. The LOCA simulation testing involved simultaneous exposure to steam and chemical spray for a 30-day period.

BY H Badeck DATE 8/31/81
CHKD. BY L Orton DATE 9/8/81

Response 1b

Referral to the Valcor Test Report documented hereunder indicates that the subject valves had been "qualified to operate in an environment of 120°F for 40 years minimum, experience a 2 x 10^8 rad integrated radiation dose, operate a minimum of 7500 cycles, sustain a 5.0g minimum seismic event, experience two LOCA onsets of 346°F and 113 psig and sustain a post LOCA environment for 6.2 years minimum at 130°F, without degradation of performance during and after these events."

The test sequence was as follows:

1. Initial Acceptance Test
2. Thermal Aging
3. Post Thermal Aging Acceptance Test
4. Cyclic Aging
5. Post Cyclic Aging Acceptance Test
6. Radiation
7. Dielectric and Insulation Resistance

BY H. Bardeck DATE 8/31/81
CHKD. BY L Orton DATE 9/8/81

8. Seismic Simulation
9. Post Seismic Acceptance Test
10. LOCA Simulation
11. Post LOCA Acceptance Test
12. Disassembly and Inspection

Response 1c

Two Fisher & Porter Test Reports, DP No. 2224-1, RPT No. 004, and DP No. 2204-51-B-006, document the withstand capability of the equipment specified on the CES sheet relative to preaging and LOCA simulation. Test Report DP No. 2224-1, RPT No. 004 indicates that radiation exposure testing was conducted on Transmitter Type 10B2490 and that it sustained an exposure dose of 1.2×10^8 rads without impairment to its functionality. Test Report No. 2204-51-B-006 indicates that transmitter type 10B2495 was subjected to a LOCA simulation test at the schedule stated below:

370°F @ 1 hr
273°F @ 1.75 hr
228°F @ 21.25 hr

The tests revealed no significant degradation of functionality in transmitter Type 10B2495. The Report indicates that Transmitter Model Series 10B, 13D, 50EP, 50EN, 50EQ and 50TC are qualified by virtue of similitude if equipped with special modifications. Since the equipment specified in the CES sheet is invested with these special modifications, the equipment is deemed qualified.

Response 1d

Review of the Target Rock test report reveals that sequential tests were performed on the Target Rock 73E-001 solenoid valve. This valve was singled out for tests by the vendor since it constituted the weak-link of his solenoid valve product line relative to thermal aging.

BY H. Bardick DATE 8/31/81
CHKD. BY [signature] DATE 9/8/81

The test sequence comprised the following:

1. Functional Test at TRC
2. Radiation Exposure to 3.3×10^7 Rads at "Isomedics Inc."
3. Post Radiation Functional Test at TRC
4. Preaging Functional Test at "East-West Technology Corp."
5. Aging Test
6. Functional Test at "East-West Technology Corp."
7. Accident Simulation Test at "East-West Technology Corp."
8. Post-accident Simulation Functional Test at "East-West Technology Corp."

No significant functional degradation of the Target Rock solenoid valves resulted from the conductance of these tests, therefore it can be concluded that the Target Rock Model 74Q-004 solenoid valve which is deemed by the vendor as having superior degradation resistance characteristics is qualified.

Response 1e

Westinghouse report WCAP 7829 indicates that the Westinghouse units were subjected to a test sequence comprising the following relative to preaging prior to LOCA testing:

500 hours @ 200°C insulation aging
2×10^8 rad irradiation of insulation and greases

The report mentions numerous other tests which were conducted, all converging towards qualification of equipment functionality for the full one year term in a post-DBA in-Containment environment.

BY H. Bardak DATE 8/31/81
CHKD. BY L. Orton DATE 9/8/81

Response 1f

Westinghouse Test Report WCAP-7709-L, Supplement 2 documents the following sequential test procedure for qualification of the hydrogen recombiner:

1. Radiation exposure of 2.0×10^8 rads on all pertinent equipment components

2. Eighty (80) heat-up and cooldown cycles in a production recombiner to simulate normal service life testing

3. Six post-LOCA pressure, temperature, steam and spray cycles with functionality testing conducted between sequential cycles

Additionally, WCAP-7709-L, Supplement 6 documents preaging of the heaters at 1700°F for 500 hours. Numerous other supportive tests were used. Collectively, Westinghouse adjudged these tests to converge towards qualification of the recombiners for service in-Containment for the period of 40 years normal operating life and one year post-DBA. Due consideration was given to the material make-up of the recombiner which is composed primarily of metallic structural material, metal-enclosed thermal insulation, metal-clad ceramic insulated heater elements, and power cables as described in WCAP-7709L.

Response 1g

According to Rosemount Report 2767, Rev. B, the test procedure was in accordance with the most severe sequence for an RTD assembly as stated in IEEE-344-1974. The sequence was as follows:

a) Initial inspection and inspection
b) Gamma radiation for 2×10^8 rads
c) Seismic vibration
d) LOCA simulation exposure
e) Final inspection and calibration

BY M Bradach DATE 8/31/81
CHKD. BY L. Ortho DATE 9/1/81

Thermal aging analysis is broached by a comprehensive material breakdown analysis. The materials of construction of the RTD's are essentially metallic. The non-metallic components consist mainly of the lead wire insulation and sealing compound. The insulation of the leads from the platinum sensor is highly compacted ceramic oxide; epoxy compound is used for potting and encapsulating the head of the RTD; kapton which is highly resistant to radiation and temperature is used as the insulation. All of these non-metallic materials are covered by metallic parts.

Based on the above information, it is concluded that these RTD's will satisfy all qualification requirements for in-Containment operation.

Response 1h

According to Franklin Institute Labs Test Report F-C3798, the electrical cable specified in the CES sheet was subjected to thermal and radiation aging prior to 30-day LOCA simulation testing. Functionality testing indicated that all electrical cable specimens maintained the specified electrical loading throughout the LOCA exposure.

Response 1j

The test report referenced on the CES sheet indicates that the device was subjected to thermal and radiation aging prior to LOCA simulation testing and that no significant degradation of functionality was observed.

Response 1k

According to Rosemount Test Report #1762, Rev A, the RTD 104-1619 tested was a general duty RTD inferior to the Reactor Coolant Loop precision RTDS. Consequently, if the former passed the requisite tests, the latter would pass by virtue of similitude. The general duty RTD sustained the sequence of preaging tests and LOCA simulation tests without sustaining functional degradation. On this basis the equipment is qualified.

