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SUBJECT: Forwards responses to NRC 861128 questions re DCRDR summary rept.

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January 23, 1987
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Director of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Project Director
PWR Project Directorate #7
Division of Pressurized Water Reactor Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528 (License No. NPF-41)
STN 50-529 (License No. NPF-51)
STN 50-530
NRC Request for Additional Information -
Detailed Control Room Design Review (DCRDR)
File: 87-A-056-026

Reference: (1) Letter from J. G. Haynes (ANPP) to G. W. Knighton (NRC) dated August 30, 1985 (ANPP-33302). Subject: Detailed Control Room Design Review (DCRDR) Report.

(2) Letter from E. A. Licitra (NRC) to E. E. Van Brunt, Jr. (ANPP) dated November 28, 1986. Subject: Request for Additional Information - Palo Verde Detailed Control Room Design Review.

Dear Mr. Knighton:

The Palo Verde Supplemental DCRDR Summary Report was submitted for your review and approval by the reference 1 letter. Based on that review, the NRC staff determined the need for additional information, which was requested by the reference 2 letter.

Attached please find the requested information regarding the DCRDR Summary Report.

If you have any further questions regarding this matter, please contact Mr. W. F. Quinn of my staff.

Very truly yours,

JG Haynes

J. G. Haynes
Vice President
Nuclear Production

JGH/PGN/ls
Attachment

cc: O. M. De Michele
E. E. Van Brunt, Jr.
A. C. Gehr
E. A. Licitra
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1. NRC QUESTION

As part of the Supplemental Summary Report Review, the staff selected sample operator tasks from Appendix A and performed an independent comparison of operator information and control requirements vs. the characteristics of available control room devices. This review required simultaneous examination of several documents.

- The listing of operator steps.
- The listing of information and control requirements for each step.
- The listing of devices that may support each step.
- The inventory of device characteristics.
- The instrument accuracy listing.

Although no errors were noted in this sample, comparisons using the information in the format provided would appear to be highly error prone. How did APS actually perform the comparison? Were any special data base printouts, comparison work sheets or other devices used to facilitate an error free comparison?

ANPP RESPONSE

In order to assist in an error free collection, filing, comparing and sorting of the large amount of data generated for this analysis, several data bases were developed using a Data Base Management System (DBMS). This DBMS is on a mini-computer and has the capacity for storing large numbers of multiple field records. The DBMS has the capability for sorting up to 16 fields and for linking files (groups of records) from several data bases through a common field in each file.

The following data bases were set up to facilitate the comparison of data for this analysis: (1) Task Analysis, (2) Information and Control, (3) Device Selection, (4) Device Inventory, (5) Indicator and Recorder Loop Accuracy, (6) SPDS Instruments, and (7) Reg. Guide 1.97 Instruments. The comparison of operator information and control requirements vs. the characteristics of available control room devices were completed using the DBMS database (2) "Information and Controls" and DBMS database (4) "Device Inventory".

2. NRC QUESTION

The instrument loop accuracy figures used in the comparison process appear to be applicable to normal plant environmental conditions, however, in some cases the need to perform a given emergency operating procedure implies plant conditions that are expected to result in loop accuracies significantly worse than normal.

Why would harsh environment instrument accuracies not be more appropriately used in some parts of the comparison process?

ANPP RESPONSE

The "required" instrument accuracy of the instrument displays specifies the maximum inaccuracy which can be tolerated while permitting the operator to successfully execute the task. The "required" accuracies were generated from the following PVNGS plant specific event sequences which were generated by Combustion Engineering.

- Reactor Trip
- Loss of Coolant Accident, large break
- Loss of Coolant Accident, small break
- Steam Generator Tube Rupture, 1 tube, 1 generator
- Excess Steam Demand Event; 1.0 ft^2 unisolable steam line break
- Excess Steam Demand Event; stuck open main steam safety valve
- Loss of Feedwater; partial
- Loss of Feedwater; total
- Loss of Forced Circulation
- ATWS coincident with a Loss of Feedwater
- SGTR with a stuck open atmospheric dump valve in same generator

The parameter value/range generated for each of the safety-function based success path task analyses was obtained by a review of all the above event sequences taken together. This "umbrella" event provided the bounding parameter values or ranges which lead to identifying the "required" accuracy.

