TU ELECTRIC

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File # 10130
IR 87-19
IR 87-15
Ref. # 10CFR2.201

William G. Counsil
Executive Vice President

February 4, 1988

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO NRC INSPECTION REPORT
50-445/87-19, 50-446/87-15

Gentlemen:

We have reviewed your report dated October 15, 1987, which provided results of your inspection report of the CPSES Design Validation Program. The inspection was conducted by the Office of Special Projects as well as contractors from August 3 to September 3, 1987, at the Stone & Webster offices in Boston and Cherry Hill and at the Ebasco offices in New York.

This documentation, although incomplete in that it contains proposed changes, was previously inadvertently provided to the staff by a contractor. This submittal completes the record.

Attached, please find TU Electric's responses to the HVAC Systems open items M-1 through M-14.

Very truly yours,

W. G. Counsil

By: John W. Beck
John W. Beck
Vice President,
Nuclear Engineering

8802090222 880204
PDR ADOCK 05000445
A PDR

RSB/grr
Attachment

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (3)

IE01
11

NRC Open Item No. M-1:

The criterion in DC-302A Section 3.1, Page 1, is to maintain space temperatures between 40°F and 122°F and during all modes of plant operation. The DBD-ME-302A Section 2.2.c, Page 10 criterion is to prevent freezing in winter months. Section 4.2, Page 13 indicates the heaters operate only during normal plant operating conditions.

Response:

1. All Design Criteria Documents have been superseded by the Design Basis Documents. Thus DC-302A has been superseded by DBD-ME-302A.

2. Section 2.2 of the DBD-ME-302A will be revised to state that temperatures above freezing are to be maintained in all Diesel-Generator Areas during normal operation; during emergency operation, temperatures above freezing are maintained only in the Diesel Generator Rooms. The indication in Section 4.2, page 13 of the DBD-ME-302A that heaters operate only during normal operation is consistent with the proposed revision. Temperatures above freezing are maintained in the Diesel-Generator Rooms during emergency operation by turning off three of the four ventilating fans during the winter months. Low temperatures in the Day Tank Room during diesel-generator operation are acceptable as temperature of fuel in the tank will stabilize at 55-65°F during this mode, irrespective of the room temperature (see Attachment 2).

   Attachment 1 contains pages of DBD-ME-302A with the proposed changes marked as stated above. The proposed changes will be incorporated in the next revision.

   List of Attachments:

   1. Pages of DBD-ME-302A Rev. 0 marked with the proposed changes.

   2. SWEC comments on Open Item No. 7 of DBD-ME-302A Rev. 0

Significance/Extent:

Generally diesel engines can operate satisfactorily at low ambient temperatures. Therefore low ambient temperature is not considered to be a safety concern. However, to prevent low temperatures, Section 5.2.1.1 of the DBD permitted the Operator to shut down some of the fans, as required, in winter. To provide additional assurance, specific operating procedures discussed above will be included in the DBD.

Extent is limited to the Diesel Generator Area Ventilation System since the only other system with 100% unheated outside air is the Service Water Ventilation System which will always stay above freezing (See Response to Open Item M-11).

NRC Evaluation:

ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
(3)	23	Set point for high temperature annunication (TIS-5692/TIS-5696)	(Set point Calculation No.) by SWEC
(4)	23, 25&41	Temperature setpoints for all electric unit heaters and their respective switch Tag Nos. Set points for pressure differential indicating switches.	(Set point Calculation No.) by SWEC
(5)	37, 38 & Attachment 1	Performance data and construction features of new added electric unit heaters	Specification 2323-MS-90
(6)	25	The electrical system description does not indicate any provision for a flammable gases or vapors environment and the respective hazardous location design equipment per NFPA 70 N.E.C.	(Section 7.1 General Description of this DBD) - by SWEC
(7)	20	Potential adverse impact on diesel fuel oil of low temperature in day tank room due to loss of non 1E unit heaters following loss of offsite power.	Analysis of unacceptable low temperature in the fuel oil after loss of offsite power (EBASCO/SWEC)

2.0 INTRODUCTION

2.1 GENERAL

The DGAVS for unit 2 is identical to the DGAVS for Unit 1 and, unless specifically indicated, the description contained herein applies to both Units 1 and 2.

The Diesel Generator Area Ventilation System (DGAVS) includes Unit Heater (UH) and the following subsystems:

a. Diesel Generator Room Ventilation Sub-System (DGRVS)

b. Day Tank Room Ventilation Sub-System (DTRVS)

The DGAVS consists of two fully redundant trains serving the Diesel Generator area associated with its respective train.

Attachment 1
Sheet 2 of 12

2.2 SYSTEM FUNCTIONS

The functions of the DGAVS are:

a. To maintain the ambient temperature in the Train A and Train B Diesel Generator areas within design limits in order to ensure the operability of the equipment and structures in these areas.

b. To provide adequate ventilation in the Day Tank Rooms.

c. ~~To prevent Diesel Generator areas from freezing in the winter months.~~ To maintain temperatures above freezing during normal operation in Diesel Generator Areas.

d. To maintain temperatures above freezing in the Diesel Generator Rooms during emergency operation.

2.3 SAFETY AND SEISMIC CLASSIFICATION

The DGAVS with the exception of electric unit heaters is Safety Class 3 and Seismic Category I. The electric unit heaters are Non-Nuclear Safety and Seismic Category II.

3.0 CODES AND STANDARDS

The specific codes, standards and regulations identified below have been used for establishing the design bases of the Diesel Generator Area Ventilation System (DGAVS).

Unless indicated hereunder, refer to specifications and vendor documents for the editions, revisions and/or dates that are applicable to these Standards and Regulations, with the exception of entries listed under "Code of Federal Regulations".

ANSI - American National Standards Institute

N18.2 (1973)
"Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants"

4.0 DESIGN BASIS AND FUNCTIONAL REQUIREMENTS

4.1 DESIGN BASIS

The DGAVS is required to remove the heat generated by the equipment, provide additional heating and provide adequate ventilation and air circulation, to meet the system functions listed in Section 2.2.

In general, the DGAVS is required to conform to 10CFR50, Appendix A, General Design Criteria 1, 2, 3, 4, 5 and 17; 10CFR50, Appendix B; NRC Regulatory Guides 1.26, 1.29, 1.47, 1.48, 1.53 and 1.76; ANSI N18.2 and Branch Technical Position ASB9.5-1 as appropriate.

4.2 REQUIRED OPERATION MATRIX

Plant conditions under which the DGAVS or portions thereof are required to operate are delineated in the following matrix:

PLANT OPERATING CONDITIONS

	NORMAL	UPSET	EMERGENCY	FAULTED
UH	X	-	-	-
DGRVS	X	X	X	X
DTRVS	X	X	X	X

4.3 FUNCTIONAL REQUIREMENTS

During normal plant operation, the DGAVS is required to maintain an indoor temperature of 122°F DB maximum during summer and 40°F DB minimum during winter under the following outdoor environmental conditions (See Reference 11.1.1d and 11.1.1e)

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Extreme Summer Temperature: 110°F DB/80°F WB(1)

Winter Design Temperature: 20°F DB(1)

Insert A

Adequate ventilation is provided to prevent the accumulation of fumes, which is a fire hazard.

4.3.1 MECHANICAL REQUIREMENTS

4.3.1.1 GENERAL MECHANICAL EQUIPMENT REQUIREMENTS

The equipment of the DGAVS is required to maintain indoor design temperatures delineated in Section 4.3 within the Diesel Generator Area for compliance with the equipment qualification of the Safety Related components located therein.

4.3.1.2 DAMPER REQUIREMENTS

Volume dampers are provided for air flow balance. Gravity dampers are provided for preventing air flow through non-operating equipment. Fire dampers are required to maintain the integrity of fire rated barriers as required in DBD-ME-001 and DBD-ME-063 (References 11.1.8.6 and 11.1.8e)

4.3.1.3 DUCTWORK REQUIREMENTS

The DGAVS ductwork is required to meet the requirements of SMACNA Standards, ERDA 76-21, ANSI N509-1980 and ANSI N510-1980 and be Seismic Category I supported.

Insert A

During emergency operation, the following maximum room temperatures are to be maintained with the outdoor air at 110 °F DB/ 80 °F WB:

HVAC Equipment Rooms	129.2 °F
All other rooms	122 °F

During emergency operation in winter at 20 °F outdoor temperature, the following minimum room temperatures will be maintained:

Diesel-Generator Rooms	40 °F
Day Tank Rooms	20 °F
HVAC Equipment Rooms	30 °F

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The DGRVS consists of two independent trains, one train for each DGA (Train A and Train B). The system for each train consists of four 25 percent capacity 50,000 CFM (Reference 11.1.3a) each vaneaxial exhaust fans, dampers, louvers, ductwork and instrumentation necessary for the operation and control of the system.

The DTRVS consists of two independent trains, one train for each DGA (Train A, and Train B). Each train consists of one 100 percent capacity 3,000 CFM (Reference 11.1.3a) centrifugal exhaust fan, dampers, louvers, ductwork and instrumentation necessary for the operation and control of the system. The system exhausts 400 CFM from the Day Tank Room and 2600 CFM from the Ventilation Equipment room (Reference 11.1.3a). 400 CFM and 2600 CFM of outdoor air are drawn into the Day Tank room and Ventilation Equipment room respectively through louvers located on walls of each room (Reference 11.1.3a).

Three electric unit heaters are provided for each DGA (Train A and Train B); two heaters have a capacity of 5 KW each(2) and one electric unit heater has a capacity of 20 KW(2). In addition, one 30 KW electric unit heaters is provided for each Ventilation Equipment Room (Train A and Train B)(2) and one 5 KW electric unit heater(2) is provided for each Fuel Oil Day Tank Room(2) (Train A and Train B).

Instrument and controls are provided for each electric unit heater.

All major components of the DGAVS are located in the Diesel Generator Area of the Safeguards Building. The system is protected from tornado and tornado generated missiles by the virtue of being housed in a structure which is designed to withstand such loads. The vaneaxial fans of the DGRVS and the centrifugal fans of the DTRVS are located at Elevation 844'-0". The electric unit heaters are located at Elevations 810'-6" and 844'-0". Outside air intake openings with tornado missile shields are located at Elevations 810'-6" and 844'-0". These openings are provided with wire mesh screens and manual volume dampers. The

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exhaust penthouse with tornado missile shields on the roof at Elevation 865'-0" is equipped with wire mesh screens and louvers.

The ductwork layout is such that when the fans are operating, outdoor air is introduced uniformly into the rooms through air intakes due to fan suction. The heat from the rooms is removed by the outdoor air which is exhausted to the outdoors by the fans. Exhaust registers in the ductwork are provided for air balance. Gravity dampers in the fan discharge are provided to isolate inoperative fans. Fire dampers are provided in the exhaust ducts from the Day Tank Rooms to isolate the rooms from the air receiver area during a fire.

5.2 SYSTEM MODES OF OPERATION

5.2.1 NORMAL SYSTEM OPERATION

5.2.1.1 DIESEL GENERATOR ROOM VENTILATION SUB-SYSTEM (DGRVS)

During normal plant condition in summer, when the diesel generator is not operating, only one of the four vaneaxial exhaust fans per train is required to be in operation. Outdoor air quantity of 50,000 CFM is drawn in through the outside air intakes and exhausted outdoors via the exhaust registers, ductwork, the operating fan and the exhaust penthouse.

During normal plant condition in winter, the fans are not required to be in operation since there is no cooling load. However, the operator may start any fan for the purpose of purging and eliminating odors.

During testing of diesel generator during summer, all four fans automatically start with the diesel generator start signal. Outdoor air quantity of 200,000 CFM (Reference 11.1.3a) is drawn in through the outside air intakes and exhausted to the outdoors through the penthouse. During winter testing, only one fan starts automatically as the control switches of the other three are locked in the "STOP" position.

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~~Depending upon the outdoor temperature, the operator may close [illegible]~~

During upset, emergency or faulted plant condition the diesel generators start automatically and, ~~all eight~~ two (in winter) or eight (in summer) vaneaxial fans (Train A and Train B) start automatically by the diesel generator start signal. ~~Subsequently, depending upon the outdoor air temperature, the operator may elect to shut down some of the fans.~~ The operator may run additional fans during winter if one fan/train is not sufficient for cooling.

5.2.1.2 DAY TANK ROOM VENTILATION SUB-SYSTEM (DTRVS)

During normal plant condition in summer and winter, both centrifugal fans (one per Train) are required to be in operation. Outdoor air quantity of 3000 CFM is drawn in through the outside air intakes and exhausted outdoors via the exhaust registers, ductwork, the operating fan and the exhaust penthouse (400 CFM for Day Tank Room and 2600 CFM for Ventilation Equipment Room (Reference 11.1.3a)).

During upset, emergency or faulted plant condition both fans continue to operate. These fans, if not operating, start automatically by the diesel generator start signal.

5.2.1.3 UNIT HEATERS (UH)

During normal plant condition in summer the electric unit heaters are not required to operate. However, their fans without heating can be operated to circulate air. In winter electric unit heaters are actuated by the respective thermostats when the ambient temperature drops below the set point.

During testing of the diesel generator in winter, the unit heaters are not normally expected to operate because the diesel generator heat loss to the room is sufficient to keep the room ambient temperature above 40°F DB. However, the unit heaters are available for operation if the thermostats call for heating.

The units heaters are not required to operate during upset, emergency or faulted plant condition. ~~Means to prevent the fuel oil reaching unacceptable temperature levels under the above conditions will be addressed later~~).

5.2.2 NORMAL SYSTEM START-UP

DGRVS exhaust fans are started from the respective STOP-AUTO-START, spring return to AUTO, switches which are located in he Control Room. Switches of all fans stay in AUTO position during summer so these can start automatically during upset, emergency or faulted plant condition. During winter, the switches of three of the four fans are locked in STOP position. The fourth is in AUTO position. This prevents freezing in winter.

DTRVS exhaust fans are started from the respective STOP-AUTO-START, spring return to AUTO, switches which are locate din the Control Room. Switches of both fans stay in AUTO position so these can start automatically during upset, emergency, or faulted plant condition.

The unit heaters are started from the respective OFF-AUTO-FAN switches which are located on the thermostats. The thermostat is located in the vicinity of the unit heater. In AUTO position the unit fan and heater are energized when the thermostat calls for heating. In FAN position only the fan operates without heating.

5.2.3 NORMAL SYSTEM SHUTDOWN

DGRVS exhaust fans are stopped from the respective STOP-AUTO-START, spring return to AUTO, switches.

DTRVS exhaust fans are stopped form the respective STOP-AUTO-START, spring return to AUTO, switches.

Unit heaters are stopped from the respective OFF-AUTO-FAN switches.

the design temperature during extreme summer temperature with the maximum internal load (Reference 11.1.3a).

The DGAVS can maintain the minimum indoor design temperature of 40°F DB ~~on elevation 810'-6"~~ during [normal plant] ~~diesel generator~~ operation. However when ~~the diesel generators are inoperative and~~ the outdoor temperature is less than 20°F DB, the indoor temperature [in the DG Rooms and DG Eqpt. Rms may] ~~would~~ fall below 40°F DB. Electric unit heaters are used to offset extreme cold temperature.

6.0 INSTRUMENTATION AND CONTROL SYSTEM DESCRIPTION

6.1 GENERAL

All instruments associated with the Diesel Generator Area Ventilation System (DGAVS) are included in the Instrumentation and Control Equipment List (ICEL Reference 11.1.6a and 11.1.6b). The instrumentation and Control logics are shown on the Instrumentation and Control Diagrams 2323-M1-2302-10 and 2323-M2-2302-10 (Reference 11.1.4.2a and 11.1.4.2b).

Sufficient parameters and status indications for fans are monitored to allow the operator to operate the system from the Main Control Room. Controls are mounted on Ventilation Control Panels CV-01 (Unit 1) and CV-02 (Unit 2). Instruments and controls are also mounted locally for ventilation fans (Train A only) in close proximity to the equipment served. All alarms are annunciated on the Ventilation Control Panels. Set points for the DGAVS instrumentation are listed in the Calculation 0302-6 (Reference 11.1.3c).

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6.2 DESCRIPTION

6.2.1 DIESEL GENERATOR ROOM VENTILATION SUB-SYSTEM (DGRVS)

A STOP-AUTO-START, spring return to AUTO, switch (HS-5691-B1,-C1,-D1,-E1/HS-5695-B,-C,-D,-E) for each of the eight vaneaxial fans (Train A and Train B) is provided on the Ventilation Control Panels CV-01 and CV-02. When the switch is in lockout position its status is indicated on the control panel. During winter, the switches for three of the four fans per train are in the lockout position. During summer, all are in the AUTO position. Each fan on Train A may also be controlled by a local START-STOP switch (HS-5691-B3,-C3,-D3,-E3) via a corresponding LOCAL-REMOTE transfer switch (HS-5691-B2,-C2,-D2,-E2). Both switches are mounted on a local Control Station. When the transfer switch is in LOCAL position, its status is indicated by an alarm in the Control Room.

When a diesel generator start signal is received, ~~all four~~ the fans for the corresponding diesel generator area whose switches are in AUTO position start automatically, if the transfer switch is in the remote position.

Space high temperature is annunciated in the Control Room via a local temperature indicating switch (TIS-5692/TIS-5696), set at (later)(3). Low airflow through a fan and its gravity damper is annunciated in the Control Room by a common annunciator via a local pressure differential indicating switch (PIS-5693-B,-C,-D,-E/PIS-5697-B, C,-D,-E), set at [redacted] Later(4) In. WG [redacted]; alarm is delayed 30 seconds. (This indicates malfunction of fan and/or gravity damper.) A common FAN TRIP alarm is provided in the Control Room. Fan status and control power indications are provided in the Control Room and on the local Control Station. All annunciation windows and indications in the Control Room are located on the Ventilation Control Panels CV-01 and CV-02.

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11.1.2 TECHNICAL SPECIFICATIONS

Sections 1.18, 3.8.1.1 and 3.8.1.2

The DGRVS and DTRVS are required to be capable of performing their functions to support the operability of the diesel generators.

Section 3.7.13

The temperature in the Diesel Generator Area shall not exceed 122°F for more than 8 hours or by more than 30°F. The limitation is to maintain the environmental qualification of the equipment.

11.1.3 CALCULATIONS

The following summarizes the calculations used in the DGAVS design.

a. Calculation 1-EB-302A-1 Rev. 1, Diesel Generator Area-Space Heat Gains, Space Heat Losses and Maximum & Minimum Temperatures - Unit 1

   Summary: The DGAVS can maintain the maximum design temperature of 122°FDB except in the Equipment Room at elevation 844'-0" during diesel generator operation. Equipment qualification for higher temperature in the Equipment Room, is proposed.

   The DGAVS can maintain the minimum design temperature of 40°F DB (in Diesel Generator Room) on elevation 810'-6" when diesel generators are operating. Supplemental heating is provided to satisfy the minimum space temperature when diesel generators are not operating(2).

b. Calculation 0302-4P Rev. 0, Diesel Generator Area Unit 1 - Pressure Drop

ATTACHMENT 2
page 1 of 1

Ebasco Services DBD No. ME-302A, Open Item No. 7

This open item originated from the draft DBD which indicated the diesel generator fuel oil day tank room was unheated and would experience ambient outdoor winter temperatures due to the arrangement of the ventilation system. As requested by Mr. Rom Madrigal on 9/16/87, Stone & Webster is providing the following information to assist Ebasco in selecting the design temperature limits of the day tank room.

Background:

Equipment in the day tank room was specified in MS-34 Rev. 1 dated 4/8/78 for a range of indoor temperatures of 60°F to 122°F.

When the diesel is not operating, the fuel oil in the day tank is stagnant and thus would approximate the ambient air temperature in the day tank room.

When the diesel generator is operating, diesel fuel circulates into and out of day tank. The fuel in the tank will depart from ambient room temperature and stabilize in the temperature range of 55-85°F. This temperature range originates from the fuel being drawn from an underground storage tank.

The minimum temperature in the day tank room should not be less than the most restrictive of the following criteria:

1. The low temperature limit on the equipment established by the environmental qualification program as determined by Impell.
2. The minimum allowable temperature for long term storage of No. 2 diesel oil in the day tank room.

TU has committed to procure diesel fuel in accordance with ASTM D975 "Standard Specification for Diesel Fuel Oils". To prevent any further restriction on the selection of fuel from suppliers, the minimum room temperature for long term storage of diesel oil should be above the most conservative "cloud point" temperature of the fuel as calculated from ASTM D975. TU Electric should be consulted for details in specifying locally procured fuel.

Should you have any questions concerning this subject, please call Mr. T. W. Waters at (617) 589-8083.

NRC Open Item No. M-2:

There is a potential functional capability problem when outdoor temperature is 20°F and the diesel is started. Since all associated fans (4) start automatically with the diesel there probably would be a transient temperature condition within the area considerably below freezing.

Resolution: The temperature in the Diesel Generator Rooms during the initial period after the start of diesel-generators in winter may potentially be below freezing. However freezing will not occur as the engine jacket water is heated by the engine and is kept continuously in circulation by pumps provided for this purpose. Similarly, Service Water is circulating in pipes, and is heated by engine jacket water. Furthermore, the duration of low room temperatures will be short as operating procedures will ensure that only one ventilating fan will be operating during winter. This will result in room temperatures well above freezing. For details, please see the response to NRC comment M-1.

The temperature in the Day Tank Room may remain below freezing for an extended period. This, however, is not a concern as the fuel in the Day Tank will stay at 55-65°F irrespective of the room temperature. For details, please see the response to NRC comment M-1.

Significance/Extent:

As discussed above, and in Open Item M-1, this is not considered to be a safety concern. Extent is limited to the Diesel Generator Area ventilation System as discussed in M-1.

NRC Evaluation:

NRC Open Item No. M-3:

Pressure Differential Indication Switches are provided to alarm air flow. Setpoints given are for pressures lower than the pressure associated with normal flow. These alarm switches would not alarm low air flow conditions due to a closed or partially closed damper before the fan or due to a closed or partially closed damper after the fan. This applies to DBDs-ME-304, 312, and 313 as well.

Resolution:

For the Diesel Generator Area Ventilation System, this concern is being resolved by relocating one pressure tap for the differential pressure switch to downstream of the gravity dampers (see Attachment 1, Ebasco to SWEC letter EB-T-3603, dated October 14, 1987). Thus, if the gravity damper fails to open, the differential pressure switch will sense a pressure difference well below the normal, and the alarm will be activated. DBD-ME-302A will be revised to include these changes as shown in Attachment 2.

Ebasco had initiated a review, prior to the NRC Inspection, of all HVAC fans which are provided with gravity dampers, and have differential pressure switches across the fans. Control system modifications have been developed to resolve this concern as described in Attachment 1.

Attachment 1 includes the fans of DBDs-ME-304 and -313. DBD-ME-312 is for the Service Water Intake Structure Ventilation System. The fans of this system have not been provided with pressure differential switches. Hence this Open Item is not applicable to the fans of SWIS Ventilation System.

The DBDs (304 and 313) will be revised as shown in Attachment 3 and 4 respectively.

List of Attachments:

1. Ebasco to SWEC letter EB-T-3603 dated October 14, 1987
2. Pages of DBD-ME-302A Rev. 0 marked with the changes stated above.
3. pages of DBD-ME-304 Rev. 0 marked with the changes stated above.
4. Pages of DBD-ME-313 Rev. 0 marked with the changes stated above.

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Significance/Extent:

There is no safety significance of this Open Item for the following reasons:

During Normal Operation, once the gravity dampers are open due to the operating fan pressure, they can be expected to remain open. Inadvertant closure of an operating fan's gravity damper is not a credible event. Also, partial opening of an operating fan's gravity damper can be expected to be detected during routine inspection, and indirectly by surveillance for compliance with the Technical Specifications regarding area temperature.

All safety related HVAC Systems are provided with redundant fans which would both start automatically during emergency. With the single failure of a gravity damper to open, the redundant fan will continue to perform its safety function.

Attachment 1, which identifies the modifications for the resolution of this concern, includes all HVAC Systems (safety and non-safety) in which fan differential pressure switches have been provided.

NRC Evaluation:

M-3

EBASCO SERVICES INCORPORATED
Two World Trade Center, New York, N.Y. 10048-0752

EBASCO

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Attachment 1
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October 14, 1987
EB-T- 3603
Files: 1-C-9
1-M-14
Correspondence Subject
Tracking Number: HVA.40.60
Reply Requested By: None

Mr R W Ackley Jr
Stone & Webster Engineering Corporation
P O Box 1002
Glen Rose, Texas 76043

SUBJECT: TU ELECTRIC
COMANCHE PEAK STEAM ELECTRIC STATION
POTENTIAL GRAVITY DAMPER FAILURE
INSTRUMENTATION CHANGES

Ref: 1. Ebasco letter EB-T-3328, dated August 6, 1987
2. Ebasco letter EB-T-3509, dated September 16, 1987

Dear Mr Ackley:

As described in References 1 and 2, our review of the Battery Rooms Exhaust System indicated that should the gravity damper downstream of the exhaust fan fail in the closed position, air flow will cease with no alarm of this condition, or automatic corrective action.

