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Writer's Direct Dial Number:

March 25, 1985  
5211-85-2059  
RFW-0442

Office of Nuclear Reactor Regulation  
Attn: D. G. Eisenhut, Director  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station Unit 1 (TMI-1)  
Operating Licensing No. DPR-50  
Docket No. 50-259  
Response to Generic Letter 84-24

In accordance with your letter of December 27, 1984, GPUN has in place and is implementing an Environmental Qualification program which to our knowledge satisfies the requirements of 10CFR50.49. In response to your previous letter of March 25, 1984, GPUN outlined the Environmental Qualification Program and provided qualification status for each of the components on the Master List by letter dated December 11, 1984 (5211-84-2292). The Master List identified components which are needed in order to provide a qualified path to safe shutdown as well as equipment required to be qualified for post accident monitoring (RG 1.97) and other plant specific requirements. Attached to GPUN's letter of December 11, 1984 were nine Justifications for Interim Operation (JIO) for equipment which was not currently qualified but which was to be tested and qualified or replaced. Seven of these JIO's (TI-1-5, 7 & 8) are no longer applicable because of testing and replacement. On February 15, 1985 (5211-85-2032) GPUN provided a request for schedular extension for the remaining two components to November 30, 1985:

a) Incore Thermocouple Extension Cable and Connector	Continental/ Bendix	JIO-TI-84-6 Rev 2 (Encl. 3)
b) Hi Range Rad Monitor Cable and Assembly	Anaconda/ Victoreen	JIO-TI-84-9 Rev 2 (Encl. 4)

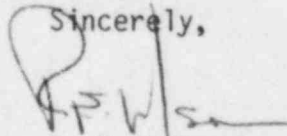
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GPUN also indicated some open items which will be resolved by March 31, 1985 (Enclosure 1). All other safety related electrical equipment required to be environmentally qualified is considered fully qualified.

Further, GPIIN has reviewed the I&E Bulletin and Notices listed in your letter of December 27, 1984. Summary information on relevance is provided in Enclosure 2. Additional information concerning the relevant Bulletin/Notices is contained in the respective EQ file.

Sincerely,



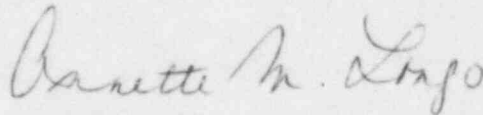
R. F. Wilson

Director Technical Functions

Sworn and subscribed to before me this 25th day of March 1985

1r/1422f

cc: R. Conte  
J. F. Stolz  
J. Van Vliet



ANNETTE M. LONGO  
Notary Public of New Jersey  
My Commission Expires Sep. 29, 1987

## Enclosure 1

### Open Items List

The following open items are described in our submittal of November 9, 1984 and December 11, 1984 (Attachment 5) and are planned for completion by March 31, 1985. Currently the modifications of Section A are installed and are awaiting turnover to the plant except A.2 which is in testing.

#### A. Modifications

1. Replacement of the differential pressure transmitters for MU23-DPT 1,2,3&4 and MU-42DPT with qualified Rosemount transmitters (JIO-TI-84-4).
2. Replacement of the level transmitters for MU-14-LT with a qualified transmitter (JIO-TI-84-4).
3. Replacement of the differential pressure transmitters for BS-1-DPT 1 & 2 with a qualified transmitter (JIO-TI-84-2).
4. Replacement of the Decay Heat Exchanger Outlet Temperature (DH-2-TE 1& 2) with qualified RTD's (JIO-TI-84-5).
5. Replacement of the low pressure injection (LPI) flow indication (DH-1DPT- 1&2) with a qualified Rosemount transmitter (JIO-TI-84-1).
6. Replacement of the cold junction RTD's (TE 952A-955A) with qualified RTD's (JIO-TI-84-7).

