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New York Power Authority

J. Phillip Bayne
Executive Vice President
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September 26, 1984
IPN-84-40

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Environmental Qualification Program

Dear Sir:

Your letter dated August 7, 1984 requested additional information concerning the Indian Point 3 Enviromental Qualification Program. The Attachment to this letter provides the Authority's response to this request.

Should you or your staff have any questions regarding this matter, please contact Mr.P. Kokolakis of my staff.

Very truly yours,

J. P. Bayne
First Executive Vice President
Chief Operations Officer

cc: Resident Inspector's Office
Indian Point Unit 3
U. S. Nuclear Regulatory Commission
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Attachment to IPN-84-40

Response to NRC Request for Additonal Information:

Environmental Qualification of Electric Equipment

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286

1. Request

Submit all applicable Justifications for Continued Operation (JCO) that are currently being relied upon and certify the following for each JCO associated with equipment that is assumed to fail:

> No significant degradation of any safety function or misleading information to the operator as a result of failure of equipment under the accident environment resulting from a design basis event will occur.

Response

Via letter dated August 24, 1981, the Authority transmitted JCOs for those equipment items requiring corrective action to establish environmental qualification. The June 9, 1982 Franklin Research Center Technical Evaluation Report (TER) concluded that these JCOs were adequate except those for the Auxiliary Feedwater Pump Room temperature switch and the solenoid valves for the main steam line isolation valves. The Authority provided revised JCOs for these two equipment items via letter dated June 1, 1983. As a result of corrective actions performed by the Authority, a number of the previously submitted JCOs are no longer necessary. Enclosure 1 to this letter presents the currently applicable JCOs. These JCOs provide a technically sound rationale for the continued operation of Indian Point 3 without undue risk to the public health and safety.

2. Request

Certify that in performing your review of the methodology to identify equipment within the scope of 10 CFR 50.49 (b)(2) that the following steps have been addressed:

a. A list was generated of safety-related electric equipment as defined in paragraph (b)(1) of 10 CFR 50.49 required to remain functional during or following design-basis loss of a Coolant Accident (LOCA) or High Energy Line Break (HELB) Accidents. The LOCA/HELB accidents are the only design-basis accidents which result in significantly adverse environments to electrical equipment which is required for safe shutdown or accident mitigation. The list was based on reviews of the Final Safety Analysis Report (FSAR), Technical Specifications, Emergency Operating Procedures, Piping and Instrumentation Diagrams (P&IDs), and electrical distribution diagrams;

b. The elementary wiring diagrams of the safety-related electrical equipment identified in Step 1 were reviewed to identify any auxiliary devices electrically connected directly into the control or power circuitry of the safety-related equipment (e.g., automatic trips) whose failure due to postulated environmental conditions could prevent required operation of the safety-related equipment and;

c. The operation of the safety-related systems and equipment were reviewed to identify any directly mechanically connected auxiliary systems with electrical components which are necessary for the required operation of the safety-related equipment (e.g., cooling water or lubricating systems). This involved the review of P&IDs, component technical manuals, and/or systems descriptions in the FSAR.

d. Nonsafety-related electrical circuits indirectly associated with the electrical equipment identified in Step 1 by common power supply or physical proximity were considered by a review of the electrical design including the use of applicable industry standards (e.g., IEEE, NEMA, ANSI, UL, and NEC) and the use of properly coordinated protective relays, circuit breakers, and fuses for electrical fault protection.

Response

a. Enclosure 2 to this letter presents the "Master List of Electrical Equipment to be Environmentally Qualified", which lists all equipment at Indian Point 3 required to remain functional in order to mitigate the design basis accidents. The equipment included ensures that; the integrity of the containment and system pressure boundaries are maintained, the reactor is shutdown and maintained in a safe shutdown condition, and offsite doses in excess of 10 CFR 100 guidelines are prevented.

The methodology utilized in the identification of electrical equipment within the scope of Paragraph (b)(1) of 10 CFR 50.49 included a review of the information contained in the plant emergency procedures, FSAR, system flow diagrams, electrical interconnecting drawings, cable drawings, systems descriptions, equipment drawings and component drawings.

The only design basis accidents which result in a harsh environment for electrical equipment required to mitigate that accident are LOCA and HELB accidents.

b. The elementary wiring diagrams were not specifically reviewed as part of the current scope of equipment qualification work effort. However, the motors for the safety systems (Safety Injection, Hydrogen Recombiner; Containment Ventilation, Auxiliary Feedwater, Residual Heat Removal) were reviewed to determine whether there were any instruments which would result in a trip that were not qualified. No such instruments were identifed in that review.

c. The operation of the safety-related systems and equipment was not specifically reviewed to identify any directly mechanically connected auxiliary systems with electrical components which are necessary for the required operation of the safety-related equipment. However a review of the P&IDs for the service water, cooling water and auxiliary coolant systems has determined the following; the lubricant for the safety-related motors is grease and there is no lubrication system external to the bearings, the cooling water for the containment fan coolers, SI recirculation pumps and diesel generators is supplied from the service water pumps, which are not subject to a harsh environment.

Further, the Authority has performed a Systems Interaction Study, which identified potential adverse interactions between non-safety related and safety related equipment. Such interactions have been or are being resolved analytically or by field modifications.

d. The methodology utilized in the identification of electrical equipment within the scope of Paragraph (b)(2) of 10 CFR 50.49 is described in Enclosure 3 to this letter. No non-safety related equipment was identified as requiring environmental qualification.

3. Request

Provide certification that all design basis events which could potentially result in a harsh environment, including flooding outside containment, were addressed in identifying safety-related electrical equipment within the scope of 10 CFR 50.49(b)(1).

Response

The environmental effects from the postulated design basis accidents are documented in Chapter 14 of the Indian Point Unit No. 3 Final Safety Analysis Report (FSAR). The environmental parameters used for electrical equipment qualification for LOCA/MSLB inside containment, however, are more conservative that those contained in FSAR Chapter 14. The Authority's letter dated August 24, 1981 addressed the issue of submergence for areas outside and inside containment. The Franklin Research Center Technical Evaluation Report (TER-C5257-456) concluded that the Authority satisfactorily addressed the issue of submergence.

4. Request

Certify that the electrical equipment within the scope of 10 CFR 50.49(b)(3) is all R.G. 1.97 Category 1 and 2 equipment or that justification has been provided for any such equipment not included in the environmental qualification program.

Response

The Authority's letter dated June 29 1984 served to transmit the Indian Point 3 program for the implementation of Regulatory Guide 1.97, Rev. 2. The Authority's methodology for the identification of electrical equipment within the scope of 10 CFR 50.49(b)(3) has considered all Regulatory Guide 1.97 Category 1 and 2 equipment. All equipment that have been identified to be within the scope of 10 CFR 50.49(b)(3) are included in the master list. As stated in our June 29, 1984 letter further analyses/assessments are required to determine compliance with Regulatory Guide 1.97. These analyses/ assessments are scheduled to be completed by September 1985. If additional equipment requiring qualification is identified during this process, it will be included in the Master List and will be qualified as part of the Regulatory Guide 1.97 implementation effort.

Enclosure 1

Justifications for Continued Operations

Equipment Type:	Electric Motor
Manufacturer & Model:	Westinghouse 69F97009
Function:	Drive Reactor Containment Fan Cooler
Location:	Containment

Discussion

There are 5 installed Reactor Containment Fan Coolers which can be used to remove heat from the containment during normal operation and during accident conditions. The motors for four of the units are qualified for normal, accident and post accident environments at Indian Point 3. Qualification of the 4 motors has been established by WCAP-7829 and Report No. 121E. The motor stators for the 4 units are insulated with the Westinghouse Class F thermolastic epoxy system. One motor stator has been insulated with a Class H insulation system which was not represented by the testing conducted in WCAP-7829.

Qualification Deficiency

Documentation of aging and irradiation testing for the Class H insulated stator.

Justification for Continued Operation

The worst case environment for the Reactor Containment Fan Coolers Motors is the double-ended Reactor Coolant System Break loss of coolant accident (LOCA). Extensive testing of the heat exchanger motor design by Westinghouse and reported in WCAP-7829 has demonstrated that the motor and motor bearings are protected from the harsh steam environment because the motor components are isolated from the environment by the casing. The winding temperature and bearing temperatures are maintained within the normal temperature ranges for the power drawn by the motor by the internal heat exchanger. Therefore, the only harsh parameters to which the stator are subjected are aging and radiation.

Justification for Continued Operation (cont'd)

The materials used in the Class H insulated stator have been identified as follows:

- Wire Insulation
  - First layer dacron and glass weave
  - Second layer GE 77944
  - Third layer Mica-Fiber Glass tape
- Slot Liner - Nomex/mylar/nomex
- Sleeving - Bently Harris Fiber Glass (C-1)
- Varnish - Class H epoxy resin VPI 378
- Lead - Silicone Rubber, 1000V

An evaluation of the radiation resistance of the materials has been made based on radiation test data contained in REIC-21, EPRI-NP-2129 and "The use of plastics and elastomers in Nuclear Radiation" by Parkinson and Sisman. The threshold of damage determined for each material used in the Class H stator is as follows:

Dacron 3×10^7 rads
Mylar $>4 \times 10^7$ rads
Nomex 3×10^8 rads
Mica $>10^8$ rads
Fiber Glass $>10^8$ rads
Silicone Rubber $>3 \times 10^7$ rads

Specific data is not available for the GE-77944 insulation and the VPI-378 epoxy. However, a General Electric 400HP motor using these materials was tested to 6×10^7 rads as reported in report F-C3365 dated February 1974. No degradation of the motor insulation was detected. In addition EPRI-NP-2129 indicates a radiation threshold for epoxy resins of 10^8 rads.

Since the 1 year post accident dose to the fan cooler motors installed at Indian Point 3 is less than 3×10^7 rads, no damage to the stator would occur.

Justification for Continued Operation (cont'd)

Regarding Aging, General Electric Report 491HA751 dated 9/15/79 states that the life of the VPI Epoxy Insulation System is in excess of 200,000 hours at 125°C.

Failure of the motor would not affect other safety-related equipment or mislead the operators.

Therefore, continued operation is justified.

Final Resolution

Either the Class H insulation system will be qualified for radiation and aging or the stator will be rewound with the Qualified Class F thermalastic epoxy insulation system originally supplied by Westinghouse prior to March 31, 1985.

EQUIPMENT TYPE: HYDROGEN RECOMBINER PANEL

MANUFACTURER: WESTINGHOUSE

FUNCTION: CONTROL AND MONITOR THE H_2 RECOMBINER

LOCATION: PRIMARY AUXILIARY BUILDING

DISCUSSION:

The FRC TER (C5257-546) indicated that the H_2 Recombiner Panel was assigned to Cateogry Ib, Equipment Qualification Pending Modification.

It appears that FRC misunderstood the purpose of the shielding analyses described by NYPA. The integrated 1 year radiation dose to the panel is approximately 10^3 rads which is well below the threshold of damage for any of the materials and is a mild environment as defined by the DOR guidelines (which apply to this equipment).

The purpose of the shield analysis (and shielding if required) is to minimize any restricted personnel access to the panel.

Since the panel and the equipment in the panel are qualified. Continued operation is justified.

