Florida Power
A Progress Energy Company

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No DPR-72

Ref: 10 CFR 50.90

September 20, 2002
3F0902-06

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – License Amendment Request #271, Revision 1 Revised Improved Technical Specification (ITS) 3.7.18, for Two Inoperable Control Complex Chillers (TAC No. MB6189)

Reference: FPC to NRC letter, 3F0802-03, dated August 14, 2002, "Crystal River Unit 3 – License Amendment Request #271, Revision 0, One Time 24-Hour Delay for Entry into Improved Technical Specification 3.0.3 for Two Inoperable Control Complex Chillers"

Dear Sir:

Florida Power Corporation (FPC) hereby submits License Amendment Request (LAR) #271, Revision 1, which revises Improved Technical Specification (ITS) 3.7.18, CONDITION A, to add a condition for alternate cooling equipment to maintain the Control Complex temperature within acceptable limits for up to 24 hours. The proposed changes to ITS 3.7.18 also include renumbering REQUIRED ACTION A.1 to A.1.1, and the addition of REQUIRED ACTION A.1.2 to initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits, AND restart a Control Complex Chiller within 24 hours. The proposed changes are being submitted as a contingency for two inoperable Control Complex Chillers during the scheduled refurbishment of the 'A' train Control Complex Chiller which will be placed out of service beginning September 30, 2002, for a complete rebuild of the unit. This revision to LAR #271 has been discussed with the NRC staff during a telephone conference on September 10, 2002.

The description of the proposed LAR, No Significant Hazards Consideration Determination, proposed Improved Technical Specifications and Bases pages, and the list of Regulatory Commitments previously provided in the referenced letter have been revised accordingly. Additionally, the No Significant Hazards Consideration Determination and Environmental Impact Evaluation have been consolidated in Attachment B, under a new section titled Regulatory Requirements. The previously provided conclusion that this request does not involve a significant hazards consideration pursuant to 10 CFR 50.92 remains unchanged.

A001

Attachments F and G contain a summary of FPC's responses to questions posed by the NRC staff during the September 10, 2002 telephone conference. Included are a copy of Analysis/Calculation H-02-0001, CR-3 Control Complex Temperatures Utilizing Appendix R Chiller (CHHE-2) and Portable Air Conditioning (AC), and pages extracted from two loop accuracy calculations as a sample of those calculations.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Dale E Young

Dale E. Young
Vice President, Crystal River Nuclear Plant

DEY/lvc

Attachments:

A. Background, Description of Proposed Change, Reason for Request, and Evaluation of Request
B. Regulatory Analysis
C. Proposed Revised Improved Technical Specifications Pages – Strikeout/Shadowed Format
D. Proposed Revised Improved Technical Specifications Pages – Revision Bar Format
E. List of Regulatory Commitments
F. Summary of FPC's responses to questions formulated by the NRC staff during the September 10, 2002, telephone conference
G. Analysis/Calculation H-02-0001, CR-3 Control Complex Temperatures Utilizing Appendix R Chiller (CHHE-2) and Portable AC (Air Conditioning), and with samples of loop accuracy calculations

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

STATE OF FLORIDA

COUNTY OF CITRUS

Dale E. Young states that he is the Vice President, Crystal River Nuclear Plant for Progress Energy; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Dale E. Young

Dale E. Young
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 20 day of Sept., 2002, by Dale E. Young.

Ellen Deppolder

Signature of Notary Public
State of Florida

Ellen Deppolder
My Commission DD040101
Expires July 08, 2005

(Print, type, or stamp Commissioned Name of Notary Public)

Personally Known ✓ -OR- Produced Identification ______

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT A

LICENSE AMENDMENT REQUEST #271

Background, Description of Proposed Change, Reason for Request, and Evaluation of Request

Background

Condition A of Improved Technical Specification (ITS) 3.7.18, "Control Complex Cooling System," requires that two Control Complex Cooling trains shall be OPERABLE. If one or more trains are inoperable AND at least 100% of the cooling capability of a single OPERABLE Control Complex Cooling train is available from the Operating Control Complex Cooling system, operation may continue for 7 days. The note to the Completion Time allows that, on a one-time basis, each Control Complex Cooling System (CCCS) train may be inoperable for up to 35 days to allow performance of chiller refurbishment activities. If the equipment within the CCCS is not capable of providing adequate cooling capability, Limiting Condition for Operation (LCO) 3.0.3 applies.

Description of the Proposed License Amendment Request

Florida Power Corporation (FPC) requests to revise ITS 3.7.18, CONDITION A, to add a requirement stating: **"OR Alternate cooling to maintain the Control Complex temperature within acceptable limits for at least 24 hours is available. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002."**

The proposed changes to ITS 3.7.18 also include renumbering REQUIRED ACTION A.1 to A.1.1, and the addition of REQUIRED ACTION A.1.2 stating: **"OR If a second chiller becomes inoperable during the 35-day extended Completion Time, initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits AND restart a Control Complex Chiller within 24 hours. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002."**

The 24 hour time period would be adequate to diagnose and restart a Control Complex Chiller that may trip due to a number of possible causes. Based on previous experience, FPC is confident that the proposed period of 24 hours will be sufficient to restart the affected chiller.

Reason for Request

Refurbishment of the 'B' train Control Complex Chiller was completed on March 26, 2002. The'A' train Control Complex Chiller will be placed out of service beginning September 30, 2002, for a complete rebuild of the unit. The rebuild is scheduled for a 17-day duration. During that period, Crystal River Unit 3 (CR-3) will be operating with the recently rebuilt 'B' train chiller in service providing cooling to the Control Complex. If the 'B' train chiller were to trip, it would render both Control Complex Chiller trains inoperable. Therefore, LCO 3.0.3 would apply and will require the unit be placed in MODE 3 in 7 hours, MODE 4 in 13 hours and MODE 5 in 37 hours. CR-3 will have alternative non-safety related cooling equipment staged and ready to be placed in service within one hour to serve the function of the Control Complex Chiller. During the 24-hour period at normal operating conditions, the alternative cooling systems will maintain the average bulk air temperature below 87°F in the Control Complex, and individual room temperatures will not exceed maximum design temperature limits.

FPC is submitting this License Amendment Request (LAR) as a contingency in the event the single operating chiller trips during the extended refurbishment period of the opposite train chiller. In the event of a chiller trip, CR-3 personnel would start the alternative cooling equipment within one hour, evaluate the cause for the chiller trip, and determine a time frame for restarting the tripped chiller. While the 'A' train chiller is being refurbished, FPC Technicians, chiller manufacturer, and Maintenance management personnel will be on site continuously, providing the best opportunity to diagnose and repair a tripped 'B' train chiller. While repairing and restarting the tripped chiller, Operations personnel will monitor the operation of the alternative cooling systems, and Control Complex temperatures. If temperatures are not maintained below administrative limits established for monitoring the performance of the alternative cooling systems, shutdown of the unit to MODE 5 will be initiated. The basis for this request is that the risk of a design basis event occurring within the 24-hour period during which CR-3 is using the alternative cooling systems is acceptably small, and is less than the risk posed by a forced shutdown of the unit.

Deterministic Evaluation

FPC has previously evaluated the design basis associated with chiller unavailabilty. The most significant functional impact to core damage from the chillers is providing heat removal for the Emergency Feedwater (EFW) control cabinets. Loss of cooling to the cabinets can cause the EFW control valves to inadvertently close. The evaluation concluded that if the operating Control Complex Chiller fails, the operators can use the Appendix R chiller for this function. The Appendix R Chilled Water System can be aligned to provide backup cooling for Control Complex vital equipment located outside the Control Room. The Appendix R chiller is non-safety related, and can be powered manually from the emergency diesel-backed 'B' train Engineered Safeguars (ES) 480 volt Bus. Under normal conditions these chillers can run simultaneously, but CR-3 loading calculations do not assume simultaneous operation of the 'B' train chiller and the Appendix R chiller during events or accident loading conditions. The same evaluation concluded that if all EFW is lost, it is still possible to cool the core using the non-safety related, diesel-backed Auxiliary Feedwater Pump (FWP-7), which is not dependent on cooling from the CCCS.

The loss of both Control Complex Chillers would result in a loss of safety related cooling equipment for the Control Complex. Alternative non-safety related cooling methods will be placed in service within one hour to provide cooling for the Control Complex. However, an increase in temperature is expected. FPC has evaluated the effect of increased temperatures on the equipment and instruments located in the Control Complex. Instrumentation and control devices are the most sensitive to ambient temperature changes. Per the Environmental & Seismic Qualification Program Manual (ESQPM), the various Control Complex rooms that house plant instrumentation experience a normal ambient temperature of 70 to 80°F. This is based on an operating Control Complex Chiller and various functioning HVAC duct heaters. While operating with alternative Control Complex cooling, it is anticipated that the temperatures will exceed the ESQPM range with local temperatures possibly up to a temperature of 104°F. An evaluation has been performed on the effect that this abnormal range of 80 to 104°F would have on plant instrumentation. The effect has been assessed with respect to the safety systems actuation setpoint accuracy, the display instrumentation uncertainty values used to monitor ITS allowable values, and display instrumentation uncertainties used for monitoring design basis operational limits.

The following is a list of systems that were evaluated for elevated ambient temperature conditions:

Reactor Protection setpoints
Engineered Safeguards Actuation setpoints
Emergency Feedwater Initiation and Control (EFIC) setpoints
Control Rod Drive Position Indication
Reactor Coolant (RC) Hot Leg Narrow Range Temperature
RC Flow
RC Narrow Range Pressure
Reactor Building (RB) Narrow Range Pressure
RB Temperature
Pressurizer Level
Makeup Tank Level and Pressure
Secondary Heat Balance

All of these evaluations concluded that there would be insignificant changes to instrument loop uncertainties within the temperature range of 70 to 104°F. The following list of parameters, which do not normally vary over short intervals (24 hours), and that have loop components in the Control Complex were evaluated to be bounded by the evaluations performed above for temperature excursions up to 104°F.

Emergency Feedwater Tank Level
Condensate Storage Tank Level
Fire Service Water Storage Tanks Level
Borated Water Storage Tank Level
Borated Water Storage Tank Temperature
Condenser Hotwell Level
Core Flood Tank Level and Pressure
Nuclear Services Closed Cycle Cooling Surge Tank Level and Pressure
Decay Heat Closed Cycle Cooling Surge Tank Level

These evaluations are based on best estimate assumptions and engineering judgment applied to existing models and calculations. On this basis, FPC is confident that the setpoints of Technical Specification instrumentation that are used to meet 10 CFR 50.36(c)(2)(ii) Criterion 1 and Criterion 2 are relatively unaffected to temperatures up to 104°F. Additionally, FPC has established limiting temperatures for various areas in the Control Complex to ensure all required components can perform their design functions. Thus, there is a high degree of confidence that instrumentation needed to monitor and actuate to maintain safety limits and design bases limits will perform their functions during increased temperature conditions.

Established surveillance procedures verify instrument response to expected parameters at steady state power operation. Remaining at steady state operation while cooling is provided by the alternative cooling systems, and is a benefit in assessing proper instrument response when compared to monitoring changing parameters expected during a plant shutdown transient.

Compliance with control room habitability requirements will be maintained.

Risk Evaluation

FPC has evaluated LAR #271 for its impact from a risk perspective. The 24-hour period that both chillers will be unavailable was evaluated and results in a delta Core Damage Frequency (CDF) of 3.66E-07. Combining this with the delta CDF of 6.3E-07, based on the previously approved 35-day maintenance to one chiller, yields a maximum delta CDF of 9.96E-07. Based on standard industry practice, however, CR-3 only schedules one half of the allowed outage time for maintenance. Considering this, the maximum expected delta CDF due to this change would be 5.9E-07, based on a planned 17-day maintenance of one chiller. This is less than the delta CDF of 6.3E-07 for a one-time 35-day maintenance outage as approved in License Amendment No. 200. This risk assessment does not credit the compensatory measures, which significantly reduce the risk associated with this activity.

Compensatory Measures

During the period of time that chiller repairs are in progress, maintenance and surveillance activities that have the potential to impact the performance of the Appendix R Chilled Water System or required support systems will not be performed. This includes minimizing activities that could potentially cause a plant trip or a loss of offsite power.

Alternate cooling to the Control Complex will be established by the following compensatory measures:

Startup of 20 tons of pre-staged air conditioning (AC)

The guidance for aligning temporary cooling to the Control Complex is provided in Section 4.1 of Maintenance Procedure MP-193, "Temporary Cooling to a Control Complex." During the refurbishment of the 'A' train Control Complex Chiller, 20-ton of portable AC (sensible heat removal) will be pre-staged on the 145-foot elevation of the Turbine Building, outside of the Control Room, prior to the start of Control Complex Chiller refurbishment activities. Initiation of cooling to the Control Room using the portable AC requires routing expandable ductwork (from the unit into the Control Complex through the vestibule and Control Complex Habitability Envelope (CCHE) door on the 145-foot elevation) and starting the unit. These actions will be completed within one hour of the second safety related chiller unavailability.

While the temporary cooling is in place, appropriate security measures will be taken to assure proper access control to the Control Complex.

Alignment of the Appendix R Chilled Water System to supply cooling to the vital equipment areas in the Control Complex

The guidance for aligning Appendix R chilled water to supply dedicated loads in the Control Complex is provided in Section 4.3 of Operating Procedure OP-409, "Plant Ventilation System." Required actions in this procedure section include:

1. securing the Appendix R Chiller and isolating Appendix R chilled water to the Turbine Building Switchgear cooling units and Reactor Building penetration cooling,

2. isolating normal duty chilled water to the Emergency Feedwater Initiation and Control (EFIC) Room cooling units,

3. aligning Appendix R chilled water to the individual cooling units in the EFIC, Battery Charger, Inverter, Remote Shutdown, and 4160V and 480V Switchgear Rooms,

4. restarting the Appendix R Chiller, and

5. starting the individual cooling unit fans.

These actions will be completed within one hour of chiller unavailability.

<u>The Control Room Emergency Ventilation System (CREVS) operates in combination with the CCCS during normal operation to distribute cooling to all areas of the Control Complex</u>

CREVS will remain in operation to distribute the cooled air provided by the Appendix R Chilled Water System and the portable 20-ton AC to all areas of the Control Complex. If outside air is cooler than the air inside the Control Complex, CREVS will operate in normal mode with 5,000 CFM fresh air intake and discharge. If outside air is warmer, CREVS will operate in the normal recirculation mode with no intake or discharge.

The Control Complex will be adequately cooled within the requested 24-hour period as follows:

A. CR-3 has previous experience maintaining cooling to the Control Room with portable AC; and

B. The Appendix R Chiller and associated heat exchangers have the capacity of removing approximately 50 tons of heat from the Control Complex. This capacity in combination with 20-tons of portable AC results in 70 tons of sensible heat removal capacity, which will maintain environmental conditions in the Control Complex below design limits for a duration of 61 hours (24-hour delay for entry into ITS LCO 3.0.3 plus 37 hours to place the Unit in MODE 5).

FPC has established procedures to reduce unnecessary heat loads while operating with the alternative cooling systems.

Additional administrative compensatory controls have been established in the event of operator fatigue resulting from higher temperature conditions during the implementation of this LAR. These measures include additional personnel on shift for relief, supplemental comfort measures such as local fans for the control board area and the availability of ice vests for Control Room personnel.

<u>Performance Monitoring</u>

FPC has established procedures to monitor the temperature in the Control Complex while operating with the alternative cooling systems. Administrative limits on temperature have been established for bulk air temperature in the Control Complex and for each individual area to preserve equipment operability. If the temperature limits are exceeded within the 24-hour period, the plant will initiate shutdown to MODE 5.

Conclusion

Based on the above evaluation, FPC believes that approval of the proposed change to ITS 3.7.18, due to inoperability of both chillers, will pose an insignificant risk to the plant or to the health and safety of the public.

Reference

FPC to NRC letter, 3F0701-02, dated July 19, 2001, "Crystal River Unit 3 – Response to NRC Request for Additional Information Re: Proposed License Amendment Request #259, Revision 0, "Control Complex Cooling System" (TAC No. MB1617)

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT B

LICENSE AMENDMENT REQUEST #271

Regulatory Analysis

No Significant Hazards Consideration Determination
Applicable Regulatory Requirements
Environmental Impact Evaluation

No Significant Hazards Consideration Determination

License Amendment Request (LAR) #271, Revision 1, proposed changes include a change to Improved Technical Specification (ITS) 3.7.18, CONDITION A, to add a condition requiring available alternate cooling to maintain the Control Complex temperature within acceptable limits for at least 24 hours. The proposed changes to ITS 3.7.18 also include renumbering REQUIRED ACTION A.1 to A.1.1, and the addition of REQUIRED ACTION A.1.2 to initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits, AND restart a Control Complex Chiller within 24 hours.

This LAR is requested as a contingency for two inoperable Control Complex Chillers while Control Complex Cooling System chiller refurbishment is performed. This request has been evaluated against the standards in 10 CFR 50.92, and has been determined to not involve a significant hazards consideration. In support of this conclusion, the following analysis is provided:

1. *Does not involve a significant increase in the probability or consequences of an accident previously evaluated.*

The Control Complex Cooling System is not an initiator of any design basis accident. The basis for this request is that the risk of a design basis event ocurring within the 24-hour period during which alternative cooling will be used is acceptably small, and is less than the risk posed by a forced shutdown of the unit. The Control Complex Cooling System safety function is to provide sufficient cooling to ensure operability of safety-related equipment located in the Control Room and other portions of the Control Complex. Control Complex cooling, within the 24-hour period, is being accomplished by the compensatory measures in place which include providing alternate cooling by aligning the Appendix R Chilled Water System to supply cooling to the vital equipment areas in the Control Complex and operation of pre-staged portable air conditioning that provides cooling to the Control Room. Control Complex Habitability Envelope integrity will be maintained throughout the duration of this operating condition, which will ensure that potential post-accident dose to operators is maintained within analyzed limits. Therefore, granting this LAR does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does not create the possibility of a new or different type of accident from any accident previously evaluated.*

The proposed License Amendment Request will not result in changes to the design, physical configuration of the plant. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any previously evaluated.

3. *Does not involve a significant reduction in the margin of safety.*

During the 24-hour period of operation with two inoperable Control Complex Chillers allowed by the proposed change to ITS 3.7.18, measures will be implemented to ensure the availability of temporary and permanently installed non-safety backup systems capable of providing cooling to the Control Room and other vital equipment areas in the Control Complex within one hour. From the risk significance perspective, using installed non-safety backup systems to provide cooling to the Control Room and other vital equipment areas in the Control Complex is acceptable. Areas with essential equipment in the Control Complex will be monitored to ensure temperatures do not exceed acceptable limits. Therefore, granting this LAR does not involve a significant reduction in the margin of safety.

Based on the above, FPC concludes that the proposed LAR presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

Applicable Regulatory Requirements

FPC has evaluated the Regulatory Requirements applicable to the proposed changes to ITS 3.7.18 as follows:

10 CFR 50.36 Technical Specifications

The discussion provided in the evaluation of request states that FPC has evaluated changes to instrument loop uncertainties within the temperature range of 70 to 80°F and found those to be insignificant. The discussion concluded that the setpoints of Technical Specification instrumentation that are used to meet 10 CFR 50.36(c)(2)(ii) Criterion 1 and Criterion 2, are unaffected to temperatures up to 104°F. Additionally, FPC has established limiting temperatures for various areas in the Control Complex to ensure all required components perform their design functions.

10 CFR 50.49 Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants

The temperature limits required to ensure equipment qualification of electrical equipment in the Control Complex will not be exceeded during the 24-hour period when the ability to use the alternate cooling method apply. Therefore, the proposed change to ITS 3.7.18 does not require exemption or relief from this regulatory requirement.

10 CFR 50, Appendix A

The general Design Criteria (GDC) for nuclear power plants (Appendix A to 10 CFR 50) came into effect after the licensing of CR-3. CR-3 has been designed and constructed taking into consideration the proposed 10 CFR 50.34, Appendix A, General Design Criteria for Nuclear Power Plant Construction Permits, as published in the Federal Register (32FR10213) on July 11, 1967, and which are applicable to this unit. Thus, the GDC in 10 CFR 50, Appendix A, applicable to this proposed change to ITS 3.7.18 is Criterion 19, Control Room. The corresponding CR-3 GDC is Criterion 11.

Control Complex cooling, within the 24-hour period, is being accomplished by the compensatory measures in place which include providing alternate cooling by aligning the Appendix R Chilled Water System to supply cooling to the vital equipment areas in the Control Complex and operation of pre-staged portable air conditioning that provides cooling to the Control Room. Control Complex Habitability Envelope integrity will be maintained throughout the duration of this operating condition, which will ensure that potential post-accident dose to operators is maintained within analyzed limits.

FPC has determined that the proposed changes do not require any exemptions or relief from regulatory requirements other that the changes requested to ITS 3.7.18.

Environmental Impact Evaluation

10 CFR 51.22(c)(9) provides criteria for identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not:

(i) involve a significant hazards consideration,

(ii) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and

(iii) result in a significant increase in individual or cumulative occupational radiation exposure.

Florida Power Corporation has reviewed proposed License Amendment Request #271, Revision 1 and concludes it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with this request.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT C

LICENSE AMENDMENT REQUEST #271

Proposed Revised Improved Technical Specifications Pages

Strikeout/Shadowed Format

~~Strikeout Text~~ Indicates Deleted Text
Shadowed Text Indicates Added Text

3.7 PLANT SYSTEMS

3.7.18 Control Complex Cooling System

LCO 3.7.18 Two Control Complex Cooling trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the cooling capability of a single OPERABLE Control Complex Cooling train available. OR Alternate cooling to maintain the Control Complex temperature within acceptable limits for at least 24 hours is available. The ability to apply the alternate cooling method for the control complex will expire on December 31, 2002.	A.1.1 Ensure adequate cooling capability from the Control Complex Cooling system in operation. OR A.1.2 If a second chiller becomes inoperable during the 35-day extended Completion Time, initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits AND restart a Control Complex Chiller within 24 hours. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002.	Immediately
	AND A.2 Restore Control Complex Cooling trains(s) to OPERABLE status.	7 days*
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in Mode 3.	6 hours
	AND B.2 Be in Mode 5.	36 hours

*On a one-time basis, each Control Complex Cooling System train may be inoperable for up to 35 days to allow performance of chiller refurbishment activities. LCO 3.0.4 is not applicable during each of the one-time 35-day Completion Times. The ability to apply the one-time 35-day Completion Time to each Control Complex Cooling System train will expire on December 31, 2002.

BASES

APPLICABLE SAFETY ANALYSIS (continued)

personnel occupancy requirements, to ensure equipment OPERABILITY.

The Control Complex Cooling System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Two redundant trains of the Control Complex Cooling System are required to be OPERABLE to ensure that at least one train is available, assuming a single failure disables one redundant component. A Control Complex Cooling train consists of a chiller and associated chilled water pump as well as a duct mounted heat exchanger that provides cooling of recirculated control complex air. All components of an OPERABLE train must be energized by the same train electrical bus. Total system failure could cause control complex equipment to exceed its operating temperature limits. In addition, the Control Complex Cooling System must be OPERABLE to the extent that air circulation can be maintained (See Specification 3.7.12).

APPLICABILITY

In MODES 1, 2, 3, and 4, the Control Complex Cooling System must be OPERABLE to ensure that the control complex temperature will not exceed equipment OPERABILITY requirements.

ACTIONS

<u>A.1.1 and A.1.2</u>

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy and diversity of subsystems, the inoperability of one component in a train does not render the Control Complex Cooling System incapable of performing its safety function. Neither does the inoperability of two different components, each in a different train, necessarily result in a loss of function for the Control Complex Cooling System. The intent of this Condition is to maintain a combination of equipment such that the cooling capability equivalent to 100% of a single train remains available and in operation. This allows increased flexibility in plant operations under circumstances when components in opposite trains are inoperable.

(continued)

ACTIONS

A.1.1 and A.1.2 (continued)

With one or more components inoperable such that the cooling capability equivalent to a single OPERABLE train is not available, the facility is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be immediately entered.

With one or more Control Complex Cooling trains inoperable and at least 100% cooling capability of a single OPERABLE train available, the inoperable components must be restored to OPERABLE status within 7 days*. In this Condition, the remaining Control Complex Cooling System equipment is adequate to maintain the control complex temperature. Adequate cooling capability exists when the control complex air temperature is maintained within the limits for the contained equipment and components. However, the overall reliability is reduced because additional failures could result in a loss of Control Complex Cooling System function. The 7 day Completion Time is based on the low probability of an event occurring requiring the Control Complex Cooling System and the consideration that the remaining components can provide the required capabilities.

*On a one-time basis, each Control Complex Cooling System train may be inoperable for up to 35 days to allow performance of chiller refurbishment activities. LCO 3.0.4 is not applicable during each of the one-time 35-day Completion Times The ability to apply the one-time 35-day Completion Time to each Control Complex Cooling System train will expire on December 31, 2002.

If a second chiller becomes inoperable during the 35-day extended Completion Time, initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits AND restart a Control Complex Chiller within 24 hours. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002.

Control Complex temperatures will be monitored during this 24-hour period to ensure all required equipment is maintained within acceptable limits.

B.1 and B.2

If the inoperable Control Complex Cooling System component cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner without challenging unit systems.

(continued)

FLORIDA POWER CORPORATION

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ATTACHMENT D

LICENSE AMENDMENT REQUEST #271

Proposed Revised Improved Technical Specifications Pages

Revision Bar Format

3.7 PLANT SYSTEMS

3.7.18 Control Complex Cooling System

LCO 3.7.18 Two Control Complex Cooling trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the cooling capability of a single OPERABLE Control Complex Cooling train available. OR Alternate cooling to maintain the Control Complex temperature within acceptable limits for at least 24 hours is available. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002.	A.1.1 Ensure adequate cooling capability from the Control Complex Cooling system in operation. OR A.1.2 If a second chiller becomes inoperable during the 35-day extended Completion Time, initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits AND restart a Control Complex Chiller within 24 hours. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002. AND A.2 Restore Control Complex Cooling trains(s) to OPERABLE status.	Immediately 7 days*
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in Mode 3. AND B.2 Be in Mode 5.	6 hours 36 hours

*On a one-time basis, each Control Complex Cooling System train may be inoperable for up to 35 days to allow performance of chiller refurbishment activities. LCO 3.0.4 is not applicable during each of the one-time 35-day Completion Times. The ability to apply the one-time 35-day Completion Time to each Control Complex Cooling System train will expire on December 31, 2002.

BASES

APPLICABLE SAFETY ANALYSIS (continued)

personnel occupancy requirements, to ensure equipment OPERABILITY.

The Control Complex Cooling System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Two redundant trains of the Control Complex Cooling System are required to be OPERABLE to ensure that at least one train is available, assuming a single failure disables one redundant component. A Control Complex Cooling train consists of a chiller and associated chilled water pump as well as a duct mounted heat exchanger that provides cooling of recirculated control complex air. All components of an OPERABLE train must be energized by the same train electrical bus. Total system failure could cause control complex equipment to exceed its operating temperature limits. In addition, the Control Complex Cooling System must be OPERABLE to the extent that air circulation can be maintained (See Specification 3.7.12).

APPLICABILITY

In MODES 1, 2, 3, and 4, the Control Complex Cooling System must be OPERABLE to ensure that the control complex temperature will not exceed equipment OPERABILITY requirements.

ACTIONS

A.1.1 and A.1.2

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy and diversity of subsystems, the inoperability of one component in a train does not render the Control Complex Cooling System incapable of performing its safety function. Neither does the inoperability of two different components, each in a different train, necessarily result in a loss of function for the Control Complex Cooling System. The intent of this Condition is to maintain a combination of equipment such that the cooling capability equivalent to 100% of a single train remains available and in operation. This allows increased flexibility in plant operations under circumstances when components in opposite trains are inoperable.

(continued)

ACTIONS

A.1.1 and A.1.2 (continued)

With one or more components inoperable such that the cooling capability equivalent to a single OPERABLE train is not available, the facility is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be immediately entered.