BY [signature] DATE 8/31/81
CHKD. BY [signature] DATE 9/1/81

SURVEILLANCE AND MAINTENANCE/REPLACEMENT PROGRAMS

In responding to NRC concerns regarding environmental qualification, we have studied the requirements and are formulating a program to modify existing procedures and review surveillance and maintenance records to assure that equipment which is exhibiting age-related degradation will be identified and replaced as necessary. Some of the records we are examining for utilization in this program include the Technical Specification surveillance system, the LER reporting system, the preventive maintenance system, and the Plant Work Order (PWO) system.

A large portion of the equipment in question is monitored and tested under the surveillance program. This is done to ensure operability and accuracy of redundant trains of safety related equipment. Records are kept of surveillances under the PWO system.

The LER reporting system has also been an effective tool for highlighting reoccuring problems with safety related equipment. Under the preventive maintenance system we conduct manufacturer's recommended periodic inspections and maintenance on selected equipment. The PWO system is the formal reporting system for logging maintenance history.

Florida Power & Light Company currently has a computer based reporting system for feedback of information obtained by the PWO system. Expansion of this system, the Generation Equipment Management System (GEMS), is being studied for potential utilization in the review of maintenance and surveillance records for aging degradation. A new, independent computer based system is also being considered.

Our present schedule will be to complete our reviews and formulate a program to meet the NRC implementation requirement of June, 1982.

In addition to studying the information feedback systems available for review of maintenance and surveillance conducted on the equipment in question, we are formulating guidelines for maintenance personnel to aid in identification of aging degradation. In accomplishing this task, we are relying heavily on industry efforts to develop effective techniques to detect age-related degradation. As we expect that this effort will be evolutionary in nature, we cannot provide a schedule for completion of this task at this time. We will, however, modify existing maintenance procedures to explicitly require visual inspection for signs of degradation including degradation due to aging in that equipment in a harsh environment. Procedure changes will be accomplished within NRC schedular requirements.

We are also currently compiling the list of equipment, reported under I&E Bulletin 79-01B, which does not have a demonstrated qualified life of 40 years. Components susceptible to degradation due to aging within this equipment are also being identified and an appropriate maintenance and/or replacement schedule will be developed. Our present plans are to utilize our Five-Year maintenance plan to identify this equipment and schedule maintenance or replacement prior to the expiration of its qualified life.

Response 2a

The radiation monitor will be functional and provide a high radiation alert trip signal even if component failure occurs.

BY H Budlich DATE 8/31/81
CHKD. BY L. Osten DATE 9/1/81

Response 3

The equipment item specified on the System Component Evaluation Sheet (CES Sheet) is located in the RAB. It is not subject to a harsh environment respecting the environmental parameters of temperature, pressure, and humidity, and experiences, in effect, only normal operating temperature, pressure, and humidity. The assessment of a non-harsh environment status was based upon consideration of HELB potential sites in the RAB, the resultant mass-energy propagation and distribution, and the impact, if any, on the environmental parameters effecting the equipment.

BY [signature] DATE 8/31/81
CHKD. BY [signature] DATE 9/1/81

Response 3a

The equipment item specified on the CES sheet is located in the annulus. It is not subject to a harsh environment relative to pressure, humidity, or chemical spray. Relative to radiation, Westinghouse Report NS-CE-755 to the NRC indicates that a material breakdown analysis was performed on the subject ASCO solenoid valves in order to evaluate susceptibility to radiation exposure. Consideration was given to the gamut of materials such as Hysol Epoxy, Buna "N", Cross-linked Polyethylene, etc., and their associated functions. All radiation damage threshold values attributable to the materials for their required functional modes exceeded 10^7 rads. The conclusion was drawn that the ASCO solenoids would remain functional for an integrated dose of 10^6 rads. Since this dose level exceeds the specified dose level, the ASCO solenoids are deemed radiation qualified.

Relative to temperature, the ASCO solenoid valves by virtue of being rated as having high temperature withstand capability are qualified to operate continuously at a temperature of 90°C.

Consideration of the above leads to the conclusion that the equipment is qualified to withstand the harsh environment during the term of its required operability.

Response 3b

The equipment item specified on the CES sheet is situated in a non-harsh environment relative to pressure, humidity, or chemical spray. Material/Component weak-link breakdown analysis was used to qualify the equipment item for radiation.

BY T.J. Bardul DATE 8/31/81
CHKD. BY L. Otto DATE 9/8/81

Response 3c

The equipment item specified on the CES sheet is located in the annulus. It is not subject to a harsh environment relative to pressure, humidity, or chemical spray. Relative to temperature, the equipment item is essentially in a non-harsh environment. Consideration of the short-term operability requirement of 15 minutes in light of the thermal lag anticipated for the equipment temperature relative to air temperature akin to the Catawba Penetration Test indicated in Response 4b supports the non-harsh environment conclusion. Additionally, analysis indicated that the equipment could withstand radiation exposure levels exceeding the specified levels without sustaining functional degradation.

Response 3d

According to the CES sheet, the equipment item is situated in a non-harsh environment with respect to all of the environmental parameters except radiation. Radiation testing was conducted as referenced on the CES sheet. The test indicates that the equipment sustained, without functional degradation, a radiation exposure level which significantly exceeded the radiation specified value.

Response 3e

According to the CES sheet, the equipment item is situated in a non-harsh environment with respect to all of the environmental parameters except radiation and temperature. Radiation qualification is indicated by Response 7a; the stated air temperature of 175°F is a peak temperature. The switch is designed for a continuous operation temperature of 160°F. Consideration of thermal lag as indicated by the Catawba Penetration Test conducted by Sandia National Laboratories would result in an equipment temperature below 160°F for the short-term operability requirement. On the basis of the above information, the equipment should be deemed qualified.

BY N. Badich DATE 8/31/81
CHKD. BY [illegible] DATE 9/8/81

Response 3f

The equipment item specified on the CES sheet is located in the annulus. It is not subject to a harsh environment relative to pressure, humidity, or chemical spray. The annulus is maintained at below atmospheric pressure by the Shield Building Ventilation Filter (SBVF). Due to SBVF suction, the RH is maintained at below 70 percent shortly after the DBA.

