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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
10 CFR 50 Appendix R
Loss of HVAC Additional Information

GPUN made a presentation to NRC on July 14, 1988 concerning the evaluation of loss of ventilation systems for an Appendix R event in the nuclear services and decay heat closed cycle cooling pump room, emergency feedwater pump rooms, diesel generator rooms, and the control building. Five (5) remaining open items were identified for which GPUN committed to provide additional information. Enclosure 1 identifies the open items and provides a response to each item.

An independent review within GPUN of the control building analysis identified a nonconservative assumption in that a uniform thickness of concrete walls, ceilings, and floors was used to model the heat sink in each room of the control building. Enclosure 2 addresses this issue and all revised temperatures remain within acceptable limits. The analysis for each room has been reperformed using actual concrete thicknesses where applicable.

The corrective actions identified in our May 5, 1988 submittal for compensating for the loss of ventilation have been proceduralized.

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We trust this additional information satisfactorily resolves the open items discussed. If any additional information is required, please contact us.

Sincerely,

H. D. Hukill
Vice President & Director, TMI-1

HDH/DJD:fg

Enclosures

cc: J. Stolz, USNRC
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Enclosure 1

1. For the Emergency Feedwater Pump Room area clarify how it was determined that 113°F is the predicted maximum temperature. Provide an explanation of how the temperature profile curve was projected to go from the end point of the test data to 113°F (reference Figure 2 of May 5, 1988 submittal). Clarify the word "stabilized" used in the submittal.

Response

The predicted maximum temperature was determined by reviewing test data to determine the rates of rise for each room and from the understanding of the operation of the emergency feedwater pumps during shutdown. The use of the word "stabilized" generalized the characteristics of the test data for the individual areas and did not account for higher temperatures measured at the ceiling area. In reviewing the test data, there are at least three areas considered to have essentially stabilized in temperature: the EF-V-30B area, the operating air compressor area (non-essential component), and the hallway. The remaining areas are considered to be stabilizing based on their decreasing rate of rise over the two hour test period. This was not accounted for in the original submittal and the temperature curve assumed a level projection to 72 hours. The physical area has openings for natural convection to occur. Air flow due to natural convection would assist in the room reaching a stabilized temperature. However, an analysis has been performed to account for the varying heat loads in the room and component temperature variations.

The previous engineering conclusions have been evaluated through the use of additional analysis. The analysis concentrated on the motor driven feedwater pumps, since they have the lower continuous operating temperature limit of 122°F. A reasonable amount of natural convection was determined from the square footage of the openings in the area, the height difference between the openings and the expected temperature differential. The convective airflow is assumed to come from the hallway directly into the motor driven pump (MDP) room or through the compressor room. From a review of the pump flow rate requirements for the EFW pumps during shutdown, and from the pump performance curve, a profile of decreasing heat input to the pump room was developed. For the first five minutes, two MDP's are assumed to be on, one required and one spurious operation, with one pump deenergized after 5 minutes. From the five minute period to approximately 22 hours into the shutdown the EFW flowrate (and motor horsepower) is constantly declining. At 22 hours into shutdown a flowrate of approximately 100 gpm (240 bhp) is required which results in a 45 percent decrease in heat input to the space. This is reflected in the 0-22 hour time frame shown in Figure 2. The slope of the room temperature between the 5-1/2 and 22 hour time period is a product of decreasing internal load, concrete temperature, and convective air flow temperature. From a review of this curve, it is apparent that the heat removal capability of the concrete (due to its temperature at this time period) and convective air flow is almost equivalent to the decreasing heat input over the same time period. From 22 hours to 72 hours the heat input is constant and the concrete temperature is constantly rising due to the portion of room heat load it can absorb along with a rise in room temperature.

An analysis was run to try to simulate the test results. For the two hour period the analysis assumed that both MDP's and the air compressor were running. The analysis also used an air flow rate of 2000 cfm (1000 from the hallway, 1000 from the compressor area) to account for expected natural convection. These values were determined based on a calculation for flows due to thermal forces resulting in an air flow velocity of approximately 50 ft./min. through open passages. The results of this comparison are shown in attached Figure 1. As can be seen from this figure, the analysis profile is well above the actual test data but the profile of the analysis curve is very similar to the test profile. This represents the cumulative affects of the conservatisms in the analysis and the magnitude of the correction factor that can be applied. This is similar to the approach utilized in the control building.