With one or more Control Complex Cooling trains inoperable and at least 100% cooling capability of a single OPERABLE train available, the inoperable components must be restored to OPERABLE status within 7 days*. In this Condition, the remaining Control Complex Cooling System equipment is adequate to maintain the control complex temperature. Adequate cooling capability exists when the control complex air temperature is maintained within the limits for the contained equipment and components. However, the overall reliability is reduced because additional failures could result in a loss of Control Complex Cooling System function. The 7 day Completion Time is based on the low probability of an event occurring requiring the Control Complex Cooling System and the consideration that the remaining components can provide the required capabilities.

*On a one-time basis, each Control Complex Cooling System train may be inoperable for up to 35 days to allow performance of chiller refurbishment activities. LCO 3.0.4 is not applicable during each of the one-time 35-day Completion Times The ability to apply the one-time 35-day Completion Time to each Control Complex Cooling System train will expire on December 31, 2002.

If a second chiller becomes inoperable during the 35-day extended Completion Time, initiate actions to establish alternate cooling within one hour to maintain the Control Complex temperature within acceptable limits AND restart a Control Complex Chiller within 24 hours. The ability to apply the alternate cooling method for the Control Complex will expire on December 31, 2002.

Control Complex temperatures will be monitored during this 24-hour delay period to ensure all required equipment is maintained within acceptable limits.

B.1 and B.2

If the inoperable Control Complex Cooling System component cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner without challenging unit systems.

(continued)

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT E

LICENSE AMENDMENT REQUEST #271

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Florida Power Corporation in this document. Any other actions discussed in the submittal represent intended or planned actions by Florida Power Corporation. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing and Regulatory Programs, of any questions regarding this document or any associated regulatory commitments.

ID Number	Commitment	Commitment Date
3F0902-06-1	FPC has established procedures to monitor the temperature in the Control Complex while operating with the alternative cooling systems. Administrative limits on temperature have been established for bulk air temperature in the Control Complex and for each individual area to preserve equipment operability. If the temperature limits are exceeded within the 24-hour period, the plant will initiate shutdown to MODE 5.	During the requested 24-hour period.
3F0902-06-2	Maintenance and surveillance activities that have the potential to impact the performance of the Appendix R Chilled Water System or required support systems will not be performed. This includes minimizing activities that could potentially cause a plant trip or a loss of offsite power.	During the period of time that chiller repairs are in progress.
3F0902-06-03	Compensatory measures are identified in a plant administrative procedure.	Prior to placing the 'A'train Control Complex Chiller out of service.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT F

LICENSE AMENDMENT REQUEST #271

Summary of FPC's Responses to Questions Formulated by the NRC Staff During the September 10, 2002, Telephone Conference

Summary of FPC's responses to questions formulated by the NRC staff During the September 10, 2002 telephone conference

NRC Question

1. State the bases for the 104°F temperature.

FPC Response

The maximum accident temperature in the Control Complex was determined to be to be 104°F by FPC Calculation M97-0020, Control Complex Heat Load Evaluation.

NRC Question

2. Provide the maximum cabinet temperature if ambient temperature is 104°F.

FPC Response

The limiting Foxboro components were qualified by vendor testing to withstand an outside room temperature of 104°F. Attachment G provides extracted pages from Reactor Coolant pressure (wide range) Loop Accuracy calculation I-88-0020. This calculation includes pertinent data from the Foxboro qualification testing.

NRC Question

3. Discuss quantitative results of analyses.

FPC Response

Attachment G contains Analysis/Calculation H-02-0001, CR-3 Control Complex Temperatures Utilizing Appendix R Chiller (CHHE-2) and Portable AC (Air Conditioning). This calculation demonstrates that the Appendix R Chiller in conjunction with 20 tons capacity of portable Air Conditioning, will maintain the Control Complex temperatures below design temperature limits for a period of 61 hours.

NRC Question

4. How do the elevated temperatures affect the qualified life of equipment?

FPC Response

The temperature limit for the Control Complex that is required to ensure equipment qualification is 95°F for the Control Room and Emergency Feedwater Initiation and Control (EFIC) Room C, 110°F for the Mechanical Equipment Room and 104°F for all remaining Control Complex rooms. The EFIC Room C (power supplies and modules) can withstand a high temperature of 110°F (Calculation I-93-0002 of Attachment G). Therefore, the aforementioned 104°F accident temperature conservatively envelopes the specifications of the components in the Control Complex.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT G

LICENSE AMENDMENT REQUEST #271

Analysis/Calculation H-02-0001, CR-3 Control Complex Temperatures Utilizing Appendix R Chiller (CHHE-2) and Portable AC (Air Conditioning), and with samples of loop accuracy calculations

Systems	AH, CH
Calc. Sub-Type	N/A
Priority Code	4
Quality Class	Non-Safety Related

NUCLEAR GENERATION GROUP

ANALYSIS / CALCULATION

H-02-0001
(Calculation #)

CR3 Control Complex Temperatures Utilizing Appendix R Chiller (CHHE-2) and Portable AC
(Title including structures, systems, components)

☐ BNP UNIT ______

☒ CR3 ☐ HNP ☐ RNP ☐ NES ☐ ALL

APPROVAL

Rev	Prepared By	Reviewed By	Supervisor
0	Signature J.M. Livingston	Signature	Signature
	Name J.M. Livingston	Name D. Wise	Name G. Englert
	Date 8/01/02	Date 8/5/02	Date 8/5/02

(For Vendor Calculations)

Vendor ______ Vendor Document No. ______

Owners Review By ______ Date ______

List Of Effective Pages

Page	Rev	Page	Rev	Page	Rev	Page	Rev
All Pages	0						

Attachments

Attach. Number	Rev.	No of Pages	Attach. Number	Rev.	No of Pages	Attach. Number	Rev.	No of Pages
1	0	1	3	0	12	5	0	20
2	0	3	4	0	1			

Amendments

Rev Letter	No of Pages	Rev Letter	No of Pages	Rev Letter	No of Pages	Rev Letter	No of Pages

Table Of Contents

Revision Summary

Revision	Revision Summary (Include brief description of revision and a list of EC's and other modifications incorporated into revision)
0	This is the original issuance of calculation H-02-0001.

Document Indexing Tables

The following tables have been formatted to facilitate the entry of the document reference information into PassPort in accordance with Section 9.7.2 of RDC-NGGC-0002. This Attachment is a substitute for form RDC-NGGC-0002-003 and has been customized to be applicable to CR3 calculations.

The leftmost column of each table is provided to indicate the required data entry that is required, using the following codes: A = Add, M = Modify, D = Delete; a dash (-) is used to indicate no change is required.

Controlled Document Revisions

Tab 3. Reference Numbers [TIMC011]

Reference Systems
(Enter two letter codes, one per line)

Action	System
A	AH
A	CH

Other References
(Enter references that are not controlled PassPort documents)

Action	Type	Reference	Sub	Title
A	NPAS	MAR 82-10-19-09		Appendix R Control Complex Dedicated Cooling System
A	NPAS	Letter# 3F0802-03 dated 8/15/02		CR3, License Amendment Request #271, One Time 24 hour delay for Entry into ITS 3.0.3 fore Two Inoperable Control Complex Chillers.
A	NPAS			Fundamentals of Classical Thermodynamics.

Tab 4. Document References [TIMC012]

Controlled Documents with Cross References
(Enter controlled documents referenced in calculation including CALC's, DWG's, MGEN's, POM-OPS's, SPEC's, etc)

Action	Facility	Doc Type	Sub Type	Document	Rev
A	CR3	DWG		FD-302-769	16
A	CR3	EDBD		Tab 8/10	10
A	CR3	EDBD		Tab 8/15	6
A	CR3	Spec.		Improved Tech. Spec.	Amend. 202
A	CR3	Calc.		H-97-0001	7
A	CR3	Calc.		M-97-0020	1
A	CR3	Calc.		EEM-01-002	0
A	CR3	IM		#1388	0
A	CR3	ED		# 48703	0

Controlled Document Information

Tab 5. Related Equipment [TIMC014]

(Enter ED for equipment for which design or operation is impacted by results of calculation.
Also enter ID of computer software programs used to prepare calculation, as Equip Type SFTAPL)

Action	Facility	Unit	System	Equip. Type	Equipment	Comp. Type	Component
A	CR3	3	CH	HX	CHHE-2		
A	CR3	3	AH	HX	AHHE-46		
A	CR3	3	AH	HX	AHHE-47		
A	CR3	3	AH	HX	AHHE-48		
A	CR3	3	AH	HX	AHHE-49		
A	CR3	3	AH	HX	AHHE-50		
A	CR3	3	AH	HX	AHHE-51		
A	CR3	3	AH	HX	AHHE-52		
A	CR3	3	AH	HX	AHHE-53		
A	CR3	3	AH	HX	AHHE-54		
A	CR3	3	AH	HX	AHHE-55		
A	CR3	3	AH	HX	AHHE-56		
A	CR3	3	AH	HX	AHHE-57		
A	CR3	3		SFTAPL	Compare/ Modt-PC, 1.6		

Controlled Document Information – New Referenced By Entries

(Enter the ID of documents that reference this calculation but that do not presently list this calculation as a reference in PassPort. Use a separate table for each document)

Tab 1. Information

Facility	Document Type	Sub-Type
CR3		
Document		

Tab 3. Document References

Facility	Doc Type	Sub Type	Document	Rev
CR3	CALC		*This calculation*	

Concurrence of document owner for this new reference

Signature	Name	Date

Record of Lead Review

Design H02-0001 Revision 0

The signature of the Lead Reviewer records that:

J. the review indicated below has been performed by the Lead Reviewer;
J. appropriate reviews were performed and errors/deficiencies (for all reviews performed) have been resolved and these records are included in the design package;
- the review was performed in accordance with EGR-NGGC-0003.

☐ **Design Verification Review** ☒ **Engineering Review** ☐ **Owner's Review**
- ☒ Design Review
- ☐ Alternate Calculation
- ☐ Qualification Testing

☐ **Special Engineering Review** ____________

☐ YES ☒ N/A **Other Records are attached**

D. Wise | [signature] | Mechanical Design | 8/2/02
Lead Reviewer (print) | **(sign)** | **Discipline** | **Date**

Item No.	Deficiency	Resolution
1)	Comments Incorporated	
2)		
3)		
4)		
5)		
6)		
7)		
8)		

FORM EGR-NGGC-0003-2-5
This form is a QA Record when completed and included with a completed design package. Owner's Reviews may be processed as stand alone QA records when Owner's Review is completed

Record of Interdisciplinary Reviews

Discipline/Program Review	Scope of Review
Systems Engineering	☒ Concurrence with Design Inputs and Assumptions ☒ Impact of Results (on designs, programs, procedures)

Reviewer (name)	Signature	Date
J. Taylor		8/2/02

Item	Comment	Resolution
1	Comments incorporated	
2		
3		
4		

Discipline/Program Review	Scope of Review
Operations	☒ Concurrence with Design Inputs and Assumptions ☒ Impact of Results (on designs, programs, procedures)

Reviewer (name)	Signature	Date
J. Huecker		8/1/02

Item	Comment	Resolution
1	Comment incorporated.	
2		
3		
4		

Discipline/Program Review	Scope of Review
Licensing	☒ Concurrence with Design Inputs and Assumptions ☒ Impact of Results (on designs, programs, procedures)

Reviewer (name)	Signature	Date
S. Powell		8/2/02

Item	Comment	Resolution
1	NO COMMENTS	
2		
3		
4		

Purpose:

The purpose of this calculation is to determine the capacity of portable Air Conditioning (AC) that is required, along with the Appendix R Chiller (CHHE-2) and associated heat exchangers, to maintain Control Complex room temperatures below design temperature limits for a period of 61 hours.

The results of this calculation will support LAR# 271 (Ref# 8). LAR# 271 seeks approval to delay entry into Improved Technical Specification (ITS) LCO 3.0.3 up to 24 hours for failure to meet the requirement of LCO 3.7.18, Condition A (two Control Complex Chillers inoperable).

LAR #271 is a contingency for two inoperable Control Complex Chillers while planned Control Complex System (CCCS) chiller refurbishment is performed. Should both Chillers (CHHE-1A/B) become inoperable the Appendix R Chiller (CHHE-2), associated heat exchangers and portable AC will be utilized for a 61-hour period (24 hour LAR period + 37 hour LCO 3.0.3 to Mode 5 period) to maintain Control Complex Room temperatures below design limits.

The long term post-LOCA case (LOCA4E) contained in calculation H-97-0001 (Ref# 5) was utilized as a basis for this calculation with the deviations identified in the Design Inputs. Compare Modt-PC, version 1.6 software was utilized in this evaluation.

Conclusions:

20 Tons of portable AC capacity (sensible heat removal) along with the Appendix R Chiller (CHHE-2) and associated heat exchangers is required to maintain Control Complex room temperatures below design temperature limits for a period of 61 hours. This time duration would provide 24 hours to repair the inoperable chiller and to obtain Mode 5 within the 37 hour requirement specified in ITS 3.0.3.

Also, this heat removal capacity shall be delivered with Turbine building environmental conditions as specified in design input # 2.11.

Note: Without establishing additional cooling after 61 hours, Control Complex Temperatures continue to rise above values identified on Attachment 1.

Body Of Calculation:

1. Methodology

   As identified above, the long term post-LOCA case (LOCA4E) contained in calculation H-97-0001 (Ref# 5) and associated design inputs was utilized as a basis for this calculation with the exception of the deviations identified in the following design input # 2.1.

   Also, the following time line is associated with this evaluation:

At T=0 minutes

- The unit is in Mode 1.
- The Control Complex (CC) Chillers CHHE-1A and CHHE-1B are out of service.
- Control Complex Ventilation System (CCVS) is not in operation.

At T=30 minutes

- Continuous recirculation (no outside air) of the Control Complex Ventilation System (CCVS) using AHF-17, AHF-19 and AHF-54 fans is established.

At T= 60 minutes

- The Appendix R Control Complex Chiller (CHHE-2), associated pump (CHP-2) and heat exchangers are in operation.
- Portable cooling AC is aligned to the Control Complex (Control Room) and in operation.
- The chilled water outlet isolation valves for the RB Penetration cooling heat exchangers AHHE-13A/B are closed. (Ref# 11 and DI# 2.12).

At T= 24 hours

- One CC chiller has been started or LCO 3.0.3 is entered.

At T= 31 hours (24 hours + 7 hours)

- Plant is in Mode 3 if LCO 3.0.3 is entered

At T= 37 hours (24 hours + 13 hours)

- Plant is in Mode 4 if LCO 3.0.3 is entered

At T=61 hours (24 hours + 37 hours)

- Plant is in Mode 5 if LCO 3.0.3 is entered

2. <u>Design Inputs</u>

2.1) The long term post-LOCA case (LOCA4E) contained in calculation H-97-0001 (Ref# 5) was utilized as a basis for the calculation with the exception of the deviations identified below:

- In the LOCA4E case, the Control Complex ventilation fans are restored in 30-minutes post-LOCA and the Control Complex Chiller is restored in 120-minutes post-LOCA. The Control Complex chillers (CHHE-1A/B) remain out of service for the entire run and are not credited for heat removal or heat addition to the Mechanical Equipment Room.
- Portable AC will provide constant Control Room heat removal and is in operation 60 minutes from the loss of both chillers (T=0).
- The Appendix R Chiller heat exchangers are modeled as temperature dependent heat removal, based on cooling coil data and chilled water flow rates (See attachment 2), and will be in operation along with the Appendix R Chiller 60 minutes from the loss of both chillers (T=0).
- The initial temperature for the Mechanical Equipment Room and Control Complex Emergency Fan Cooler Unit (AHF-18A/B and AHF-19A/B) is 80 °F. This DI is justified by

attachment 4 which identifies that the Mechanical Equipment Room has been maintained below 80 °F since 4/00 (SP-300 data).

2.2) The Appendix R Chiller/ associated heat exchangers and portable AC are required to remove sensible heat from the Control Complex.

2.3) ITS (Ref# 8), LCO 3.0.3 identifies that if a LCO can not be met the unit shall be placed in a mode or condition that the specification is not applicable. Action shall be initiated in 1 hour to place the unit in Mode 3 in 7 hours, Mode 4 in 13 hours and in Mode 5 in 37 hours.

2.4) Deleted

2.5) Control Complex cooling (CHHE-1A and CHHE-1B) is not required to maintain Mode 5 or achieve Mode 6 per LCO 3.7.18 (Ref # 8).

2.6) The Appendix R chiller has a rated capacity of 1,125,000 BTU/Hr (approx. 94 tons) and a required capacity of 589,458 BTU/hr (approx. 49 tons). (Reference # 3).

2.7) Chilled water (45 °F) is delivered by the Appendix R Chilled Water System to the EFIC rooms, Battery Charger Rooms A and B, Inverter Rooms A and B, 4160V Switchgear Rooms A and B, the Remote Shutdown Room, and the 480V Switchgear Rooms. (Reference # 3). Heat load is removed from each room by the following heat exchangers that interface with the chilled water supplied by CHHE-2 . Flow rates and required cooling loads are provided. (Reference #2,3 & 4).

Room	Heat Exchanger Tag	Heat Exchanger Model #'s (York)	Chiller Water Flow Rate (GPM)	Cooling Required, Btu/Hr.
EFIC Rooms	AHHE-44	ACH-182 (Ellis & Watts)	37	182,358
Batt. Charger Room A	AHHE-46	DEV-6 (3R)	3.0	6,000
Batt. Charger Room B	AHHE-47	DEV-6 (3R)	3.0	6,000
Inverter Room A	AHHE-54/55	DEV-14 (6R)	12.0/Hx	70,000
Inverter Room B	AHHE-56/57	DEV-14 (6R)	12.0/Hx	89,500
4160V Switchgear Room A	AHHE-48	DEV-12 (4R)	6.0	30,000
4160V Switchgear Room B	AHHE-49	DEV-12 (4R)	6.0	30,000
Remote Shutdown Room	AHHE-45	DEV-6 (3R)	3.0	8,600
480V Switchgear Room A	AHHE-50/51	DEV-14 (6R)	8.0/Hx	83,500
480V Switchgear	AHHE-52/53	DEV-14 (6R)	8.0/Hx	83,500

Room B				
		Total	101+37=138	589,458 (49 tons)

2.8) Per IM# 1388 (Ref # 12), the York Model DEV Air Conditioners are direct drive units where vertical discharge is needed. The model number denotes the following characteristics:

- DEV: Ducted, Exposed Vertical discharge
- Size: 06 = 600 CFM, 12 = 1200 CFM, 14= 1400 CFM
- Coils: 3R = 3 row coil, 4R = 4 row coil, 6R= 6 row coil

Cooling capacities are computed in attachment 2.

2.9) The temperature limit for CC rooms that is required to ensure equipment qualification is 95 °F for the Control Room and EFIC Room C, 110 °F for the Mechanical Equipment Room and 104 °F for all remaining CC rooms. (Ref # 6) The Mechanical Equipment Room temperature of 110 °F is utilized based on justification in attachment 3 (Ref # 6) that identifies that AHF-17 and AHF-19 are bounded by 110 °F.

2.10) The Appendix R Chiller (CHHE-2), associated heat exchangers/fans and the portable AC to be utilized are non-safety components. The Appendix R Chiller can be powered from emergency diesel generator. (Ref# 11). However, portable AC will not have this capability.

2.11) Portable AC will be directed through the Control Room vestibule door located on the East end of the 145' elevation of the Turbine Building. Per reference # 7, this area was recorded at 103 °F DB and 86 °F WB (approx. 50% RH). Therefore, portable AC shall be capable of supplying the required sensible capacity (Tons) at these environmental conditions.

2.12) Per ED 48703 (Ref # 11), RB penetration cooling can be isolated short term. If air temperatures were to exceed 200 °F actions should be taken to drive the temperatures down. However, plant shutdown should be triggered at 350 °F.

3. Assumptions

3.1) Plant configuration will be maintained through CP-140 or appropriate controls.

3.2) All Control Complex rooms are initially maintained at 80 deg F.

3.3) Discharge temperature of the Appendix R Chiller (CHHE-2) is maintained at 45 °F or below.

3.4) Appendix R Chilled Water System heat exchanger flow rates are maintained as specified in MAR 82-10-19-09.

3.5) The Appendix R Chiller and the identified portable AC can be aligned 1 hour from loss of both Control Complex Chillers (CHHE-1A/B). Utilization of plant procedures MP-193 Rev 29 Titled "Temporary Cooling to the Control Complex" and OP-409 Rev 54 titled "Plant Ventilation System" this alignment is valid per discussions with Operations personnel.

4. Detailed Calculations

See Methodology section above.

5. Results

The following files and attachment 1 document the results of this evaluation:

Input File	20ton80degFall
Output File	20ton80degFall.out
Plot File	20ton80degFall.plt
Graph Files	20ton80degFall.graph1
	20ton80degFall.graph2
	20ton80degFall.graph3

As identified, the Appendix R chiller, associated heat exchangers and the portable AC are required to maintain Control Complex Room temperatures below their design limits for a 61 hour period. This time duration takes into consideration the 24 hours addressed in LAR# 271 and the 37 hours required to obtain Mode 5 per ITS 3.0.3.

The tabulated results contained in attachment 1 identify that 20 tons of AC (Sensible Heat Removal) will maintain all Control Complex Rooms below their design limits specified in design input #2.9. The Control Room and the EFIC Room C will be maintained below 95 °F, the Mechanical Equipment Room will be maintained below 110 °F and the remaining Control Complex rooms are maintained below 104 °F.

Also, the 20 Tons of AC shall be delivered with Turbine building environmental conditions as specified in design input # 2.11.

References:

1.) FD-302-769 Rev 16, Appendix R Chilled Water.

2.) DBD Tab 8/10 Rev 10, Titled "Control Complex Air Handling System"

3.) DBD Tab 8/15 Rev 6, Titled "Chilled Water System"

4.) MAR 82-10-19-09, Titled "Appendix R Control Complex Dedicated Cooling System".

5.) Calculation H-97-0001 Revision 7, Titled "Control Complex Transient Temperature Response"

6.) Calculation M-97-0020 Rev 1, Titled "Control Complex Heat Load Evaluation"

7.) Engineering Evaluation EEM-01-002 Rev 0, Titled "Refined Inputs for H97-0001/ MECH-0094 Rev 6

8.) Improved Technical Specification (ITS), Through Amendment 202.

9.) Florida Power Letter 3F0802-03 dated 8/15/02. CR3, License Amendment Request # 271, One time 24 hour delay for Entry into ITS 3.0.3 for Two Inoperable Control Complex Chillers.

10.) Fundamentals of Classical Thermodynamics, Wylen & Sonntag, Second Edition.

11.) ED 48703, Evaluation of Control Complex Chiller for NOED during CHHE-1B refurbishment.

12.) IM # 1388 Revision 0, Titled "Fan Coil Air Conditioners".

13.) Compare Modt-PC version 1.6 software.

Calculation H-02-0001 Rev 0
Control Complex Temperatures
Attachment 1

Control Complex Room Temperatures				
Volume Number	Description	Temp - F, @ 24 hrs, 20 ton AC	Temp - F, @ 61 hrs, Mode 5, 20 ton AC	
1	Control Room (Elev. 145')	85.5	**94.4**	
2	Kitchen, Break, Corridor (Elev. 145')	90.8	100.3	
3	Cable Spreading Room (Elev. 134')	88.4	97.1	
4	CRD (Relay) Room (Elev. 124')	89.6	95.3	
5	EFIC Room A (Elev. 124')	87.6	91.5	
6	EFIC Room B (Elev. 124')	85.3	89.3	
7	EFIC Room C (Elev. 124')	82.8	86.5	
8	EFIC Room D (Elev. 124')	89.4	93.5	
9	480V Switchgear Room A (Elev. 124')	80.9	85	
10	480V Switchgear Room B (Elev. 124')	82.5	86.7	
11	General Area by Elevator (Elev. 108')	87.6	94.9	
12	Remote Shutdown Room (Elev. 108')	71.8	75.4	
13	Battery Room A (Elev. 108')	91.0	98.6	
14	Battery Room B (Elev. 108')	92.0	99.5	
15	Battery Charger Room A (Elev. 108')	86.4	91.6	
16	Battery Charger Room B (Elev. 108')	88.6	94.5	
17	Inverter Room A (Elev. 108')	82.5	86.2	
18	Inverter Room B (Elev. 108')	84.2	88.4	
19	4160V Switchgear Room A (Elev. 108')	83.3	88.8	
20	4160V Switchgear Room B (Elev. 108')	85.3	91.7	
21	Stairwell (Elev. 95' to 198')	89.6	97.9	
22	Supply Air Plenum Above Control Room	91.4	100.1	
25	Mechanical Equipment Room (El. 164')	101.4	**108.9**	
	Bulk Average Temperature	86.9	92.9	

Calculation H-02-0001 Revision 0
Appendix R Heat Exchanger Capacites
Attachment 2

The method utilized to determine the sensible heat removal capabilities for the following York Direct Drive AC Units has been taken from vendor Form 115.36-EG1 (490). (Attachment 3). Cooling Capacities are determined by the specified GPM method.

Attached cooling selection curves, the known entering water flow rate and the following formula are utilized to obtain the sensible heat capacity using an iterative process.