EQUIPMENT TYPE:	SAMPLING SYSTEM PUMP MOTORS, SOLENOID VALVES AND CAPACITOR
MANUFACTURER:	MOTORS-THOMAS, MILLIPORE, DAYTON CAPACITOR-DAYTON SOLENOID ASCO 8262 POST ACCIDENT SAMPLING SOLENOID (M1 TO M10)
FUNCTION:	POST ACCIDENT SAMPLING
LOCATION:	PRIMARY AUXILIARY BUILDING

DISCUSSION

This equipment is used for reactor coolant system post-accident sampling. The equipment does not provide any direct accident mitigating function. In addition, during an accident the environment is mild.

QUALIFICATION DEFICIENCY

Lack of documentation.

JUSTIFICATION FOR CONTINUED OPERATION

The only adverse environment is a result of intermittent radiation from the fluid sampled. Preliminary evaluation indicates that the total integrated dose would be below the threshold for radiation damage for any materials identified in the literature as being subject to radiation damage. Furthermore this equipment is accessible for replacement or repair. There are no failure modes which would mislead the operation.

Therefore continued operation is justified.

FINAL RESOLUTION

Total dose calculations for sampling system equipment due to intermittent fluid flow and deposition of radioactive material on internal surfaces will be finalized and materials damage from radiation will be assessed. Qualification will be established by March 31, 1985.

EQUIPMENT TYPE:	LIMIT SWITCH
MANUFACTURER:	NAMCO-D2400X AND D1200G
FUNCTION:	POSITION INDICATION FOR SAMPLING VALVES (AOV-951,953,955A,B)
LOCATION:	CONTAINMENT

DISCUSSION

These limit switches provide position indication for normally closed/fail closed valves in lines used to take samples from the Reactor Coolant System during normal operation. The valves would be used for long-term post-accident sampling.

QUALIFICATION DEFICIENCY

Lack of documentation.

LIMIT SWITCH FAILURE MODE

Limit switch failure could result from entry of steam and chemical spray to the switch internals. The failure mode would be either a short circuit or ground. The result could be either no indication or indication that the valve is both open and closed.

JUSTIFICATION FOR CONTINUED OPERATION

The sampling lines also have isolation valves with position switches outside containment both in the pipe penetration area and outside the Sampling Room in the Primary Auxiliary Building. The only harsh environment in these areas is radiation for which the position switches are qualified. Therefore the operator can assure containment isolation of the sampling lines during an accident and failure of the limit switches inside containment would not affect other safety-related equipment or mislead the operator.

For post-accident sampling the position indication of the valves located outside containment and the sampling flow measurements provide the operators adequate information to determine the position of the sampling valves located within containment. Therefore continued operation is justified.

FINAL RESOLUTION

The limit switches will be replaced with qualified switches.

EQUIPMENT TYPE:	RESISTANCE TEMPERATURE DETECTOR
MANUFACTURER AND MODEL:	SOSTMAN 11901B
FUNCTION:	WIDE RANGE REACTOR COOLANT TEMPERATURE MEASUREMENTS
LOCATION:	CONTAINMENT

DISCUSSION

The Sostman RTD's are used to measure reactor coolant system cold leg and hot leg temperatures over the range between 70°F and 650°F. They are identified as the wide range reactor coolant system temperature detectors.

The wide range reactor coolant system temperature detectors do not provide control signals to any other safety-related equipment. They do, however, provide information to the operators on post-accident temperatures. In particular from the hot leg detectors, the operators can determine the core outlet temperature. The cold and hot leg temperature detectors can also be used to infer RHR flow during the post-accident cool down phase.

DEFICIENCIES

Aging, peak temperature and radiation.

JUSTIFICATION FOR CONTINUED OPERATION

Since the wide range RTD's have no control function the failure of any RTD would not affect any other safety-related equipment. The only feasible failure modes for the RTD's are either an open circuit or a ground. Either failure mode results in a zero reading which would tell the operators that the unit had obviously failed and could not be used to monitor temperature.

After LOCA the core exit temperature (and therefore, the hot leg temperature) will be approximately the saturation temperature corresponding to the plant pressure. Because Indian Point Unit 3 has installed qualified Foxboro pressurizer pressure transmitters, the operators can verify the hot leg temperature from the pressurizer pressure measurement.

JUSTIFICATION FOR CONTINUED OPERATION (cont'd)

The operator also has another backup temperature measurement from the core exit thermocouples. Although the thermocouples are not safety grade equipment, they are simple devices and do not require a power source.

The testing on the Sostman RTD's reported in WCAP-9157 was extensive and no failures were reported. The LOCA simulation included testing at 340°F and 66 psi which envelopes the Indian Point Unit 3 conditions. Irradiation was to 10^8 rad. The post-accident 1 year dose for Indian Point Unit 3 is less than 2×10^7 rads. The normal full power dose rate at the RTD is less than 500R/hr. This would indicate a lifetime of approximately 15 years and the ability to withstand the post-accident dose of 2×10^7 rads. Therefore, there is a high degree of confidence that the RTD's will function as required.

Since the wide range RTD's have no control function and since the only failure modes would be immediately obvious to the operators (no reading), failure of any individual instrument would not mislead the operators.

Therefore, continued operation is justified.

FINAL RESOLUTION

The Sostman RTD's will be replaced with fully qualified units.

EQUIPMENT TYPE: LEVEL SWITCH

MANUFACTURER: GEMS MODEL LS1900

FUNCTION: CONTAINMENT SUMP LEVEL INDICATION

LOCATION: CONTAINMENT

DISCUSSION

The Gems Model LS1900 level switches are installed in the reactor containment sumps. These level switches have no control function but do provide information to the control room operators on the containment sump level. Franklin Research Center (FRC) has issued a Technical Evaluation Report (TER-C5257-456) which discussed the Gems Level Switches. FRC assigned the level switches to category Ib, Equipment Qualification Pending Modification.

QUALIFICATION DEFICIENCY

Documented evidence of qualification.

JUSTIFICATION FOR CONTINUED OPERATION

NYPA has installed qualified transmitters to measure containment water level as required by NUREG-0737. Since it is assumed that the Gems level switches will fail, their failure will not mislead the operators who will determine containment water level using the qualified Barton model 764 level transmitters (LT1253 and 1254) installed to measure containment water level as required by NUREG-0737.

Failure of the Gems level switches will not affect other safety-related equipment because they have no control function and are not connected to other safety-related equipment in containment.

Therefore, continued operation is justified.

FINAL RESOLUTION

The Authority considers that sump level switches can provide useful information to operating personnel. Therefore, either bistables will be incorporated into the circuits for the containment water level transmitters or the Gem's level switches will be replaced with qualified units.

EQUIPMENT TYPE:	FLOW AND PRESSURE TRANSMITTERS
MANUFACTURER:	FOXBORO E11 and E13 Series
FUNCTION:	SI-Recirculation Flow (FT-945A,B); Hig Head SI Flow (FT-924A,925,926,926A,927, 980,981,982); RHR Flow (FT-638,640); Pressurizer Level (LT-459,460,461); Reactor Coolant Pressure (PT-402,403)
LOCATION:	Containment

DISCUSSION

The Foxboro E-11 and E-13 transmitters are used to measure pressure, level, and flow in safety-related systems inside containment. The transmitters are used to provide trip functions and to provide the operators with information used for emergency procedures.

QUALIFICATION DEFICIENCY

Test sequence and instrument accuracy.

JUSTIFICATION FOR CONTINUED OPERATION

Testing by Westinghouse was performed and documented in letter NS-PLC-5023 T.M. Anderson (Westinghouse) to E.G. Case (Nuclear Regulatory Commission) dated April 26, 1978. Foxboro Model E11 and E13-DM-MCA with radiation resistant amplifier (this model transmitter is similar to the E13DH-MCA with radiation resistant amplifiers model) was the subject of the test. The irradiation exposure consisted of an intergrated dose of 1.8×10^7 rads. The output of the test units experienced no change as a result of radiation exposure. The transmitters then underwent autoclave testing at Westinghouse Forest Hills test facility. The profile consisted of chemical spray injection (1.140% boric acid and .17% sodium hydroxide) at the start of the test with a temperature rise to 320°F maintaining 75 psig. At the end of the initial 20 minutes the test conditions were gradually reduced to 220°F and held there for 5½ days (equivalent to 4 weeks) before the first unit became inoperable and exceeded the ± 25% accuracy limit set for long term monitoring.

Foxboro performed environmental tests on the same type of transmitter and documented it in Report Q9-6005. The profile of the test consisted of steam at 318°F and 90 psig for one hour then decreasing to 228°F and 56 psi for an additional 12 hours. The output of the transmitter decreased by a maximum of 9.00% during the 318°F period and 5.58% during the 228°F period.

In addition, the following tests were performed by Foxboro on a separate effects testing basis:

1. Irradiation testing of various type electronics amplifiers used in transmitters, Report T2-1075.
2. Irradiation testing of various electronics amplifiers used in transmitters, Report T3-1097.
3. Loss of coolant environment and chemical spray performed on various transmitters, Report T3-1013.
4. Loss of coolant environment without chemical spray, supplement to Reprot T3-1013.
5. Irradiation testing of gaskets used in transmitters, Report T4-6045.
6. Transmitter amplifier irradiation, Report T3-1068.
7. Oil bath transmitter test, Report T4-6061.

All of the above mentioned tests were performed at Franklin Institute Research Laboratory except the supplement to Report T3-1013 which was performed by Foxboro.

The testing demonstrates that post-accident degradation of the transmitters is a slow, long term process. The transmitters can be expected to function reliably for accident mitigation and provide valid information to the operators. Therefore continued operation is justified. However, since they perform a long term cooling monitoring function, they will be replaced with fully qualified units.

Although the testing performed involved separate effects tests, no degradation occurred at radiation levels comparable to the Indian Point Unit 3 conditions. Therefore, there is a high probability of operation.

Westinghouse has advised NRC of established accuracy requirements, in percent of span for short term (5 minutes) trip functions and long term (4 months) post-accident monitoring consistent with plant safety analysis as follows.

Allowable Accuracy Tolerances for In-Containment Transmitters Required to Mitigate or Monitor the Effects of Postulated Accidents (Radiation and Environment)

Transmitter Function	Accuracy Short Term	(Percent of Span) Long Term
1. Pressurizer Water Level (4-20mADC)	N/A	±25
2. Steam Generator Pressure	+10	±10
3. Steam Generator Water Level (4-20mADC) (Narrow Range)	+10	±25
4. Steam Generator Water Level (4-20mADC) (Wide Range)	N/A	±25
5. Steam Flow (4-20mADC)	-10	N/A
6. Pressure-Reactor Coolant System (Wide Range) (4-20mADC)	N/A	±10
7. Containment Sump Water Level (4-20mADC)	±10	±25

The maximum errors determined from the Foxboro testing were -13% for pressure transmitters. (Report T3-1013) and -5.7% to +4% (Reports T3-1013 and T3-1097) for differential pressure transmitters. Report T3-1068 reported 2 failures at 76MRad in which the output went to 0. It is therefore concluded that failure or errors due to accident conditions would not mislead the operators.

FINAL RESOLUTION

The transmitters will be replaced with qualified units.