The "existing" instrument accuracies are the Root-Mean-Square (RMS) as calculated from the accuracy data on the transmitter, converter, and indicator. These calculated accuracies, in conjunction with the resolution of the indication, were used to determine if the devices were suitable to provide the information to the operator within the "required" accuracy specified.

The above discussion on the "required" and "existing" instrument accuracy selection made it possible not to deem harsh environment accuracies necessary for the analysis being performed. This is due to the fact that the "required" instrument accuracies are based on PVNGS plant specific event sequences which considered harsh environment events. In addition, the "existing" instrument accuracies meet the Reg. Guide 1.97 requirements.

3. NRC QUESTION

The task analysis and comparison process identified a number of operator steps which are not supported by control room equipment. For the most part, APS has decided not to correct these items because the operator steps involved represent alternative ways of accomplishing procedural tasks. The primary methods of performing these tasks are available and are supported by control room equipment. Staff's review generally concurred with APS's assessment. However, there were a few steps that are not clearly related only to alternative methods of performing EOP tasks. These steps are itemized in Attachment 1.

Please discuss the primary means of accomplishing the tasks related to the steps listed in Attachment 1.

ANPP RESPONSE

The operator tasks listed on Attachment 1 consist of operator tasks which are secondary and tertiary (implicit) tasks for performing a primary task (explicit). These implicit tasks are only performed in the event the operator fails to accomplish the primary task due to a failure in the device selected for performing the primary task.

The Attachment 1 tasks have been reviewed to determine if they are absolutely necessary for safety and have been found not to be. The inclusion of these devices in the control room would only result in excessive clutter on the control boards.

Therefore, the primary means of accomplishing the Attachment 1 tasks are through an auxiliary operator outside the control room. For those devices that have not been included in the control room, ANPP has provided training to the operators so that the operators are aware of these alternate tasks which may be used to bring the plant to a safe shutdown condition.

4. NRC QUESTION

The task analysis and comparison process identified four operator tasks for which required displays and controls do not exist either in or out of the control room. These items are listed in Table 3-3 of the Appendix BB of the Final Summary Report. APS has committed to correct only one of these cases.

What are the bases for not correcting the other three discrepancies?

ANPP RESPONSE

The bases for not correcting Items 1, 2 and 3 on Table 3-3 are as follows:

Item 1: Shutdown Cooling Loop A Heat-Up Rate

Through the use of two temperature recorders (SIA-TR-351 and SIB-TR-3), the operator logs at various times the temperature and calculates the shutdown cooling loop heat-up rate. The speed of the recorders is noted on the chart paper. Therefore, no additional device is required in the control room to monitor shutdown cooling loop heat-up rate.

Item 2: Reactor Coolant System (RCS) Cooldown Rate

Through the use of two temperature recorders (RCA-TR-112 and RCA-TR-122), the operator logs the temperature at various time intervals and calculates the RCS cooldown rate. The speed of the temperature recorders is noted on the chart paper.

Therefore, no additional device is required to monitor the RCS cooldown rate.

Item 3: High Pressure Safety Injection (HPSI) Total Flow

To monitor total HPSI flow, the "HPSI Head Flow" curve provided on the main control panels are used. These curves assist the operator in determining total HPSI flow by correlating the Pressurizer pressure to number of HPSI pumps operating to number of HPSI gallons flowing in the system. Therefore, no additional device is required in the control room to monitor total HPSI flow.

5. NRC QUESTION

The task analysis and comparison process identified many displays and controls that have design characteristics that do not support the operator steps for which they would be used. APS has, in general, not committed to correct these items.

What are the bases for not correcting these items?