GPM = TMBH/ (WTR X .5)

GPM = Entering water flow rate
TMBH = Total heat removal capacity (x 1000), Btu/hr
WTR = Water Temperature Rate.
SMBH = Sensible heat removal capacity (x 1000), Btu/hr
SBS = Sensible heat removal capacity, Btu/sec

Capacities for each unit is determined under the following Control Complex Room temperatures:

Room Temp. , DB Temp. °F	WB Temp °F	% RH
72	63	65
84	67	45
92	71	35
104	75	26

Calculation H-02-0001 Revision 0
Appendix R Heat Exchanger Capacites
Attachment 2

1). York AC Unit DEV-6 (3R), 600 CFM, 3 gpm @ 45 °F

Control Complex Rooms:

Battery Charger Room A, Tag # AHHE-46
Battery Charger Room B, Tag # AHHE-47
Remote Shutdown Room, Tag # AHHE-45

Room Temp, DB (°F)	Room Temp, WB (°F)	WTR, °F	TMBH	GPM	SMBH	SBS
72	63	8	11.7	2.93	9.4	2.61
84	67	10	14.4	2.88	13.1	3.63
92	71	12	18.4	3.06	15.6	4.33
104	75	15	20.6	2.74	19.8	5.5

2). York AC Unit DEV-12 (4R), 1200 CFM, 6 gpm @ 45 °F

Control Complex Rooms:

4160V Switchgear Room A, Tag # AHHE-48
4160V Switchgear Room B, Tag # AHHE-49

Room Temp, DB (°F)	Room Temp, WB (°F)	WTR, °F	TMBH	GPM	SMBH	SBS
72	63	10	27	5.4	21.5	5.97
84	67	12	35.5	5.91	31.5	8.75
92	71	15	42.5	5.6	35	9.72
104	75	17	50.5	5.94	44	12.22

Calculation H-02-0001 Revision 0
Appendix R Heat Exchanger Capacites
Attachment 2

3). York AC Unit DEV-14 (6R), 1400 CFM, 8 gpm @ 45 °F

Control Complex Rooms:

480V Switchgear Room A, Tag # AHHE-50/51
480V Switchgear Room B, Tag # AHHE-52/53

Room Temp, DB (°F)	Room Temp, WB (°F)	WTR, °F	TMBH	GPM	SMBH	SBS
72	63	11	44	8	58 (2 x 29)	16.11
84	67	14	52	7.42	82 (2 x 41)	22.77
92	71	16	64	8	98 (2 x 49)	27.22
104	75	19	74	7.79	136 (2 x 68)	37.77

4). York AC Unit DEV-14 (6R), 1400 CFM, 12 gpm @ 45 °F

Control Complex Rooms:

Inverter Room A, Tag # AHHE-54/55
Inverter Room B, Tag # AHHE-56/57

Room Temp, DB (°F)	Room Temp, WB (°F)	WTR, °F	TMBH	GPM	SMBH	SBS
72	63	8	49	12.25	62 (2 x 31)	17.22
84	67	10	59	11.81	90 (2 x 45)	25
92	71	12	72	12	104 (2 x 52)	28.88
104	75	14	85	12.14	142 (2 x 71)	39.44

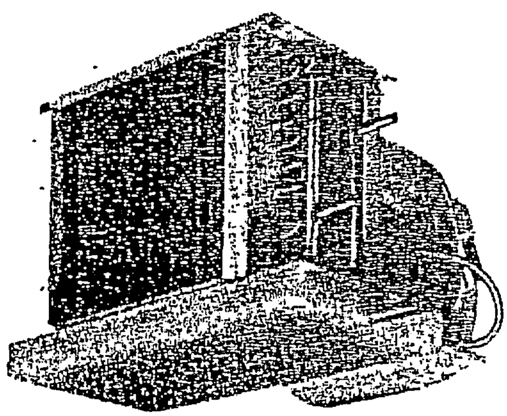
To: Mark Livingston

FORM 115.35-EG1 (490)

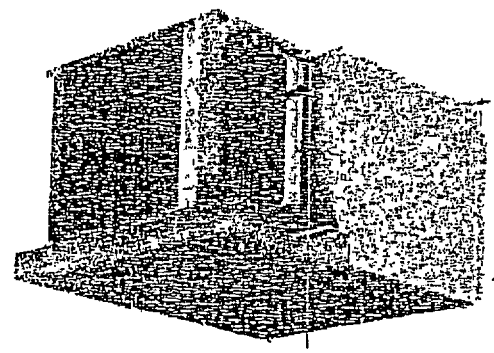
YORK®

DUCTED DIRECT DRIVE

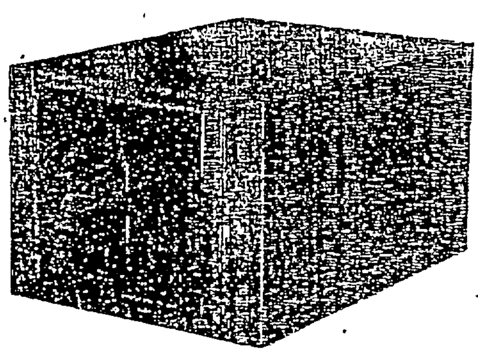
FAN COIL AIR CONDITIONERS



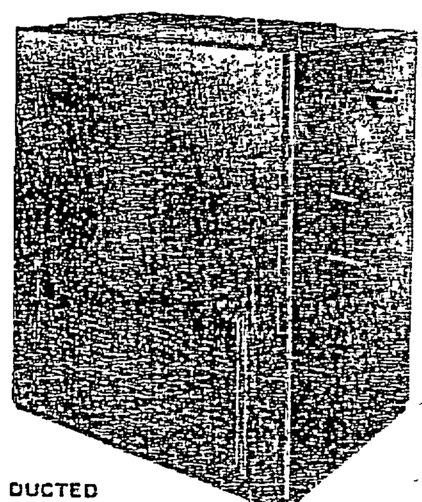
DUCTED
CONCEALED



DUCTED CONCEALED
WITH PLENUM



DUCTED
EXPOSED

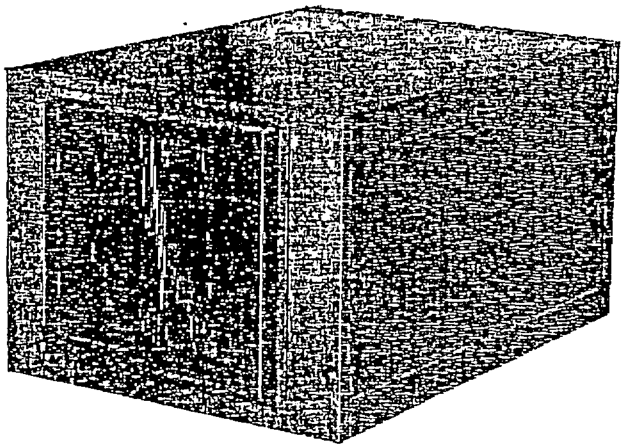


DUCTED
EXPOSED VERTICAL

CAPACITIES FROM 600 to 2000 CFM

Calc. H-02-0001 Rev 0
Attachment 3
Page 1 of 12

EXPOSED MODEL FEATURES



MODEL DE

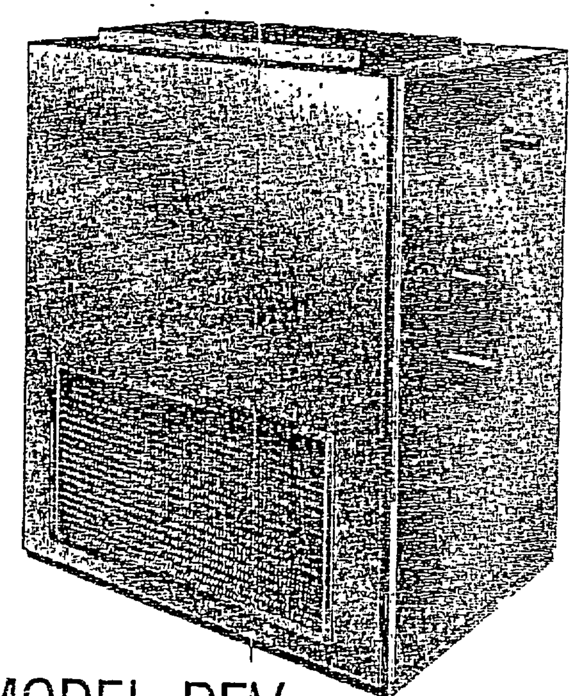
The Model DE Ducted exposed unit is designed for installations where the unit and its ductwork are visible to the occupants, such as in work areas and commercial areas The unit has an 18-gauge galvanealed steel enclosure with 1/2-inch coated glass fiber insulation meeting NFPA-90A requirements. The unit has a completely removable bottom panel for access to the valves and piping. The front panel has a 1-inch supply air duct collar and the rear panel has a 1-inch return air duct collar with an integral filter rack.

The fan assembly, consisting of either one or two direct-drive, motor-blower assemblies, with large-diameter, forward-curved blower wheels, is statically and dynamically balanced. Torsion-flex-mounted motors and balanced fan wheels assure smooth, quiet performance.

The drain pan is made of 18-gauge galvanized steel. Its interior and exterior surfaces are sprayed with a closed-cell, polyurethane insulation. A drip lip is available for control of condensate from valves and piping.

A throwaway-type 1-inch glass fiber filter is standard. Cleanable filters are also available.

The Model DEL unit is the DE unit as described above except with supply and return air grilles and low static motor(s). The Model DEL is finished in an attractive oven baked paint. The Model DEL is not available with filters.



MODEL DEV

The Model DEV exposed vertical unit is designed for installations where vertical discharge is needed, such as in a utility closet. The unit is completely enclosed in an 18-gauge galvanized steel cabinet. The top panel has a 1-inch supply air duct collar. The cabinet is acoustically and thermally insulated with 1/2-inch coated glass fiber insulation meeting NFPA-90A requirements. The front panel is easily removed to provide complete access to the coil and the motor-blower assembly, and to allow removal of the standard 1-inch glass fiber throwaway filter. Cleanable filters are available as an option.

The drain pan is made of 18-gauge galvanized steel, sprayed inside and outside with a closed-cell, polyurethane insulation.

The fan assembly, consisting of either one or two direct-drive motor-blower assemblies, with large-diameter, forward-curved blower wheels, is statically and dynamically balanced. The motor-blower assembly may be easily removed for complete servicing. Removal of the motor-blower assembly exposes the entire entering face of the coil for cleaning. Low-RPM torsion-flex-mounted motors and balanced fan wheels assure smooth, quiet performance.

Calc. H-02-0001 Rev 0
Attachment 3
Page 2 of 12

MECHANICAL SPECIFICATIONS

FAN COIL UNITS

PERFORMANCE DATA

CAPACITIES – Unit capacities are certified in compliance with Air Conditioning and Refrigeration Institute Standard 440.

SAFETY – Units listed with Underwriters Laboratory Ⓤ Standard 883 and Canadian Standards Association Ⓢ.

BASIC UNIT

The basic DC is fabricated of galvanized steel. Provision for hanging the unit is provided by slots in the top of the housing. A one inch discharge duct collar is furnished.

The condensate drain pan is lined with closed cell, fire retardant, foam insulation. Water never touches the metal pan, thus the possibility of corrosion is minimized. Every horizontal unit is available with an optional drip lip at the coil header end of the unit to provide positive control of condensate when control valves are used. The motor-blower assembly is designed for easy removal from the basic unit for servicing. This also provides access to the entering air face of the coil for easy cleaning.

CABINET

Horizontal and Vertical Cabinet Models DE and DEV have galvanized steel panels acoustically and thermally insulated with ½ inch glass fiber.

Horizontal Model DE Units have removable side panels for access to motor blower assembly, valves and piping. The front and rear panels have one inch duct collars for return air and supply air duct connections.

Vertical Model DEV Units have a removable front access panel to provide access to coil and motor blower sections. The top panel is provided with a one inch discharge duct flange.

COILS

Coils have ½ inch O.D. copper tubes with aluminum fins mechanically bonded to the tubes. All Coils are leak tested air under water and are suitable for design working pressures of 250 psig @ 200 degrees F and 400 psig @ 100 degrees F.

A variety of coil selections are available. The standard coil provides adequate capacity for most installations with an eight to ten degree design water temperature rise. A high capacity coil is offered for those installations requiring the higher latent heat capabilities or those designed for a twelve-degree water temperature rise. Also offered is a four-pipe coil consisting of standard or high capacity cooling with one and two rows of heating surface.

Optional steam coils are available and are suitable for working pressures of 15 psig.

FILTERS

All cabinet model units have 1 inch throwaway filters furnished as standard equipment. Cleanable filters are optional except on DEL.

FANS

The fans are centrifugal, forward-curved, double-width wheels. Blower housings are galvanized steel with special rolled perimeter seams to provide added rigidity

MOTORS

All motors are resilient mounted, three speed, with UNDERWRITERS listed thermal overload protection. Motor bearings are of the sleeve type or ball bearing type with oversized oil reservoirs provided to assure positive lubrication with minimum servicing required. Positive speed reduction is assured through careful matching of motor torque to blower loading. Standard motors are permanent split capacitor.

Calc. H-02-0001 Rev 0
Attachment 3
Page 3 of 12

COOLING SELECTION

HYDRONIC COOLING UNIT

NOTE All capacities (Qt and Qs) in these examples are expressed in thousands of BTU/hr. (MBH)

A. SELECTION FOR SPECIFIED TOTAL COOLING

Specified Performance 450 CFM at 0.10" ESP
13.8 TMBH/9.2 SMBH
75 DB/65 WB Entering Air
3.5 GPM (Max.) at 42 Entering Water

1. From Air Delivery table, page 10, a Unit Size 06 will deliver the specified 450 CFM at .10 ESP. (A DC unit, for example, is capable of as much as 740 CFM at that condition, operating at high speed, with a 3 row coil.

2. The Hydronic Capacity Correction Factors are determined from the chart on page 11 using the Unit Size and specified air delivery.

   Example:
   Size 06 Unit at 450 CFM — Ct=0.82
   Cs=0.80

3. Determine the base total capacity by dividing the specified total capacity by Ct

   Example:
   $$Qt\text{ (base)} = Qt_b = \frac{13.8\text{ TMBH}}{0\ 82} = 16\ 8\text{ TMBH}$$

4. First, try using the 3 row coil. Enter the capacity chart (reproduced on page 7) at the base total capacity (16.8 TMBH) and read up to the entering wet bulb temperature (65 EWB in example).

5 Read horizontally to the right to the entering water temperature (42 EWT in the example).

6. Read up to the Water Temperature Rise scale to determine the water temperature rise (WTR = 7.9).

7. Determine the actual sensible cooling capacity by reading from the intersection point of the base total capacity (Qt_b) and the entering wet bulb temperature (EWB) horizontally to the entering dry bulb temperature (75 EDB in example).

8 Read down to the MBH capacity scale to determine the base sensible capacity (Qs_b = 12 SMBH).

9 Calculate the actual sensible capacity (Qs) by multiplying the base sensible capacity by Cs

   $$Qs = Qs_b \times Cs$$

   $$Qs = 12\text{ SMBH} \times 0.80 = 9.6\text{ SMBH}$$

10. Calculate the actual GPM by using the formula below:

   $$GPM = \frac{Qt}{WTR \times .5}$$

   $$GPM = \frac{13.8\text{ TMBH}}{7.9 \times .5} = 3.48$$

11. The water pressure drop (WPD) may now be read from the pressure drop curves (page 25).

B. SELECTION FOR SPECIFIED SENSIBLE COOLING

Specified Performance 450 CFM at 0.10" ESP
11.0 TMBH/8.4 SMBH
75 DB/65 WB Entering Air
2.5 GPM (Max.) at 42 EWT

1. Select a unit and determine the actual unit air delivery and total and sensible air delivery correction factors using the methods outlined in Steps 1 and 2 for the total cooling selection procedure (A).

   Example: Unit Size 06 delivering 450 CFM at 0.10" ESP

   Ct = 0.82
   Cs = 0.80

2. Determine the base sensible capacity by dividing the specified sensible capacity by Cs.

   Example:

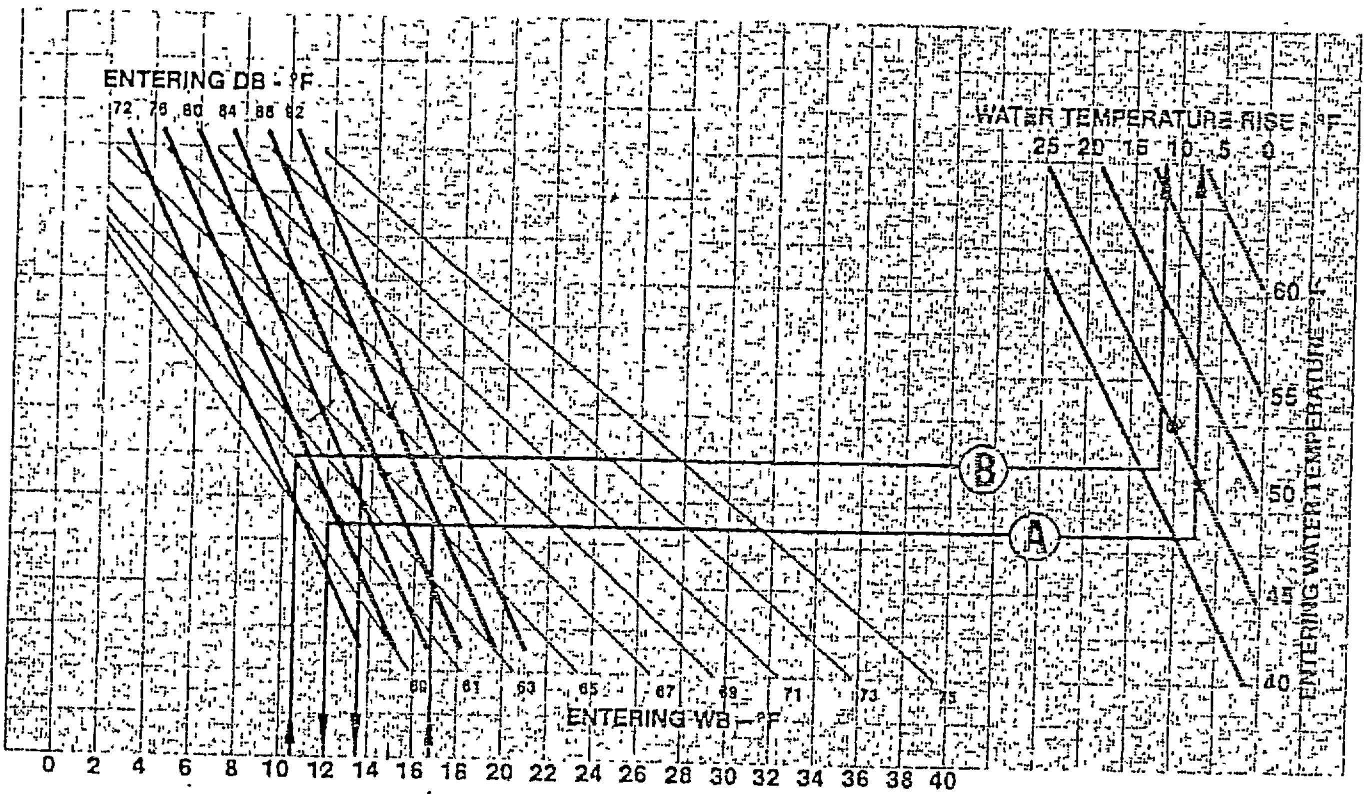
   $$Qs\text{ (base)} = Qs_b = \frac{8.4\text{ SMBH}}{0\ 80} = 10.5\text{ SMBH}$$

3. Enter the capacity chart (reproduced on page 7) at the base sensible capacity (10.5 SMBH) and read up to the entering dry bulb temperature (75 EDB in example).

4 Read right horizontally to the entering water temperature (42 EWT).

5. Read up to the Water Temperature Rise scale to determine the water temperature rise (WTR = 12).

NOMINAL 600 CFM – 3 ROW COIL



6 From the intersection point of the base sensible capacity and the entering dry bulb temperature found in Step 3 read horizontally to the entering wet bulb temperature (65 EWB in example).

7. Read down to the MBH capacity scale to determine the base total capacity (Qt_b = 13.6 TMBH).

8. Calculate the actual total capacity by multiplying the base total capacity by Ct.

$Qt = Qt_b \times Ct$

Qt = 13.6 TMBH x 0.82 = 11.2 TMBH

9. Calculate the actual GPM by using the formula below.

$$GPM = \frac{Qt}{WTR \times .5}$$

$$GPM = \frac{11.2\ TMBH}{12 \times .5} = 1.87$$

10. The water pressure drop (WPD) may now be read from the pressure drop curves (page 25).

C. UNIT RATING FOR SPECIFIED GPM

Specified Performance. Unit Size 06
450 CFM at 0.10" ESP
75 DB/65 WB Entering Air
3.0 GPM at 42 Entering Water

1. Determine the actual unit CFM and the total and sensible air delivery correction factors as in Steps 1 and 2 for the total capacity selection procedure (A).

Example: Unit Size 06 delivering 450 CFM at 0.10" ESP

Ct = 0.82
Cs = 0.80

COOLING SELECTION

Calc. H-02-0001 Rev 0
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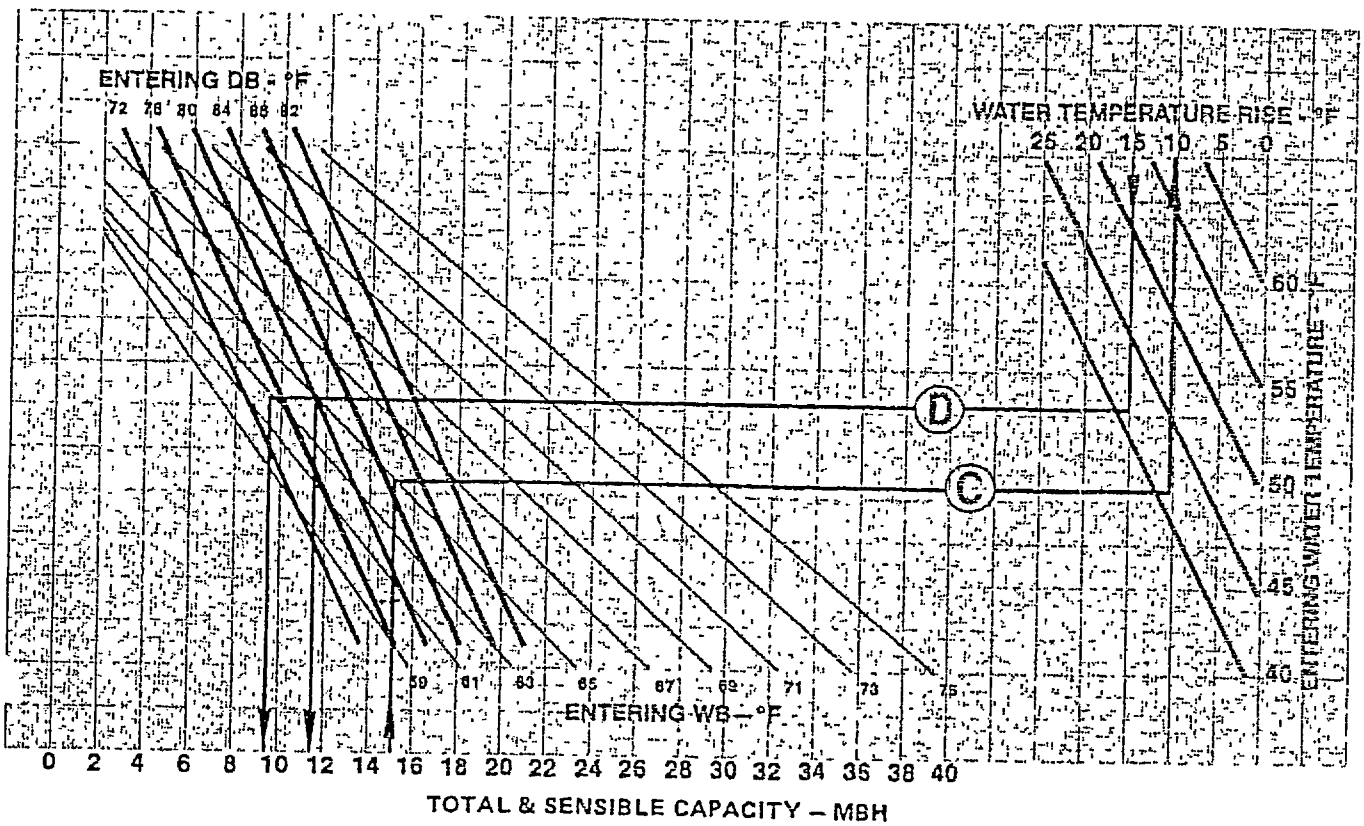
NOMINAL 600 CFM – 3 ROW COIL



2. Arbitrarily select a TMBH and apply Ct to obtain a beginning base total capacity (Qt_b).

   Example: Assume TMBH = 12.3

   $$Qt_b = \frac{12.3 \text{ TMBH}}{0.82}$$

   $Qt_b =$ 15.0 TMBH

3. Enter the capacity chart reproduced above at the selected base total capacity (15.0 TMBH) and read up to the entering wet bulb temperature (65 EWB in example).
4. Read right horizontally to the entering water temperature (42 EWT in the example).
5. Read up to the Water Temperature Rise scale to determine the water temperature rise (WTR = 10.3).
6. Calculate the actual GPM for the selected TMBH by using the formula:

   $$GPM = \frac{Qt}{WTR \times .5}$$

   $$GPM = \frac{12.3 \text{ TMBH}}{10.3 \times .5} = 2.39$$

7. Since 2.39 does not match the specified 3.0 GPM, another TMBH must be selected and Steps 2 through 6 must be repeated until the required GPM calculated in Step 6 matches the specified GPM. (A TMBH of 13.3 results in a GPM = 3.0, the specified GPM).
8. Once the specified GPM is matched and the total cooling capacity is known, the actual sensible capacity may be determined using Steps 7, 8, and 9 of the total capacity selection procedure (A).
9. The water pressure drop (WPD) may be read from the water pressure drop curves (page 26).

Calc. H-02-0001 Rev 0
Attachment 3
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D. UNIT RATING FOR SPECIFIED WATER TEMPERATURE RISE

Specified Performance: Unit Size 06
450 CFM at 0.10" ESP
75 DB/65 WB Entering Air
15 WTR at 42 Entering Water

1. Determine the actual unit CFM and the total and sensible air delivery correction factors as in Steps 1 and 2 for the total capacity selection procedure.

   Example: Unit Size 06 delivering 450 CFM at .10" ESP

   Qt = 0.82
   Qs = 0.80

2. Enter the capacity chart (reproduced on page 8) at the specified water temperature rise (15 WTR) and read down to the entering water temperature (42 EWT).

3. Read left to the entering dry bulb and wet bulb temperatures then down to the MBH scale to determine the base sensible and total capacities respectively (Qt_b = 11.4 TMBH)and (Qs_b = 9.4 SMBH).

4. Calculate the actual total and sensible capacities by applying the air delivery correction factors

   Total: $Qt = Qt_b \times Ct$

   Qt = 11.4 TMBH x 0.82 = 9.3 TMBH

   Sensible: $Qs = Qs_b \times Cs$

   Qs = 9.4 SMBH x 0.80 = 7.5 SMBH

5 Calculate the actual GPM by the formula:

   Example:

$$GPM = \frac{Qt}{WTR \times .5}$$

$$GPM = \frac{9.3\ TMBH}{15 \times .5} = 1.24$$

6. The water pressure drop (WPD) may be read from the water pressure drop curves (page 25).

To: Mark Livingston - 3 pgs.

Calc. H-02-0001 Rev 0
Attachment 3
Page 8 of 12

AIR DELIVERY

UNIT			CFM @ 0.0 E.S.P. FOR FAN SPEED INDICATED			HIGH-SPEED CFM @ E.S.P. INDICATED						
MODEL	SIZE	COIL	LOW	MED	HIGH	0.10	0.20	0.25	0.30	0.40	0.50	0.60
DC	06	3 Row	545	615	800	740	600	650	620	560	470	[illegible]
	08		645	885	1080	1010	940	910	870	800	710	590
	10		825	1015	1200	1260	1240	1190	1130	1010	810	640
	12		845	1125	1450	1360	1270	1220	1180	1090	990	850
	14		1090	1405	1470	1730	1690	1570	1450	1310	1170	1020
	16		900	1120	2080	1940	1800	1730	1660	1510	1350	1110
	18		1455	1895	2270	2130	1970	1920	1850	1720	1660	1320
	20		1435	1875	2270	2160	2050	1990	1940	1820	1670	1430
	06	4 Row	690	630	780	770	660	630	600	540	430	[illegible]
	08		630	870	1050	990	920	890	850	770	680	540
	10		805	1020	1250	1230	1210	1160	1100	970	840	700
	12		925	1130	1420	1330	1240	1200	1150	1060	950	790
	14		1060	1350	1810	1680	1560	1490	1420	1270	1110	880
	16		875	1385	2030	1890	1750	1680	1610	1480	1280	1000
	18		1430	1760	2230	2090	1950	1880	1810	1670	1600	1210
	20		1405	1840	2250	2120	2010	1950	1900	1780	1600	1300
	06	6 Row	505	595	740	680	620	590	560	470	330	[illegible]
	08		600	830	1010	940	870	840	800	710	590	—
	10		765	1075	1190	1170	1140	1090	1030	890	720	[illegible]
	12		885	1055	1360	1270	1180	1130	1090	990	850	—
	14		820	1300	1730	1630	1450	1380	1310	1170	970	[illegible]
	16		845	1315	1460	1810	1600	1590	1510	1350	1110	—
	18		1355	1760	2110	1980	1850	1790	1720	1660	1320	[illegible]
	20		1375	1800	2180	2060	1940	1880	1820	1670	1430	—
DCP DE DEV	06	3 Row	535	630	700	710	640	600	570	500	410	280
	08		590	810	980	920	850	820	780	700	590	430
	10		755	855	1170	1140	1100	1040	900	910	810	600
	12		1045	1240	1600	1480	1360	1300	1240	1120	980	780
	14		845	1335	1780	1660	1540	1480	1420	1300	1120	830
	16		850	1345	1970	1840	1710	1640	1580	1450	1280	970
	18		1330	1730	2070	1940	1810	1750	1680	1640	1370	1110
	20		1415	1800	2240	2100	1960	1890	1820	1670	1510	1270
	06	4 Row	520	610	780	690	620	580	550	470	380	230
	08		575	795	970	900	830	790	760	670	550	350
	10		715	930	1140	1090	1070	1010	960	800	780	660
	12		1035	1215	1590	1460	1330	1270	1200	1070	920	700
	14		825	1305	1740	1620	1500	1400	1300	1240	1050	[illegible]
	16		835	1315	1930	1800	1670	1600	1510	1400	1200	—
	18		1300	1695	2030	1900	1770	1710	1640	1480	1300	[illegible]
	20		1400	1830	2220	2070	1920	1850	1770	1620	1440	—
	06	6 Row	485	570	710	640	570	540	500	410	280	[illegible]
	08		560	770	940	860	780	740	700	590	430	—
	10		690	875	1070	1010	990	930	880	760	620	[illegible]
	12		965	1145	1480	1360	1240	1180	1120	980	780	—
	14		790	1245	1660	1540	1420	1360	1300	1120	830	[illegible]
	16		795	1255	1840	1710	1580	1520	1450	1280	970	—
	18		1266	1625	1960	1820	1680	1610	1540	1370	1110	[illegible]
	20		1340	1750	2120	1970	1820	1750	1670	1510	1270	—
DEL	06	3 Row	405	545	850	650	600	570	[illegible]	[illegible]	[illegible]	[illegible]
	08		490	670	820	780	740	710	—	—	—	—
	10		660	835	1020	950	880	840	[illegible]	[illegible]	[illegible]	[illegible]
	12		810	960	1240	1190	1120	1080	—	—	—	—
	14		700	1105	1470	1400	1310	1250	[illegible]	[illegible]	[illegible]	[illegible]
	16		685	1065	1590	1510	1420	1360	—	—	—	—
	18		1155	1505	1900	1700	1590	1520	[illegible]	[illegible]	[illegible]	[illegible]
	20		1280	1675	2030	1940	1830	1760	—	—	—	—
	06	4 Row	460	540	670	640	500	530	[illegible]	[illegible]	[illegible]	[illegible]
	08		480	665	810	770	720	690	—	—	—	—
	10		645	820	1000	930	850	800	[illegible]	[illegible]	[illegible]	[illegible]
	12		795	945	1220	1170	1100	1050	—	—	—	—
	14		680	1090	1450	1370	1270	1200	[illegible]	[illegible]	[illegible]	[illegible]
	16		680	1070	1570	1480	1380	1310	—	—	—	—
	18		1140	1485	1700	1670	1540	1450	[illegible]	[illegible]	[illegible]	[illegible]
	20		1260	1650	2000	1910	1780	1700	—	—	—	—
	06	6 Row	445	570	650	600	620	450	[illegible]	[illegible]	[illegible]	[illegible]
	08		464	640	700	740	680	630	—	—	—	—
	10		620	785	980	880	780	710	[illegible]	[illegible]	[illegible]	[illegible]
	12		776	925	1190	1120	1030	960	—	—	—	—
	14		665	1060	1400	1310	1180	1008	[illegible]	[illegible]	[illegible]	[illegible]
	16		850	1010	1510	1420	1290	1200	—	—	—	—
	18		1090	1420	1700	1590	1420	1410	[illegible]	[illegible]	[illegible]	[illegible]
	20		1225	1600	1940	1610	1670	1550	—	—	—	—

NOTES. 1. Tabled values are standard CFM at sea level, 70 degrees F with dry coil
2. The ratings above include filter and/or grille where applicable, i.e DCP, DE, DEL and DEV.