#### B. File Status

(See Revised Attachment 5 attached)

GPU NUCLEAR CORPORATION  
ATTACHMENT 5\*

TMI-1 EQ FILES STATUS REV. 1

<u>FILE NO.</u>	<u>MANUFACTURER/ MODEL NO./ COMPONENT</u>	<u>QUALIFICATION STATUS</u>
EQ-TI-103	Limatorque Various (Containment) Valve Motor Operators	Qualified.
EQ-TI-105	Limatorque SMB-0, -000, -1,-2,-3 Valve Actuators (Auxiliary Building)	Qualified
EQ-TI-113	ASCO 206-381-5RVF 206-381-7RVF NP 8316 66E Solenoid Valves	Qualified DHV-4B will have a qualified terminal block installed to correct a motor leads problem by March 31, 1985.
EQ-TI-114	ASCO 8316, 8321 Series Solenoid Valves	Qualified
EQ-TI-115	Square D 9013-AMG-5 Pressure Switch	Qualified
EQ-TI-117	Static-O-Ring 9TA, 4N6 and 12N6 Series Pressure Switches	Qualified
EQ-TI-118	Rosemount 1153 Series D Pressure Transmitters	Qualified

\*GPUN letter dated 12/11/84 (5211-84-2292)

EQ-TI-119	Westinghouse Class 1E Large A.C. Pump Motors	Qualified
EQ-TI-121	General Electric 5K37JG403 Pump Motor	Qualified
EQ-TI-123	General Electric 5K810037A1 Pump Motors	Qualified
EQ-TI-124	Transamerica Delaval (GEMs) XM54852 Level Transmitter	Qualified
EQ-TI-127	Namco M8, D2400X and SL Series Limit Switches	Qualified
EQ-TI-128	Bailey Meter BY 8B41X-A BY 3B40X-A Level Transmitter	Qualified
EQ-TI-129	Rosemount 1152 Pressure Transmitter	Qualified
EQ-TI-130	Rosemount 177HW-2	Qualified
EQ-TI-131	Conax Modified PL Series/ 7590-10000-01 through 23 Conduit Connector	Qualified
EQ-TI-132	Micro Switch BZE6-2RN DTE6-2RN Limit Switches	Qualified

EQ-TI-133	General Semiconductor JTXIN6071A Voltage Suppression Diode	Radiation test completed. Qualified subject to replacement of the suppression diodes associated with solenoid valves SV/ICV-3, SV/MUV-3, and SV/MUV-18 with selected units having low measured values of leakage current ( $I_R$ ) (JIO-TI-84-8). Replacement will be completed by March 31, 1985.
EQ-TI-134	Raychem WCSF-200-N Low Voltage Splice (IKV)	Qualified
EQ-TI-135	Target Rock 80Z-14-003, 80Z-14-005, 80Z-14-008 Solenoid Valves	Qualified
EQ-TI-137	General Electric F01 Series Containment Electrical Penetration	Qualification documentation has been prepared by the vendor in which they conclude that the penetrations are qualified with no outstanding items. Documentation will be received and reviewed by March 31, 1985.
EQ-TI-138	Ross 2676A4011 (Pilot and Solenoid Assembly, Part No. 233C93) Solenoid Assembly	Qualified
EQ-TI-139	Babcock and Wilcox Incore Thermocouple Monitoring System	As described in our request for schedular extension dated Feb. 12, 1985 the cable and connector will be tested in April with a report due in May. In the event that the cable fails to pass it will be replaced in Nov. 1985 with qualified cable. See JIO-TI-84-6 Rev. 2 (Enclosure 3).
EQ-TI-141	Valcor V526-5296 Solenoid Valves	Qualified.
EQ-TI-142	Rockwell International 190MM23001 Thermal Hydrogen Recombiner	Qualified



EQ-TI-143	Compsip KIII/KIV Hydrogen Analyzer System	Qualified
EQ-TI-144-	Victoreen 877-1 Radiation Detector	Detector qualified. Documentation is not available to support qualification for the existing cable assembly. See JIO-TI-84-9 Rev. 2 (Enclosure 4)
EQ-TI-147	ASCO SA21AR Pressure Switches	Qualified subject to confirmation of installation documentation for PS-479A/B/C to be completed by March 31, 1985.
EQ-TI-148	Bailey Meter B3032685F  RTD	Replaced by qualified Weed RTD's (EQ-TI-136). See Item A.4 (JIO-TI-84-5)
EQ-TI-149	Rosemount 1153 Series B Pressure Transmitters	Qualified