EQUIPMENT TYPE: FLOW TRANSMITTER

MANUFACTURER: BARTON, MODEL 386

FUNCTION: RHR RECIRCULATION FLOW (FT-946A,B,C,D); H_2 RECOMBINER FLOW

LOCATION: CONTAINMENT

DISCUSSION

The Franklin Research Center (FRC) has issued a Technical Evaluation Report, TER-C5257-456 dated June 9, 1982 which discussed the Barton 386 flow transmitter used to measure RHR Recirculation Flow. FRC assigned the flow transmitters (FT-946A,B,C,D) to category Ib, Equipment Qualification Pending Modification.

QUALIFICATION DEFICIENCY

Documented evidence of Qualification was not considered adequate by FRC.

JUSTIFICATION FOR CONTINUED OPERATION

WCAP-7410L reports tests on Barton transmitters designated as Model 332 Mod I. After successful completion of the testing Barton redesignated the transmitter as model 386. This model is installed at Indian Point Unit 3. The testing reported in WCAP-7410L enveloped the temperatures and pressures required for Indian Point Unit 3. No chemical spray was included inthe test program but an analysis of the effects of chemical spray was contained in Westinghouse letter NS-CE-719 dated July 25, 1975. Irradiation testing to 240 Megarads was performed after the LOCA expsoure. The total duration of the LOCA simulation test was 2 hours. The transmitter accuracy was within 2% of the pretest values.

Although the testing was not performed in the sequence recommended by IEEE-323 (Irradiation after LOCA exposure rather than before LOCA exposure) and the test transmitters were not preaged, no significant degradation was noted during the testing. Therefore, there is a high likelihood that the transmitters will perform their intended function. In addition, RHR flow rate will be established and adjusted following change over to recirculation. After flow is established there is no need to change the flow. The H_2 recombiner

JUSTIFICATION FOR CONTINUED OPERATION (cont'd)

flow is needed early in the accident and provides readout at the H_2 recombiner panel. The qualified thermocouple provides the operator with indication that the flow is correct.

These transmitters perform their function early in the accident. Subsequent failure of the transmitters would not affect any other safety-related equipment or mislead the operators.

Therefore, continued operation is justified.

FINAL RESOLUTION

The transmitters will be replaced with fully qualified Foxboro transmitters.

EQUIPMENT TYPE: SOLENOID VALVE

MANUFACTURER: LAURENCE MODEL 629BC85PS

FUNCTION: H_2 RECOMBINER ISOLATION VALVES (IV-2A&B, 3A&B, 5A&B)

LOCATION: PIPE PENETRATION AREA

DISCUSSION

The Laurence Solenoid Valves are used to actuate the isolation valves for the Hydrogen Recombiner and are located in the piping penetration area. The only harsh parameter to which the valves are exposed when they are required to operate is radiation caused by RHR recirculation.

The Franklin Research Center (FRC) has prepared a Technical Evaluation Report (TER-C5257-456) which assigned these valves to Category Ib, Equipment Qualification Pending Modification.

DEFICIENCIES

Aging and radiation.

JUSTIFICATION FOR CONTINUED OPERATION

The Laurence model 629BC85PS solenoid valves have Buna-N seating surfaces and a silicone varnish impregnated coil. Similar solenoid valves from another manufacturer (ASCO) having Buna-N seating materials were subjected to 5×10^7 rads and no detectable damage occurred to the valve seating surfaces. The Indian Point Unit 3 post-accident dose in the pipe penetration area is less than 3.6×10^6 rads. Therefore, no damage to the seats is expected. EPRI NP-2129 indicate thresholds for radiation damage above 6.7×10^8 for silicone alkyd varnishes. Although the exact composition of the varnish used in the Laurence solenoid is not known (material is proprietary) the silicone varnishes used for Class H insulation systems are all basically similar. Since the Indian Point Unit 3 dose is less than 3.6×10^6 rads it is expected that this radiation level will have little effect on the solenoid.

JUSTIFICATION FOR CONTINUED OPERATION (cont'd)

Valve position indication is available from qualified position indicators. Therefore, failure of any valve would not mislead the operator who can determine the position of the valve and take appropriate corrective action.

Because the valves are normally deenergized the coil and elastomers are subjected only to the ambient temperatures in the pipe penetration area and aging effects would be minimal. Although qualification cannot be completely established by analysis because of the proprietary nature of the coil insulation, there is a high degree of assurance that the valves will perform their function in the radiation environment based on tests of similar valves having basically the same material.

Therefore, continued operation is justified.

FINAL RESOLUTION

The valves will be replaced with qualified units.

EQUIPMENT TYPE: SOLENOID VALVE

MANUFACTURER: SKINNER

FUNCTION: ACTUATES FAN COOLER DAMPERS (SOV-1293 thru 1307)

LOCATION: CONTAINMENT

DISCUSSION

These solenoid valves are used to actuate the dampers associated with the fan coolers. The valves are normally energized.

The Franklin Research Center has issued a Technical Evaluation Report (TER-C5257-456) which assigned these valves to Category Ib, Equipment qualification pending modification.

DEFICIENCY

Lack of documentation.

JUSTIFICATION FOR CONTINUED OPERATION

The solenoid valves for the fan cooler dampers are continuously energized during normal operation. Their function is to maintain the dampers for LOCA closed and the dampers for normal ventilation flow open. They are deenergized by a Safety Injection (SI) signal in the event of a LOCA. In the deenergized position the normal dampers are closed and the dampers used for LOCA conditions are opened.

The possible failure modes of the solenoid (open circuit, short circuit, ground) have the same effect as an SI signal, namely to deenergize the solenoid and to position the dampers in the required positions. Failure of the solenoids would not affect any other safety-related equipment because the SI signal isolates the solenoids from their respective power supplies.

JUSTIFICATION FOR CONTINUED OPERATION (cont'd)

Failure of the solenoid would not mislead the operators because the fan cooler dampers would be in the proper positions.

Therefore, continued operation is justified.

FINAL RESOLUTION

The solenoids will be replaced with fully qualified solenoid valves.

EQUIPMENT TYPE: SOLENOID OPERATED VALVE

MANUFACTURER: ASCO-NP8320 and HB8316

FUNCTION: OPERATES CONTAINMENT PURGE AND PRESSURE RELIEF VALVES (PCV-1190, FCV-1170, 1172)

LOCATION: CONTAINMENT

BACKGROUND

The Franklin Research Center has prepared and submitted to the NRC a Technical Evaluation Report (TER) titled "Review of Licensee's Resolution of Outstanding Issues From NRC Equipment Environmental Qualification Safety Evaluation Reports," dated June 9, 1982. The NRC used this TER to prepare a Safety Evaluation Report (SER), which was sent to the Authority be letter dated December 30, 1982. The SER requested that the Justification for Continued Operation be reviewed and revised for any equipment judged to have qualification deficiencies. This exhibit provides resolution of the concern identified in the SER.

QUALIFICATION DEFICIENCY

The concern identified in the TER for these SOVs is that they are not sealed to prevent the intrusion of moisture.

LOCATION AND SAFETY FUNCTION

This equipment is located within the reactor containment. Their safety function is to operate the containment purge valves (FVC-1170 and -1172) and pressure relief valve (PCV-1190).

JUSTIFICATION FOR CONTINUED OPERATION

The TER quotes the result of a test on Sample No. 3, which had an ac coil. In the previous TER, issued by on April 16, 1981, FRC stated:

"a. Of the valve models tested, the one with a model number that most closely matches that of the installed equipment in Sample No. 6, Model Number NP-831665E having a dc, Class H coil, NEMA 4, 7, and 9 solenod enclosure, and normally closed operation. The Guidelines require that the test specimen be the same as the equipment being qualified. The Licensee did not present information describing the installed item; a statement that it is identical to the test sample; or an analysis comparing the impact of deviations between the test specimen's specific design features, materials, and production procedures and those of the installed equipment. Therefore, an independent conclusion cannot be reached regarding the extent to which the results of the test program provide valid evidence of qualification. The Licensee should provide certification that the important features of the instaled equipment are the same as those in the test specimen."

The Authority provided the following information in its submittal dated August 21, 1981:

"LICENSEE RESPONSE:

The concern is that the ASCO solenoid valve NP 8316A75E, which was installed, differs from the tested model NP 831665E. The difference between the valves is the size of the pipe connection and the orifice. The concern of aging is on-going; however, since we have data to indicate that the solenoid will perform its function for a minimum of 4 years, a replacement schedule is incorporated. This schedule will be modified as necessary when more data on aging is received." (Recent analyses show lifetimes in excess of 15 years).

The TER further stated:

"1. During the referenced qualification test, there was an excessive amount of water infiltration into the interior of many of the solenoids. This was evidently the result of a poor choice of conduit material and the method of electrical connection used in the test program, which does not appear to represent that used in any power plant. There is the strong implication that the test was to be conducted with the electrical wiring penetration of the solenoid case isolation (sealed) from the test environment. It was this isolation barrier that evidently failed during the test, allowing spray solution to enter and seriously degrade the coil. Although this did not occur with Sample No. 6, which is the one that most closely matches the installed equipment, there is nothing in the referenced report to indicate that this was not merely a fortuitous result. The results of the test must therefore be regarded as inconclusive until the uncertainties associated with the method of making the wiring interface with the solenoid, both in the plant and in the test, are resolved."

The SOVs evidencing difficulty operated satisfactorily throughout the testing and only showed a reduced insulation resistance which did not preclude the units from functioning. The performance of the dc solenoid during the test indicates successful operation under all test conditions. The problems identified in the TER are associated with ommission of an informational measurement which does not affect the operation. Since the test conditions are substantially more severe than the IP-3 accident conditions, operation of the valve is assured. In addition, Report F-C4539 establishes qualification of HB series valves. Therefore, continued operation is justified.

RESOLUTION OF QUALIFICATION DEFICIENCY

Steam and spray will be prevented from entering the solenoid enclosure with a suitable qualified seal such as RTV or Conax Connectors.

EQUIPMENT TYPE:	SOLENOID OPERATED VALVE
MANUFACTURER:	ASCO MODEL LB83146
FUNCTION:	PILOT VALVES FOR SAMPLING SYSTEM VALVES (AOV 951, 953, 955A,B)
LOCATION:	CONTAINMENT

DISCUSSION

These valves are normally closed/fail closed valves which supply air to normally closed/fail closed air operated valves in the lines used to take samples from the reactor coolant system. The valves are not required to operate during an accident and do not change position during an accident but are required for sampling.

QUALIFICATION DEFICIENCY

Lack of documentation.

JUSTIFICATION FOR CONTINUED OPERATION

As noted above the valves are normally closed/fail closed and are not required to change position during an accident. If a failure occurred it would not degrade any safety function nor mislead the operator because the valves are not accident mitigating. There is no failure mode which would cause the valves to change position. Qualified valves located outside containment provide the isolation function in the lines with which these valves are associated.

For post-accident sampling after the Containment Environment returns to normal (except for radiation and humidity) there is a high degree of assurance that the valves will function. These valves are similar in coil construction (molded coil design) and non-metallic materials (seals, seats, discs, o-rings) to non-Np ASCO solenoids which have been subjected to LOCA tests (radiation 50 Mrad and steam at 420°F and 113 psig) and have performed successfully. The test valve coils were not sealed and the molded coil was directly subjected to steam exposure.

Therefore, continued operation is justified.