Due to the concern that there may be similar problems in other HVAC systems, Ebasco reviewed the controls of all supply and exhaust fans which were provided with gravity dampers and had differential pressure switches across the fans. It was found that the controls of all such fans indeed have the same concern, i.e. the pressure differential switch will not sense the failure of the gravity damper to open. Hence the no-flow condition could potentially remain undetected.

Ebasco recommends the following corrective action:

1. If a fan normally operates in parallel with other fans, provide a pitot tube (or equivalent) in the duct and connect it to the existing pressure differential switch so that the latter senses the duct velocity pressure. If the gravity damper fails closed, the differential pressure switch will actuate due to the low velocity pressure in the duct.

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Sheet 2 of 14

October 14, 1987
EB-T- 3603

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2. If a fan normally operates alone, relocate one of the pressure taps of the pressure switch across the fan. If the gravity damper is upstream of the fan, the pressure tap between the fan and the gravity damper should be relocated to the upstream side of the gravity damper. If the gravity damper is downstream of the fan, the pressure tap between the fan and gravity damper should be relocated to the downstream side of the gravity damper. If the damper fails closed, the existing pressure differential switch will actuate the low-flow alarm.

The attachment to this letter lists all HVAC system fans which require modification. For each fan, the recommended change (item 1 or 2 above) is indicated. The list also gives the recommended location of the pitot tube, upstream or downstream of the fan, based on our review of the ductwork configuration to see which side provides smoother flow conditions.

SWEC is requested to issue a DCA for these changes by October 30, 1987. Please contact us if you have any questions.

Very truly yours,

J P Padalino /JR

J P Padalino
Project Manager
New York Office

CBRR/dd
Attachment

TU ELECTRIC
COMANCHE PEAK SES

OCT 30 1987

cc: L D Nace
O W Lowe
J Muffett
C L Terry
D M Reynerson
R T Jenkins
F W Madden
M W Smith
D Fuller (w/att)
P B Stevens
C G Creamer (w/att)
D P Barry (SWEC - Site)
S L Stamm (SWEC - Site) (w/att)
J S Carty (SWEC - Boston) (w/att)
W J Parker (SWEC - Boston)
J Camobrecco (SWEC - Boston)
C S Nardella (SWEC - Boston) (w/att)
R T Kohli (SWEC - Boston) (w/att)
W Dewar (SWEC - Boston) (w/att)
File: ARMS (w/att)

bc: R C Iotti
E Odar
K Fitzgerald
J P Padalino
J J Ruggiero JR
L T Ahlman
N Barakat
C B R Rao (w/att)
G Benedicto
M M Shah (w/att)
H Patel (w/att)
File

RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0300, REV. CP-7

DWG. TITLE: VENTILATION CONTAINMENT

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Containment Recirculation	CP1-VAFNAV-01	Vaneaxial	2323-M1-2300	1-PIS-5406	1	IS
	CP1-VAFNAV-02	Vaneaxial	Sh. 01, Rev. CP-3	1-PIS-5410	1	IS
	CP1-VAFNAV-03	Vaneaxial		1-PIS-5414	1	DS
	CP1-VAFNAV-04	Vaneaxial		1-PIS-5418	1	DS
Reactor Coolant Pipe Penetration Cooling	CP1-VAFNBL-01	Centrifugal	2323-M1-2300	1-PIS-5462	2	
	CP1-VAFNBL-02	Centrifugal	Sh. 07, Rev. CP-2	1-PIS-5464	2	
	CP1-VAFNBL-03	Centrifugal		1-PIS-5466	2	
	CP1-VAFNBL-04	Centrifugal		1-PIS-5468	2	
CRDM Ventilation	CP1-VAFNCB-01	Centrifugal	2323-M1-2300	1-PIS-5422	2	
	CP1-VAFNCB-02	Centrifugal	Sh. 02, Rev. CP-2	1-PIS-5424	2	
Neutron Detector Well Cooling	CP1-VAFNAV-09	Vaneaxial	2323-M1-2300	1-PIS-5437	1	DS
	CP1-VAFNAV-10	Vaneaxial	Sh. 04, Rev. CP-3	1-PIS-5442	1	DS
Preaccess Filtration	CP1-VAFNAV-11	Vaneaxial	2323-M1-2300	1-PIS-5430	1	DS
	CP1-VAFNAV-12	Vaneaxial	Sh. 03, Rev. CP-3	1-PIS-5433	1	DS

Explanation of Required Changes: 1. Provide a Pitot Tube
2. Relocate Pressure Tap

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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0301, REV. CP-9

DWG. TITLE: VENTILATION CONTAINMENT

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Containment Hydrogen Purge - Exhaust	CPX-VAFNCB-01	Centrifugal	2323-M1-2301	X-PIS-5527	2	
	CPX-VAFNCB-02	Centrifugal	Sh. 02, Rev. CP-2	X-PIS-5530	2	
Containment Hydrogen Purge - Supply	CPX-VAFNCB-03	Centrifugal	2323-M1-2301	X-PIS-5533	1	DS
	CPX-VAFNCB-04	Centrifugal	Sh. 03, Rev. CP-3	X-PIS-5535	1	DS

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

Attachment 1
Sheet 5 of 14

RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0302, REV. CP-8

DWG. TITLE: VENTILATION-SAFEGUARD & ELECTRICAL AREA

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Fuel Oil Day Tank & Pump Room - Exhaust	CP1-VAFNCB-04	Centrifugal	2323-M1-2302	1-PIS-5693A	2	
	CP1-VAFNCB-05	Centrifugal	Sh. 10, Rev. CP-1	1-PIS-5697A	2	
Diesel Generator Area - Ventilation	CP1-VAFNAV-25	Vaneaxial	2323-M1-2302	1-PIS-5693B	2	
	CP1-VAFNAV-26	Vaneaxial	Sh. 10, Rev. CP-1	1-PIS-5693C	2	
	CP1-VAFNAV-27	Vaneaxial		1-PIS-5693D	2	
	CP1-VAFNAV-28	Vaneaxial		1-PIS-5693E	2	
	CP1-VAFNAV-29	Vaneaxial		1-PIS-5697B	2	
	CP1-VAFNAV-30	Vaneaxial		1-PIS-5697C	2	
	CP1-VAFNAV-31	Vaneaxial		1-PIS-5697D	2	
	CP1-VAFNAV-32	Vaneaxial		1-PIS-5697E	2	
Main Steam & Feed Water Penetration Area - Supply	CP1-VAFNAV-17	Vaneaxial	2323-M1-2302	1-PIS-5617	1	IS
	CP1-VAFNAV-18	Vaneaxial	Sh. 03, Rev. CP-2	1-PIS-5619	1	IS
Electrical Area - Supply	CP1-VAFNAV-15	Vaneaxial	2323-M1-2302	1-PIS-5608	1	DS
	CP1-VAFNAV-16	Vaneaxial	Sh. 03, Rev. CP-2	1-PIS-5610	1	DS

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

Attachment 1
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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0303-01, REV. CP-7

DWG. TITLE: VENTILATION-FUEL HANDLING BUILDING

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Spent Fuel Pool Exhaust	CPX-VAFNAV-33	Vaneaxial	2323-M1-2303	X-PIS-5730	1	DS
	CPX-VAFNAV-34	Vaneaxial	Sh. 03, Rev. CP-2	X-PIS-5732	1	DS
	CPX-VAFNAV-35	Vaneaxial		X-PIS-5726	1	DS
	CPX-VAFNAV-36	Vaneaxial		X-PIS-5728	1	DS

Explanation of Required Changes: 1. Provide a Pitot Tube
2. Relocate Pressure Tap

Attachment 1
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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0304, REV. CP-12

DWG. TITLE: CONTROL ROOM AIR CONDITIONING

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Control Room AC Supply	CPX-VAACCR-01	Centrifugal	2323-M1-2304	X-PS-5849	1	DS
	CPX-VAACCR-02	Centrifugal	Sh. 05, Rev. CP-6	X-PS-5852	1	DS
	CPX-VAACCR-03	Centrifugal		X-PS-5850	1	DS
	CPX-VAACCR-04	Centrifugal		X-PS-5854	1	DS
Control Room Makeup Air Supply	CPX-VAFNAV-37	Vaneaxial	2323-M1-2304	X-PIS-5827	1	DS
	CPX-VAFNAV-38	Vaneaxial	Sh. 01, Rev. CP-5	X-PIS-5830	1	DS
Control Room Emergency Pressurization	CPX-VAFNCB-05	Centrifugal	2323-M1-2304	X-PIS-5833	1	IS
	CPX-VAFNCB-06	Centrifugal	Sh. 02, Rev. CP-5	X-PIS-5836	1	IS
Control Room Emergency Filtration	CPX-VAFNCB-23	Centrifugal	2323-M1-2304	X-PIS-5843	2	
	CPX-VAFNCB-24	Centrifugal	Sh. 04, Rev. CP-2	X-PIS-5844	2	
Control Room Exhaust	CPX-VAFNID-01	Centrifugal	2323-M1-2304	X-PIS-5855	2	
	CPX-VAFNID-02	Centrifugal	Sh. 06, Rev. CP-5	X-PIS-5856	2	
Control Room Complex Kitchen & Toilet Exhaust	CPX-VAFNID-03	Centrifugal	2323-M1-2304	X-PIS-5857	2	
	CPX-VAFNID-04	Centrifugal	Sh. 07, Rev. CP-3	X-PIS-5858	2	

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

Attachment 1
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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0304-01, REV. CP-6

DWG. TITLE: AC - OFFICE & SERVICE AREA

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Office & Service Area AC - Supply	CPX-VAACPK-03	Centrifugal	2323-M1-2304-10, Rev. CP-1	X-PIS-5868	1	DS
	CPX-VAACPK-04	Centrifugal		X-PIS-5869	1	DS

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0305, REV. CP-8

DWG. TITLE: VENTILATION UNCONTROLLED & MISC. AREAS

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Uncontrolled Access Area - Supply	CPX-VAFNAV-31	Vaneaxial	2323-M1-2305-01, Rev. CP-2	X-PIS-5929	1	DS
	CPX-VAFNAV-32	Vaneaxial		X-PIS-5930	1	DS
Uncontrolled Access Area - Exhaust	CPX-VAFNID-05	Vaneaxial	2323-M1-2305-02, Rev. CP-3	X-PS-5936	1	DS
	CPX-VAFNID-06	Vaneaxial		X-PS-5939	1	DS
Battery Charger Distribution Panel - Exhaust	CP1-VAFNID-05	Vaneaxial	2323-M1-2305 Sh. 03, Rev. CP-4	1-PS-5942	2	
	CP1-VAFNID-06	Vaneaxial		1-PS-5945	2	
Battery Room 1-1 Exhaust	CP1-VAFNID-07	Centrifugal	2323-M1-2305 Sh. 04, Rev. CP-4	1-PIS-5948	2	
	CP1-VAFNID-08	Centrifugal		1-PIS-5951	2	
Battery Room 1-2 Exhaust	CP1-VAFNID-09	Centrifugal	2323-M1-2305 Sh. 04, Rev. CP-4	1-PIS-5954	2	
	CP1-VAFNID-10	Centrifugal		1-PIS-5957	2	
Battery Room 1-3 Exhaust	CP1-VAFNID-11	Centrifugal	2323-M1-2305 Sh. 04A	1-PS-5960	2	
	CP1-VAFNID-12	Centrifugal		1-PS-5963	2	

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0306, REV. CP-6

DWG. TITLE: VENTILATION TURBINE BUILDING

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Condensate & Heater Drain Pumps Area - Supply	CP1-VAFNAV-41	Vaneaxial	2323-M1-2306	1-PIS-5982	1	IS
	CP1-VAFNAV-42	Vaneaxial	Sh. 02, Rev. CP-2	1-PIS-5984	1	IS
Basement Area - Supply	CP1-VAFNAV-43	Vaneaxial	2323-M1-2306	1-PIS-5995	1	DS
	CP1-VAFNAV-44	Vaneaxial	Sh. 03, Rev. CP-3	1-PIS-5996	1	DS
Switchgear Area - Supply	CP1-VAFNAV-23	Vaneaxial	2323-M1-2306	1-PIS-5978	1	IS
	CP1-VAFNAV-24	Vaneaxial	Sh. 01A	1-PIS-5980	1	IS

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0309, REV. CP-8

DWG. TITLE: VENTILATION - PRIMARY PLANT VENTILATION EQUIPMENT

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
Primary Plant Ventilation System - Supply	CPX-VAFNAV-17	Vaneaxial	2323-M1-2309 -03, Rev. CP-2	X-PIS-6182	1	DS
	CPX-VAFNAV-18	Vaneaxial		X-PIS-6189	1	DS
	CPX-VAFNAV-19	Vaneaxial		X-PIS-6196	1	DS
	CPX-VAFNAV-20	Vaneaxial		X-PIS-6203	1	DS
	CPX-VAFNAV-21	Vaneaxial		X-PIS-6210	1	DS
	CPX-VAFNAV-22	Vaneaxial		X-PIS-6217	1	DS
	CPX-VAFNAV-23	Vaneaxial		X-PIS-6224	1	DS
	CPX-VAFNAV-24	Vaneaxial		X-PIS-6231	1	DS
Primary Plant Ventilation System - Exhaust (NNS)	CPX-VAFNCB-09	Centrifugal	2323-M1-2309 Sh. 02, Rev. CP-4	X-PIS-6111	1	DS
	CPX-VAFNCB-10	Centrifugal		X-PIS-6116	1	DS
	CPX-VAFNCB-11	Centrifugal		X-PIS-6121	1	DS
	CPX-VAFNCB-12	Centrifugal		X-PIS-6126	1	DS
	CPX-VAFNCB-13	Centrifugal		X-PIS-6131	1	DS
	CPX-VAFNCB-14	Centrifugal		X-PIS-6136	1	DS
	CPX-VAFNCB-15	Centrifugal		X-PIS-6141	1	DS
	CPX-VAFNCB-16	Centrifugal		X-PIS-6146	1	DS
	CPX-VAFNCB-17	Centrifugal		X-PIS-6151	1	DS
	CPX-VAFNCB-18	Centrifugal		X-PIS-6156	1	DS

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

Attachment 1
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RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0309, REV. CP-8

DWG. TITLE: VENTILATION - PRIMARY PLANT VENTILATION EQUIPMENT

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
	CPX-VAFNCB-19	Centrifugal		X-PIS-6161	1	DS
	CPX-VAFNCB-20	Centrifugal		X-PIS-6166	1	DS
	CPX-VAFNCB-21	Centrifugal		X-PIS-6171	1	DS
	CPX-VAFNCB-22	Centrifugal		X-PIS-6176	1	DS
Primary Plant Ventilation System - Exhaust (ESF)	CPX-VAFNCB-07	Centrifugal	2323-M1-2309-01, Rev. CP-2	X-PIS-6101	1	DS
	CPX-VAFNCB-08	Centrifugal		X-PIS-6106	1	DS
Auxiliary Building Ventilation - Equipment Room Supply	CPX-VAFNAV-25	Vaneaxial	2323-M1-2309 - 05, Rev. 4	X-PIS-6241	2	
	CPX-VAFNAV-26	Vaneaxial		X-PIS-6243	2	
Auxiliary Building Ventilation - Equipment Room Exhaust	CPX-VAFNAV-27	Vaneaxial	2323-M1-2309 - 04, Rev. 4	X-PIS-6237	1	DS
	CPX-VAFNAV-28	Vaneaxial		X-PIS-6239	1	DS

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Explanation of Required Changes: 1. Provide a Pitot Tube
2. Relocate Pressure Tap

RESOLUTION OF GRAVITY DAMPER FAILURE PROBLEM

FLOW DIAGRAM NO.: 2323-M1-0313, REV. CP-4

DWG. TITLE: VENTILATION AAP BLDG. AND CONTROL BLDG. UPS AREA AC SYSTEMS

System/ Fan Function	Fan Tag No.	Fan Type	I&C Dwg. No.	Pressure Switch No.	Change Required	Location of Pitot Tube Disch. Side (DS) Inlet Side (IS)
UPS & Distribution Rooms Cooling - Supply	CPX-VAACUP-01	Centrifugal	2323-M1-2313	X-PIS-3631	2	
	CPX-VAACUP-02	Centrifugal	- 01, Rev. CP-1	X-PIS-3632	2	
UPS & Distribution Rooms Cooling - Return	CPX-VAFNAV-42	Vaneaxial	2323-M1-2313	X-PIS-3633	2	
	CPX-VAFNAV-43	Vaneaxial	- 01, Rev. CP-1	X-PIS-3634	2	

Explanation of Required Changes:
1. Provide a Pitot Tube
2. Relocate Pressure Tap

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ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
(3)	23	Set point for high temperature annunication (TIS-5692/TIS-5696)	(Set point Calculation No.) by SWEC
(4)	24,25&41,23	Temperature setpoints for all electric unit heaters and their respective switch Tag Nos. Set points for pressure differential indicating switches.	(Set point Calculation No.) by SWEC
(5)	37, 38 & Attachment 1	Performance data and construction features of new added electric unit heaters	Specification 2323-MS-90
(6)	25	The electrical system description does not indicate any provision for a flammable gases or vapors environment and the respective hazardous location design equipment per NFPA 70 N.E.C.	(Section 7.1 General Description of this DBD) - by SWEC
(7)	20	Potential adverse impact on diesel fuel oil of low temperature in day tank room due to loss of non 1E unit heaters following loss of offsite power.	Analysis of unacceptable low temperature in the fuel oil after loss of offsite power (EBASCO/SWEC)

2.0 INTRODUCTION

2.1 GENERAL

The DGAVS for unit 2 is identical to the DGAVS for Unit 1 and, unless specifically indicated, the description contained herein applies to both Units 1 and 2.

The Diesel Generator Area Ventilation System (DGAVS) includes Unit Heater (UH) and the following subsystems:

a. Diesel Generator Room Ventilation Sub-System (DGRVS)

b. Day Tank Room Ventilation Sub-System (DTRVS)

The DGAVS consists of two fully redundant trains serving the Diesel Generator area associated with its respective train.

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6.2 DESCRIPTION

6.2.1 DIESEL GENERATOR ROOM VENTILATION SUB-SYSTEM (DGRVS)

A STOP-AUTO-START, spring return to AUTO, switch (HS-5691-B1,-C1,-D1,-E1/HS-5695-B,-C,-D,-E) for each of the eight vaneaxial fans (Train A and Train B) is provided on the Ventilation Control Panels CV-01 and CV-02. When the switch is in lockout position its status is indicated on the control panel. During winter, the switches for three of the four fans per train are in the lockout position. During summer, all are in the AUTO position. Each fan on Train A may also be controlled by a local START-STOP switch (HS-5691-B3,-C3,-D3,-E3) via a corresponding LOCAL-REMOTE transfer switch (HS-5691-B2,-C2,-D2,-E2). Both switches are mounted on a local Control Station. When the transfer switch is in LOCAL position, its status is indicated by an alarm in the Control Room.

When a diesel generator start signal is received, ~~all four~~ the fans for the corresponding diesel generator area whose switches are in AUTO position start automatically, ~~if the transfer switch is in the remote position.~~

Space high temperature is annunciated in the Control Room via a local temperature indicating switch (TIS-5692/TIS-5696), set at (later)(3). Low airflow through a fan and its gravity damper is annunciated in the Control Room by a common annunciator via a local pressure differential indicating switch (PIS-5693-B,-C,-D,-E/PIS-5697-B, C,-D,-E), set at Later (4) In. WG [illegible]; alarm is delayed 30 seconds. (This indicates malfunction of fan and/or gravity damper.) A common FAN TRIP alarm is provided in the Control Room. Fan status and control power indications are provided in the Control Room and on the local Control Station. All annunciation windows and indications in the Control Room are located on the Ventilation Control Panels CV-01 and CV-02.

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6.2.2 DAY TANK ROOM VENTILATION SUB-SYSTEM (DTRVS)

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A STOP-AUTO-START, spring return to the AUTO, switch (HS-5691-A1/HS-5695-A), for each of the two centrifugal fans (Train A and Train B) is provided on the Ventilation Control Panels CV-01 and CV-02. When the switch is in a lockout position its status is indicated on the control panel.

The fan on Train A may also be controlled by a local START-STOP switch (HS-5691-A3) via a corresponding LOCAL-REMOTE transfer switch (HS-5691-A2). Both switches are mounted on a local Control Station. When the transfer switch is in LOCAL position its status is indicated by an alarm in the Control Room.

When a diesel generator start signal is received by the fan for the corresponding diesel generator area, the fan if not running, starts automatically, if the transfer switch is in the remote position.

Low airflow through a fan and its gravity damper is annunciated in the Control Room by a common annunciator via a local pressure differential indicating switch (PIS-5693-A/PIS-5697-A), set at [redacted] in. WG ~~(Reference 11.1.2e)~~; alarm is delayed 30 seconds. (This indicates malfunction of fan and/or gravity damper.) A common FAN TRIP alarm is provided in the Control Room. Fan status and control power indication are provided in the Control Room and on the local Control Station. All annunciation windows and indications in the Control Room are located on the Ventilation Control Panels CV-01 and CV-02.

LATER (4)

6.2.3 UNIT HEATERS (UH)

Each of the electric unit heaters (Train A and Train B) is provided with [illegible]al control switch with integral thermostat. The control switch has AUTO-OFF-FAN positions. When the switch is

Calculation 2-0302-4P Rev. 0, Diesel Generator Area Unit 2 - Pressure Drop

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Summary: Calculated fan static pressure for DGRVS fan is 1.0 In. WG at 0.075 Lb/Cu Ft air density and 50,000 CFM airflow. Calculated fan static pressure for DTRVS fan is 0.6 In. WG at 0.075 Lb/Cu Ft air density and 3000 CFM airflow.

c. Calculation 0302-6 Rev. 0, Set Points for Instrumentation and Control Equipment Unit 1 and 2

Summary: Set Point for Temperature Indicating Switch to alarm space low temperature = 35°F(4)

Set Point for starting the Electric Unit Heaters = 40°F(4)

~~Set Point for the Pressure Differential Indicating Switch for the DGRVS fans to alarm low air flow = 0.6 In. WG.(4)~~

~~Set Point for the Pressure Differential Indicating Switch for the [illegible] fans to alarm low airflow = [illegible](4).~~

Set Point for Temperature Indicating Switch to alarm space high temperature = later(4).

11.1.3 DRAWINGS

1.1.4.1 FLOW DIAGRAMS

a. 2323-M1-0302 — Flow Diagram - Ventilation, Safeguard and Electrical Area.

b. 2323-M2-0302 — Flow Diagram - Ventilation, Safeguard and Electrical Area.

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ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
(2)	31	System operation on receipt of a smoke or fire signal.	Control Room Habitability, DBD-ME-003 (SWEC/EPM)
(3)	34	Precautions during low CCW temperature of 40°F.	Operating Procedures (TU Electric)
(4)	46	Setpoint calculation for the supplemental air conditioning units.	Set point calculation (SWEC)
(5)	47	Location of activation switches for the zone reheat coils.	ICD-2323-M1-2304-08 (SWEC)
(6)	37, 40, 42, 43, 45, 47, 48	Setpoint calculations for space temperature alarms, flow velocity and differential pressure alarms and fire alarms.	Set point calculations (SWEC)
(7)	52 thru 59	Missing data for the following equipment: a. Control Room AC Units b. Emergency Pressurization Units c. Emergency Filtration Units	Vendor Documentation (Ebasco)
(8)	85	Instrument air piping drawing numbers and titles.	Drawing Numbers 2323-M1-2700 Series (SWEC)
(9)	Attach. 8 Pages 1,2,3 of 3	Performance curves for supplemental AC unit fans.	Vendor Documentation (Ebasco)

Humidification package in each unit is under the control of the associated room humidistat. The humidification package is activated by the humidistat (X-HS-5849/-5850) when it senses lower relative humidity than the setpoint of 45% RH ~~(Reference 11.1.3e,~~ Calculation 0304-5).