EQ Bulletin/Notices Summary

<u>IEB/N</u>	<u>Subject</u>	<u>Relevant</u>	<u>Comment</u>
82-04	Cont. Elect. Penetration Assemb.	No	GPUN ltr 5/20/83 (5211-83-164)
82-11	Inaccuracies in Wide Range Press. Inst.	No	TMI-1 is not a Westinghouse plant.
82-52	Test Summary Reports 1-11	No	ASCO NP 1 not exposed to greater than 20 Mrads
83-45	GE CR-2940 Position Selector Switch	No	Not used on Class 1E Equipment in radiation areas approaching 10 MRads.
83-72	Test Summary Reports 12-24	Yes	13,17,18,22&24 Apply
84-23	ASCO solenoid Valves No. 8344 & 8316	Yes	Only SV 3&4 FWV-17B
84-44	Rockbestos Cable	Yes	Qualified to DOR Guidelines
84-47	Terminal Blocks	Yes	Inside containment TMI-1 use Raychem Splice. Outside containment TB's are used



84-57	Moisture Intrusion	Yes	Moisture intrusion effects on specific components have been addressed in the relevant EQ files. EQ related maintenance/ surveillance requirements are identified to the plant on the SCEWs. The preventive actions in IEN-84-57 are under review.
84-68	Field wiring of Solenoid valves	Yes	Valcor and Target Rock.
84-78	Underated Terminal Blocks (Sean Products)	Yes	Generally. Specifically TMI-1 has no Beau Terminal Blocks in the EQ Program

JIO-TI-84-6, Rev. 2  
March 1, 1985  
Page 1 of 7

COMPONENT

Tag No: None  
Description: TMI-1 Incore Thermocouple Cable Assembly

OBJECTIVE

The objective of this JIO is:

- a. to demonstrate that the safety function can be accomplished within the time frame for which the cable assembly is qualified.
- b. to demonstrate that the safety function can be accomplished by designated alternative instrumentation.
- c. to demonstrate the applicability of TMI-2 accident test data in support of the cable assembly qualification.

EQUIPMENT DESCRIPTION

<u>Equipment Description</u>	<u>Manufacturer</u>	<u>Model No.</u>
Incore Monitoring System	Babcock & Wilcox	DA7L-1B-1T-1C-128
Incore assembly to cable connector	Bendix	JT07A-14-19P (302) JT06A-14-19S (101)
Cable	Continental Wire & Cable Co.	GAI B/M EK-15L

The incore thermocouple cable, which extends from the incore assembly connector to the reactor building penetration has not been demonstrated to be environmentally qualified in accordance with 10CFR50.49 for the combined steam and pressure/temperature environment associated with a large break LOCA or steam line break accident.

EQUIPMENT LOCATION

The incore thermocouple junctions are located in the outlet plenum of the fuel assemblies, inside the reactor vessel. The thermocouple wires for each assembly pass through a pressure boundary (seal plate) located on the south side of elevation 346' inside containment. This elevation is the operating deck and is outside the reactor cavity and D-ring. The cable assembly is, therefore, protected against the jet impingement effects of LOCAs and HELBs. It is exposed to the bulk containment environment. The Bendix connector, which is located outside of the seal plate pressure boundary, enables the incore detector assembly to be connected to an external cable that extends to the containment penetration.

## EQUIPMENT FUNCTION

The incore thermocouples provide a direct measurement of the core outlet temperature from 52 locations in the outlet plenum of the fuel assemblies. Data from all of the 52 incore T/C data are available in the control room via the plant computer. Sixteen of these T/Cs (4 per quadrant) may be read out digitally in the control room. These 16 T/Cs are designated as the Backup Incore Readout System (BIRO).

## EVALUATION

### a. Large Break LOCA Steam/Pressure/Temperature

The incore thermocouples are used to indicate that the core is being cooled by verifying the effects of LPI cooling. The minimum qualification period is the time necessary to achieve and verify stable cooling by the low pressure injection (LPI) system. For the smallest large break LOCA of 0.5 Ft<sup>2</sup>, the RCS depressurizes to pressures at which LPI achieves full flow in under five minutes (refer to Figure C-10 of Reference 1). Within two hours, the LPI suction would be established from the building sump and long term core cooling established. Flow of at least 1000 gpm per LPI train is specified in plant procedures. In the case of a core flood line break accident, this assures at least 1000 gpm to the vessel. This is sufficient flow to assure adequate core cooling for any large break LOCA. Long term indication that core cooling is maintained may also be obtained from LPI heat removal path components.