ANPP RESPONSE

The displays and controls that have design characteristics that do not support the operator steps for which they would be used are listed on "Information and Control Requirements Discrepancy Report", Appendix I of the Reference 1 submittal. These items were reviewed by ANPP through the established review process and our recommendations are provided below.

(a) Observation 1-1-15-10-0-0

Task Description	Observation
Verify reactor power 10E[X]% as constant or decreasing	Loop accuracy of 30% is in disagreement with 1/2 decade accuracy requirement

ANPP RECOMMENDATION

ANPP review of this observation indicates that the reactor power loop accuracy is not 30%, but 1/2 decade, which meets the "required" loop accuracy.

(b) Observation 1-2-15-15-0-0

Task Description	Observation
Verify spent fuel pool level	No indicator for spent fuel pool level is provided in the control room

ANPP RECOMMENDATION

ANPP will provide a local spent fuel pool level indication (i.e., marking on side of pool) as committed in Reference 2.

(c) Observations 1-3-40-30-5-25 and 1-3-40-30-20-25

Task Description	Observation
Steam Generator Auxiliary feed flow	No adequate instrumentation for Auxiliary Feedwater pump 'N' flow, existing parameter measured in lbs/hr while "required" parameter given in GPM

ANPP RECOMMENDATION

This observation identifies a discrepancy which relates to the "existing" flow meter having its engineering units in "lb/hr" instead of the "required" information being in "gpm". The recommended ANPP resolution is to provide an additional label on the meter such that the operator can convert the "lb/hr" into "gpm" and/or allow the operator to read the scale in "gpm". This was committed to in Reference 2.

(d) Observations 1-3-35-10-15-20 and 1-3-35-15-15-20

Task Description	Observation
LPSI pump amps	Resolution on the ammeters SIA-HS-3 and SIB-HS-4, does not meet the $\pm$2 amp accuracy requirement

ANPP RECOMMENDATION

These ammeters are an integral part of the hand switch and were meant only to be an indication of the pump status. There are alternate means of verifying pump status such as pressure indication, flow, etc. Therefore, no change is required.

(e) Observations 3-3-10-5-0-20 and 3-3-10-5-0-40

Task Description	Observation
HPSI pump amps	Resolution of the ammeters SIA-HS-1 and SIA-HS-2 does not meet the $\pm$2 amp accuracy requirement

ANPP RECOMMENDATION

Same as recommendation to Question 5(d)

(f) Observations 3-3-10-5-0-40, 3-3-15-20-20-20 and 3-3-25-15-15-10

Task Description	Observation
LPSI pump amps	Resolution of the ammeters SIA-HS-2 and SIA-HS-3 does not meet the ±2 amp accuracy requirement

ANPP RECOMMENDATION

Same as recommendation to Question 5(d).

(g) Observation 3-3-20-25-15-20

Task Description	Observation
Containment Spray pump amps	Resolution of the ammeter SIB-HS-6 does not meet the ±2 amp accuracy requirement

ANPP RECOMMENDATION

Same as recommendation to Question 5(d)

(h) Observations 3-3-50-5-5-5 and 3-3-50-5-10-5

Task Description	Observation
Containment Sump A and B level	The available control room instruments, SIA-LI-706 and SIB-LI-707, do not meet trending requirements

ANPP RECOMMENDATION

ANPP review of this observation indicates that containment sump level can be trended on recorder HP-UR-9.

(i) Observation 3-4-30-0-0-0

Task Description	Observation
Verify RCS pressure as constant or decreasing	Resolution for existing pressure recorder RCA-PR-102A does not meet the accuracy requirements

ANPP RECOMMENDATION

ANPP review of this observation assumes that RCS pressure equals Pressurizer pressure. The operator can verify RCS pressure as constant on pressure indicators RCA-PI-101A, RCB-PI-101B, RCA-PI-101C or RCD-PI-101D, and verify RCS pressure as decreasing on pressure recorder RCA-PR-102A. When the required task is split into two tasks (constant and decreasing), the instrumentation currently available in the control room is acceptable.