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Fan and inlet damper status indications are provided on the Ventilation Control Panel. If a fan breaker switch is in LOCK-STOP position, ~~the status is indicated on~~ the Ventilation Control Panel. ~~Fans are provided with local~~ velocity pressures ~~differential~~ (at discharge of fans are indicated locally by pressure) indicators (X-PI-5849/-5850/-5852/-5854). All four fans are provided with a common A/C Trouble alarm. After 30 seconds from a fan start a low velocity pressure ~~differential across the fan~~ will trigger the alarm ~~fan malfunction~~ on the Ventilation Control Panel via a pressure switch (X-PS-5849/-5850/-5852/-5854) which is set at ~~0.20~~ (later) In. WG.(6) ~~(Reference 11.1.3e, Calculation 0304-5)~~ (This indicates malfunction of fan and/or damper.)

6.2.2 OUTDOOR AIR INTAKE DAMPERS

Refer to ICD 2323-M1-2304-03 (Reference 11.1.4.2k).

A CLOSE-AUTO-OPEN, spring return to AUTO, switch (X-HS-5837A/-5838A) for each of the two outdoor air intake isolation pneumatic dampers is provided on the Ventilation Control Panel.

Each damper automatically closes when it receives a High Chlorine Signal (Refer to Section 6.2.10) and opens when it receives SIAS or BOS from Unit 1 or 2 or High Radiation Signal (Refer to Section 6.2.10). (The SIAS, BOS and High Radiation Signals can be traced through the Emergency Recirculation).

Each damper is provided with individual air accumulators for operation during instrument air supply failure. The instrument air line is provided with a local pressure indicator.

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low velocity pressure ~~differential across~~ at the fan discharge due to reduced airflow is alarmed on the Ventilation Control Panel by a pressure differential indicating switch (X-PIS-5827/-5830) which is set at ~~0.25~~ (later)(6) IN. WG. ~~(Reference 11.1.3c, Calculation 0304-5)~~. (This alarm indicates malfunction of fan and/or damper.)

6.2.4 TOILET AND KITCHEN EXHAUST FANS

Refer to ICD 2323-M1-2304-07 (Reference 11.1.4.2q

A STOP-AUTO-START, spring return to AUTO switch (X-HS-5857/-5858) for each of the two toilet and kitchen exhaust fans is provided on the Ventilation Control Panel.

With the start of a fan, the associated fan intake motorized damper (CPX-VADPOU-27) automatically opens. Each fan is interlocked to start automatically during Emergency Ventilation Mode (Refer to Section 6.2.3 for TWO TRAIN MODULE switch) if the makeup air supply fan on the associated power train is operating. Each fan is also interlocked to stop if the associated intake damper CPX-VADPOU-27 or 28 remains closed within 10 Seconds of the associated fan start. The exhaust fan is also interlocked to stop if the makeup air supply fan on the associated power train is not operating.

Inlet dampers status indications are provided on the Ventilation Control Panel. If a fan breaker switch is in LOCK-STOP position the status is indicated on the Ventilation Control Panel. A common 'fan trip' alarm is provided on the Ventilation Control Panel. If the damper CPX-VADPOU-27 or 28 remains closed within 10 Seconds of the associated fan start, a 'damper closed' alarm is annunciated on the Ventilation Control Panel. After 30 ~~Seconds~~ from a fan start, low pressure differential across the fan and gravity damper due to reduced airflow is alarmed on the Ventilation Control Panel by a pressure differential indicating switch (X-PIS-5857/-5858) which is set at ~~0.50~~ (later)(6) In. WG ~~(Reference 11.1.3c, Calculation 0304-5)~~. (This indicates malfunction of fan and/or gravity damper.)

Attachment 3
Sheet 4 of 8

Panel. If the damper CPX-VADPMU-05 or 06 remains closed within 10 seconds of the associated fan start, a 'damper closed' alarm is annunciated on the Ventilation Control Panel. After 30 seconds from a fan start a low pressure differential across the fan and gravity damper due to reduced airflow is alarmed on the Ventilation Control Panel by a pressure differential indicating switch (X-PIS-5855/-5856) which is set at (later) ~~1.00~~ In. WG. ~~(Reference 11.1.3e, Calculation 0304-5)~~. (This indicates malfunction of fan and/or gravity damper.)

6.2.6 EMERGENCY PRESSURIZATION UNITS

A STOP-AUTO-START, spring return to AUTO, switch (X-HS-5831A/-5834A) is provided for each of the two fans on the Ventilation Control Panel. A CLOSE-AUTO-OPEN spring, return to AUTO, switch (X-HS-5831D/5834D) is provided for each of the two unit inlet dampers on the Ventilation Control Panel. A 'TRAIN A/B TWO TRAIN MODULE' switch (X-HS-5877) is provided on the Ventilation Control Panel to start a unit manually either on Train A or Train B.

The fans are interlocked to start upon receipt of any one of High Radiation (Refer to Section 6.2.10), SIAS and BOS Signals from Unit 1 or 2, provided the associated outdoor air intake damper is open. With the start of a fan the associated unit inlet motorized damper automatically opens and the unit heating coil is activated. Each fan is interlocked to stop, upon receipt of a High Chlorine Signal or Fire Signal; or if the associated outdoor air intake damper or unit inlet damper is closed.

Chlorine Signal is generated from either of the four chlorine detectors located at the outdoor air intakes (two each intake), with a set point of 5.0 PPM (Reference 11.1.3.g, Calculation TNE-NU-CA-0000-484). Fire Signal is generated from the local Fire Protection Panels CPX-EIPRLV-29 and 29a and annunciated on the main Fire Protection Panel CPX-ECPRCV-06 located in the Control Room, during an occurrence of fire in the operating unit charcoal adsorber.

The unit air flow quantity is adjusted by manually modulating the operating unit inlet damper, by the associated switch (X-HS-5831D/-5834D) to maintain the CRC at a positive pressure of 0.125 In. WG with respect to the surroundings verified by the pressure indicators (Refer to Section 6.2.5) mounted on the Ventilation Control Panel.

Fans and unit inlet damper status indications are provided on the Ventilation Control Panel. If a fan control switch (X-HS-5831A/-5834A) is in Lock-Stop position the status is indicated on the Ventilation Control Panel.

Local differential pressure indicators are provided for prefilters, HEPA filters, charcoal adsorbers and the units. Each unit differential pressure switch with a set point of 8.0 In. WG (Reference 11.1.3e, Calculation 0304-5), is annunciated due to increase in dust accumulation on filters, on a 'fan low pressure/unit high pressure' alarm located on the Ventilation Control Panel.

A common 'fan & heater trip' alarm (common to both units) is provided on the Ventilation Control Panel. If the operating unit inlet damper fails to open within 10 Seconds of the associated fan start a 'damper closed' alarm is annunciated on the Ventilation Control Panel. A 'fan low pressure/unit high pressure' alarm for each fan is provided on the Ventilation Control Panel to annunciate after 20 Seconds of the ~~fan start with a fan~~ low velocity pressure at fan discharge ~~differential~~ less than set point of ~~2.0~~ (later)[6] In. WG due to reduced airflow. ~~(Reference 11.1.3e, Calculation 0304-5).~~ (The low velocity pressure indicates malfunction of fan and/or gravity damper.)

The high-temperature and high-high temperature limits of the adsorbers, sensed by a thermistor strip across the adsorber bed; and trouble in the local fire detection panel, are annunciated on the main Fire Protection Panel CPX-ECPRCV-06 located in the Control Room.

Attachment 3
Sheet 6 of 8

Fans and unit inlet dampers status indications are provided on the Ventilation Control Panel. If a fan breaker switch (X-HS-5845/-5846) is in Lock-Stop position the status is indicated on the Ventilation Control Panel.

Local differential pressure indicators are provided for prefilters, HEPA filters, charcoal adsorbers and the units. Each unit differential pressure switch with a set point of 7.0 In. WG (Reference 11.1.3e, is annunciated due to increase in dust accumulation on filters, on a 'fan low pressure/unit high pressure' alarm located on the Ventilation Control Panel. An airflow element is provided in each fan discharge. The unit airflow quantity is maintained at 8000 CFM ±10% by manually adjusting the variable inlet vanes of the operating fan, to compensate for the increase in filter pressure drop due to dust accumulation.

A common 'fan trip' alarm (common to both units) is provided on the Ventilation Control Panel. If the operating unit inlet damper fails to open within 10 Seconds of the associated fan start, a 'damper closed' alarm is annunciated on the Ventilation Control Panel. The 'fan low pressure/unit high pressure' alarm for each fan as described above, is provided on the Ventilation Control Panel to annunciate after 30 Seconds ~~of the fan~~ start ~~with a fan~~ the pressure differential ~~set point~~ (later) of ~~3.0~~ 6 In. WG across the fan and gravity damper due to reduced airflow. ~~(Reference 11.1.3e, Calculation 0304-5)~~ (This indicates malfunction of fan or gravity damper.)

The adsorber abnormal temperature sensing, setpoints and activation of deluge system are described in Section 6.2.6.

d. Calculation 0304-1P1 (Rev 4), "Pressurization of Control Room Complex"

Summary: Exfiltration air quantity from the Control Room Complex to maintain a positive pressure of 0.25 In. WG with respect to the outdoors = 800 CFM. Infiltration air quantity to the non-pressurized Control Room Complex = 423 CFM at differential pressure of 0.125 In. WG.

e. Calculation 0304-5 (Rev 0), "Set Points for Instrumentation and Control Equipment"

Summary: The following are the setpoints for the CRACS instrumentation and control equipment.

~~Set Point to alarm low air flow through Makeup Air Supply Fan = [illegible] In. WG~~.

Set Point to alarm high pressure drop through Emergency Pressurization Unit = 8.0 In. WG.

~~Set Point to alarm low air flow through Emergency Pressurization Unit Fan = [illegible] In. WG.~~

Set Point to alarm high pressure drop through Emergency Filtration Unit = 7.0 In. WG.

~~Set Point to alarm low air flow through Emergency Filtration Units Fan = 2.0 In. WG~~.

~~Set Point to alarm low air flow through Air Conditioning Units Fan = 1.5 In. WG.~~

~~Set Point to alarm low air flow through Control Room Exhaust Fan = 1.0 In. WG.~~

~~Set Point to alarm low air flow through Kitchen and Toilet Exhaust Fan = 0.30 In. WG.~~

Set Point to alarm air leakage into the Control Room = 0.00 In. WG.

Set Point to energize the zone reheat coils for Console and Control Rooms Units 1 & 2 and Production Supervisor's Office = 70°F.

Set Point to alarm that temperature is not maintained in the Computer Rooms, Main Console Area of the Control Room and Production Supervisor's Office = 65°F.

Set Point to alarm low humidity in the Instrument Rooms Unit 1 and Unit 2 and to energize humidifiers in the AC units = 45% RH.

f. Calculation 0304-6 (Rev 0), "Set Points for Instrumentation and Control Equipment"

Summary: Set Points to energize the refrigeration circuit of the AC units = 75°F.

Set Point to energize the electric heating coil of the AC unit = 68°F.

g. Calculation TNE-NU-CA-0000-484, "Control Room Habitability Analysis for Chlorine Release" Setpoint for Chlorine Sensor = 5 PPM.

Attachment 4
Sheet 1 of 1

TU ELECTRIC
COMANCHE PEAK SES

OCT 30 1987

a. Air Conditioning Unit Status

b. Booster Return Fan Status

The following indications are provided locally:

a. Space temperature in the UPS and Distribution Rooms (X-TIS-3630A,-B,-C,-D).

b. Supply air fan pressure differential (X-PIS-3631,-3632) across and gravity damper.

c. Booster return fan pressure differential (X-PIS-3633,-3634) across and gravity damper.

6.2.3 ALARMS

The following abnormal conditions are annunciated on the Ventilation Control Panel X-CV-01:

a. Space high temperature is alarmed by any one of the four temperature indicating switches (X-TIS-3630A,-B,-C,-D) set at 104°F(2), and located in each UPS and Distribution Room.

b. A common low pressure alarm occurs to indicate low air flow through fan as described below.

   i. Supply fan low air flow is alarmed by a pressure indicating switch (X-PIS-3631,-3632) which measures pressure differential across the fan and gravity damper. It is set at X (later) in. WG(2). (This indicates malfunction of fan and/or gravity damper.)

   ii. Booster return fan low air flow is alarmed by a pressure indicating switch (X-PIS-3633,-3634) which measures pressure differential across the fan and gravity damper. It is set at X (later) in. WG(2). (This indicates malfunction of fan and/or gravity damper.)

NRC Open Item No. M-4:

The subject calculation does not require maintaining the space temperature at or above 40°F during all modes of operation due to the conflict between the DBD and DC.

The calculation demonstrates that the design criteria are met except as mentioned above.

Response:

1. Design Criteria Document DC-302A has been superseded by DBD-ME-302A.

2. The calculation is consistent with the DBD with changes as marked up in the response to NRC comment M-1.

Significance/Extent:

There is no safety significance, and the extent is limited to the Diesel Generator Area Ventilation System. For details, see Open Item M-1.

NRC Evaluation:

OCT 30 1987

TU ELECTRIC
COMANCHE PEAK SES

NRC Open Item No. M-5:

The calculation refers to Calculation No. EE-11 which gives an "estimated generator heat loss". Since the generator heat loss is a large percentage of the total heat input into the area, the estimated value requires confirmation. A letter from the manufacturer indicates the "estimated" value is good. This letter should be referenced in the calculation.

Response:

Information regarding generator heat loss was obtained in a telephone conversation with the manufacturer. The record of this telephone conversation will be incorporated into Calculation EE-11. Pages of this calculation marked with the intended revision are attached (Attachment 1).

Significance/Extent:

There is no safety significance since the results of the calculation are correct. Since the Ebasco Calculation Procedures require identification of all sources for inputs, missing references are believed to be isolated.

NRC Evaluation:

EBASCO SERVICES INCORPORATED M-5 EE-11

Attachment 1

Sheet 1 of 3

BY E.ANASTASSIADES DATE 6/23/86 SHEET 43 OF 92

CHKD. BY NUCITO DATE 7/28/86 OFS NO. 3306 DEPT. NO. 560

CLIENT TEXAS UTILITIES

TU ELECTRIC COMANCHE PEAK SES OCT 30 1987

PROJECT COMANCHE PEAK UNIT #1

SUBJECT AS BUILT HVAC CALCULATIONS - ELECTRICAL

Total heat loss due to lighting panel ESB3 and 120V distribution panel 1EC3-1 is the same as before (normal conditions) i.e 33 + 45 = 78 Watts

Total heat loss due to panels is 2700 + 78 = 2778 Watts

Heat loss due to diesel generator is 4% of 6370 KW i.e 254.8 KW. 4% loss is based on vendor provided information (see Attachment 2).

SUMMARY

Heat loss due to lighting	– 5105	Watts
Heat loss due to [illegible]	– 1380	Watts
Heat loss due to space heaters	– 0	Watts
Heat loss due to panels	– 2778	Watts
Heat loss due to generator	– 254,800	Watts

881/6-81

EBASCO SERVICES INCORPORATED EE-11

BY Bukowski DATE 6/24/86 Attachment 1 Sheet 2 of 3 SHEET 51 OF 92

CHKD BY Nucito DATE 8/6/86 OFS NO. 3306 DEPT. NO. 560

CLIENT Texas Utilities

PROJECT Comanche Peak Unit 1 SES

SUBJECT As-Built HVAC Calculation - Electrical

ROOM 85 CONT'D (LOCA w/LOOP)

HEAT LOAD DUE TO OTHER EQUIPMENT

THERE IS A GENERATOR CONTROL & ENGINE CONTROL PANEL & A NEUTRAL GROUNDING CABINET IN THIS LOCATION. THE HEAT LOAD DUE TO THE CONTROL PANELS IS BASED ON REF. 3.10 SECTION D WHICH STATES THE HEAT LOSS CAN BE ESTIMATED @ 30 WATTS / SQUARE FOOT OF THE TOTAL PANEL FRONT SURFACE AREA. AN ESTIMATED HEIGHT & WIDTH OF EACH PANEL IS 90" H x 72" W. THIS TOTALS

(30 WATTS)(2)(7.5x6) = 2700 WATTS

THE NEUTRAL GROUNDING CABINET HOUSES A 25KVA SINGLE PHASE GROUNDING XFMR. THE HEAT LOAD DUE TO THIS EQPT IS ZERO SINCE THERE IS CURRENT FLOW ONLY ON A GROUND FAULT.

THE 7200 WATT SPACE HEATER IS NOT ON WHEN THE DG IS RUNNING ∴ THE HEAT LOAD IS ZERO

THE HEAT LOAD DUE TO THIS EQPT. IS 2700 WATTS

HEAT LOAD DUE TO THE DIESEL GENERATOR

See Attachment 2.

THE GENERATOR'S RATED OUTPUT IS 7000 KW. CONSIDERING A 96% EFFICIENCY, THE LOSSES WILL BE 4%. THE REQ'D KW FOR LOCA COINCIDENT W/ LOOP PER FSAR TABLE 8.3-1B IS 6370 KW. ESTIMATED LOSSES WILL BE

6370 KW x .04 = 254.8 KW

11046/8-74

Attachment 1, Sheet 3 of 3

RECORD OF TELEPHONE CONVERSATION

Attachment 2 to Calc. EE-11, Rev. 1

DATE 6/25/86

Back-up calculation

TO C. Ruiz NAME/FILE NO.

FROM L. Bukowski

CLIENT/PROJECT Texas Utilities / Comanche Peak

SUBJECT Heat loss due to diesel generator

CHARGE: DEPT. NO. 560 CLIENT SYMBOL TUGC OFS NO. 3306

DISCUSSION WITH A.R. Fleischer (Delaval) (415) 577-7400

I contacted Al to verify the heat load shown on his 4/29/86 letter to J. Nucito. Al informed me that the value in his letter is good for the diesel engine only & does not include any heat load from the generator. He stated that the generator is approximately a 96% efficient machine ∴ for our calculations, we can consider that the 4% difference will be added heating.

COMMENTS

BY L. Bukowski (NAME) Sr. Engr. (TITLE) 560 (DEPT. NO.)

CC:

OCT 30 1987

NRC Open Item No. M-6:

TU ELECTRIC
COMANCHE PEAK SES

Neither the DBD nor DC-304 require maintaining the relative humidity during other than normal plant operation (Section 4.3a, Page 16). FSAR Section 9.4.1.2, Page 9.4-8 commits to maintaining relative humidity as (given in Table 9.4.2) in the Control Room Complex during all modes of operation.

Response:

DC-304 has been superseded by DBD-ME-304. Attachment 1 (Ebasco to Impell letter EB-T-3536, dated September 22, 1987) is the proposed FSAR change. As seen therein, the proposed relative humidity limits are:

Normal Operation	35 to 50% RH
Emergency Operation	50% RH Maximum

Section 4.2 of DBD-ME-304 is in agreement regarding normal operation. The emergency operation requirement will be added to this section of DBD (see Attachment 2 proposed DBD revision).

Significance/Extent:

Since this item relates to documentation inconsistency only, there is no safety significance.

Attachment 1 (proposed FSAR Change Request) addresses design relative humidities for all areas, and will be the basis for the next revision to the DBD's.

NRC Evaluation:

Attachment 1
Sheet 1 of 6

M-6

EBASCO SERVICES INCORPORATED
Two World Trade Center, New York, N.Y. 10048-0752

EBASCO

September 22, 1987

EB-T- 3536
Files: CPN-2
1-M-14
Reply Requested By:
October 2, 1987

TU ELECTRIC COMANCHE PEAK SEC

OCT 30 1987

Mr J Wawrzeniak
Impell Corporation
P O Box 1002
Glen Rose, Texas 76043

Dear Mr Wawrzeniak:

SUBJECT: TU ELECTRIC
COMANCHE PEAK STEAM ELECTRIC STATION
HVAC SYSTEM
PROPOSED FSAR CHANGE TO TABLE 9.4-2

Ref: 1. Ebasco to TU Electric letter EB-T-3347, dated August 10, 1987
2. Ebasco to TU Electric letter EB-T-3529, dated September 21, 1987

With the above referenced letters Ebasco has submitted to TU Electric proposed changes to FSAR Table 9.4-2. A copy of the proposed changes is enclosed herewith.

Impell is hereby requested to review the FSAR Sections under their primary responsibility, in particular Section 3.11B "Environmental Design of Mechanical and Electrical Equipment", and process the required FSAR Changes consistent with the proposed changes to Table 9.4-2 attached herewith.

Please acknowledge receipt of this letter, and confirm Impell's initiation of this action. Your response is requested by October 2, 1987.

Feel free to call if you have any questions.

Very truly yours,

J P Padalino
Project Manager
New York Office

CBRR/dd
Attachment

cc: L D Nace
O W Lowe
R T Jenkins
F W Madden
M W Smith
D W Fuller (w/att)
P B Stevens
C Weary (w/att)
G Kast (Impell - Site) (w/att)
N Moisidis (Impell - Site)
D Bhatia (Impell - Site) (w/att)
File: ARMS (w/att)

bc: R C Iotti
E Odar
K Fitzgerald (w/att)
H K Patel
J P Padalino
J J Ruggiero (w/att)
L T Ahlman
N Barakat
C B R Rao (w/att)
G Benedicto
R M Ramirez (w/att)
J Roth
File

TABLE 9.4-2

Attachment 1
Sheet- 3 of 6

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

OCT 30 1987
TU ELECTRIC
COMANCHE PEAK ...

Building or Area	Normal Plant Operation: Normal Maximum DB(°F)	Normal Maximum RH%	Normal Minimum DB(°F)	Cooldown Maximum DB(°F)	Pressure In. of Wg
Auxiliary Building - AB					
AB - Elevator Machine Rm	122	*	40	N/A	Ambient
AB - All Other Areas	104	*	40	122	Slightly Negative
Electrical & Control Building - ECB					
1) ECB - Control Room	80	35-50	70	N/A	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	N/A	+0.125
3) ECB - UPS & Distribution Rooms ~~and Battery Rooms~~	104	*	40	N/A	Ambient
4) ECB - Uncontrolled Access Area	104	*	40	N/A	Ambient
5) ECB - Battery Rooms	104	*	70	N/A	Ambient
6 ~~5~~) ECB - All Other Areas	104	*	40	N/A	Ambient

Building or Area	Emergency Conditions: Maximum DB(°F)	Maximum RH%	Minimum DB(°F)	Pressure In. of Wg
1) ECB - Control Room	80	~~35-50~~ 50	70	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	+0.125
3) ECB - UPS & Distribution Rooms	122	*	40	Ambient

Building or Area	Normal Plant Operation: Normal Maximum DB(°F)	Normal Maximum RH%	Normal Minimum DB(°F)	Cooldown Maximum DB(°F)	Pressure In. of Wg
Fuel Handling Building - FHB					
FHB - All Areas	104	*	40	122	Slightly Negative

*Uncontrolled
N/A Not Applicable
0714s

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

OCT 30 1987

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Reactor Containment Buildings - RCB					
1) RCB - Outside Missile Barrier	120	*	50	120	Ambient
2) RCB - Inside Missile Barrier	140	*	50	140	Ambient
3) RCB - CRDM Shroud (Air Temperature)	163 Outlet	*	50	163	Ambient
4) RCB - Detector Well & Reactor Cavity	175	*	135 (Average Temp.)	175	Ambient
5) RCB - Reactor Coolant Pipe Penetrations	200	*	50	200	Ambient
Safeguard Buildings - SGB					
1) SGB - MS & FW Piping Area	104	*	40	104	Slightly Negative
2) SGB - All Other Areas	104	*	40	122	Slightly Negative
Diesel Generator Bldg - DGB					
1) DGB - All Areas	122	*	40	122	Ambient

	Emergency Conditions DB(°F) Max.
2) DGB - All Areas	129.2
Engineered Safety Features (AB, FHB and SGB)	
ESF - Pump Rooms	122
Engineered Safety Features - ESF (SGB)	
Electrical Areas	122

*Uncontrolled

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

OCT 30 1987

Building or Area (Cont'd)	Normal Plant Operation: Normal, Maximum DB(°F)	Normal Maximum RH%	Normal Minimum DB(°F)	Cooldown Maximum DB(°F)	Pressure In. of Wg
Turbine Buildings – TB					
1) TB – All Other Areas	122	*	40	N/A	Ambient
2) TB – Switchgear Area	104	*	40	N/A	Ambient
3) TB – ERF – Computer Battery Rm	104	*	40	N/A	
4) TB – CAS Rm	75	35-50	68	N/A	Ambient
– CPU Rm	75	35-50	68	N/A	Ambient
– UPS Rm	75	35-50	68	N/A	Ambient
– Battery Room	104	*	40	N/A	
– EVAC Equip Rm	104	*	40	N/A	Ambient
5) TB – Office & Service Area A/C	80	35-50	70	N/A	Ambient
6) TB – Laboratories	75	35-50	68	N/A	Slightly Negative
7) TB – Hot Shop	85	*	68	N/A	Slightly Negative
Decontamination Area	75	*	68		
Service Water Intake Structure – SWIS					
1) SWIS – All Areas	126.2	*	40	122	Ambient

	Emergency Conditions DB(°F)
2) SWIS – All Areas	131.8

*Uncontrolled

Attachment 1
Sheet 6 of 6

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

OCT 30 1987

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Miscellaneous Building - MB					
1) MB - Alternate Access Point Bldg - (AAPB)	80	35-50	68	N/A	Ambient
2) MB - Circulating Water Intake Structure Chlorination Building (CWISCB)	115	*	40	N/A	Slightly Negative
3) MB - SWIS - Chlorination Bldg - (CB)	115	*	40	N/A	Slightly Negative
4) MB - Switchyard Relay House - SRH	80	35-30	68	N/A	Ambient
5) MB - Guard House - GH	80	35-50	68	N/A	Ambient
Maintenance and Administration Bldg					
M & AB	80	35-50	68	N/A	Ambient

*Uncontrolled

ATTACHMENT 2

PLANT OPERATING CONDITIONS

Sheet 1 of 1

	NORMAL	UPSET	EMERGENCY	FAULTED
EMERGENCY FILTRATION UNITS & FANS	**	X	X	X
MAKEUP AIR SUPPLY FANS	X	*	*	*
CONTROL ROOM EXHAUST FANS	X	*	*	*
KITCHEN & TOILET EXHAUST FANS	X	*	*	*
PNEUMATIC, MOTORIZED AND GRAVITY DAMPERS	X	X	X	X
SUPPLEMENTAL AIR CONDITIONING UNITS	X	-	-	-
ZONE REHEAT COILS	X	-	-	-

Notes:

* During Emergency Ventilation Mode

** During Chlorine Release

.3 FUNCTIONAL REQUIREMENTS

The CRACS is required to maintain the following environmental conditions in the CRC:

a. 75°F ± 5°F DB during all plant conditions in all areas of the CRC except the Mechanical Equipment Rooms (Reference 11.1.1, FSAR Table 9.4-2). 35 to 50% relative humidity during normal plant operation. During emergency operation, relative humidity will be maintained at 50% maximum.

