# SACRAMENTO MUNICIPAL UTILITY DISTRICT

OFFICE MEMORANDUM

TO: NRC Resident Inspector DATE: January 23, 1986 NOM 86-49

XXXVII

FROM: Dan Whitney

#### SUBJECT: TRANSMITTAL OF REQUESTED INFORMATION

The attached December 26, 1985 event related Closure Report on Human Factors Review , Action List , is provided as requested. Item 2.b

It is our understanding that you will forward this material to the NRC IIT Team for their information and use. Should you have questions regarding this material, do not hesitate to contact us.

Attachment: NRC (3 copies)

- cc: G. A. Coward w/o attachments
- J. V. McColligan w/o attachments J. Delezenski w/o attachments

### ACTION ITEM CLOSURE REPORT

### (Format, Rev. 2)

Action List Item Number 2b Action List Description Root Cause Analysis: Human Factors Review Quarantined Equipment List Item Number N/A Responsibility of J. Jones 7 Date 1-17-86 Prepared By D. Mrazek

- Description of Issue/Concern: A. Human Factors Implications of the Transient of December 26, 1986.
- Investigations Done: See Attachment Β.
- Conclusions/Explanation (should include Root Cause): See Attachment C.
- Short-term Followup Required/Recommendations: See Attachment D.
- Long-term Recommendations: See Attachment; To be incorporated into long Ε. term Human Factors Program
- N/A Programmatic Implications: F.

Coordinaton SMUE List tion

Date 1-23-86

Reviewed and Accepted

# SUMMARY OF HUMAN FACTORS OBSERVATIONS

OF THE 26 DECEMBER 1985 TRIP

Item Number	Addressed by HEO Number*	Control Room   Related	HFE Observations	Disposition
1	GN-0-0324	Yes	Excessive noise in Control Room	Reduce noise level from essential HVAC
2		No	Time Delays in accessing valves	Analyze accessibility of valves
3	GN-S-0464 GN-S-0466 GN-S-0468	No	Poorly Located emergency/ protective equipment	Add more different sizes of equipment Clearly mark equipment sizes Provide maps indicating
	GN-S-0469			<pre>l location of equipment Locate lead sealed l lockers with equipment Develop procedure to l analyze usefulness l of equipment after each l trip</pre>
4		Yes	Time delays thru Control Room door	Improve Control Room   Security interface
5		Yes	Difficulty monitoring plant	Install long cord on NRC
6		Yes	Spurious ringing on NRC phone	Repair system to alleviate
7	GN-S-0293	Yes	Poor communication between Control Room & plant	Provide new wireless communication system
8	AN-0-0225	Yes	No MSLF alarm	Provide alarm
9		No	Poor local valve status indication	Provide accurate valve status indication, including highly visible labels
10		Yes	No Control Room control of ICS components upon ICS failure	Investigate providing redundant controllers on ICS components
11	PS-0-0348 PS-W-0474	Yes	Difficulty tracking status of Pressurizer Relief Tank	Replace indicator with trend recorder
*	HEO's reference	ed are from the	submitted CRDP Summary Report	

1

-

Item Number	Addressed by HEO Number*	Control Room Related	HFE Observations	Disposition
12'*		Yes	Inconsistent indication between SPDS & OTSG level trend recorders	Modify systems to improve consistency
13		Yes	Insufficient status information on diesel generators	Provide important parameter status in the Control Room
14	GN-0-0278 GN-0-0305 XX-S-0214 PS-S-0212 PS-S-0209 XX-S-0213 SS-S-0215 GN-S-0208	Yes	Unreliable/unreadable recorders	Replace trend & impact recorders
15	GN-S-0068 GN-S-0074 GN-S-0075	Yes	Due to loss of power, inconsistency between feedwater flow meters and trend recorders	Label all indicators   with power source   and train
16		No	Poor labeling of breakers S1/S2	Relabel
17		No	Difficult to use elementary drawings	Improve readability & consistency of drawings
18		Yes	Confusing alarms on IDADS	Improve operator/IDADS   interface
19	SF-V-0396 GN-S-0258	Yes	AFW components scattered throughout Control Room	consolidate with EFIC
20	GN-W-0513 GN-0-0283 GN-S-0253	Yes	Delays in gaining control of SFAS valves	Relabel lenses
21		No	EOP's were vague	Modify EOP's
22		No	Damage to pump	Investigate feasibility of adding low suction trips to important
23		No	Inadequate personnel support	Provide 24 hr support
24	RI-V-0392	Yes	Difficulties recognizing loss	Yellow band failure point on indicators
25		No	No information on feedwater heater reliefs	Investigate providing relief information
26	MR-S-0493   thru  MR-S-0511	Yes	Radiation information scattered throughout Control Room	Centrally located within the RM-11

.

HEO'S referenced are from the submitted CRDR Summary Report.

\*

12

#### HUMAN FACTORS REVIEW

#### OF DECEMBER 26, 1985 TRIP

Following the reactor trip on December 26, 1985, it was determined that a human factors evaluation should be made to assess the operational usefulness of the Control Room and operational concerns in the plant during the transient. Many of the Control Room concerns addressed by this evaluation had already been discovered by the Control Room Design Review (CRDR) and are documented as Human Engineering Observations (HEO's). Where applicable, these HEO's are referenced and attached within this report. The human factors evaluation consisted of an initial interview with all of the operators involved in the transient, a review of all post-trip documentation, follow-up interviews with operators, when necessary, and walk-throughs of specific events. The evaluation was based on the criteria in the CRDR Criteria Report. This review is a summary of the evaluation. It is organized to group observations according to the structure of the Criteria Report.

#### WORKSPACE

- Excessive noise in the Control Room, when both essential HVAC units autostarted, made it difficult to communicate. During the CRDR this problem was documented by the environmental survey (GN-0-0324). It was brought to the attention of the HVAC group, which is in charge of these units. for action.
- 2. There were difficulties or time delays for the operators who were trying to gain access to various control areas. This is due to the need for some areas to be locked or under HP control. Flow paths and accessibility should be analyzed to minimize time delays under high stress situations for operators accessing critical local valves such as the ADV's and TBV's.
- Emergency equipment such as high tops and respirators were not located 3. where the operators thought they would be most useful to deal with the situation. This concern was partially identified during the CRDR (GN-S-0464, GN-S-0466, GN-S-0469, GN-S-0468). At that time it was recommended that (464) sufficient sizes of operator protective equipment be made available to fit any crew, of which more fire protective equipment has been ordered; (466) all protective equipment and their associated storage locations should be clearly labeled for size; (468) maps indicating the location of protective and emergency equipment should be placed near the exit from the Control Room and in each of the change rooms to facilitate rapid access to the equipment, locate lead sealed lockers containing equipment for protection on the controlled and uncontrolled sides of every level; (469) a procedure should be developed for documenting the performance of the emergency equipment which should include a debrief of all those involved to ensure that any problems are discovered. This debriefing should be part of the post trip operator interviews that have been recently implemented.

Time was wasted waiting for the Control Room access door to cycle between exits and entrances and there were difficulties in coordinating with Security so that the door could be guarded but left open. There needs to be a better interface between Security and the Control Room. Also, the possibility of modifying the Control Room access door such that one of the two doors is entrance only and the other is exit only, eliminating cycling time delays, should be considered.

### COMMUNICATIONS

- 5. The operator who was communicating with the NRC on the red phone found it difficult to keep track of the status of the plant from within the clearance area where the phone is located. The phone was previously located in the Control Room proper and it was found to contribute to noise and confusion during a transient. A long cord should be installed on the NRC phone so that the communicator can easily observe the events in the Control Room during a transient and still remain out of the way and on the phone continuously, as required.
- A plant trip or voltage transient often causes the NRC phone to spuriously ring. This is an unnecessary nuisance under high stress. The phone system should be repaired so that this does not occur.
- 7. There were problems establishing and maintaining communications between the Control Room and the personnel out in the plant, especially those in the tank farm. During the CRDR (GN-S-0293) it was recommended that a new wireless communications system for operations use between the Control Room and external plant areas be added. This system should allow the Control Room to talk with one or more people and ideally also allow the operators to talk with each other.

### ANNUNCIATOR WARNING SYSTEMS

8. During the transient there was no status information on the Main Steam Failure Logic (MSFL). There is a need for a MSFL alarm. As part of the CRDR an annunciator task force was developed (Premod 8522) to replace the annunciator system; improving the man-machine interface, improving the display control integration and utilizing annunciator window/computer CRT displays to present the operator with prioritized alarms. A specific alarm identified to be added is Main Steam Line Failure Logic activation for half and full trip (AN-0-0225) which would have been useful during this transient.

.

### CONTROLS

- 9. It was hard to tell if AFW valves FV-20527 and FV-20528 were closed all the way when manually controlling them locally, even though there was a stem indicator. The label on these valves are misleading because the pointer must travel past the label edge. For example, on the B AFW valve there appears to be a mark on the edge of the label which could be assumed to be the closed position since it isn't labelled. In fact, many of the valves have poor or nonexistant local indication of their positions. Valve position should be obvious from local visual inspection. Recalibrating and labelling every valve in the plant is a major effort, yet important. An analysis of the importance or frequency of manually controlling a valve should be performed to develop a prioritization for labelling the valves. The auxiliary and equipment operators should be involved in this effort to improve their knowledge of the valve operations. These labels should conform to the guidelines in the CRDR Criteria Report for lettering, nomenclature, etc. For added visibility, they should be black on a fluorescent background and marked OPENED/CLOSED and any other pertinent positions.
- 10. Due to the loss of ICS power, the flow control valves that were controlled by this system all went to 50%, which contributed to the overcooling problem. The operators would like to have the ability to control these valves from redundant controllers powered from a separate source, within the Control Room.

### VISUAL DISPLAYS

- 11. It was difficult for the operators to track the status of the pressurizer relief tank over time during the transient to recognize problems with the system such as leaks or overfilling. As identified by the CRDR (PS-0-0348, PS-W-0474), a 2-pen trend recorder will be substituted for the existing dual scale analog vertical meter on H2PS to display pressurizer relief tank pressure and level.
- 12. There was an inconsistency between the SPDS and the trend recorders for the OTSG levels - 93% on the SPDS compared to 100+% on the recorders. The operators relied more strongly upon the SPDS and were given false information. The calibration of these two systems should be checked and modifications be made to make the indications accurate and consistent. The possibility of coding the SPDS display such that it is obvious if a bar chart reaches its 100% point, (such as changing the color of the bar chart) if a variable has reached the extreme should be investigated.
- 13. There is not sufficient information within the Control Room on the status of the diesel generators when they are being used. Currently an operator is sent down several times a hour to check on the status of the diesel generators while they are running. This is done after an annunciator alarm has come in because there is no reflash capability on the annunciator windows. A study should be performed to identify the important parameters to display and those should be presented in the Control Room on the computer or as reflashable annunciator windows. This should be incorporated into the annunciator study (Premod 8522).