Utilizing the inputs for decreasing motor heat loads as described above, in place of the EFW pump operational condition for the test, the analysis was run for 72 hours (Fig. 2). The correction factors determined from the analysis/test profiles (Fig. 1) must be subtracted from the 72 hour analysis profile. This correction factor is appropriate to apply to either pump provided it is in operation. For the EF-P-2A and the EF-P-2B pumps the correction factor for both pumps is 11°F. Since these curves are based on average temperature, the numerical difference between the average temperature and higher component temperature should be deducted from this correction factor. In both of the pump rooms this amounts to a 1°F deduction making the correction factor 10°F for the EF-P-2A and -2B pumps. Applying this correction factor to the end point temperature of EF-P-2B shown on the curve (Figure 2) yields a room temperature of 112°F. (The 2A pump is the pump that is deenergized at the five minute time period into the shutdown event.) A calculation was also performed to assess the effect on room temperature if operation of the second MDP continued for 12 hours. The result was a peak temperature in the "B" pump room of 117°F and a 72 hour temperature of 114°F. These temperatures are well below the continuous operating temperature limit of 122°F for these pumps. The above results are consistent with our previous statements that the EFW pump room temperature under realistic Appendix R shutdown conditions was expected to be lower than the room temperature profile based on the test data. These analytical results confirm that the previous extrapolation of test data was appropriate and that in all cases maximum expected temperature 72 hours after loss of HVAC are well within equipment operating limits.

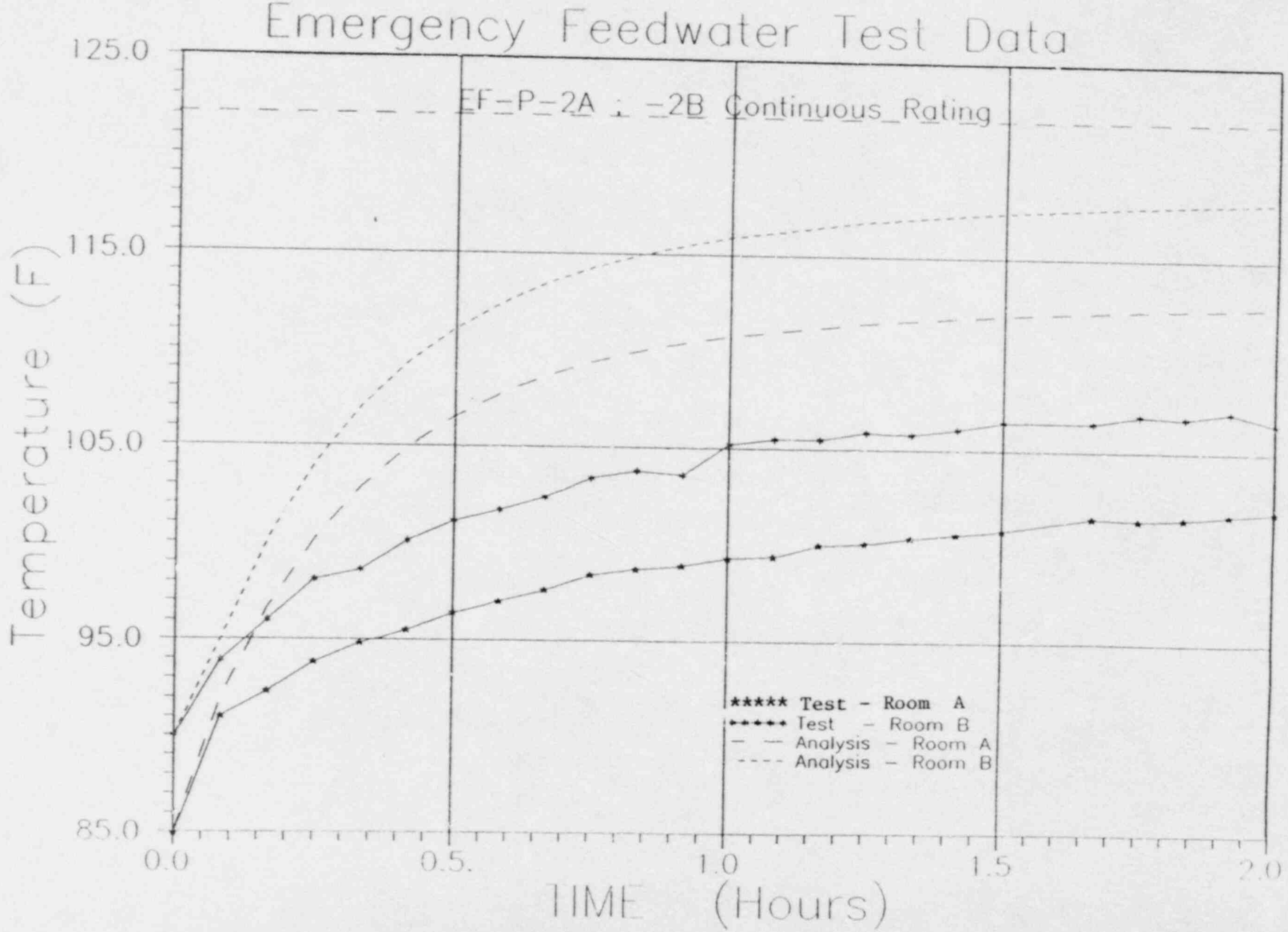
Since no temperature limits for operation apply to the turbine driven (TDP) EFW pump and the MS-V-4B has a continuous operating temperature limit of 150°F, the MDP's are considered to be the critical area. Although the test temperatures were higher in the turbine driven pump room, more margin existed between the peak test temperature and the continuous operating temperature limit of MS-V-4B. The heat load in the MDP room is higher than for the TDP room which would result in a higher delta T from the initial temperature to the temperature at 72 hours. Based on the results provided in the analysis noted above no further investigation of the TDP room was made.