77R

NRC Open Item No. M-7:

Section 6.2.1, Page 36 and Section 6.2.8, Page 46 of the subject document give space thermostat setpoints at 68°F. FSAR Table 9.4-2 commits to 75°F ± 5°F. Both heating and cooling thermostat setpoints should be within the FSAR committed range.

Response:

1. Instrument and control setpoints are presently being developed. Hence the space thermostat setpoint is an open item, together with other setpoints. Marked up pages of DBD-ME-304, identifying this setpoint as an open item are included at Attachment 1.

2. These DBD open items will be closed after Stone & Webster furnishes instrument setpoints based on Ebasco's transmittal of design limits.

Significance/Extent:

Since the set points are currently open items in the DBD's, and also since all safety related instrument set points are being validated by SWEC based on Ebasco's design limit inputs, there is no safety significance.

NRC Evaluation:

Attachment TU ELECTRIC COMANCHE PEAK SES M-7
Sheet 1 of 3 OCT 30 1987

ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
(2)	31	System operation on receipt of a smoke or fire signal.	Control Room Habitability, DBD-ME-003 (SWEC/EPM)
(3)	34	Precautions during low CCW temperature of 40°F.	Operating Procedures (TU Electric)
(4)	46	Setpoint calculation for the supplemental air conditioning units.	Set point calculation (SWEC)
(5)	47	Location of activation switches for the zone reheat coils.	ICD-2323-M1-2304-08 (SWEC)
(6)	36, 47, 48	Setpoint calculations for space temperature alarms and fire alarms.	Set point calculations (SWEC)
(7)	52 thru 59	Missing data for the following equipment: a. Control Room AC Units b. Emergency Pressurization Units c. Emergency Filtration Units	Vendor Documentation (Ebasco)
(8)	85	Instrument air piping drawing numbers and titles.	Drawing Numbers 2323-M1-2700 Series (SWEC)
(9)	Attach. 8 Pages 1,2,3 of 3	Performance curves for supplemental AC unit fans.	Vendor Documentation (Ebasco)

The unit fans are interlocked to start upon receipt of any one of the following signals from Unit 1 or 2:

- High Radiation (Refer to Section 6.2.10)
- SIAS
- BOS

With the start of a unit fan the associated unit inlet pneumatic damper opens automatically.

When a fan is started, the associated refrigeration system, heating system and humidification system control circuits are energized. The refrigeration system operates if the associated room thermostat (X-TIS-5847/-5848) senses higher temperature than the set point of 75°F (Reference 11.1.3f, Calculation 0304-6). Condenser water flow is required to activate the compressor. The water flow is automatically regulated to keep the condenser head pressure within a set limit of 150 PSIG (Reference 11.1.4.6, Purchase Order No. CP-0087) by the pressure indicator controller located on the Ventilation Control Panel. Refrigerant flow through the direct expansion cooling coil subsections are regulated by the respective thermostatic expansion valves actuated by coil leaving refrigerant temperature superheat sensing elements. The compressor is capable of automatic partial load operation by unloading the cylinders to balance the refrigerant cycle. The compressor partial load operation is described in vendor's Instruction Manual (Reference 11.1.4.6, Purchase Order No. CP-0087).

The electric heating coil in each unit is under the control of the associated room thermostat. The heating coil is activated by the thermostat (X-TIS-5847/-5848) when it senses lower space temperature than the setpoint of ~~[illegible] (Reference 11.1.3f, Calculation 0304-[illegible])~~ (Later)(6)

6.2.8 SUPPLEMENTAL AIR CONDITIONING UNITS

The supplemental air conditioning units circuits are individually energized by the associated control switch located on Ventilation Control Panel X-CV-03. The fan and the refrigeration cooling system are under the control of the respective unit room thermostat, which senses higher temperature than the setpoint and activates the respective unit.

The following setpoints for the room thermostats are provided for the various units (later).(4)

- Computer Room Unit 1 — CP1-VAACCC-01. [redacted]
  CP1-VAACCC-02. [redacted]
  CP1-VAACCC-03. [redacted]
- Computer Room Unit 2 — CP2-VAACCC-01. [redacted]
  CP2-VAACCC-02. [redacted]
  CP2-VAACCC-03. [redacted]
- Electric Equipment Corridor Unit 1 — CP1-VAACTC-01.
- Electric Equipment Corridor Unit 2 — CP1-VAACTC-01.
- TSC Corridor — CPX-VAACTC-01.
- TSC Office — CPX-VAACTC-02.

Unit reheat coil and humidification package setpoints and reference to be provided (later).(4)

January 8, 1988

NRC Open Item No. M-8:

Section 5.4, Page 34 of the subject document states "Precautions during low CCW temperature of 40°F is to be furnished (later)". It is our understanding that air conditioning manufacturers warn that special arrangements must be made to accommodate condensing water temperatures below 55°F. This document should contain evidence that the manufacturer of the purchased air conditioning units agrees that the "precautions" taken for the 40°F condensing water temperature will not jeopardize the operation of the units, nor compromise their safety related performance.

Response:

As seen in Attachment 1, the vendor of these air conditioners has confirmed that the flow control method will operate satisfactorily down to the minimum expected water temperature (40°F) entering the condenser. Flow control is accomplished by the modulation of the component cooling water (condenser water) flow rate in response to refrigerant head pressure. The condenser water modulating control valve, which is furnished as a part of the safety-related air conditioning unit, is safety-related. Hence this concern will be deleted from DBD-ME-304. Accordingly marked up pages of the DBD are in Attachment 2. R1

List of Attachments:

1. Stone & Webster to TU Electric letter SWTU-0755 dated February 12, 1987.
2. Pages of DBD-ME-304 Rev. 0, marked according to the changes stated in the response above.

Significance/Extent:

There is no safety concern as the manufacturer of this air conditioner has already confirmed that the control valve provided is adequate for condenser water temperatures down to 40°F. The air conditioning unit, including the control valve for flow modulation, is safety-related. Extent is limited to refrigeration equipment with water-cooled condensers. All such systems have already been reviewed. See Attachment 1, and the response to Open Item M-13. R1

NRC Evaluation:

STONE & WEBSTER ENGINEERING CORPORATION

COPY

494 Attachment 1 Sheet 1 of 5

OCT 30 1987 M-8

Copy to J P Padalino

TU ELECTRIC COMANCHE PEAK SES

F&G HVAC Chillers

Copy to:
RECamp
RPBaker
FMadden
JLBarker
RTJenkins
RLGrubb (IM)
BCIotti (KB)
SMReynerson
ARMS

R. C. IOTTI FEB 18 1987

RECEIVED FEB 26 1987 J. P. PADALINO

Mr. J. E. Krechting
Director of Engineering
TU ELECTRIC
P. O. Box 1002
Glen Rose, Texas 76043

February 12, 1987
J. O. No. 16345
SWTU- 0755
No Response Required

STATUS UPDATE
SIGNIFICANT DEFICIENCY ANALYSIS REPORT - SDAR - CP-86-18
SAFETY CHILLED WATER SYSTEM CHILLER UNITS (SN-0151)
COMANCHE PEAK STEAM ELECTRIC STATION - UNITS 1 & 2
TU ELECTRIC

Statement of Problem:

SDAR CP-86-18 addresses the failure to maintain component cooling water (CCW) supply temperatures at or above the chilled water return temperature for both the operating and standby safety chillers. This condition was evaluated as a significant deficiency in final design and reported under 10CFR50.55(e). (Ref. TXX-4820 dated May 21, 1986).

Present Status & Plan of Action:

Subsequent to the assumption of responsibility for this effort in late November 1986, SWEC prepared a report for TUE (SWTU-0348 dated December 15, 1986) outlining the advantages and disadvantages of the two most attractive options to resolve the CCW low temperature problem with a recommendation to implement option 1. The options were as follows:

1. Qualification/Modification of components for 40°F CCW inlet temperature.

2. Installation of an 18" bypass line.

Based upon the SWEC recommendation, TUE directed SWEC to proceed with option 1 (Ref. NE-1753, dated January 21, 1987).

Twenty-seven components served by the CCW system are affected (See Attachment). The components must either be qualified by analysis to accept the 40 degree F CCW inlet temperature or have individual component and/or system modifications made. Presently, all vendors have been contacted to ascertain the acceptability of the 40 degree F CCW inlet temperature; this had not previously been done. All vendors have not yet responded.

The following discussion summarizes the status. Three vendors require component/system modification (three components), two vendors are currently analyzing the acceptability of the 40 degree F CCW inlet temperature for eighteen components, and all other vendors have verified that the remainder of the components (6) can accept the 40 degree F CCW inlet temperature without modification.

A. Components Requiring Modification

o <u>York International Co. - Safety Chillers</u>

York has advised that the safety chillers will operate satisfactorily both during operation and upon startup from the standby to full load conditions with 40 degree F CCW inlet temperature based on the implementation of the following chiller and CCW system modifications: (a) The addition of a flow regulating valve in the condenser CCW outlet piping to maintain condenser refrigerant pressure above evaporator pressure. This modification will also require the addition of a pressure controller on the refrigerant side of the condenser to control the operation of the flow regulating valve (b) The CCW not be allowed to circulate through the condenser prior to chiller startup to avoid low oil pressure trips resulting from refrigerant boiling out of the oil due to a sudden decrease in refrigerant pressure caused by circulating cold CCW through a standby chiller <u>and</u> (c) The present refrigerant cooled oil cooler be replaced by a water cooled oil cooler as the evaporator refrigerant temperatures for certain conditions exceed the maximum temperature for the existing refrigerant cooled oil cooler.

o <u>Trane Co. - Ventilation Chillers</u>

Trane has advised that the ventilation chillers will operate satisfactorily both during operation and upon startup from the standby to full load conditions with 40 degree F CCW inlet temperature based upon the addition of a flow

Attachment 1
Sheet 3 of 5

OCT 30 1987

regulating valve in the condenser CCW outlet piping to maintain condenser refrigerant pressure above evaporator pressure. This modification will also require the addition of a pressure or differential pressure controller on the refrigerant side of the chiller to control the operation of the flow regulating valve.

o <u>Ingersoll-Rand Co. - Instrument Air Compressors</u>

Ingersoll-Rand has advised that the instrument air compressor will operate satisfactorily with 40 degree F CCW inlet temperature based on the implementation of one of the following CCW system modifications: (a) In a base load unit, the addition of a thermostatic control valve in the compressor CCW discharge piping to maintain the compressor CCW inlet temperature above 60 degree F and the compressor CCW outlet temperature between 100 - 110 degrees F to prevent water condensation in the compressor internals. If the unit is also used as a standby, an on-off solenoid valve is required in the compressor CCW discharge piping, in addition to the thermostatic control valve, to terminate CCW flow when the compressor is not operating <u>or</u> (b) The addition of CCW bypass piping to reverse CCW flow direction through the compressor, i.e., to the aftercooler first and then to the jacket, during cold weather <u>and</u> the addition of a thermostatic control valve in the compressor CCW discharge piping to maintain the CCW inlet/outlet temperature within the allowable parameters to prevent water condensation in the compressor internals.

SWEC is in the process of evaluating/implementing the above vendor recommendations.

B. Components Being Analyzed

o <u>Joseph Oat Corporation - Containment Spray/Spent Fuel Pool Heat Exchangers</u>

Joseph Oat needs to analyze for the possibility of overstressing of the containment spray heat exchanger tube U-bends due to the CCW temperature differential. Field Requisition No. 54220 is being processed for this work. Joseph Oat has stated that the spent fuel pool heat exchangers are exposed to similar stresses which are not as severe. It is expected that the containment spray heat exchanger analysis will envelop the spent fuel pool heat exchangers.

A favorable response is expected from J. Oat in mid-March 1987.

Attachment 1
Sheet 4 of 5

OCT 30 1987
TU ELECTRIC
COMANCHE PEAK SES

o Westinghouse - Miscellaneous Equipment

1. An analysis is being performed to show that the thermal shock after a loss of CCW will not be a problem to the RCP thermal barrier coolers. A favorable response is expected from Westinghouse in late March 1987.

2. An analysis of the impact of 40 degree F CCW on other Westinghouse supplied equipment is also being performed. A favorable response is expected from Westinghouse in early March 1987.

All analyses and modifications are presently scheduled to be complete, including installation, by the end of November 1987, for Unit 1.

SWEC is finalizing the required design modifications. We anticipate submitting our next status update June 8, 1987.

Should you need additional information, please contact Mr. R. Simons at extension 6552.

SLStamm
Project Engineering Manager

KAK:SLA

OCT 30 1987

Attachment 1
Sheet 5 of 5

TU ELECTRIC
COMANCHE PEAK SES

Attachment To SWTU-0755

February 12, 1987

Components Served by Component Cooling Water System

Component	Safety Related	Vendor	Acceptable at 40 Degree F CCW Temperature
1. Safety Chillers - Condensers	yes	York	No - mod. req'd
2. Vent. Chillers - Condensers	no	Trane	No - mod. req'd
3. Instr. Air Compr. - Jacket/ Aftercooler	no	Ing.-Rand	No - mod. req'd
4. Contmt. Spray Heat Exchangers	yes	J.Oat	Pending Verif.
5. Spent Fuel Pool Ht.Exchangers	yes	J.Oat	Pending Verif.
6. Waste Gas Compr. Pkgs. - Seal Water Coolers	yes	West.	Pending Verif.
7. Catlyt. Recombiner Pkgs. - Heat Exchangers	yes	West.	Pending Verif.
8. Seal Wtr. Ht. Exchangers	yes	West.	Pending Verif.
9. Letdown Heat Exchangers	yes	West.	Pending Verif.
10. Letdown Chillers - Condensers	no	West.	Pending Verif.
11. RHR Pump Seal Coolers	yes	West.	Pending Verif.
12. RHR Heat Exchangers	yes	West.	Pending Verif.
13. RCP Thermal Barrier Coolers	yes	West.	Pending Verif.
14. RCP Upr Brg. Lube Oil Clrs.	yes	West.	Pending Verif.
15. RCP Lwr Brg. Lube Oil Clrs.	yes	West.	Pending Verif.
16. RCP Motor Air Coolers	yes	West.	Pending Verif.
17. RCDT Heat Exchangers	yes	West.	Pending Verif.
18. Excess Letdown Ht Exchangers	yes	West.	Pending Verif.
19. Flr Drn. Evaporator Pkgs. - Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
20. Wst. Evaporator Pkgs. - Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
21. Boron Recycle Evap. Pkgs.- Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
22. Pos. Disp. Chg. Pump - Hydraulic Coupling Oil Clr.	yes	West.	yes
23. Process Sample Coolers	no	Sentry Equip.	yes
24. PASS Sample Coolers	no	Sentry Equip.	yes
25. Contmt. Spray Pmps.-Seal Clrs.	yes	Bingham-Will.	yes
26. Cntrl. Rm. Air Conditioners- Condensers	yes	CVI	yes
27. UPS Air Conditioners - Condensers	yes	CVI	yes

Attachment 2
Sheet 1 of 2

OCT 30 1987

TU ELECTRIC
COMANCHE PEAK SES [illegible]

ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
(2)	31	System operation on receipt of a smoke or fire signal.	Control Room Habitability, DBD-ME-003 (SWEC/EPM)
~~(3)~~	~~34~~	~~Precautions during low CCW temperature [illegible].~~	~~Operating Procedures ([illegible])~~
(4)	46	Setpoint calculation for the supplemental air conditioning units.	Set point calculation (SWEC)
(5)	47	Location of activation switches for the zone reheat coils.	ICD-2323-M1-2304-08 (SWEC)
(6)	47, 48	Setpoint calculations for space temperature alarms and fire alarms.	Set point calculations (SWEC)
(7)	52 thru 59	Missing data for the following equipment: a. Control Room AC Units b. Emergency Pressurization Units c. Emergency Filtration Units	Vendor Documentation (Ebasco)
(8)	85	Instrument air piping drawing numbers and titles.	Drawing Numbers 2323-M1-2700 Series (SWEC)
(9)	Attach. 8 Pages 1,2,3 of 3	Performance curves for supplemental AC unit fans.	Vendor Documentation (Ebasco)

Attachments 2 through 8 depict the fan performance curves for the CRACS.

5.4 SYSTEM LIMITATIONS AND PRECAUTIONS

The CRACS is designed for the outdoor summer temperature of 110°F DB and outdoor winter temperature of 20°F DB. If the summer outdoor temperature exceeds the design limit, there could be an excursion in the indoor temperatures. However, this is expected to be insignificant due to the conservative selection of the outdoor design temperature (Reference 11.1.3a, Calculation X-EB-304-1). If the winter outdoor temperature falls below 20°F DB, the possibility of indoor temperature falling below the design limits is minimal since the CRC has sufficient internal heat generated to compensate for heat loss (Reference 11.1.3b, Calculation X-EB-304-2).

The Component Cooling Water (CCW) flow to the water cooled condenser for each central air conditioning unit is automatically regulated to keep the condenser head pressure within a set limit of 150 PSIG (Reference 11.1.4.6, Purchase Order No. CP-0087). The cooling performance of the refrigeration system is based on 250 GPM of waterflow through each condenser at a maximum condenser water inlet temperature of 135°F. Any excursion of water inlet temperature above 135°F or reduction of water quantity below 250 GPM with the maximum CCW temperature of 135°F at the maximum load would reduce the system capacity.

~~Precaution during low CCW temperature of 40°F is to be furnished (later).~~

For precaution regarding spurious activation of automatic charcoal adsorber deluge system refer to DBD-ME-001 and DBD-ME-020 (Reference 11.1.8g and m).

TU ELECTRIC
COMANCHE PEAK SES OCT 30 1987

NRC Open Item No. M-9:

X-EB-304-4, Rev. 0, fails to demonstrate by calculations or any other acceptable method that the sensible cooling requirements of the Control Room Complex can be met by the "as-built" HVAC system.

Response:

Calculation X-EB-304-4 will be revised as shown in the attachment. In this revision, it is demonstrated by explicit calculations that the sensible cooling capacity requirements are met by the air conditioners under all operating modes. This calculation will be completed by November 7, 1987.

Significance/Extent:

As shown in the Attachment, the air conditioners have adequate sensible cooling capacity under all operating modes. Hence there is no safety concern. The extent is limited to this calculation since this is the only instance where determination of sensible and latent cooling loads, at off-design conditions, is performed.

NRC Evaluation:

TU ELECTRIC
COMANCHE PEAK SES

M-9

EBASCO SERVICES INCORPORATED
CALCULATION COVER SHEET

OCT 30 1987

CLIENT: TU ELECTRIC — OFS. NO. TUGC 3306

PROJECT: COMANCHE PEAK STEAM ELECTRIC STATION UNIT #1 AS-BUILT HVAC CALCULATIONS — DEPT. NO. 533

SUBJECT: Cooling Capacity of Control Room Air Conditioners

CALCULATION NO. X-EB-304-4 — NUMBER OF SHEETS 27

CONTAINS ASSUMPTIONS WHICH REQUIRE CONFIRMATION YES ☐ NO ☒

IF YES, SERIAL NUMBERS OF LISTED ASSUMPTIONS WHICH REQUIRE CONFIRMATION

ASSUMPTIONS CONFIRMED ON BY

REV NO.	SHEET NOS.	CALCULATION BY NAME	DATE	CHECKED BY NAME	DATE	OPTIONAL	REVIEWED OR APPROVED BY NAME	DATE
2	All Sheets	M. M. Shah	8/27/87					
1	Sh. 1-12, added Sh. 13-16 & Att. 3	M. M. Shah	8/10/87	M. [illegible]	8/11/87		N [illegible]	8/26/87
0	all	M. M. Shah	6/17/87	[illegible]	6/26/87		N [illegible]	7/7/87

PRELIMINARY ☐ FINAL ☒ SUPERSEDES CALC. NO. REV. 0

2-09-1987 [130, 22] CHRT36R

OCT 30 1987

TABLE OF CONTENTS

SECTION AND CONTENT — SHEET NO.

ATTACHMENTS TO CALCULATIONS — TOTAL SHEET NOS.

ATTACHMENTS TO CALCULATIONS	TOTAL SHEET NOS.	
1. Performance data of Westinghouse packaged airconditioning unit Model UF 360W	1	
2 Performance data of McQuay packaged airconditioning unit size 060B	1	
3 Performance data of McQuay packaged airconditioning unit Model UF 240W	1	R1
4. Trane Psychrometric chart		R2

REF.

1. OBJECTIVE

Evaluate the adequacy of the airconditioning units for the Control Room during normal and emergency conditions (LOCA with recirculation and LOCA with emergency ventilation). The tag numbers of the air conditioning units are CPX-VAACCR-01, -02, -03, -04. R1

2. DESIGN BASES

A. Known performance of the air-conditioning units is per Vendor Manual (Reference A), given later here in Section 7.1.

REF.

3. REFERENCES

A. CVI Manual, CP-0087-01, Control Room Air Conditioning Units (No revision)

B. Calculation No: X-EB-304-1 Rev. 2, Control Room Space Heat Gains and Maximum Space Temperatures. | R1

C. ASHRAE Handbook, Equipment, 1983, Chapter 19.

D. McQuay Air Conditioning Catalog 205-4, Roofpak Single Zone Heating & Cooling units, 1980.

E. Westinghouse Performance Data UF-B8, Commercial Packaged Cooling, Nov. 1966 - R2

F. ASHRAE Handbook, Equipment, 1983, Chapter 6

G. TUGCO Calculation TNE-SY-CA-0000-132, Rev. 0, Appendix A-3, Sheet 108 of 135.

R1 | H. McQuay Air Conditioning Performance Data UF-86, Dated August, 1982

4. ASSUMPTIONS

None

5. ATTACHMENTS

1. Performance data of Westinghouse packaged airconditioning unit Model UF 360W — E
2. Performance data of McQuay packaged airconditioning unit size 060B — D

REF

5. ATTACHMENTS (Contd.)

R1 3. McQuay Air Conditioning Performance Data UF-86, Dated August, 1982. — H

R2 4. Trane Psychrometric Chart

6. CONCLUSION

R2 Control room airconditioning units have sufficient capacity to meet the required cooling loads under all operating conditions as seen in the following table:

Operating Mode	Required Cooling Capacity Btu/hr.		Calculated Airconditioner cooling capacity, Btu/hr	
	Sensible	Latent	Sensible	Latent
Normal	1,505,485	120,465	1,677,340	369,022
Emergency Recirculation	1,695,820	37,515	1,739,885	128,787
Emergency Ventilation	1,797,400	149,565	1,819,488	207,164

REF

7. CALCULATIONS

7.1 Known Performance of Air Conditioners

From the vendor manual, The combined performance of the two units operating together in parallel is: — A

Entering air temp., F	77 DB/64 WB
Leaving air temp., F	52.1 DB/52 WB
Cooling capacity, Btu/hr.	
Sensible	1,360,800
Latent	487,200
Total	1,848,000
Air Flow Rate, cfm	50,600 ×
Temp. of water entering condenser, F	135
Saturated suction temperature, F	44.5

	REF.