- 14. The recorders were untrustworthy during the transient and yet the operators tend to rely upon data presented on a recorder. The continuous and impact trend recorders in the Control Room should be replaced with more reliable, more readable recorders. This problem has been identified during the CRDR (GN-0-0278, CO-0-0305, XX-S-0214, PS-S-0212, PS-S-0209, XX-S-0213, SS-S-0215, GN-S-0208) and a study is currently underway to investigate other recorders as potential replacements.
- 15. The operators were given conflicting data on main feedwater flow. Feedwater flow has both vertical indicators and trend recorders located on H1RI. The indicators are powered by NNI and the recorders are powered by ICS. When ICS power was lost, the recorders provided misleading/erroneous data but the indicators gave accurate indication. During the CRDR it was identified that there was need to label the power source for all indicators and recorders (GN-S-0068, GN-S-0074, GN-S-0075). The label should describe the source and train of the power.

### LABELS AND LOCATION AIDS

- 16. Breakers S1 and S2 tripped, causing loss of ICS power. When a computer technician checked to verify that the breakers were closed, it appeared as if they were. These toggle switch type breakers are located high in a cabinet. The only position indication is the word "ON" painted on the bottom of the switches which is only visible when the breaker is closed. When tripped the switch moves so that the word disappears. There is no indication that it is in the tripped position. The labels on breakers S1 and S2 should be modified. The "ON" painted on the actual switch should be removed and a label should be placed on the side with both the CLOSED and the OPEN/TRIPPED position clearly labeled.
- 17. When the operators tried to use the elementary drawings they discovered that there was insufficient wiring nomenclature. The drawings should be made more consistent, accurately identifying all items on the drawing.

### PROCESS COMPUTERS

18. The IDADS screen display alarms were ignored because there was "a bunch of flashing purple on the screen" until the plant was secured and there was time available to call up the numerous screens to retrieve the information to acknowledge the alarms. The Project Engineer for IDADS modifications has been made aware of this problem.

### PANEL LAYOUT AND CONTROL/DISPLAY INTEGRATION

19. The AFW indications and controls are spread throughout the Control Room which made it difficult to control this system. This concern has been identified by the CRDR (SF-V-0396, GN-S-0258). As part of EFIC, a single functional operating area will be established on HISS which will contain all normally used controls and displays associated with the auxiliary feedwater system. The make-up system isolation valve SFV-23604 was put into manual on H2SFA but not H2SFB and the operators delayed gaining control of this valve for about ten minutes. The controls for the BWST suction valves, SFV-25003 and SFV-25004, were also confusing. Normal Safety Features type 4 -button sets (AUTO/MANUAL/CLOSE/OPEN) are provided for SFV-25003 in Channel 1A and for SFV-25004 on Channel 1B. These are used to provide suction for the respective HPI trains. In order to assure suction for LPI pumps (Channel 2) and reactor building spray pumps (Channel 4). Channels 2 and 4 send parallel signals to the respective valves. Therefore, redundant parallel controls are provided on Channel 2A and 4A for SFV-25003 and 2B and 4B for SFV-25004. In order to reposition either valve following an SFAS actuation, permissive signals must be obtained for all SFAS channels actuated before the valve control in Channel 1 can affect the valve position. This concern had been identified by the CRDR (GN-W-0513, GN-0-0283, GN-S-0253, SF-0-0336). For those items that need to be put into manual at more than one location the lens wording should be changed to read, for example, "MANUAL +2A, 4A" to indicate that other switches must be put into manual prior to being able to control the valves.

20.

### OTHER

- 21. The EOP's provided no guidance as to how long it would take for something to occur or whether more than one step should or could be occurring simultaneously. There was no breakpoint to indicate when to move on to the next step (no timeline). There wasn't sufficient guidance for securing cooling using AFW. This information will be relayed to the group maintaining the EOP's.
- 22. Due to low suction, the make up pump was severely damaged. There should be an investigation on the feasibility of low suction trips on vital pumps such as the make up/HPI pumps.
- The operating crew's abilities were stretched to their limits (one of the 23. crew suffered from exhaustion during the transient) trying to manually control the plant during the transient. There seems to be a need for additional support. Further analysis should be done on different possible transients to determine the minimum number to handle the problem. There is a definite need for 24 hour a day support from maintenance (including engineering). Procedure C-37 for cooldown requires an I&C technician in order to hook up the portable source range detector if the Control Room is evacuated. It seems that this justifies the requirement for at least an I&C technician available at all times. Some of the tasks that needed to be performed during this transient would have best been done by knowledgeable technicians. Also, the emergency plan should include immediate calling in of supplemental crews to aid in dealing with the transient without tying up an operator at the phone. The Watch Commander should be provided with a list of the current phone numbers for all of the crews. During a transient, if the Control Room decides that more help is needed, one call from the Control Room to the Watch Commander would bring in the next shift.

- 24. After restoration of ICS power some operators were uncertain of the expected component response. This should be thoroughly analyzed and adequate training provided. This is part of the larger problem of recognizing loss of power, identified during the CRDR (RI-V-0392). Many of the indicators in the Control Room fail at midscale, possibly causing a delay in recognizing that the system is malfunctioning. The scales should be marked with a yellow band at the midscale failure point to help in recognizing a potential problem.
- 25. The operators didn't know which feedwater heaters reliefs lifted. The need for this information within the Control Room should be investigated.
- 26. During the transient some of the radiation monitors alarmed. With some of the radiation information located in the back room and some located in the RM-11 computer, it was difficult for the operators to get a clear picture of the overall release. As recommended by the CRDR (MR-S-0493 thru MR-S-0511), the radiation information should be centrally located, preferably within the Control Room in the RM-11 computer system.

GN-0-0324

### CRITERIA REPORT REFERENCE

N/O

4.1.4.5 AUDITORY ENVIRONMENT

PANEL ITEM NO.

N/0

ITEM DESCRIPTION

CR. DIS. #IN/A

HEO DESCRIPTION

Control room emergency ventilation system is too loud and provides inadequate ventilation.

Interference with communications, distruption in control room. Inattention due to noise, heat and humidity. Possible equipment degredation in computer room. May not be able to hear key plant equipment such as code safety valve actuations.

### **RECOMMENDED MODIFICATION**

NOT APPLICADLE

# TECHNICAL REVIEW

GN-0-0324

This HED was written for the old one channel HMMC system. This was replaced during the 1985 refueling outage. The new system has two independant channels with either one being designed to provide adequate ventilation. Therefore, this is not applicable.

Surveys are being conducted for the noise, temperature, humidity, and air velocity. If any problem areas are noted. HEU's will be written at that time to address the concern.

SEE ATTACHED FOR SURVEY RESULTS

CATEGORY : NA

EN-0-0324

10 Moulton Street, Cambridge, MA 02238 Telephone (617) 491-1850

### **BBN** Laboratories Incorporated

9 December 1985

Mr. L. R. Keilman Manager Nuclear Engineering Department Sacramento Municipal Utility District 6201 S. Street P.O. Box 15830 Sacramento, CA 95813

Subject: Rancho Seco Nuclear Power Plant Control Room Study BBN Project No. 138683

Dear Mr. Keilman:

In reference to my letter of 27 November 1985, I can hereby offer the following opinions:

- The normal ambient sound level in the control room was at such a level which allowed for easy speech and telephone communication throughout. In accordance with the enclosed Exhibit 6.1-26 (from NUREG 0700) normal voice can be used for operators communicating at distances up to 12 feet. By raising the spe=ker's voice, communication can take place up to 24 feet between the speaker and the listener.
- 2. The higher sound levels generated by the individual essential systems A&B causes impaired communication within the control room and while using the telephone. In accordance with Exhibit 6.1-26 normal voice communication is only possible at distances up to 4 feet and with a raised voice at distances up to 8 feet.
- 3. The highest background sound levels were found when both of the essential systems were operated simultaneously and it had a severe impact on communication. In accordance with Exhibit 6.1-26 the normal voice level cannot be used for more than about 2 feet and the raised voice level for distances up to 4 feet.
- 4. All annunicators were easily heard during normal ambient conditions. It would be less easy to discern the annunicators during the essential systems operation and

A Subsidiary of Bolt Beranek and Newman Inc.

Mr. L.R. Keilman Sacramento Municipal Utility District BBN Project No. 138683 9 December 1985 Fage 2

> it is believed that it would not be possible to clearly hear the RM-11 annunicator during the combined operation of the essential systems.

- 5. None of the annunciators were perceived to be too loud, however, the radiation alarm was found to be a little more annoying, not because of level but because of its pitch. Due to their mostly periodic character none of the annunciators seem to impair communication.
- The difference in tonal character and periodicity made it possible to determine and recognize individual annunciators.
- 7. The measurements showed that the reverberation time was slightly above the guidelines suggested level at a couple of frequencies, however, this was not experienced as an impairment to communication.
- 8. The luminance level was found to be comfortable during normal operation.
- Only minor glare was found in the TV monitors in panel H2SP panel.
- 10. The emergency lighting level did not meet the guidelines in that it varied from dark to extremely bright. In the investigators opinion the darkness of the work desks was the major problem in that it would not be easy to read procedures manuals, note taking etc. under these conditions. Due to the backlighting of instrument panels no perceived impairment of panel displays were found.

1

Please do not hesitate to bring your comments to my attention.

Sincerely yours,

BBN LABORATORIES INCORPORATED

auce Paul Jensen

PJ/kc

Encl. Exhibit 6.1-25 cc: Bob Starkey





t,

BN-8-0464

#### CRITERIA REPORT REFERENCE

4.1.3.1 d

OPERATOR PPROTECTIVE EQUIPMENT

PANEL ITEM NO.

# CR. DIS. MIN/A

OPERATOR PROTECTIVE EQUIPMENT/STEAM SUITS & BLOVES

**HEO DESCRIPTION** 

There are not enough of the Various sizes to properly fit everyone on some shifts.