2. For the Emergency Feedwater Pump Room area, assess the effect of the highest design river water and outside air temperatures. Assess end point/maximum temperature.

Response

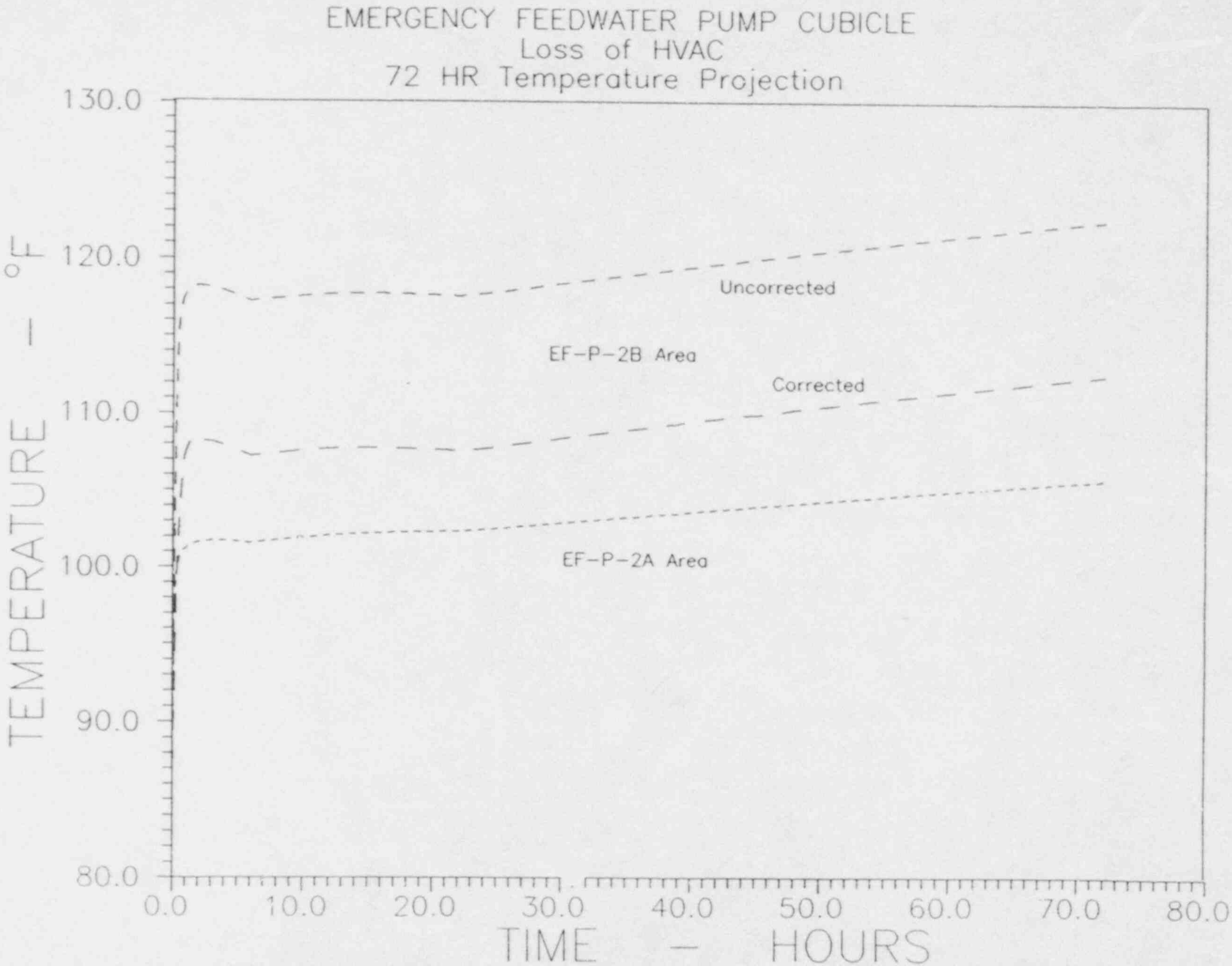
The Emergency Feedwater Pump Rooms located on the lower levels of the Intermediate Building are normally cooled by operation of one of the two installed air handling units (AH-E-24A, -24B). The design basis of these room coolers is to handle the heat loads generated during an emergency condition with EFW pumps operational. This design heat load is greater than the plant normal operating loads (EFW pumps non-operational). This ensures that the EFW Pump Room area initial temperature will not be significantly different from the test day temperature. During normal plant operation either air handling unit operates continuously in a complete recirculation mode and is isolated from the outside supply air. Due to the lack of introduction of outside air into the emergency feedwater pump rooms and the thick concrete construction of the Intermediate Building, variations of the outside ambient temperatures do not have an impact on the temperature in the EFW pump rooms themselves. Additionally, a large portion of the emergency feedwater pump area, the entire floor area, and at least ten vertical feet of wall area on three sides is in contact with the earth. This provides a significant heat sink since the temperature of the earth is essentially constant. This factor is a major contributor to maintaining the normal temperature in the EFW pump area relatively constant year round regardless of the outside ambient air temperature and nuclear services closed cooling water (NSCCW) (water source to the coils installed in AH-E-24A, -24B) temperature. Based on the history of the NSCCW temperature, it is estimated that at the time of the test the cooling water temperature was approximately 80 - 85°F while the maximum temperature could be as high as 90°F. The higher cooling water temperature will cause the air supply temperature from the air handling unit to increase an equal amount. However, the resultant room temperature will not increase by the same amount since a higher temperature in the space provides a greater temperature differential to the heat sinks and a lower differential to the heat producers (heat out increases while heat in decreases). Therefore, the temperature of the EFW pump area at the start of the test is approximately the same initial temperature that would normally exist even with higher outside ambient air temperature and NSCCW temperatures to the air handling units. Accordingly, it is concluded that the temperature profile for the EFW pump room will not change due to variations in outside ambient effects, and there is no impact on the expected maximum room temperature 72 hours after loss of HVAC.