7.2 Required Cooling Capacity

During normal operation, the following performance is needed: B

Entering air temp., F	79.0 DB/62.8 WB	
Cooling capacity, Btu/hr.		
Sensible	1,505,485	
latent	120,465	
total	1,625,950	
Air flow rate, cfm	51,690	
Temp. of water entering condenser, F	102.4	G

During LOCA with emergency recirculation, the following performance is needed: B

Entering air temp., F	82.5 DB/63.4 WB	
Cooling capacity, Btu/hr.		
Sensible	1,695,820	
Latent	37,515	
Total	1,733,335	
Air flow rate, cfm	51,690	
Temp. of water entering condenser, F	129.6	G

The requirements for emergency ventilation are on sheet 13. | R1

TU ELECTRIC
COMANCHE PEAK SES

EBASCO SERVICES INCORPORATED

BY M.M. Shah DATE 10/27/87 Calc. X-EB-304-4 Rev. 2 SHEET 7 OF 22 (R1)
CHKD. BY ______ DATE ______ 3306.061 DEPT. NO. 533
CLIENT TEXAS UTILITIES GENERATING CO.
PROJECT COMANCHE PEAK SES UNIT 1&2 OCT 30 1987
SUBJECT Cooling capacity of Control Room Airconditioners

	REF
7.3 Effect of Various Parameters on Performance of Airconditioners	
Figure 1 shows the effects of various parameters on the performance of a typical airconditioning unit. This figure refers to an air cooled condenser. Obviously, results will qualitatively be the same if a water-cooled condenser with constant water flow rate is used.	
From Figure 1, the following conclusions may be drawn:	
(a) The total cooling capacity remains constant if the wet bulb temperature of the air entering the cooling coils is constant. Thus as the DB temp. increases, sensible cooling capacity increases and the latent cooling decreases, the total capacity remaining constant.	
(b) A drop in temperature of air entering the condenser increases the cooling capacity of unit. Obviously, the same will happen if the unit had a water-cooled condenser and the temperature of water entering the condenser is lowered.	
That the trends shown in Figure 1 are typical may be confirmed by studying ASHRAE Handbook (Reference C) as well as catalogs of various manufacturers. Attachments 1 and 2 are typical catalog data.	C D, E

581/8-81

EBASCO SERVICES INCORPORATED

BY M.M. Sheh DATE 10/27/87 Calc. X-EB-304 Rev. 2 TU ELECTRIC COMANCHE PEAK SES SHEET 8 OF 22 /R2

CHKD. BY ______ DATE ______ OFS NO. 3306.061 DEPT. NO. 533

CLIENT TEXAS UTILITIES GENERATING CO.

PROJECT COMANCHE PEAK SES UNIT 1 & 2 OCT 30 1987

SUBJECT Cooling Capacity of Control Room Airconditioners

REF.

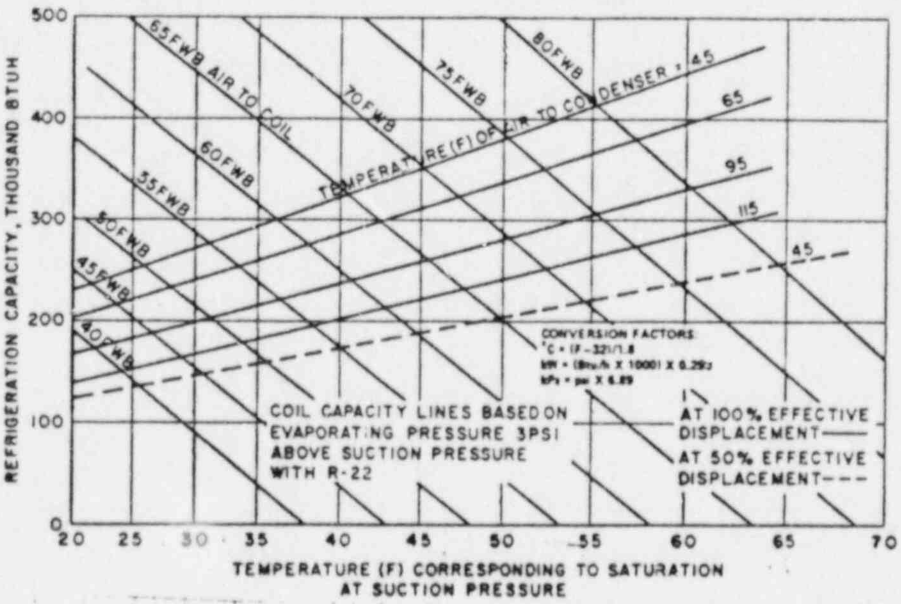


Figure 1: Performance of a typical airconditioning unit with air-cooling coil and air-cooled condenser. From ASHRAE Handbook, Equipment Volume, 1983, page 19.3. C

	REF
7.4 Effect of Total Air Flow Over Cooling Coil.	
Vendor's data is based on 50,600 cfm through the cooling coils. System design is based on 51,690 cfm flow. This is approximately 2% higher.	
Reference to Figure 17 of ASHRAE Guide (Eqpt. vol; 1983, page 6.14) shows that a 2% increase in air flow will slightly reduce the air side resistance, as is indeed expected from heat transfer experience. This will slightly increase coil heat transfer and thus the cooling capacity of the unit will increase slightly.	F
Conservatively, this slight increase in cooling capacity due to higher flow rate of air is neglected.	

REF.

R2 | 7.5 Evaluation of Performance During LOCA with Emergency Recirculation

We first ignore the fact that entering condenser water temp. is lower under LOCA conditions compared to the unit rating condition.

The entering WB temperatures to the coil are:

		REF.
unit rating condition	64 F	Sheet 5
LOCA condition	63.4 F	Sheet 6

To quantify, the effect of WB temperature, the data in attachment 2 are used.

For unit RPS-060B, 18000 cfm air entering cooling coil at 75 F DB, air entering condenser at 95 F, the following values of total cooling capacity are given:

Entering WB 71 F,	722000 Btu/hr.
" " 67 F,	674000 Btu/hr.

% change per. deg. F decrease in wet bulb

$$= \frac{722000 - 674000}{722,000 \times 4} \times 100 = 1.66\%$$

$$\simeq 1.7\%$$

That this figure of 1.7% is typical can be confirmed by studying other data in attachment 2 as well those in Figure 1 and Attachment 1.

Ref

As shown on page 20, cooling capacity of an airconditioner increases by 0.4% per degree drop in temperature of water entering the condenser.

Thus total cooling capacity of airconditioners

$$= [1 + 0.017(63.4 - 64) + 0.004(135 - 129.6)] \times 1{,}848{,}000$$

R2

$$= 1{,}868{,}669 \text{ Btu/hr.}$$

Change in enthalpy of air through the coil

$$= \frac{1{,}868{,}669}{4.5 \times 51{,}690} = 8.034 \text{ Btu/lb}$$

Enthalpy at coil entering condition of 82.5 FDB/63.4 FWB

= 28.6 Btu/lb

Enthalpy at coil outlet = 28.6 - 8.03 = 20.57 Btu/lb

Hence the coil outlet condition should be on the 20.57 Btu/lb enthalpy line. Typical variation of air conditions during passage through cooling coil is shown on the TRANE Co. psychrometric chart (Attachment 4). In Figure 2 the coil inlet and outlet conditions given by the AC vendor are joined by a curve on this basis. Then a curve is drawn through the present coil inlet condition, taking guidance from the curves in the Trane psychrometric chart and the vendor — Sheet-13

Ref.

performance data. The coil outlet condition is thus determined to be 51.9 °F DB/50.5 °F WB.

Sensible cooling capacity = 1.1 × (82.5 − 51.9) × 51,690
= 1,739,885 Btu/hr.

Latent cooling capacity = 1,868,669 − 1,739,885

R2 = 128,787 Btu/hr.

Thus it has been shown that both the sensible and latent cooling capacities of air conditioners under the condition of LOCA with emergency recirculation exceed the requirements.

EBASCO SERVICES INCORPORATED TU ELECTRIC COMANCHE PEAK SES

BY M. M. Shah DATE 10/27/87 Calc. X-EB-304-4 Rev. 2 SHEET 13 OF 22

CHKD. BY ______ DATE ______ OFS NO. 3306.061 DEPT. NO. 533

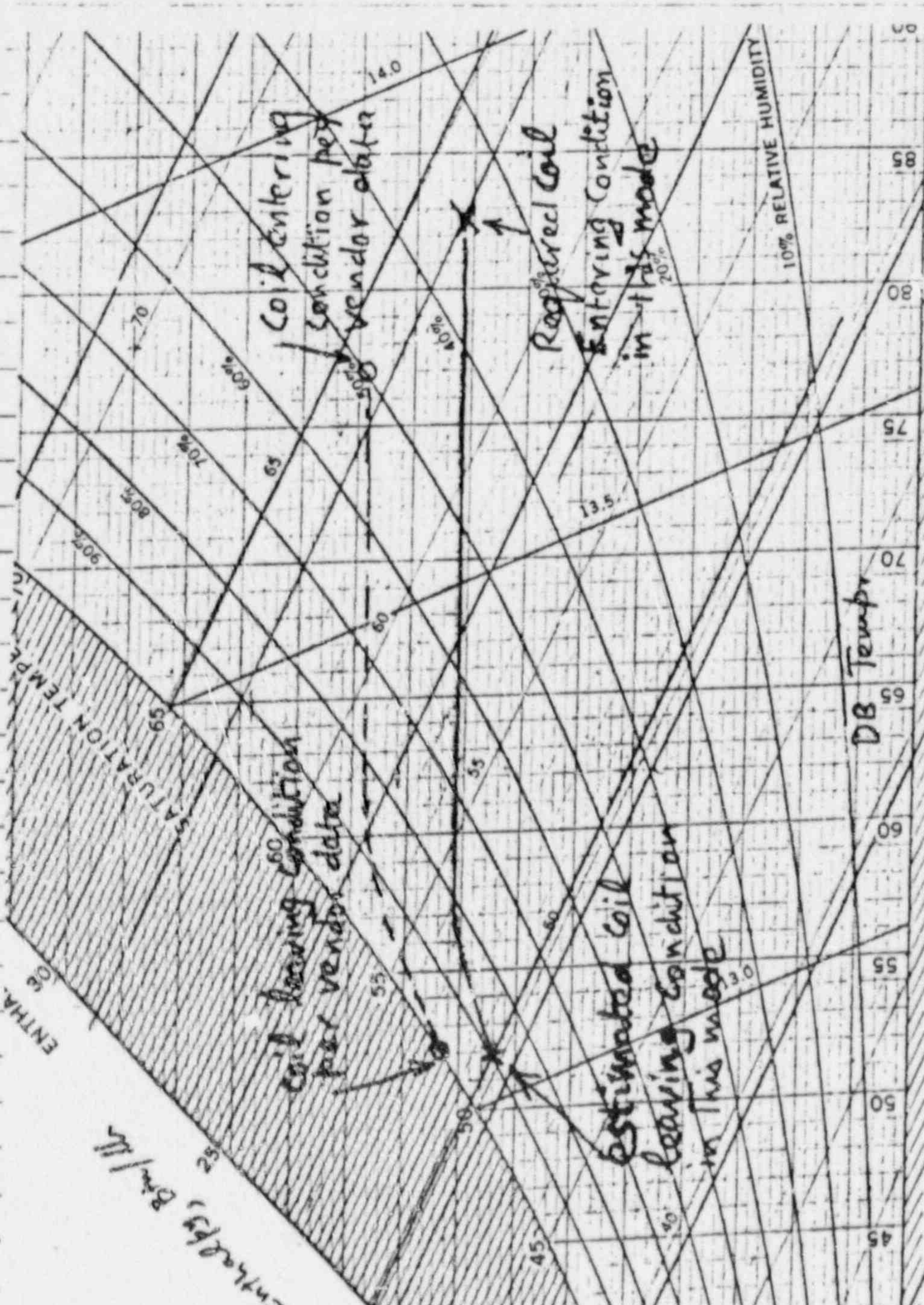
CLIENT

OCT 30 1987

PROJECT

SUBJECT Cooling capacity of Control Room Air-Conditioners

R2



Ref.

7.6 Evaluation of Performance Under Normal Conditions

Entering air WB is 62.8 F while that in vendor data is 64 F.

Entering condensor water temp. is 102.4 F while that in vendor data is 135 F.

R2 Adjusting for the differences in air and water conditions noted above; — Sheets 10, 20

total cooling capacity of airconditioners

$= [1 + 0.004 \times (135 - 102.4) + 0.0017(62.8 - 64)] \times 1,878,000$

$= 2,046,363$ Btu/hr.

Enthalpy of air at coil entering condition of 79.0 F DB/62.8 F WB = 28.2 Btu/lb

change in air enthalpy during passage through coil

$= \dfrac{2,046,363}{4.5 \times 51,690} = 8.8$ Btu/lb

coil outlet enthalpy = 28.2 − 8.8 = 19.4 Btu/lb

Plotting on the psychrometric chart as before, coil outlet condition is 49.5 F DB/48.2 F WB — Sheet 16

Ref.

sensible cooling capacity = 1.1 (79 − 49.5) × 51,690

= 1,677,340 Btu/hr.

Latent cooling capacity = 2,046,363 − 1,677,340

= 369,022 Btu/hr

R2 Hence the airconditioner sensible and latent cooling capacities under normal operating conditions far exceed the required capacities.

EBASCO SERV[illegible] [illegible]CORPORATED

BY M. M. Shah DATE 10/27/87 Calc. [illegible] EB-304-4 [illegible] 2 SHEET 16 OF 22

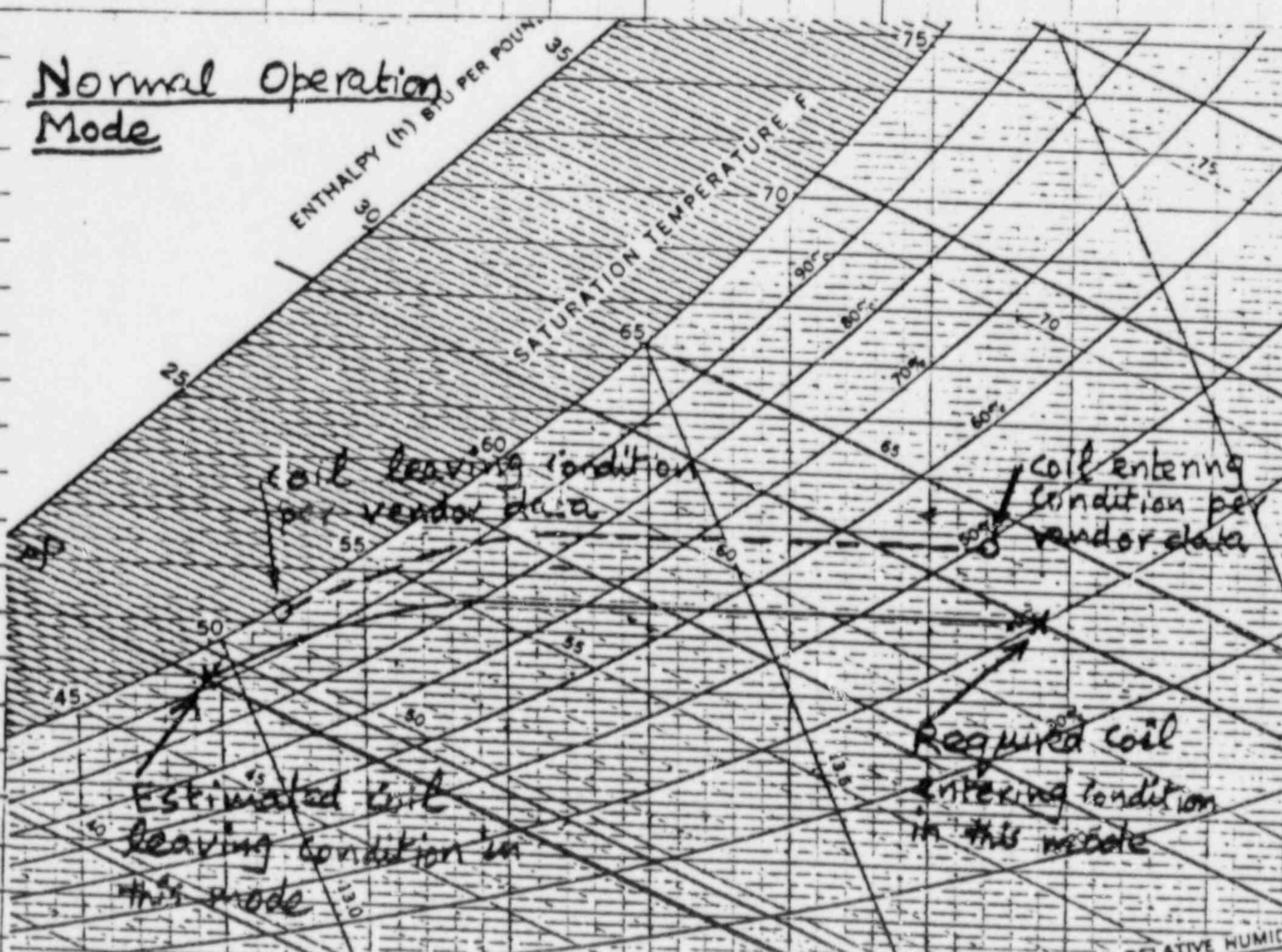
CHKD. BY ______ DATE ______ OFS NO. 3306.061 DEPT. NO. 533

CLIENT TU ELECTRIC

PROJECT COMANCHE PEAK SES [illegible] OCT 30 1987

SUBJECT Cooling capacity of Control Room Air Conditioners.

Figure 3



881/8-61

EBASCO SERVICES INCORPORATED

TU ELECTRIC COMANCHE PEAK SES

BY M.M. Sheh DATE 10/27/87 Calc. No. X-EB-304-4 Rev. 2

SHEET 17 OF 22/R

CHKD. BY ——— DATE

OFS NO. 3306.061 DEPT. NO. 533

CLIENT TEXAS UTILITIES GENERATING CO.

PROJECT COMANCHE PEAK SES UNIT 1 & 2

OCT 30 1987

SUBJECT Cooling capacity of Control Room Airconditioners

REF

7.7 Evaluation of Performance Under Emergency Ventilation Mode.

During emergency ventilation, the following performance is needed:

		REF
Entering air temp., F	84.2 DB/64.6 WB	B
Cooling capacity, Btu/hr.		
Sensible	1,797,400	
Latent	149,565	
Total	1,946,965	
Air flow rate, cfm	51,690	
Temp. of water entering condenser, F	113.6* F	

R1

* Emergency ventilation mode is used to provide relief to CR operators. It will not be required for at least 12 hours after LOCA. By this time, CCW temp. would have dropped to 113.6 F. G

To determine the effect of lower temperature of entering condenser water temperature, the data in Attachment 1 (Westinghouse's unit) are studied.

At 62 F entering WB, 44.3 gpm water at 65 F, cooling capacity = 354,500 Btu/hr.

At 62 F entering WB, 42.6 gpm water at 80 F, Cooling capacity = 328,500 Btu/hr.

Ref.

Neglecting the small difference in water flow rate, increase in capacity per degree drop in entering water temp.

$$= \frac{354,500 - 328,500}{328,500 \times (80-65)} \times 100$$

$$= 0.527\%$$

Again from attachment 1,

At 77 F entering WB, 111.3 gpm water entering at 75F, cooling capacity = 453,000 Btu/hr.

R1 At 77 F entering WB, 107.7 gpm entering water at 90F, cooling capacity = 427,000 Btu/hr.

increase cooling capacity per degree drop in entering water temp.:

$$= \frac{453,000 - 427,000}{427,000 \times (90-75)} \times 100$$

$$= 0.406\%$$

EBASCO SERVICES INCORPORATED

TU ELECTRIC COMANCHE PEAK SES

BY M.M. Shah DATE 10/27/87 Calc. No. X-EB-304-4 Rev. 2 SHEET 19 OF 22 R

CHKD. BY DATE OFS NO. 3306.061 DEPT. NO. 533

CLIENT TEXAS UTILITIES GENERATING CO.

PROJECT COMANCHE PEAK SES UNIT 1 & 2 OCT 30 1987

SUBJECT Cooling Capacity of Control Room Airconditioners

REF

The data for a McQuay Airconditioner (Attachment 3) are analyzed in a similar way.

At 77 F WB entering air temp.

75 F entering water temp., 74.2 gpm,
cooling capacity = 302,000 Btu/hr.

90 F entering water temp., 71.8 gpm,
cooling capacity = 284,500 Btu/hr.

R1 Neglecting the small difference in water flow rate, increase in cooling capacity per degree drop in entering water temp.

$$= \frac{302,000 - 284,500}{284,500 \times (90-75)} \times 100$$

$$= 0.41\%$$

At 62 F WB entering air temp.

80 F entering water temp., 58.2 gpm,
cooling capacity = 230,500 Btu/hr

90 F entering water temp., 56.8 gpm,
cooling capacity = 219,500 Btu/hr.

Increase in cooling capacity per degree drop in entering water temperature

$$= \frac{230,500 - 219,500}{219,500 \times (90-80)} \times 100 = 0.5\%$$

881/8-81

REF.

Thus performance data of typical airconditioning units show increases of 0.41 to 0.53% in cooling capacity per degree drop in temp. of water entering the condenser. We conservatively use 0.4% per degree.

Rated capacity of A/C units (REF. A)

= 1,848,000 Btu/hr at 135 F entering water and 64 F WB entering air.

With 113.6 entering water and 64 F WB entering air,

R1 total cooling capacity = 1,848,000[1+0.004 (135-113.6)]

= 2,006,189 Btu/hr.

As shown on Sheet 10, total cooling capacity increases by approx. 1.7% per degree rise in entering air WB temp.

Hence total capacity at 113.6 F entering water temperature and 64.6 F WB

= 2,006,189 × [1 + 0.017 × (64.6 − 64.0)] (REF. Sheet 10)

= 2,026,652 Btu/hr.

R2

TU ELECTRIC
COMANCHE PEAK SES

EBASCO SERVICES INCORPORATED

BY M.M.Sheh DATE 10/27/87 Calc. No. X-EB-304-4 Rev. 2 SHEET 21 OF 22

OFS NO. 3306.061 DEPT. NO. 533

CHKD. BY ______ DATE ______

OCT 30 1987

CLIENT ______

PROJECT ______

SUBJECT Cooling capacity of Control Room Air Conditioners

	Ref.
Enthalpy at 84.2 F DB/64.6 F WB coil entering condition = 29.6 Btu/lb	
Change in enthalpy of air across coil = $\frac{2,026,652}{4.5 \times 51,690}$ = 8.71 Btu/lb.	
coil outlet enthalpy = 29.6 − 8.71 = 20.89 Btu/lb	
R2 Following the same procedure as before, plotting on psychrometric chart gives coil outlet condition as:	Sheet 22
52.2 F DB / 51.0 F WB	
coil sensible cooling capacity = 1.1 (84.2 − 52.2) × 51,690 = 1,819,488 Btu/hr	
coil latent cooling capacity = 2,026,652 − 1,819,488 = 207,164 Btu/hr.	
Hence coil (air conditioner) sensible and latent cooling capacities exceed the required sensible and latent cooling capacities during emergency ventilation mode.	