(j) Observations 3-5-25-5-20-25, 3-5-35-10-0-15, 3-5-30-20-10-15 and 3-5-25-5-5-25

Task Description	Observation
Auxiliary Feedwater pump 'N' flow	"Required" parameter given in GPM, while "existing" indicators (SGN-FR-1113, SGN-FR-1123) measure in lb/hr

ANPP RECOMMENDATION

Same as recommendation to Question 5(c).

(k) Observation 3-5-60-15-0-10

Task Description	Observation
RMWT Level Status (CTA-LR-35)	"Required" parameters given in (%), while "existing" indicators measure in ft.

ANPP RECOMMENDATION

PVNGS Tech Specs require that the operator monitors the tank level in "feet". The emergency operating guidelines from which the "required" parameters were derived only require that the operator monitor RMWT tank level status (Full). The engineering units between the indicators on the control boards and emergency guidelines are not inconsistent since the emergency guidelines do not specify an engineering unit. The emergency guidelines only require the operator to monitor the RWMT tank level to determine if it is full.

ANPP has committed in Reference 2 to provide meter banding to indicate when the tank is full.

(l) Observations 3-6-45-10-0-15, 3-6-45-20-10-15 and 3-6-60-15-5-25

Task Description	Observation
Auxiliary Feedwater Pump 'N' Flow	"Required" parameter given in GPM, while "existing" indicators (SGN-FR-1113, SGN-FR-1123) measure in lb/hr

ANPP RECOMMENDATION

Same as recommendation to Question 5(c).

(m) Observation 3-6-45-20-10-20

Task Description	Observation
Steam Generator flow controller	Parameter not measured on SGN-FIC- 1111

ANPP RECOMMENDATION

ANPP review of this observation indicates that this was erroneously reported in the final report (Reference 1). There currently exists an indication for this parameter.

(n) Observation 3-6-45-20-10-25

Task Description	Observation
Steam Generator flow controller	Parameter not measured on SGN-FIC-1121

ANPP RECOMMENDATION

Same as recommendation to Question 5(m).

(o) Observation 4-1-35-10-15-0

Task Description	Observation
Auxiliary Feedwater Pump 'N' flow	"Existing" indicator (SGN-FR-1112) measures in lb/hr while "required" parameter is given in GPM

ANPP RECOMMENDATION

Same as recommendation to Question 5(c).

(p) Observation 4-1-60-5-0-5

Task Description	Observation
CST level status	Recorder CTA-LR-35 measures in "ft" while "required" parameter given in "%"

ANPP RECOMMENDATION

Same as recommendation to Question 5(k) for the CST tank level.

(q) Observation 4-1-60-5-0-10

Task Description	Observation
RMWT level status	Indicator CHN-LI-210 measures in "ft" while "required" parameter given in "%"

ANPP RECOMMENDATION

Same as recommendation to Question 5(k).

(r) Observations 4-2-30-5-10-15 and 4-2-30-10-0-20

Task Description	Observation
Loop 2B T-cold temperature	Indicator RCD-TI-112CD has inadequate range (465-615°F) for indicating "required" parameter (350-565°F)

ANPP RECOMMENDATION

ANPP review of this observation indicates that recorder RCA-TR-122 is provided on the control boards to display temperature between 50°F and 750°F. As committed in Reference 2, ANPP will perform an investigation prior to each Unit's first refueling outage to determine if the "delta T" meters on panel RMN-B04, QSPDS and panel RMN-B02 in the control room are adequate for the operators to perform the required task.

(s) Observations 4-2-35-10-0-15, 4-2-80-5-0-30 and 4-2-80-10-0-30

Task Description	Observation
Auxiliary Feedwater Pump 'N' flow	Recorder (SGN-FR-1113) measures flow in lb/hr while "required" parameter is given in GPM

ANPP RECOMMENDATION

Same as recommendation to Question 5(c).