FIGURE 1



Emergency Feedwater Test Data
EF-P-2A ; -2B Continuous Rating
Temperature (F)
125.0
115.0
105.0
95.0
85.0
0.0
0.5
1.0
1.5
2.0
TIME (Hours)
***** Test - Room A
***** Test - Room B
— — Analysis - Room A
---- Analysis - Room B

FIGURE 2


EMERGENCY FEEDWATER PUMP CUBICLE
Loss of HVAC
72 HR Temperature Projection
130.0
120.0
110.0
100.0
90.0
80.0
TEMPERATURE — °F
Uncorrected
EF-P-2B Area
Corrected
EF-P-2A Area
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
TIME — HOURS

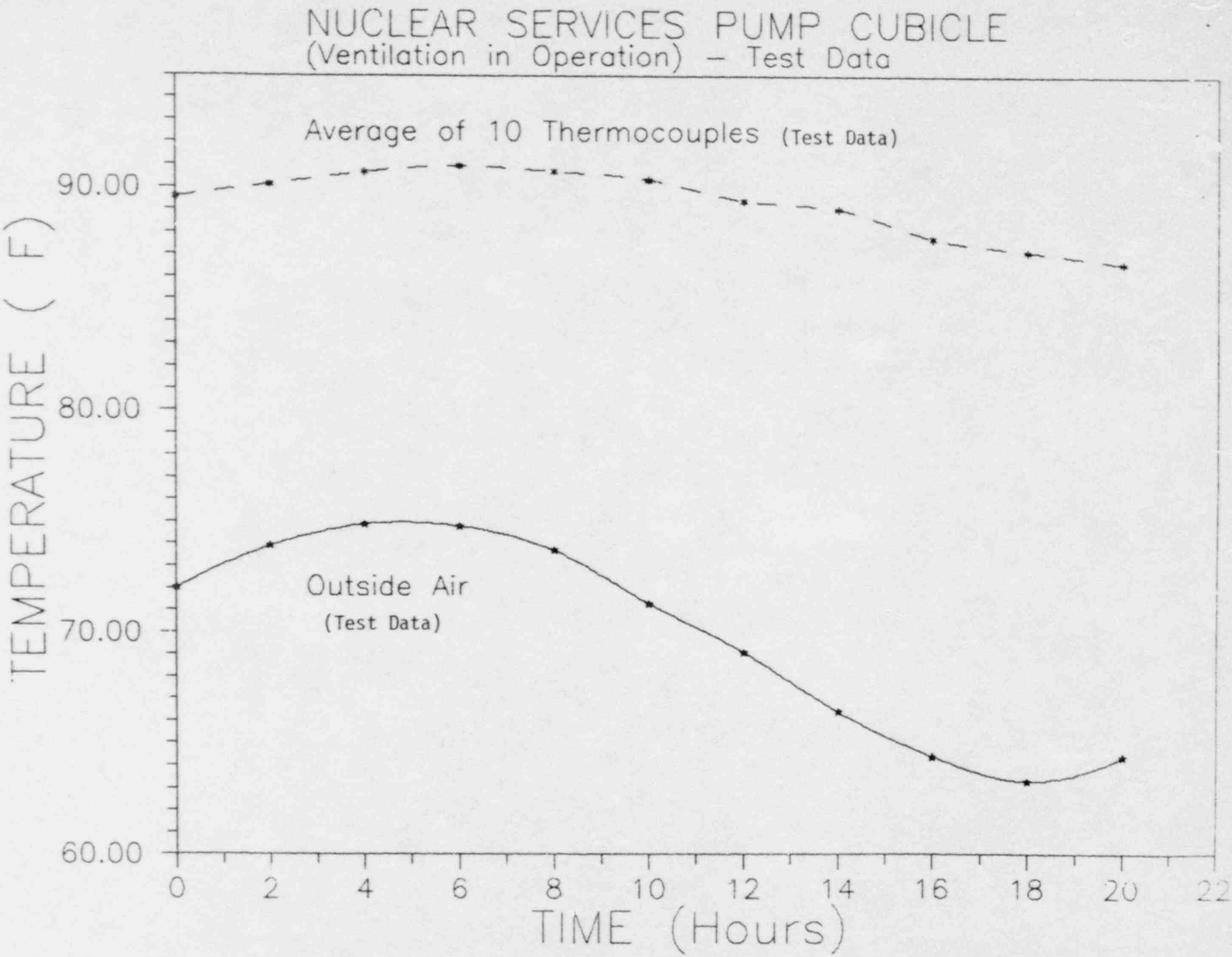
3. For the Nuclear Services Closed Cycle Cooling Water (NSCCW) Pump Room area, assess the effect of the highest design river water and outside ambient air temperatures on the end point/maximum temperature. Also, confirm that heat removal of cooling water does not outweigh the additional heat input due to the third pump running.