Response 3g

The equipment item specified on the CES sheet is located in the annulus. It is not subject to a harsh environment relative to pressure, humidity, or chemical spray. Radiation qualification was performed by type test as stated on the CES sheet; relative to temperature, switches are spec. rated by the vendor as being operational continuously up to an ambient temperature of 90°C.

Response 4a

The Namco limit switches specified in the CES sheet are spec. rated by the vendor as having water, oil, and dust tight enclosures, meeting NEMA Type 1, 4, and 13 requirements, and as being operational up to an ambient temperature of 90°C. Consideration of the 30 second required operating time at the specified transient temperature of 175°F and transient pressure of 15.7 psia in light of the above-stated spec. rating leads to the conclusion that the equipment is qualified to withstand the transient harsh environment during the term of its required operability.

Response 4b

The equipment referred to in the CES sheets is situated in the steam trestle area which is outdoors. Consideration of the postulated MSLB in the steam trestle area, and the size of the equipment vent relief area relative to the steam trestle compartment volume lead to the conclusion that the pressure surge will be dissipated almost immediately and the air temperature spike will be of very short duration such that the equipment will not in effect

BY H. Badri DATE 8/31/81
CHKD. BY L. Orton DATE 9/1/81

experience a harsh environment. The Catawba Penetration Test as referenced in the Sandia National Laboratories' Qualification Testing Evaluation Program* indicates that for a connector assembly junction box configuration, the thermal lag at the incipient two minutes of the test was such that the temperature of the connector within the junction box was of the order of 25°C while the corresponding temperatures of the junction box interior surface and exterior surface (air temperature) were of the order of 50°C and 125°C, respectively.

Response 4c

The ASCO solenoid valves specified in the CES sheet are spec. rated by the vendor as having an explosion-proof and watertight enclosure (NEMA 4, 7, and 9). According to Westinghouse Report NS-CE-755, the solenoid valves have the withstand capability of 350°F for the duration of one hour.

Consideration of the above leads to the conclusions that the equipment is qualified to withstand the transient harsh environment during the term of its required operability.

Response 4d

The Namco limit switches specified in the CES sheet are spec. rated by the vendor as having water, oil, and dust tight enclosures, meeting NEMA Type 1, 4, and 13 requirements, and being operational continuously up to an ambient temperature of 90°C. Consideration of the 15 minute required operating time at the specified temperature of 150°F in light of the above-stated spec. rating leads to the conclusion that the equipment is qualified to withstand the short-term harsh environment.

* Highlights of the Program were presented by Lloyd L. Bonzon at the July 7-10 NRC Bethesda meeting on Equipment Qualification

BY H. Bardid DATE 8/31/81
CHKD. BY L. Ortiz DATE 9/8/81

Response 4e

An engineering analysis, abetted by test report data and vendor information, was conducted of the push button station. The analysis indicates, relative to temperature and thermal aging, that the materials comprising the push button station will not sustain functional degradation for the long-term temperature and thermal aging environment to the extent of compromising the safety function of the push button station.

Response 4f

Electrical boxes and enclosures are utilized to contain control stations, terminal blocks and relays, or to facilitate cable installation into raceways. The boxes and enclosures do not have a unique accident monitoring or post accident monitoring function. Boxes and enclosures are either steel or cast iron construction. Enclosures are usually housed within padlocked or "lead sealed" boxes to restrict access to remote shutdown functions in compliance of 10CFR50 Appendix A, GDC 19. Both the enclosure and the box are NEMA IV qualified. This double metal containment should qualify the enclosure contra the in-Containment harsh environment for all environmental parameters.

Response 5a

The System Component Evaluation Work Sheet (CES Sheet) reflects a radiation specification value of 3.5×10^5 rads or less, and a radiation qualification value of 10^6 rads. The radiation specification value derives from the equipment dose maps which are elaborated upon in Section IIH; the radiation qualification value derives from a vendor assessment: - In a NAMCO letter to Ebasco, dated July 3, 1980, Robert H. Kantner to Sushil K. Sinha, the vendor states that the subject limit switches will operate satisfactorily in a radiation environment of up to 10^6 rads.

BY N. Badeck DATE 8/31/81
CHKD. BY L. Dston DATE 9/1/81

Response 5b

The EPRI Equipment Qualification Data Bank Quarterly Report of April, 1981 indicates that all Westinghouse equipment items designated as motors are entered as having a radiation qualification of at least 1.4 E + 8 rads. This high level of radiation qualification is attributable in part to the Westinghouse Material Radiation Exposure Test Program as exemplified by Westinghouse Report WCAP-7829. The Report reflects that a comprehensive program was conducted by Westinghouse wherein various materials such as insulation systems as well as ancillary materials such as motor lead cable, splice tape, lubricants, cements, etc., were subjected to radiation exposure of 2×10^8 rads in order to generate a list of radiation qualified materials for incorporation into motor design. In our judgment the CES cited qualification of Westinghouse motors to a minimum of 2×10^6 rads is well founded.

Response 5c

The qualification of equipment for radiation environment denoted on the System Component Evaluation Work Sheets derives from GE Pamphlet GEP 840. According to this pamphlet, reactor coolant pumps using the same insulation system and class are satisfactory for continuous operation up to 3.3×10^7 rads. This radiation qualified value is greater than the radiation specified value by a factor of 100, hence in our judgment the GE motor specified on the CES sheet is radiation qualified.

Response 5d

Westinghouse Report NS-CE-755 to the NRC indicates that a material breakdown analysis was performed on the subject ASCO solenoid valves in order to evaluate susceptibility to radiation exposure. Consideration was given to the gamut of materials such as Hysol Epoxy, Buna "N", Cross-linked Polyethylene, etc., and their associated functions. All radiation damage threshold values

BY H Bazlach DATE 8/31/81
CHKD. BY L. Otto DATE 9/1/81

attributable to the materials for their required functional modes exceeded 10^7 rads. The conclusion was drawn that the ASCO solenoids would remain functional for an integrated dose of 10^6 rads. Since this dose level exceeds the specified dose level, the ASCO solenoids are deemed radiation qualified.

Response 5e

The equipment item specified on the CES sheet was qualified for radiation by type test. Radiation constituted the only harsh environmental parameter.

Response 5f

The equipment item specified on the CES sheet was qualified for radiation by analysis. Radiation constituted the only harsh environmental parameter.