Difficulty acctuating controls or danger to operator safety due to improper fit.

## **RECOMMENDED MODIFICATION**

Provide sufficient sizes to fit all crew on all shifts. Ordered 11/85.

# TECHNICAL REVIEW

BN-8-0464

÷.

This observation is correct, there are not sufficient fire suits to fit all sizes. During 11/85 all new equipment (fire suits) have been ordered which are more adaptable to different sizes and are more effective as protection.

CATEGORY :R

BN-8-0464

8N-8-0465

### CRITERIA REPORT REFERENCE

4.1.3.1. e OPERATOR PROTECTIVE EQUIPMENT

### PANEL ITEM NO.

N/A ' N/A'

#### ITEM DESCRIPTION.

CR. DIS. WINA OPERATOR PROTECTIVE EQUIPMENT/STEAM SUITS

### HEO DESCRIPTION

Sizes not well marked on protective clothing.

Improper fit which might make actuating controls difficult or be dangerous to the operator.

**RECOMMENDED MODIFICATION** 

Clearly label all equipment as to size.

## TECHNICAL REVIEW

#### BN-8-0466

The protective equipment such as Steam Suits, Fire Suits, hats, and boots should have sizes clearly marked, not only on equipment, but on shotving or pegs where stored. There should be sizes available to fit all personnel. With equipment properly marked and stored will avoid delay in selecting correct size, therefore recommend action be taken as written.

CATEGORY :

GN-8-0466

#### BN-8-0468

#### CRITERIA REPORT REFERENCE

4.1.3.1 g

OPERATOR PROTECTIVE EQUIPMENT

- PANEL ITEM NO.
- N/A N/A

#### **ITEM DESCRIPTION**

CR. DIS. . N/A OPERATOR PROTECTIVE EQUIPMENT

### HEO DESCRIPTION

The protective/emergency gear is not centrally located.

Not finding the proper emergency equipment.

### **RECOMMENDED' MODIFICATION**

Place a map near the C. R. doors indicating the location of the various equipment.

# TECHNICAL REVIEW

#### 8N-9-0468

Providing the operators with an emergency equipment map prominently located near the exit of the control room will eliminate unnecessary delays.

CATEGORY :

BN-8-0468

BN-0-0469

### CRITERIA REPORT REFERENCE

4.1.3.1 h & I OPERATOR PROTECTIVE EQUIPMENT

PANEL ITEM NO.

CR. DIS. #IN/A EMERGENCY & PROTECTIVE EQUIPMENT

### **HEO DESCRIPTION**

The ease of access & ability to execute the training is difficult to judge. There is currently no good way to evaluate these parameters.

Improper training, faulty or poorly placed equipment for emergency.

# RECOMMENDED MODIFICATION

Provide a procedure for documenting the performance of the emergency equipment during emergencies & drills. This should include a de-brief of all those involved to ensure that any problems discovered under the given emergency is addressed.

# TECHNICAL REVIEW

#### BN-8-0469

Operations make a weekly check and inventory of emergency and protective equipment throughout plant. Safety Department makes a monthly check, but there is not a procedure to evaluate and document the performance of personnel and equipment involved. It is recommended that a procedure be developed to assess the performance of personnel & equipment. with a feedback to those involved. This could be performed by the STA group triggered by an emergency team/fire brigade callout.



6N-8-0469

#### HEO NO. BN-0-0293

.....

140

CRITERIA REPORT REFERENCE 4.2.1.6 ANNOUNCING SYSTEMS

PANEL ITEM NO.

ITEM DESCRIPTION

### **HEO DESCRIPTION**

.

There is no reliable method of paging personnel in all areas of the plant, especially in high noise areas or areas outside the reactor and auxiliary buildings.

- 24

Inability to communicate with personnel outside the control room when needed.

## **RECOMMENDED MODIFICATION**

Provide an announcing/paging/communicating system capable of contacting operations personnel locatd at any location on site.

# TECHNICAL REVIEW

GN-0-0293

Identify areas where page is needed or malfunctioning and make repairs, then evaluate if a beeper system may be necessary.

CATEGORY :B

611-0-0293

AN-0-0225

# CRITERIA REPORT REFERENCE .

4.3.1.2

ALARM PARAMETER SELECTION

PANEL ITEM NO.

# ITEM DESCRIPTION

CR. DIS. . N/A

### **HEO DESCRIPTION**

Main steam line break failure logic actuated unnoticed by operators.

Insufficient warning system alerting operators to plant condition

# RECOMMENDED MODIFICATION

Add KSLD Failure Logic Alers.

# TECHNICAL REVIEW

#### 6150-0-MA

Presently there is no annunciator in the control room to alert the operator on MSLB failure logic actuation. It is recommended that MSLB Failure Logic Full Channel Actuated, MSLB Failure Logic Half channel Actuated be incorporated in the alare system. See HED GN-0-0306. These changes have been recommended to the annunciator task force for implementation.

CATEGORY :

AN-0-0225

PS-0-0348

CRITERIA REPORT REFERENCE

4.5.4.1.9

GENERAL CHARACTERISTICS OF GRAPHIC RECORDER

PANEL ITEM NO. H2PS 6

CR. DIS. #: PI-21920,LI-21905B PRT PRESSURE INDICATION PRT LEVEL INDICATION

### HEO DESCRIPTION .

No trend information is provided for pressurizer relief tank level or pressure. The trend aspects of those parameters are more relevent than their absolute values.

Delay/failure to identify leaking or malfunctioning pressurizer relief valves.

### RECOMMENDED MODIFICATION

Install dual pen recorder of PRT pressure and invel.

# TECHNICAL REVIEW

#### PS-S-0349

The pressurizer relief tank (PRT) is the temporary retention tank for primary water after its expulsion from the keatter Coolant System. This water comes from the pressurizer via the Electromagnetic Deprated Valve (EMDV) and two (2) code safety relief valves. These valves are wonitored for position by accelerometers that are prominently displayed on H2PE (110). These accelerometers are also alcowed on H2PEN (window 32). This alerts the operator that water is going to the PRT.

The PRT has a rupture disk that is set for 180 PS1. Therefore, the pressure and level have little meaning after the rupture disk separates. These proposed recorders must then be for normal operations and the manual cycling of the PRT recirc pump. There are H1 (window 54) pressure and H1 L0 (window 62) level alarms on H2PS6 for the PRT. These serve to alert the operator to a slow leak into or cut of the PRT. These alarms also alert the operator to add or remove mater from the PRT.

Recorders would provide an indication of leak rale into or out of the PRT that is not currently available.

CATEGORY :0

FS-0-0348

P8-W-0474

CRITERIA REPORT REFERENCE

4.5.1.5 d SCALE MARKING

PANEL . ITEM NO. H2PS 6 L & R

ITEM DESCRIPTION CR. DIS. #1L1-219058, PI-21920

PZR RLF TANK V-219 LEVEL/PRESSURE INDICATOR

### **HEO DESCRIPTION**

This dual meter combines two different numerically incompatible scales (0-10 Ft, 0-200 psig) which mismatch on center scale is confusing and hard to read.

Delay/confusion reading meters.

### **RECOMMENDED MODIFICATION**

Modify the scale to ten (10) major - twenty (20) minors (one (1) minor between each major). Provide level marking for every foot from 6 to 16°, and pressure marked every 20 pmig from 0 to 200 pmig.

# TECHNICAL REVIEW

#### P8-W-0474

The level is measured in feet from approximately the 6' level to the 16' level, although it is recorded as 0-10. Both level and pressure are available as digital readouts from the plant computer. Operators use the analog meter only as qualitative quick check of approximate level. When running leak checks or other times when exact values are required, operators use the computer. They feel that the meter should permit reading the level to the nearest 6" and the pressure to the nearest 20 psig.



PS-W-0474

BN-0-0278

# CRITERIA REPORT REFERENCE

ITEM NO.

4.5.4.2.a(2) SPECIFIC REGORDER TYPES

#### PANEL

HICO

N/A '

#### **ITEM DESCRIPTION**

CR. DIS. #:UJR-10161,02403 TEXAS INSTRUMENT COMPUTER TREND RECORDERS

### **HEO DESCRIPTION**

TI instrument multiparameter recorders currently use only black ink for all parameters record. "Each (parameter)should use a different colored ink to permit channel (sic-parameter) 10 from live color."

Inability to differentiate or distinguish between two traces on chart, especially when traces cross.

# RECOMMENDED MODIFICATION

Provide multi color capability for recorders.

# TECHNICAL REVIEW

#### GN-0-0278

The TI trend recorders use a thermal print head rather than ink. Therefore, multi-color capability for these recorders cannot be realized, HED #CO-O-0305 recommends that the TI recorders be replace.

It is recommended that the TI recorders be replaced with multi-colored pen trend recorder. Presently there is a study being conducted for an acceptable mulit-pen trend recorder.

CATEGORY : D

GN-0-0278

RC-8-0089

CRITERIA REPORT REFERENCE

N/A

4.5.1.2 d/4511

PANEL ITEM NO.

HIRC

**ITEM DESCRIPTION** 

CR. DIS. #IN/A

RECORDER: REACTOR COOLANT PRESSURE

. .

USABILITY OF DISPLAYED VALUES

**HEO DESCRIPTION** 

Scale markings on trend recorders only go as high as 2500. Reliefs are set at 2500 and there is no room to monitor an increase. Operators feel that scale ranging up to 3000 would . be more appropriate.

Improper decision making due to unavailable information.

**RECOMMENDED MODIFICATION** 

Install transmitters capable of measuring 0-3000 psig and put display in SPDS. Modification complete, August 1983. Verification complete.

# TECHNICAL REVIEW

RC-8-0089

Per requirements of Reg. Buide 1.97 install transmitters capable of measuring 0-3000 psig. This information to be is displayed on SPDS, IDADS (computer) and trended on UJR-10101.

Since this information will be readily available to the operator it is recommended that no change of range is required for the existing recorders. Also expanding the range will be detrimental to operations due to reading accuracy of scales.