Response

During normal plant operation the nuclear services pump cubicle (NSPC) is ventilated via a dedicated air handling unit (AH-E-15 A or B) and air provided from the Auxiliary Building (through ducted exhaust from the cubicles with makeup through the opening in the southeast corner of the zone). The amount of air contribution from the Auxiliary Building accounts for approximately 27% of the total airflow in the pump cubicles. A comparison of test day temperature changes indicates a min. to max. recorded outside air = Δ 11.6°F and NSPC = Δ 4.4°F. A review of the test data taken prior to the loss of ventilation test demonstrates the relationship between outside air temperature and the ambient temperature of the nuclear services pump cubicle (see Figure 3). The average NSPC temperature at time = 0930 was not included in this evaluation since all ten (10) thermocouple readings dropped in temperature (0.5° - 4°F) which is inconsistent with previous data, or when comparing it to the outside air temperature which rose 6.8°F in the same time period. The location of the thermocouples contributed to a slightly depressed average temperature in the pump cubicle area. At least four (4) of the ten (10) thermocouples were away from heat producing equipment and were influenced by the air contribution from the Auxiliary Building to a greater extent. The average pump cubicle temperature prior to loss of ventilation on the test day was 87-91°F. The NSCCW temperature to the air handling unit coolers was approximately 85-90°F during the test resulting in an initial temperature in the NSPC close to an expected maximum. After loss of ventilation, there is no introduction of outside air. Recent data taken outside the NSPC with ventilation operating indicated a temperature of 90°F with outside air temperatures of approximately 100°F. This demonstrates significant heat sinks are available on the 305' elevation of the Auxiliary Building which are capable of maintaining cooler temperatures during mid-summer peak temperatures. The Auxiliary Building minimum supply air temperature is controlled through the use of resistance heating to maintain a minimum building temperature of 65°F. This results in an Auxiliary Building elevation 305' temperature variation of approximately 25°F year round. Applying the NSPC percentage temperature deviation when compared to Auxiliary Building 305' temperature results in a temperature variation in the nuclear services pump cubicle of only 9°F. The NSPC temperature is primarily controlled by the operation of the dedicated air handling units (AH-E-15 A or B) with its supply air temperature dependent on the temperature of the nuclear closed cooling water (provided to cooling coils). The small deviation in temperature in the nuclear services pump cubicle provides a nearly constant initial temperature when loss of ventilation must be considered. Therefore, the predicted maximum temperature of 99°F is reasonable based on the review of existing test data. It is realized that the outside air temperature for the time period prior to the loss of ventilation was below normal for that time of year. As noted before, this did not have a significant effect on the initial ambient temperature of the NSPC. It did have an effect immediately after the initiation of the loss of ventilation since a cooler source of air from areas outside the pump room was available to the pump room through natural convection. The result was a dip in localized temperatures until the thermal differences (air temperatures) between the pump cubicle and the area outside the pump cubicle achieved uniform mixing. Higher initial Auxiliary Building temperatures (such as 90°F) would have created a smoother room profile since the temperature differences between the two areas would not be as dramatic. It is not considered to have an effect on the predicted maximum temperature.