Response 6a

The RTDs referenced in the CES sheet have an explosion-proof connection head and are completely encased in pipe insulation. This configuration precludes susceptibility to chemical spray and moisture permeation for at least the required short-term operability period.

The RTD sensing elements are designed to withstand normal operating temperatures and pressures which are higher than the corresponding temperatures and pressures encountered during the DBA.

A weak-link material breakdown analysis reveals a radiation damage threshold of 5×10^6 rads for the lead wires. For an operability time of one hour at the incipience of the postulated DBA, a conservative estimate of the integrated dose at the center of Containment is 2×10^6 rads. This is less than the radiation damage threshold of 5×10^6 rads.

In consideration of the above the equipment is deemed to be qualified.

BY H. Bardul DATE 8/31/81
CHKD. BY L Osten DATE 9/1/81

Response 6b

The RTD's referenced in the CES sheet are required by Emergency Operating Procedures to monitor reactor coolant temperature during a small break LOCA or MSLB in order to calculate subcooled margin. Since the small break LOCA or MSLB does not involve core damage, the radiation exposure during this regime of operations is less than 0.1% of that generated during the postulated DBA. Even if the radiation exposure is conservatively taken as 2×10^6 rads for the postulated DBA, the radiation damage threshold of non-metallic parts used in the RTDs such as KAPTON insulation, KYNAR tubing, etc., far exceeds the conservative radiation level of 2×10^6 rads.

The RTDs are designed to measure temperature (615°F) and withstand pressure higher than the corresponding temperatures and pressures encountered during the DBA. The RTDs have explosion proof construction and are completely encased in pipe insulation. This configuration precludes susceptibility to chemical spray and moisture permeation at least for the required short-term operability period. In consideration of the above, the equipment is deemed to be qualified.

Response 6c

The switch specified on the CES sheet is required to initiate the isolation of O.A.I. valve to the Control Room in the event of temperature rise due to pipe-break. The switch per se is located in the Control Room. Only the capillary extends outside the Control Room and is exposed to a harsh environment. The capillary is made of 304 stainless steel and as such is not susceptible to radiation, thermal aging, temperature, or humidity.

Pressure is specified as being 14.7 psia.

BY H Badeck DATE 8/31/81
CHKD. BY L. Osterman DATE 9/1/81

The fluid inside the tubing is "Dowtherm" which is not susceptible to malfunction during the short-term harsh temperature environment of 150°F since the capillary is rated for 160°F continuous service, and "Dowtherm" is neither susceptible to thermal aging nor to the specified radiation exposure levels. Hence the equipment is qualified.

Response 6d

The NRC circular IE 81-06 indicates that "(Foxboro) model number units operating in the range 4 to 20 mA are not a concern in these matters (relating to EQ)."

The Foxboro/E11GM falls into the category of operating at 4 to 20 mA, hence it should not be deemed an ipso facto concern regarding any potential deficiency requiring corrective action.

Foxboro Test Report No. T3-1068 reveals radiation qualification to 2.2×10^8 rads; Foxboro Test Report No. Q9-6005 indicates test temperatures and pressures exceeding the FSAR specified test temperature and pressures during the short term; pressure test of 30 psig for 12 hours was used as test equivalent to specified pressure of 5 psig for 31 days; long-term temperature of 150°F is enveloped by spec. rated operating temperature; thermal aging analysis using material/component breakdown weak-link analysis and Arrhenius formulation indicates that only approximately 1% of the usable life of the weak-link material is expended during the combined 40 years of normal operation and 31 days DBA. Note that 100% humidity is not considered harsh environment. 1

1	JH 9-23-81	TJB 9-23-81
REV NO.	BY/DATE	CH/DATE

BY H Badr DATE 8/31/81
CHKD. BY L Orton DATE 9/8/81

Response 7a

The referenced Engineering Analysis Sheet reflects that a weak-link material/component breakdown analysis was performed to determine whether any of the constituent materials/components comprised in the equipment being evaluated was susceptible to radiation to the point of potentially compromising the accident mitigation or post-accident monitoring functions of the equipment. The weak-link analysis yielded a radiation qualification value which was substantially greater than the radiation specification value, hence the equipment item was deemed radiation qualified. Section IIH details the methodology used for radiation qualification assessment.

Response 8a

Raychem Corporation Aging Study of WCSF Compound indicates that specimens of WCSF Compound were subjected to oven aging in air at 136°C, 150°C, 162°C, and 175°C. Based on the derivative Arrhenius analysis of the oven aging data, the WCSF compound was shown to be capable of sustaining a continuous operating temperature of 40 years at a temperature of 91°C without loss of functionality. This thermal aging severity far exceeds the severity encountered due to a 40 year normal service temperature of 120°F and one year DBA temperature profile.

Response 8b

A conservatively assumptive thermal aging analysis was conducted using as basis data the GE Topical Report IEEE-323 Class IE Induction Motors, Models 5K828840C81 and 5K811043C16, Horizontal Class B Insulated, Jan. 1977. The conservative assumptions utilize a cumulative operating temperature of 120°C based on the sum of 40°C ambient, 70°C temperature rise, and a 10°C hot spot. Operability time per 40 years is assumed to be 1000 hrs. The GE Topical Report indicates a minimum lifetime of 60,000 hours at 120°C, thus the thermal aging lifetime expended for this operating mode will be about 1.7 percent. Consideration of accident operability modes and shelf life @ 50°C does not extend the thermal lifetime expenditure beyond 3 percent.

BY H. Budish DATE 8/31/81
CHKD. BY L. Ostrow DATE 9/8/81

Response 10a

The qualification method is encompassed by specific response to SER deficiencies. In each case the qualification argument, qualification value, and qualification time satisfies the specified environmental conditions.

Response 11a

The equipment item specified on the CES sheet has a metallic enclosure and should be able to withstand corrosivity for the required operability time of 15 minutes.

It is not required for accident mitigation of the DBA LOCA or MSLB. The postulated LOCA associated with this P/D indicator switch is a HELB of the letdown line. The severity of this accident is substantially less than that of the LOCA.

Response 11b

Chemical spray is excluded from the equipment by virtue of a stainless steel enclosure jacket. The Victoreen Tech Manual 8770-6761 R 0 indicates that Victoreen radiation monitors 857-1, 857-2, and 857-3 can withstand a direct spray solution impingement of 0.97 percent boric acid on the enclosure jacket. This exceeds significantly the specified concentration of 1720-2450 ppm of boric acid solution.