FINAL RESOLUTION

The valves will be qualified or replaced with qualified ASCO NP series valves.

EQUIPMENT TYPE:	SOLENOID OPERATED VALVE
EQUIPMENT MANUFACTURER:	LAURENCE MODELS 110114 and 12544W
FUNCTION:	PROVIDES AIR SUPPLY TO OPEN AND CLOSE THE MAIN STEAM ISOLATION VALVES
LOCATION:	STEAM AND FEEDLINE PENETRATION AREA

DISCUSSION

The Franklin Research Center has prepared and submitted to the NRC a Technical Evaluation Report (TER) titled "Review of Licensee's Resolution of Outstanding Issues From NRC Equipment Environnmental Qualification Safety Evaluation Reports," dated June 9, 1982. The NRC used this TER to prepare a Safety Evaluation Report (SER), which was sent to the Authority by letter dated December 30, 1982. The SER and Appendix D of the TER identifies two equipment items for which the Authority's Justification for Continued Operation was judged to be inadequate. This exhibit provides resolution of the concern addressed in the SER.

QUALIFICATION DEFICIENCY

The concern identified in the TER for the Laurence SOV's is that qualification documentation was not available.

LOCATION AND SAFETY FUNCTION

This equipment is located in the Shield Wall Area at El. 43'0". This enclosure provides weather protection for the main steam and boiler feed piping. Sheet metal paneling similar to that used in other areas of the plant is fastened to stringers which are jointed to the structural steel. A steam line break will cause the panels to fail, allowing steam to escape to the building exterior and preventing further pressure buildup.

LOCATION AND SAFETY FUNCTION (cont'd)

High energy lines in this enclosure are the main boiler feed lines upstream and downstream of the check valves, main steam lines upstream and downstream of the main stop valves, and steam supply lines to the AFP turbine. Pipe whip restraints are provided for the seismic Class I portion of these lines where necessary to prevent damage to adjacent Class I steam or feedwater lines. Other safety-related equipment in the area are the main steam isolation and main steam relief valves.

Temperature buildup in the area would not be significant since the exterior wall siding would blow off almost immediately following a break. The main steam isolation valves (MSIVs) are signaled to close immediately upon steam line break.

Main steam isolation valve controls must function to isolate all main steam lines in the event of a full MSLB downstream of the stop valves. The MSIV control SOVs are protected by adequate distance from postulated breaks at locations downstream of the stop valves. Hence, the control circuits would have performed their function before any temperature effects could build-up to impair their operation. Failure of the solenoid would not affect other safety-related equipment or mislead an operator.

EQUIPMENT DESCRIPTION

The Laurence SOV's are part of a packaged operating system supplied with the main steam isolation valves (MSIVs). Figure 1 shows the configuration and provides a description of the system operation. Figure 2 shows schematically the power supplies for the solenoid valves, demonstrating that the redundant SOV's shown on Figure 1 are powered from separate buses, and that the system, therefore, is not subject to a single disabling failure.

Figure 3 is an assembly drawing of a Laurence SOV. The configuration corresponds to the supply valve of Figure 1. In normal operation the lever arm (A) is held in the open position by latch (B). The spring (C) holds one

EQUIPMENT DESCRIPTION (cont'd)

latch in position. In this configuration the solenoid is deenergized and the valve plug (F) is held off the seat against the force of spring (D). When the solenoid coil is energized the plunger (E) is pulled upwards, disengaging the latch (B) from the lever arm (A). Spring (D) then forces the valve plug (F) to the closed position.

The solenoid dump valves function similarly. The only difference is that the spring force causes the valve to open.

FAILURE MODE ANALYSIS

The only failures which would prevent the valves from performing their function (refer to Figure 3) are:

1) Failure of spring (D).
2) Open or short-circuit in solenoid coil or coil connections.
3) Binding or sticking between the lever (A) and latch (B).

1) Failure of Spring (D). The drawing (Figure 3) states that internal parts are type 303 stainless steel (viz., plug (D), spring (F) and washer (G)), and the fluid is air. At normal ambient temperatures, the corrosion of stainless steel in air is negligible. Operating experience with installed valves at Indian Point 3 for a period of about 6 years has shown no spring failures in 16 valves when periodically tested as required by the Technical Specifications. Even if the spring force should be reduced, the weight of the lever arm (A) and the direction of flow would provide the necessary force to move the valves to their proper positions.

2) Open or Short Circuit in Solenoid Coil or Coil Connections. The valve is normally deenergized and located in an area where the ambient temperature is 105°F (or less). Aging degradation of the Class H coil is negligible (rated for continuous duty at approximately 350°F). As

noted for the springs above, no failures or anomalies of the coilds or connections have been identified by the periodic testing required by the Technical Specifications. Random failure of a coil would not preclude system operation because the design is "single-failure-proof".

3) Binding or sticking between the lever are (A) and latch (B). If high friction from metal-to-metal contact between the latch and lever arm (or between the latch and the solenoid plunger) occurred, the coil force to cause valve actuation would increase. If friction forces resulted in binding, the solenoid would not produce sufficient force to actuate the valve. To preclude such events, the moving parts of the operating mechanism are periodically lubricated. They are also tested as required by the Technical Specifications to demonstrate operability.

As noted above, aging of the solenoid coil is not of concern. However, the Buna-N material used in the valve disc is subject to aging. Because there is no data available in the published literature for Buna-N as used in the SOV's, a qualified life cannot be established. Data on Buna-N seals (gaskets and "O" rings) have indicated lifetimes between 6 and 15 years at 135°F. Since, in this valve application, the material is normally unstressed, engineering judgement would indicate that a life of 15 years (the upper bound for stressed materials) could be anticipated. If some degradation occurs it would not prevent the valve from shutting off the air supply, even if some seal leakage occurred. Even with seal failure the valves would operate. As noted above, periodic testing assures that no significant degradation has occurred.

It is, therefore, concluded that there is no credible failure mode that would prevent the valves from functioning.

JUSTIFICATION FOR CONTINUED OPERATION (Revised)

Continued operation is justified because:

1) There are no credible failure modes which would prevent the valves from operating.

2) Engineering judgement indicates that qualified life has not been exceeded.

3) The instrumentation that initiates protective action in the event of a steam line break is not exposed to the accident environment and will function to actuate the solenoids and trip the valves. The operating time from SOV actuation to MSIV closing is less than 5 seconds. This time is verified by periodic testing.

4) The temperature and pressure in the area where the solenoids are located would not significantly increase over ambient in the event of a steam line break before isolation of the break could occur.

5) The systems in which the valves are located are "single-failure-proof".

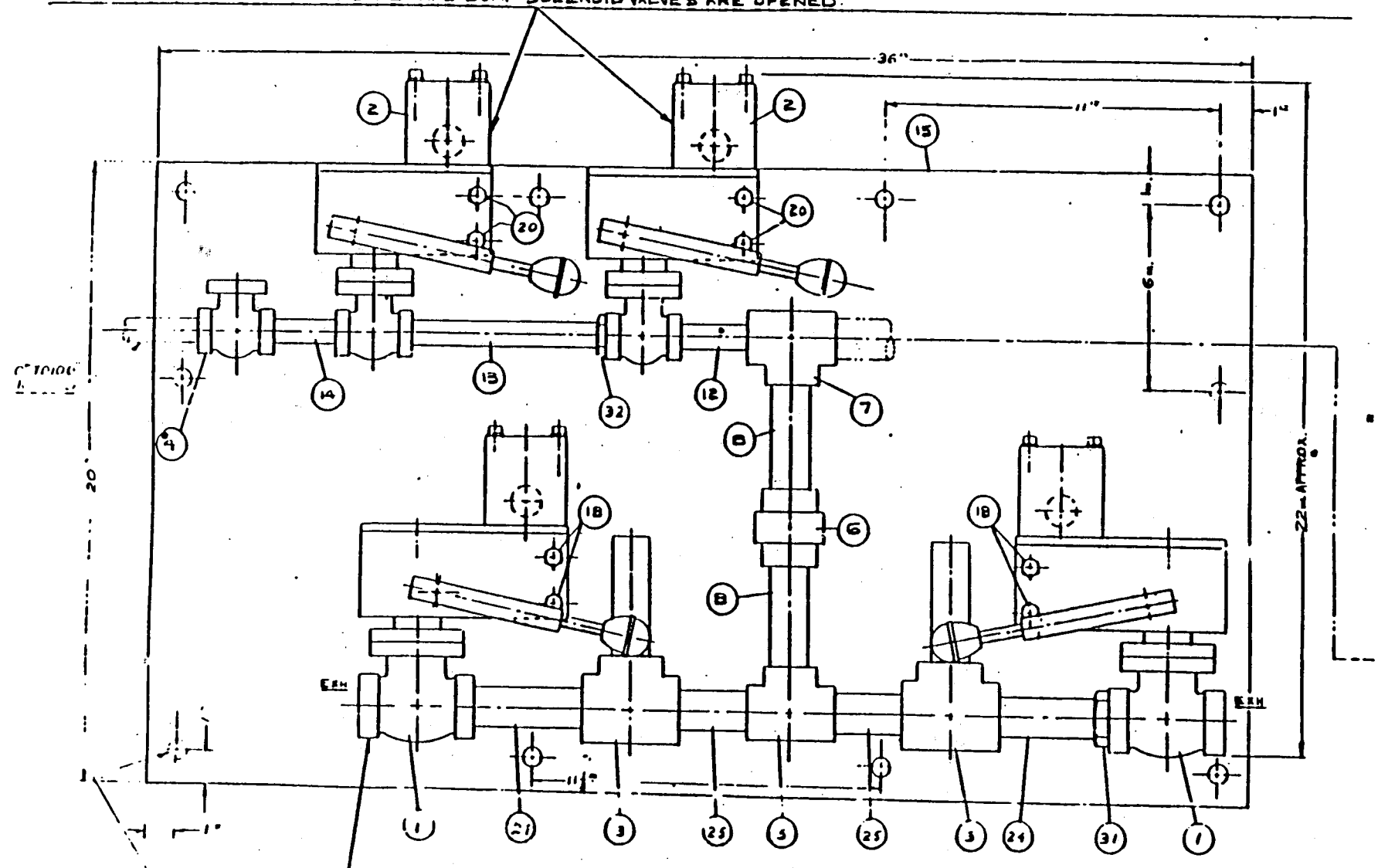
6) The only break that could affect the solenoids is a break in the piping upstream of the MSIV with which the SOVs are associated. Blowdown of other steam generators in such an event is prevented by the check valves installed in the main steam lines upstream of the MSIVs.

7) Valve failure after trip would not affect other safety-related equipment or mislead the operators.

RESOLUTION OF QUALIFICATION DEFICIENCY

The valves will be replaced by qualified valves.

TWO - 2 - SOLENOID VALVES IN TANDEM EACH SUITABLE FOR 125 VOLTS D.C. (PERIODIC 140 V.D.C.) CLASS H COIL INSULATION DRIP PROOF NEMA 2 ENCLOSURES.
R.G. LAURENCE 1200 TYPE WITH RESILIENT SEAT - NORMALLY OPEN WHEN DE-ENERGIZED, CLOSE WHEN ENERGIZED FROM SIGNAL.
TO SHUT OFF AIR SUPPLY AT SAME TIME DUMP SOLENOID VALVES ARE OPENED.