The principal method of assuring stable long term cooling is by monitoring low pressure injection flow. This instrumentation will be qualified for operation in a post-LOCA environment before restart of TMI-1. Additional qualified instrumentation will also be available to determine that the DH heat exchangers are functioning (DH outlet temperature and certain secondary services cooling water temperature will be available to the operator as per R.G. 1.97). Verification of proper heat exchanger performance and LPI flow assures long term core cooling following any large break LOCA.

### b. Use of Incore Thermocouples During Accident/Transients (SB LOCA and HELB Inside Containment)

#### 1. Alternate Instrumentation

The symptom oriented emergency procedures at TMI-1 cover both design basis and beyond design basis accidents and transients. ATPs refer to the incore thermocouples for use in the following situations:

<u>INDICATION</u>	<u>ACTION</u>	<u>ALTERNATE</u>
1. Subcooling margin (SCM) less than 25F as calculated by T/Cs and RCS pressure <sup>1</sup>	<ul style="list-style-type: none"> <li>° Initiate HPI</li> <li>° Raise OTSG level to 90 - 95%</li> </ul>	Use RCS pressure and temperature and calculate SCM once flow is verified in the RC loops in accordance with plant procedure ATP 1210-10. (see Item 5)
2. Subcooling margin greater than 25F <sup>1</sup>	<ul style="list-style-type: none"> <li>° Allowed to throttle HPI if pressurizer level is on scale</li> <li>° Restart RCPs</li> </ul>	Use RCS pressure and temperature and calculate SCM once flow is verified in the RC loops in accordance with plant procedure ATP 1210-10. (see Item 5)
3. Subcooling margin approaching 100F subcooling <sup>1</sup>	<ul style="list-style-type: none"> <li>° Throttle HPI to prevent exceeding PTS limits</li> </ul>	Use RCS pressure and temperature and calculate SCM once flow is verified in the RC loops in accordance with plant procedure ATP 1210-10. (see Item 5)
4. Incore T/Cs do not indicate a decreasing temperature trend	<ul style="list-style-type: none"> <li>° Maintain a minimum EFW flow of at least 225 gpm until OTSG level reaches 90 - 95% (Ref 8)</li> </ul>	Plant procedure requires OTSG level to be raised to 90-95% upon loss of SCM (see Item 1) although minimum flow would not be specified. OTSG level would still be raised to 90-95% in time to prevent prevent core uncover

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<sup>1</sup> With reactor coolant pumps running, the subcooling margin is calculated from the hot leg RTDs. If RCPs are off, the subcooling margin is calculated from the incore thermocouples.

<u>INDICATION</u>	<u>ACTION</u>	<u>ALTERNATE</u>
5. Incore T/Cs and hot leg RTDs not trending together	° This is one indication of a loss of natural circulation. Attempt to re-establish natural circulation flow	Use RCS temperature $T_{HOT} + T_{COLD}$ OTSG level and pressure steam & feed flow

None of the above actions are taken during a large break LOCA. Rather, they are intended to maintain or restore the plant to subcooled conditions during HELBs and SB LOCAs and prevent core damage.

## 2. T/C Required Operating Time and Environment

The RCS would be cooled down and depressurized with LPI removing decay heat in 2 - 10 hours during an SB LOCA. For an SB LOCA which does not quickly depressurize the RCS to LPI operating conditions, the containment cooling system heat removal capacity will exceed the energy release to the reactor building while the OTSG heat removal system removes the core decay heat and cools the RCS. Thus, the containment pressure and temperature will be returned to nearly pre-event conditions within a relatively short period. With LPI established, the core is kept covered by the LPI flow. LPI mode core cooling can be confirmed from LPI flow and DH heat removal system performance monitoring.