Response 11c

The test chamber chemical spray test is generally more severe than the postulated containment chemical spray environment which it simulates. This is due to the fact that asperities in both chemical spray mass distribution and concentration distribution are more likely to occur in the confinement space of the test chamber than the containment expanse.

BY H. Bardek DATE 8/31/81
CHKD. BY L. Ostrow DATE 9/8/81

The corrosivity of a boric acid-sodium hydroxide solution depends primarily on pH as opposed to concentration; however, in the pH region of interest (pH 8.5 - 10.5) appurtenant to steel, the relative aggressivity normalized to a pH of 7.0 is approximately a flat response such that the attack rate is approximately the same.

Consideration of the above leads to the conclusion that the chemical spray test values constitute an equivalent to the specification values.

Response 12a

A study embodying refined calculations was performed to determine Containment sump level as a function of time following a LOCA. The study concluded that the maximum flood level calculated for St. Lucie #1 is 26 feet in lieu of the FSAR stated value of 27.3 feet. Further, it was determined that the required operability of up to 15 minutes the flood level would reach 21.75 feet. Since the switch is situated above this level, it will not be subject to submergence.

Response 12b

The CES sheet indicates a submergence qualification which envelopesthe submergence specification. Tests at 70 psig documented in the Gulf Electronic Systems Reports E-115-173, E-115-176, E-115-180, and E-115-181 indicate no undue leakage. The pressure head of 70 psig is substantially greater than the containment atmosphere pressure of 44 psig plus the small sump water head of less than 4 psig, hence the equipment is qualified for submergence.

BY H. Bradock DATE 8/31/81
CHKD. BY L. Orton DATE 9/8/81

Response 12c

The vendor maintains that the additional pressure head induced by the flood level when taken conjointly with Containment atmospheric pressure will not exceed the test pressure of 113 psig used during the LOCA simulation tests and thereby concludes that inleakage will not occur during submergence. The test pressure profile used for the LOCA simulation test was as follows:

113 psig	0 - 5 hrs after the incipience of DBA		
95 psig	5 - 8 hrs	"	"
69 psig	8 - 11 hrs	"	"
28 psig	11 hrs - 4 days	"	"
13 psig	4 days - 31 days	"	"

This test profile envelops the pressure profile cited in the FSAR as a licensing commitment:

44 psig	0 - 2 hrs after the incipience of DBA		
27 psig	2 - 24 hrs	"	"
5 psig	1 - 31 days	"	"
1 psig	31- 1 yr.	"	"

The comparison of the test profile and the FSAR test profile substantiates the vendor's conclusion in light of the fact that the pressure head induced by the flood level will not exceed 4 psig.

Response 12d

The CES sheet indicates a submergence qualification which envelopes the submergence specification. Tests at 35 to 68 psig as documented in the CES-cited Conax test reports indicate no undue leakage. The pressure head of 68 psig exceeds the containment pressure of 44 psig plus the small sump head of less than 4 psig, hence the equipment is qualified for submergence.

BY W. Bachert DATE 8/31/81
CHKD. BY L. Ostrow DATE 9/8/81

Response 12e

The equivalency of the Raychem functional submergence test for 20 months @ 75°C is documented in FSAR Attachment 5 to Appendix 3A, Part D.

Response 12f

The severity of submergence qualification tests as indicated by the CES sheets and as documented by the CES-cited test reports exceed in severity the submergence specification.

BY N. Bardeck DATE 8/31/81
CHKD. BY L. Orton DATE 9/8/81

Response 13

An "exemption" was not requested for the equipment item described on the CES sheet. The environmental qualification of the equipment item is given by the CES sheet data, and the responses to the NRC identified deficiencies.

BY H. Burdash DATE 8/31/81
CHKD. BY J. Ostrow DATE 9/1/81

Response 14a

According to the CES sheet, the qualification time for the equipment item cited exceeds the specification time. The harsh environment comprises only the environmental parameter of radiation aging. For this parameter, the qualification value exceeds the specification value, hence the equipment item specified on the CES sheet is deemed qualified.

Response 14b

The harsh environment comprises only the environmental parameter of radiation aging. For this parameter, the qualification time used for evaluation in effect exceeds the required specification time.

Response 14c

The qualification time of 24 hours envelops the required specification time, hence the qualification method is not herein compromised.

Response 14d

The qualification time is 15 minutes. Pressure switch is required to initiate closing of SG Blowdown isolation valves in case of pipe rupture. Specified operating time of 15 minutes is very conservative, actual time of switch operation will be a few seconds.

BY T. Bardick DATE 8/31/81
CHKD. BY J. Ostrow DATE 9/8/81

Response 14e

The qualification time is 7 days. It exceeds the specified equipment operability time of 15 minutes.

Response 14f

The qualification time for the temperature stress parameter is 7 days which exceeds the harsh environment duration of 15 minutes.

Response 14g

The test qualification time and paired environmental parameter stress values envelop the short-term specification requirements; the spec. rated values for the environmental parameters envelop the long-term specification requirements. This is evinced by Rosemount Report 2767, Rev. B, 1-18-77, and Rosemount Similarity Report 67912A, 6-22-79, and a material breakdown analysis similar to Response 6b.

Response 14h

The Rosemount RTD Model 88-102-42 is similar in design, material constituency, and material configuration to Rosemount RTD Model RI-88-120-17. The latter was qualified by test and analysis, hence the former is qualified on the basis of similitude. As before, material breakdown reveals essentially metallic components with nonmetallic components comprised by materials such as Kapton.

Response 14j

The test qualification time and environmental parameter stress values envelop the specification time and specified values.

BY H. Bardach DATE 8/31/81
CHKD. BY L. Orton DATE 9/8/81

Response 15

We do not understand the significance of the deficiency symbol, QI, since this information was given on the CES sheet.

BY H. Bendick DATE 8/31/81
CHKD. BY J. Ostrow DATE 9/8/81

Response 16

Required operability time for Containment Isolation valve is 15 min. as per FSAR Section 3.11.1.3.