(t) Observations 4-3-10-15-0-80, 4-3-10-15-0-40, 4-3-10-15-0-20 and 4-3-10-15-0-60

Task Description	Observation
Verify expected amps	SIA-HS-1 has a resolution of ±10 amps but "required" accuracy is ±3 amps; SIB-HS-2 has a resolution of ±10 amps but "required" accuracy is ±3 amps; SIA-HS-3 has a resolution of ±10 amps but "required" accuracy is ±2 amps; SIB-HS-4 has a resolution of ±10 amps but "required" accuracy is ±2 amps

ANPP RECOMMENDATION

Same as recommendation to Question 5(d).

(u) Observations 4-3-10-15-0-20, 4-3-10-15-0-40, 4-3-10-15-0-60 and 4-3-10-15-0-80

Task Description	Observation
Verify expected amps	SIA-HS-1 has a resolution of ±10 amps but "required" accuracy is ±3 amps; SIB-HS-2 has a resolution of ±10 amps but "required" accuracy is ±3 amps; SIA-HS-3 has a resolution of ±10 amps but "required" accuracy is ±2 amps; SIB-HS-4 has a resolution of ±10 amps but "required" accuracy is ±2 amps

ANPP RECOMMENDATION

Same as recommendation to Question 5(d).

(v) Observation 4-3-20-10-0-0

Task Description	Observation
Verify HPSI flow greater than 1100 gpm	No indicators for HPSI total flow

ANPP RECOMMENDATION

Same as recommendation to Question 4 (Item 3)

(w) Observations 11-3-20-15-40-10, 11-3-20-15-35-15, 4-3-20-15-40-30 and 4-3-20-15-35-20

Task Description	Observation
Verify main feed pump supplying feedwater	No indicators for 'A' main feed flow
Verify main feed pump supplying feedwater	No indicators for 'B' main feed flow

ANPP RECOMMENDATION (HED 221)

Feedwater flow is measured as steam generator inlet flow to ensure that the main feed pumps are providing flow to the steam generators. To assist the operator in determining when the main feedwater pumps are "ON", ANPP will provide an "ON-OFF" indication status for the main feedwater pumps on the main control board as committed in Reference 2.

(x) Observations 4-3-20-15-35-35 and 4-3-20-15-40-30

Task Description	Observation
Auxiliary Feedwater Pump flow	"Required" parameter given in gpm, while "existing" indicators (SGN-FR-1113, SGN-FR-1122) measure in lb/hr

ANPP RECOMMENDATION

Same as recommendation to Question 5(c).

(y) Observations 4-5-35-10-15-20 and 4-5-35-10-15-25

Task Description	Observation
Verify circ-water differential pressure	"Required" resolution and loop accuracy do not meet "existing" accuracy requirements of ECN-PDI-10

Task Description	Observation
Verify chilled water supply temperature	"Required" resolution and loop accuracy do not meet "existing" accuracy requirements of ECN-PDI-12

ANPP RECOMMENDATION

Further evaluation of the required pressure accuracies has shown that the existing essential chilled water pressure indicators have the correct accuracies, as required. The temperature indication for the chilled water supply is one-of-five indications available in the control room to indicate the essential chilled water system status. Therefore, no additional devices are required in the control room.

(z) Observation 4-5-45-5-10-85

Task Description	Observation
Verify 'A' LPSI pump amps	Resolution not adequate on SIA-HS-3

ANPP RECOMMENDATION

Same as recommendation to Question 5(d).

(aa) Observations 4-5-45-5-15-60 and 4-5-45-10-15-60

Task Description	Observation
Monitor Shutdown Cooling loop 'A' heatup rate	No instrument available

ANPP RECOMMENDATION

Same as recommendation to Question 4 Item (1).

(bb) Observations 4-5-45-5-15-95 and 4-5-45-10-15-95

Task Description	Observation
Monitor RCS cooldown rate	No instrument available

ANPP RECOMMENDATION

Same as recommendation to Question 4 Item (2).