EBASCO SERVICES INCORPORATED

BY M. M. Shah DATE 10/27/86 Calc. No. X-EB-304-4 Rev. 2

CHKD. BY ______ DATE ______ OFS NO. 3306.61 DEPT. NO. 533

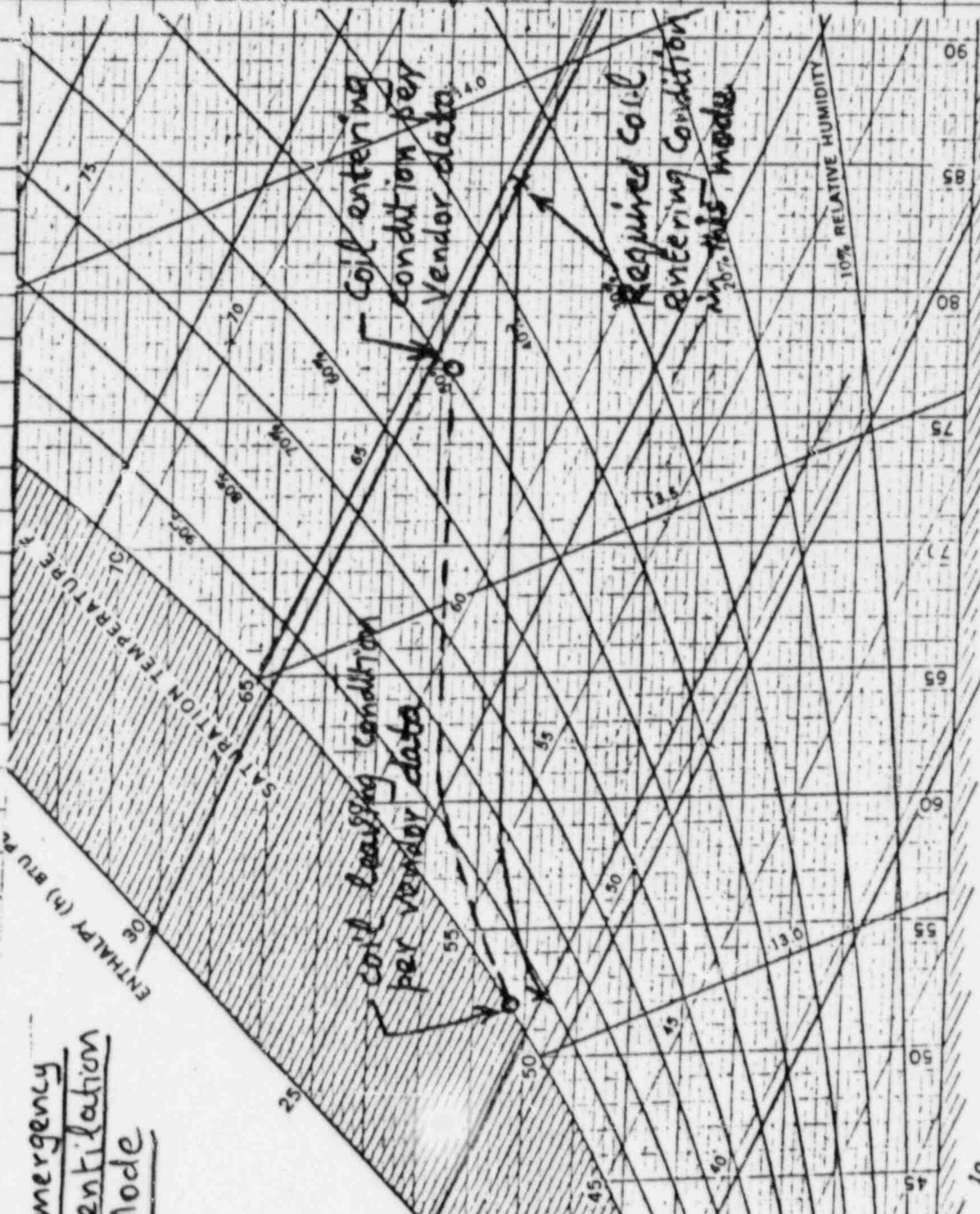
CLIENT

PROJECT

SUBJECT Cooling capacity of Control Room Air Conditioners

Figure 4

R2



Emergency Ventilation Mode

COMMERCIAL PACKAGED COOLING

PERFORMANCE DATA

UF-B8

MODEL UF 360W

ATTACHMENT 1

CALC X-EB-304-4 Rev.0

MAIN TAB U

Sheet 1 of 1

OCT 30 1987 TU ELECTRIC COMANCHE PEAK SES

60 CYCLES A-C

COOLING PERFORMANCE — 12,000 CFM (Reference E) 30 TONS

Condenser Leaving Water Temperature F	Evap. Entering Air Wet Bulb Temp. F	Unit Total Cooling Capacity Btuh Thous.	Evap. Leaving Air Wet Bulb Temp. F	Evaporator Entering Air Dry Bulb Temp. — F: 65	70	75	80	85	90	95	Comp. KW Input	Condenser Water: Entering Water Temp. F	GPM	Pressure Drop Ft.
				Sensible Cooling Capacity—Thousands BTUH										
85	62	354.5	51.8	170.2	223.5	280.0					26.18	65 70 75	44.3 59.1 88.5	2.0 3.4 7.0
	67	390.5	56.9	—	168.0	222.5	277.5	332.0			27.08	65 70 75	48.3 64.4 96.6	2.4 4.0 8.2
	72	424.5	62.2	—	—	165.4	216.2	271.8	326.2		27.90	65 70 75	42.1 69.3 104.1	2.7 4.5 9.4
	77	453.0	67.7	—	—	—	158.5	212.5	267.1	321.5	28.50	65 70 75	55.7 74.3 111.3	3.1 5.1 10.5
90	62	345.5	52.0	165.8	221.0	276.1					27.15	70 75 80	43.7 58.2 87.3	1.9 3.3 6.8
	67	381.0	57.1	—	163.9	217.0	274.1	327.5			28.20	70 75 80	47.7 63.6 95.4	2.3 3.9 8.0
	72	415.0	62.4	—	—	161.8	216.0	270.0	323.5		29.10	70 75 80	51.5 68.5 102.9	2.6 4.4 9.2
	77	444.0	67.9	—	—	—	—	208.5	262.0	319.9	29.78	70 75 80	55.1 73.4 110.1	3.0 5.0 10.2
95	62	337.5	52.3	162.0	216.0	270.0					28.13	75 80 85	43.2 57.6 86.4	1.9 3.2 6.6
	67	370.5	57.4	—	159.2	215.0	270.2	322.2			29.25	75 80 85	47.1 62.7 94.2	2.2 3.8 7.8
	72	404.5	62.7	—	—	157.6	210.0	266.4	319.5		30.30	75 80 85	50.9 67.8 101.7	2.5 4.3 9.0
	77	436.0	68.1	—	—	—	152.5	204.5	261.6	314.0	31.05	75 80 85	54.5 72.6 108.9	2.9 4.7 10.0
100	62	328.5	52.6	157.7	213.5	266.0					29.18	80 85 90	42.6 56.9 85.2	1.8 3.2 6.3
	67	360.5	57.7	—	158.7	212.5	267.0				30.38	80 85 90	46.5 62.3 93.0	2.1 3.7 7.6
	72	395.0	62.9	—	—	158.0	209.5	264.5	316.0		31.50	80 85 90	50.4 67.2 100.8	2.4 4.2 8.8
	77	427.0	68.3	—	—	—	149.5	204.9	260.2	312.0	32.33	80 85 90	53.9 71.7 107.7	2.8 4.8 9.9

1. Performance is based on an air flow of 12,000 CFM over the evaporator coil. For air flow at other than 12,000 CFM refer to air flow correction factors. Rating in accordance with ARI Standard 210 is 360,000 BTUH. For units operating on 208 volts, deduct 8000 BTUH.
2. No allowance has been made for fan motor heat. Fan motor brake horsepower requirements should be converted to equivalent heat using the table on the reverse side of this sheet. Heat equivalent should be added to the cooling load or deducted from the unit capacity.
3. Power input is for compressor only. To obtain total unit power input convert fan horsepower requirements to kilowatts (using tables on the reverse side of this sheet) and add to the compressor kilowatt input.
4. Capacity is based on clean condenser tubes. For fouling factors of .0005 and .001 apply multipliers of .97 and .95 respectively.
5. Maximum condenser water side working pressure is 150 PSIG.
6. Shaded areas indicate dry coil operation and all sensible cooling.

AIR FLOW CORRECTION FACTORS

FACTORS	CFM: 9,600	10,800	12,000	13,200	14,400
Sensible Capacity	.87	.94	1.00	1.05	1.09
Total Cooling Capacity	.96	.98	1.00	1.03	1.06
Heating Capacity	.89	.95	1.00	1.05	1.10
KW Input	.99	.99	1.00	1.01	1.01

SUPERSEDES UF-B8 DATED NOVEMBER, 1965

CHANGES THIS ISSUE—Note 1 on Page 2 (Heating Coil).

USE OF FACTORS

To adjust the performance of the UF 360W when 9,600 CFM of air is entering the evaporator at 80F dry bulb and 67F wet bulb, and a condenser leaving water temperature of 95F, apply factors as indicated below.

SENSIBLE CAPACITY = 270,200 X .87 = 235,000

TOTAL COOLING CAPACITY = 370,500 X .96 = 355,680 BTUH

POWER INPUT = 29.25 X .99 = 28.95 KW

EFFECTIVE NOVEMBER, 1966—R2

Unit size 060B

Calc. X-EB-304-4 Rev. 0 — ATTACHMENT 2 — McQuay Catalog (Ref. D) — Sheet 1 of 1

TU ELECTRIC COMANCHE PEAK SES

UNIT DATA	ENT. AIR TEMP. DB	WB	85 TH	85 SH	85 KW	95 TH	95 SH	95 KW	105 TH	105 SH	105 KW	115 TH	115 SH	115 KW
RPS-060B 18,000 CFM 3-ROW EVAP. STD. COIL	75	71	758	315	65.2	722	301	70.4	685	287	75.7	644	272	81.2
		67	707	386	62.7	674	373	67.7	640	358	72.9	603	343	78.2
		63	***	***	****	***	***	****	***	***	****	563	413	75.2
	80	71	757	397	65.2	721	383	70.3	683	369	75.7	***	***	****
		67	707	469	62.6	674	455	67.7	639	440	72.9	602	425	78.2
		63	***	***	****	***	***	****	***	***	****	564	495	75.2
	85	71	756	480	65.1	721	466	70.3	683	451	75.6	643	436	81.2
		67	706	551	62.6	673	537	67.6	639	522	72.8	602	507	78.1
		63	***	***	****	***	***	****	601	584	70.3	570	570	75.7
	90	71	755	561	65.1	720	548	70.2	682	533	75.6	643	519	81.1
		67	707	633	62.6	675	618	67.6	641	602	73.0	606	584	78.5
		63	***	***	****	653	653	66.4	627	627	72.0	598	598	78.0
RPS-060B 20,000 CFM 3-ROW EVAP. STD. COIL	75	71	771	322	65.8	734	308	71.0	695	294	76.4	***	***	****
		67	721	400	63.3	687	386	68.4	650	371	73.5	612	356	78.9
		63	***	***	****	***	***	****	607	447	70.7	572	432	75.9
	80	71	770	412	65.8	733	398	71.0	694	383	76.3	***	***	****
		67	720	490	63.3	686	476	68.4	649	461	73.6	612	446	78.9
		63	***	***	****	***	***	****	609	538	70.7	573	521	76.0
	85	71	770	502	65.8	733	488	71.0	694	473	76.3	***	***	****
		67	720	580	63.3	686	566	68.3	650	551	73.5	612	535	78.9
		63	***	***	****	***	***	****	617	617	71.3	587	587	77.0
	90	71	769	591	65.7	732	578	70.9	693	563	76.3	***	***	****
		67	722	668	63.4	688	651	68.5	654	632	73.8	620	620	79.5
		63	702	702	62.4	676	676	67.8	648	648	73.4	617	617	79.4
RPS-060B 22,000 CFM 3-ROW EVAP. STD. COIL	75	71	782	329	66.4	744	315	71.6	704	300	76.9	***	***	****
		67	732	413	63.9	696	399	68.9	659	384	74.1	620	368	79.5
		63	***	***	****	650	481	66.2	616	466	71.3	580	451	76.4
	80	71	781	426	[illegible]	743	472	71.5	703	398	76.9	***	***	****
		67	730	510	63.9	696	496	68.9	658	481	74.1	619	466	79.4
		63	***	***	****	651	579	66.4	618	563	71.4	582	546	76.7
	85	71	781	523	66.3	743	509	71.5	702	495	76.9	***	***	****
		67	731	607	63.8	697	593	68.9	659	578	74.1	621	562	79.6
		63	***	***	****	662	662	67.0	633	633	72.4	602	602	78.2
	90	71	780	620	66.3	742	606	71.5	703	592	76.9	***	***	****
		67	735	699	64.1	702	680	69.2	668	668	74.6	634	634	80.5
		63	723	723	63.5	695	695	68.9	666	666	74.6	634	634	80.6
RPS-060B 24,000 CFM 3-ROW EVAP. STD. COIL	75	71	791	336	66.9	752	321	72.1	711	307	77.4	***	***	****
		67	741	426	64.4	705	411	69.4	666	396	74.6	626	380	80.0
		63	***	***	****	659	499	66.7	623	484	71.8	586	469	76.9
	80	71	791	440	66.8	752	426	72.0	711	411	77.4	***	***	****
		67	740	530	64.3	704	515	69.3	666	500	74.5	626	485	79.9
		63	***	***	****	661	604	66.8	626	587	71.9	590	568	77.3
	85	71	790	544	66.8	750	530	72.0	710	515	77.3	***	***	****
		67	742	635	64.3	706	620	69.4	668	604	74.7	628	587	80.1
		63	706	706	62.6	678	678	67.8	648	648	73.4	616	616	79.2
	90	71	790	649	66.8	752	635	72.0	712	620	77.4	***	***	****
		67	748	727	64.7	715	715	69.9	682	682	75.6	***	***	****
		63	742	742	64.5	713	713	69.9	682	682	75.6	***	***	****
RPS-060B 18,000 CFM 4-ROW EVAP.	75	71	806	336	67.5	766	321	72.7	724	305	78.1	***	***	****
		67	753	414	65.0	716	398	70.0	677	382	75.2	636	366	80.6
		63	702	490	62.4	668	475	67.3	632	459	72.3	595	442	77.6
	80	71	805	426	67.5	765	411	72.7	723	395	78.1	***	***	****
		67	752	504	64.9	715	488	70.0	676	472	75.3	635	456	80.6
		63	702	580	62.4	669	565	67.3	633	549	72.4	596	532	77.7
	85	71	804	516	67.4	765	500	72.7	723	485	78.0	***	***	****
		67	751	594	64.9	715	578	70.0	677	562	75.2	636	546	80.6
		63	707	668	62.5	675	650	67.7	641	630	73.0	607	607	78.5
	90	71	803	605	67.4	764	590	72.6	722	575	78.0	***	***	****
		67	755	683	65.1	719	666	70.2	682	648	75.6	***	***	****
		63	728	728	63.8	700	700	69.2	670	670	74.8	638	638	80.8
RPS-060B 20,000 CFM 4-ROW EVAP.	75	71	820	344	68.2	778	328	73.4	735	312	78.8	***	***	****
		67	766	429	65.6	728	414	70.7	688	397	75.9	***	***	****
		63	715	513	63.1	680	498	68.0	644	482	73.0	604	464	78.3
	80	71	819	443	68.1	778	427	73.4	734	411	78.7	***	***	****
		67	765	528	65.6	727	512	70.7	687	496	75.9	***	***	****
		63	717	612	63.1	681	596	68.1	645	580	73.2	606	561	78.5
	85	71	818	541	68.1	777	526	73.3	733	510	78.7	***	***	****
		67	766	627	65.6	728	611	70.7	689	595	75.9	647	577	81.4
		63	724	705	63.5	691	691	68.6	659	659	74.1	626	626	79.9
	90	71	818	640	68.1	777	625	73.3	734	609	78.7	***	***	****
		67	771	722	65.9	735	704	71.1	698	683	76.6	***	***	****
		63	754	754	65.1	725	725	70.6	693	693	76.3	***	***	****

8

OCT 30 1987

McQUAY AIR CONDITIONING

Commercial Packaged Cooling

PERFORMANCE DATA Sheet 1 of 1 **UF-B6**

ATTACHMENT 3 CALC X-EB-304-4 REV. 1

Model UF 240W

60 CYCLES A-C — COOLING PERFORMANCE – 8,000 CFM — 20 TONS

Condenser Leaving Water Temperature F	Evap. Entering Air Wet Bulb Temp. F	Unit Total Cooling Capacity BTUH Thous.	Evap. Leaving Air Wet Bulb Temp. F	Evaporator Entering Air Dry Bulb Temp. – F: 65	70	75	80	85	90	95	Comp. kW Input	Condenser Water: Entering Water Temp. F	GPM	Pressure Drop Ft.
				Sensible Cooling Capacity – Thousands BTUH										
85	62	236.5	51.7	113.5	149.0	186.5	186.5	186.5	186.5	186.5	17.45	65 70 75	29.5 39.4 59.0	2.0 3.4 7.0
	67	260.5	56.9	–	112.0	148.5	185.0	221.5	221.5	221.5	18.05	65 70 75	32.2 42.9 64.4	2.4 4.0 8.2
	72	283.5	62.2	–	–	110.5	144.5	181.1	218.0	256.0	18.60	65 70 75	34.7 46.2 69.4	2.7 4.5 9.4
	77	302.0	67.7	–	–	–	105.7	142.0	178.0	214.1	19.00	65 70 75	37.1 49.5 74.2	3.1 5.1 10.5
90	62	230.5	52.0	110.8	147.5	184.2	184.2	184.2	184.2	184.2	18.10	70 75 80	29.1 38.8 58.2	2.0 3.3 6.8
	67	254.0	57.2	–	109.2	144.5	182.9	218.2	218.2	218.2	18.80	70 75 80	31.8 42.4 63.6	2.3 3.9 R1 8.0
	72	277.0	62.4	–	–	108.0	144.0	180.0	216.0	252.0	19.40	70 75 80	34.3 45.7 68.6	2.6 4.4 9.2
	77	296.0	67.9	–	–	–	103.6	139.0	174.5	213.0	19.85	70 75 80	36.7 48.9 73.4	3.0 5.0 10.2
95	62	225.0	52.3	108.0	144.0	180.0	180.0	180.0	180.0	180.0	18.75	75 80 85	28.8 38.4 57.6	1.9 3.3 6.6
	67	247.0	57.5	–	106.2	143.2	180.2	214.5	214.5	214.5	19.50	75 80 85	31.4 41.8 62.8	2.2 3.8 7.8
	72	270.0	62.7	–	–	105.3	140.3	178.1	213.5	248.1	20.20	75 80 85	33.9 45.2 67.8	2.5 4.3 9.0
	77	290.5	68.1	–	–	–	101.7	136.5	174.3	209.2	20.70	75 80 85	36.3 48.4 72.6	2.9 4.9 10.0
100	62	219.5	52.6	105.1	142.5	177.5	177.5	177.5	177.5	177.5	19.45	80 85 90	28.4 37.9 56.8	1.9 3.2 6.3
	67	240.5	57.7	–	106.0	142.0	178.0	178.0	178.0	178.0	20.25	80 85 90	31.0 41.5 62.0	2.1 3.7 7.6
	72	263.5	62.9	–	–	105.4	139.6	176.5	210.2	247.5	21.00	80 85 90	33.6 44.8 67.2	2.4 4.2 8.8
	77	284.5	68.3	–	–	–	99.7	136.5	173.5	207.7	21.55	80 85 90	35.9 47.8 71.8	2.8 4.8 9.9

1. Performance is based on an air flow of 8,000 CFM over the evaporator coil. For air flow at other than 8,000 CFM refer to air flow correction factors. Rating in accordance with ARI Standard 210 is 240,000 BTUH. For units operating on 208 volts, deduct 5000 BTUH.
2. No allowance has been made for fan motor heat. Fan motor brake horsepower requirements should be converted to equivalent heat using the table on the reverse side of this sheet. Heat equivalent should be added to the cooling load or deducted from the unit capacity.
3. Power input is for compressor only. To obtain total unit power input convert fan horsepower requirements to kilowatts (using tables on the reverse side of this sheet) and add to the compressor kilowatt input.
4. Capacity is based on clean condenser tubes. For fouling factors of .0005 and .001 apply multipliers of .97 and .95 respectively to capacity only. Maximum condenser water side working pressure is 150 PSIG.
5. Shaded areas indicate dry coil operation and all sensible cooling.

AIR FLOW CORRECTION FACTORS

Factors	CFM: 6,400	7,200	8,000	8,800	9,600
Sensible Capacity	.87	.94	1.00	1.05	1.09
Total Cooling Capacity	.97	.98	1.00	1.01	1.03
Heating Capacity	.88	.94	1.00	1.06	1.12
kW Input	.99	.99	1.00	1.01	1.01

USE OF FACTORS

To adjust the performance of the UF 240W when 6,400 CFM of air is entering the evaporator at 80F dry bulb and 67F wet bulb, and a condenser leaving water temperature of 95F, apply factors as indicated below.

Sensible Capacity = 180,200 × .87 = 156,900
Total Cooling Capacity = 247,000 × .97 = 240,000
Power Input = 19.5 × .99 = 19.3 kW

TU ELECTRIC
COMANCHE PEAK SES

OCT 30 1987

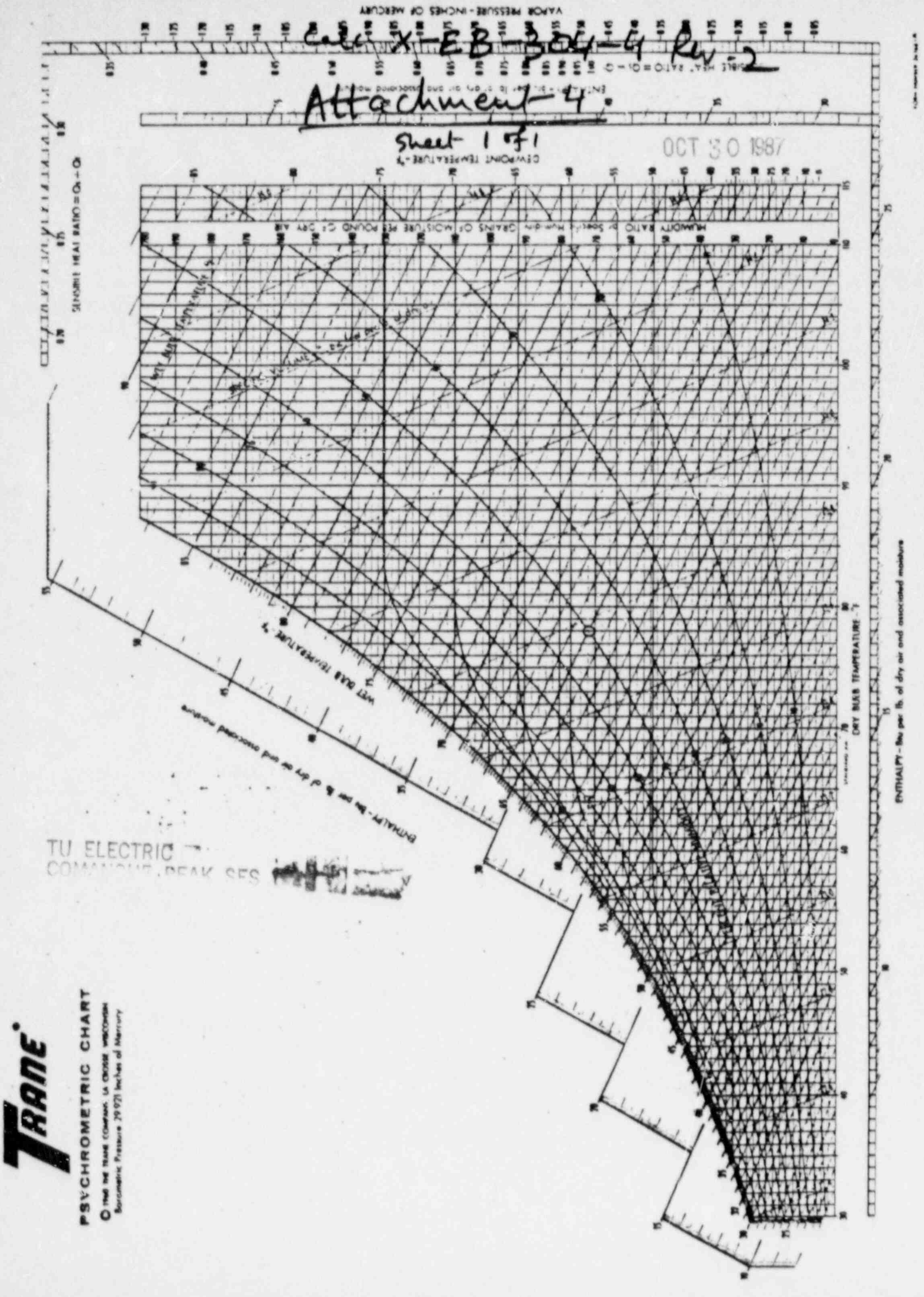
EFFECTIVE AUGUST, 1982

Calc X-EB-304-4 Rev 2

Attachment 4

Sheet 1 of 1

OCT 30 1987



NRC Open Item No. M-10:

Open Item M-10: Concerning functional capability of the Control Room charcoal filters, drawing 2323-M1-0308 and DCA 59135 show a fire line with an isolation valve connected to the filters. Downstream of the valve is a drip trap that would collect and drain valve leakage. Of concern is that the trap could be dry as there apparently is no provision for a trap primer. Upon filter operation, an air leak bypass could occur.