CORRECTION FACTORS

HYDRONIC CAPACITY CORRECTION FACTORS – TOTAL (C_t) and SENSIBLE (C_s)

ACTUAL CFM	UNIT SIZE															
	06		08		10		12		14		16		18		20	
	Ct	Cs	Ct	Cs	Ct	Cs	Ct	Cs	Ct	Cs	Ct	Cs	Ct	Cs	Ct	Cs
100 125 150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
175 200 225	– 0.46 0.51	– 0.41 0.45	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –
250 275 300	0.56 0.68 0.62	0.49 0.53 0.67	0.47 0.51	0.43 0.45	0.43	0.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
350 400 450	0.89 0.76 0.82	0.65 0.73 0.80	0.57 0.62 0.67	0.50 0.57 0.63	0.48 0.63 0.58	0.46 0.47 0.52	– 0.46 0.51	– 0.41 0.45	– – –	– – –	– – –	– – –	– – –	– – –	– – –	– – –
500 550 600	0.89 0.95 1.00	0.87 0.94 1.00	0.72 0.77 0.82	0.69 0.74 0.80	0.62 0.66 0.70	0.57 0.62 0.67	0.55 0.58 0.62	0.47 0.53 0.57	0.57 0.68	0.47 0.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
700 800 900	1.11 1.18 –	1.12 1.22 –	0.92 1.00 1.08	0.91 1.00 1.08	0.78 0.86 0.94	0.76 0.85 0.93	0.69 0.76 0.82	0.65 0.73 0.80	0.62 0.68 0.74	0.57 0.64 0.71	0.57 0.62 0.67	0.50 0.57 0.63	– 0.57 0.62	– 0.51 0.57	– – 0.58	– – 0.52
1000 1200 1400	[illegible]	[illegible]	1.16	1.15	1.00 1.13	1.00 1.14	0.89 1.00 1.11	0.87 1.00 1.12	0.82 0.90 1.00	0.80 0.89 1.00	0.72 0.82 0.92	0.69 0.80 0.91	0.68 0.76 0.84	0.65 0.72 [illegible]	0.62 0.70 0.78	0.57 0.67 0.75
1600 1800 2000	– – –	– – –	– – –	– – –	– – –	– – –	1.18 – –	1.22 – –	1.10 – –	1.11 – –	1.00 1.08 1.16	1.00 1.08 1.18	0.93 1.00 1.07	0.92 1.00 1.07	0.86 0.94 1.00	0.85 0.93 1.00
2200 2400	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.07 1.13	1.07 1.14

ALTITUDE CORRECTION FACTORS

ELEVATION	TOTAL HEAT	SENSIBLE HEAT
1000 2000 3000	0.99 0.98 0.97	0.96 0.93 0.89
4000 5000 6000	0.96 0.94 0.93	0.86 0.83 0.80

Calc. H-02-0001 Rev 0
Attachment 3
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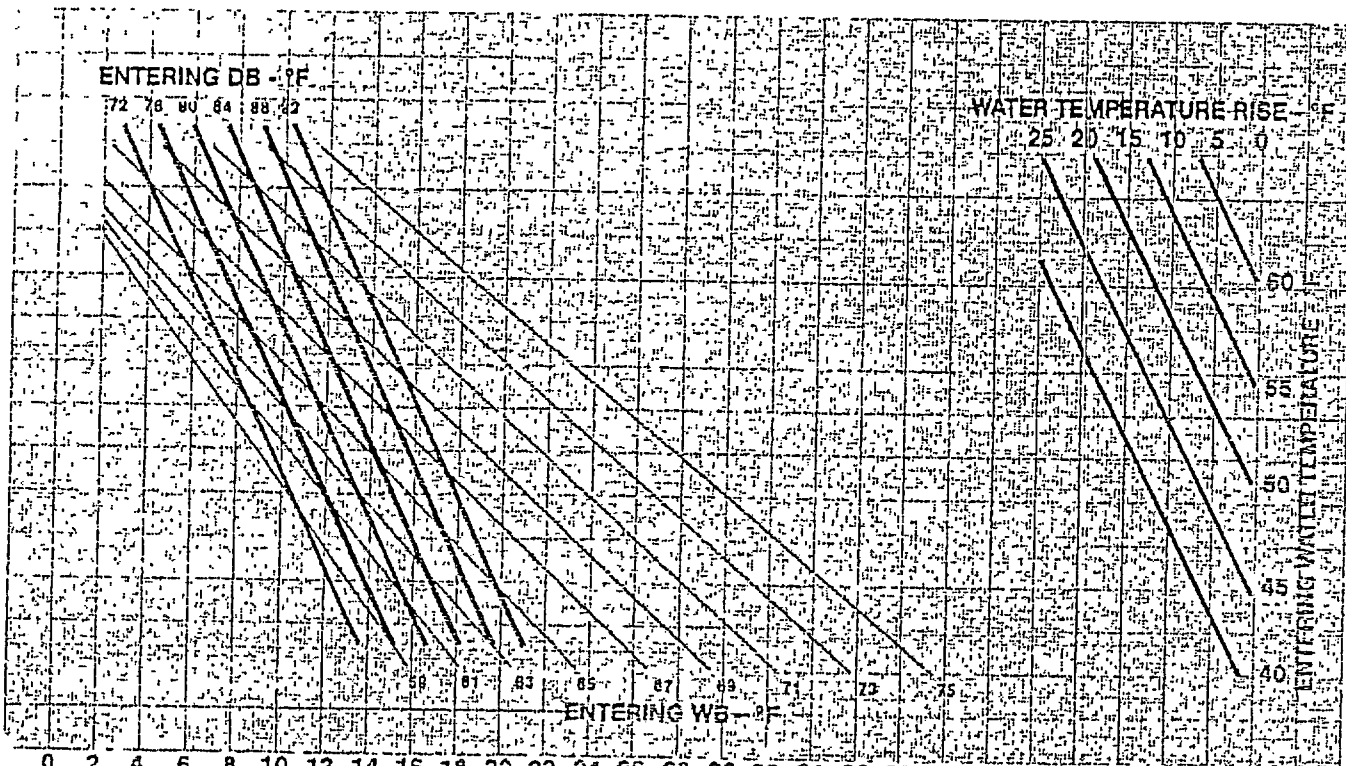
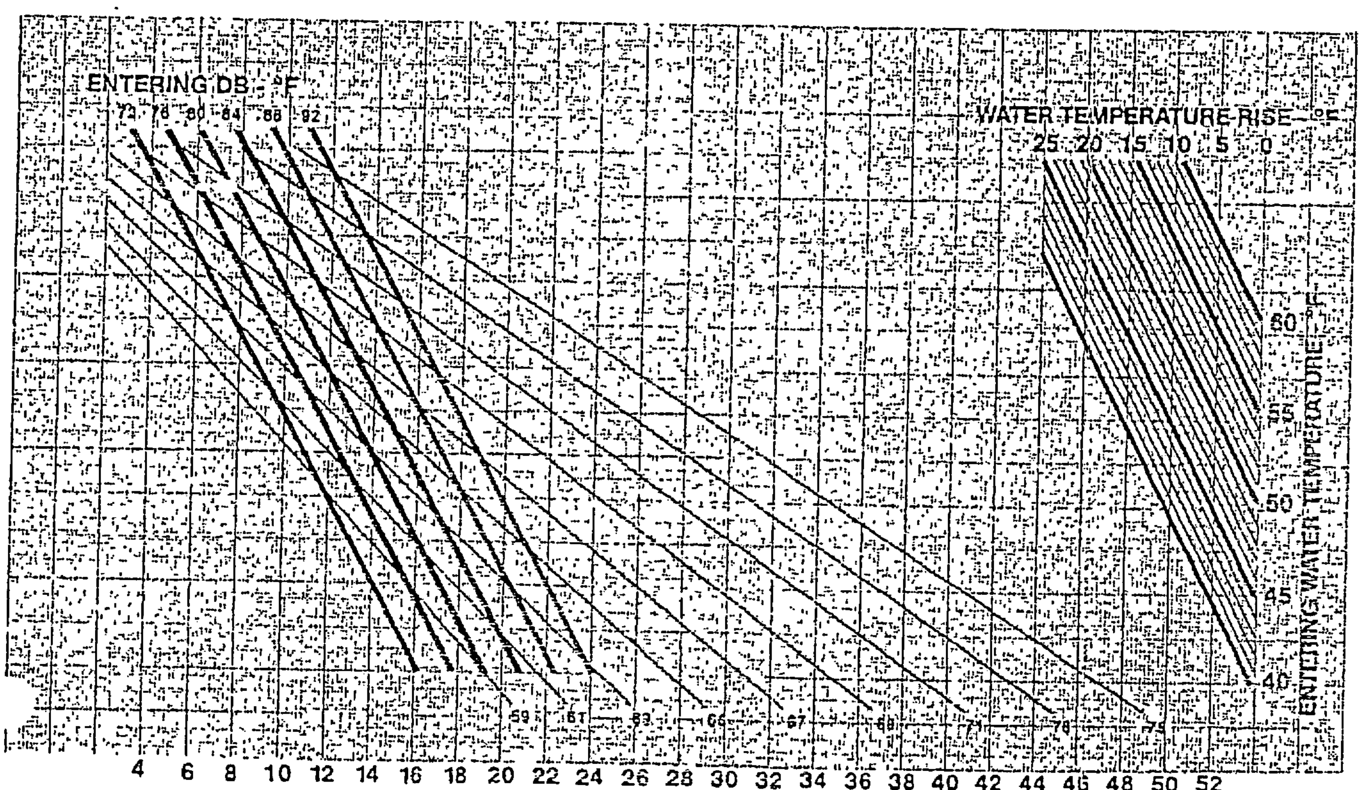
COOLING CURVES

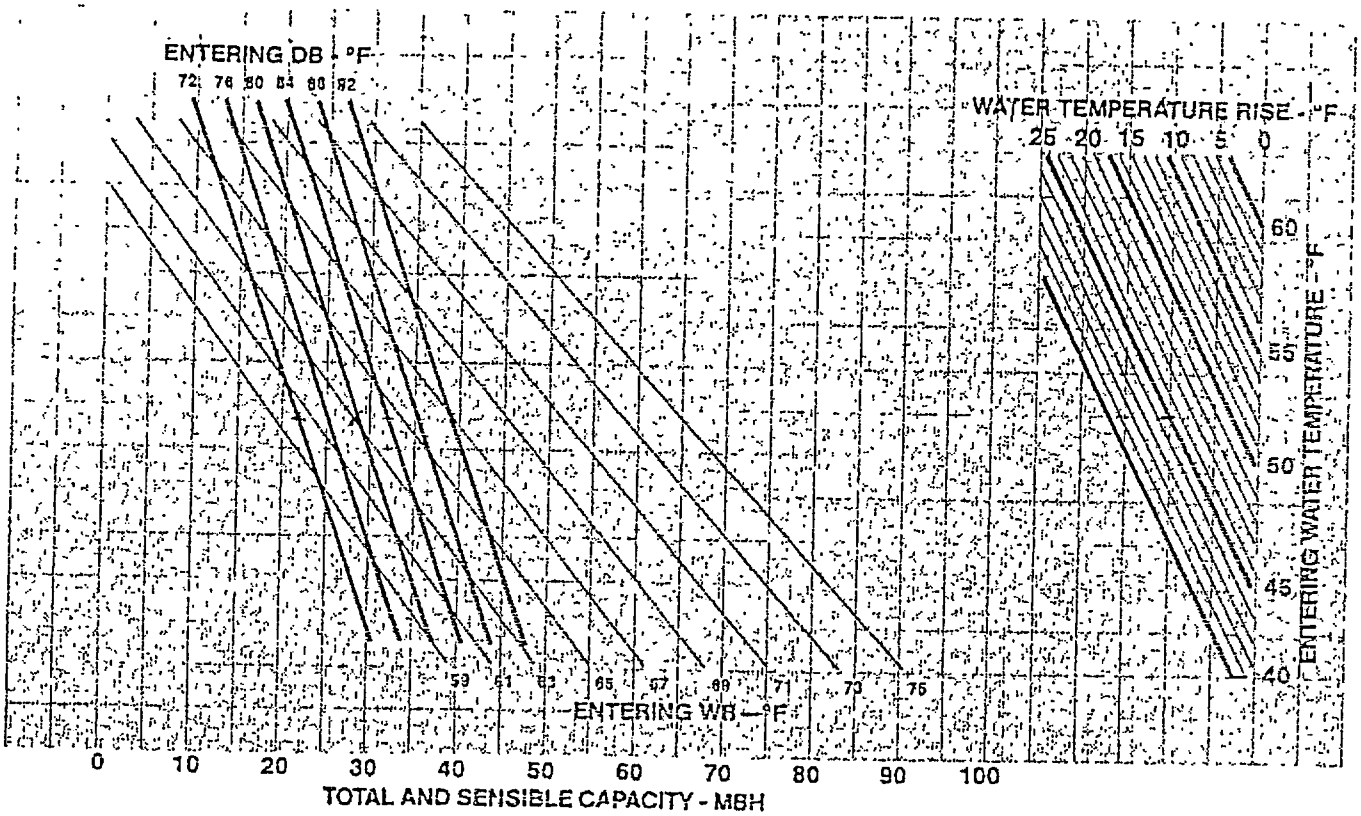
NOMINAL 600 CFM – 3 ROW COIL



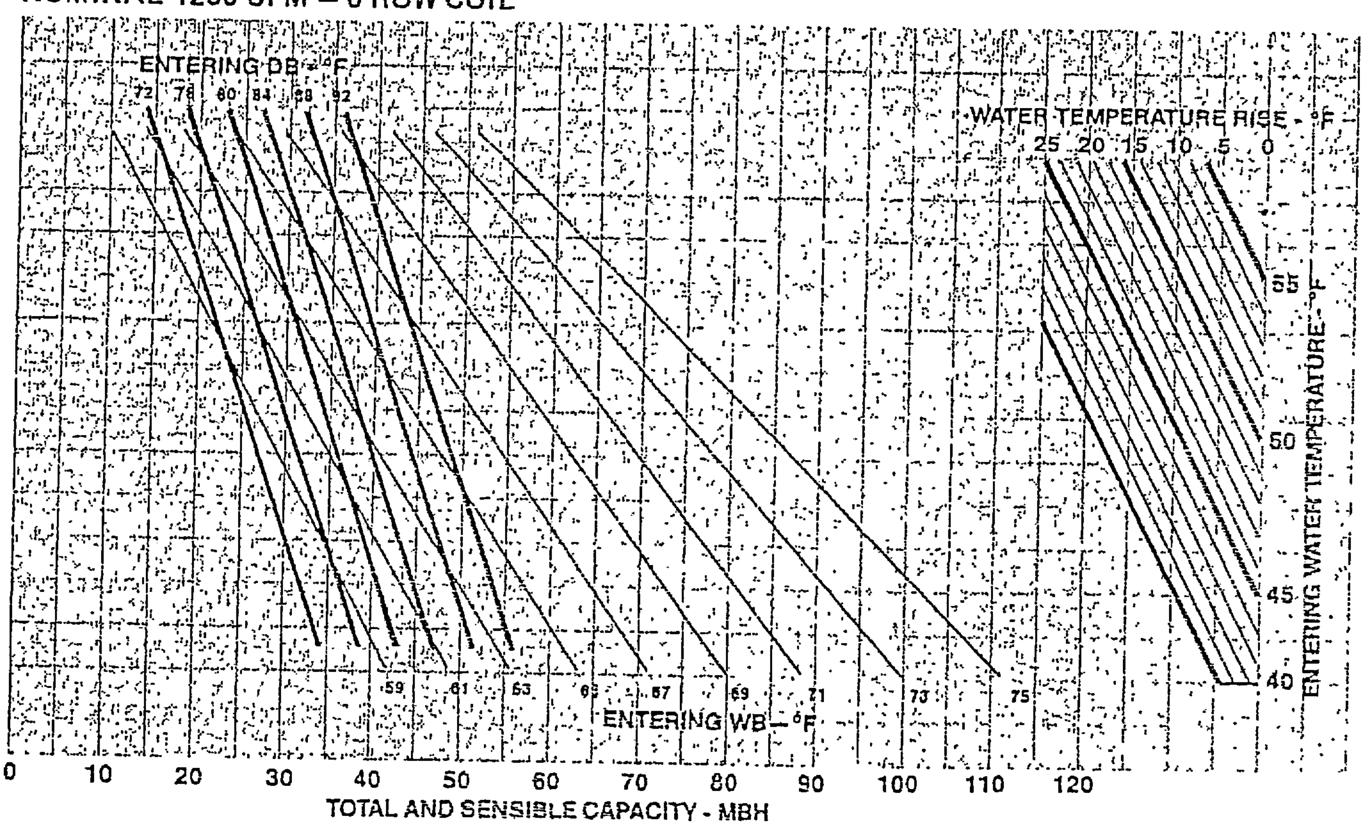
NOMINAL 600 CFM – 4 ROW COIL



NOMINAL 1200 CFM — 4 ROW COIL



NOMINAL 1200 CFM — 6 ROW COIL



To: Mark Livingston

Calc. H-02-0001 Rev 0
Attachment 3
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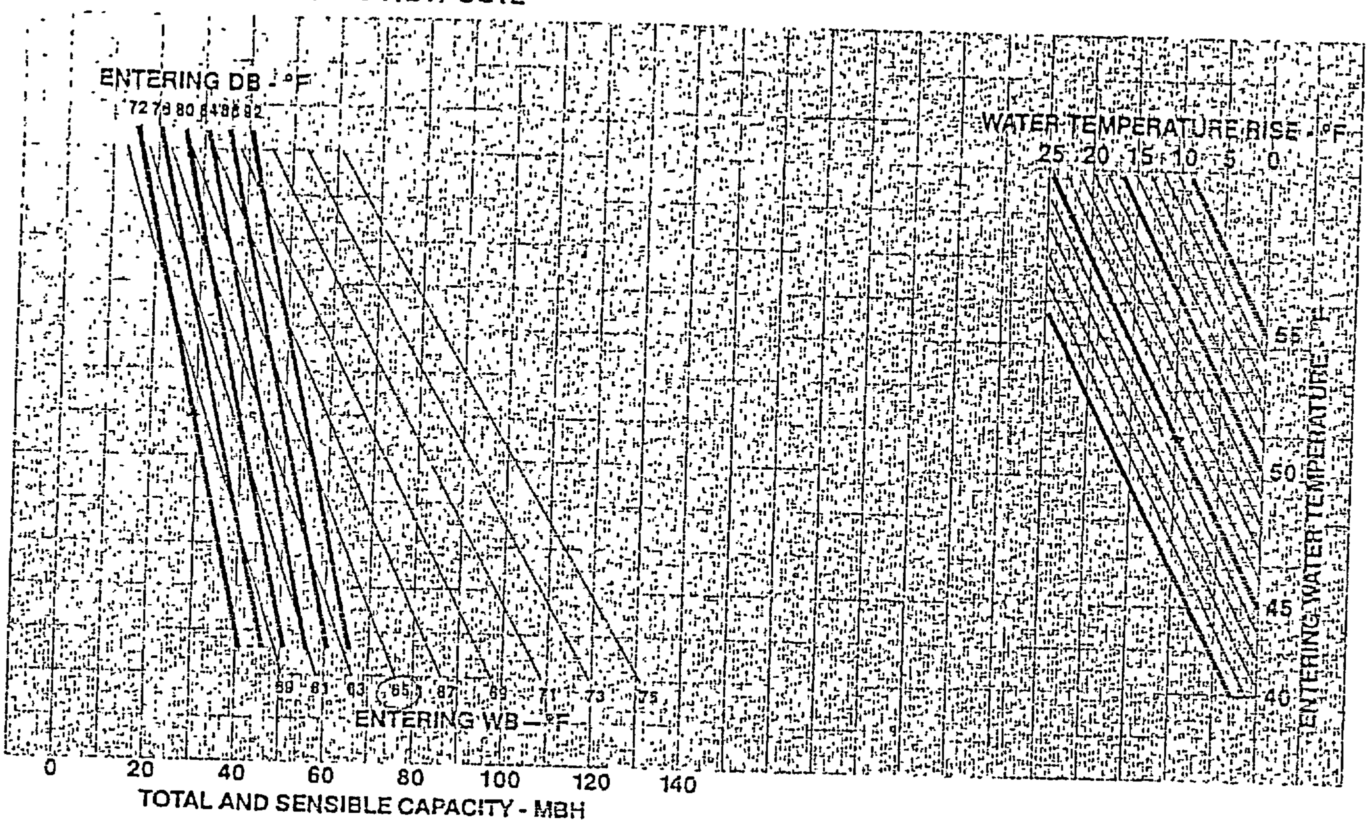
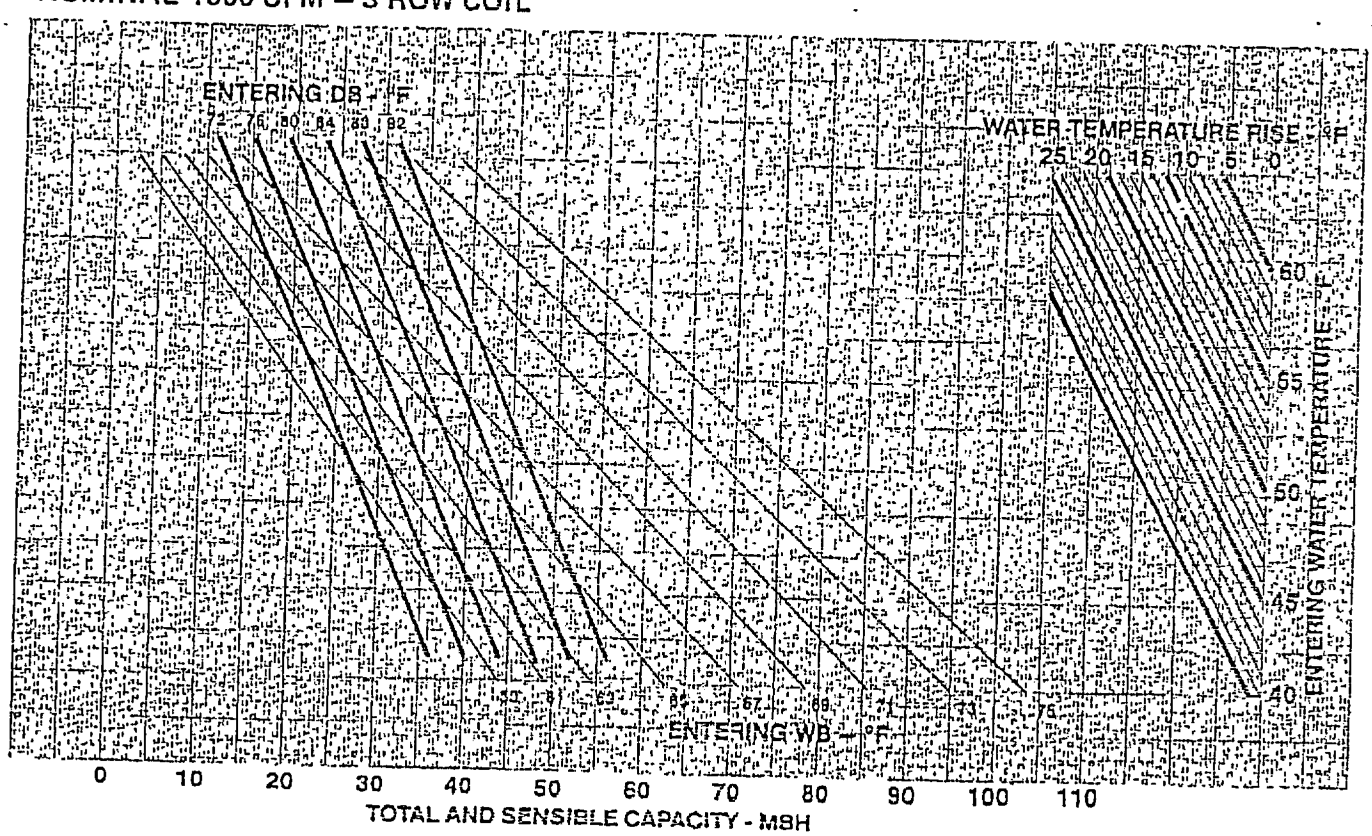
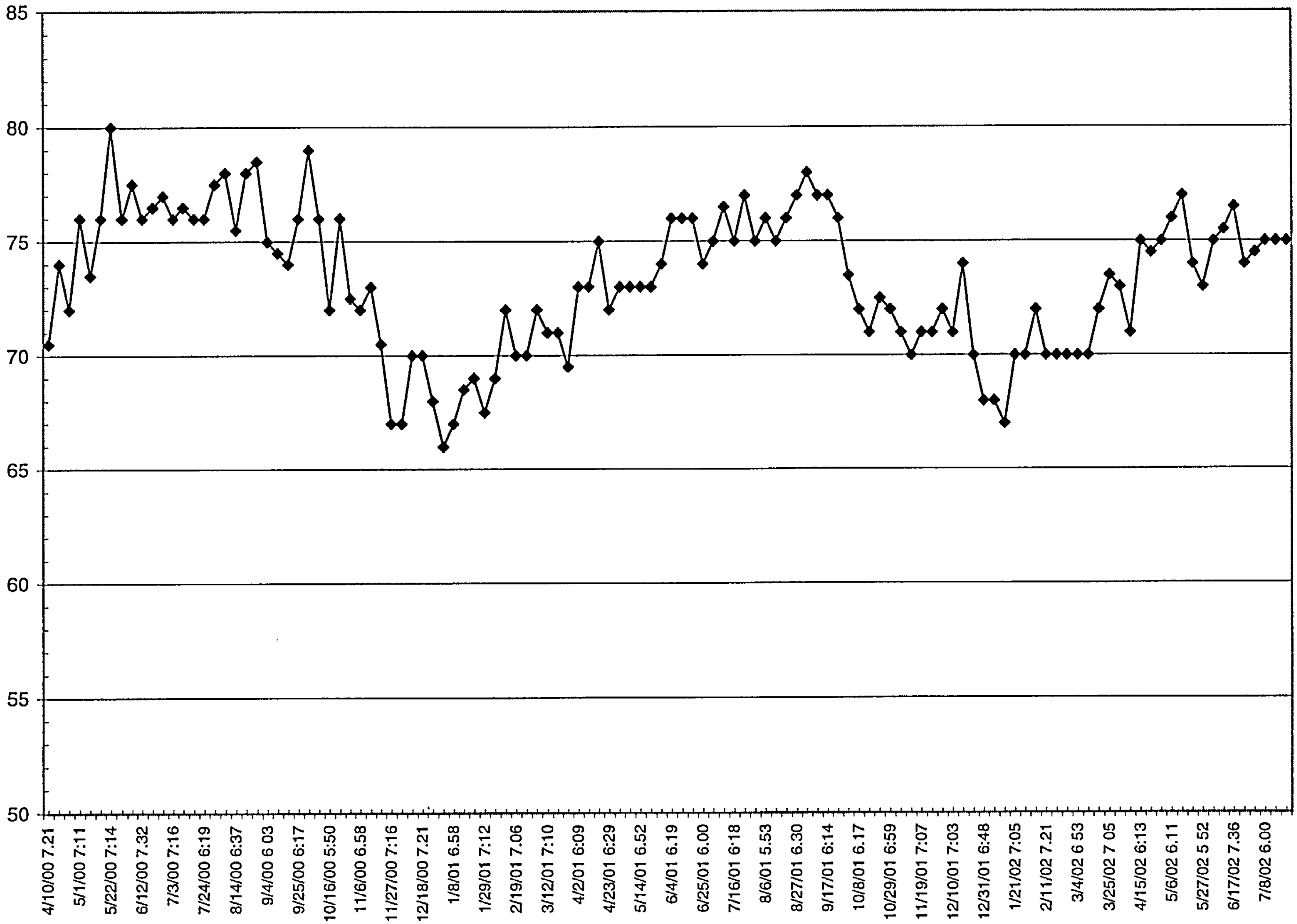
NOMINAL 1400 CFM — 6 ROW COIL