NOTES - RE SOLENOID DUMP VALVES

TWO - R.G. LAURENCE TWO WAY SOLENOID VALVES WITH HAND RESET TO BE FURNISHED. FULL BORE WITH RESILIENT SEAT - CAT NO 125434W 125 VOLT D.C. (PERIODIC 140 V.D.C.) CLASS H INSULATION DRIP PROOF NEMA 2 ENCLOSURES. NORMALLY LATCHED CLOSED WHEN DE-ENERGIZED OPEN WHEN ENERGIZED BY TRIPPING, LATCH MUST BE RELATCHED IN CLOSED POSITION BY HAND WHEN DE-ENERGIZED.

SOLENOID VALVE TO DUMP AIR FROM CLOSING CYLINDER AND ACCUMULATOR ON SIGNAL - THE SAME SIGNAL SHOULD SHUT SUPPLY SOLENOID VALVE SIMULTANEOUSLY

FIGURE 1

INFORMATION ONLY
Not For Installation

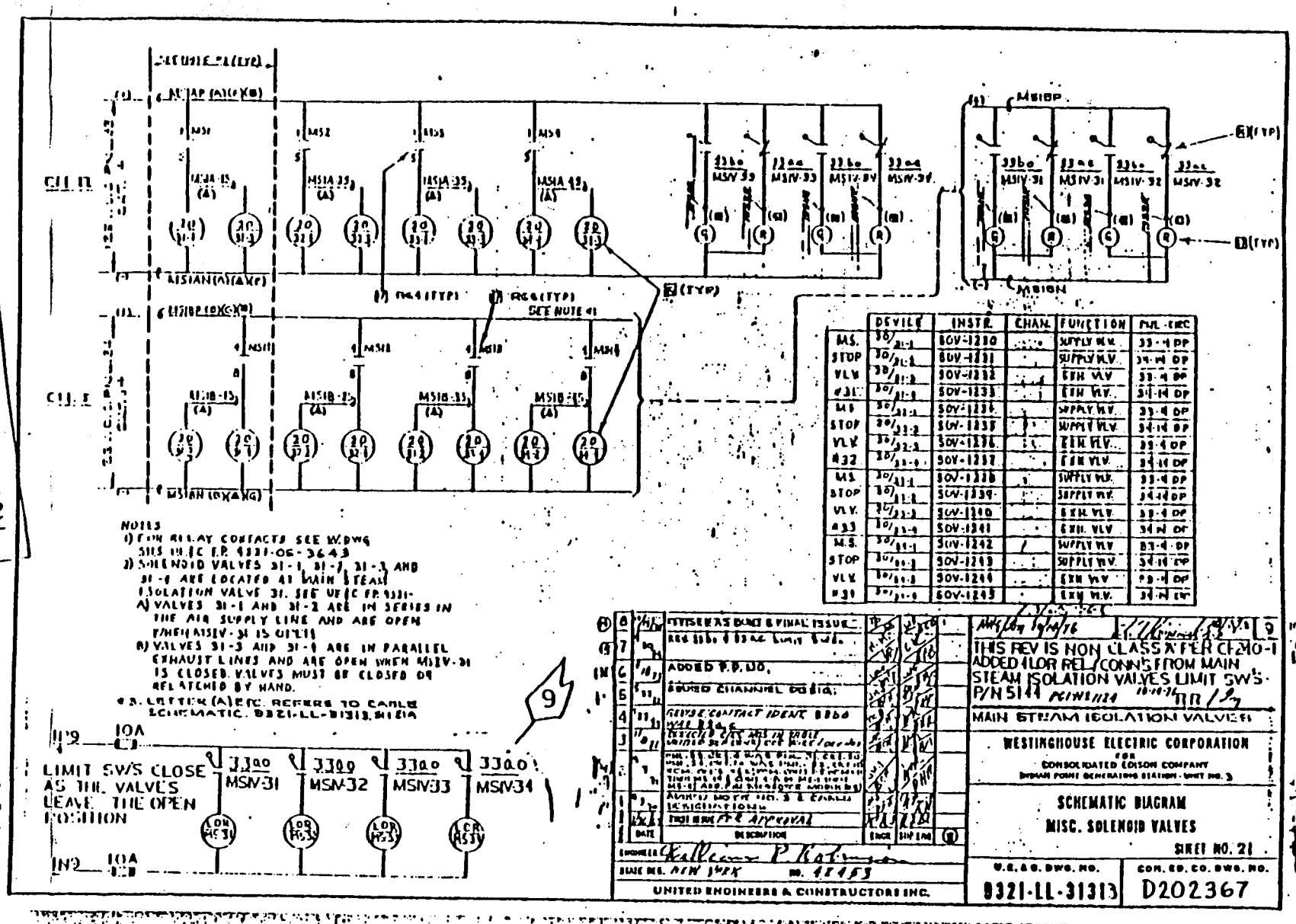
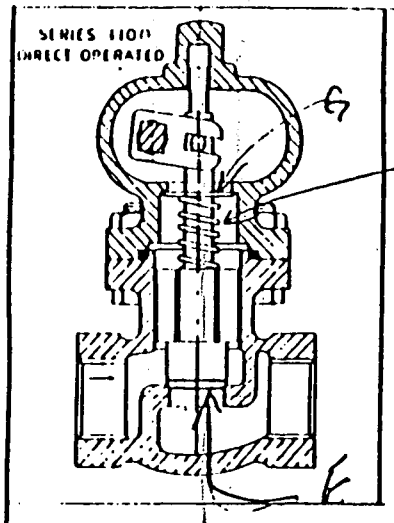


FIGURE 2



ITEM _____ TAG _____

MARK _____

CUSTOMER _____

P.O. _____ REQ. _____

USER P.A.S.N.Y.

LOCATION INDIAN POINT #3

SERIES 1100
2-WAY MANUALLY RESET
ROTARY SHAFT SOLENOID VALVE
NORMALLY CLOSED-LATCH TO OPEN
ELECTRICALLY TRIPPED-TRIPS ON ENERGIZATION

( )LAURENCE CATALOG NO. 110114W

PIPE SIZE 1/2" C_v(APPR.) 3.0 PORT DIA. 1/2"

VALVE TYPE DIRECT OPERATED

VALVE BODY BRONZE DISC BUNA-N

INNER PARTS TYPE 303 ST. STEEL

FLUID AIR SPEC. GRAVITY

VISCOSITY

OTHER PROPERTIES

MAX OPENING PRESSURE DIFFERENTIAL 125 PSI

OPERATING TEMP'S AMBIENT

FLOW RATE ΔP

TYPE CONNECTIONS CL. 250 SCREWED

SOLENOID ENCLOSURE NEMA 2

125 VOLTS DC CONT. DUTY

COIL INSULATION CLASS H

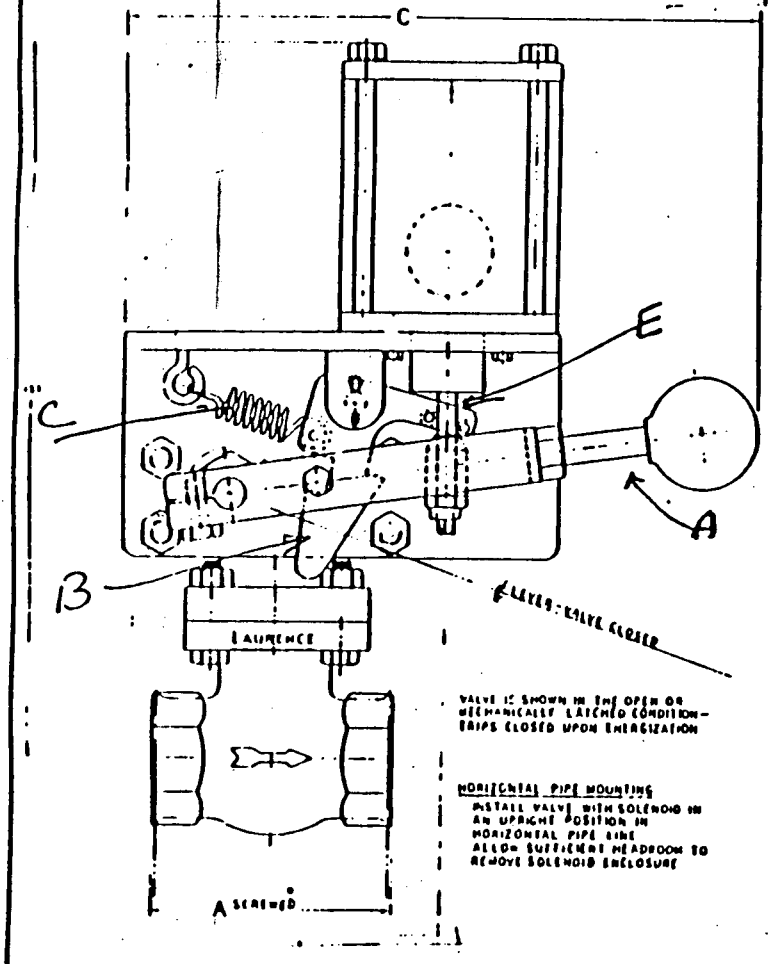
DIMENSIONS: (APPROX) A- 2 1/2" B- 8 3/4" C- 8"
D- 4 1/2" NET WEIGHT

CURRENT DATA: (APPROX) 0.2 AMPS HOLDING
0.2 AMPS INRUSH
AT 125 VOLTS DC

REFER TO BULLETIN SERIES 1100

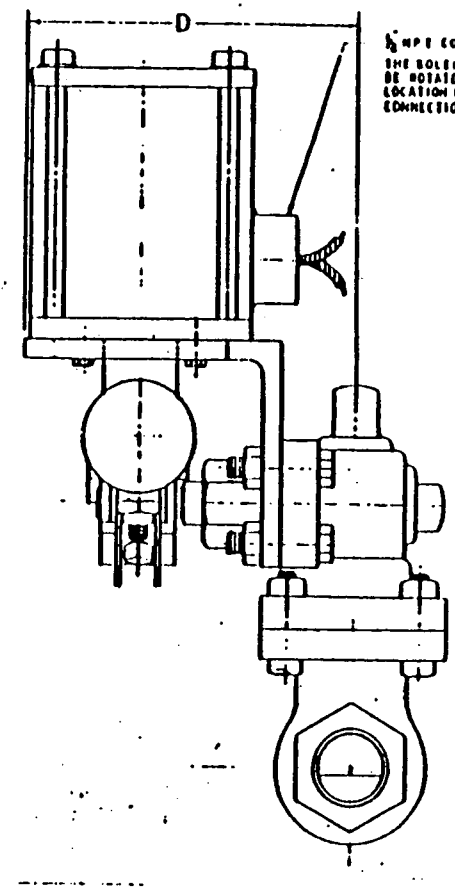
LAURENCE SERIAL NO. 21371-2

LAURENCE S.O. NO. 21371



VALVE IS SHOWN IN THE OPEN OR MECHANICALLY LATCHED CONDITION-TRIPS CLOSED UPON ENERGIZATION

HORIZONTAL PIPE MOUNTING
INSTALL VALVE WITH SOLENOID IN AN UPRIGHT POSITION IN HORIZONTAL PIPE LINE
ALLOW SUFFICIENT HEADROOM TO REMOVE SOLENOID ENCLOSURE