It should be noted that during the NSCCW test, an extra Nuclear Services pump was in operation which contributed higher internal heat load. When comparing the heat contribution from the motor and the potential cooling affect of the associated piping, there is a resultant increase in heat load of approximately 25,000 BTUH compared to the total heat load of 100,000 BTUH. This supports the previous conclusion that the heat load into the pump cubicle during the test bounds the actual heat load during an Appendix R shutdown event.

FIGURE 3


NUCLEAR SERVICES PUMP CUBICLE
(Ventilation in Operation) – Test Data
Average of 10 Thermocouples (Test Data)
Outside Air
(Test Data)
TEMPERATURE (F)
90.00
80.00
70.00
60.00
0
2
4
6
8
10
12
14
16
18
20
22
TIME (Hours)

4. Provide analysis showing how the "Q" value in the Control Room changes when one-half of the normal control room lights are turned off.

Response

The heat load contribution in the Control Room is from various control panels, control consoles, instrument racks, and lighting. The total heat load is conservatively estimated to be 129,885 BTU/HR. This total consists of the heat load contribution due to the panels, consoles, and racks which is equal to 65,749 BTU/HR, and the heat load contribution from the lighting equal to 64,136 BTU/HR. The heat contribution from lighting was determined from the total number of lighting fixtures in the Control Room. All of the lighting fixtures were assumed energized for conservatism. This included 177 fluorescent lighting fixtures consisting of 2 lamp/40 watt tubes, 6 DC incandescent lighting fixtures of 150 watts each, and 5 incandescent fixtures of 100 watts each. An additional factor of approximately 20% was included for the fluorescent ballast losses for each fluorescent fixture. All wattage is assumed to be converted to thermal energy, since the amount of light energy utilized is insignificant. The total wattage of all lighting loads and ballast contribution is thus equal to 18,792 watts. Converting to BTU/HR by multiplying by 3.413 (constant used to convert watts to BTU's), the BTU/HR heat contribution is found to be 64,136. Therefore, reducing the Control Room lighting by one-half, results in a reduction of heat load from 129,885 BTU/HR to 97,817 BTU/HR.

5. For areas in the Control Building that do not have three hour fire barrier features, justify the assumption that fires in these areas have an insignificant "Q" value input to adjacent Control Building rooms.

Response

The TMI-1 Control Building is divided into fire areas by 3 hour rated walls. The evaluation of the effects of a fire which results in a loss of HVAC assumes no heat input from the area of the fire into adjacent areas including those containing required safe shutdown equipment based on the fire rating. GPUN has reviewed the Control Building for fires where two conditions are met: (1) the fire causes a loss of HVAC to an adjacent area containing required safe shutdown equipment and (2) the fire barrier between the two areas contains features which are not three hour fire rated.

The review identified three fire barriers meeting these conditions: (1)480 VAC switchgear rooms (CB-FA-2a/2b), (2)4160 VAC switchgear rooms (CB-FA-3a/3b), and (3) relay room to control building patio area (CB-FA-3d/FH-FZ-5). For the switchgear rooms, a fire in one of the rooms will result in a loss of HVAC to the adjacent room while use of the switchgear in the adjacent room is required to achieve safe shutdown. For CB-FA-3d/FH-FZ-5 boundary, a fire in Control Building Patio Area (FH-FZ-5) will result in a loss of HVAC due to failure of air lines to HVAC dampers. Circuits and cabinets located in the Relay Room (CB-FA-3d) are required to achieve safe shutdown. The three boundaries identified are 3 hour rated fire barriers except for penetrations by passively ventilated bus ducts routed between the areas. The passively ventilated bus ducts are sealed around the periphery with 3 hour rated seals. The bus ducts between switchgear rooms are sealed internally with non-rated, non-combustible smoke stops which will not fail during a fire but will conduct heat into the adjacent area containing the required safe shutdown equipment. The control rod drive bus ducts between the relay room and patio are not internally sealed. The blockouts containing these ducts have rated seals on the outside of the ducts. These ducts have a small cross-sectional area, and a seal placed in the 2'6" wall would cause a localized hot spot along the enclosed bus bars during normal operation. These seals have also been previously evaluated as acceptable by NRC. The fire in each area is assumed to be extinguished within 30 minutes and near normal conditions restored within 1 hour as previously accepted by NRC.

(1) The wall between the 480 VAC Switchgear Rooms (CB-FA-2a/2b) contains a single ventilated 800 Ampere bus duct with a non-rated internal seal one inch thick of approximately 19"W x 8.5"H constructed of two 1/2" thick fiberglass plates. A fire in CB-FA-2a having maximum heat input to the bus duct would involve Cable Tray No. 319 located approximately 2 feet from the penetration. The combustible loading in CB-FA-2a/2b is low and consists of cable, resistant to flame spread, in trays. On this basis, the exposure fire is assumed to be represented by the "A" time-temperature curve of Figure 8-1E, Handbook of Fire Protection, 13th Edition, for a 30 minute duration after which the fire is assumed to be extinguished by the fire brigade. During the 30 minute duration and for the following 1 hour period, it is conservatively calculated (based on