Therefore, the incore thermocouples would have to be available for about 10 hours in order to perform the above actions specified in the emergency procedure functions. At the end of that time, the RCS would be cooled down and depressurized with LPI removing decay heat. Small break LOCAs can be described into categories based on their effect on RCS pressure. The following discussion describes these three categories and discusses the time required for incore T/Cs during each type break and the effect of such a break on the containment environment.

The largest small break LOCAs result in continuous depressurization to the LPI setpoint. Examples of such RCS pressure responses are illustrated in B&W ECCS analyses (Reference 3) and TMI-1 ATOG, Part II, Volume 2 (Reference 4). Analyzed breaks in this class (about 0.1 to 0.5 square feet) depressurize to below the core flood tank actuation setpoint in about 15 minutes. Since these break sizes are large enough on their own to remove decay heat, continued cooldown and depressurization to pressures at which LPI flow is established is on the order of several hours. Once LPI flow is established, then core cooling is verified by LPI flow and DH heat exchanger performance. Since this size of break is large enough to remove decay heat, the containment temperature and pressure peaks at about 30 psig and 240-250F.



The next size category of breaks (about 0.1 to .02 square feet) stabilizes at pressures near the OTSG pressure. This occurs because the break is too small to remove decay heat. The OTSGs remove the remaining decay heat and cool the cold leg temperature to the OTSG saturation temperature. As RCS pressure decreases, the break flow decreases, and HPI flow increases. With two HPI pumps available, the sensible heat of the HPI in combination with the break flow exceeds decay heat almost immediately and depressurizes the RCS to the LPI setpoint in several hours. With one HPI pump available, the break is large enough to initially exceed the flow from one HPI pump. The RCS either does not refill until several hours into the transient or until the LPI system is initiated. Nevertheless, break flow in combination with the sensible heat removal from HPI flow depressurizes and cools the RCS. Reference 3 shows the response for break sizes as small as .055 square feet result in depressurization to the core flood tank pressures in less than 45 minutes. Based on mass and energy balance calculations, the RCS depressurizes to the LPI initiation setpoint in less than 10 hours (Reference 4). HPI flow to the vessel is assumed to be a maximum of 330 gpm (i.e. 64% to the core and 36% out the break).

The containment response to such a break (.085 ft<sup>2</sup> LOCA) with one HPI pump available has been analyzed in Reference 6. The building active and passive heat sinks remove the energy relieved to the building for this class of breaks. Pressure never exceeds 15 psig and temperature, which peaks at 200F is reduced below 175F within 10 minutes.

The third class of small breaks belongs to those which are too small to remove decay heat or pass full HPI flow. The initial result is a voiding of the RCS and loss of heat transfer to the secondary side. Eventually, the RCS voids sufficiently to initiate boiler condenser heat transfer to the OTSGs and RCS pressure decreases. Reduction of RCS pressure to the CFT actuation setpoint will cause the RCS to continue cooldown even without OTSG heat transfer. The system begins to fill as a result of this depressurization (break flow decreases and HPI flow increases). In 2-3 hours, the decay heat drops off sufficiently to cause the RCS to begin cooling down even without OTSG heat transfer. HPI flow exceeds the break flow at this time.

Considering only mass and energy balances, the RCS could be refilled in several hours for this break. However, steam voids in the hot leg U-bend could delay refill and re-establishment of single phase natural circulation. Procedural guidance for bumping RC pumps would cause the system to refill. If the RCS repressurized to 2300 psig, the PORV would be opened as per procedures. This action will reduce RCS pressure until the CFTs activate. CFT flow in conjunction with HPI flow is sufficient to cause the RCS to cooldown and depressurize. Alternatively, opening the hot leg vents would allow refill of the system if the hot legs contained steam in the U-bend but subcooled water in the remainder of the hot leg piping.

The containment conditions for this class break are comparable (but less severe) than results shown for the .085 ft<sup>2</sup> LOCA.