NOMINAL 1600 CFM — 3 ROW COIL



Mechanical Equipment Room Temperature (SP-300)



```
CRYSTAL RIVER-3 CONTROL COMPLEX TEMP. RESPONSE (LOCA4E.INP)
INITIAL RUN                                                /AA
LOCA/LOOP-extended 100 hrs,FANS @30 MIN, Walls init @77.5
41 47 0 209 38 0 0 0 0 1 12 31 0 0 0 12 0 41 0      /B
1 0 0.0001 10 0 0                                    /B1
10000000  1 5 0.0 518400 0.5 0.0                        /C1
600.0     0.1 3000     3000      1 1                        /C2
1800.0    0.1 4000     8000      1 1                        /C2
18000     0.2 45000    90000     1 1                        /C2
86400     0.2 535000   1070000   1 1                         /C2
518400    0.2 535000   1070000  1 1                         /c2
33330. 14.7 80.0  0.54 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D1
24465. 14.7 80.0  0.65 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D2
48908. 14.7 80.0  0.58 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D3
28013. 14.7 80.0  0.62 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D4
1507.  14.7 80.0  0.61 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D5
1901.  14.7 80.0  0.60 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D6
2128.  14.7 80.0  0.64 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D7
1348.  14.7 80.0  0.55 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D8
3223.  14.7 80.0  0.43 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D9
3164.  14.7 80.0  0.59 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D10
4123.  14.7 80.0  0.51 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D11
2194.  14.7 80.0  0.51 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D12
8214.  14.7 80.0  0.45 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D13
8393.  14.7 80.0  0.45 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D14
3869.  14.7 80.0  0.47 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D15
4035.  14.7 80.0  0.55 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D16
6191.  14.7 80.0  0.45 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D17
5917.  14.7 80.0  0.46 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D18
12570. 14.7 80.0  0.49 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D19
12911. 14.7 80.0  0.56 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D20
34618. 14.7 80.0  0.50 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D21
28267.   14.7 60.4  0.50 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D22
1.E9     14.7 115.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 1 0.    /D23 TB 164'
1.E9     14.7 99.0  0.50 0. 0. 0. 0. 0. 0. 0. 0. 2 0.    /D24
83663    14.7 80.0  0.50 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D25
1.E9     14.7 80.0  0.50 0. 0. 0. 0. 0. 0. 0. 0. 3 0.    /D26
1.E9     14.7 178.2 0.50 0. 0. 0. 0. 0. 0. 0. 0. 4 0.    /D27 E
5.E3     14.7 80.0  0.50 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D28
5.E3     14.7 86.7  0.50 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D29
196.4    14.7 98.0  0.45 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D30
260.5    14.7 98.0  0.46 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D31
600.0    14.7 98.0  0.43 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D32
552.0    14.7 98.0  0.59 0. 0. 0. 0. 0. 0. 0. 0. 0 0.    /D33
1.E9     14.7 189.2 0.50 0. 0. 0. 0. 0. 0. 0. 0. 5 0.    /D34 W
1.E9     14.7 136.1 0.50 0. 0. 0. 0. 0. 0. 0. 0. 6 0.    /D35 S
1.E9     14.7 237.3 0.50 0. 0. 0. 0. 0. 0. 0. 0. 7 0.    /D36 Horz
1.E9     14.7  80.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 8 0.    /D37 (not used)
1.E9     14.7  80.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 9 0.    /D38 Mach shop
1.E9     14.7 110.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 10 0.   /D39 TB 145'
1.E9     14.7 105.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 11 0.   /D40 TB 119'
1.E9     14.7 100.0 0.50 0. 0. 0. 0. 0. 0. 0. 0. 12 0.   /D41 TB 95'
0 0 0 0                                             /DD
6 22 1 0 -1 0 0                                                  /E-1
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-1
NO                                                                /FF-1
6 28 2 0 -2 0 0                                                  /E-2
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-2
NO                                                                /FF-2
6 28 3 0 -3 0 0                                                  /E-3
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-3
NO                                                                /FF-3
6 28 4 0 -4 0 0                                                  /E-4
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-4
NO                                                                /FF-4
6 29 5 0 -5 0 0                                                  /E-5
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-5
NO                                                                /FF-5
6 29 6 0 -6 0 0                                                  /E-6
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-6
NO                                                                /FF-6
6 29 7 0 -7 0 0                                                  /E-7
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-7
NO                                                                /FF-7
6 29 8 0 -8 0 0                                                  /E-8
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.        /F-8
```

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NO                                                                    /FF-8
6 28 9 0 -9 0 0                                                      /E-9
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-9
NO                                                                   /FF-9
6 28 10 0 -10 0 0                                                     /E-10
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-10
NO                                                                   /FF-10
6 28 11 0 -11 0 0                                                     /E-11
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-11
NO                                                                   /FF-11
6 28 12 0 -12 0 0                                                     /E-12
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-12
NO                                                                   /FF-12
6 28 13 0 -13 0 0                                                     /E-13
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-13
NO                                                                   /FF-13
6 28 14 0 -14 0 0                                                     /E-14
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-14
NO                                                                   /FF-14
6 28 15 0 -15 0 0                                                     /E-15
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-15
NO                                                                   /FF-15
6 28 16 0 -16 0 0                                                     /E-16
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-16
NO                                                                   /FF-16
6 28 17 0 -17 0 0                                                     /E-17
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-17
NO                                                                   /FF-17
6 28 18 0 -18 0 0                                                     /E-18
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-18
NO                                                                   /FF-18
6 28 19 0 -19 0 0                                                     /E-19
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-19
NO                                                                   /FF-19
6 28 20 0 -20 0 0                                                     /E-20
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-20
NO                                                                   /FF-20
6 11 21 0 -21 0 0                                                     /E-21
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-21
NO                                                                   /FF-21
6 28 22 0 -1 0 0                                                     /E-22
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-22
NO                                                                   /FF-22
6 4 28 0 -23 0 0                                                     /E-23
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-23
NO                                                                   /FF-23
6 4 29 0 -24 0 0                                                     /E-24
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-24
NO                                                                   /FF-24
6 5 8 0 -25 0 0                                                     /E-25
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-25
NO                                                                   /FF-25
6 5 7 0 -26 0 0                                                     /E-26
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-26
NO                                                                   /FF-26
6 7 6 0 -27 0 0                                                     /E-27
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-27
NO                                                                   /FF-27
6 8 6 0 -28 0 0                                                     /E-28
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-28
NO                                                                   /FF-28
6 6 4 0 -29 0 0                                                     /E-29
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-29
NO                                                                   /FF-29
6 7 4 0 -30 0 0                                                     /E-30
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-30
NO                                                                   /FF-30
6 21 2 0 -21 0 0                                                     /E-31
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-31
NO                                                                   /FF-31
6 1 28 0 -1 0 0                                                     /E-32
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-32
NO                                                                   /FF-32
6 2 28 0 -22 0 0                                                     /E-33
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.             /F-33
NO                                                                   /FF-33
```

```
6 3 28 0 -3 0 0                                                          /E-34
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-34
NO                                                                       /FF-34
6 9 4 0 -9 0 0                                                           /E-35
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-35
NO                                                                       /FF-35
6 10 4 0 -10 0 0                                                         /E-36
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-36
NO                                                                       /FF-36
6 14 28 0 -14 0 0                                                        /E-37
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-37
NO                                                                       /FF-37
6 15 28 0 -15 0 0                                                        /E-38
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-38
NO                                                                       /FF-38
6 16 28 0 -16 0 0                                                        /E-39
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-39
NO                                                                       /FF-39
6 20 28 0 -20 0 0                                                        /E-40
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-40
NO                                                                       /FF-40
6 19 28 0 -19 0 0                                                        /E-41
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-41
NO                                                                       /FF-41
6 18 28 0 -18 0 0                                                        /E-42
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-42
NO                                                                       /FF-42
6 17 28 0 -17 0 0                                                        /E-43
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-43
NO                                                                       /FF-43
6 12 11 0 -12 0 0                                                        /E-44
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-44
NO                                                                       /FF-44
6 13 28 0 -13 0 0                                                        /E-45
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-45
NO                                                                       /FF-45
6 28 25 0 -31 0 0                                                        /E-46
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-46
NO                                                                       /FF-46
6 25 28 0 -31 0 0                                                        /E-47
10. 0. 0. 0. 0. -2. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.               /F-47
NO                                                                       /FF-47
5
0.0      14.7 115.0 0.50 0. 0. 0. 0. 0. 0. 0.
1800.0   14.7 122.0 0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 122.0 0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7    14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.          /J1
3
0.0    14.7 99.0  0.50 0. 0. 0. 0. 0. 0. 0.
1800.0 14.7 115.0 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7  14.7 115.0 0.50 0. 0. 0. 0. 0. 0. 0.            /J2
5
0.0      14.7  80.0  0.50 0. 0. 0. 0. 0. 0. 0.
1800.0   14.7 100.0  0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 100.0  0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  85.0  0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7    14.7  85.0  0.50 0. 0. 0. 0. 0. 0. 0.         /J3 CC 95'
2
0.0    14.7 178.3  0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7  14.7 178.3  0.50 0. 0. 0. 0. 0. 0. 0.           /J4
2
0.0    14.7 189.2 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7  14.7 189.2  0.50 0. 0. 0. 0. 0. 0. 0.           /J5 W
2
0.0    14.7 136.1  0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7  14.7 136.1  0.50 0. 0. 0. 0. 0. 0. 0.           /J6 S
-13
0.0        14.7 237.3 0.50 0. 0. 0. 0. 0. 0. 0.
7200.0     14.7 213.3 0.50 0. 0. 0. 0. 0. 0. 0.
14400.0    14.7 154.6 0.50 0. 0. 0. 0. 0. 0. 0.
21600.0    14.7  80.5 0.50 0. 0. 0. 0. 0. 0. 0.
28800.0    14.7  72.5 0.50 0. 0. 0. 0. 0. 0. 0.
36000.0    14.7  69.3 0.50 0. 0. 0. 0. 0. 0. 0.
43200.0    14.7  67.3 0.50 0. 0. 0. 0. 0. 0. 0.
50400.0    14.7  65.7 0.50 0. 0. 0. 0. 0. 0. 0.
```