a transient thermal model evaluation) that the fire would result in less than 800 BTU's being conducted to CB-FA-2b via the non-rated internal seal and a 10 ft. square section of wall surrounding the penetration. This heat input would result in a temporary temperature rise of less than 1.0°F in CB-FA-2b at approximately 1 hour. A similar temperature rise will occur in CB-FA-2a for a fire in CB-FA-2b. Adding this heat input from the fire to the computer model time-temperature curve increases the expected maximum temperature in CB-FA-2a or CB-FA-2b 72 hours after loss of HVAC by a negligible amount. Operation of the electrical equipment in CB-FA-2b with Appendix R safe shutdown loads at this temperature will not degrade the normal equipment life expectancy. In summary, the contribution of the heat from the fire is short-lived and does not affect the 72 hour temperature of the adjacent room.

(2) The wall between the 4160 VAC Switchgear Rooms (CB-FA-3a/3b) contains three ventilated 1200 Ampere bus ducts with a non-rated internal seal one inch thick of approximately 23"W x 10.5"H constructed of two 1/2" thick fiberglass plates. The three bus ducts are arranged such that two are adjacent to each other, with the third separated by a distance to 29'6". Since a self-generating cable tray fire is expected to propagate no more than 10 feet in a 1/2 hour, the heat is considered to be conducted through only two of the non-rated internal seals. A fire in CB-FA-3a or CB-FA-3b having maximum heat input to the bus ducts would involve Cable Trays 255 and 41 located adjacent to the penetration. The combustible loading in CB-FA-3a/3b is low and consists of cable, resistant to flame spread, in trays. On this basis, the exposure fire is assumed to be represented by the "A" time-temperature curve of Figure 8-1E, Handbook of Fire Protection, 13th Edition, for a 30 minute duration after which the fire is assumed to be extinguished by the fire brigade. During the 30 minute duration and for the following 1 hour period, it is conservatively calculated (based on a transient thermal model evaluation) that the fire would result in less than 1100 BTU's being conducted via two non-rated internal seals and a 10 ft. square section of wall surrounding the penetration. This heat input would result in a temporary temperature rise of approximately 1.0°F in CB-FA-3a or CB-FA-3b after 1 hour. Adding this heat input from the fire to the computer model time-temperature curve increases the expected maximum temperature in CB-FA-3a or CB-FA-3b 72 hours after loss of HVAC by a negligible amount. Operation of the electrical equipment with Appendix R safe shutdown loads at this temperature will not degrade the normal equipment life expectancy. In summary, the contribution of the heat from the fire is short-lived and does not affect the 72 hour temperature of the adjacent room.

(3) The fuel handling building FH-FZ-5 fire area is essentially a large volume area divided by partial floors or divided by grating floors between elevation 322' and 397'. Above elevation 338'6" the floors are all grating. The control rod drive bus ducts consist of six 8" wide by 8" high self-ventilated duct assemblies, which penetrate the relay room wall through two blockouts at approximately elevation 350'. These

blockouts are sealed with 3 hour rated foam fire stops. The combustible loading in FH-FZ-5 is moderate, consisting of ordinary combustibles, and cable resistant to flame spread, in trays. On this basis, the exposure fire is assumed to be represented by the "D" time-temperature curve of Figure 8-1E, Handbook of Fire Protection, 13th Edition, for a 1 hour duration after which the fire is assumed to be extinguished by the fire brigade. We have evaluated the effect of heat transfer through the six openings by conservatively calculating the radiant and conductive heat transferred through the openings assumed to be completely open. A large part of the combustibles in FH-FZ-5 are at a higher elevation than the bus duct penetrations and the drafting effects of a fire in FH-FZ-5 would result in a net negative pressure with respect to the relay room at the elevation of the bus ducts due to the extreme height of the ceiling in the space, the buoyancy of the heated air, and due to numerous openings in the FH-FZ-5 area.

The calculation shows that the peak heat load contributed by the fire is conservatively estimated to be 35,500 BTUH, and the net effect of the fire heat is less than a 5°F temporary increase in the relay room temperature and negligible change in temperature at 72 hours. In summary, the contribution of the heat from the fire is short-lived and does not affect the 72 hour temperature of the adjacent room.

ENCLOSURE 2

The Control Building TSAP model has been revised since the May 5, 1988 submittal to incorporate more detailed representation of the concrete, effects of radiant heat transfer, and new initial conditions for certain rooms. The revisions are summarized as follows:

1. The uniform thickness of concrete in the building has been changed such that for specific rooms, the walls, floors, and ceiling are separated and individually modeled. This feature was added as a result of a third party design review concern that the 4-1/2 inch thick floor slab modeled at elevation 338'6" overestimated the heat sink available and was not allowing sufficient heat transfer between the second floor and the third floor rooms. The more exact model now predicts temperatures about 5°F higher in each of the switchgear rooms.