BY H Baded DATE 8/31/81
CHKD. BY J. Ostrow DATE 9/8/81

ATTACHMENT 4

Parametric Analysis of Thermal Aging Evaluations Utilizing Arrhenius Methodology

A parametric analysis was developed and utilized to assist in Thermal aging evaluations. The analysis utilized Arrhenius methodology. The scope of the parametric analysis was such that it enveloped the gamut of Arrhenius methodology values derivable from the references to this attachment. The parametric analysis encompassed 13 environmental temperature profiles specified for St Lucie Unit No. 1 as given in Specimen 1 and generated thermal aging lifetime depletion values* for each of the profiles as a function of activation energy and lognormal slope intercept. A computer program was used to generate the output. A sample of the output is given by Specimen 2.

Application of Arrhenius methodology utilizing the references in this Attachment required evaluation of activation energy, and the lognormal slope and intercept values from test data in order to derive thermal aging lifetimes. The latter lifetime evaluations were requisite for deriving the thermal aging lifetime depletion values. A discussion follows.

Given the lognormal distribution

$$\mathrm{Log}_{10} L^* = u(x) = \overset{*}{a} + \overset{*}{B}x$$

where x is the reciprocal of absolute temperature T, u(x) is the logarithmic mean, and L^* is the median lifetime in hours at temperature T.

we have

$$B^* = \frac{T'T}{T'-T} \log \left(t^*/t^{*'}\right)$$

$$T' > T$$

$$a^* = \log (t^{*'}) - (B^*/T')$$

$$\phi = kB^*/.4343$$

where T' and T are test data temperatures with corresponding median value testing lifetimes (in hours) of $t^{*'}$ and t^*, B^* is the median slope value, a is the median intercept value for the lognormal distribution, and K=Boltzman constant = 8.617E-5 ev/^{o}K. As B^* and a are determinable from test data we are led to solutions in median life-

* Assume that the thermal aging lifetime is normalized to one, then a thermal aging lifetime depletion value of less than one indicates thermal aging qualification, whereas a depletion factor greater than one indicates thermal aging failure.

times L^*_i as a function of temperature T_i and we have

$$L^*_i \text{ (years)} = \frac{\text{Antilog} \left(-\text{ log intercept value} + \left(\frac{\text{Slope Value}}{T_i}\right)\right)}{8760}$$

where T_i represents interpolative temperatures. T_i was assigned values corresponding to temperatures of importance cited in accident temperatures profiles or normal operating temperature zone maps. Some of these temperatures are given in Specimen 1.

Having established the median lifetimes relative to the temperature values for all the Arrhenius data pertaining to the references in this Attachment, it is possible to establish a simple test to determine analytically whether a material/component which is required to endure an environmental temperature profile combining a specified DBA and a normal operations temperature over 40 years will be qualified for thermal aging. The test is based on the criterion:

$$\sum_i \frac{t_{T_i}}{t^*_i} \leq 1$$

where $t^*_i = t^*_1, t^*_2, t^*_3, \ldots t^*_n$ corresponds to

Lifetimes $L_1{}^*, L_2{}^*, \ldots L_n{}^*$

which were evlauated for the referenced $T_1, T_2, T_3, \ldots T_n$, and $t_{T_i} = t_{T_1}, t_{T_2}, t_{T_3}, \ldots, t_{T_{13}}$ corresponds to the cumulative postulated durations at temperatures $T_1, T_2, T_3, \ldots, T_n$. The technique can be thought of as matching temperatures and summing corresponding median lifetime ratios.

If the temperatures do not match exactly, conservatism would dictate only that larger reference temperature values be selected to compare with anticipated temperatures and that the use of smaller reference temperatures be disallowed.

For example if the Environmental Temperature profile and the derivative thermal aging lifetimes for a given reference data block

(citation) were as depicted below:

Environmental TEMPERATURE SCHEDULE	TEMPERATURE	THERMAL AGING LIFETIME
1) Normal operations	270°F	6536 hrs.
40 years @ 110°F	240°F	1742 hrs.
2) Accident	160°F	4.51 years
0 - 24 hrs 270°F	130°F	170.16 years
2 - 24 hrs 240°F	110°F	459.37 years
1 - 31 days 130°F	For Activation Energy 0.8 ev Log Normal Slopes Intercept 6.13	

The qualification test in essence would be the criterion test:

$$\text{Is } \sum_i \frac{t_{T_i}}{t^*_i} \leq 1?$$

Where the test is passed if the value is less than or equal to unity.

$$\text{or Is } \left(\frac{40 \text{ year}}{459.37 \text{ year}} + \frac{2 \text{ hours}}{6536 \text{ hours}} + \frac{20 \text{ hrs}}{1742 \text{ hours}} + \frac{720 \text{ hrs.}}{4.51 \times 8760} + \frac{334\ (24) \text{ hrs.}}{170.16 \text{ year} \times 8760 \text{ hrs}} \right) \leq 1?$$

If the answer is yes, the test is passed and the material/component associated with the values as given by the citation is qualified. If the answer is no, the test is failed and the material/component does not qualify on this basis. Evaluating, we get 0.13 hence test is passed and material/component qualifies. Of course if the statistical approach were used the response would not be simply yes or no but rather a probability table for different confidence intervals relative to passing or failing the test. Specimen 2 computer output exemplifies a sample of the thermal aging lifetime depletion value output.

SPECI[illegible] 1

ENVIRONMENTAL TEMPERATURE PROFILES AS A FUNCTION OF POSTULATED LOCA AND MSLB AND REQUIRED EQUIPMENT OPERABILITY TIME FOR ACCIDENT MITIGATED OR POST ACCIDENT MONITORS

CASE	TYPE OF ACCIDENT	REQUIRED E/OPERABILITY TIME	TEMPERATURE (°F)								
			370	340	270	240	150	130	120	110	94
1	LOCA	1 year	-	-	2 h.	22 h.	30 d.	334 d.	-	40 y.	-
2	LOCA	1 year	-	-	2 h.	22 h.	30 d.	334 d.	40 y.	-	-
3	LOCA	38 day	-	-	2 h.	22 h.	30 d.	-	-	40 y.	-
4	LOCA	30 day	-	-	2 h.	22 h.	30 d.	-	40 y.	-	-
5	LOCA	1 day	-	-	2 h.	22 h.	-	-	-	40 y.	-
6	LOCA	1 day	-	-	2 h.	22 h.	-	-	40 y.	-	-
7	MSLB	15 mins.	15 m.	-	-	-	-	-	-	40 y.	-
8	MSLB	15 mins.	15 m.	-	-	-	-	-	40 y.	-	-
9	MSLB	15 mins.	15 m.	-	-	-	-	40 y.	-	-	-
10	MSLB	15 mins.	15 m.	-	-	-	-	-	-	-	40 y
11	MSLB	1 y or 30 d.	-	8 h.	-	4 d.	-	-	-	-	40 y
12	MSLB	1 y or 30 d.	-	8 h.	-	4 d.	-	-	-	40 y.	-
13	MSLB	1 day	-	8 h.	-	-	-	-	-	40 y.	-