```
57600.0    14.7  64.9 0.50 0. 0. 0. 0. 0. 0. 0.
64800.0    14.7  95.6 0.50 0. 0. 0. 0. 0. 0. 0.
72000.0    14.7 168.3 0.50 0. 0. 0. 0. 0. 0. 0.
79200.0    14.7 220.5 0.50 0. 0. 0. 0. 0. 0. 0.
86400.0    14.7 237.3 0.50 0. 0. 0. 0. 0. 0. 0.        /J7 Horz
2
0.0     14.7 70.0  0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7   14.7 70.0  0.50 0. 0. 0. 0. 0. 0. 0.           /J8 not used
5
0.0       14.7  80.0  0.50 0. 0. 0. 0. 0. 0. 0.
7200.0    14.7 115.0  0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 115.0  0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  95.0  0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7     14.7  95.0  0.50 0. 0. 0. 0. 0. 0. 0.         /J9 mach shop
5
0.0       14.7 110.0 0.50 0. 0. 0. 0. 0. 0. 0.
1800.0    14.7 117.0 0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 117.0 0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7     14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.         /J10 TB 145'
5
0.0       14.7 105.0 0.50 0. 0. 0. 0. 0. 0. 0.
1800.0    14.7 112.0 0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 112.0 0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7     14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.         /J11 TB 119'
5
0.0       14.7 100.0 0.50 0. 0. 0. 0. 0. 0. 0.
1800.0    14.7 107.0 0.50 0. 0. 0. 0. 0. 0. 0.
259200.  14.7 107.0 0.50 0. 0. 0. 0. 0. 0. 0.
345600.  14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.
1.0E7     14.7  95.0 0.50 0. 0. 0. 0. 0. 0. 0.         /J12 TB 95'
-1   4  0.
-2   4  0.
-3   4  0.
-4   4  0.
-5   4  0.
-6   4  0.
-7   4  0.
-8   4  0.
-9   4  0.
-10  4  0.
-11  4  0.
-12  4  0.
-13  4  0.
-14  4  0.
-15  4  0.
-16  4  0.
-17  4  0.
-18  4  0.
-19  4  0.
-20  4  0.
-21  4  0.
-22  4  0.
-23  4  0.
-24  4  0.
-25  4  0.
-26  4  0.
-27  4  0.
-28  4  0.
-29  4  0.
-30  4  0.
-31  4  0.                 /K
   0. 0.00
1800. 0.00
1800. 13.350
1.0E7 13.350               /L-1
   0. 0.00
1800. 0.00
1800. 1.146
1.0E7 1.146                /L-2
   0. 0.00
1800. 0.00
1800. 0.209
1.0E7 0.209                /L-3
   0. 0.00
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1800. 0.00
1800. 8.608
1.0E7 8.608             /L-4
   0. 0.00
1800. 0.00
1800. 1.4625
1.0E7 1.4625             /L-5
   0. 0.00
1800. 0.00
1800. 1.800
1.0E7 1.800             /L-6
   0. 0.00
1800. 0.00
1800. 2.5875
1.0E7 2.5875             /L-7
   0. 0.00
1800. 0.00
1800. 0.900
1.0E7 0.900             /L-8
   0. 0.00
1800. 0.00
1800. 2.748
1.0E7 2.748             /L-9
   0. 0.00
1800. 0.00
1800. 2.814
1.0E7 2.814             /L-10
   0. 0.00
1800. 0.00
1800. 1.219
1.0E7 1.219             /L-11
   0. 0.00
1800. 0.00
1800. 0.161
1.0E7 0.161             /L-12
   0. 0.00
1800. 0.00
1800. 0.248
1.0E7 0.248             /L-13
   0. 0.00
1800. 0.00
1800. 0.294
1.0E7 0.294             /L-14
   0. 0.00
1800. 0.00
1800. 0.190
1.0E7 0.190             /L-15
   0. 0.00
1800. 0.00
1800. 0.574
1.0E7 0.574             /L-16
   0. 0.00
1800. 0.00
1800. 2.366
1.0E7 2.366             /L-17
   0. 0.00
1800. 0.00
1800. 2.858
1.0E7 2.858             /L-18
   0. 0.00
1800. 0.00
1800. 2.044
1.0E7 2.044             /L-19
   0. 0.00
1800. 0.00
1800. 3.756
1.0E7 3.756             /L-20
   0. 0.00
1800. 0.00
1800. 1.380
1.0E7 1.380             /L-21
   0. 0.00
1800. 0.00
1800. 2.526
1.0E7 2.526             /L-22
   0. 0.00
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1800. 0.00
1800. 14.170
1.0E7 14.170                  /L-23
   0. 0.00
1800. 0.00
1800. 6.750
1.0E7 6.750                  /L-24
   0. 0.00
1800. 0.00
1800. 0.5913
1.0E7 0.5913                  /L-25
   0. 0.00
1800. 0.00
1800. 0.8712
1.0E7 0.8712                  /L-26
   0. 0.00
1800. 0.00
1800. 0.6674
1.0E7 0.6674                  /L-27
   0. 0.00
1800. 0.00
1800. 1.4913
1.0E7 1.4913                  /L-28
   0. 0.00
1800. 0.00
1800. 3.9587
1.0E7 3.9587                  /L-29
   0. 0.00
1800. 0.00
1800. 2.7913
1.0E7 2.7913                  /L-30
   0. 0.00
1800. 0.00
1800. 4.720
1.0E7 4.720                  /L-31
1    2       0. 0. 0. 0
2    2       0. 0. 0. 0
3    2       0. 0. 0. 0
4    2       0. 0. 0. 0
5    2       0. 0. 0. 0
6    2       0. 0. 0. 0
7    2       0. 0. 0. 0
8    2       0. 0. 0. 0
9    2       0. 0. 0. 0
10   2       0. 0. 0. 0
11   2       0. 0. 0. 0
12   2       0. 0. 0. 0
13   2       0. 0. 0. 0
14   2       0. 0. 0. 0
15   2       0. 0. 0. 0
16   2       0. 0. 0. 0
17   2       0. 0. 0. 0
18   2       0. 0. 0. 0
19   2       0. 0. 0. 0
20   2       0. 0. 0. 0
21   2       0. 0. 0. 0
22   2       0. 0. 0. 0
28   7       0. 0. 0. 0
-29  3       3600. 0. 0. 0
28   4       0. 0. 0. 0
25   6       0. 0. 0. 0
-28  6  1.0E7  0. 0. 0
-29  6  1.0E7  0. 0. 0
1    4       0. 0. 0. 0
-15   4      3600. 0. 0. 0
-16   4      3600. 0. 0. 0
-17   4      3600. 0. 0. 0
-18   4      3600. 0. 0. 0
-19   4      3600. 0. 0. 0
-20   4      3600. 0. 0. 0
-12   4      3600. 0. 0. 0
-9    4      3600. 0. 0. 0
-10   4      3600. 0. 0. 0      /Q
0.      0.    2.43
1.0E7   0.    2.43             /R-1
0.      0.    2.29
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1.0E7  0.   2.29          /R-2
0.     0.   4.09
1.0E7  0.   4.09          /R-3
0.     0.   18.21
1.0E7  0.   18.21         /R-4
0.     0.   0.00
1.0E7  0.   0.00          /R-5
0.     0.   0.00
1.0E7  0.   0.00          /R-6
0.     0.   0.00
1.0E7  0.   0.00          /R-7
0.     0.   0.00
1.0E7  0.   0.00          /R-8
0.     0.   0.00
1.0E7  0.   0.00          /R-9
0.     0.   0.00
1.0E7  0.   0.00          /R-10
0.     0.   0.054
1.0E7  0.   0.054         /R-11
0.     0.   0.188
1.0E7  0.   0.188         /R-12
0.     0.   1.28
1.0E7  0.   1.28          /R-13 R
0.     0.   1.68
1.0E7  0.   1.68          /R-14 R
0.     0.   3.93
1.0E7  0.   3.93          /R-15
0.     0.   4.39
1.0E7  0.   4.39          /R-16
0.     0.   0.00
1.0E7  0.   0.00          /R-17
0.     0.   0.00
1.0E7  0.   0.00          /R-18
0.     0.   2.5
1.0E7  0.   2.5           /R-19
0.     0.   2.5
1.0E7  0.   2.5           /R-20
0.     0.   0.0
1.0E7  0.   0.0           /R-21
0.     0.   2.03
1.0E7  0.   2.03          /R-22
0.0       0.     0.0
7200.     0.     0.0
7200.     0. 0.0
7800.     0. 0.0
12000.    0. 0.0
15275.    0. 0.0
1.0E7     0. 0.0          /R-23 v28 f(t) 5A/B
60.    0.   -12.81
80.    0.   -41.35
100.   0.   -68.07        /R-24 v29 f(t) 43/44
0.     0.   0.0
1800.  0.   0.0
1800.  0.  50.32
1.0E7  0.  50.32          /R-25 v28
0.     0.  11.11
1800.  0.  11.11
1800.  0.  17.37
7200.  0.  17.37
7200.  0.  17.37
1.0E7  0.  17.37          /R-26 fan + chiller load  v25
53.2  0.  -79.301
55.6  0.  -163.161
57.5  0.  -250.190
59.4  0.  -334.109
60.1  0.  -366.837
160.0 0.  -366.837       /R-27 v28 (not used)
53.0  0.  -12.814
54.8  0.  -27.336
56.6  0.  -41.348
58.4  0.  -54.896
59.1  0.  -60.179
160.0 0.  -60.179        /R-28 v29
0.    0.   0.
3600. 0.   0.
3600.01 0. -66.
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1E+7  0.   -66.          /R-29 v1
72.   0.   -2.61
84.   0.   -3.63
92.   0.   -4.33
104.  0.   -5.50         /R-30 v15
72.   0.   -2.61
84.   0.   -3.63
92.   0.   -4.33
104.  0.   -5.50         /R-31 v16
72.   0.   -17.22
84.   0.   -25.00
92.   0.   -28.88
104.  0.   -39.44        /R-32 v17
72.   0.   -17.22
84.   0.   -25.00
92.   0.   -28.88
104.  0.   -39.44        /R-33 v18
72.   0.   -5.97
84.   0.   -8.75
92.   0.   -9.72
104.  0.   -12.22        /R-34 v19
72.   0.   -5.97
84.   0.   -8.75
92.   0.   -9.72
104.  0.   -12.22        /R-35 v20
72.   0.   -2.61
84.   0.   -3.63
92.   0.   -4.33
104.  0.   -5.50         /R-36 v12
72.   0.   -16.11
84.   0.   -22.77
92.   0.   -27.22
104.  0.   -37.77        /R-37 v9
72.   0.   -16.11
84.   0.   -22.77
92.   0.   -27.22
104.  0.   -37.77        /R-38 v10
HEAT SINK 1 - WALL BETWEEN CTRL RM (1) AND AUX BLDG (24)
1 2 24 1 1 1 574.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-1
6 0 24.0 95.0 82.1 2 0.0 0.0 1 0 2                      /Z-1
0.92 145.0 0.156                                         /Z3-1
2 0 24.5 82.1 81.5 2 0.0 0.0 1 0 2                       /Z-1
0.42 100.0 0.20                                          /Z3-1
HEAT SINK 2 - WALL BTWN CTRL RM (1) AND CORRIDOR (2)
1 2 2 1 1 1 251.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-2
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-2
0.92 145.0 0.156                                         /Z3-2
2 0 24.5 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-2
0.42 100.0 0.20                                          /Z3-2
HEAT SINK 3 - WALL BTWN CTRL RM (1) AND BREAK RM (2)
1 2 2 1 1 1 249.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-3
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-3
0.92 145.0 0.156                                         /Z3-3
2 0 12.5 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-3
0.42 100.0 0.20                                          /Z3-3
HEAT SINK 4 - WALL BTWN CTRL RM (1) AND TURB BLDG 145' (39)
1 2 39 1 1 1 552.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-4
6 0 24.0 103.9 84.5 2 0.0 0.0 1 0 2                      /Z-4
0.92 145.0 0.156                                         /Z3-4
2 0 24.5 84.5 83.6 2 0.0 0.0 1 0 2                       /Z-4
0.42 100.0 0.20                                          /Z3-4
HEAT SINK 5 - WALL BTWN CTRL RM (1) AND EAST SOLAIR (27)
1 2 27 11 1 1 585.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-5
6 0 24.0 124.7 84.7 2 0.0 0.0 1 0 2                      /Z-5
0.92 145.0 0.156                                         /Z3-5
2 0 24.5 84.7 83.8 2 0.0 0.0 1 0 2                       /Z-5
0.42 100.0 0.20                                          /Z3-5
HEAT SINK 6 - SUSP CEILING ABOVE CTRL RM (1) BELOW PLENUM (22)
1 1 1 2 22 2 3336.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3    /X-6
3 0 2.0 76.4 61.6 2 0.0 0.0 1 0 2                        /Z-6
0.021 0.7 0.20                                           /Z3-6
HEAT SINK 7 - CONTROL RM (1) FLOOR
1 1 3 2 1 3 3297.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3    /X -7
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-7
0.92 145.0 0.156                                         /Z3-7
HEAT SINK 8 - WALL BTWN CORRIDOR (2) AND AIR PLENUM (22)
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1 1 2 1 22 1 256.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-8
6 0 24.0 74.2 63.7 2 0.0 0.0 1 0 2                         /Z-8
0.92 145.0 0.156                                           /Z3-8
HEAT SINK 9 - WALL BTWN BREAK RM/OFFICE (2) AND AIR PLENUM (22)
1 1 2 1 22 1 256.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-9
4 0 12.0 72.7 65.2 2 0.0 0.0 1 0 2                         /Z-9
0.92 145.0 0.156                                           /Z3-9
HEAT SINK 10 - WALLS BTWN BREAK RM/OFFICE (2) AND AUX BLDG (24)
1 1 24 1 2 1 500.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3    /X-10
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                        /Z-10
0.92 145.0 0.156                                          /Z3-10
HEAT SINK 11 - WALLS BTWN CORRIDOR/OFFICE (2) AND STAIRWELL (21)
1 1 2 1 21 1 724.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-11
4 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-11
0.92 145.0 0.156                                          /Z3-11
HEAT SINK 12 - WALL BTWN CORRIDOR (2) AND TURB BLDG 145'(39)
1 1 2 1 39 1 163.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3    /X-12
6 0 24.0 83.8 103.7 2 0.0 0.0 1 0 2                       /Z-12
0.92 145.0 0.156                                          /Z3-12
HEAT SINK 13 - FLOOR BTWN CORRIDOR (2) AND EQPT RM EL 164' (25)
1 1 2 2 25 3 475.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-13
3 0 8.0 82.2 87.8 2 0.0 0.0 1 0 2                         /Z-13
0.92 145.0 0.156                                          /Z3-13
HEAT SINK 14 - FLOOR BTWN CABLE GALLERY (3) AND CORRIDOR (2)
1 1 3 2 2 3 1303.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-14
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                         /Z-14
0.92 145.0 0.156                                          /Z3-14
HEAT SINK 15 - WALL BTWN CABLE GALLERY (3) AND EAST SOLAIR (27)
1 1 3 1 27 11  77.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-15
6 0 24.0 84.1 124.5 2 0.0 0.0 1 0 2                       /Z-15
0.92 145.0 0.156                                          /Z3-15
HEAT SINK 16 - WALLS BTWN CABLE GALLERY (3) AND AUX BLDG (24)
1 1 3 1 24 1 1265.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-16
6 0 24.0 81.7 94.8 2 0.0 0.0 1 0 2                        /Z-16
0.92 145.0 0.156                                          /Z3-16
HEAT SINK 17 - WALLS BTWN CABLE GALLERY (3) AND STAIRWELL (21)
1 1 3 1 21 1 395.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-17
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-17
0.92 145.0 0.156                                          /Z3-17
HEAT SINK 18 - WALL BTWN CABLE GALLERY (3) AND TURB BLDG 119'(40)
1 1 3 1 40 1 664.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-18
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                        /Z-18
0.92 145.0 0.156                                          /Z3-18
HEAT SINK 19 - FLOOR BTWN CABLE GALLERY (3) AND CRD RM (4)
1 3 4 2 3 3 2835.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-19
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-19
27.0 490.0 0.12                                           /Z3-19
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-19
0.025 5.7 0.20                                            /Z3-19
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-19
98.0 174.0 0.156                                          /Z3-19
HEAT SINK 20 - FLOOR BTWN CABLE GALLERY (3) AND EFIC RM A (5)
1 3 5 2 3 3 171.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-20
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-20
27.0 490.0 0.12                                           /Z3-20
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-20
0.025 5.7 0.20                                            /Z3-20
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-20
98.0 174.0 0.156                                          /Z3-20
HEAT SINK 21 - FLOOR BTWN CABLE GALLERY (3) AND EFIC RM B (6)
1 3 6 2 3 3 216.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-21
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-21
27.0 490.0 0.12                                           /Z3-21
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-21
0.025 5.7 0.20                                            /Z3-21
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-21
98.0 174.0 0.156                                          /Z3-21
HEAT SINK 22 - FLOOR BTWN CABLE GALLERY (3) AND EFIC RM C (7)
1 3 7 2 3 3 240.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-22
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                       /Z-22
27.0 490.0 0.12                                           /Z3-22
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-22
0.025 5.7 0.20                                            /Z3-22
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                      /Z-22
98.0 174.0 0.156                                          /Z3-22
HEAT SINK 23 - FLOOR BTWN CABLE GALLERY (3) AND EFIC RM D (8)
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1 3 8 2 3 3 150.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-23
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                         /Z-23
27.0 490.0 0.12                                             /Z3-23
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-23
0.025 5.7 0.20                                              /Z3-23
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-23
98.0 174.0 0.156                                            /Z3-23
HEAT SINK 24 - FLOOR BTWN CABLE GALLERY (3) AND 480V SWGR RM A (9)
1 3 9 2 3 3 358.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-24
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                         /Z-24
27.0 490.0 0.12                                             /Z3-24
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-24
0.025 5.7 0.20                                              /Z3-24
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-24
98.0 174.0 0.156                                            /Z3-24
HEAT SINK 25 - FLOOR BTWN CABLE GALLERY (3) AND 480V SWGR RM B (10)
1 3 10 2 3 3 354.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-25
1 0 0.250 77.5 77.5 2 0.0 0.0 1 0 2                         /Z-25
27.0 490.0 0.12                                             /Z3-25
1 0 0.5625 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-25
0.025 5.7 0.20                                              /Z3-25
1 0 0.6875 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-25
98.0 174.0 0.156                                            /Z3-25
HEAT SINK 26 - WALL BTWN CRD RM (4) AND MACH SHOP (38)
1 1 4 1 38 1 516.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-26
6 0 24.0 78.0 79.5 2 0.0 0.0 1 0 2                          /Z-26
0.92 145.0 0.156                                            /Z3-26
HEAT SINK 27 - WALLS BTWN CRD RM/CORRIDOR (4) AND AUX BLDG (24)
1 1 24 1 4 1 445.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-27
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                          /Z-27
0.92 145.0 0.156                                         .  /Z3-27
HEAT SINK 28 - WALL BTWN CRD RM/CORRIDOR (4) AND TURB BLDG 119'(40)
1 1 4 1 40 1 251.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-28
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                          /Z-28
0.92 145.0 0.156                                            /Z3-28
HEAT SINK 29 - WALLS BTWN CRD RM/CORRIDOR (4) AND STAIRWELL (21)
1 1 4 1 21 1 319.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-29
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-29
0.92 145.0 0.156                                            /Z3-29
HEAT SINK 30 - WALL BTWN CRD RM/CORRIDOR (4) AND EFIC RM A (5)
1 1 4 1 5 1 127.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-30
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-30
0.92 145.0 0.156                                            /Z3-30
HEAT SINK 31 - WALLS BTWN CRD RM/CORRIDOR (4) AND EFIC RM B (6)
1 1 6 1 4 1 262.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-31
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-31
0.92 145.0 0.156                                            /Z3-31
HEAT SINK 32 - WALL BTWN CRD RM/CORRIDOR (4) AND EFIC RM C (7)
1 1 7 1 4 1 127.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-32
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-32
0.92 145.0 0.156                                            /Z3-32
HEAT SINK 33 - WALL BTWN CRD RM/CORRIDOR (4) AND EFIC RM D (8)
1 1 4 1 8 1 73.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-33
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-33
0.92 145.0 0.156                                            /Z3-33
HEAT SINK 34 - WALL BTWN CRD RM/CORRIDOR (4) AND EFIC RM D (8)
1 1 4 1 8 1 113.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-34
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-34
0.92 145.0 0.156                                            /Z3-34
HEAT SINK 35 - WALLS BTWN CRD RM/CORRIDOR (4) AND 480V SWGR RM A (9)
1 1 9 1 4 1 323.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-35
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-35
0.92 145.0 0.156                                            /Z3-35
HEAT SINK 36 - WALL BTWN CRD RM/CORRIDOR (4) AND 480V SWGR RM B (10)
1 1 10 1 4 1 193.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-36
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-36
0.92 145.0 0.156                                            /Z3-36
HEAT SINK 37 - FLOOR BTWN CRD RM/CORRIDOR (4) AND BATTERY RM A (13)
1 1 13 2 4 3 537.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-37
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                           /Z-37
0.92 145.0 0.156                                            /Z3-37
HEAT SINK 38 - FLOOR BTWN CRD RM/CORRIDOR (4) AND BTTRY CHGR RM A (15)
1 1 15 2 4 3 249.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-38
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                           /Z-38
0.92 145.0 0.156                                            /Z3-38
HEAT SINK 39 - FLOOR BTWN CRD RM/CORRIDOR (4) AND INVERTER RM A (17)
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1 1 17 2 4 3 404.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-39
3 0 8.0 79.3 78.5 2 0.0 0.0 1 0 2                        /Z-39
0.92 145.0 0.156                                            /Z3-39
HEAT SINK 40 - FLOOR BTWN CRD RM/CORRIDOR (4) AND INVERTER RM B (18)
1 1 18 2 4 3 385.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-40
3 0 8.0 79.3 78.5 2 0.0 0.0 1 0 2                        /Z-40
0.92 145.0 0.156                                            /Z3-40
HEAT SINK 41 - FLOOR BTWN CRD RM/CORRIDOR (4) AND 4160V SWGR RM A (19)
1 1 19 2 4 3 430.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-41
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-41
0.92 145.0 0.156                                            /Z3-41
HEAT SINK 42 - FLOOR BTWN CRD RM/CORRIDOR (4) AND 4160V SWGR RM B (20)
1 1 20 2 4 3 458.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-42
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-42
0.92 145.0 0.156                                            /Z3-42
HEAT SINK 43 - FLOOR BTWN CRD RM/CORRIDOR (4) AND CORRIDOR-201 (11)
1 1 11 2 4 3 270.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-43
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-43
0.92 145.0 0.156                                            /Z3-43
HEAT SINK 44 - FLOOR BTWN CRD RM/CORRIDOR (4) AND REMOTE SDWN RM (12)
1 1 12 2 4 3 143.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3    /X-44
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-44
0.92 145.0 0.156                                            /Z3-44
HEAT SINK 45 - WALL BTWN EFIC RM A (5) AND TURB BLDG 119'(40)
1 1 5 1 40 1 105.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-45
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                        /Z-45
0.92 145.0 0.156                                            /Z3-45
HEAT SINK 46 - WALL BTWN EFIC RM A (5) AND EFIC RM C (7)
1 1 5 1 7 1 108.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-46
2 0 3.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-46
0.166 100.0 0.20                                              /Z3-46
HEAT SINK 47 - WALL BTWN EFIC RM A (5) AND EFIC RM D (8)
1 1 5 1 8 1 71.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-47
2 0 3.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-47
0.166 100.0 0.20                                             /Z3-47
HEAT SINK 48 - FLOOR BTWN EFIC RM A (5) AND BATTERY RM B (14)
1 1 14 2 5 3 171.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3    /X-48
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-48
0.92 145.0 0.156                                            /Z3-48
HEAT SINK 49 - WALL BTWN EFIC RM B (6) AND EFIC RM C (7)
1 1 6 1 7 1 113.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-49
2 0 3.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-49
0.166 100.0 0.20                                             /Z3-49
HEAT SINK 50 - WALL BTWN EFIC RM B (6) AND EFIC RM D (8)
1 1 8 1 6 1 61.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-50
2 0 3.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-50
0.166 100.0 0.20                                             /Z3-50
HEAT SINK 51 - FLOOR BTWN EFIC RM B (6) AND BATTERY RM B (14)
1 1 14 2 6 3 68.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-51
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-51
0.92 145.0 0.156                                              /Z3-51
HEAT SINK 52 - FLOOR BTWN EFIC RM B (6) AND BTRY CHARGER RM B (16)
1 1 16 2 6 3 131.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-52
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-52
0.92 145.0 0.156                                              /Z3-52
HEAT SINK 53 - WALL BTWN EFIC RM C (7) AND TURB BLDG 119'(40)
1 1 7 1 40 1 148.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-53
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                         /Z-53
0.92 145.0 0.156                                              /Z3-53
HEAT SINK 54 - FLOOR BTWN EFIC RM C (7) AND BATTERY RM B (14)
1 1 14 2 7 3 242.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-54
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-54
0.92 145.0 0.156                                              /Z3-54
HEAT SINK 55 - FLOOR BTWN EFIC RM D (8) AND BATTERY RM B (14)
1 1 14 2 8 3 48.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-55
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-55
0.92 145.0 0.156                                              /Z3-55
HEAT SINK 56 - FLOOR BTWN EFIC RM D (8) AND BTRY CHARGER RM B (16)
1 1 16 2 8 3 89.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-56
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-56
0.92 145.0 0.156                                              /Z3-56
HEAT SINK 57 - WALL BTWN 480V SWGR RM A (9) AND AUX BLDG (24)
1 1 24 1 9 1 246.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-57
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                         /Z-57
0.92 145.0 0.156                                              /Z3-57
HEAT SINK 58 - WALL BTWN 480V SWGR RM A (9) AND 480V SWGR RM B (10)
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1 1 10 1 9 1 111.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-58
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-58
0.92 145.0 0.156                                                /Z3-58
HEAT SINK 59 - FLOOR BTWN 480V SWGR RM A (9) AND 4160V SWGR RM A (19)
1 1 19 2 9 3 365.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-59
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                               /Z-59
0.92 145.0 0.156                                                /Z3-59
HEAT SINK 60 - WALLS BTWN 480V SWGR RM B (10) AND AUX BLDG (24)
1 1 24 1 10 1 359.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-60
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                            /Z-60
0.92 145.0 0.156                                                /Z3-60
HEAT SINK 61 - FLOOR BTWN 480V SWGR RM B (10) AND 4160V SWGR RM B (20)
1 1 20 2 10 3 359.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-61
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                               /Z-61
0.92 145.0 0.156                                                /Z3-61
HEAT SINK 62 - WALL BTWN CORRIDOR (11) AND TURB BLDG 119' (40)
1 1 11 1 40 1 126.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-62
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                            /Z-62
0.92 145.0 0.156                                                /Z3-62
HEAT SINK 63 - WALL BTWN CORRIDOR (11) AND REMOTE SHUTDOWN RM (12)
1 1 12 1 11 1 97.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-63
2 0 3.0 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-63
0.166 100.0 0.20                                                /Z3-63
HEAT SINK 64 - WALL BTWN CORRIDOR (11) AND STAIRWELL (21)
1 1 11 1 21 1 271.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-64
4 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-64
0.92 145.0 0.156                                                /Z3-64
HEAT SINK 65 - WALL BTWN CORRIDOR (11) AND 4160V SWGR RM B (20)
1 1 20 1 11 1 133.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-65
3 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-65
0.92 145.0 0.156                                                /Z3-65
HEAT SINK 66 - WALL BTWN CORRIDOR (11) AND BATTERY RM B (14)
1 1 11 1 14 1 237.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-66
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-66
0.92 145.0 0.156                                                /Z3-66
HEAT SINK 67 - WALL BTWN CORRIDOR (11) AND BTRY CHARGER RM B (16)
1 1 11 1 16 1 110.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-67
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-67
0.92 145.0 0.156                                                /Z3-67
HEAT SINK 68 - FLOOR BTWN CORRIDOR (11) AND HP AREA EL 95' (26)
1 1 26 2 11 3 270.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-68
3 0 18.0 77.5 77.5 2 0.0 0.0 1 0 2                              /Z-68
0.92 145.0 0.156                                                /Z3-68
HEAT SINK 69 - WALL BTWN REMOTE SHDWN RM (12) AND AUX BLDG (24)
1 1 24 1 12 1 130.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-69
4 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                            /Z-69
0.92 145.0 0.156                                                /Z3-69
HEAT SINK 70 - WALL BTWN REMOTE SHDWN RM (12) AND STAIRWELL (21)
1 1 12 1 21 1 258.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3       /X-70
4 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-70
0.92 145.0 0.156                                                /Z3-70
HEAT SINK 71 - WALL BTWN REMOTE SHDWN RM (12) AND 4160V SWGR RM B (20)
1 1 20 1 12 1 247.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-71
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-71
0.92 145.0 0.156                                                /Z3-71
HEAT SINK 72 - FLOOR BTWN REMOTE SHDWN RM (12) AND HP AREA EL 95' (26)
1 1 26 2 12 3 143.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-72
4 0 18.0 77.5 77.5 2 0.0 0.0 1 0 2                              /Z-72
0.92 145.0 0.156                                                /Z3-72
HEAT SINK 73 - WALL BTWN BATTERY RM B (14) AND TURB BLDG 119'(40)
1 1 14 1 40 1 444.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-73
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                            /Z-73
0.92 145.0 0.156                                                /Z3-73
HEAT SINK 74 - WALL BTWN BATTERY RM B (14) AND BTRY CHARGER RM B (16)
1 1 16 1 14 1 412.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-74
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                              /Z-74
0.92 145.0 0.156                                                /Z3-74
HEAT SINK 75 - WALL BTWN BATTERY RM B (14) AND BATTERY RM A (13)
1 1 14 1 13 1 228.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-75
2 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-75
0.92 145.0 0.156                                                /Z3-75
HEAT SINK 76 - FLOOR BTWN BATTERY RM B (14) AND HP AREA EL 95' (26)
1 1 26 2 14 3 544.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3    /X-76
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                               /Z-76
0.92 145.0 0.156                                                /Z3-76
HEAT SINK 77 - WALL BTWN BATTERY RM A (13) AND TURBINE BLDG 119'(40)
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1 1 13 1 40 1 434.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-77
6 0 24.0 82.8 99.7 2 0.0 0.0 1 0 2                           /Z-77
0.92 145.0 0.156                                               /Z3-77
HEAT SINK 78 - WALL BTWN BATTERY RM A (13) AND GROUND adiab
1 1 13 1 0  0 206.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-78
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                           /Z-78
0.92 145.0 0.156                                               /Z3-78
HEAT SINK 79 - WALL BTWN BATTERY RM A (13) AND BTRY CHARGER RM A (15)
1 1 15 1 13 1 408.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-79
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                           /Z-79
0.92 145.0 0.156                                               /Z3-79
HEAT SINK 80 - FLOOR BTWN BATTERY RM A (13) AND HP AREA EL 95' (26)
1 1 26 2 13 3 535.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3      /X-80
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-80
0.92 145.0 0.156                                               /Z3-80
HEAT SINK 81 - WALL BTWN BTRY CHARGER RM A (15) AND GROUND adiab
1 1 15 1 0 0 99.  0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-81
6 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-81
0.92 145.0 0.156                                               /Z3-81
HEAT SINK 82 - WALL BTWN BTRY CHGR RM A (15) AND BTRY CHGR RM B (16)
1 1 16 1 15 1 104.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3      /X-82
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-82
0.92 145.0 0.156                                               /Z3-82
HEAT SINK 83 - WALL BTWN BTRY CHGR RM A (15) AND INVERTER RM A (17)
1 1 17 1 15 1 185.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3      /X-83
4 0 12.0 79.3 78.2 2 0.0 0.0 1 0 2                            /Z-83
0.92 145.0 0.156                                               /Z3-83
HEAT SINK 84 - WALL BTWN BTRY CHGR RM A (15) AND INVERTER RM B (18)
1 1 18 1 15 1 175.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0._   3      /X-84
4 0 12.0 79.3 78.2 2 0.0 0.0 1 0 2                            /Z-84
0.92 145.0 0.156                                               /Z3-84
HEAT SINK 85 - FLOOR BTWN BTRY CHGR RM A (15) AND HP AREA EL 95' (26)
1 1 26 2 15 3 258.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3      /X-85
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-85
0.92 145.0 0.156                                               /Z3-85
HEAT SINK 86 - WALL BTWN BTRY CHGR RM B (16) AND 4160V SWGR RM A (19)
1 1 19 1 16 1 426.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-86
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-86
0.92 145.0 0.156                                               /Z3-86
HEAT SINK 87 - FLOOR BTWN BTRY CHGR RM B (16) AND HP AREA EL 95' (26)
1 1 26 2 16 3 263.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3      /X-87
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-87
0.92 145.0 0.156                                               /Z3-87
HEAT SINK 88 - WALL BTWN INVERTER RM A (17) AND AUX BLDG (24)
1 1 24 1 17 1 213.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-88
6 0 24.0 95.3 83.7 2 0.0 0.0 1 0 2                            /Z-88
0.92 145.0 0.156                                               /Z3-88
HEAT SINK 89 - WALL BTWN INVERTER RM A (17) AND GROUND adiab
1 1 17 1 0 0 316.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-89
6 0 24.0 80.0 80.0 2 0.0 0.0 1 0 2                            /Z-89
0.92 145.0 0.156                                               /Z3-89
HEAT SINK 90 - WALL BTWN INVERTER RM A (17) AND INVERTER RM B (18)
1 1 18 1 17 1 403.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-90
4 0 12.0 80.0 80.0 2 0.0 0.0 1 0 2                            /Z-90
0.92 145.0 0.156                                               /Z3-90
HEAT SINK 91 - FLOOR BTWN INVERTER RM A (17) AND HP AREA EL 95' (26)
1 1 26 2 17 3 407.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3     /X-91
3 0 8.0 78.2 79.0 2 0.0 0.0 1 0 2                             /Z-91
0.92 145.0 0.156                                               /Z3-91
HEAT SINK 92 - WALL BTWN INVERTER RM B (18) AND AUX BLDG (24)
1 1 24 1 18 1 187.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-92
6 0 24.0 95.3 83.7 2 0.0 0.0 1 0 2                            /Z-92
0.92 145.0 0.156                                               /Z3-92
HEAT SINK 93 - WALL BTWN INVERTER RM B (18) AND 4160V SWGR RM A (19)
1 1 19 1 18 1 403.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-93
4 0 12.0 78.2 79.3 2 0.0 0.0 1 0 2                            /Z-93
0.92 145.0 0.156                                               /Z3-93
HEAT SINK 94 - FLOOR BTWN INVERTER RM B (18) AND HP AREA EL 95' (26)
1 1 26 2 18 3 389.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.     3     /X-94
3 0 8.0 78.2 79.0 2 0.0 0.0 1 0 2                             /Z-94
0.92 145.0 0.156                                               /Z3-94
HEAT SINK 95 - WALL BTWN 4160V SWGR RM A (19) AND AUX BLDG (24)
1 1 24 1 19 1 420.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-95
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                            /Z-95
0.92 145.0 0.156                                               /Z3-95
HEAT SINK 96 - WALL BTWN 4160V SWGR RM A (19) AND 4160V SWGR RM B (20)
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1 1 20 1 19 1 380.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-96
4 0 12.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-96
0.92 145.0 0.156                                               /Z3-96
HEAT SINK 97 - FLOOR BTWN 4160V SWGR RM A (19) AND HP AREA EL 95' (26)
1 1 26 2 19 3 824.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3    /X-97
3 0 8.0 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-97
0.92 145.0 0.156                                               /Z3-97
HEAT SINK 98 - WALL BTWN 4160V SWGR RM B (20) AND AUX BLDG (24)
1 1 24 1 20 1 873.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-98
6 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                            /Z-98
0.92 145.0 0.156                                               /Z3-98
HEAT SINK 99 - FLOOR BTWN 4160V SWGR RM B (20) AND HP AREA EL 95' (26)
1 1 26 2 20 3 840.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3    /X-99
5 0 18.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-99
0.92 145.0 0.156                                               /Z3-99
HEAT SINK 100 - FLOOR BTWN STAIRWELL (21) AND GROUND (ADIABATIC)
1 1 0 0 21 3 336.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.    3     /X-100
2 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-100
0.92 145.0 0.156                                               /Z3-100
HEAT SINK 101 - WALLS BTWN STAIRWELL (21) AND EAST SOLAIR (27)
1 1 21 1 27 11 180.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-101
3 0 24.0 84.1 124.5 2 0.0 0.0 1 0 2                           /Z-101
0.92 145.0 0.156                                               /Z3-101
HEAT SINK 102 - WALL BTWN STAIRWELL (21) AND TURBINE BLDG 164'(23)
1 1 21 1 23 1 1770.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-102
2 0 24.0 84.7 107.8 2 0.0 0.0 1 0 2                           /Z-102
0.92 145.0 0.156                                               /Z3-102
HEAT SINK 103 - WALL BTWN STAIRWELL (21) AND AUX BLDG (24)
1 1 24 1 21 1 1726.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-103
3 0 24.0 94.8 81.7 2 0.0 0.0 1 0 2                            /Z-103
0.92 145.0 0.156                                               /Z3-103
HEAT SINK 104 - WALLS BTWN STAIRWELL (21) AND HP AREA EL 95' (26)
1 1 21 1 26 1 412.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-104
2 0 24.0 77.5 77.5 2 0.0 0.0 1 0 2                            /Z-104
0.92 145.0 0.156                                               /Z3-104
HEAT SINK 105 - WALLS BTWN STAIRWELL (21) AND EQPT RM EL 164' (25)
1 1 21 1 25 1 693.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-105
2 0 24.0 80.9 91.6 2 0.0 0.0 1 0 2                            /Z-105
0.92 145.0 0.156                                               /Z3-105
HEAT SINK 106 - WALL BTWN CTRL RM PLENUM (22) AND TURB BLDG 145' (39)
1 1 22 1 39 1 508.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-106
6 0 24.0 70.0 100.4 2 0.0 0.0 1 0 2                           /Z-106
0.92 145.0 0.156                                               /Z3-106
HEAT SINK 107 - WALL BTWN CTRL RM PLENUM (22) AND EAST SOLAIR (27)
1 1 22 1 27 11 513.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-107
6 0 24.0 70.3 121.2 2 0.0 0.0 1 0 2                           /Z-107
0.92 145.0 0.156                                               /Z3-107
HEAT SINK 108 - WALL BTWN CTRL RM PLENUM (22) AND AUX BLDG (24)
1 1 22 1 24 1 508.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-108
6 0 24.0 67.9 91.5 2 0.0 0.0 1 0 2                            /Z-108
0.92 145.0 0.156                                               /Z3-108
HEAT SINK 109 - FLOOR BTWN EQUPT RM 164' (25) AND CTRL RM PLENUM (22)
1 1 22 2 25 3 2497.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3    /X-109
3 0 8.0 72.8 82.6 2 0.0 0.0 1 0 2                             /Z-109
0.92 145.0 0.156                                               /Z3-109
HEAT SINK 110 - FLOOR BTWN CORRIDOR (2) AND EQPT RM EL 164' (25)
1 1 2 2 25 3 825.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3      /X-110
3 0 24.0 80.4 90.6 2 0.0 0.0 1 0 2                            /Z-110
0.92 145.0 0.156                                               /Z3-110
HEAT SINK 111 - FLOOR BTWN EQUPT RM 164' (25) AND CTRL RM PLENUM (22)
1 1 22 2 25 3 833.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-111
6 0 24.0 66.1 86.4 2 0.0 0.0 1 0 2                            /Z-111
0.92 145.0 0.156                                               /Z3-111
HEAT SINK 112 - OPENINGS IN SUSP CEILING ABOVE CTRL RM (1)
1 1 1 12 22 10 54.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3      /X-112
1 0 0.10 60.4 60.4 2 0.0 0.0 1 0 2                            /Z-112
10000.0 0.01 0.01                                              /Z3-112
HEAT SINK 113 - MCB FRAME & POWER-STRUTS IN CTRL RM (1)
1 1 1 1 0 0 1000.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3       /X-113
2 0 0.151 80.0 80.0 2 0.0 0.0 1 0 2                           /Z-113
27.0 490.0 0.12                                                /Z3-113
HEAT SINK 114 - MISC CONCRETE BLOCK + DRYWALL IN CTRL RM (1)
1 3 1 1 1 1 168.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3       /X-114
2 0 0.5 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-114
0.42 100.0 0.20                                                /Z3-114
2 0 8.5 77.5 77.5 2 0.0 0.0 1 0 2                             /Z-114
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0.33 38.0 0.2                                              /Z3-114
2 0 9.0 77.5 77.5 2 0.0 0.0 1 0 2                          /Z-114
0.42 100.0 0.20                                            /Z3-114
HEAT SINK 115 - DOOR BTWN CTRL RM (1) AND CORRIDOR (2)
1 1 1 1 2 1 35.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-115
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                        /Z-115
0.0114 490.0 0.12                                          /Z3-115
HEAT SINK 116 - GRILLE BTWN 480V SWGR RM A (9) AND CRD RM (4)
1 1 9 13 4 10 7.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-116
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-116
10000.0 0.01 0.01                                          /Z3-116
HEAT SINK 117 - GRILLE BTWN 480V SWGR RM B (10) AND CRD RM (4)
1 1 10 13 4 10 7.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-117
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-117
10000.0 0.01 0.01                                          /Z3-117
HEAT SINK 118 - GRILLE BTWN CORRRIDOR (2) AND STAIRWELL (21)
1 1 2 14 21 10 7.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-118
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-118
10000.0 0.01 0.01                                          /Z3-118
HEAT SINK 119 - GRILLE BTWN CORRRIDOR (11) AND STAIRWELL (21)
1 1 11 14 21 10 7.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-119
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-119
10000.0 0.01 0.01                                          /Z3-119
HEAT SINK 120 - DOOR BTWN CTRL RM (1) AND TURB BLDG 145'(39)
1 1 1 1 39 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-120
1 0 0.125 88.3 102.8 2 0.0 0.0 1 0 2                         /Z-120
0.0114 490.0 0.12                                            /Z3-120
HEAT SINK 121 - DOOR BTWN CORRIDOR (2) AND STAIRWELL (21)
1 1 2 1 21 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-121
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-121
0.0114 490.0 0.12                                            /Z3-121
HEAT SINK 122 - DOOR BTWN CABLE SPRD RM (3) AND STAIRWELL (21)
1 1 3 1 21 1 24.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-122
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-122
0.0114 490.0 0.12                                            /Z3-122
HEAT SINK 123 - DOOR BTWN CRD RM (4) AND STAIRWELL (21)
1 1 4 1 21 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-123
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-123
0.0114 490.0 0.12                                            /Z3-123
HEAT SINK 124 - DOOR BTWN CRD RM (4) AND EFIC RM D (8)
1 1 4 1 8 1 32.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-124
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-124
0.0114 490.0 0.12                                            /Z3-124
HEAT SINK 125 - DOOR BTWN CRD RM (4) AND 480V SWGR RM A (9)
1 1 4 1 9 1 36.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-125
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-125
0.0114 490.0 0.12                                            /Z3-125
HEAT SINK 126 - DOOR BTWN CRD RM (4) AND 480V SWGR RM B (10)
1 1 4 1 10 1 36.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-126
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-126
0.0114 490.0 0.12                                            /Z3-126
HEAT SINK 127 - DOOR BTWN EFIC RM A (5) AND EFIC RM D (8)
1 1 5 1 8 1 24.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-127
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-127
0.0114 490.0 0.12                                            /Z3-127
HEAT SINK 128 - DOOR BTWN EFIC RM B (6) AND EFIC RM C (7)
1 1 6 1 7 1 24.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-128
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-128
0.0114 490.0 0.12                                            /Z3-128
HEAT SINK 129 - DOOR BTWN EFIC RM B (6) AND EFIC RM D (8)
1 1 6 1 8 1 42.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-129
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-129
0.0114 490.0 0.12                                            /Z3-129
HEAT SINK 130 - DOOR BTWN CORRIDOR (11) AND REMOTE SHTDN RM (12)
1 1 11 1 12 1 21.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-130
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-130
0.0114 490.0 0.12                                            /Z3-130
HEAT SINK 131 - DOOR BTWN CORRIDOR (11) AND STAIRWELL (21)
1 1 11 1 21 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-131
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-131
0.0114 490.0 0.12                                            /Z3-131
HEAT SINK 132 - DOOR BTWN CORRIDOR (11) AND 4160V SWGR RM B (20)
1 1 11 1 20 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-132
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-132
0.0114 490.0 0.12                                            /Z3-132
HEAT SINK 133 - DOOR BTWN CORRIDOR (11) AND BATTERY RM B (14)
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1 1 11 1 14 1 46.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-133
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-133
0.0114 490.0 0.12                                         /Z3-133
HEAT SINK 134 - DOOR BTWN CORRIDOR (11) AND BTRY CHGR RM B (16)
1 1 11 1 16 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-134
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-134
0.0114 490.0 0.12                                         /Z3-134
HEAT SINK 135 - DOOR BTWN BATTERY RM A (13) AND BTRY CHGR RM A (15)
1 1 13 1 15 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-135
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-135
0.0114 490.0 0.12                                         /Z3-135
HEAT SINK 136 - DOOR BTWN BATTERY RM A (13) AND BATTERY RM B (14)
1 1 13 1 14 1 46.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-136
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-136
0.0114 490.0 0.12                                         /Z3-136
HEAT SINK 137 - DOOR BTWN BATTERY RM B (14) AND BTRY CHGR RM B (16)
1 1 14 1 16 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-137
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-137
0.0114 490.0 0.12                                         /Z3-137
HEAT SINK 138 - DOOR BTWN BTRY CHGR RM A (15) AND BTRY CHGR RM B (16)
1 1 15 1 16 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-138
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-138
0.0114 490.0 0.12                                         /Z3-138
HEAT SINK 139 - DOOR BTWN BTRY CHGR RM A (15) AND INVERTER RM A (17)
1 1 15 1 17 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-139
1 0 0.125 78.3 79.3 2 0.0 0.0 1 0 2                       /Z-139
0.0114 490.0 0.12                                         /Z3-139
HEAT SINK 140 - DOOR BTWN BTRY CHGR RM A (15) AND INVERTER RM B (18)
1 1 15 1 18 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-140
1 0 0.125 78.3 79.3 2 0.0 0.0 1 0 2                       /Z-140
0.0114 490.0 0.12                                         /Z3-140
HEAT SINK 141 - DOOR BTWN INVERTER RM A (17) AND INVERTER RM B (18)
1 1 17 1 18 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-141
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-141
0.0114 490.0 0.12                                         /Z3-141
HEAT SINK 142 - DOOR BTWN INVERTER RM B (18) AND 4160V SWGR RM A (19)
1 1 18 1 19 1 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-142
1 0 0.125 79.3 78.3 2 0.0 0.0 1 0 2                       /Z-142
0.0114 490.0 0.12                                         /Z3-142
HEAT SINK 143 - DOOR BTWN 4160V SWGR A (19) AND 4160V SWGR B (20)
1 1 19 1 20 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-143
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-143
0.0114 490.0 0.12                                         /Z3-143
HEAT SINK 144 - DOOR BTWN STAIRWELL (21) AND EAST SOLAIR (27)
1 1 21 1 27 11 24.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-144
1 0 0.125 84.1 124.5 2 0.0 0.0 1 0 2                      /Z-144
0.0114 490.0 0.12                                         /Z3-144
HEAT SINK 145 - DOOR BTWN STAIRWELL (21) AND TURBINE BLDG 145'(39)
1 1 21 1 39 1 118.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-145
1 0 0.125 87.2 100.3 2 0.0 0.0 1 0 2                      /Z-145
0.0114 490.0 0.12                                         /Z3-145
HEAT SINK 146 - DOOR BTWN STAIRWELL (21) AND HP AREA (26)
1 1 21 1 26 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-146
1 0 0.125 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-146
0.0114 490.0 0.12                                         /Z3-146
HEAT SINK 147 - DOOR BTWN STAIRWELL (21) AND EQUIP RM EL 164' (25)
1 1 21 1 25 1 39.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-147
1 0 0.125 82.7 89.8 2 0.0 0.0 1 0 2                       /Z-147
0.0114 490.0 0.12                                         /Z3-147
HEAT SINK 148 - CONCRETE PILLAR + DRYWALL IN CTRL RM (1)
1 3 1 1 1 1 60.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-148
2 0 0.5 77.5 77.5 2 0.0 0.0 1 0 2                         /Z-148
0.42 100.0 0.20                                           /Z3-148
3 0 18.5 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-148
0.92 145.0 0.156                                          /Z3-148
2 0 19.0 77.5 77.5 2 0.0 0.0 1 0 2                        /Z-148
0.42 100.0 0.20                                           /Z3-148
HEAT SINK 149 - WALL BET CORRIDOR (2) & WEST SOLAIR (34)
1 1 2 1 34 11 496.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-149
6 0 24.0 84.2 134.0 2 0.0 0.0 1 0 2                       /Z-149
0.92 145.0 0.156                                          /Z3-149
HEAT SINK 150 - GRILLE BTWN EFIC RM A (5) & EFIC RM C (7)
1 1 5 15 7 10 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-150
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                        /Z-150
10000.0 0.01 0.01                                         /Z3-150
HEAT SINK 151 - GRILLE BTWN EFIC RM A (5) & EFIC RM D (8)
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1 1 5 10 8 15 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-151
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-151
10000.0 0.01 0.01                                        /Z3-151
HEAT SINK 152 - GRILLE BTWN EFIC RM B (6) & EFIC RM D (8)
1 1 6 15 8 10 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-152
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-152
10000.0 0.01 0.01                                        /Z3-152
HEAT SINK 153 - GRILLE BTWN EFIC RM C (7) & EFIC RM B (6)
1 1 7 15 6 10 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-153
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-153
10000.0 0.01 0.01                                        /Z3-153
HEAT SINK 154 - GRILLE BTWN EFIC RM C (7) & CRD RELAY RM (4)
1 1 7 15 4 10 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-154
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-154
10000.0 0.01 0.01                                        /Z3-154
HEAT SINK 155 - GRILLE BTWN EFIC RM B (6) & CRD RELAY RM (4)
1 1 6 15 4 10 4.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-155
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-155
10000.0 0.01 0.01                                        /Z3-155
HEAT SINK 156 - MISC STEEL IN INVERTER RM A (17)
1 1 17 1 0 0 144.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-156
1 0 0.075 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-156
27.0 490.0 0.12                                         /Z3-156
HEAT SINK 157 - MISC STEEL IN INVERTER RM B (18)
1 1 18 1 0 0 122.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-157
1 0 0.075 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-157
27.0 490.0 0.12                                         /Z3-157
HEAT SINK 158 - MISC STEEL IN 480V SWGR RM A (9)
1 1 9 1 0 0 74.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3       /X-158
1 0 0.075 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-158
27.0 490.0 0.12                                         /Z3-158
HEAT SINK 159 - MISC STEEL IN 480V SWGR RM B (10)
1 1 10 1 0 0 70.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-159
1 0 0.075 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-159
27.0 490.0 0.12                                         /Z3-159
HEAT SINK 160 - WALL BET EQUIP RM (25) & AUX BLDG (24)
1 1 25 1 24 1 1760.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-160
6 0 24.0 95.8 98.2 2 0.0 0.0 1 0 2                       /Z-160
0.92 145.0 0.156                                         /Z3-160
HEAT SINK 161 - WALL BET EQUIP RM (25) & EAST SOLAIR (27)
1 1 25 1 27 11 1160 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-161
6 0 24.0 98.2 127.9 2 0.0 0.0 1 0 2                       /Z-161
0.92 145.0 0.156                                         /Z3-161
HEAT SINK 162 - WALL BET EQUIP RM (25) & TURB BLDG 164'(23)
1 1 25 1 23 1 1353.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3    /X-162
6 0 24.0 98.9 111.1 2 0.0 0.0 1 0 2                       /Z-162
0.92 145.0 0.156                                         /Z3-162
HEAT SINK 163 - CEILING BET EQUIP RM (25) & HORZ SOLAIR (36)
1 1 25 3 36 3 4735.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3    /X-163
6 0 36.0 95.3 121.5 2 0.0 0.0 1 0 2                       /Z-163
0.92 145.0 0.156                                         /Z3-163
HEAT SINK 164 - STEEL ELECT PANELS IN CRD/RELAY RM (4)
1 1 4 1 4 1 2064.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-164
1 0 0.178 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-164
27.0 490.0 0.12                                         /Z3-164
HEAT SINK 165 - WALLS WITHIN EQUIP RM (25)
1 1 25 1 25 1 2550.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3    /X-165
6 0 24.0 95.0 95.0 2 0.0 0.0 1 0 2                        /Z-165
0.92 145.0 0.156                                         /Z3-165
HEAT SINK 166 - HEAT SOURCE WITHIN INVERTER A CABINETS (30)
1 1 30 0 30 5 343.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-166
2 0 0.814 108.0 108.0 2 2097.8 2097.8 1 0 2               /Z-166
27.0 490.0 0.12                                         /Z3-166
HEAT SINK 167 - HEAT SOURCE WITHIN INVERTER B CABINETS (31)
1 1 31 0 31 5 374.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-167
2 0 1.008 108.1 108.1 2 1713.5 1713.5 1 0 2          /Z-167
27.0 490.0 0.12                                         /Z3-167
HEAT SINK 168 - STEEL BEAMS IN 480V SWGR RM A (9)
1 1 9 1 0 0 322.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3      /X-168
1 0 0.198 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-168
27.0 490.0 0.12                                         /Z3-168
HEAT SINK 169 - HEAT SOURCE WITHIN 480V SWGR A CABINETS (32)
1 1 32 0 32 8 518.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-169
2 0 0.70 108.0 108.0 2 1475.5 1475.5 1 0 2               /Z-169
27.0 490.0 0.12                                         /Z3-169
HEAT SINK 170 - HEAT SOURCE WITHIN 480V SWGR B CABINETS (33)
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1 1 33 0 33 8 437.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-170
2 0 0.763 110.7 110.7 2 1854.4 1854.4 1 0 2            /Z-170
27.0 490.0 0.12                                         /Z3-170
HEAT SINK 171 - STEEL BEAMS IN 480V SWGR RM B (10)
1 1 10 1 0 0 322.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-171
1 0 0.198 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-171
27.0 490.0 0.12                                         /Z3-171
HEAT SINK 172 - STEEL BEAMS IN CRD ROOM (4)
1 1 4 1 0 0 2726.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-172
1 0 0.199 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-172
27.0 490.0 0.12                                         /Z3-172
HEAT SINK 173 - HEAT SOURCES IN EFIC ROOM A (5)
1 1 5 0 5 16 220.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-173
2 0 0.295 108.0 108.0 2 3834.3 3834.3 1 0 2               /Z-173
27.0 490.0 0.12                                         /Z3-173
HEAT SINK 174 - STEEL BEAMS IN EFIC RM A (5)
1 1 5 1 0 0 147.6 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-174
1 0 0.190 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-174
27.0 490.0 0.12                                         /Z3-174
HEAT SINK 175 - DUCTS IN EFIC RM A (5)
1 1 5 1 5 1 46.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-175
1 0 0.03 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-175
27.0 490.0 0.12                                         /Z3-175
HEAT SINK 176 - HEAT SOURCES IN EFIC ROOM B (6)
1 1 6 0 6 16 332.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-176
2 0 0.269 98.4 98.4 2 2392.3 2392.3 1 0 2               /Z-176
27.0 490.0 0.12                                         /Z3-176
HEAT SINK 177 - STEEL BEAMS IN EFIC RM B (6)
1 1 6 1 0 0 94.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3.    /X-177
1 0 0.140 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-177
27.0 490.0 0.12                                         /Z3-177
HEAT SINK 178 - DUCTS IN EFIC RM B (6)
1 1 6 1 6 1 209.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-178
1 0 0.03 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-178
27.0 490.0 0.12                                         /Z3-178
HEAT SINK 179 - HEAT SOURCES IN EFIC ROOM C (7)
1 1 7 0 7 16 243.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-179
1 0 0.3175 104.8 104.8 2 3018.2 3018.2 1 0 2            /Z-179
27.0 490.0 0.12                                         /Z3-179
HEAT SINK 180 - STEEL BEAMS IN EFIC RM C (7)
1 1 7 1 0 0 144.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-180
1 0 0.200 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-180
27.0 490.0 0.12                                         /Z3-180
HEAT SINK 181 - DUCTS IN EFIC RM C (7)
1 1 7 1 7 1 209.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-181
1 0 0.03 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-181
27.0 490.0 0.12                                         /Z3-181
HEAT SINK 182 - HEAT SOURCES IN EFIC ROOM D (8)
1 1 8 0 8 16 113.8 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0    3     /X-182
1 0 0.355 118.1 118.1 2 4800.7 4800.7 1 0 2             /Z-182
27.0 490.0 0.12                                         /Z3-182
HEAT SINK 183 - STEEL BEAMS IN EFIC RM D (8)
1 1 8 1 0 0 94.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-183
1 0 0.140 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-183
27.0 490.0 0.12                                         /Z3-183
HEAT SINK 184 - DUCTS IN EFIC RM D (8)
1 1 8 1 8 1 26.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-184
1 0 0.03 80.0 80.0 2 0.0 0.0 1 0 2                     /Z-184
27.0 490.0 0.12                                         /Z3-184
HEAT SINK 185 - CABINET (30) TO INVERTER RM A (17)
1 1 30 6 17 18 35.25 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-185
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-185
10000.0 0.01 0.01                                         /Z3-185
HEAT SINK 186 - CABINET (31) TO INVERTER RM B (18)
1 1 31 6 18 18 38.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-186
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                       /Z-186
10000.0 0.01 0.01                                         /Z3-186
HEAT SINK 187 - XFMRS IN INVERTER ROOM A (17)
1 1 17 0 17 7 40.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-187
1 0 1.224 100.0 100.0 2 2991.2 2991.2 1 0 2               /Z-187
27.0 490.0 0.12                                           /Z3-187
HEAT SINK 188 - XFMRS IN INVERTER ROOM B (18)
1 1 18 0 18 7 40.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-188
1 0 1.224 101.5 101.5 2 3300.0 3300.0 1 0 2               /Z-188
27.0 490.0 0.12                                           /Z3-188
HEAT SINK 189 - CABINETS (32) TO 480V SWGR RM A (9)
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1 1 32 9 9 18 88.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-189
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-189
10000.0 0.01 0.01                                          /Z3-189
HEAT SINK 190 - CABINETS (33) TO 480V SWGR RM B (10)
1 1 33 9 10 18 101.9 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-190
1 0 0.10 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-190
10000.0 0.01 0.01                                          /Z3-190
HEAT SINK 191 - MISC STEEL PANELS IN BTRY CHGR RM A (15)
1 1 15 1 15 1 228.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3     /X-191
1 0 0.226 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-191
27.0 490.0 0.12                                            /Z3-191
HEAT SINK 192 - MISC STEEL PANELS IN BTRY CHGR RM B (16)
1 1 16 1 16 1 228.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-192
1 0 0.226 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-192
27.0 490.0 0.12                                            /Z3-192
HEAT SINK 193 - HEAT SOURCE CONTROL ROOM (1) CABINETS
1 1 1 0 1 4 6634.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-193
1 0 0.1229 98.0 98.0 2 1551.5 1551.5 1 0 2                 /Z-193
27.0 490.0 0.12                                            /Z3-193
HEAT SINK 194 - SWGR CABINETS IN 4160V SWGR RM A (19)
1 1 19 1 19 1 735.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-194
1 0 0.400 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-194
27.0 490.0 0.12                                            /Z3-194
HEAT SINK 195 - SWGR CABINETS IN 4160V SWGR RM B (20)
1 1 20 1 20 1 735.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-195
1 0 0.400 80.0 80.0 2 0.0 0.0 1 0 2                          /Z-195
27.0 490.0 0.12                                            /Z3-195
HEAT SINK 196 - HEAT SOURCE CONTROL ROOM (1) MCB
1 1 1 4 1 4 1885.3 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-196
1 0 0.128 94.57 94.57 2 2247.0 2247.0 1 0 2              /Z-196
27.0 490.0 0.12                                            /Z3-196
HEAT SINK 197 - SUPPLY DUCTS
1 1 28 19 0 0 5006.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-197
1 0 0.0326 60.0 60.0 2 0.0 0.0 1 0 2                         /Z-197
27.0 490.0 0.12                                            /Z3-197
HEAT SINK 198 - RETURN DUCTS
1 1 28 19 0 0 4647.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-198
1 0 0.0327 80.0 80.0 2 0.0 0.0 1 0 2                         /Z-198
27.0 490.0 0.12                                            /Z3-198
HEAT SINK 199 - COOLING COIL AHHE-5
1 2 28 19 0 0 518.0 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-199
1 0 0.143 60.9 60.9 2 0.0 0.0 1 0 2                        /Z-199
220.0 558.0 0.091                                            /Z3-199
1 0 0.275 53.1 53.1 2 0.0 0.0 1 0 2                        /Z-199
0.34 62.0 1.0                                            /Z3-199
HEAT SINK 200 - CONCRETE COLUMN IN PLENUM
1 1 22 1 22 1 609.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0  3     /X-200
2 0 28.9 60.4 60.4 2 0.0 0.0 1 0 2                         /Z-200
0.92 145.0 0.156                                            /Z3-200
HEAT SINK 201 - WALL BTWN CABLE GALLERY (3) AND MACH SHOP (38)
1 1 3 1 38 1 526.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0. 3     /X-201
6 0 24.0 78.0 79.5 2 0.0 0.0 1 0 2                           /Z-201
0.92 145.0 0.156                                            /Z3-201
HEAT SINK 202 - WALL BTWN BATTERY RM A (13) AND MACH SHOP (38)
1 1 13 1 38 1 81.2 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3     /X-202
6 0 24.0 78.0 79.5 2 0.0 0.0 1 0 2                           /Z-202
0.92 145.0 0.156                                             /Z3-202
HEAT SINK 203 - WALL BTWN BTRY CHARGER RM A (15) AND MACH SHOP (38)
1 1 15 1 38 1 39.0  0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3     /X-203
6 0 24.0 78.0 79.5 2 0.0 0.0 1 0 2                             /Z-203
0.92 145.0 0.156                                               /Z3-203
HEAT SINK 204 - WALL BTWN INVERTER RM A (17) AND MACH SHOP (38)
1 1 17 1 38 1 124.5 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-204
6 0 24.0 80.0 80.0 2 0.0 0.0 1 0 2                             /Z-204
0.92 145.0 0.156                                               /Z3-204
HEAT SINK 205 - CEILING BTWN STAIRWELL (21) AND HORZ SOLAIR (36)
1 1 21 2 36 3 336.1 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.   3     /X-205
3 0 36.0 81.3 120.1 2 0.0 0.0 1 0 2                            /Z-205
0.92 145.0 0.156                                               /Z3-205
HEAT SINK 206 - WALLS BTWN STAIRWELL (21) AND SOUTH SOLAIR (35)
1 1 21 1 35 11 204.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3     /X-206
3 0 24.0 81.8 107.9 2 0.0 0.0 1 0 2                            /Z-206
0.92 145.0 0.156                                               /Z3-206
HEAT SINK 207 - WALLS BTWN STAIRWELL (21) AND WEST SOLAIR (34)
1 1 21 1 34 11 160.4 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0.  3     /X-207
3 0 24.0 84.2 134.0 2 0.0 0.0 1 0 2                            /Z-207
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0.92 145.0 0.156                                                /Z3-207
HEAT SINK 208 - WALL BET CORRIDOR (2) & INTER BLDG (AUX) (24)
1 1 2 1 24 11 152.7 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3    /X-208
6 0 24.0 81.7 94.8 2 0.0 0.0 1 0 2                            /Z-208
0.92 145.0 0.156                                                /Z3-208
HEAT SINK 209 - WALL BET EQUIP RM (25) & WEST SOLAIR (34)
1 1 25 1 34 11 757 0.0 500.0 0. 0. 0. 0. 0. 0. 0. 0   3      /X-209
6 0 24.0 98.3 137.4 2 0.0 0.0 1 0 2                           /Z-209
0.92 145.0 0.156                                                /Z3-209
3 1.46 8*0                /ZZ1-1 CONST HTC WALLS
3 1.63 8*0                /ZZ1-2 CONST HTC HORIZ W/ HEAT FLOW UP
3 1.08 8*0                /ZZ1-3 CONST HTC HORIZ W/ HEAT FLOW DOWN
13 0 0 0.3369 0.333 5*0 /ZZ1-4 CONTROL ROOM CABINETS & MCB
3 14.22 8*0               /ZZ1-5 CONST HTC INVERTER HEAT SOURCE
3 76.94 8*0               /ZZ1-6 CONST HTC INVERTER CABINETS
13 0 0 5.622 0.333 5*0  /ZZ1-7 XFMRS IN INVERTER ROOMS
13 0 0 3.990 0.333 5*0  /ZZ1-8 480V SWGR HEAT SOURCE
13 0 0 10.727 0.333 5*0  /ZZ1-9 480V SWGR CABINETS
4 1 4 7*0                 /ZZ1-10 TIME DEP HTC
3 1.46 8*0                /ZZ1-11 CONSTANT HTC still air OUTSIDE walls
13 0 0 1.1  0.55 5*0     /ZZ1-12 TEMP DEP HTC - CTRL RM CEILING
13 0 0 6.0  0.50 5*0     /ZZ1-13 TEMP DEP HTC - 480V SWGR RM GRILLES
13 0 0 4.6  0.50 5*0     /ZZ1-14 TEMP DEP HTC - STAIRWELL GRILLES
13 0 0 5.0  0.50 5*0     /ZZ1-15 TEMP DEP HTC - EFIC ROOMS
13 0 0 1.107 0.333 5*0  /ZZ1-16 EFIC ROOM CABINETS HEAT SOURCE
13 0 0 1.23 0.55 5*0    /ZZ1-17 TEMP DEP HTC - TEMP CTRL RM OPENINGS
3 10000.0 8*0             /ZZ1-18 CONST HTC INVTR & SWGR CABINETS
4 2 4 7*0                 /ZZ1-19 TIME DEP HTC - INSIDE DUCTS
0.0     10000.0
1800.   10000.0
1800.   0.0
1.0E7   0.0                 /ZZ2-1
0.0     0.0
1800.   0.0
1800.   1.0
1.0E7   1.0                 /ZZ2-2
1 2 3               /ZZP
0 /
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Florida Power CORPORATION