CATEGORY :

RC-8-0089

CO-0-0305

#### CRITERIA REPORT REFERENCE

4.5.4.1

GENERAL CHARACTERISTICS OF GRAPHIC RECORDERS

#### PANEL ITEM NO.

HICO N/A

#### ITEM DESCRIPTION

CR. DIS. #:UJR-10101,02,03 IDAD's (COMPUTER) TREND RECORDERS

#### **HEO DESCRIPTION**

TI graphic recorders do not display current parameter value, scale is a standardized 0-100% with no indication of the acutal range or engineering units of the parameters displayed. Display is monochromatic, difficult to identify individual parmeter traces.

Inability to read or distinguish deplayed values, having only outdated information.

# RECOMMENDED MODIFICATION

Remove TI recorders and replace with multicolor pen recorders and additional CRTs with screep dump capability.

### TECHNICAL REVIEW

#### CO-0-0305

TI recorders were used to record NUREG 0737 parameters prior to IDAD computer being separational. At present time the discrete parameters are no longer required to be recorded. Therefore the TI recorders can be replaced by multiculered pen recorders for distinction of computer points required to be printed. Scales for computer points vary in accordance with the parameter, any recorder will always need to have a universal scale if attached to the computers for trending, i.e., scale to read 0 to 100%. Given adequate number of CRT's, the desired parameter can be trended with the proper engineering units and a screen dump will provide the operators with a hard copy of the displayed' parameter.

CATEGORY : B

CO-0-0305

CRITERIA REPORT REFERENCE

4.5.4.2.0(3)

.....

PANEL

ITEM NO.

CR. DIG 0.TJR-6-(1-14) TREND RECORDER: R.B. HUMIDITY & MISC TEMP

#### **HEO DESCRIPTION**

These recorders are impact recorders. Many characters/numbers not separated from other surroundings. Numbers printed off of wheel and often printed on top of each other making it difficult to decifer.

SPECIFIC RECORDER TYPES

Reading errors

RECOMMENDED MODIFICATION

# TECHNICAL REVIEW

#### P8-5-0214

The 42 parameters fed to this 24 point multipoint recorder consist of various pump bearing temperatures and CCW temperatures taken at various points. Since the concern with these temperatures is trending changes, these parameters become candidates for computer inputs. This frees valuable C.R. panel space, yet provides operator access to desired temperature readings through the computer trend recorders.

Another solution is to replace the current multipoint recorder with a 48 point, easily read multipoint recorder comparable with the L & N multipoint recorders presently existing in the control room.

CATEGORY :D

\$150-8-XX

P8-8-0212

#### CRITERIA REPORT REFERENCE

4.5.4.2.0(3)

SPECIFIC RECORDER TYPES

PANEL ITEM NO.

#### **ITEM DESCRIPTION**

CR. DIS #:TJR-05 (1-22) TREND RECORDER: REACTOR COOLANT PUMP MOTOR BEARING TEMP

### **HEO DESCRIPTION**

These recorders are impact recorders. Many characters/numbers not separated from other surroundings. Numbers printed off of wheel and often printed on top of each other making it difficult to decifer.

Reading errors

### RECOMMENDED MODIFICATION

REPLACE MULTIPOINT RECORDERS

### TECHNICAL REVIEW

#### S120-8-84

The 42 parameters fed to this 24 point multipoint recorder consist of various pump bearing temperatures and ECW temperatures taken at various points. Since the concern with these temperatures is trending changes, these parameters become candidates for computer inputs. This frees valuable C.R. panel space, yet provides operator access to desired temperature readings through the computer trend recorders.

Another solution is to replace the current multipoint recorder with a 48 point, easily read multipoint recorder comparable with the L & N multipoint recorders presently existing in the control room.

CATEGORY

2130-8-89

P8-8-0209

### CRITERIA REPORT REFERENCE

4.5.4.2.b(3)

SPECIFIC RECORDER TYPES

PANEL ITEM NO. H2PB 71

### ITEM DESCRIPTION

CR. DIS #:T.IR-04

TREND RECORDER: COMP. CLB WTR & MIBC BEARING TEMP

### **HEO DESCRIPTION**

Above recorders are impact recorders. Many characters/numbers not separated from other surroundings. Numbers printed off of wheel and often printed on top of each other making it difficult to decifer.

Reading errors

### **RECOMMENDED MODIFICATION**

REPLACE multipoint recorders.

### TECHNICAL REVIEW

#### P9-8-0209

The 42 parameters fed to this 24 point multipoint recorder consist of various pump bearing temperatures and CCH temperatures taken at various points. Since the concern with these temperatures is trending changes, these parameters become candidates for computer inputs. This frees valuable C.R. panel space, yet provides operator access to desired temperature readings through the computer trend recorders.

Another solution is to replace the current multipoint recorder with a 48 point, easily read multipoint recorder.



P8-8-0209

XX-8-0213

CRITERIA REPORT REFERENCE

PANEL ITEM NO.

CR. DIS #:TJR-08 (7-8) TREND RECORDER: COMPONENT COOLING WATER PUMP

#### HEO DESCRIPTION

These recorders are impact recorders. Many characters/numbers not separated from other surroundings. Numbers printed off of wheel and often printed on top of each other making it difficult to decifer.

Reading errors

# RECOMMENDED MODIFICATION

REPLACE MULTIPOINT RECORDERS

## TECHNICAL REVIEW

#### XX-8-0213

Sec. 1

The 42 parameters fed to this 24 point multipoint recorder consist of various pump bearing temperatures and CCW temperatures taken at various points. Since the concern with these temperatures is trending changes, these parameters become condidates for computer inputs. This frees valuable C.R. panel space, yet provides operator access to desited temperature readings thgough the computer trend recorders.

Another solution is to replace the current multipoint recorder with a 48 point, easily read multipoint recorder comparable with the L & N multipoint recorders presently existing in the control room.

CATEGORY b

E130-8-XX

XX-8-0215

### CRITERIA REPORT REFERENCE 4.5.4.2.6(3)

SPECIFIC RECORDER TYPES

PANEL ITEM NO. H2X 11

ITEM DESCRIPTION CR. DIS #:TJR-07-(1-23) . TREND RECORDER: R. B. VENT BYSTEM TEMP

### **HEO DESCRIPTION**

These recorders are impact recorders. Many characters/numbers not separated from other surroundings. Numbers printed off of wheel and often printed on top of each other making it difficult to decifer. 1.00

Reading errors

### **RECOMMENDED MODIFICATION** REPLACE MULTIPOINT RECORDERS

# **TECHNICAL REVIEW**

#### XX-8-0215

The 42 parameters fed to this 24 point multipoint recorder consist of various points. Since the concern with these temperatures is trending changes, these parameters become candidates for computer inputs. This frees valuable C.R. panel space, yet provides operator access to desired temperature readings through the computer trend recorders.

Another solution is to replace the current multipoint recorder with a 48 point, easily read multipoint recorder comparable with the L & N multipoint recorders presently existing in the control room.

CATEGORY :D

XX-8-0215

#### HEO NO. BM-8-0268

.

1

CRITERIA REPORT REFERENCE

4.5.4.1

GENERAL CHARACTERISTICS OF GRAPHIC RECORDERS

1.00

PANEL ITEM NO. ALL N/A

ITEM DESCRIPTION

TREND RECORDER: ALL

### HEO DESCRIPTION

The graph pen on the trend recorders could stick in one position, not causing failure to equipment, but could cause failure of operator response.

Inappropriate action on the part of the operator due to invalid information. Failure to obtain or apply all relevant decision information.

### **RECOMMENDED MODIFICATION**

1.000

Replace strip chart recorders with more relfable units.

# TECHNICAL REVIEW

8050-8-ND

The existing Bailey trend recorders are antiquated and replacement parts are difficult to be obtained. It is recommended that the recorders be exchanged with more reliable ones.

CATEGORY :

6N-8-0208

#### GN-6-0068

### CRITERIA REPORT REFERENCE

4.6.1.2/4.6.2.1 HIERARCHICAL SCHEME

PANEL ITEM NO.

ALL N/A

#### ITEM DESCRIPTION

CR. DIS. #IN/A ALL GROUP AND FUNCTIONAL LABELS

# **HEO DESCRIPTION**

- 1) Group & function labels are about the same sizeno size coding.
- 2) Function & position labels are the same. 3) Group labels above & below the related components.
- 4) No color coding, function & group labels are white print.

Delay in reading a display or operating the correct control. Read wrong display or operate wrong control.

# RECOMMENDED MODIFICATION

Revise all labels to agree with the Labeling Review Report.

### TECHNICAL REVIEW

#### 6N-6-0068

All lacels need to be revised to contore to the laceling review report. Size coming is not a peneral practice. broup labels are above related components. Lolor coding of labels is used to identify NNI dower only (not a deneral practice). Labels are to be white with plack print.



6N-5-0068

GN-8-0074

CRITERIA REPORT REFERENCE

4.6.3

LABEL CONTENT

PANEL ITEM NO.

CR. DIS. #1N/A FUNCTION/CONTROL/DISPLAY LABELS

### **HEO DESCRIPTION**

Functional/Control/Display labeling errors and inconsistencies

Misreading label or misinterpreting label.

### RECOMMENDED MODIFICATION

. .

Revise all labels to agree with the Labeling Review Report.

# TECHNICAL REVIEW

#### 6N-5-0074

All labels need to be revised to conform to the labeling review report. Size coding is not a general practice. Group labels are above related components. Color coding of labels is used to identify NNI power only (not a general practice). Labels are to be white with black print.

CATEGORY :D

UN-8-0074

EN-8-0075

CRITERIA REPORT REFERENCE

4.6.2.1 PLACEMENT

PANEL ALL

ITEM NO. N/A

ITEM DESCRIPTION CR. DIS. NIN/A LABEL PLACEMENT

### **HEO DESCRIPTION**

.

Label location and quality of label.

Misinterpreting reading, missing label.

\*

RECOMMENDED MODIFICATION

.....

Revise all labels to agree with the Labeling Review Report.

.

# TECHNICAL REVIEW

#### GN-5-0075

All lagels need to be revised to conform to the lapeling review report. Size cooing is not a general practice. Group lapels are above related components. Lolor coding of labels is used to identify NNI power only (not a peneral practice). Labels are to be white with black print.