### 3. TMI-2 Experience

Experience from the TMI-2 accident gives indication that the cable assembly can survive high humidity temperatures between 140 and 180F (Reference 9, "Equipment and Actuation Matrix") and chemical spray. Inspections performed on the TMI-2 cables indicate that fifty (50) thermocouples are known to have electrical continuity through the seal table to the internal area of the reactor vessel (References 2 and 7). The remaining two (2) thermocouple cables are in an unknown condition at this time with an open connection either at the seal table or internal to the vessel. This condition is being investigated. The cable and connection at the seal table are being removed for examination and testing (see "Qualification Plan" below). EG&G has concluded that the only evidence that the problem could be at the seal table (i.e. external to the vessel) is that the anomalies seen on these two cables are different from the other cables. All other thermocouples are known to be damaged inside the reactor vessel as a result of core damage. However, they also believe that the condition of these two cables could be an actual physical condition inside the reactor vessel. The incore thermocouple anomaly is similar to two SPND cables that are known to be in a damaged area having indications of being open and dry (while they are expected to be open and wet) (References 2 and 7). This further supports the suggestion that the two anomalous thermocouples may be damaged internal to the reactor vessel.

### QUALIFICATION PLAN

GPUN is pursuing parallel paths concerning the incore thermocouple extension cable qualification. The first path includes testing of the extension cable between the seal plate connector and the containment penetration to verify qualification. Results of this test will be available by May 1985. This testing will include the same type of cable that was exposed to the TMI-2 accident environment. The second path involves the replacement of the extension wires with qualified cable should the cables fail and the connectors pass the test. The resolution of this item will be based on the results of the testing. The test plan is currently under review. The schedule for completion of testing of the extension cable and connector is 30 weeks for procurement and fabrication, and 28 weeks for engineering and installation. Eighteen of those 28 weeks overlap with the procurement and fabrication schedule.

### RESULTS

For large break LOCAs:

- The safety function is accomplished by procedural guidance and qualified instrumentation without reliance on the incore thermocouple assemblies.

For SB LOCAs and HELB inside containment:

- The safety function can be accomplished by alternate qualified instrumentation with existing procedural guidance.

- The safety function can be accomplished within the relatively short time (2-10 hours) and in a relatively benign containment environment using the incore thermocouple assemblies.
- The safety function can be accomplished based on inspections of the TMI-2 incore thermocouple assemblies which are similar to those at TMI-1.

#### CONCLUSIONS

The information provided in this discussion demonstrates safe plant operation with important to safety electrical equipment that has not yet been qualified in accordance with 10CFR50.49. Safe plant operation has been demonstrated by meeting the acceptance criteria of 10CFR50.49 which are addressed as objectives of this justification.

#### REFERENCES

1. R. C. Jones, J. Biller, B. M. Dunn, "ECCS Analysis of B&W's 177-FA Lowered-Loop NSS-Rev 3". July 1977. BAW 10103A. Babcock & Wilcox, Co. Lynchburg, VA.
2. R. Meininger to Distribution, "Examination of TMI-1 Incore Extension Cable and Seal Table Connector - RDM-58-84". November 7, 1984. EG&G. Middletown, PA.
3. James H. Taylor, Letter to S. A. Varga, US NRC. July 18, 1978. Babcock & Wilcox Co., Lynchburg, VA.
4. Babcock & Wilcox Co., "Abnormal Transient Operating Guidelines". Doc ID 74-1124158-00. April 6, 1983. Lynchburg, VA.
5. Calculation Number C-1101-220-5450-023, "CSMP Analysis of TMI-1 SB LOCA Response".
6. L. C. Lanese. "Containment Response to Small Break LOCAs". TDR 644. Draft.
7. TMI-2 Incore Instrumentation Damage - An Update GEND-INF-031, Volume II. April 1984. EG&G, Idaho Falls, Idaho.
8. Babcock & Wilcox Co. Evaluation of SBLOCA Operating Procedures and Effectiveness of Emergency Feedwater Spray for B&W - Designed NSSS. February 1983. B&W Doc ID 77-1141270-00. Lynchburg, VA.
9. "Analysis of Three Mile Island - Unit 2 Accident", Nuclear Safety Analysis Center, NSAC-80-1. March 1980.

## Justification for Interim Operation

1.0 Component

Victoreen Monitor Cable and Connector Assembly  
Tag No.: RMG 22 & 23

2.0 Objective

The objective of this JIO is to demonstrate that:

The safety function can be accomplished by some designated alternative equipment if the principal equipment has not been demonstrated to be fully qualified.