Response:

TU Electric will be requested to implement Maintenance/Surveillance procedures to ensure that the drip trap has sufficient water at all times to prevent the potential air leak path into the filtration unit. Ebasco has verified, by field inspection, that the traps of the air clean-up units have provision for priming.

Significance/Extent:

Air leakage through a "dry" trap could potentially reduce filtration unit effectiveness. The concern will be resolved by Administrative Procedures indicated above.

The extent is limited to air clean-up units, and the Administrative Procedures will address all such units.

NRC Evaluation:

Open Item M-11: The team noted the following examples where sections of the DBD either contradicted the above requirements or indicated that the SWIS Ventilation System relied upon a non-safety component to perform a safety function.

Sections 2.2 and 2.3.2 on Page 9 and Section 4.2 on Page 12 require maintaining the Intake Structure Heating System operational only during normal modes of plant operation and state the heating system is non-nuclear safety. Therefore, it cannot be relied upon during emergency modes.

Sections 2.3.3 Page 10, 4.2 Page 12 and 5.2.1.3 Page 21 state the Diesel Fire Pump Room Exhaust System is required to operate only during normal modes of plant operation and then only during operation of the Electric Motor-Driven Fire Pump.

Sections 5.12 Page 18 and 5.3.1 Page 23 discuss situations when the Service Water Pump Area Temperatures are well above 122°F and state the equipment is qualified to operate at a maximum temperature of 131.8°F.

Response:

Design Criteria Document DC-312 has been superseded by Design Basis Document DBD-ME-312. FSAR Table 9.4-2 is proposed to be revised as shown in Attachment 1, Ebasco to Impell letter, EB-T-3536, dated September 22, 1987. It is seen in Attachment 1 that the revised SWIS space temperature limits are:

126.2°F (Max.)	for normal operation,
131.8°F (Max.)	for emergency operation,
40°F (Min.)	for all modes.

The following responses to NRC comments are based on these revised commitments:

1. During emergency operation, the non-safety heaters are not needed. Heat generated by the operating Service Water pumps will be enough to maintain 40°F minimum space temperature.

   From Calculation X-EB-312-2, Rev. 1, the heating load is 153,180 BTUH with the outdoor temperature at 20°F. This does not take credit for heat gains from the operating pumps. From Calculation X-EB-312-1, Rev. 2, motor heat gain from each operating pump is 155,604 BTUH. At least one pump per plant unit will be operating. It can be seen that the heat from even one pump is adequate to offset the heat losses in winter. In view of these considerable heat gains, the space temperature will still be 40°F minimum, even if the space heaters are not operating.

2. The Diesel Fire Pump is abandoned in place (see Attachment 2). Hence, there is no heat load in the room under any plant operating condition. Consequently, the temperature in this room is of no concern. Subject DBD will be revised to reflect this position (see Attachment 3 for marked-up sheets).

   All loads other than those of the Electric Motor Driven Fire Pump (EMDFP) have been considered in Calculation X-EB-312-1 Rev. 2. Hence, the operation of Diesel Fire Pump Room (DFPR) exhaust fan is not required for maintaining space temperature unless the EMDFP is operating. If the EMDFP operates, the DFPR exhaust system removes its heat output. Also, note that fire coincident with LOCA is not a Design Basis Event. Therefore, it is clear that SWIS Ventilation System does not rely on the non-safety DFPR Ventilation System for maintaining the space temperatures.

3. As stated at the beginning of the response, the DBD supersedes the Design Criteria. Hence the Design Criteria requirement of 122°F is no longer applicable and the contradiction noted has been eliminated. The acceptability of room temperatures upto 131.2°F has been confirmed by Impell. See Attachment 4.

   List Of Attachments:

   1. Ebasco to Impell letter EB-T-3536, dated September 22, 1987.

   2. Comments by Engineering Planning & Management (EPM) on DBD-ME-312 Rev. 0 (Draft A).

   3. Pages of DBD-ME-312 Rev. 0, marked as stated in the above response.

   4. Impell to Ebasco letter IMT-1730 dated April 9, 1987.

Significance/Extent:

The comments are being resolved by some changes to the DBD. No changes to equipment, system, or procedures are needed. Hence there is no safety significance. The extent is limited to this system since the Open Item is specific to this system.

NRC Evaluation:

ATTACHMENT I OCT 30 1987 page 1 of 6

EBASCO SERVICES INCORPORATED
Two World Trade Center, New York, N.Y. 10048-0752

EBASCO

TU ELECTRIC
COMANCHE PEAK SES

September 22, 1987

M-11

EB-T- 3536
Files: 1-I-2
1-M-14
Reply Requested By:
October 2, 1987

OC7

Mr J Wawrzeniak
Impell Corporation
P O Box 1002
Glen Rose, Texas 76043

BLDG. SVCS. ENGRG.
SEP 22 1987
COMANCHE PEAK

Dear Mr Wawrzeniak:

SUBJECT: TU ELECTRIC
COMANCHE PEAK STEAM ELECTRIC STATION
HVAC SYSTEM
PROPOSED FSAR CHANGE TO TABLE 9.4-2

Ref:
1. Ebasco to TU Electric letter EB-T-3347, dated August 10, 1987
2. Ebasco to TU Electric letter EB-T-3529, dated September 21, 1987

With the above referenced letters Ebasco has submitted to TU Electric proposed changes to FSAR Table 9.4-2. A copy of the proposed changes is enclosed herewith.

Impell is hereby requested to review the FSAR Sections under their primary responsibility, in particular Section 3.11B "Environmental Design of Mechanical and Electrical Equipment", and process the required FSAR Changes consistent with the proposed changes to Table 9.4-2 attached herewith.

Please acknowledge receipt of this letter, and confirm Impell's initiation of this action. Your response is requested by October 2, 1987.

Feel free to call if you have any questions.

Very truly yours,

J P Padalino
Project Manager
New York Office

CBRR/dd
Attachment

OCT 30 1987

TU ELECTRIC
COMANCHE PEAK SES

cc: L D Nace
O W Lowe
R T Jenkins
F W Madden
M W Smith
D W Fuller (w/att)
P B Stevens
C Weary (w/att)
G Kast (Impell - Site) (w/att)
N Moisidis (Impell - Site)
D Bhatia (Impell - Site) (w/att)
File: ARMS (w/att)

bc: R C Iotti
E Odar
K Fitzgerald (w/att)
H K Patel
J P Padalino
J J Ruggiero (w/att)
L T Ahlman
N Barakat
C B R Rao (w/att)
G. Benedicto
R M Ramirez (w/att)
J Roth
File

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area	Normal Plant Operation – Normal: Maximum DB(°F)	Normal: Maximum RH%	Normal: Minimum DB(°F)	Cooldown: Maximum DB(°F)	Pressure In. of Wg
Auxiliary Building - AB					
AB - Elevator Machine Rm	122	*	40	N/A	Ambient
AB - All Other Areas	104	*	40	122	Slightly Negative
Electrical & Control Building - ECB					
1) ECB - Control Room	80	35-50	70	N/A	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	N/A	+0.125
3) ECB - UPS & Distribution Rooms ~~and Battery Rooms~~ &	104	*	40	N/A	Ambient
4) ECB - Uncontrolled Access Area	104	*	40	N/A	Ambient
5) ECB - Battery Rooms	104	*	70	N/A	Ambient
6) ~~5)~~ ECB - All Other Areas	104	*	40	N/A	Ambient

Building or Area	Emergency Conditions – Maximum DB(°F)	Maximum RH%	Minimum DB(°F)	Pressure In. of Wg
1) ECB - Control Room	80	~~35-50~~ 50	70	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	+0.125
3) ECB - UPS & Distribution Rooms	122	*	40	Ambient

Building or Area	Normal Plant Operation – Normal: Maximum DB(°F)	Normal: Maximum RH%	Normal: Minimum DB(°F)	Cooldown: Maximum DB(°F)	Pressure In. of Wg
Fuel Handling Building - FHB					
FHB - All Areas	104	*	40	122	Slightly Negative

*Uncontrolled
N/A Not Applicable
0714s

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Reactor Containment Buildings - RCB					
1) RCB - Outside Missile Barrier	120	*	50	120	Ambient
2) RCB - Inside Missile Barrier	140	*	50	140	Ambient
3) RCB - CRDM Shroud (Air Temperature)	163 Outlet	*	50	163	Ambient
4) RCB - Detector Well & Reactor Cavity	175	*	135 (Average Temp.)	175	Ambient
5) RCB - Reactor Coolant Pipe Penetrations	200	*	50	200	Ambient
Safeguard Buildings - SGB					
1) SGB - MS & FW Piping Area	104	*	40	104	Slightly Negative
2) SGB - All Other Areas	104	*	40	122	Slightly Negative
Diesel Generator Bldg - DGB					
1) DGB - All Areas	122	*	40	122	Ambient

	Emergency Conditions DB(°F) Max.
2) DGB - All Areas	129.2
Engineered Safety Features (AB, FHB and SGB)	
ESF - Pump Rooms	122
Engineered Safety Features - ESF (SGB)	
Electrical Areas	122

*Uncontrolled

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES
DURING NORMAL PLANT AND EMERGENCY CONDITIONS

OCT 30 1987

Building or Area (Cont'd)	Normal Plant Operation: Normal, Maximum DB(°F)	Normal, Maximum RH%	Normal, Minimum DB(°F)	Cooldown, Maximum DB(°F)	Pressure In. of Wg
Turbine Buildings - TB					
1) TB - All Other Areas	122	*	40	N/A	Ambient
2) TB - Switchgear Area	104	*	40	N/A	Ambient
3) TB - ERF - Computer Battery Rm	104	*	40	N/A	[illegible]
4) TB - CAS Rm	75	35-50	68	N/A	Ambient
- CPU Rm	75	35-50	68	N/A	Ambient
- UPS Rm	75	35-50	68	N/A	Ambient
- Battery Room	104	*	40	N/A	[illegible]
- HVAC Equip Rm	104	*	40	N/A	Ambient
5) TB - Office & Service Area A/C	80	35-50	70	N/A	Ambient
6) TB - Laboratories	75	35-50	[illegible]	N/A	Slightly Negative
7) TB - Hot Shop	85	*	[illegible]	N/A	Slightly Negative
Decontamination Area	75	*	68		
Service Water Intake Structure - SWIS					
1) SWIS - All Areas	126.2	*	40	122	Ambient

	Emergency Conditions DB(°F)
2) SWIS - All Areas	131.8

*Uncontrolled

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area (Cont'd)	Normal Plant Operation: Normal Maximum DB(°F)	Normal Maximum RH%	Normal Minimum DB(°F)	Cooldown Maximum DB(°F)	Pressure In. of Wg
Miscellaneous Building - MB					
1) MB - Alternate Access Point Bldg - (AAPB)	80	35-50	68	N/A	Ambient
2) MB - Circulating Water Intake Structure Chlorination Building (CWISCB)	115	*	40	N/A	Slightly Negative
3) MB - SWIS - Chlorination Bldg - (CB)	115	*	40	N/A	Slightly Negative
4) MB - Switchyard Relay House - SRH	80	35-50	68	N/A	Ambient
5) MB - Guard House - GH	80	35-50	68	N/A	Ambient
Maintenance and Administration Bldg					
M & AB	80	35-50	68	N/A	Ambient

*Uncontrolled

ATTACHMENT 2

B

TU ELECTRIC
COMANCHE PEAK SES

DESIGN BASIS DOCUMENT
COMMENT FORM

OCT 30 1987

Page 1 of 2

(1) SUBJECT: SERVICE WATER INTAKE STRUC. VENTILATION SYSTEM (2) DBD-ME-312 (3) REV. A

(3) DATE SUBMITTED: ______

(4) CLASS I ✓, CLASS II ______, NON-SAFETY ______

(5) Responsible Engineer: ______ (6) Return By:* ______

(7) REVIEW FORM DISTRIBUTION:

ECE: ______ MECH ______ ELEC ______ C/S ______

CONTRACTOR: ✓ MECH ______ ELEC ______ C/S

OTHER EPM FSSA

(8) COMMENTS:

Comment #	Page	Section	Discussion	Resolution
1	7	2.2	① WITH THE ADDITION OF THE NEW FIRE WATER PUMP HOUSE, THE EXISTING DIESEL FIREPUMP IS TO BE ABANDONED IN PLACE, THEREFORE THE SYSTEM IS NO LONGER REQ'D TO PURGE THE AREA OR PROVIDE COMBUSTION AIR TO THE DIESEL ENGINE.	Except for room identification (DFPR) all references to requirements of the diesel fire pump have been deleted, as well as references to the pump itself.
2	10	4.2	② DFPR EXHAUST SYSTEM IS NOT REQUIRED TO BE OPERATIONAL IN ALL NORMAL OPERATING MODES (1-6) SEE COMMENT #1	
3	17	5.2.1.3	③ ELIMINATE DIESEL DRIVEN FIRE PUMP — WORK WITH COMMENT #1	

accepted by EPM

*No response by this date may be documented as "No Comment" response for that reviewer.

(10) REVIEWER SIGNATURE/DATE: [signature] 7/10/87

DESIGN BASIS DOCUMENT
COMMENT FORM

OCT 30 1987

Page 2 of 2

TU ELECTRIC
COMANCHE PEAK SES

DBD- ME-312 Rev. 0

Comment	Page	Section	Discussion	Resolution
4	18	5.2.2.3	(4) ELIMINATE ITEM C (WORK WITH COMMENT #1)	See page 1 of 2
5	19	5.2.3.3	(5) ELIMINATE DIESEL DRIVEN FIRE PUMP (SEE COMMENT #1)	
6	23	6.2.3	(6) ELIMINATE DIESEL DRIVEN FIRE PUMP (SEE COMMENT #1)	

(10) REVIEWER SIGNATURE/DATE: [signature] 7/16/87

FORM: ECE-DC-17.2a

a. Service Water Pump Area (SWPA) Exhaust System

b. Intake Structure (IS) Heating System

c. Diesel Fire Pump Room (DFPR) Exhaust System

2.2 SYSTEM FUNCTIONS

The main design objective of SWPA Exhaust System is to remove from the intake structure the heat dissipated by the service water pump motors and other heat generating sources, so as to maintain the ambient temperature within design limits, during all modes of plant operation. The system is also required to intermittently purge the area to remove odors during periods when the system is not required to operate to perform its previously stated main function.

The IS Heating System is required to provide freeze protection in the intake structure during normal plant operation.

The DFPR Exhaust System is required to ventilate the [redacted] Electric Fire Pump Area (EFPA).

2.3 SAFETY AND SEISMIC CLASSIFICATION

2.3.1 SWPA EXHAUST SYSTEM

The Service Water Pump Area propeller exhaust fans, including the integral gravity dampers, are Safety Class 3 and Seismic Category I.

2.3.2 IS HEATING SYSTEM

The Intake Structure electric unit heaters are Non-Nuclear Safety (NNS) and Non-Seismic. However, they are seismically supported.

Heating System is required to provide heating in the winter to prevent freezing. The DFPR exhaust system is required to ventilate the [redacted] EFPA. The SWIS Ventilation System is required to be designed, fabricated, installed and operated to meet the applicable requirements of 10CFR50 Appendix A, GDC 1,2,3,4 and 5, Appendix B and NRC Reg Guides 1.26, 1.29 and 1.68.

4.2 REQUIRED OPERATION MATRIX

The plant conditions under which the SWIS Ventilation System or portions thereof are required to operate are delineated in the following matrix:

	PLANT CONDITIONS			
	NORMAL MODES	UPSET	EMERGENCY	FAULTED
ENTIRE SYSTEM	X	-	-	-
SWPA EXHAUST SYSTEM	X	X	X	X
XS HEATING SYSTEM	X	-	-	-
DFPR EXHAUST SYSTEM	X	-	-	-

4.3 FUNCTIONAL REQUIREMENTS

The SWIS Ventilation System is required to maintain the indoor temperature between 40°F DB and 122°F DB (Reference 11.1.1, FSAR Section 9.4B.1) under the following outdoor environmental conditions (Reference 11.1.1, FSAR Table 9.4-1).

Outdoor Conditions:

Extreme Summer Temperature	110°F DB/80°F WB(4)
Winter Temperature	10°F DB
Average Wind Veloity	15 MPH

The DFPR Exhaust System shall have a heat removal capacity of (Later)[1] Btu/HR (Reference, Later[1]) with an exhaust air flow rate of 8,000 ACFM (Reference 11.1.4.1), so as to limit the [redacted] EFPA temperature within the maximum design limit.

4.3.1.2 DAMPER REQUIREMENTS

Gravity dampers are required to be provided wherever it is necessary for isolation purposes, to prevent backflow of outdoor air into the building through the wall opening of a non-operating exhaust fan. Fire dampers are required in all fire barrier.

4.3.1.3 DUCTWORK REQUIREMENTS

There are no specific requirements associated with SWIS Ventilation System ductwork.

4.3.2 INSTRUMENTATION AND CONTROL REQUIREMENTS

Instruments and controls are required for the safety related systems, to provide audible and visual alarms in the Control Room, continuously monitor system performance, and alert Operators of system malfunction, in compliance with 10CFR50, Appendix A, GDC 13. Instruments and Controls are required to meet the requirements of NRC RG 1.47.

5.1.3 IS Heating System

The IS winter design heating load is 153,180 Btu/HR (Reference 11.1.3b, Calculation X-EB-312-2,Rev. 0). To meet this heating load, six 7 1/2 KW electric unit heaters, placed inside the perimeter of the Intake Structure, are provided.

5.1.4 DFPR Exhaust System

The DFPR Exhaust System cools and ventilates the [redacted] Electrical Fire Pump Area (EFPA) by inducing 100% outdoor air into the area served. The system consists of one 100 percent capacity vaneaxial fan, a gravity damper downstream of the fan, fire dampers, ductwork, and the instrumentation necessary for system operation and control. The vaneaxial exhaust fan is rated for a total 8000 SCFM air flow (6000 SCFM from the EFPA[1], and 2000 SCFM from the DFPR[1]). Thus, the total amount of outdoor make-up air required to satisfy the above exhaust requirements is approximately 8000[1] SCFM. It is drawn from the underground water reservoir space into the EFPA via a grated floor opening. Thereafter, approximately 2000[1] SCFM is transferred from the EFPA to the DFPR to satisfy the exhaust make-up air requirements of the room. This air is transferred into the room through a wall opening, equipped with a fire damper. Air is exhausted directly from both the DFPR and EFPA by means of the vaneaxial exhaust fan, and is discharged directly to the outdoors.

5.3.3 DFPR EXHAUST SYSTEM

The DFPR Exhaust System is the once through type, utilizing all-outdoor air to cool ~~the Diesel Driven Fire Pump Room and~~ the Electric Motor Driven Fire Pump Area. The system performance is similar to SWPA Exhaust System described in Section 5.3.1.

5.4 SYSTEM LIMITATIONS AND PRECAUTIONS

The SWPA and DFPR Exhaust Systems are designed for the outdoor summer extreme temperature of 110°F. If this temperature is exceeded, there could be corresponding excursions in indoor temperature. However, such excursions are not anticipated, due to the conservative selection of the outdoor design temperature and the thermal storage effect of the structure and equipment.

The IS Heating System is designed to maintain a minimum temperature of 40°F DB for freeze protection with outdoor design temperature of 20°F. At outdoor temperature substantially below 20°F, the indoor temperature might possibly fall below the freezing point. However, this is unlikely since the heating load calculations conservatively did not take into account the heat gains from equipment and the thermal storage characteristics of structure and contents. Furthermore, if necessary, additional portable electric heaters can be utilized.

6.0 INSTRUMENTATION AND CONTROL SYSTEMS DESCRIPTION

6.1 GENERAL

All instruments associated with SWIS Ventilation System are included in the Instrumentation and Control Equipment List (ICEL). The instrumentation and control logics are shown on the Instrumentation and Control Diagram 2323-M1-2312-01. Sufficient parameters and status indications for fans and heaters are

Non 1E Power Supply System: Non-safety related electric power supply to electric unit heaters, DFPR exhaust fan and controls. Refer to Drawings 2323-E1-0014 and ECE-E1-0014-A.

Class 1E Power Supply System: Safety related electric power supply to the SWPA exhaust fans and associated safety related controls. Refer to Drawings 2323-E1-0014 and 2323-E2-0014.

9.2 SUPPORT SERVICES SUPPLIED

The SWIS Ventilation System is required to provide adequate outdoor air for ventilation of the SW Pump Area, ~~the Diesel Fire Pump Room~~ and the Electrical Fire Pump Area of the SW Intake Structure. The system is also required to ensure freeze protection for the SW Intake Structure in winter. The system air flows required to satisfy the above requirements are shown on Flow Diagram 2323-M1-312.

10.0 EQUIPMENT DESCRIPTION

The following is principal performance data and construction features of the major equipment and components. This information is extracted from the equipment specifications, vendor drawings and instruction manuals

10.1 PROPELLER EXHAUST FANS

Tag Nos.	CPX-VAFNWV-02
	CPX-VAFNWV-03
	CPX-VAFNWV-04
	CPX-VAFNWV-05
	CPX-VAFNWV-06
	CPX-VAFNWV-07
	CPX-VAFNWV-08
	CPX-VAFNWV-09

TU ELECTRIC
COMANCHE PEAK SES

OCT 30 1987

IMPELL CORPORATION

IMT- 1730

Attachment 4
Sheet 1 of 5

RECEIVED

April 9, 1987

J P PADALINO

TO: EBASCO Services Incorporated
Two World Trade Center
New York, NY 10048

ATTENTION: J. P. Padalino

SUBJECT:

COMANCHE PEAK STEAM ELECTRIC STATION
AS-BUILT HVAC CALCULATIONS
SERVICE WATER INTAKE STRUCTURE TEMPERATURES

REFERENCES:

1) EB-T-1131
2) Calculation No. X-EB-312-3, Rev. 0
As-Built HVAC Calculations,
Seasonal Temperature Profile.

Reference 2 (EBASCO Calculations), determined a typical year temperature profile for the various rooms in the Service Water Intake Structure. These calculations revealed that the maximum normal operating temperature of 122° F, and the postulated accident maximum temperature of 122° F, are exceeded by 4.2° F and 9.8° F, respectively (Reference 1). Consequently, EBASCO has requested Impell to determine the impact on the qualification status of the equipment in the subject area.

Impell Equipment Qualification Group (EQG) has reviewed the applicable qualification documentation for the various Class 1E devices located in rooms 275A, 275B, 275C, 275D, 275E, 275F, 275G, and 277, and has concluded that the equipment is qualified operate at the maximum temperature of 131.8° F as indicated in Reference 2.

In addition, Impell performed a preliminary calculation to determine the qualified lives for the Class 1E equipment in the subject rooms. Table 1 of the attachment compares the actual qualified life of the various Class 1E equipment with those calculated at the current design normal maximum temperature (122° F) and the maximum normal temperature calculated in Reference 2 (126.2° F). The actual qualified life is based on the time/temperature spectrum calculated by EBASCO in Reference 2.

When the time/temperature spectrum is considered the actual qualified lives of the equipment in the subject rooms are of acceptable duration.

Impell is in the process of formalizing supporting calculations. These calculations will be included in the appropriate EQ documentation upon any decision to modify the subject HVAC system.