(cc) Observations 6-2-20-20-0-0, 6-2-10-20-0-0, 6-2-25-10-30-0 and 6-2-30-10-30-0

Task Description	Observation
Verify containment pressure as constant or decreasing	HCA-PR-353A has a resolution of ±2.0 psig, while the "required" accuracy is ±0.5 psig and the "required" loop accuracy is ±1.0 psig.

ANPP RECOMMENDATION

The control room has devices with ranges of -4 to 80 psig which conform with Reg. Guide 1.97 requirements. Therefore, no additional devices are required in the control room.

(dd) Observations 6-2-50-5-5-5 and 6-2-50-5-10-5

Task Description	Observation
Verify containment level as increasing	No recorders available in control room

ANPP RECOMMENDATION

Same as recommendation to Question 5(h).

(ee) Observations 6-2-50-5-5-35 and 6-2-50-5-10-35

Task Description	Observation
Verify expected amps for HPSI 'A' pump	SIA-HS-1 has a resolution of ±10 amps while the "required" accuracy is ±8 amps
Verify expected amps for HPSI 'B' pump	SIA-HS-2 has a resolution of ±10 amps while the "required" accuracy is ±8 amps

ANPP RECOMMENDATION

Same as recommendation to Question 5(d).

(ff) Observation 6-2-65-0-0-05

Task Description	Observation
Reset CSAS (Containment Spray Actuation Signal)	No instrumentation found to reset CSAS.

ANPP RECOMMENDATION

Instructions for resetting CSAS in the control room are provided for by emergency operating procedure 41EP-1ZZ01. Therefore, no specific resetting device is required in the control room.

(gg) Observations 11-20-45-0-5-5 and 11-20-45-0-5-10

Task Description	Observation
CST level status CTA-LR-35	"Required" parameter given in (%), while "existing" instrument measures in ft.
RMWT level status CTA-LR-35	"Required" parameter given in (%), while "existing" instrument measures in ft.

ANPP RECOMMENDATION

Same as recommendation to Questions 5(p) and 5(q), respectively.

(hh) Observations 12-15-10-20-5-15, 12-15-10-20-10-5 and 12-15-10-20-15-0

Task Description	Observation
'A' charging pump amp status	No instrument to measure pump CHA-P01 amps
'B' charging pump amp status	No instrument to measure pump CHB-P01 amps
'E' charging pump amp status	No instrument to measure pump CHE-P01 amps

ANPP RECOMMENDATION

ANPP review of this observation indicates that currently an indication light, flow meter and discharge pressure are available to monitor pump performance. Therefore, an ammeter is superfluous and is not required to monitor the pump current as part of establishing the A, B and E charging pump status.

(ii) Observation 12-20-65-40-0-10

Task Description	Observation
RU-1 level radiation status	Parameter not provided

ANPP RECOMMENDATION

ANPP review of this observation indicates that currently a Radiation Monitoring System (RMS) CRT exists in the control room to determine RU-1 level radiation status. If the RMS is not available, then manual sampling can be performed to determine status. This is acceptable for obtaining the appropriate status.

(jj) Observations 12-20-65-40-0-20 and 12-20-65-40-0-25

Task Description	Observation
RU-148 level radiation status	Range on SQA-RI-148 not adequate (1E00 to 1E07 R/HR) to measure "required" parameter of less than 1 R/HR
RU-149 level radiation status	Range on SQA-RI-148 not adequate (1E00 to 1E07 R/HR) to measure "required" parameter of less than 1 R/HR

ANPP RECOMMENDATION

ANPP review of this observation indicates that a radiation indicator with 10^{-1} R/hr is not necessary, since alarms are currently provided on the RMS to indicate device failure.

(kk) Observations 12-20-65-75-10 and 12-20-65-60-30-10

Task Description	Observation
RMWT level	CHN-LI-210 has a range of 1.5 to 41.5 ft while "required" parameter is given in (%)

ANPP RECOMMENDATION

Same recommendation as Question 5(k).