½ NPT CONDUIT CONNECTION
THE SOLENOID HOUSING MAY BE ROTATED TO VARY THE LOCATION OF THE CONDUIT CONNECTION

VALVE BODY CAN BE ROTATED 90° TO FOUR POSITIONS TO FACILITATE MOUNTING FOR DIRECTION OF FLOW-SEE INSTRUCTION SHEET

FIG. NO. 1100-F2

R.G. LAURENCE CO. INC.
TENAFLY, N.J. 07670 U.S.A.
PHONE: 201 568-5471

FIGURE 3

Enclosure 2

Master List of Electrical Equipment
to be Environmentally Qualified

MASTER LIST OF ELECTRICAL EQUIPMENT IMPORTANT
TO SAFETY TO BE ENVIRONMENTALLY QUALIFIED
INDIAN POINT UNIT NO. 3

System I Safety Injection

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
SI Pump 31, 32,33	29	SI Pump Room	Westinghouse 509US	Motor for High Head SI Pump	Original Installation	Units qualified. Report 7154-222E dated July 1983 applies. (a)
FT-945A,B	5	Containment	Foxboro E13DMMCA	Flow Transmitter (Recirculation Spray Flow)	Original Installation	To be replaced with qualified Foxboro Transmitters. (f)
FT-924A,-925,-926, -926A,-927,-980, -981,982	5	Containment	Foxboro E13DMMCA	Flow Transmitter (High Head SI Flow)	Original Installation	To be replaced with qualified Foxboro Transmitters. (g)
PT-922,-923,-947	6	SI Pump Room	Foxboro E11GM	Pressure Transmitter (SI Pump Suction & Discharge Pressure	Original Installation	Units qualified. WCAP-8541 and NS-TMA-2139 apply. (a)
Recirc. Pump 31, 32	30	Containment	Westinghouse 588.5	Motor for SI Recirc. Spray Pump	Original Installation	Units qualified. Report 7154-120E dated July 1983 applies.
MOV-856B,C,E,G, H,J	52	Containment	Limitorque SMB-00	High Head SI Valves	Original Installation	Report 7154-101E dated August 1983 applies.
MOV-1802A,B	52	Containment	Limitorque SMB-00	SI Recirc. & Spray Pump Discharge Valves	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
No Tag No.	None	Pipe Penetr-ation Area	NAMCO D2400X	BIT to Boric Acid Tank (1851A, B)	Original Installation	Units Qualified. Report 7154-233E dated May 1983 applies.
850A, 850C	None	SI Pump Room	Limitorque SMB-0	SI Pump Discharge	1983	Units Qualified. Report 7154-110E dated August 1983 applies.

System I, Safety Injection (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
MOV-889A,B	53	Containment	Limitorque SMB-0	SI Recirculation & Spray Isolation Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-888A,B	62	Pipe Penetration Area	Limitorque SMB-00	High Head SI Recirc. Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.(a)
MOV-842,843	63	SI Pump Room	Limitorque SMB-00	SI Mini-Flow Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)
MOV-851A,B	63	SI Pump Roon	Limitorque SMB-00	SI Discharge Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)
MOV-1810	63	SI Pump Room	Limitorque SMB-00	RWST Discharge Valve (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)
MOV-887A,B	64	SI Pump Room	Limitorque SMB-00	SI Pump Suction Isolation Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)
MOV-1835A,B	66	Pipe Penetration Area	Limitorque SMB-0	BIT Discharge Valves (Limitorque	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)
MOV-1852A,B	67	SI Pump Room	Limitorque SMB-0	BIT Injection Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.(a)
MOV-894A,B,C,D	68	Containment	Limitorque SMB-2	Accumulation Discharge Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (a)(h)
No Tag No.	56	Containment	NAMCO EA-180	Limit Switches for Valves 856B,C	1980	Units qualified. Report 7154-130E dated August 1983 applies. (e)
Solenoids for PCV-1851A,B	None	Pipe Penetration Area	ASCO-8314	BIT to Boric Acid Tanks	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System II, Auxiliary Coolant

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
RHR Pump 31, 32	27	RHR Pump Room	Westinghouse 509UPZ	Motors for RHR Pumps (Westinghouse)	Original Installation	Units qualified. Report 7154-220E dated July 1983 applies.
HCV-638,-640	1,55	Containment	Limitorque SMB-00	RHR Flow Control Valves (Limitorque)	1980	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-745A,B	52	Containment	Limitorque SMB-00	RHR Isolation Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-1869A,B	None	Containment	Limitorque SMB	RHR Isolation Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-746,747, 899A,B	54	Containment	Limitorque SMB-3	RHR HX Isolation Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-822A,B	62	Pipe Penetration Area	Limitorque SMB-00	RHR HX Cooling Water Supply Valves (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
MOV-744	65	Pipe Penetration Area	Limitorque SMB-1	RHR Isolation Valve (Limitorque)	Original Installation	To be replaced with qualified units. (b)(g)
MOV-885A,B	66	Pipe Penetration Area	Limitorque SMB-0	Containment Sump Stop Valve	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
FT-638,640	None	Containment	Foxboro E13DHMCA	RHR Flow Transmitters	Original Installation	To be replaced with qualified Foxboro units. (g)
MOV-769,-784, -786,-789,-797; FCV-625	62	Pipe Penetration Area	Limitorque SMB-00	RCP Cooling Water Isolation (Limitorque)	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies. (b)(g)

System II, Auxiliary Coolant (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
FT-946A,B, C,D	2	Containment	Barton 386	RHR Recirculation Flow Transmitters	Original Installation	To be replaced with qualified Foxboro units. (g)
LT-938,-939	23	Containment	GEMS LS1900	Recirculation Sump Level Transmitters	Original Installation	Note k.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System III, Auxiliary Feedwater

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
ABFP 31,33	28	AFW Pump Room	Westinghouse	Motor for Auxiliary Feed Pumps	Original Installation	Units qualified. Report 7154-221E dated July 1983 applies.
PT-1205	8	AFW Pump Room	Foxboro E11GM	Pressure Transmitter City Water Pressure	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984. (c)
PT-406A,B PT-1260,-1261, -1262	8	AFW Pump Room	Foxboro E11GM	Pressure Transmitter AFW Pump Suction Pressure	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984. (c)
PT-1263,-1264, -1265	8	AFW Pump Room	Foxboro E11GM	Pressure Transmitter AFW Pump Discharge Pressure	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984. (c)
FT-1200,-1201, 1202, -1203	8	AFW Pump Room	Foxboro E11GM	Feedwater Flow Transmitter	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984. (c)
PT-1163,-1164, -1165,-1166	9	AFW Pump Room	Foxboro E11GM	Pressure Transmitter AFW Pressure	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984. (c)
Solenoids for PCV-1121,-1123	12	AFW Pump Room	ASCP 8300	City Water Supply to AFW System	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
Solenoid for PCV-1139	12	AFW Pump Room	ASCO 8300	AFW Recirc. Isolation	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
Solenoids for PCV-1187,-1188, -1189	12	AFW Pump Room	ASCO 8300	AFW Pump Steam Pressure Control	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
Solenoids for LCV-1158	15	AFW Pump Room	ASCO 8317	Condensate Storage Tank Discharge (ASCO)	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System III, Auxiliary Feedwater (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
Limit Switch for PCV-1121, 1123	46	AFW Pump Room	NAMCO EA-170	Position Indicator for Auxiliary Feedwater Recirculation Valves	Original Installation	Units qualified. Report 7154-233E dated July 1983.
Limit Switch PCV-1187,1188, -1189	None	AFW Pump Room	Micro BZE-2RN	AFW Pump Suction Valve Position Indication (Micro)	Original Installation	Note C.
TC-1112S, 1113S	40	AFW Pump Room	UEC F110A6CS	Temperature Switch In AFW Pump Room	Original Installation	Units qualified. Report 7154-245E dated March 1984.
FCV-405A,B,C,D	61	AFW Pump Room	Fisher 546	E/P Converter for AFW Flow Control	Original Installation	Units qualified. Report 4, Problem 1531 Proj. 72AR28 applies. Aging Analysis Report No. 7205 dated April 1984 applies.
				Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.		

Note - Previous submittals included the Solenoid Valves and Limit Switches for PCV-1310A&B, the Isolation Valves for the steam supply to the AFW Pump Turbines. However, the authority has determined that these valves are located in a mild environment for the accident they are intended to mitigate. These valves are located at different elevations in the Steam and Feedline penetration area. Their function is to isolate a break in the steam line to the AFW pump turbine. The AFW pump room is an isolated room which does not connect to the steam and feedline penetration area so that the valves perform their function in a normal mild environment. The valves are not required to function in the event of a main steam line break in the steam and feedline penetration area. Their failure in the event of a main steam line break would not preclude supplying feedwater to the steam generators because the 2 motor driven AFW pumps are not affected and will supply an adequate amount of feedwater to mitigate the accident. Therefore it is concluded that these valves are not within the Scope of 10CFR50.49 because they are not affected by the accident they are intended to mitigate.

System IV, Reactor Coolant

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
PT-455,-456, -457,-474	3	Containment	Foxboro NE11GM NIE-1-BEL	Pressurizer Pressure Transmitters	1984	Transmitters qualified. Wyle Report 45592-4 applies.
LT-459,-460, -461	11	Containment	Foxboro	Pressurizer Level Transmitters	Original Installation	To be replaced with qualified Foxboro Units. (g)
PT-402,-403	4	Containment	Foxboro E11GH	Reactor Coolant System Transmitters	Original Installation	To be replaced with qualified Foxboro units. (g)
Solenoids for PCV-956A,B,C,D	13	Pipe Penetration Area	ASCO 8314	Pressurizer Sample Isolation	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
Solenoids for PCV-519,-552	13	Pipe Penetration Area	ASCO 8314	Pressurizer Relief Tank Make-up Isolation	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
Solenoids for PCV-1702,-1705	13	Pipe Penetration Area	ASCO 8314	R.C. Drain Pump Discharge Valves	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
Solenoids for PCV-1786,-1787	13	Pipe Penetration Area	ASCO 8314	R.C. Drain Tank Vent Valves	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
Solenoids for AOV-1788,-1789, -548,-549, -956E,F,G,H	13	Pipe Penetration Area	ASCO 8314	Sampling Isolation Valves	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
SOV-1723,1728	13	Pipe Penetration Area	ASCO 8314	Sump Pump Discharge Valves	Original Installation	Units qualified. Report 7154-212E dated May 1983 applies.
MOV-222	62	Pipe Penetration Area	Limitorque SMB-00	RCP Seal Water Isolation	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.

System IV, Reactor Coolant (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
Solenoids for AOV-951,-953, -955A,B	None	Containment	ASCO LB8314	Sampling Isolation Valves	Original Installation	To be replaced with qualified units. (f)
RTD-410A,B, -411A,B, -413A,B,-420A,B, -421A,B,-423A,B, -430A,B,-431A,B, -433A,B,-440A,B, -441A,B,-443A,B	22	Containment	RdF	Reactor Coolant Temperature	1983	Units qualified. Narrow range units replaced with qualified RdF Units. WCAP-8587 applies.
			Sostman		Original Installation	Wide range units to be replaced with qualified RdF Units.
No Tag No.	43	Containment	TEC -501	Relief Valve Acoustic Monitor	1982	Units qualified. TEC report 517-TR-03 Rev. 2 applies.
MOV-535,-536	None	Containment	Limitorque SMB	PORV Block Valves	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
Limit Switches for PCV-956A, B,C,D,E,F	48	Pipe Penetration Area	NAMCO D2400X	Reactor Coolant & Pressurizer Sample Valve Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for PCV-1702, -1705	48	Pipe Penetration Area	NAMCO D2400X	Reactor Coolant Drain Tank Discharge Valve Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for PCV-1786, -1787	48	Pipe Penetration Area	NAMCO D2400X	R.C. Drain Tank Vent Valve Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.