CATEGORY :D

UN-1-0075

#### HEO NO. TECHNICAL REVIEW BF-V-0396 SF-V-0396 CRITERIA REPORT REFERENCE Due to panel, room and component geometries, you can not see 4.9.1.1. SINGLE CONTROL AND DISPLAY PAIRS required displays when within control distance of HS-20578 on H26FA and only marginally so when at HS-20577 on H25FB. By taking two steps an operator could read AFW flow, DISS operate range level (but not start up level), RCS temp and LR RCS Press. WR Press and PIR level would not be visible. PANEL ITEM NO. 114 4 115 HEBF These valves will coase to be directly controlled by SFAS and will no longer have a throttling bypass function when the EFIC installation is complete. **ITEM DESCRIPTION** CR. DIS. #1H8-20578 & H9-20577 Any practical solution to this situation would entail major REQUIRED INFORMATION WHILE THROTTLING AFW BYPASS FLOW panel modifications- moving or providing additional controls or displays- and presumably could not be implimented any earlier than the EFIC modifications. The situation which requires throttling AFW bypass flow is estimated as being an extremely unlikely event, i.e. a scenario whereby AFW is required , but the control valves (SFV-20257 & 28) are not available a.g. loss of ICS **HEO DESCRIPTION** concurrent with loss of RCP's or MFW pumps. None of the key parameters of interest needed when throttling Since it will take approximately as long to correct the AFW flow are available at H2SF near the AFW bypass valves. problem as it will take for it to be obviated by the EFIC modification which eliminates it, and it is an extremely low probability concern- it is recommended that no physical changes be made to mitigate this HED. Operator training should suphasize the close coordination and communications that would be required between the person at H2SF on the bypass valves and others at the consoles or H2PS who can see the related displays. Swe also related HED BF-V-0374 concerning the control of HPI If it is necossary to control AFW flow with the bypass flow from H2SF. valves, the person operating the controls can not see AFW flow, SG levels, or RCS temperature, pressure and level. **RECOMMENDED MODIFICATION** Mitigate with operator training until problems are eliminated by EFIC modi "tcations.

CATEGORY :n

8F-V-0396

BN-8-0258

#### CRITERIA REPORT REFERENCE

4.9.2.1/4821c

LOCATION AND ARRANGEMENT OF

PANEL ITEM NO.

N/A N/A

ITEM DESCRIPTION CR. DIB. #1N/A AUXILLARY FEEDWATER BYSTEM CONTROLS

### **HEO DESCRIPTION**

Aux FW system controls aren't located together and are next to the main FW pumps. Some are on HIRC and some on HISS. The aux and main FW controls are located together.

Activation of wrong controls.

### **RECOMMENDED MODIFICATION**

1. Relocate components into functional groups and visually separate auxiliary and main FW controls

2. If uncalibrated pushbuttons are never used, they should be removed or moved to a back panel.

## TECHNICAL REVIEW

GN-S-0258

.

Installation of the EFIC system will correct this problem. This situation is very important to correct considering that importance has been placed on the auxiliary Feedwater System.

CATEGORY :B

GN-9-0258
BN-H-0513.

### CRITERIA REPORT REFERENCE

4.9.2.1

LOCATION OF CONTROLS-BHET BUCTION VALVES .

PANEL ITEM NO.

CR. DIS. MIN/A

BUST SUCTION VALVES - 25003, 25004

### **HEO DESCRIPTION**

BHGT suction valve controls are not provided on HIRC, with all other related controls for HPI pumps.

Delay in starting HPI Flow without initiating SFAS if HPI pump lined up to BWST fails to start.

### RECOMMENDED MODIFICATION

Place parallel controls for BHST suction valves SFV-25003 & SFV-25004 on HIRC.

# TECHNICAL REVIEW

#### GN-W-0513

Delay in starting the HPI not lined up to BWST will cause the operator to be involved in a time consuming procedure for Reactor Coolant Pump Beal Restoration, at a time when his attention is required at another station.

CATEGORY :

GN-H-0513

GN-0-0283

# CRITERIA REPORT REFERENCE

4.4.3.3.4

LEGEND PUSHBUTTONS

PANEL ITEM NO.

CR. DIS. WINA

### HEO DESCRIPTION

Legend pushbuttons are not readily distinguishable from legend lights.

10

Attempting to operate a device using a display. Delay or possibly failure to operate a device.

#### **RECOMMENDED MODIFICATION**

Provide readily distinguishable coding to differentiate active pushbuttons from indicator only devices.

# TECHNICAL REVIEW

#### 6N-0-0283

There are many BLPB in the control room. Some of them are indicators and controls, some are indicators only and some are controls with no indication. It's desirable to be able to distinguish between these functions. Since the waterity of DLPB are indicators and controls and these have a tendency to require more than one line of text on a button, they should remain the standard format with the PB frame color coordinating with system shading, the lense frame remaining standard black and the lense color according to the color code standards (i.e. RED=steam valve open). The BLPB that are used only as controls (no indication) should have opaque lenses to make them obviously not indicators. The BLPB that are only used as indicators should be shape coded. The lenses that are both indicators and controls are rectangular in shape. The lenses that are indicators only, have the corners blocked out to provide an octagonal shape.

The titles on indicators only should be changed to DPENED/CLOSED or RUNNING/STOPPED.

CATEGORY : P

GN-0-0283

BN-8-0253

CRITERIA REPORT REFERENCE

4.4.3.3. . LEGEND FUSHBUTTONS

PANEL ITEM NO.

ALL N/A

ITEM DESCRIPTION.

CR. DIS. #IN/A LEGEND LIGHTB VS LEGEND PUSHBUTTONS

### **HEO DESCRIPTION**

There is no distinction between legend lights and legend pushbuttons. There is a minimal amount of legend lights and an overwhelming amount of legend pushbuttons with no distinction between the two types.

Confusion in reading legends and selection of controls (push or read); delay in operation

## **RECOMMENDED MODIFICATION**

Provide readily distinguishable coding to differentiate active push buttons from indicator only devices.

# TECHNICAL REVIEW

#### GN-8-0253

There are many BLPB in the control room. Some of them are indicators and controls, some are indicators, only and some are controls with no indication. It's desirable to be able to distinguish between these functions. Since the majority of BLPB are indicators and controls and these have a tendency to require more than one line of text on a button, they should remain the standard format with the PB frame color corrdinating with system shading, the lense frame remaining standard black and the lense color according to the color code standards (i.e., RED = steam valve open). The BLPB that are used only as controls (no indication) should have opaque lenses to make them obviously not indicators. The BLPB that are only used as indicators should be shape coded.

As part of the labeling review the titles on indicators only should be changed. For example, DPENED/CLOSED or RUNNING/STOPPED.

# CATEGORY :

6N-8-0253

#### HEO NO. 5F-D-0336

CRITERIA REPORT REFERENCE

1 H.

PANEL ITEM NO. H25F AMB 20, 32, 48, 19, 31, 47

ITEM DESCRIPTION CR. DIS. 4: HS-25003 A, B & C, HS-25004 A, B & C/H2SFA/H2SFB

#### **HEO DESCRIPTION**

· Actor

Both H2SF papels contain three separate four button sets of controls and indications for a BWST suction valve. (only one of three has active pushbuttons for the open/close functions, the other two sets have open/close status indicators.)

Delay or failure to place DWST suction valves in desired position.

RECOMMENDED MODIFICATION

Provide indication only legends for the indication of SFV-25003 and SFV-25004 for channels 2A, 2B, 4A, 4B as resolved on HED GN-0-0253 and GN-0-0283.

### TECHNICAL REVIEW

SF-0-0336 '

HEO is accurate in the description of the function of the controls for SFV-25003 & SFV-25004. To prevent delay and/or failure to place valve on desired position, it is recommended that channels 2A, 2B, 4A, 4B indications of valve positions he identified as indication only per resolution of HEO GN-0-0253 GN-0-0283.

CATEGORY : B

5F-0-0336

S600-A-18

CRITERIA REPORT REFERENCE

4.5.1.1.f

PANEL ITEM NO.

### ITEM DESCRIPTION

CR. DIG. #IN/A

ICE BAILEY HAND AUTO PROCESS CONTROLLERS

INFORMATION TO BE DISPLAYED

### **HEO DESCRIPTION**

On loss of power to an ICB component, the Bailey Hand Auto Station Process controllers mater will fail midscale.

Delay/failure to recognize a malfunction in the ICS system.

# **RECOMMENDED MODIFICATION**

Mark controller meter at the failure point (midscale).

# TECHNICAL REVIEW

#### S650-A-18

HED is accurate. Mid scale failure of the indicator on the controller due to signal failure can cause plant oscilations by operator or system attempting to control plant based on controller information. Loss of power can be detected because either the RED "AUTO" or the WHITE "HAND" indicating lights are always on. The absence of either one being lit indicates that the light bulb is burned out or that the power is off and the operator can take appropriate action. Physically mark a yellow line horizontally across the controller meter at the failure location of the pointer (midscale). If the pointer is in this location for a period of time, the operator should move the position switch (which changes the display on the meter) to see if the pointer moves to another point.

CATEGORY :.

S60-A-18

10

MR-8-0493

CRITERIA REPORT REFERENCE

2.1.1

BYSTEM DESIGN

PANEL ITEM NO. HAMR N/A

CR. DIS. #IN/A VICTOREEN RAD MONITOR SYSTEM

**HEO DESCRIPTION** 

Can't detect failure in circuitry.

Misinterpret information.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

MR-8-0493

Based on the static survey, there are nineteen (19) HE problems.

Two (2) of these (HED #MR-8-0493 and MR-S-0494) have been judged to be category B; the rest of the HED's (MR-6-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and

the operator's confidence in the system. In aggregate, these HEO's should be considered as category B.

The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

M8-8-0493

# HEO NO. MR-B-0494 CRITERIA REPORT REFERENCE 2.1.1 BYSTEM DESIGN PANEL ITEM NO. HAMR N/A ITEM DESCRIPTION CR. DIS. 01N/A VICTOREEN RAD MONITOR SYSTEM

**HEO DESCRIPTION** 

Gives erroneous readings including false alarms.

Misinterpret information, violation of Tech. Spec's.

# **RECOMMENDED MODIFICATION**

Do to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0494

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-B-0493 and MR-B-0494) have been judged to be category B; the rest of the HED's (MR-B-0495 through MR-B-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY ;

MA-8-0495

CRITERIA REPORT REFERENCE

4.4.2.1

DIRECTION OF MOVEMENT

PANEL ITEM NO.

HAMR N/A

### **ITEM DESCRIPTION**

CR. DIS. WINA BYPASS TOGGLE BWITCH AND ASSOCIATED LIGHTS

**HEO DESCRIPTION** 

Toggle position up - is for bypassed position.