3.0 Existing Equipment Description

The cable assembly consists of the following components:

3.1

<u>Device Type</u>	<u>Manufacturer</u>	<u>Model No.</u>
Cable	Anaconda/Time Wire	FR-13AA
Cable Connector	Victoreen	Pt No. 877-1-5
High Temperature Software	Victoreen	Pt No. MS#A-0015
Potting Resin	Victoreen	Pt No. MS# J4375
Shrink Sleeving	Victoreen	Pt No. MS#H-6229
Nickel Seal	Victoreen	Pt No. 877-1-60
Adhesive, Duhesive No. 300	Victoreen	Pt No. MS# J4365
Pull Box	GPU field	None
Stainless Steel Hose	Swagelok	SS-12HU-6-S12
Heat Shrinkable tube/splice	Raychem	WCSF-N

4.0 Equipment Location

The cable assembly is located inside the containment at 362-0" elevation. This cable assembly runs from the containment penetration to the Victoreen radiation detectors RMG-22 & 23 mounted on top the "D" rings. The normal radiological dose rate in this compartment is 10 to 100 MR/hr which results in a maximum integrated dose of  $3.4 \times 10^4$  Rads over 40 years at aging temperature of 125°F. During a LOCA the postulated total integrated dose is  $2.0 \times 10^7$ , at a temperature of 275°F.

## 5.0 Equipment Function

This cable assembly delivers high voltage to the high range monitor ionization chamber (877-1) inside the containment building and provides return signals to the ratemeter mounted in panel PRF in the Main Control Room (MCR). The equipment performs no safety function but is used exclusively for post-accident monitoring.

However, this monitor does perform the following functions:

- a. Provides indication which may restrict personnel access to the Reactor Building under high radiation conditions.
- b. Provides limited gross radiation data following an accident involving high radiation release to the Reactor Building.

## 6.0 Evaluation

- a) As an alternate over the short term, RMG 8 will be used. RM G8 is an 8 decade containment dome monitor equipped with a high range gamma sensitive ionization chamber detector located in the Reactor Building. RMG 8 Monitors airborne activity thru 2 inches of lead which shields the detector and desensitizes it to detect radiation levels from .01R/hr. up to  $1 \times 10^6$  R/hr. This monitor is powered from the 1D vital bus. This ionization chamber detector is housed in a watertight container hermetically sealed to withstand the Reactor Building post accident pressure. This monitor reads out and alarms in the control room. Although this monitor has not been environmentally qualified; based on the accident at TMI-2, this type monitor provided the necessary functions in the post accident environment. TMI-1 and TMI-2 both have Victoreen Model 847-1 detector and 846-1 ratemeter for containment dome radiation monitoring.

The failure of the Time Wire Cable will not:

- a. Degrade any safety function because the system is fused to protect faults from affecting other Class 1E systems or
  - b. Mislead the operator because under very low voltage situations an alarm is indicated in the control room informing the operator to use alternate instrumentation (TMI-1 alarm procedures PRF-1-2-8 and 1-3-8). In the case of a low voltage signal (not low enough to alarm) the operator will check the redundant channel and the dome monitor (RMG-8) based on training received in the operation of these monitors.
- b) As an alternate over the long term, the Containment Atmospheric Post Accident Sampling System (CAPASS) will be used. It is capable of taking a Reactor Building atmospheric sample from which radioactivity level may be determined. The CAPASS is located outside the reactor building.

#### 7.0 Equipment Qualification Program

The modified Time wire will be replaced with qualified triaxial cable. Delivery of the cable and connector at the detector end is expected in approximately 15 weeks after receipt of the purchase order. Installation would require a scheduled shutdown of 30 days.

#### 8.0 Results

- a. Based on the evaluation in Section 6.0, the equipment is qualified based on experience (testing) at TMI-2 for its designated function.
- b. The objective of the JIO has been satisfied by the evaluation.

#### 9.0 Conclusion

Safe plant operation with electrical equipment important to safety, as defined in 10CFR50.49, which has not yet been qualified has been demonstrated by the information provided in this JIO. This has been accomplished by meeting the acceptance criteria of 10CFR50.49.