INTEROFFICE CORRESPONDENCE

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Design Engineering	NA1E	240-3415

SUBJECT. Crystal River Unit 3
Quality Record Transmittal - Analysis/Calculation

TO. Records Management - SA2A

The following analysis/calculation package is submitted as the QA Record copy·

DOCNO (FPC DOCUMENT IDENTIFICATION NUMBER)	REV	SYSTEM(S)	TOTAL PAGES TRANSMITTED
I-88-0020	11	RC	103

TITLE
RC PRESSURE (WIDE RANGE) LOOP ACCURACY CALCULATION

KWDS (IDENTIFY KEYWORDS FOR LATER RETRIEVAL)
ERROR, PRESSURE, RCS, PAM, REMOTE SHUTDOWN

FLORIDA POWER CORPORATION
NUCLEAR ENGINEERING DEPARTMENT
CRYSTAL RIVER UNIT 3
REVIEWED AND ACCEPTED BY:

DXREF (REFERENCES OR FILES - LIST PRIMARY FILE FIRST)
SP-161C
I-89-0004, I-94-0012, I-88-0006, I-88-0015

ENGINEER A.T. BARNARD A.T. Barnard DATE 11/9/99
SUPERVISOR S.Z. BORKOSKI [signature] DATE 11/9/99

VEND (VENDOR NAME)	VENDOR DOCUMENT NUMBER (DXREF)	SUPERSEDED DOCUMENTS (DXREF)
Framatome		I-88-0020 Revision 10

TAG

See Attached Sheet

PART NO.

COMMENTS (USAGE RESTRICTIONS, PROPRIETARY, ETC)

This calculation was revised to ~~correct the Zone 58 accident temperature~~ incorporate revised E/SQPM data ATB 11/3/99 in the Design Inputs, and correct Typographical errors in the CEloop equations No changes to the calculated uncertainties resulted.

NOTE:
Use Tag number only for valid tag numbers (i e , RCV-8, SWV-34, DCH-99); otherwise, use Part number field (i e., CSC14599, AC1459). If more space is required, write "See Attachment" and list on separate sheet.

**FOR RECORDS MANAGEMENT USE ONLY **
Quality Record Transmittal received and information entered into SEEK.
Entered by: _______________ Date _________

(Return copy of Quality Record Transmittal to DE Support Specialist.)

DESIGN ENGINEER	DATE	VERIFICATION ENGINEER	DATE	SUPERVISOR, DESIGN ENG	DATE
Edwin D. Lee [signature] Edwin D. Lee	10/22/99	Robert H Ficke [signature] Robert H Ficke	11/2/99	L. M. Lesniak [signature] L. M. LESNIAK	11-3-99

cc: Nuclear Projects (If MAR/CGWR/PEERE Return to Service Related) ☐ Yes ☒ No
Supervisor, Config Mgt Info
Mgr., Design Engineering (Original) w/attach
Mgr., Radiological Emergency Planning w/attach ☐ Yes ☒ No

D M Porter w/attach

Calculation Review form Part III actions required ☐ Yes ☒ No
(If Yes, send copy of the Calculation to the Responsible Organization(s) identified in Part III on the Calculation Review form)

NOV -9 1999

Rev 9/98

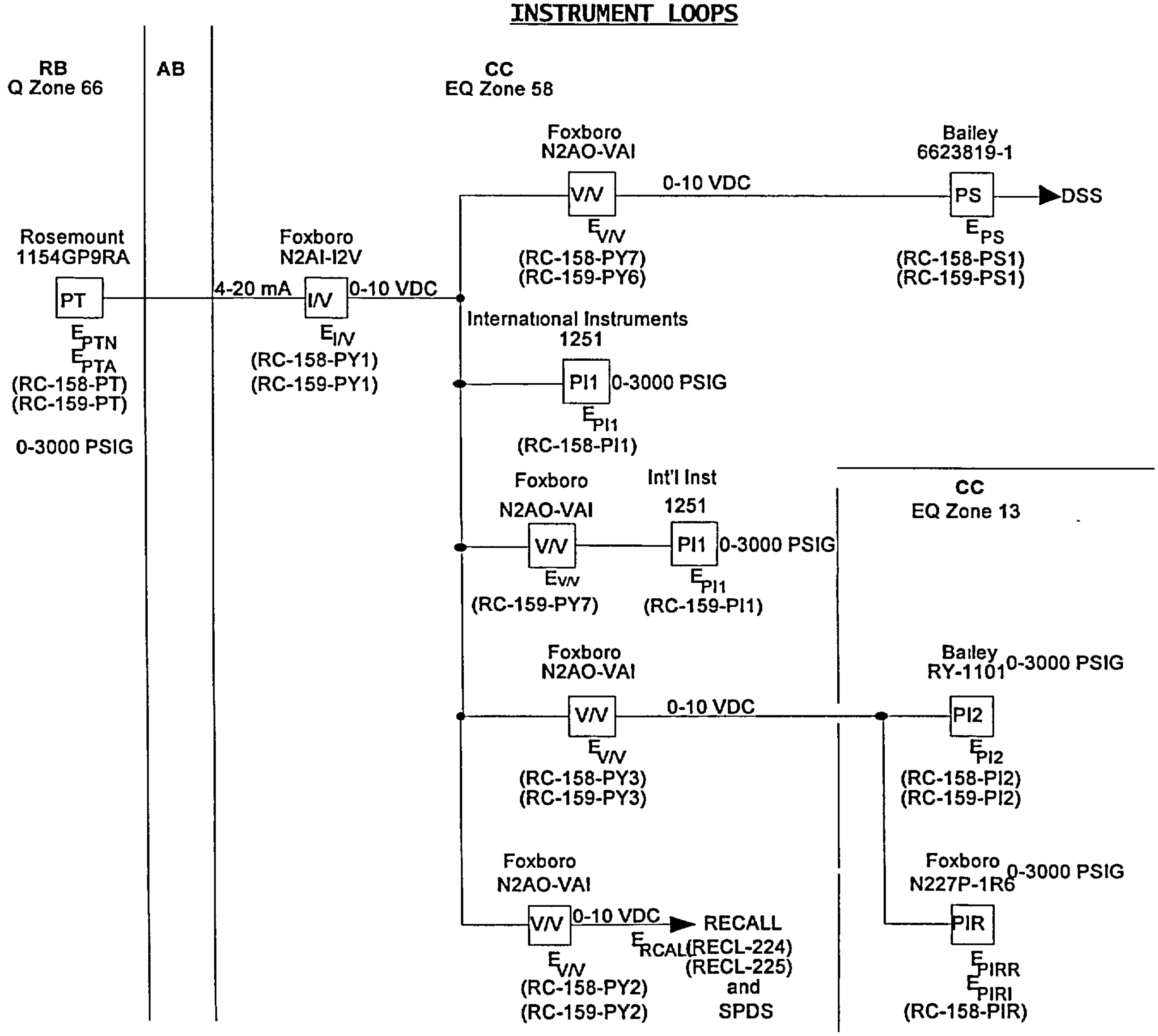
DOCUMENT IDENTIFICATION NO	REVISION
I-88-0020	11

I. PURPOSE:

The purpose of this calculation is to determine the instrument loop accuracy of the RC Wide Range Pressure loops (transmitters RC-158-PT and RC-159-PT) that provide Control Room indication and recording for Normal and Post-Accident Monitoring (Technical Specification 3.3.17.2.(3) - Reference 2), RECALL/SPDS, Remote Shutdown Indication (Technical Specification 3.3.18.2.(2a) - Reference 2) and input to ATWS.