Misinterpret system status.

**RECOMMENDED MODIFICATION** 

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

## TECHNICAL REVIEW

#### MR-8-0495

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-5-0493 and MR-5-0494) have been judged to be category B; the rest of the HEO's (MR-5-0495 through MR-5-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the B.A. RM-11 Monitor System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The G.A. RM-11 Monitor System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information provided by the G.A. RM-11 Monitor System.



MR-8-0496

#### CRITERIA REPORT REFERENCE

4.4.4.4

ROTORY SELECTOR CONTROLS

PANEL ITEM NO.

HAMR

N/A

### ITEM DESCRIPTION

CR. DIS. #IN/A BELECTOR SWITCHES FOR RAD MONITORS

**HEO DESCRIPTION** 

Non-standard pointers (off-set small circle).

Misinterpret selector position.

12

# **RECOMMENDED MODIFICATION**

Due to an apprepate of problems with the Victoreen system. upgrade the RM-11 and monitor system to encorporate those items currently sonitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-5-0496

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-6-0493 and MR-6-0494) have been judged to be category B; the rest of the HED's (MR-8-0495 through MR-8-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's' confidence in the system. In appregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.



8-8-0496

MR-8-0497

CRITERIA REPORT REFERENCE

PANEL

ITEM NO.

CR. DIS. WINA BELECTOR SHITCHES FOR RAD MONITORS

# **HEO DESCRIPTION**

Some of the switches are normal clock-wise, others are normal counterclockwise.

Misinterpret monitor status.

### **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0497

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-S-0493 and MR-S-0494) have been judged to becategory B; the rest of the HED's (MR-S-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-8-0498

CRITERIA REPORT REFERENCE

4.6.3.3

CONSISTENCY

PANEL ITEM NO.

# ITEM DESCRIPTION

CR. DIS. #IN/A ALL'LABELS

# **HEO DESCRIPTION**

Labels are confusing and inconsistent.

Misinterpret purpose of device.

## **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0498

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-5-0493 and MR-8-0494) have been judged to be category B; the rest of the HEO's (MR-8-0495 through MR-8-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :D

HEO NO. MR-8-0499		i
CRITERIA 4.5.3.1	EPORT REFERENCE CHARACTERIBIICS AND PROBLEMS WITH LIGHT INDICATORS	
PANEL	ITEM NO.	
ITEM DESC	AIPTION GAS PURGE CONTROL/INDICATOR LIGHTS	,

### **HEO DESCRIPTION**

The indicator lights need a special tool for bulb replacement, also some are missing covers and can't be replaced.

Lack of status of system due to burned out bulbs.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

### TECHNICAL REVIEW

#### MR-8-0499

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED &MR-S-0493 and MR-S-0494) have been judged to be category B; the rest of the HED's (MR-S-0495 through MR-S-0511)have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-6-0499

MR-8-0500

#### CRITERIA REPORT REFERENCE

N/A

4.	5.	1.	6	

COLOR CODING

PANEL ITEM NO.

HAMR N

ITEM DESCRIPTION

CR. DIS. #IN/A ENTIRE PANEL

# **HEO DESCRIPTION**

Color coding is not consistent throughout panel nor is it consistent with rest of control room.

Misinterpretation of information.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0500

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-5-0493 and MR-5-0494) have been judged to be category B; the rest of the HED's (MR-5-0495 through MR-5-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-8-0501

CRITERIA REPORT REFERENCE

N/A

4.5.4.2. b

SPECIFIC RECORDER TYPES

PANEL ITEM NO.

HAMR

#### **ITEM DESCRIPTION**

CR. DIS. WIN/A WESTRONIC DISCRETE TREND RECORDERS

**HEO DESCRIPTION** 

Hard to read or interpret especially because traces often appear to cross.

Misread trend information.

**RECOMMENDED MODIFICATION** 

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

### TECHNICAL REVIEW

#### MR-8-0501

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-5-0493 and MR-5-0494) have been judged to be category B; the rest of the HED's (MR-5-0495 through MR-5-0511) have been judged individually to be category D. The sum total of the category D observations seriously underminesboth the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen Bystem.

CATEGORY :

18-8-0501

MR-8-0502

## CRITERIA REPORT REFERENCE

4.5.3.1

CHARACTERISTICS AND PROBLEMS OF LIGHT INDICATIONS

PANEL ITEM NO.

### ITEM DESCRIPTION

CR. DIS. MIN/A BREEN STATUS LIGHTS ON MONITORS

## **HEO DESCRIPTION**

When green light is on, meter is believable, when off, it is failed.

Misinterpretation of system status and information.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# **TECHNICAL REVIEW**

#### MR-8-0502

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-B-0493 and MR-B-0494) have been judged to be category B; the rest of the HEO's (MR-S-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen Bystem and the operator's confidence in the system. In aggregate, these HEO's should be considered category B. The G.A. RM-11 Monitor System is made up of vendor supplied

modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-6-0502

CRITERIA REPORT REFERENCE 4.4.3.3 . LEGEND PUBHBUTTONS

PANEL ITEM NO.

# ITEM DESCRIPTION

SQUARE ILLUMINATED PUSHBUTTONS AND INDICATORS (NON-LEGEND)

### **HEO DESCRIPTION**

No differentiation between indicators and pushbuttons.

Confusion in operating.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0503

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HEO &MR-S-0493 and MR-S-0494) have been judged to be category B; the rest of the HEO's (MR-S-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-8-0504

CRITERIA REPORT REFERENCE

PANEL ITEM NO.

CR. DIS. #IN/A PUMP STATUS INDICATION LIGHTS

#### HEO DESCRIPTION

Inconsistent color coding, either RED or WHITE = ON

#### Misinterpret system status.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0504

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED #MR-5-0493 and MR-5-0494) have been judged to be category B; the rest of the HED's (MR-5-0495 through MR-5-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is catable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

#### HEO NO. MR-8-0505

# CRITERIA REPORT REFERENCE

4.5.1.6

COLOR CODING

PANEL ITEM NO.

HAMR

N/A

# **ITEM DESCRIPTION**

MONITOR METERS ON ALL PANELS CR. D15. #1N/A

**HEO DESCRIPTION** 

On some sections, the red meter is the operating meter and the black is for calibrations. Other meters are code opposite.

Misinterpret scales.

## **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system. upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

## TECHNICAL REVIEW

#### MR-8-0505

Based on the static survey, there are nineteen (19) RE problems. Two (2) of these (HED #MR-8-0493 and MR-5-0494) have been judged to be category B; the rest of the HEO's (MR-5-0495 through MR-8-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

# HEO NO MR-B-0506 CRITERIA REPORT REFERENCE 4.5.1.5 BCRLE MARKING PANEL HAMR ITEM NO. ITEM DESCRIPTION ALL CIRCULAR METERS

# **HEO DESCRIPTION**

Meters are evenly spaced .1,1,10... and there are 8 evenly spaced minor markings, making a linear log scale.

Very confusing scale to read.

### **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0506

Based on the static survey, there are ninetsen (19) HE problem Two (2) of these (HEO BMR-8-0493 and MR-S-0494) have been judg category B; the rest of the HEO's (MR-S-0495 through MR-S-0511 have been judged individually to be category D. The sum total the category D observations seriously undermines both the abil of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B.

The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the wany HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :D

MR-8-0507

#### CRITERIA REPORT REFERENCE

- 4.5.1.1 INFORMATION TO BE DISPLAYED
- PANEL ITEM NO.

ITEM DESCRIPTION CR. DIS. #IN/A CIRCULAR METERS

### **HEO DESCRIPTION**

Unecessary info on meter faces such as trademarks and calibration scales.

Confusing clutter.

# RECOMMENDED MODIFICATION

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0507

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED BMR-S-0493 and MR-S-0494) have been judged to be category B; the rest of the HEO's (MR-S-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :D

# HEO NO SOS

CRITERIA REPORT REFERENCE

PANEL ITEM NO.

ITEM DESCRIPTION SCALE LABELS

### HEO DESCRIPTION

Engineering units are non-standard abreviations.

Misinterpret displayed information.

# **RECOMMENDED MODIFICATION**

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-9-0508

Based on the static survey, there are ninsteen (19) HE problems. Two (2) of these (HED #MR-8-0493 and MR-6-0494) have been judged to be category B; the rest of the HED's (MR-6-0495 through MR-8-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that, is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY

MR-8-0509

#### CRITERIA REPORT REFERENCE

4.4.1.1

GENERAL PRINCIPLES

PANEL ITEM NO.

HAMR N/A

ITEM DESCRIPTION

# **HEO DESCRIPTION**

There are numerous controls/displays only used by technicians for calibration purpose.

Confusing and cluttered panels.

# RECOMMENDED MODIFICATION

Due to an aggregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0509

Based on the static survey, there are nineteen (19) HE problems. Two (2) of these (HED @MR-B-0493 and MR-B-0494) have been judged to be category B; the rest of the HED's (MR-B-0495 through MR-S-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HED's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information prasently provided by the Victoreen System.

CATEGORY :D

MR-R-0510

CRITERIA REPORT REFERENCE

4.4.1.1

HAMR

1

E Mare

RENERAL PRINCIPLES

PANEL ITEM NO. N/A

**ITEM DESCRIPTION** 

SOME CIRCULAR METERS CR. DIS. #:N/A

### **HEO DESCRIPTION**

Meters are located too high to be read.

Misread scale

### RECOMMENDED MODIFICATION

Due to an appregate of problems with the Victoreen system, upgrade the RM-11 Rad monitor system to encemporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### 6120-8-810

Based on the static survey, there are ninetean (19) HE problems. Two (2) of these (HED MMR-8-0493 and MR-8-0494) have been judged to be category Fi the rest of the HEO's (MR-6-0495 through MR-8-0511) have Seen judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In appregate, these HE/D's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.



MR-6-0510

#### HEO NO. MR-8-0511

CRITERIA REPORT REFERENCE 4.4.1.1 GENERAL PRINCIPLES

PANEL ITEM NO. HAMR N/A

ITEM DESCRIPTION CR. DIS. MIN/A ALL BACK LIT INDICATORS AND CONTROL/INDICATORS

### **HEO DESCRIPTION**

There is only one single filement bulb with no test capabilities

Misinterpret system status information

### RECOMMENDED MODIFICATION

Due to an apprepate of problems with the Victoreen system. upgrade the RM-11 Rad monitor system to encorporate those items currently monitored by the Victoreens.