System IV, Reactor Coolant (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
Limit Switches for AOV-951, -953,-955A,B	None	Containment	NAMCO D2400X, D1200G	Sample Isolation Valve Position	Original Installation	To be replaced with qualified NAMCO Limit Switches. (g)
Limit Switches for AOV-1788, -1789,-548,-549, 956G,H	48	Pipe Penetration Area	NAMCO D2400X	Sample Isolation Valve Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System V, Chemical and Volume Control

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
Solenoids for PCV-791,-793, -796,-798	14	Pipe Penetration Area	ASCO 8316	Let Down HX Isolation Valves	Original Installation	Units qualified. Report 7154-213E dated May 1983 applies.
Solenoids for PCV-201,-202	14	Pipe Penetration Area	ASCO 8316	Let Down Isolation Valves	Original Installation	Units qualified. Report 7154-213E dated May 1983 applies.
Limit Switches for PCV-791, -793,-796,-798	48	Pipe Penetration Area	NAMCO D2400X	Let Down HX Isolation Valve Position Indication	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for PCV-201, -202	48	Pipe Penetration Area	NAMCO D2400X	Let Down Isolation Valve Position Indication	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for PCV-1214,1214A thru 1217,1217A	48	Pipe Penetration Area	NAMCO D2400X	Steam Generator Blowdown Isolation Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for 519 and 552	48	Pipe Penetration Area	NAMCO D2400X	PZR Relief Tank Make-up Isolation Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for Valves 1723 and 1728	48	Pipe Penetration Area	NAMCO D2400X	Containment Sump Discharge Valves Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for Valves 1786 1787	48	Pipe Penetration Area	NAMCO D2400X	Reactor Coolant Drain Tank Vent Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
Limit Switches for Valves for PCV-1234 thru 1241	48	Pipe Penetration Area	NAMCO D2400X	Radiation Monitoring Isolation Valves Position	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
SOV-1314,1314A thru 1317,1317A	16	Pipe Penetration Area	ASCO-8300	Steam Generator Blowdown Isolation	Original Installation	Units qualified. Report 7154-111 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System VI, Heating and Ventilation System (containment)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
FCU-31,32 33,34,35	31	Containment	Westinghouse 69F97009	Motors for Containment Fan Coolers	Original Installation	Units qualified. Report 7154-121E dated July 1983 applies.*
SOV-1293, thru 1307	21	Containment	Skinner	Solenoids valves for Fan Cooler Damper	Original Installation	To be replaced with qualified solenoids. (e)(f)
No Tag No.	58	Containment	NAMCO EA-740	Limit Switches for Fan Cooler Dampers	1980	Units qualified. Report 7154-131E dated May 1983 applies.
Solenoids for PCV-1190, FCV-1170,-1172	20	Containment	ASCO HB-8316 NP-8320	Solenoids for Containment Purge, Pressure Relief Valves	1980	Units qualified. Report 7154-101E dated July 1983 and FC-4539 dated 9/76 apply. (e)
Solenoids for FCV-1171,-1173	16	Pipe Penetration Area	ASCO 8300	Solenoids for Containment Purge Valves	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
MOV-880A,B,C, D,E,F,G,H,J,K	52	Containment	Limitorque SMB-00	Charcoal Filter Dousing Valves	Original Installation	Units qualified. Report 7154-101E dated August 1983 applies.
No Tag No.	None	Containment	NAMCO EA180	Limit Switches for Purge Dampers PCV-1170 and 1172	Original Installation	Units Qualified. ACME Cleveland Report dated 7/7/77 applies. (e)
No Tag No.	None	Pipe Penetration Area	NAMCO EA180	Limit Switches for Purge Dampers PCV-1171 and 1173	Original Installation	Units Qualified. ACME Cleveland Report dated 7/7/77 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

* The motor for FCU-33 failed in September 1984. A qualified motor could not be procured. A JCO has been prepared for the replacement motor. The new motor will be qualified or replaced with a qualified motor by March 31, 1985.

System VI, Heating and Ventilation System (containment)

Note 2 - In the May 1983 Submittal, the authority incorrectly identified TE-1203-1, 1203-2, 1203-3, 1204-4, 1203-5 and TC-1117, 1135, 1143 and 1155. These items should not have been listed because:

a) Temperature Detectors Foxboro Model 1502-T (TE-1203-1, -2, -3, -4, -5) Fan cooler outlet temperature. These temperature detectors are used in normal operation to control service water flow to the fan cooler heat exchangers (the temperature detectors provide a signal to the temperature controllers for valves TCV-1103, 1104 and 1105). In the event of a safety injection signal, air is removed from the controllers and the valves move to their full open position. Since the temperature detectors have no accident mitigating function and there is no known failure mode of the valves or the temperature detectors which could affect the safety position of the valves, the temperature detectors are exempt from qualification.

b) Temperature Detectors Fenwal EL 2717-11 (TC 1117, 1135, 1143 and 1153), Fan Cooler Charcoal Filter fire detectors. The accident which these fire detectors are intended to mitigate is a fire in the fan cooler charcoal filters. They initiate fire suppression water flow in the event of a high temperature (>325°F) in the fan cooler charcoal filters. The units are hermetically sealed having a stainless steel shell, metallic temperature element, mica insulation, an epoxy/glass lead seal and TAGT insulated lead wires.

The temperature detectors are not used to mitigate a LOCA or MSLB and because of their hermetically sealed design and set point would not be affected by the accident conditions. The detectors are exempt from qualification because they do not have an accident mitigating (LOCA/MSLB) function.

System VII, Main Steam

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
PT-419A,B,C PT-429A,B,C PT-439A,B,C PT-449A,B,C	8	AFW Pump Room	Foxboro E11GM	Main Steam Pressure Transmitter	Original Installation	Units qualified. WCAP-8541, and NS-TMA-2319 apply. Aging Report No. 7205N dated May 1984 applies.
FT-419A,B FT-429A,B FT-439A,B FT-449A,B	None	Containment	Rosemount 1151	Main Steam Flow Transmitters	Original Installation	Note J.
LT-417A,B,C,D LT-427A,B,C,D LT-437A,B,C,D LT-447A,B,C,D	11	Containment	Foxboro E13DNMCA	Steam Generator Level Transmitter	Original Installation	To be replaced with qualified Foxboro units. (g)
Solenoids for MS-1-31,-32, -33,-34	18	Steam and Feed Penetration Area	Laurence 110114W 125434W	Main Steam Isolation Valves	Original Installation	To be replaced with qualified units. (f)
Limit Switches for MS-1-32, -32,-33,-34	47	Steam and Feed Penetration Area	NAMCO SL3	Main Steam Isolation Valve Position Indication	Original Installation	Units qualified. Report 7154-232E Rev. 1 dated February 1984 applies. (e)
PCV-1134,-1135, -1136,-1137	60	Steam and Feed Penetration Area	Fisher 546	Main Steam Atmospheric Relief Valves Actuation	Original Installation	Units qualified. Report 4 Problem 1531, Project 72AR28 applies. Aging Report No. 7205 dated April 1984 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System VIII, Main Feedwater

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
FT-418A,B FT-428A,B FT-438A,B FT-448A,B	10	AFW Pump Room	Foxboro E13DM	Main Feedwater Flow Transmitter	Original Installation	Units qualified. WCAP-8541 applies. Aging Report No. 7205N dated May 1984 applies.
BFD-5-1,5-2, 5-3,5-4	None	Steam and Feed Penetration Area	Limitorque SMB	Main Feedwater Isolation Valves	Original Installation	Units qualified. Report 7154-100E dated August 1983 applies.
BFD-90-1,90-2, 90-3,90-4	None	Steam and Feed Penetration Area	Limitorque SMB	Low Flow Feedwater Bypass Isolation Valves	Original Installation	Units qualified. Report 7154-100E dated August 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System IX, Containment

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
PT-948A,B,C PT-949A,B,C	7	Pipe Penetration Area	Foxboro E11GM	Containment Pressure Transmitters	Original Installation	Units qualified. WCAP-8541 applies. Aging March 1984.
Solenoid Valves for PCV-1191, -1192	51		ASCO NP8316	Actuates Containment Pressure Relief Valves	1980	Units qualified. Report 7154-110E and ASCO report AQS-21678T/R apply.
Limit Switches for PCV-1190, -1191,-1192	56,57	Containment and Pipe Penetration Area	NAMCO EA-180	Containment Pressure Relief Valve Position Indication	1980	Units qualified. Report 7154-130E applies. (e) (PCV-1190 only).
LT-940,-941	23	Containment	Gems LS1900	Containment Sump Level	Original Installation	Note K.
Solenoids for DW1,DW2,550, 1610	41	Pipe Penetration Area	ASCO NP8316	Actuates Containment Isolation Valves	1980	Units qualified. ASCO report AWS-21678/TR applies.
Limit Switches for DW1,DW2, 550,1610	42	Pipe Penetration Area	NAMCO EA-180	Containment Isolation Valve Position Indication	1980	Units qualified. Report 7154-130E applies.
PT-1421,1422	None	Pipe Penetration Area	Barton 763	Containment Pressure Transmitter	1981	Units qualified. Barton report R3-763-6 applies.
LT-1253,1254	None	Containment	Barton 764	Containment Level Transmitters	1981	Units qualified. Barton report R3-764-9-0 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System X, Instrument Air

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
Solenoid for PCV-1228	None	Pipe Penetration Area	ASCO 8300	Instrument Air Isolation	Original Installation	Unit Qualified. Report 7154-121E applies.
Limit Switch for PCV-1228	48	Pipe Penetration Area	NAMCO D2400X	Instrument Air Isolation Valve Position Indication	Original Installation	Unit qualified. Report 7154-233E dated May 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XIII, Common Equipment.

System XI, H_2 Recombination

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
No Tag No.	35	Pipe Penetration Area	Westinghouse	H_2 Recombiner I&C Panel	Original Installation	See Note (d).
No Tag No.	36	Containment	Westinghouse	Igniter Exciter for H_2 Recombiner	Original Installation	Qualified. WCAP-7709L applies.
No Tag No.	37	Containment	Westinghouse	Thermocouple for H_2 Recombiner Exhaust Temperature	Original Installation	Qualified. WCAP-7709L applies.
No Tag No.	38	Containment	Westinghouse	H_2 Recombiner Blower Motor	Original Installation	Motor qualified. Report 7154-122E dated July 1983 applies.
No Tag No.	39	Containment	Barton	Transmitter for H_2 Recombiner	Original Installation	To be replaced with qualified units. (f)
IV-2A,B, -3A,B,-5A,B	19	Pipe Penetration Area	Laurence 629BC85PS	Solenoids for H_2 Recombiner Isolation (Laurence)	Original Installation	To be replaced with qualified units. (f)
Limit Switches for IV-2A-B, -3A-B,-5A-B	50	Pipe Penetration Area	Micro EXAR-3	Limit Switches for H_2 Recombiner Isolation	Original Installation	Qualified. Report 235E dated April 1983 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XV Common Equipment.