SPECIMEN 2

MEAN VALUES [illegible] RATIO TEST FOR THERMAL AGING; ACTIVATION ENERGY= 0.[illegible] ELECTRON VOLTS

SLOPE INTRCPT	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12	CASE 13
0.50	2.30E-07	3.68E-07	2.17E-07	3.55E-07	2.14E-07	3.52E-07	2.12E-07	3.50E-07	5.69E-07	9.18E-08	1.25E-07	2.45E-07	2.32E-07
1.00	7.28E-07	1.16E-06	6.87E-07	1.12E-06	6.78E-07	1.11E-06	6.70E-07	1.11E-06	1.80E-06	2.90E-07	3.96E-07	7.76E-07	7.34E-07
1.50	2.30E-06	3.68E-06	2.17E-06	3.55E-06	2.14E-06	3.52E-06	2.12E-06	3.50E-06	5.69E-06	9.18E-07	1.25E-06	2.45E-06	2.32E-06
2.00	7.28E-06	1.16E-05	6.87E-06	1.12E-05	6.78E-06	1.11E-05	6.70E-06	1.11E-05	1.80E-05	2.90E-06	3.96E-06	7.76E-06	7.34E-06
2.50	2.30E-05	3.68E-05	2.17E-05	3.55E-05	2.14E-05	3.52E-05	2.12E-05	3.50E-05	5.69E-05	9.18E-06	1.25E-05	2.45E-05	2.32E-05
3.00	7.28E-05	1.16E-04	6.87E-05	1.12E-04	6.78E-05	1.11E-04	6.70E-05	1.11E-04	1.80E-04	2.90E-05	3.96E-05	7.76E-05	7.34E-05
3.50	2.30E-04	3.68E-04	2.17E-04	3.55E-04	2.14E-04	3.52E-04	2.12E-04	3.50E-04	5.69E-04	9.18E-05	1.25E-04	2.45E-04	2.32E-04
4.00	7.28E-04	1.16E-03	6.87E-04	1.12E-03	6.78E-04	1.11E-03	6.70E-04	1.11E-03	1.80E-03	2.90E-04	3.96E-04	7.76E-04	7.34E-04
4.50	2.30E-03	3.68E-03	2.17E-03	3.55E-03	2.14E-03	3.52E-03	2.12E-03	3.50E-03	5.69E-03	9.18E-04	1.25E-03	2.45E-03	2.32E-03
5.00	7.28E-03	1.16E-02	6.87E-03	1.12E-02	6.78E-03	1.11E-02	6.70E-03	1.11E-02	1.80E-02	2.90E-03	3.96E-03	7.76E-03	7.34E-03
5.50	2.30E-02	3.68E-02	2.17E-02	3.55E-02	2.14E-02	3.52E-02	2.12E-02	3.50E-02	5.69E-02	9.18E-03	1.25E-02	2.45E-02	2.32E-02
6.00	7.28E-02	1.16E-01	6.87E-02	1.12E-01	6.78E-02	1.11E-01	6.70E-02	1.11E-01	1.80E-01	2.90E-02	3.96E-02	7.76E-02	7.34E-02
6.50	2.30E-01	3.68E-01	2.17E-01	3.55E-01	2.14E-01	3.52E-01	2.12E-01	3.50E-01	5.69E-01	9.18E-02	1.25E-01	2.45E-01	2.32E-01
7.00	7.28E-01	1.16E+00	6.87E-01	1.12E+00	6.78E-01	1.11E+00	6.70E-01	1.11E+00	1.80E+00	2.90E-01	3.96E-01	7.76E-01	7.34E-01
7.50	2.30E+00	3.68E+00	2.17E+00	3.55E+00	2.14E+00	3.52E+00	2.12E+00	3.50E+00	5.69E+00	9.18E-01	1.25E+00	2.45E+00	2.32E+00
8.00	7.28E+00	1.16E+01	6.87E+00	1.12E+01	6.78E+00	1.11E+01	6.70E+00	1.11E+01	1.80E+01	2.90E+00	3.96E+00	7.76E+00	7.34E+00
8.50	2.30E+01	3.68E+01	2.17E+01	3.55E+01	2.14E+01	3.52E+01	2.12E+01	3.50E+01	5.69E+01	9.18E+00	1.25E+01	2.45E+01	2.32E+01
9.00	7.28E+01	1.16E+02	6.87E+01	1.12E+02	6.78E+01	1.11E+02	6.70E+01	1.11E+02	1.80E+02	2.90E+01	3.96E+01	7.76E+01	7.34E+01
9.50	2.30E+02	3.68E+02	2.17E+02	3.55E+02	2.14E+02	3.52E+02	2.12E+02	3.50E+02	5.69E+02	9.18E+01	1.25E+02	2.45E+02	2.32E+02
10.00	7.28E+02	1.16E+03	6.87E+02	1.12E+03	6.78E+02	1.11E+03	6.70E+02	1.11E+03	1.80E+03	2.90E+02	3.96E+02	7.76E+02	7.34E+02
10.50	2.30E+03	3.68E+03	2.17E+03	3.55E+03	2.14E+03	3.52E+03	2.12E+03	3.50E+03	5.69E+03	9.18E+02	1.25E+03	2.45E+03	2.32E+03
11.00	7.28E+03	1.16E+04	6.87E+03	1.12E+04	6.78E+03	1.11E+04	6.70E+03	1.11E+04	1.80E+04	2.90E+03	3.96E+03	7.76E+03	7.34E+03
11.50	2.30E+04	3.68E+04	2.17E+04	3.55E+04	2.14E+04	3.52E+04	2.12E+04	3.50E+04	5.69E+04	9.18E+03	1.25E+04	2.45E+04	2.32E+04
12.00	7.28E+04	1.16E+05	6.87E+04	1.12E+05	6.78E+04	1.11E+05	6.70E+04	1.11E+05	1.80E+05	2.90E+04	3.96E+04	7.76E+04	7.34E+04
12.50	2.30E+05	3.68E+05	2.17E+05	3.55E+05	2.14E+05	3.52E+05	2.12E+05	3.50E+05	5.69E+05	9.18E+04	1.25E+05	2.45E+05	2.32E+05