2. The effects of radiant heat transfer from equipment, and the equipment mass of heat sources were added to rooms CB-FA-3a, 3b and 4b to be consistent with the more exact modeling previously done. This change has the effect of lowering the shape of the initial rate of temperature rise and provides a closer correlation between the test data and calculated values. The evaluation of these new analyses resulted in lower correction factors to be applied to the analytically predicted temperatures.

3. The control room ceiling was modeled as the actual 10 inch thick slab, supported by fire proof insulated steel decking. This change was made to be consistent with the other floor slab revisions, and resulted in the predicted control room temperature rising 1°F when coupled with all other effects.

4. Lower initial temperatures were utilized for four second floor rooms. These temperatures resulted from the evaluation of continuous strip chart recordings of temperatures taken in the rooms over a period of weeks. This resulted in a change in the initial transient profile.

The evaluation of the Appendix R safe shutdown equipment at the revised temperatures are summarized in the attached revised Table 1. All revised temperatures remain within acceptable limits. Table 1 was previously presented at the July 14, 1988 NRC meeting and included the predicted temperatures based on the May 5, 1988 GPUN submittal.

It is noted that the revised predicted temperature 72 hours after loss of HVAC in CB-FA-3b is at the 4160V switchgear continuous rating limit of 104°F. The 4160V switchgear loading for an Appendix R shutdown is less than one third the rated current at 104°F. Therefore, this revised temperature will not affect the safe operation of the switchgear.

Table 1

CONTROL BUILDING - ACCEPTANCE OBJECTIVES

FIRE AREA	CONTINUOUS TEMPERATURE RATING	REVISED PREDICTED 72 HR. TEMP. °F
CB-FA-1 (HEALTH PHYSICS & LAB AREA)	ELECTRICAL POWER & CONTROL CABLES/104°F AMBIENT TEMPERATURE WITH 122°F RISE	86
CB-FA-2A (480V 1P SWGR. RM)	480V SWGR 1P@ 120°F - ALLOWABLE LOADING 1315 AMPS - ACTUAL SHUTDOWN LOADING 643 AMPS 480V - 1AESMCC/@ 120°F - ALLOWABLE LOADING 985 AMPS - ACTUAL SHUTDOWN LOADING 250 AMPS	120
CB-FA-2B (480V 1S SWGR. RM.)	- 480V SWGR 1S/@ 118°F - ALLOWABLE LOADING 1353 AMPS - ACTUAL SHUTDOWN LOADING 643 AMPS 480V - 1BESMCC/@ 118°F - ALLOWABLE LOADING 1015 AMPS - ACTUAL SHUTDOWN LOADING 326 AMPS	118
CB-FA-2C (RSP RM.)	SIGNAL CONDITIONING CABINET B/104°F CONTROL SWITCHES/104°F CIRCUIT BREAKERS/104°F SWITCHBOARD INSTRU. RECORDERS 122°F	93
CB-FA-2D (1A, 1C,1E INVERTER RM)	INVERTERS/120°F BATTERY CHARGERS/122°F DISTRIBUTION PANELS/158°F MAX. HOT SPOT - LIGHTLY LOADED	112

TABLE 1
CONTROL BUILDING - ACCEPTANCE OBJECTIVES

FIRE AREA	CONTINUOUS COMPONENT/RATED TEMP	REVISED PREDICTED 72 HR. TEMP. °F
CB-FA-2E (1B, 1D INVERTER RM)	INVERTERS/120°F BATTERY CHARGERS/122°F DISTRIBUTION PANELS/158°F MAX LIGHTLY LOADED	115
CB-FA-2F (A & C BATTERY RM)	BATTERIES HAVE BEEN SUBJECTED TO ELEVATED AMBIENT TEMPERATURES (130°F) WITHOUT ADVERSE EFFECTS	97
CB-FA-2G	BATTERIES HAVE BEEN SUBJECTED TO ELEVATED AMBIENT TEMPERATURES (130°F) WITHOUT ADVERSE EFFECTS	88
CB-FA-3A (4160V 1D SWGR. RM)	4160V 1D SWITCHGEAR/104°F	102
CB-FA-3B (4160V 1E SWGR. RM)	4160V 1E SWITCHGEAR/104°F - ALLOWABLE LOADING = 1200 AMPS - ACTUAL SHUTDOWN LOADING = 327 AMPS	104
CB-FA-3C (ESAS CAB. RM)	ESAS CABINETS/131°F SIGNAL CONDITIONING CABINET/104°F	93
CB-FA-3D (RELAY RM)	NNI/ICS CABINETS/110°F	102
CB-FA-4A (INSTRUMENT SHOP)	LIGHTING PANEL/158°F MAX HOT SPOT	102
CB-FA-4B (CONTROL RM)	INSTRUMENTS/122°F CONTROL SWITCHBOARD/104°F	103