Georg R. Kast
Project Engineer
Equipment Qualification

GRK:DHB:PC:MCP:mw
Attachment

cc: ARMS

C. S.	Keary	(TU Electric w/att)
R.	Gillis	(TU Electric w/att)
E.	Alarcon	(TU Electric w/att)
R.	Williams	(TU Electric w/att)
R.	Kohli	(SWEC w/att)
J.	Lamarca	(SWEC w/att)
S.	Gharakhanian	(Impell w/att)
B.	Cooke	(Impell w/att)
N.	Moisidis	(Impell w/att)

Attachment 4
Sheet 3 of 5

TU ELECTRIC OCT 30 1987
COMANCHE PEAK SES

IMT - 1730

TABLE 1

PRELIMINARY SUMMARY OF QUALIFIED LIFE OF CLASS 1E EQUIPMENT IN THE SERVICE WATER INTAKE STRUCTURE

COMPONENT	QUALIFIED LIFE (YEARS) @126.2° F (3)	@122° F (2)	Actual (1)
Rosemount Transmitter Series "B"			
Electronic Boards	3	4.	19.5
Transmitter	7	9.	>40
O-Ring	25.5	35.5	>40
Namco Limit Switch			
Model EA-180	6.5	8	>40
Asco Solenoid Model NP 8320 (4)			
Coil	5	5.5	20.5
Viton Elastomer	6	7.5	35
Limtorque Motor Operator	>40	>40	>40
MCC's (5)			
Starters			
Size 1			
CR 209C Reverser	4	4.5	27
CR 206C Starter	4	4.5	27
CR 205C Contactor	4	4.5	27
Size 2			
CR 209D Reverser	4	4.5	27
CR 206D Starter	4	4.5	27
CR 205D Contactor	4	4.5	27
CR 224D Overload Relay	32.5	>40	>40
Size 3			
CR 209E Reverser	4	4.5	27
CR 206E Starter	4	4.5	27
CR 205E Contactor	4	4.5	27
CR 224E Overload Relay	32.5	>40	>40
Size 4			
CR 206F Starter	4	4.5	27
CR 224F Overload Relay	32.5	>40	>40

Attachment 4
Sheet 4 of 5

COMPONENT	QUALIFIED LIFE (YEARS) @126.2° F (3)	@122° F (2)	Actual (1)
Starters Cont.			
Size 5			
CR 206G	4	4.5	27
Size 6			
CR 286H Starter	32.5	41	>40
CR 285H Contactor	3.5	4	15
Circuit Breakers			
"E" Frame			
480 V TED	4	5.5	30.5
600 V TED (TEC)	4	5.5	30.5
600 V THED	4	5.5	30.5
"J" Frame			
THJK	3.5	4.5	27.5
TJC	3.5	4.5	27.5
"F" Frame			
THFK	10.5	13	>40
TFC	6.5	8	>40
TFJ	6.5	8	>40
Various Components			
CR 120 B Auxilary Relay	19	24	>40
G.E. 8411-3 Fuse Block	13.5	17	>40
ITT Exane II Lead Wire	15.5	12	>40
AMP PIDG Terminals	>40	>40	>40
G.E. SBM Switch	1	1.5	12.5
Gould Control Fuse, GEFD-001	>40	>40	>40
Agostat E 7000 Series	1.5	2	10
CR 120Y Undervoltage Relay	1.5	1.5	4.5
CR 282 Pneumatic Timer	15.5	19.5	>40
CR 294 Indicator Light	18	22.5	>40
CR 294 Pushbutton	18	22.5	>40
CR 294 Selector Switch	18	22.5	>40
Auto Transfer Switch-Terminal Boards	13.5	17	>40
Bus Barrier & Supports	>40	>40	>40
RTV Silicone Sealer	15	19	>40
Grommets	23.5	29.5	>40
Vertical Bus Sleeving	>40	>40	>40
Terminal Boards	14.5	17.5	>40

Attachment 5
Sheet 5 of 5

IMT- 1730

NOTES

(*) This summary is preliminary.

(1) Actual is based on Room 275 B yearly time/temperature profile from EBASCO Calc. No. X-EB-312-3, Rev. O. (this room has most severe temperatures)

(2) Design basis maximum temperature

(3) Calculated maximum temperature (Calc. No. X-EB-312-3, Rev. 0)

(4) Solenoids considered to be normally energized (most severe case)

(5) Generic components to MCC's (not tag specific)

Open Item M-12: DC-313, in Section 3.1, page 1, states the UPS and distribution rooms shall be maintained between 40°F and 104°F during all modes of plant operation. The subject document in Sections 4.3, page 13 and 11.1.3a, page 37 states that during either upset, emergency or faulted modes indoor temperatures are required to be maintained between 122°F and 40°F.

In the subject document, Section 11.1.3, page 37, b. Summary conflicts with Section 10.13, page 27 concerning the static pressure developed by the fan to move air through the ductwork (1.5 vs. 3 inches). The static pressure calculation document number is not referenced in this DBD.

Response:

1. Design Criteria Document DC-313 is superseded by Design Basis Document DBD-ME-313. The design space temperatures shown in the subject document (DBD-ME-313, Rev. 0) are the ones that are applicable. Attachment 1, Ebasco to Impell Letter EB-T-3536, dated September 22, 1987, showing the proposed FSAR changes to Table 9.4-1 "Indoor Space Design Temperatures, Humidities and Pressures During Normal Plant and Emergency Conditions", agrees with temperatures in the DBD.

2. The fan static pressure of 3" WG shown in Section 10.13, page 27 of DBD-ME-313 is the vendor-provided performance data. Section 11.1.3b, Summary on page 37 of the DBD shows a fan static pressure of 1.5" WG which is taken from Gibbs & Hill Calculation No. 0305-4F, Rev. 0. A reference to this calculation is already provided in DBD Section 11.1.3b on page 37. As the available fan static pressure exceeds the calculated required static pressure, the fan selection provides a margin of safety. The final safety margin will be determined when Ebasco completes the pressure loss calculation.

Significance/Extent:

The fan static pressure is higher than the currently calculated pressure drop through the ductwork. Hence there is no safety concern.

NRC Evaluation:

TU ELECTRIC
COMANCHE PEAK SES ATTACHMENT 1 OCT 30 1987 page 1 of 6

EBASCO SERVICES INCORPORATED EBASCO

Two World Trade Center, New York, N.Y. 10048-0752

M-12

September 22, 1987

EB-T-3536
Files: 1-I-2
1-M-14
Reply Requested By:
October 2, 1987

OC7

Mr J Wawrzeniak
Impell Corporation
P O Box 1002
Glen Rose, Texas 76043

NUC. SVCS. ENGRG.
SEP 22 1987
COMANCHE PEAK

Dear Mr Wawrzeniak:

SUBJECT: TU ELECTRIC
COMANCHE PEAK STEAM ELECTRIC STATION
HVAC SYSTEM
PROPOSED FSAR CHANGE TO TABLE 9.4-2

Ref:
1. Ebasco to TU Electric letter EB-T-3347, dated August 10, 1987
2. Ebasco to TU Electric letter EB-T-3529, dated September 21, 1987

With the above referenced letters Ebasco has submitted to TU Electric proposed changes to FSAR Table 9.4-2. A copy of the proposed changes is enclosed herewith.

Impell is hereby requested to review the FSAR Sections under their primary responsibility, in particular Section 3.11B "Environmental Design of Mechanical and Electrical Equipment", and process the required FSAR Changes consistent with the proposed changes to Table 9.4-2 attached herewith.

Please acknowledge receipt of this letter, and confirm Impell's initiation of this action. Your response is requested by October 2, 1987.

Feel free to call if you have any questions.

Very truly yours,

J. P. Padalino

J P Padalino
Project Manager
New York Office

CBRR/dd
Attachment

 OCT 30 1987

ATTACHMENT 1

cc:	L D Nace	
	O W Lowe	
	R T Jenkins	
	F W Madden	
	M W Smith	
	D W Fuller	(w/att)
	P B Stevens	
	C Weary	(w/att)
	G Kast	(Impell - Site) (w/att)
	N Moisidis	(Impell - Site)
	D Bhatia	(Impell - Site) (w/att)
	File: ARMS	(w/att)

bc:	R C Iotti	
	E Odar	
	K Fitzgerald	(w/att)
	H K Patel	
	J P Padalino	(w/att)
	J J Ruggiero	
	L T Ahlman	
	N Barakat	(w/att)
	C B R Rao	
	G. Benedicto	(w/att)
	R M Ramirez	
	J Roth	
	File	

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area	Normal Plant Operation: Normal, Maximum DB(°F)	Normal, Maximum RH%	Normal, Minimum DB(°F)	Cooldown, Maximum DB(°F)	Pressure In. of Wg
Auxiliary Building - AB					
AB - Elevator Machine Rm	122	*	40	N/A	Ambient
AB - All Other Areas	104	*	40	122	Slightly Negative
Electrical & Control Building - ECB					
1) ECB - Control Room	80	35-50	70	N/A	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	N/A	+0.125
3) ECB - UPS & Distribution Rooms ~~and Battery Rooms~~	104	*	40	N/A	Ambient
4) ECB - Uncontrolled Access Area	104	*	40	N/A	Ambient
5) ECB - Battery Rooms	104	*	70	N/A	Ambient
6) ~~5)~~ ECB - All Other Areas	104	*	40	N/A	Ambient

	Emergency Conditions: Maximum DB(°F)	Maximum RH%	Minimum DB(°F)	Pressure In. of Wg
1) ECB - Control Room	80	~~35-50~~ 50	70	+0.125
2) ECB - Mechanical Equip. Rooms	104	*	40	+0.125
3) ECB - UPS & Distribution Rooms	122	*	40	Ambient

Building or Area	Normal Plant Operation: Normal, Maximum DB(°F)	Normal, Maximum RH%	Normal, Minimum DB(°F)	Cooldown, Maximum DB(°F)	Pressure In. of Wg
Fuel Handling Building - FHB					
FHB - All Areas	104	*	40	122	Slightly Negative

*Uncontrolled
N/A Not Applicable
0714s

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Reactor Containment Buildings - RCB					
1) RCB - Outside Missile Barrier	120	*	50	120	Ambient
2) RCB - Inside Missile Barrier	140	*	50	140	Ambient
3) RCB - CRDM Shroud (Air Temperature)	163 Outlet	*	50	163	Ambient
4) RCB - Detector Well & Reactor Cavity	175	*	135 (Average Temp.)	175	Ambient
5) RCB - Reactor Coolant Pipe Penetrations	200	*	50	200	Ambient
Safeguard Buildings - SGB					
1) SGB - MS & FW Piping Area	104	*	40	104	Slightly Negative
2) SGB - All Other Areas	104	*	40	122	Slightly Negative
Diesel Generator Bldg - DGB					
1) DGB - All Areas	122	*	40	122	Ambient

	Emergency Conditions DB(°F) Max.
2) DGB - All Areas	129.2
Engineered Safety Features (AB, FHB and SGB)	
ESF - Pump Rooms	122
Engineered Safety Features - ESF (SGB)	
Electrical Areas	122

*Uncontrolled

ATTACHMENT 1

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Turbine Buildings - TB					
1) TB - All Other Areas	122	*	40	N/A	Ambient
2) TB - Switchgear Area	104	*	40	N/A	Ambient
3) TB - ERF - Computer Battery Rm	104	*	40	N/A	
4) TB - CAS Rm	75	35-50	68	N/A	Ambient
- CPU Rm	75	35-50	68	N/A	Ambient
- UPS Rm	75	35-50	68	N/A	Ambient
- Battery Room	104	*	40	N/A	
- HVAC Equip Rm	104	*	40	N/A	Ambient
5) TB - Office & Service Area A/C	80	35-50	70	N/A	Ambient
6) TB - Laboratories	75	35-50	68	N/A	Slightly Negative
7) TB - Hot Shop Decontamination Area	85 75	* *	68 68	N/A	Slightly Negative
Service Water Intake Structure - SWIS					
1) SWIS - All Areas	126.2	*	40	122	Ambient
	Emergency Conditions DB(°F)				
2) SWIS - All Areas	131.8				

*Uncontrolled

ATTACHMENT 1

Page 6 of 6

TABLE 9.4-2

INDOOR SPACE DESIGN TEMPERATURES, HUMIDITIES AND PRESSURES DURING NORMAL PLANT AND EMERGENCY CONDITIONS

Building or Area (Cont'd)	Normal Plant Operation				
	Normal			Cooldown	
	Maximum		Minimum	Maximum	Pressure
	DB(°F)	RH%	DB(°F)	DB(°F)	In. of Wg
Miscellaneous Building - MB					
1) MB - Alternate Access Point Bldg - (AAPB)	80	35-50	68	N/A	Ambient
2) MB - Circulating Water Intake Structure Chlorination Building (CWISCB)	115	*	40	N/A	Slightly Negative
3) MB - SWIS - Chlorination Bldg - (CB)	115	*	40	N/A	Slightly Negative
4) MB - Switchyard Relay House - SRH	80	35-50	68	N/A	Ambient
5) MB - Guard House - GH	80	35-50	68	N/A	Ambient
Maintenance and Administration Bldg					
M & AB	80	35-50	68	N/A	Ambient

*Uncontrolled

January 8, 1988

NRC Open Item No. M-13:

The UPS refrigeration units use Component Cooling Water (CCW) for condensing purposes as does the Control Room refrigeration units; however, DBD-ME-313 does not, in System Limitations and Precautions, Section 5.4 page 19, mention a precaution for the low, 40°F, condensing water temperature as does DBD-ME-304 page 34 (Open Item M-8). Section 6.3.1, page 21 states that a pneumatic flow control valve in the water cooled condenser inlet regulates flow rate of the CCW. It is our understanding most air conditioning equipment manufacturers give precautions against using condensing water temperatures below 55°F. The manufacturer's acceptance of this flow control method to accommodate the low condensing water temperature should be confirmed in order to ensure that the safety related performance of these units is not compromised.

Response:

As seen in Attachment 1, SWEC to TU Electric Letter, SWTU-0755, dated February 12, 1987, the vendor of these air conditioners has confirmed that the flow control method will operate satisfactorily down to the minimum expected water temperature (40°F) entering the condenser. Flow control is accomplished by the modulation of the component cooling water (condenser water) flow rate in response to refrigerant head pressure. The condenser water modulating control valve, which is furnished as a part of the safety-related air conditioning unit, is safety-related. Hence there are no special precautions for low water temperature to be incorporated into the DBD. R1

Significance/Extent:

There is no safety significance as the manufacturer of this air conditioner has already confirmed that the control system provided is adequate for condenser water temperatures down to 40°F. The air conditioning unit, including the control valve for flow modulation, is safety-related. R1

Extent limited to refrigeration equipment with water-cooled condensers. All such systems have already been reviewed. See Attachment 1 and the response to Open Item M-8.

NRC Evaluation:

COPY

STONE & WEBSTER ENGINEERING CORPORATION - ELECTRIC
COMANCHE PEAK SES

M-13

494 Attachment 1
Sheet 1 of 5

Copy to J P Padalino

OCT 30 1987

F.C HVAC Chillers

Copy to:
RECamp
RPBaker
FMadden
JLBarker
RTJenkins
RLGrubb (IM)
RCIotti (KB)
SMReynerson
ARMS

R. C. IOTTI
FEB 18 1987

RECEIVED
FEB 26 1987
J. P. BADALINO

Mr. J. E. Krechting
Director of Engineering
TU ELECTRIC
P. O. Box 1002
Glen Rose, Texas 76043

February 12, 1987
J. O. No. 16345
SWTU- 0755
No Response Required

STATUS UPDATE
SIGNIFICANT DEFICIENCY ANALYSIS REPORT - SDAR - CP-86-18
SAFETY CHILLED WATER SYSTEM CHILLER UNITS (SN-0151)
COMANCHE PEAK STEAM ELECTRIC STATION - UNITS 1 & 2
TU ELECTRIC

Statement of Problem:

SDAR CP-86-18 addresses the failure to maintain component cooling water (CCW) supply temperatures at or above the chilled water return temperature for both the operating and standby safety chillers. This condition was evaluated as a significant deficiency in final design and reported under 10CFR50.55(e). (Ref. TXX-4820 dated May 21, 1986).

Present Status & Plan of Action:

Subsequent to the assumption of responsibility for this effort in late November 1986, SWEC prepared a report for TUE (SWTU-0348 dated December 15, 1986) outlining the advantages and disadvantages of the two most attractive options to resolve the CCW low temperature problem with a recommendation to implement option 1. The options were as follows:

1. Qualification/Modification of components for 40°F CCW inlet temperature.

2. Installation of an 18" bypass line.

Based upon the SWEC recommendation, TUE directed SWEC to proceed with option 1 (Ref. NE-1753, dated January 21, 1987).

Twenty-seven components served by the CCW system are affected (See Attachment). The components must either be qualified by analysis to accept the 40 degree F CCW inlet temperature or have individual component and/or system modifications made. Presently, all vendors have been contacted to ascertain the acceptability of the 40 degree F CCW inlet temperature; this had not previously been done. All vendors have not yet responded.

The following discussion summarizes the status. Three vendors require component/system modification (three components), two vendors are currently analyzing the acceptability of the 40 degree F CCW inlet temperature for eighteen components, and all other vendors have verified that the remainder of the components (6) can accept the 40 degree F CCW inlet temperature without modification.

A. Components Requiring Modification

o <u>York International Co. - Safety Chillers</u>

York has advised that the safety chillers will operate satisfactorily both during operation and upon startup from the standby to full load conditions with 40 degree F CCW inlet temperature based on the implementation of the following chiller and CCW system modifications: (a) The addition of a flow regulating valve in the condenser CCW outlet piping to maintain condenser refrigerant pressure above evaporator pressure. This modification will also require the addition of a pressure controller on the refrigerant side of the condenser to control the operation of the flow regulating valve (b) The CCW not be allowed to circulate through the condenser prior to chiller startup to avoid low oil pressure trips resulting from refrigerant boiling out of the oil due to a sudden decrease in refrigerant pressure caused by circulating cold CCW through a standby chiller <u>and</u> (c) The present refrigerant cooled oil cooler be replaced by a water cooled oil cooler as the evaporator refrigerant temperatures for certain conditions exceed the maximum temperature for the existing refrigerant cooled oil cooler.

o <u>Trane Co. - Ventilation Chillers</u>

Trane has advised that the ventilation chillers will operate satisfactorily both during operation and upon startup from the standby to full load conditions with 40 degree F CCW inlet temperature based upon the addition of a flow regulating valve in the condenser CCW outlet piping to maintain condenser refrigerant pressure above evaporator pressure. This modification will also require the addition of a pressure or differential pressure controller on the refrigerant side of the chiller to control the operation of the flow regulating valve.

- <u>Ingersoll-Rand Co. - Instrument Air Compressors</u>

  Ingersoll-Rand has advised that the instrument air compressor will operate satisfactorily with 40 degree F CCW inlet temperature based on the implementation of one of the following CCW system modifications: (a) In a base load unit, the addition of a thermostatic control valve in the compressor CCW discharge piping to maintain the compressor CCW inlet temperature above 60 degree F and the compressor CCW outlet temperature between 100 - 110 degrees F to prevent water condensation in the compressor internals. If the unit is also used as a standby, an on-off solenoid valve is required in the compressor CCW discharge piping, in addition to the thermostatic control valve, to terminate CCW flow when the compressor is not operating <u>or</u> (b) The addition of CCW bypass piping to reverse CCW flow direction through the compressor, i.e., to the aftercooler first and then to the jacket, during cold weather <u>and</u> the addition of a thermostatic control valve in the compressor CCW discharge piping to maintain the CCW inlet/outlet temperature within the allowable parameters to prevent water condensation in the compressor internals.

SWEC is in the process of evaluating/implementing the above vendor recommendations.

B. Components Being Analyzed

- <u>Joseph Oat Corporation - Containment Spray/Spent Fuel Pool Heat Exchangers</u>

  Joseph Oat needs to analyze for the possibility of overstressing of the containment spray heat exchanger tube U-bends due to the CCW temperature differential. Field Requisition No. 54220 is being processed for this work. Joseph Oat has stated that the spent fuel pool heat exchangers are exposed to similar stresses which are not as severe. It is expected that the containment spray heat exchanger analysis will envelop the spent fuel pool heat exchangers.

  A favorable response is expected from J. Oat in mid-March 1987.

c Westinghouse - Miscellaneous Equipment

1. An analysis is being performed to show that the thermal shock after a loss of CCW will not be a problem to the RCP thermal barrier coolers. A favorable response is expected from Westinghouse in late March 1987.

2. An analysis of the impact of 40 degree F CCW on other Westinghouse supplied equipment is also being performed. A favorable response is expected from Westinghouse in early March 1987.

All analyses and modifications are presently scheduled to be complete, including installation, by the end of November 1987, for Unit 1.

SWEC is finalizing the required design modifications. We anticipate submitting our next status update June 8, 1987.

Should you need additional information, please contact Mr. R. Simons at extension 6552.

SLStamm
Project Engineering Manager

KAK:SLA

Attachment 1
Sheet 5 of 5

OCT 30 1987
TU ELECTRIC
COMANCHE PEAK SES

Attachment To SWTU-0755

February 12, 1987

Components Served by Component Cooling Water System

Component	Safety Related	Vendor	Acceptable at 40 Degree F CCW Temperature
1. Safety Chillers - Condensers	yes	York	No - mod. req'd
2. Vent. Chillers - Condensers	no	Trane	No - mod. req'd
3. Instr. Air Compr. - Jacket/ Aftercooler	no	Ing.-Rand	No - mod. req'd
4. Contmt. Spray Heat Exchangers	yes	J.Oat	Pending Verif.
5. Spent Fuel Pool Ht.Exchangers	yes	J.Oat	Pending Verif.
6. Waste Gas Compr. Pkgs. - Seal Water Coolers	yes	West.	Pending Verif.
7. Catlyt. Recombiner Pkgs. - Heat Exchangers	yes	West.	Pending Verif.
8. Seal Wtr. Ht. Exchangers	yes	West.	Pending Verif.
9. Letdown Heat Exchangers	yes	West.	Pending Verif.
10. Letdown Chillers - Condensers	no	West.	Pending Verif.
11. RHR Pump Seal Coolers	yes	West.	Pending Verif.
12. RHR Heat Exchangers	yes	West.	Pending Verif.
13. RCP Thermal Barrier Coolers	yes	West.	Pending Verif.
14. RCP Upr Brg. Lube Oil Clrs.	yes	West.	Pending Verif.
15. RCP Lwr Brg. Lube Oil Clrs.	yes	West.	Pending Verif.
16. RCP Motor Air Coolers	yes	West.	Pending Verif.
17. RCDT Heat Exchangers	yes	West.	Pending Verif.
18. Excess Letdown Ht Exchangers	yes	West.	Pending Verif.
19. Flr Drn. Evaporator Pkgs. - Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
20. Wst. Evaporator Pkgs. - Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
21. Boron Recycle Evap. Pkgs.- Evap. Cond., Vent Cond., Dist. Cooler	no	West.	Pending Verif.
22. Pos. Disp. Chg. Pump - Hydraulic Coupling Oil Clr.	yes	West.	yes
23. Process Sample Coolers	no	Sentry Equip.	yes
24. PASS Sample Coolers	no	Sentry Equip.	yes
25. Contmt. Spray Pmps.-Seal Clrs.	yes	Bingham-Will.	yes
26. Cntrl. Rm. Air Conditioners-Condensers	yes	CVI	yes
27. UPS Air Conditioners - Condensers	yes	CVI	yes

NRC Open Item No. M-14

Open Item M-14: The sensible cooling load calculated is about 22 tons. This conflicts with the statement made in DBD-ME-313, Section 1.4, Item 1 on page 8 relative to requiring a major reduction in cooling load from 26-1/2 to 13-3/4 tons.

On page 24, the sensible heat gains shown do not agree with those given in DBD-ME-313, Section 11.1.3 page 37.a, Summary. (263,538 and 259,813 BTUH vs. 167,493 and 165,458 BTUH).

Response:

1. The statement in Section 1.4 of DBD, that the total cooling load is 13-3/4 ton, is incorrect. The actual load is indeed about 22 tons. The DBD will be corrected as shown in Attachment 1.

2. The sensible load given on page 24 of calculation is the total including space heat loads and the heat load from the supply and return fans. The loads given in Section 11.1.3 of the DBD on page 37 are "total space sensible heat gains"; these do not include fan heat output. Hence there is no conflict.

   List of Attachments:

   1. Page 8 of DBD-ME-313 Rev. 0, marked with changes as stated in the above response.

Significance/Extent:

There is no safety concern. The discrepancy between calculations and DBD is due to an error in the DBD. This will be corrected in the next revision.

The extent is limited to this DBD based on our review of other similar DBD's.

NRC Evaluation:

Attachment 1
Sheet 1 of 1

1.4 OPEN ITEMS

ITEM NUMBER	PAGE NUMBER	STATEMENT OF PROBLEM	CLOSURE DOCUMENT
1	General Text	The AC Unit performance data currently available is that delineated in the vendor's manual CP-0087-002 and denotes the "AS-BUILT" condition and is used in the text. Data relating to the refrigeration cycle such as compressor unloading cycle, condenser water flow, refrigerant setpoints, etc) require revision by the equipment manufacturer to suit ~~a~~ the ~~major reduction in~~ cooling loads ~~(from 26-1/2 to 13-3/4 tons~~) recently established in Calc. X-EB-313-1, Rev. 0.	New revision with DCA to spec MS-87 (by Ebasco)
2	22 & 23	Basis for establishing HVAC Control setpoints.	Setpoint calculation (by SWEC)
3	19	Determine the maximum space temperature in the UPS Distribution Rooms after a loss of all electrical power	Calculation No. (later) (by Ebasco)

1266R

Outgoing Correspondence bcc (1):

M. D. Spence
A W. G. Counsil
J. W. Beck
R. W. Ackley
ARMS
J. L. Barker
* R. Bentley
* Bethesda Licensing
* W. R. Burchette
* J. H. Butts
R. D. Calder
F. A. Camp
* R. L. Cloud
D. E. Deviney
* L. Dietrich
* W. S. Eggeling
* J. Ellis
W. G. Fenoglio
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* B. Finkelstein
J. C. Finneran
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D. R. Woodlan
R. A. Wooldridge

January 13, 1988

* - First Class Mail