The RCS Wide Range Pressure Indication is a Reg. Guide 1.97 Type A variable (Reference 4.a). Therefore, per Attachment 5 of the I&C Design Criteria for Instrument Loop Uncertainty Calculations (Reference 1), this calculation will be developed as a Category B Loop.

INSTRUMENT LOOPS



IV. ASSUMPTIONS (A):

1. The modules and indicators located in Control Complex EQ Zones 13 and 58 will be calibrated at a temperature between 70° and 80°F, based on the Normal Temperature range stated in Design Inputs(DI) 6, 10, and 13, and on the M&TE accuracy selected in DI 31(2).

   The modules and indicators located in EQ Zones 13 and 58 will be operated over a normal temperature range of 60° to 80°F. This range is based on the maximum Normal Temperature stated in DI 6, 10, and 13 and an assumed minimum temperature. The maximum temperature is maintained at the DI 6, 10, and 13 stated value of 80°F since the Control Complex Heat Load Evaluation calculation M-97-0020 (reference 10.j) assumes this to be the maximum initial temperature for evaluation. The minimum temperature is assumed to be 60°F, since this bounds the minimum Normal Temperature stated in DI 6, 10, and 13 and also allows for continued analyzed plant operations during HVAC equipment problems when the temperature may decrease below the minimum value stated in DI 6, 10, and 13.

   The modules and indicators located in EQ Zones 13 and 58 will be operated over an accident temperature range of 60° to 104°F. This range is based on the minimum assumed temperature discussed in the paragraph above. The maximum accident temperature in the control complex was determined by calculation M97-0020 (Reference 10.j) to be 104°F, experienced during a LOCA in conjunction with a Loss of Offsite Power. This maximum temperature also allows for continued analyzed plant operations up to the vendor stated limit for the lowest maximum temperature rated component in the loop. The Foxboro components are limited to 104°F per Product Specification PSS 9-7A1A page 4 located in Instruction Manual 586 (reference 17.b), which states a 104°F ambient limit for racks fully loaded with one power supply and no fans, the configuration which exists in the Remote Shutdown Auxiliary Equipment Cabinet.

   Considering the above paragraphs, the module and indicator/recorder temperature effects will be calculated for the maximum change in temperature of the component from the temperature at which it was calibrated to the temperature at which it will be operated. For normal conditions, the component will be assumed to be calibrated at 80°F and operated at 60°F for a 20°F change (80-60) and for accident conditions, the component will be assumed to be calibrated at 70°F and operated at 104°F for a 34°F change (104-70).

2. Assume that the pressure transmitters located in EQ Zone 66 can be calibrated at either 70°F (minimum temperature for this Zone) or 109°F (maximum temperature for this Zone). Therefore, a 39°F change will be used in the calculation. This will ensure that any temperature effects are conservatively calculated.

E_S = Seismic Effect = ± 0.0% DI5.4

E_{RAD} = Radiation Effect = ± (1.5% URL + 1.0% span)

= ±[(1.5 x 3000 psig) + (1.0 x 3000 psig)]/3000 psig
= ±2.5% span

E_{PTA} = $\pm[(E_{REF})^2 + (E_{P/T})^2 + (E_{RAD})^2]^{½}$

= $\pm[(0.25)^2 + (3.0)^2 + (2.5)^2]^{½}$
= $\pm[(0.0625) + (9.0) + (6.25)]^{½}$
= $\pm[15.3125]^{½}$
= **±3.91% span**

Device I/V: Foxboro N2AI-I2V Current-to-Voltage Converter ($E_{I/V}$) DI7

Normal

E_{REF} = Reference Accuracy = ± 0.25% span

E_T = Temperature Effect = ± 0.5% span/45°F

= ±(0.5/45°F) x (20°F) A1
= ±0.22% span

$E_{I/V}$ = $\pm[(E_{REF})^2 + (E_T)^2]^{½}$

= $\pm[(0.25)^2 + (0.22)^2]^{½}$
= **±0.33% span**

Accident

E_{REF} = Reference Accuracy = ± 0.25% span

E_T = Temperature Effect = ± 0.5% span/45°F

= ±(0.5/45°F) x (34°F) A1
= ±0.38% span

$E_{I/V}$ = $\pm[(E_{REF})^2 + (E_T)^2]^{½}$

= $\pm[(0.25)^2 + (0.38)^2]^{½}$
= **±0.45% span**

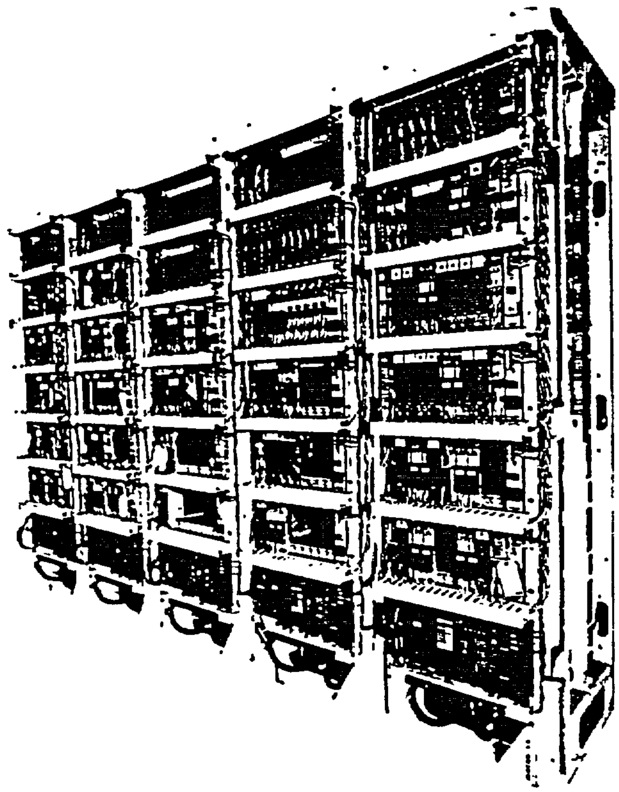
Device V/V: Foxboro N2AO-VAI Signal Converter/Isolator ($E_{V/V}$) DI8

Normal

E_{REF} = Reference Accuracy = ± 0.5% span

E_T = Temperature Effect = ± 0.5% span/45°F

= ±(0.5/45°F) x (20°F) A1
= ±0.22% span



SPEC 200 SEISMIC RACKS AND RACK-MOUNTED EQUIPMENT

Seismically type-tested and subject to the stringent controls required for nuclear applications

NUCLEAR SERVICE QUALIFICATION

The SPEC 200 Racks and Rack-Mounted Equipment covered in this specification are subjected to type testing and/or analysis to provide a basis for nuclear power plant qualification. The products offered for Class 1E service are evaluated in accordance with the Foxboro interpretation of IEEE Standards 323-1974 and 344-1975. Other products offered are evaluated for structural integrity per IEEE Standard 344-1975. N-Series equipment is virtually identical to the corresponding non-nuclear equipment, although certain mechanical modifications result from seismic requirements

STRINGENT QUALITY ASSURANCE PROGRAM

The Foxboro quality assurance program meets the requirements of 10CFR50, Appendix B; ANSI N45.2; MIL-Q-9858A; and CSA Z299.2. The program has been audited by the U.S. Nuclear Regulatory Commission and by a number of users in the nuclear power industry.

SIMPLIFIED INSTALLATION

Modular design permits assembly of up to five double-faced racks into one shippable section. The interconnecting wiring within a section can be installed and checked prior to shipment to the user. Connections to remote SPEC 200 display instruments are made by standard flame-retardant cables with plug connectors at both ends. Optional terminal block assemblies for field wiring can occupy either or both faces of any rack. Provision is made for top and/or bottom entry of cable to the racks. In addition, racks can be specified for either bolting or welding to the user's support structure.

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QOAAA04 Part 3 - Seismic Vibration Test Procedure for Current Production Rack-Mounted Modules for Class 1E Qualification per IEEE 344-1975.

QOAAA05 - Qualification by Similarity of SPEC 200 Rack-Mounted Modules and Power Supplies for Class 1E Functions under Seismic Environments.

QOAAA06 - Similarity of SPEC 200 Rack-Mounted Modules of Current Production Design to Type-Tested, Naturally Aged Modules.

QOAAA07 - Simulation of Advanced Life Condition of 2ARPS-A6, Style D Multi-Nest Power Supplies for Class 1E Qualifications.

QOAAA08 - Environmental Test of Fully-Loaded N-2ES Rack.

QOAAA19 - Determination of Seismic Vibration Test Response Spectra for Possible Loading Configurations of N-2ES Style B Rack.

Test Results Documents

QOAAA16 - Seismic Testing of N-2ES Style B Racks for Structural Integrity Qualification per IEEE 344-1975.

QOAAA20 Part 1 - Seismic Testing of SPEC 200 Current Production Model Rack-Mounted Modules in an N-2ES Style B Rack.

QOAAA20 Part 2 - Seismic Testing of N-2ES Style B Rack and Naturally-Aged Modules for Class 1E Qualification for IEEE 344-1975.

QOAAA20 - Appendix A, Determination of SSE Floor Level Response Spectra to which SPEC 200 Modules have been qualified in specific N-2ES Rack Loading Configurations.

QOAAA24 - Heat Rise Test on N-2ES Racks.

QOAAB01 - Class 1E Qualification of SPEC 200 Instrumentation Equipment to Generic Service Conditions per IEEE 323-1974 and IEEE 344-1975 (Summary).

Type Test Reports for individual system components are tabulated with the descriptions of the various components in a later section.

Generic Values

IEEE Standard 323-1974 requires that a product to be qualified for Class 1E service must be subjected to all influences of normal, abnormal, and Design Basis Event (DBE) conditions, allowing for margin.

The Foxboro qualification test program first established a data base at reference conditions. This data was then compared to data obtained from tests at the normal operating limits specified for each parameter. The normal operating limit specifications are listed later in this document.

Foxboro believes that the specified normal operating limits encompass both the normal and abnormal conditions specified in most nuclear power plant locations for equipment of this type. Next, testing was extended to encompass seismic (DBE) operating conditions, and to satisfy margin requirements. The following are the limits used where applicable during qualification testing

Temperature Limits—5 and 60°C (40 and 140°F) at the nest-mounted equipment. The maximum value, considering temperature rise in the rack and margin, is not exceeded when:

a) rack is fully loaded, has two power supplies per face, is equipped with fan(s), and the outside room temperature is 40°C (104°F) maximum;
b) rack is fully loaded, has only one power supply per face, is equipped with fan(s), and the outside room temperature is 44°C (110°F) maximum;
c) rack is fully loaded, has only one power supply per face, is equipped with top louvers, and the outside room temperature is 40°C (104°F) maximum

Relative Humidity—50 and 95% at 30°C (86°F) maximum wet bulb temperature.

Radiation—None

Mains Supply Voltage—Reference +10 and −15%. System dc power supply outputs do not vary more than ±5% for +10 and −15% variation in mains supply voltage.

Mains Supply Frequency—47 and 53 Hz, or 57 and 63 Hz.

dc Supply Voltage—Reference +5 and −5%.

Vibration—Operating Basis Earthquake (OBE) and Safe Shutdown Earthquake (SSE) as described below.

Seismic Testing

Generic floor-level SSE and OBE required response spectra were established which conservatively enveloped control room required response spectra for a number of nuclear power generating stations. The generic required response spectra which represented target qualification levels were applied as seismic inputs to N-2ES Racks to provide a basis for Class II (structural integrity) qualification as documented in Test Report QOAAA16.

Testing was conducted with random multi-frequency input applied biaxially for each of four rack orientations using a 45-degree vectored drive. Five tests at the OBE level and one test at the SSE level were run in each of the four orientations following the procedures of IEEE 344-1975.

Test response spectra at equipment locations obtained in the above tests were used as a basis for establishing target required response spectra for Class 1E qualification of rack-mounted components. A variety of rack loading configurations also were tested with the generic (target) floor-level SSE input to provide test response data at locations significant to such configurations. Test procedures are detailed in Document QOAAA19. Test results are presented in QOAAA20, Appendix A.

Class 1E seismic testing of the rack-mounted nest equipment was performed using N-2ES Racks as test fixtures Results of this testing are reported in Test Reports QOAAA20, Parts 1 and 2.

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In general, the test response spectra for the nest devices enveloped those obtained at device locations of the desired rack loading configurations with generic (target) floor-level seismic inputs.

In the few instances where complete enveloping was not obtained, the designated seismic qualification level for the rack configuration in question was reduced below that of the target floor-level response spectra by the factor of undertesting determined. This is detailed in Foxboro Test Report QOAAA20, Appendix A.

In turn, generic OBE and SSE floor-level test response spectra were developed which were enveloped by the designated seismic qualification levels of the several rack configurations of Test Report QOAAA20, Appendix A. These generic qualification levels as shown in Figures 1 and 2 are applicable to all configurations of Class 1E rack-mounted components listed and illustrated later in this document. Response spectra are given for 1%, 2.5% and 5% of critical damping. Spectra for other damping values can be determined by interpolation.

Operating Limits

Parameter	Reference	Normal
Rack Internal Temperature	21 and 25°C (70 and 77°F)	5 and 50°C * (40 and 120°F)
Relative Humidity	30 and 50%	10 and 95% at 30°C (86°F) maximum wet bulb
Mains Supply Voltage	120, 220, or 240 V ac, as applicable	Reference +10 and −15%
Mains Supply Frequency	50 or 60 Hz, as applicable	Reference +3 and −3 Hz
dc Supply	+15 and −15 V dc	Reference +5 and −5%

*Normal operating limits considering temperature rise in rack (but not margin) when room temperature is 40°C (104°F) maximum, or alternatively, when room temperature is 44°C (110°F maximum), top cover has fan inserts, and there is but one multi-nest power supply in each rack face.

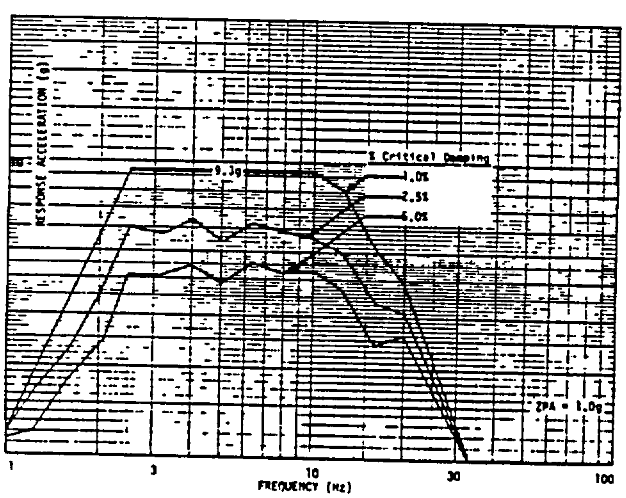

Figure 1. Generic OBE Floor-Level Qualification Response Spectra, Horizontal and Vertical

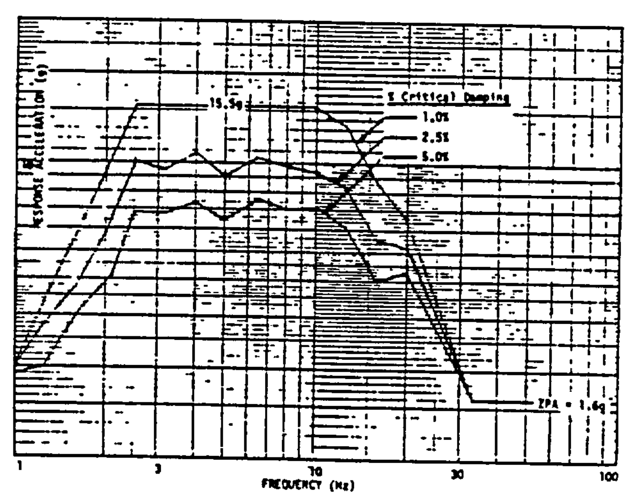

Figure 2. Generic SSE Floor-Level Qualification Response Spectra, Horizontal and Vertical

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Florida Power CORPORATION

INTEROFFICE CORRESPONDENCE

A-C-XMTL FRM

Design Engineering	NAIE	3415
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SUBJECT. Crystal River Unit 3
Quality Record Transmittal - Analysis/Calculation
TO: Records Management – SA2A

The following analysis/calculation package is submitted as the QA Record copy:

DOCNO (FPC DOCUMENT IDENTIFICATION NUMBER)	REV	SYSTEM(S)	TOTAL PAGES TRANSMITTED
I-93-0002	6	SP	261

TITLE
EFIC –Steam Generator Level Instrumentation Loop String Accuracy and Setpoints

KWDS (IDENTIFY KEYWORDS FOR LATER RETRIEVAL)
Steam Generator, EFIC, Error, Indication, Dry Steam Generator, Recorder, Control Valves, Bistable, Level, Natural Circulation, Inadequate Sub Cooling Margin, IR and Setpoints, EOG JMK 9-8-99

DXREF (REFERENCES OR FILES - LIST PRIMARY FILE FIRST)	FLORIDA POWER CORPORATION NUCLEAR ENGINEERING DEPARTMENT CRYSTAL RIVER UNIT 3 REVIEWED AND ACCEPTED BY:
SP-146A, SP-146B, SP-193A, SP-416	
I-92-0008, I-97-0004, I-97-0003,	
MAR 92-12-07-01	ENGINEER Richard Iwachow DATE 09/08/99
	SUPERVISOR G Hildebrandt for S. Bartoszek DATE 9/8/99

VEND (VENDOR NAME)	VENDOR DOCUMENT NUMBER (DXREF)	SUPERSEDED DOCUMENTS (DXREF)
Framatome	N/A	I-93-0002 Rev. 5
	TAG	
See Attached Sheet		
	PART NO.	

COMMENTS (USAGE RESTRICTIONS, PROPRIETARY, ETC)
This revision replaces revision 5, all pages except for attachment 1, 2, 3, 4, which are deleted, attachments 5, 6, 7, 8, 9, 10, 11, 12, 13, and 17 do not change. Attachment 15 and 16 are revised and replaced. Attachment 18 is new. NOTE THIS CALC INCLUDES NEW RECALL POINTS TO BE INSTALLED BY MAR 92-12-07-01. JMK 9-3-99

NOTE:
Use Tag number only for valid tag numbers (i e., RCV-8, SWV-34, DCH-99), otherwise, use Part number field (i e , CSC14599, AC1459) If more space is required, write "See Attachment" and list on separate sheet.

**FOR RECORDS MANAGEMENT USE ONLY **
Quality Record Transmittal received and information entered into SEEK.
Entered by ______________ Date

(Return copy of Quality Record Transmittal to DE Support Specialist.)

DESIGN ENGINEER	DATE	VERIFICATION ENGINEER	DATE	SUPERVISOR, DESIGN ENG	DATE
Randall Harrison	9-3-99	John N Kurtz	9-3-99	L. M. Kesniak	9-3-99
Randall Harrison		John N Kurtz		L. M. KESNIAK	

cc Nuclear Projects (If MAR/CGWR/PEERE Return to Service Related) ☒ Yes ☐ No
Supervisor, Config Mgt Info
Mgr , Design Engineering (Original) w/attach
Mgr , Radiological Emergency Planning w/attach ☐ Yes ☒ No
D M Porter w/attach
G V. Hildebrandt w/attach
R Iwachow w/attach
R E. Wagner w/attach
J R Paljug (FTI)
W Chase w/attach

Calculation Review form Part III actions required ☒ Yes ~~☒ No~~ JMK 9-3-99
(If Yes, send copy of the Calculation to the Responsible Organization(s) identified in Part III on the Calculation Review form)

SEP 14 1999

Rev 3/97

DOCUMENT IDENTIFICATION NO	REVISION
I-93-0002	6

I. PURPOSE

Determination of instrument loop accuracy's of the EFIC - Steam Generator transmitters SP-017-LT through SP-032-LT for EFIC low level initiate, overfill, overfill reset, and emergency feedwater valve control; for post-accident monitoring and for normal surveillance requirements.

The EFIC steam generator level measurement instrumentation supports the operation of the emergency feedwater initiation and control system which is required for design basis accident mitigation. The steam generator level instrumentation is used by the control room personnel to perform manual actions as instructed by Emergency Operating Procedures (EOP's). Based on the guidance given in the I&C Design Criteria "Instrument Loop Uncertainty Calculations" (Reference 1), Attachment 5, "Graded Approach Methodology for Instrument Uncertainty", the EFIC steam generator level measurement instruments are divided into three functional areas. The first functional area deals with instruments providing the actuation signal for initiating EFIC based on a low level conditions in either steam generator. The loop uncertainty determination for these instruments follows the methodology format given for a Category A approach. The next area deals with the level instrumentation used to automatically fill the steam generators to pre-determined level setpoints based on safety analysis whose uncertainty determination will follow the Category B graded approach methodology. Included in this same category are the main control board pressure instrumentation and Recall and Plant Computer points utilized by the plant operator in mitigation of the design basis events. Additional recall computer points have been added to the calculation resulting from the implementation of MAR 92-12-07-01 (Reference 110). Finally, the Category C Graded Approach methodology is applied in determination of a loop uncertainty for a portion of the steam generator level instrumentation circuit that provides an overfill protective function. The protective function outputs a closure signal to the emergency feedwater vector valves (EFV-11, EFV-14, EFV-32, EFV-33, EFV-55, EFV-56, EFV-57 and EFV-58) on a high steam generator level condition. The protective feature is a back-up in the event control power is loss to either the block valves (EFV-11, EFV-14, EFV-32, and EFV-33) or the control valves (EFV-55, EFV-56, EFV-57 and EFV-58). The overfill protective feature is cleared when the high level condition recedes to a predetermined setpoint allowing the re-opening of the valves. The Graded Approach criteria classifies this type of plant operating mode as characteristic of a Category C determination method.

Refer to Figures 1, 2 and 3 for the depiction of the steam generator level loop strings. Figure 1 represents EFIC Low Level Range Channels A and B. Figure 2 represents EFIC High Level Range Channels A and B. Figure 3 represents both EFIC High and Low Level Ranges Channels C and D.

IV ASSUMPTIONS (A)

1. The modules and indicators located in Control Complex EQ Zones 13 and 58 will be calibrated at a temperature between 70° and 80°F, based on the Normal Temperature range stated in Design Inputs(DI) #8, #11, and #14, and on the M&TE accuracy selected in DI 33c and 33d.

   The modules and indicators located in EQ Zones 13 and 58 will be operated over a normal temperature range of 60° to 80°F. This range is based on the maximum Normal Temperature stated in DI #8, #11, and #14 and an assumed minimum temperature. The maximum temperature is maintained at the DI #8 and #11 stated value of 80°F since the Control Complex Heat Load Evaluation calculation M-97-0020 (Reference 105) assumes this to be the maximum initial temperature for evaluation. The minimum temperature is assumed to be 60°F, since this bounds the minimum Normal Temperature stated in DI #8, #11, and #14 and also allows for continued analyzed plant operations during HVAC equipment problems when the temperature may decrease below the minimum value stated in DI #8, #11, and #14.

   The modules and indicators located in EQ Zones 13, and 58 will be operated over an accident temperature range of 60° to 104°F. This range is based on the minimum assumed temperature discussed in the paragraph above. The maximum temperature is assumed to be 104°F experienced during a LOCA in conjunction with Loss of Offsite Power.

   The level indicating recorders (DI#17,#18) are Foxboro Model N227 are tested to 135°F to meet Class 1E requirements (Reference 58). Their power supplies (DI 19) are Foxboro Model TI-2AX with a maximum operating temperature of 120°F (Reference 58). The level indicators (DI #8, #9, #10, #14, #15 #16) are International Instruments Model 1251 series with an operating temperature of 122°F (Reference 42). The EFIC Cabinets (power supplies and modules, DI #11) withstand a high temperature of 110°F (Reference 40). Thus, the aforementioned 104°F accident temperature conservatively envelopes the required/listed component specifications in the Control Complex.

   Considering the above paragraphs, the module and indicator/recorder temperature effects will be calculated for the maximum change in temperature of the component from the temperature at which it was calibrated to the temperature at which it will be operated. For normal conditions, the component will be assumed to be calibrated at 80°F and operated at 60°F for a 20°F change (80-60) and for accident conditions, the component will be assumed to be calibrated at 70°F and operated at 104°F for a 34°F change (104-70).

2. Assume that the differential pressure transmitters located in EQ Zone 66 are calibrated at 70°F, which is the lowest ambient temperature condition expected for this zone. This will ensure that any temperature effects are conservatively calculated.

3. The tested cable insulation leakage resistance at a temperature of 300° F will be used for a HELB event within the Intermediate Building, for the following reasons, (cable qualification test data is from Tab F1 of VQP CABL-B365, Reference 18). In addition, the:

   (1) The test data shows that the cable is subjected to a LOCA event pressure of up to 105 psig and that the cable is above ambient pressure for approximately 3-days. The IB HELB pressure peaks at 6.2 psig, two seconds into the HELB event (zones 21, 53, 57) and then decreases to 0.5 psig at 40 seconds into the event. The pressure is further reduced to 0.1 psig, 17 minutes into the event. The 0.1 psig pressure can be assumed to be ambient pressure.

Connection of the EFIC cabinet instrument ground is not recommmended although connection of the cabinet safety (chassis) ground to a suitable earth ground is recommended.

5.4 PHYSICAL LIMITATIONS

The EFIC cabinets are freestanding cabinets designed to be installed as a single-bay or dual-bay cabinet configuration. Cabinet mounting hardware is 5/8 - 11 UNC, SAE Grade 5, ASTM A449, hexagon socket head cap screws, plain washers and helical spring lock washers, 6 places per cabinet. The Switch Panel is designed to be mounted with four 1/4-20 UNC hexagon socket head screws, plain washers and helical spring lock washers. The Remote Hand/Auto Station is designed to be mounted with eight 1/4-28 UNF slotted hexagon head machine screws. The Switch Panel and Hand/Auto Station are designed for mounting in a 0.12 to 1.00 inch thick vertical panel.

Up to 20.1 pounds of customer cabling may be added to channel C and 21.3 pounds may be added to channel A. For a dual-bay cabinet configuration a total of 41.4 pounds of customer cabling may be added.

The EFIC cabinet is designed to operate in an environment of 40^{o}-110^{o}F and 10% to 90% relative humidity. The control room mounted equipment (i.e. SG Bypass Switch, Switch Panel, Remote Hand/Auto Station) is designed for 40^{o}-140^{o}F and 10% to 90% relative humidity.