# TECHNICAL REVIEW

#### MR-8-0511

Based on the static survey, there are nineteen (19), HE problems. Two (2) of these (HED #MR-5-0493 and MR-5-0494) have been judged to be category B; the rest of the HEO's (MR-6-0495 through MR-6-0511) have been judged individually to be category D. The sum total of the category D observations seriously undermines both the ability of the operator to effectively use the Victoreen System and the operator's confidence in the system. In aggregate, these HEO's should be considered as category B. The Victoreen System is made up of vendor supplied modules, which would be difficult to modify to correct the many HE problems cited. Currently in the control room, there is also a General Atomics Radiation Monitor System that is capable of being expanded to include all information presently provided by the Victoreen System.

CATEGORY :

MR-6-0511

# SACRAMENTO MUNICIPAL UTILITY DISTRICT

OFFICE MEMORANDUM

TO: NRC Resident Inspector

DATE:

January 24, 1986 NOM 86-55

stelada. Dan Whitney

-----

FROM:

5. 1 . 1

SUBJECT: TRANSMITTAL OF REQUESTED INFORMATION

The attached December 26, 1985 event related Nuclear Safety Report is provided as requested.

It is our understanding that you will forward this material to the NRC IIT Team for their information and use. Should you have questions regarding this material, do not hesitate to contact us.

Attachment: NRC (3 copies) cc: G. A. Coward S. Redeker J. V. McColligan J. Delezenski

8645164198 15pp.

	ACTION ITEM CLOSURE REPORT
. *	(Format, Rev. 2)
AC	TION LIST ITEM NUMBER 7a
AC	TION LIST DESCRIPTION _ Health Physics Aspects/Radiological Evaluation
QIJ	ARANTINED EQUIPMENT LIST ITEM NUMBER NA
RE	SPONSIBILITY OF Fred Kellie +OP
PR	EPARED BY Fred Kellie AWA DATE 1-20-86
Α.	DESCRIPTION OF ISSUE/CONCERN: Review Health Physics Aspects and perform a radiological evaluation on the 12-26-85 Loss of ICS Transient.
8.	INVESTIGATIONS DONE:
c.	<ol> <li>Calculated highest gas and iodine dose at the site boundary for the duration of the incident due to release from the Auxiliary Building Stack (ABS). (Continued on page 2).</li> <li>CONCLUSIONS/EXPLANATION (should include Root Cause):</li> </ol>
D.	<ol> <li>Highest gas and iodine dose for an individual if at the site boundary for the duration of the incident was 0.2 mrem. Release did not exceed T.S.3.18.1a and 1b. (Continued on page 2).</li> <li>SHORT-TERM FOLLOWUP REQUIRED/RECOMMENDATIONS.</li> </ol>
	See attached recommendations list.

E. LONG-TERM RECOMMENDATIONS:

See attached recommendations list.

- F. PROGRAMMATIC IMPLICATIONS:
  - Inability to obtain data on Code Safety and Atmospheric Dump valve lift did not allow for a timely assessment of radiological releases from the secondary system.

(Continued on page 2). REVIEWED AND ACCEPTED in love Action List Coordingtor - SMUD

DATE 1-21-86

# NUCLEAR SAFETY SIGNIFICANCE OF THE 12/26/85 EVENT

The Rancho Seco Nuclear Power Plant experienced a reactor trip and subsequent cooldown transient on 12/26/85. The cooldown was initiated by the failing open to the 50% position of the turbine bypass valves and atmospheric dump valves.

Section 14.2.2.1.1 of the Updated Safety Analysis Report (USAR) describes the accident analysis of a steam line failure. The 12/26/85 event can be compared to this analysis since the opening of six main code safety valves, two atmospheric dump valves and four turbine bypass valves are, in effect, a failed steam line. The list in Section 14.2.2.1.3.B of the USAR contains the major assumptions which are made for the main steam line failure analysis. The major analysis assumptions and results are compared with the 12/26/85 event in the following table:

## COMPARISON

Main Steam Line Failure Analysis Assumptions and Results

1% defective fuel rods.

Complete severance of 36" Main Steam pipe. Duration of release -4.5 hours.

Steam line break between Reactor Building and a turbine stop valve:

490°F reached in 43 seconds.

10 gpm primary to secondary leakage.

Site area dose thyroid 12,700 mRem. Whole body 46 mRem.

### 12/26/85 Event

0% defective fuel rods.

6 code safety valves open for <1 minute, 2 ADVs and 4 TBVs 50% open for <10 minutes.

Open valves located in the same portion of the main steam system.

490°F reached in 6-7 minutes.

0.0 gpm - no known leakage from tritium sample and calculation.

Site area dose thyroid 0.0 mRem. Whole body 0.2 mRem.

ACTION ITEM CLOSURE REPORT (Format, Rev. 2)

-2-

# B. INVESTIGATIONS DONE:

- Calculated MPC at the site boundary due to ABS release and release from the secondary system to determine IOCFR50.72, 50.73 compliance.
- Radiological implications of operator entry into the Make-Up Pump Room.
- C. CONCLUSIONS/EXPLANATION (should include Root Cause):
  - Conservative evaluation of MPC at site boundary was <2 MPC for one hour.
  - Two operators entered the Make-Up Pump Room and West Decay Heat Cooler Room without a proper assessment of the radiological conditions of those areas and without respiratory protection.
  - F. PROGRAMMATIC IMPLICATIONS:
    - Present procedures are inadequate to timely assess radiological releases and determine IOCFR50.72 and Technical Specification compliance especially if radioactivity is present in the secondary system.
    - 3. Lack of communications between operations and Health Physics.
    - 4. Lack of clearly defined separation of responsibilities for radiation protection between Operations and Health Physics. Eg. Is the Emergency Team capable of performing an assessment (gas, particulate, and iodine) of area of unknown radiological conditions? There are presently no Health Physics people on the Emergency Team.
    - Health Physics procedures to respond to radiclogical events which are greater than routine but minor enough not to require implementation of the Emergency Plan.

\* See attached memo FWK 85-276 for further details.

The results of this analysis (Section 14.3.3 of the USAR) showed a thyroid dose of 0.046 Rem at the site boundary. The results of the 12/26/85 event appear in the Action Item Closure Report for Item 7a (attached enclosure). The whole body dose to a person at the highest down wind sector at the site boundary for the length of the event (4 hours) was calculated to be 0.2 mRem. Charcoal filters from two different radiation monitors sampling the Auxiliary Building stack, during the length of the event, were analyzed for radioiodine peaks. No peaks were found resulting in a thyroid dose of 0.0 mRem.

The results of both cases are minute fractions of the 10CFR100 limits of 25 Rem whole body and 300 Rem thyroid at the site boundary. The event of 12/26/85 was an overcooling of the Reactor Coolant System. Occurrences of this type have been evaluated in the USAR in the form of an analysis of a guillotine failure of a main steam line. The consequences of the 12/26/85 event are bounded by this analysis.

# Required \* D and E Recommendations

SU

 Train Operators and Chem & HP Techs on proper response to entries into areas of unknown radiological status.

A. Guidelines:

- A. Have the on duty SMUD H.P. Tech provide Health Physics coverage upon entry.
- Dress to maximum protection; cloth and paper coveralls, hoods, 2 pairs of gloves, high top shoecovers, rubber booties, and disposable flat shoecovers. Tape hood, gloves, and high top shoecovers to the coveralls. Wear rainsuits if water is involved.
- Always wear an SCBA if radiological conditions are unknown.
- d. H.P. Tech take a gas sample, Hi-Vol air sample, and smears. Document rad levels and all results of analyses on an RWP written ASAP after the event.
- e. Fill out the proper Personnel and Clothing Contamination report if required.
- Make the required modification on RJR 13 to differentiate between the various monitor points so that a proper assessment may be made of radiological releases and conditions before, during, and after the event.
- 3. Some method to timely assess which and length of Atmospheric Dump and Code Safety Relief Valve must be made. This information must be relayed to RAC or person evaluating IOCFR50.72 releases so that an assessment can be made within 4 hours after the event if radioactivity is in the secondary system. Change AP 28?

\* SU - Start Up

ST

SU

\* LT - Long Term

\* ST - Short Term

0.1		
Required	* D	and E Recommendations -2-
ST	.4.	Resolve discrepancies between R-15002B and R-15045.
ST	5.	Provide the necessary procedure changes to insure RAC1, 2, 3 are replaced when IDADS is rebooted.
ST	6.	Mount the recently purchased SCBAs in the -20 and grade level for easy access by the Operators in case of an emergency
Start U	p →	Provide an emergency locker with Anti 'C's and full face filter respirators.
SU	7.	Designate on the Daily Assignment and the Control Room Manning Board who the onsite H.P. person is (if not already done).
LT	8.	A procedure to determine compliance with all regulatory requirements on releases should be written in one procedure with a computer program for the Apple in TSC.
SU	9.	Investigate methods to provide some means to ensure adequate numbers of keys are available to H.P. and Operators in order to respond in an incident.
SU	10.	Remind the A.O.s to write Work Request on recorders that are not printing points properly, specifically, the Auxiliary Building purge monitor readout on H2RWW (RJR 11-02).
SU	11.	Provide a gate or opening in the controlled area fence just north of the Spent Fuel Cooler to allow Operator ingress and egress to observe or operate 'A' AFW valves (only allow entry and exit during emergency situations).
ST	12.	We need data to show gas isotopic mix and concentration vs reading on R-15049 and R-15050.

\* SU - Start Up

. . .

\*\*\*\*

\* LT - Long Term . \* ST - Short Term

# Required \* D and E Recommendations

LT

SU

ST

SU

ST

13. A procedure for the operator to give him guidance on 10CFR50.72 evaluation should be written. (eq. when R-15002B reads <u>x</u> cpm and is expected to exceed that value for one hour, a gas, particulate, charcoal (silver zeolite), and tritium should be obtained on ABS and analyzed immediately (See AP 305-28). If R-15001B or R-15045 exceeds high alarm setpoint then you have exceeded T.S. 3.18.1a. The charcoal or silver zeolite should be counted ASAP to ensure you didn't exceed T.S. 3.1.8.1b (See AP 309-4G).