System XII, Sampling

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
SOV-1534, -1535,-1536, -1537,-1538, -1539,-1540, -1541	16	Pipe Penetration Area	ASCO 8300	Containment Building Air Sample Isolation	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
SOV-1523,1523A thru 1526,1526A	16	Pipe Penetration Area	ASCO 8300	Solenoids for Steam Generator Sample Isolation	Original Installation	Units qualified. Report 7154-111E dated June 1983 applies.
Limit Switches for PCV-1223, 1223A thru 1226, 1226A	48	Pipe Penetration Area	NAMCO D2400X	Position Indication for Steam Generator Sample Isolation Valves	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
No Tag No.	None	Pipe Penetration Area	NAMCO D2400X	Position Indication for Containment Building Air Sampling	Original Installation	Units qualified. Report 7154-233E dated May 1983 applies.
M-1 through M-10	None	PAB	ASCO 8262	Sampling System Isolation	1980	June 1984
No Tag No.	None	PAB	Thomas 727CH33	Sample Pump Motor	1980	June 1984
No Tag No.	None	PAB	Millipore CN0949	Sample Pump Motor	1980	June 1984
Solenoid for 958	None	Pipe Penetration Area	ASCO NP8320	RHR Sample	1980	Unit Qualified. Report AQS 21678 T/R applies.
990A,B; 994A	None	Pipe Penetration Area	Limitorque SMB-000/-00	SI Recirculation Sample	1980	Units Qualified. Report 7154-101E August 1983 applies.

System XII, Sampling (continued)

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
No Tag No.	None	PAB	Thomas 707CN50	Sample Pump Motor	1980	June 1984
No Tag No.	None	PAB	Dayton 2Z830	Sample Pump Motor	1980	June 1984
No Tag No.	None	PAB	Dayton 4X426A	Capacitor	1980	June 1984
R25,R26	None	Containment	General Atomic RD-25	High Range Radiation Monitor	1983	Units qualified. Report E-254-960 May 1, 1981 applies.
R27	None	Fan House	General Atomic	Wide Range Gas Monitor	1983	Unit qualified. Report E255-968 applies.

Cables, splices, terminal blocks, electrical penetrations used in safety-related systems are discussed in System XV, Common Equipment.

System XIII, Common Equipment

Plant ID No.	TER No.	Location	Manufacturer and Model No.	Description	Expected Or Actual Installation Date	Expected or Actual Environmental Qualification Documentation Date
N/A	32	Containment	Westinghouse 542247	Terminal Block	Original Installation	Units qualified. Report 7154-180E dated January 1983 applies. (J)
N/A	33 & 34	Containment	Westinghouse WX31774,31775, 31776,31892	Electrical Penetrations	Original Installation	Units qualified. PENTR-81-37 and PENRLK 3-16-01 apply.
N/A	44 & 45	Inside & Outside Cntmt.	Rockbestos Firewall III	Rockbestos Cable	1980	Cable qualified. Report 170E applies.
N/A	24	Inside & Outside Cntmt.	Kerite	Kerite Cable	Original Installation	Cable qualified. Report 170E applies.
N/A	25	Inside & Out-outside Cntmt.	Raychem WCSF(N)	Raychem Cable Splice	Original Installation	Splices qualified. Report 170E applies.
N/A	26	Inside & Outside Cntmt.	Lewis	Lewis Cable	Original Installation	Cable qualified. Report 170E applies.
N/A	59	Containment	Conax N11001	Connector	1980	Connector qualified. Conax Report IPS-409 applies.

Notes for Master List of Electrical Equipment Important to Safety

a) This equipment performs its function before the environment becomes harsh. A harsh radiation environment can only occur after the safety injection function has been completed and the system is no longer in use. The safety injection pumps take suction from the refueling water storage tank which is not radioactive and no radiation exposure occurs to the equipment. When all of the water has been pumped into the plant the safety injection is no longer used for any break which would cause core damage. Recirculation through the safety injection system would only occur for very small breaks which would not depressurize the reactor coolant system. It is only recirculation through the RHR system after large break LOCA that results in a high radiation area in the pipe penetration area and SI pump room. In addition, test report WCAP-8541, WCAP-8754 and WCAP-7410L establishes qualification of the equipment for the harsh environment so that the equipment would be available for use at any time in the post accident period. Aging analyses and qualification reports are available for all of the SI System Equipment.

b) MOV-744, MOV-769 and MOV-797 have motor brakes with Class B insulation. WCAP-7410L indicates that the Class B insulated motor brake failed during environmental testing. Although the testing was more severe than the Indian Point Unit 3 accident conditions, because it cannot be determined at what point the motor brake failed and the exact cause of the failure, the Authority plans to replace the actuators of MOV-744, MOV-769 and MOV-797 with qualified actuators.

c) As noted in the FRC TER for equipment located in the Auxiliary Feed Pump Room:

"At present, qualification is not established for the redundant temperature switches (see equipment item 40). Once the Licensee has demonstrated a reliable steam line isolation feature initiated by the qualified temperature switches, the safety-related components located in the auxiliary pump room will be excluded from the scope of their review. The Licensee should ensure that the critical components will not be elevated to temperatures that will affect their operability."

The Authority agrees with the FRC evaluation. The temperature switch (TER item 40) has been qualified in Report 245E. Since the temperature switch will preclude a harsh steam environment the equipment is satisfactory.

An evaluation of the effects of a break in the 4" steam supply line to the AFW turbine driven pump has been made and it has been determined that the total duration of the transient is less than one minute. The safety-related equipment located in the AFW pump room has been evaluated for a much more conservative transient (135°F for 1 hour) and it has been concluded that the equipment is qualified and satisfactory for the environment. WCAP-8541 demonstrates that the transmitters are qualified and perform reliably well above the maximum accident temperature. To ensure continued qualification the seals will be replaced as required by the aging analysis.

d) The only harsh parameter is low levels of radiation ($\sim 10^3$ rads); shielding analysis to be completed by prior to March 31, 1985.

e) The conduit connection will be sealed using a qualified seal such as a conax connector or RTV.

f) This item has been scheduled to be completed during the Mid-Cycle Outage that is for steam generator inspection but may be deferred to the cycle 4/5 refueling outage because of length of outage, manpower shortages, and other time restraints.

g) This item has been scheduled to be completed during the cycle 4/5 refueling outage but could be completed during the Mid-Cycle Outage if its duration is extended beyond its scheduled completion date.

h) Regarding the accumulator discharge valves, FRC, (in TER-C5257-206) stated the following:

"FRC Evaluation"

The accumulator discharge valves (MOV-894A,B,C,D) are normally-open motor-operated gate valves. These valves are checked-open by the safety injection signal at the start of the accident. Accumulators are installed to reflood the core following a design basis accident during the initial blowdown while the safety injection pumps are being started and attaining rated capacity. Accumulator injection begins within seconds of the start of the accident, and the dead-band for starting the active safety injection equipment is generally approximately 30 seconds. Once the accumulators have discharged, the discharge valves are hsut as a backup to the check valves, which prevent back-flooding of the accumulators. Since there are two check valves in each accumulator discharge line, the proper operation of these valves following the injection phase of an accident is of little consequence even if the valves are not promptly shut.

FRC Conclusion:

The accumulator discharge valves (Item 7) do not require environmental qualification beyond their short-term function."

The Authority has reviewed the applicable test reports (WCAP-7410L and Limitorque B0003) and has determined that the testing envelopes the Indian Point Unit 3 accident conditions and that the valves are qualified for their required operating time plus 1 hour.

i) The test reports applicable to the Westinghouse terminal blocks installed at Indian Point Unit No. 3 are F-C4911-1 and F-C4911-2. Insulation resistance measurements were made during the test at 500VDC, 100VDC and 50VDC. The lowest resistance measurement at 500VDC was 6.5×10^5 ohms which corresponds to a leakage current of 0.77 milliamps. The lowest resistance at 100VDC was 6×10^5 ohms which corresponds to a leakage current of 0.17 milliamps. The lowest resistance at 50VDC was 3.5×10^5 ohms which corresponds to a leakage current of 0.14 milliamps. The leakage currents would not adversely affect Indian Point Unit No. 3 instrument circuits.

j) The main steam flow transmitters are qualified. A Rosemount 1151DP transmitter from the same order as the installed units satisfactorily completed testing on May 21, 1984. The transmitter was preaged to an equivalent life of 15 years, subjected to a radiation level of 1.53 megarads (MSLB radiation level) and to steam and chemical spray for 1.5 hours (1 hour plus operating time for trip function equipment). The transmitters maximum error was approximately -6% which is within the allowable limits specified (-10%) by Westinghouse for the main steam flow transmitter. The qualification report is expected in June of 1984.

k) As part of the Indian Point Unit 3 TMI action plan program (NUREG-0737) Qualified Barton 764 transmitters were installed to monitor containment water level. The installed GEMS level switches, however, provide signals to indicating lights in the control room. The Authority considers that the indicating lights provide useful information to the operating personnel. Therefore, either bistables will be incorporated into the transmitter circuits or the GEM's level switches will be replaced with qualified units to provide signals to the indicating lights in the control room.

Enclosure 3

10 CFR 50.49(b)(2) Methodology

1. In preparing the May 1983 submittal in response to 10 CFR 50.49 the following was done:

   A. The non-safety-related systems which are connected to the emergency AC and DC buses were identified.

   B. Any equipment located in potentially harsh environments in the non-safety systems identified in A was listed.

   C. Failure modes and effects analyses were performed on the equipment based on the environmental conditions (steam, radiation, chemical spray) to which the equipment would be exposed.

   D. The effects of the potential failure modes were evaluated to determine whether there could be any degradation of the emergency AC and DC power supplies.

   The evaluation included systems such as lighting, communications, security, and HVAC and it was determined that:

   - Some items such as cable are qualified for the harsh environment to which they would be exposed.

   - There were no failure modes of equipment which could degrade the emergency AC or DC power supplies and thus affect safety-related equipment.

2. In determining the motor operated valves and solenoid valves for air operated valves to be included in the May 1983 submittal required by 10 CFR 50.49, the System flow diagrams were reviewed to assure that the listing was complete. The review established the following:

   - The valves used to isolate the safety-related systems from nonsafety systems or to isolate safety-related portions of a system from non-safety-related portions of the same systems were:

     - Qualified motor opeated valves (Limitorque)
     - Check valves
     - Normally closed manual valves
     - Qualified solenoid pilot valves for air operated valves
     - Solenoid valves whose failure modes ensure that the isolation function is accomplished and maintained.

   - The valves associated with the ultimate heat sink (service water, closed cooling water, River Water) were either qualified for the environment to which they would be exposed or were located in a mild environment.

3. In determining the list of instruments (transmitters and limit switches) to be included in the May 1983 submittal required by 10 CFR 50.49, the flow diagrams (P&ID's) were reviewed to assure that the listing was complete. The review established that the transmitters and limit switches in the safety-related systems were either qualified or are scheduled to be replaced with qualified equipment.