13.00	7.28E+05	1.16E+06	6.87E+05	1.12E+06	6.78E+05	1.11E+06	6.70E+05	1.11E+06	1.80E+06	2.90E+05	3.96E+05	7.76E+05	7.34E+05
13.50	2.30E+06	3.68E+06	2.17E+06	3.55E+06	2.14E+06	3.52E+06	2.12E+06	3.50E+06	5.69E+06	9.18E+05	1.25E+06	2.45E+06	2.32E+06
14.00	7.28E+06	1.16E+07	6.87E+06	1.12E+07	6.78E+06	1.11E+07	6.70E+06	1.11E+07	1.80E+07	2.90E+06	3.96E+06	7.76E+06	7.34E+06
14.50	2.30E+07	3.68E+07	2.17E+07	3.55E+07	2.14E+07	3.52E+07	2.12E+07	3.50E+07	5.69E+07	9.18E+06	1.25E+07	2.45E+07	2.32E+07
15.00	7.28E+07	1.16E+08	6.87E+07	1.12E+08	6.78E+07	1.11E+08	6.70E+07	1.11E+08	1.80E+08	2.90E+07	3.96E+07	7.76E+07	7.34E+07
15.50	2.30E+08	3.68E+08	2.17E+08	3.55E+08	2.14E+08	3.52E+08	2.12E+08	3.50E+08	5.69E+08	9.18E+07	1.25E+08	2.45E+08	2.32E+08
16.00	7.28E+08	1.16E+09	6.87E+08	1.12E+09	6.78E+08	1.11E+09	6.70E+08	1.11E+09	1.80E+09	2.90E+08	3.96E+08	7.76E+08	7.34E+08
16.50	2.30E+09	3.68E+09	2.17E+09	3.55E+09	2.14E+09	3.52E+09	2.12E+09	3.50E+09	5.69E+09	9.18E+08	1.25E+09	2.45E+09	2.32E+09
17.00	7.28E+09	1.16E+10	6.87E+09	1.12E+10	6.78E+09	1.11E+10	6.70E+09	1.11E+10	1.80E+10	2.90E+09	3.96E+09	7.76E+09	7.34E+09
17.50	2.30E+10	3.68E+10	2.17E+10	3.55E+10	2.14E+10	3.52E+10	2.12E+10	3.50E+10	5.69E+10	9.18E+09	1.25E+10	2.45E+10	2.32E+10
18.00	7.28E+10	1.16E+11	6.87E+10	1.12E+11	6.78E+10	1.11E+11	6.70E+10	1.11E+11	1.80E+11	2.90E+10	3.96E+10	7.76E+10	7.34E+10
18.50	2.30E+11	3.68E+11	2.17E+11	3.55E+11	2.14E+11	3.52E+11	2.12E+11	3.50E+11	5.69E+11	9.18E+10	1.25E+11	2.45E+11	2.32E+11
19.00	7.28E+11	1.16E+12	6.87E+11	1.12E+12	6.78E+11	1.11E+12	6.70E+11	1.11E+12	1.80E+12	2.90E+11	3.96E+11	7.76E+11	7.34E+11
19.50	2.30E+12	3.68E+12	2.17E+12	3.55E+12	2.14E+12	3.52E+12	2.12E+12	3.50E+12	5.69E+12	9.18E+11	1.25E+12	2.45E+12	2.32E+12
20.00	7.28E+12	1.16E+13	6.87E+12	1.12E+13	6.78E+12	1.11E+13	6.70E+12	1.11E+13	1.80E+13	2.90E+12	3.96E+12	7.76E+12	7.34E+12
20.50	2.30E+13	3.68E+13	2.17E+13	3.55E+13	2.14E+13	3.52E+13	2.12E+13	3.50E+13	5.69E+13	9.18E+12	1.25E+13	2.45E+13	2.32E+13
21.00	7.28E+13	1.16E+14	6.87E+13	1.12E+14	6.78E+13	1.11E+14	6.70E+13	1.11E+14	1.80E+14	2.90E+13	3.96E+13	7.76E+13	7.34E+13
21.50	2.30E+14	3.68E+14	2.17E+14	3.55E+14	2.14E+14	3.52E+14	2.12E+14	3.50E+14	5.69E+14	9.18E+13	1.25E+14	2.45E+14	2.32E+14
22.00	7.28E+14	1.16E+15	6.87E+14	1.12E+15	6.78E+14	1.11E+15	6.70E+14	1.11E+15	1.80E+15	2.90E+14	3.96E+14	7.76E+14	7.34E+14
22.50	2.30E+15	3.68E+15	2.17E+15	3.55E+15	2.14E+15	3.52E+15	2.12E+15	3.50E+15	5.69E+15	9.18E+14	1.25E+15	2.45E+15	2.32E+15
23.00	7.28E+15	1.16E+16	6.87E+15	1.12E+16	6.78E+15	1.11E+16	6.70E+15	1.11E+16	1.80E+16	2.90E+15	3.96E+15	7.76E+15	7.34E+15
23.50	2.30E+16	3.68E+16	2.17E+16	3.55E+16	2.14E+16	3.52E+16	2.12E+16	3.50E+16	5.69E+16	9.18E+15	1.25E+16	2.45E+16	2.32E+16
24.00	7.28E+16	1.16E+17	6.87E+16	1.12E+17	6.78E+16	1.11E+17	6.70E+16	1.11E+17	1.80E+17	2.90E+16	3.96E+16	7.76E+16	7.34E+16
24.50	2.30E+17	3.68E+17	2.17E+17	3.55E+17	2.14E+17	3.52E+17	2.12E+17	3.50E+17	5.69E+17	9.18E+16	1.25E+17	2.45E+17	2.32E+17
25.00	7.28E+17	1.16E+18	6.87E+17	1.12E+18	6.78E+17	1.11E+18	6.70E+17	1.11E+18	1.80E+18	2.90E+17	3.96E+17	7.76E+17	7.34E+17

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