-3-

- 14. When a nonroutine radioactive release occurs or an Unusual Event involving a potential for a radioactive release, the Radiation Protection Superintendent and Chemistry Superintendent should be called immediately to provide support in calculations of releases.
- 15. Auxiliary Building fan flow recorder FR-54206 timer device should be reset to the proper date and time. As operators review the chart if they notice the chart timer device is not correct they should write a work request to correct it (WR #108033 written).
- 16. Emergency Plan Guidance TAB 4 needs to be rewritten to update current alarm setpoints on R-15001B and R-15002B. We no longer have instantaneous limits in Technical Specification. The Emergency Plan should reflect the latest revisions to Technical Specification. Other TABs should be reviewed to ensure they are up-to-date.
- 17. Make the necessary operation casualty procedure changes to immediately divert the plant effluent if water is in the main steam-lines and the code safeties or ADV may lift (Drains in this area go directly offsite).

\* SU - Start Up

\* LT - Long Term

\* ST - Short Term

Required \* D and E Recommendations

SU

 Evaluate changing the Emergency Plan to make the onshift Health Physics person a member of the Emergency Team.

-4-

\* SU - Start Up

\* LT - Long Term

\* ST - Short Term

# SACRAMENTO MUNICIPAL UTILITY DISTRICT

OFFICE MEMORANDUM

TO: File

DATE: December 30, 1985

FWK 85-276

FROM: Fred Kellie

SUBJECT: RADIOLOGICAL ASSESSMENT DURING LOSS OF ICS EVENT AND SUBSEQUENT MAKE-UP PUMP DAMAGE AT -0430 12-26-85

- I. ODRs Written:
  - Unable to properly assess radiological releases and conditions due to inability to differentiate the various monitor points on RJR-13 (ODR-457).
  - b. R-15001 A and B pump and motor damaged due to SFV's going shut during SFAS actuating (ODR-458).
  - c. Operators entered the Make-Up Pump Room and WDHCR without properly assessing smearable contamination, gas, or radioiodine activity levels or wearing SCBA. RWP 85-875 not appropriate for this task (ODR-460).
  - d. Unable to call up RAC1, 2, or 3 on the IDADS computer during manning of the TSC. This hampered timely assessment of radiological releases (ODR-459).
  - e. Unable to timely assess release from the secondary system due to inability to quickly obtain which ADV's and/or Code Reliefs lifted and the length of the lift (ODR-456).
- II. Radiological Releases

A review of recorder RJR-13 on the H4MR for R-15002 the Auxiliary Building Stack monitor as best I can read (see ODR-457 written on RJR-13) indicated that R-15002 B (gas) did not exceed 2000 II. Radiological Releases - Continued

cpm (based on comparison of highest reading on R-15045, it should have read ~17,000 cpm). A review of recorder RJR-11 on H2RWW was of no value because the gas point for Auxiliary Building Stack was not printing.

-2-

Even though I couldn't verify by reviewing RJR-13 and RJR-11 with the RM-11 printout, there appeared to be a difference in alarm setpoints between R-15002B and R-15045. See below:

ALERT					Н		
		cpm	uCi/cc (Xe-133)	uCi/sec	cpm	uC1/cc (Xe-133)	uC1/sec
R-15002	A (part) B (gas)	2500 1000	NA 2.5E-5	NA 5E2	25,000	NA 3.5E-3	NA 7E4
R-15045		NA	1.83E-4	4.9E3	NA	3.66E-4	9.883

Discrepancies between R-150028 and 15045 are as follows:

- The alert and high alarms for concentration and release rate are not equivalent.
- The flow rate used to calculated the release rate for R-15045 is 57,000 cfm which is the maximum flow if both Auxiliary Building fans are running. Realistically, only one fan should be running.

The CAEG monitor as best as can be read from RJR-13 was about 300 cpm at 0500. It had been reading about 450 cpm prior to the event.

A review of the main steam-line monitors on the RM-11 (GA) did not show any change during the event.

FILE

# III. 10CFR50.72 Evaluation

- A. Auxiliary Building release 12-26-85
  - At 0500 0.93 MPC total at site boundary (This was the highest Auxiliary Building Release rate which only lasted 10 minutes).

-3-

- 2. At 0650 0.054 MPC total at site boundary.
- 3. Total curies noble gases released 74 curies.

a. 69 C1 Xe-133 b. 4.5 Ci Xe-135 c. 0.75 Ci Kr-85m

- B. Release from the Secondary System
  - 1. See ODR-456 on ADV's and Code Safety Reliefs.
  - Because of residual activity and the possibility of continuing very small primary to secondary leak, an evaluation was made to determine MPC's at site boundary.

Based on samples taken on the main steam-line at 0810, the MPC total at the site boundary was 0.83. The major contributor was Cs-134 and Cs-137 in which the most conservative MPC (insoluble) was used.

In the most conservative case, assuming the Auxiliary Building Stack release stayed at 0.93 MPC at the site boundary for an hour (it was actually no more than 10 minutes) and the secondary release was conservatively 0.85, (averaged over an hour) the total did not exceed

FILE
. III. 10CFR50.72 Evaluation - Continued

2 MPC at the site boundary,

3. Total curies released - noble gases 5.9E-3 Particulate 7.0E-4 Tritium 8.3E-3

-4-

IV. Gas and Iodine Dose at Site Boundary

- a. Charcoal cartridges in service during the length of the event from both R-15002 and R-15045 did not show any radioiodine peaks upon analysis. Therefore, there was no thyroid dose.
- b. Whole body dose to a person at the highest downwind sector at the site boundary for the length of the event (4 hours) calculated to be 0.2 mrem. This value was obtained by calculating the dose due to the release (every 10 minutes) from the Auxiliary Building Stack (R-15045). The average dose rate for this time period was 0.05 mrem/hr times 4 hours equals 0.2 mrem whole body dose. This is a conservative value because the Auxiliary Building fan was tripped for about 20 minutes (actually ~0600-0622 per Grant Simmons). therefore, there was no discharge during this time period.
- V. Radiological Implications of Operator Entry to the Make-Up Pump Room (see ODR-460 and RPO 85-80).

At -0430 an Auxiliary Operator and Equipment Attendant entered the Make-Up Pump Room and the West Decay Heat Cooler Room. Due to the seriousness of the event (loss of coolant from the damaged pump), the operators did not take time to wear any type of respiratory protection on these entries. The A.O. and E.A. twice entered the Make-Up Pump Room, once to isolate

FILE

V. Radiological Implications - Continued

the pump (close SIM-001 and 003) about 5 minutes duration and once to observe pump damage less than one minute. In between entry to the pump room, they went to the WDHCR to unsuccessfully open SFV-23604.

-5-

Both wore cloth and paper coveralls, two pairs of rubber gloves, rubber booties and flat PVC shoecovers. It was noted that they could not find any high top shoe covers at the grade level changeroom, however, later investigation showed an ample supply. The A.O. also wore a set of plastic raingear and taped his gloves to his coveralls. They used an RO-2 or RO-2A to assess the radiation levels. Their entry was made on RWP 85-875 which is for "Operator Routine Tasks". No assessment: was made of smearable contamination, particulate, gaseous of radioiodine activity until after entry on RWP 85-1134.

First knowledge by the onshift H.P Tech that entries had been made to the Make-Up Pump Room was when the A.O. and E.A. set off the Hand and Foot Monitor. The H.P. Tech was at the Hand and Foot Monitor checking on a security guard/fire watch who had gaseous contamination of his pants. Personnel and Clothing Contamination reports indicated the A.O.'s shoes, socks, and pants were contaminated at 10,000, 500, and 8,000 cpm, respectively. The E.A. had contamination on his hand (400 cpm - unable to confirm because E.A. was performing his own decontamination) and shoes ~8,000 cpm and 600 cpm after deconning.

Both the A.O. and E.A. were whole body counted the morning of December 26. The results on the A.O. indicated 1% MPBB of Silver-110M and the E.A. had 0.3% of MPBB of Silver-110M.

The A.O. received 20 mrem external exposure and the E.A. 10 mrem.

FILE

SACRAMENTO MUNICI	IPAL UTILITY DISTRICT [ 620] S Street, Bax 15830, Secremento, California 95813; (91 Note - I regu SMUD & make a stat of whether the 12/26 en bounded to FSAF
	TELECOPIER TRANSMITTAL COVER SHEET & SMUD uspin
DATE: 1-24-86	TIME: 1:36 p.m.
LEASE DELIVER THE	FOLLOWING PAGES TO:
IME:dorde	on Educon
ITY: RECLO	d.
ELECOPY NO .: (30)	1) 492 - 7612 VERTEY NO .
HIS TELECOPY SENT B	BY:
HIS TELECOPY SENT B AME: J. Fueld	NY: I Redeker EXT: 4614 AREA NO.:
HIS TELECOPY SENT B AME: J. Fuelo EPARTMENT: JL	er: 1 / RedeRen Ext: 4614 AREA NO.:
THIS TELECOPY SENT B	Area NO.:
HIS TELECOPY SENT B	A / RedeRen EXT: <u>4614</u> AREA NO.: <u>uc.ops</u> (INCLUDING COVER SHEET) TRANSMITTING FROM
HIS TELECOPY SENT B IAME: J. Fuele DEPARTMENT: JL UMBER OF PAGES XXON 2310 QWIP (AUT	AY: 2 / RedeRen EXT: <u>4614</u> AREA NO.: <u>Lec.ops</u> INCLUDING COVER SHEET) TRANSMITTING FROM OMATIC
HIS TELECOPY SENT B AME: J. Jule DEPARTMENT: JL UMBER OF PAGES XXON 2310 QWIP (AUT	ALL PAGES DI FASE CALL BACK AS FOOD AS DOCUMENTE INCLUDING COVER SHEET) TRANSMITTING FROM
HIS TELECOPY SENT B AME: J. Jule EPARTMENT: JL UMBER OF PAGES XXON 2310 QWIP (AUT F YOU DO NOT RECEIV UMBER IS (209) 333-	E ALL PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE. MY PHONE 2935
HIS TELECOPY SENT B AME: J. Jule DEPARTMENT: JL UMBER OF PAGES XXON 2310 QWIP (AUT F YOU DO NOT RECEIV UMBER IS (209) 333-	E ALL PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE. MY PHONE 2935
HIS TELECOPY SENT B AME: PARTMENT: WMBER OF PAGES XXON 2310 QWIP (AUT F YOU DO NOT RECEIV UMBER IS (209) 333-	E ALL PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE. MY PHONE 2935

.

OFTIMA