(ll) Observation 13-10-10-0-0-0

Task Description	Observation
Volume Control Tank	No recorder provided for trending parameter in control room, only computer output exists

ANPP RECOMMENDATION

ANPP review of this observation indicates that the Plant Monitoring System (PMS) in the control room is adequate for providing parameter trending in the control room. Therefore, other additional devices to trend parameters are unnecessary in the control room.

(mm) Observations 13-920-100-15-0-20, 13-20-100-15-0-35, 13-20-100-15-0-40 and 13-20-100-15-0-45

Task Description	Observation
Radiation sample activity	No parameter provided on Cond. Demin. Sump
Radiation sample activity	No parameter provided on Retention Basin 1
Radiation sample activity	No parameter provided on Retention Basin 2
Radiation sample activity	No parameter provided on Evap. Pond

ANPP RECOMMENDATION

ANPP review of this observation indicates that manual sampling is adequate. Therefore, no additional devices on the control boards are necessary.

(nn) Observations 14-10-85-0-0-5 and 14-10-85-0-0-5

Task Description	Observation
Verify Steam Generator (SG) 1 and 2 pressure as decreasing	Resolution of 20 psia not adequate for the "required" accuracy of $\pm$10 psia on SGA-PR-1013A

ANPP RECOMMENDATION

Since it is only required that SG pressure for SG 1 and SG 2 be verified to be decreasing, the existing recorder in the control room is adequate since the recorder has a range of 0 to 1524 psia, and the operator task requires verification that SG pressure be decreasing between 0 and 1350 psia. Even with the current accuracy of 20 psia the device will inform the operator that either of the SG pressures are decreasing to 1350 psia and below.

(oo) Observations 15-10-30-0-0-5 and 15-10-30-0-5

Task Description	Observation
Verify main FW pump 'A' suction pressure low	"Required" parameter provided only through plant annunciator (FWN-PSL-17A) alarm
Verify main FW pump 'B' suction pressure low	"Required" parameter provided only through plant annunciator (FWN-PSL-18A) alarm

ANPP RECOMMENDATION

ANPP review of this observation indicates that main feedwater pump A/B suction pressure is provided in the control room through the ERFDADS and Plant Monitoring System (PMS). The operator can obtain the parameter value through the use of these two systems, whenever the plant annunciator alarms. Therefore, no additional devices are required in the control room.

(pp) Observations 15-20-10-15-0-25, 15-20-10-15-0-30, 15-20-20-10-5-70, 15-20-20-10-5-75, 15-20-20-10-10-70 and 15-20-20-10-10-75

Task Description	Observation
Steam Generator Auxiliary Feedwater flow	No adequate instrumentation for trending AFW pump 'N' flow (SGN-FR-1113 and SGN-FR-1123)

ANPP RECOMMENDATION

ANPP review of this observation indicates that trend recording of the Steam Generator flows is not required to monitor increasing or decreasing flows.

6. NRC QUESTION

One of APS' stated objectives for the System Function and Task Analysis was to "verify that all Reg. Guide 1.97 and SPDS instrument transmitters are adequate to meet the information and control needs of the operators". APS identified a number of discrepancies in this regard; these are discussed in Sections 3.3 and 3.4 of Appendix BB to the Final Summary report. APS has not committed to correct any of these items.

What are the bases for not correcting these items?

APS RESPONSE

Listed below are the bases for not correcting the Section 3.3 (Reg. Guide 1.97) and Section 3.4 (SPDS) device observations.

3.3 Suitability of Reg. Guide 1.97 Devices

RG-1) Spent fuel pool water level does not have any level instrumentation, only a high/low level switch alarm on local panel. Task 1-2-15-20-00.

ANPP Recommendation for RG-1

There is no RG 1.97 requirement for PVNGS to install a spent fuel level monitoring device in the control room.

RG-2) Radioactive gas holdup tank pressure does not have any control room indicators, only local panel indicators. This parameter is a Reg. Guide 1.97 requirement only and is not called out as a task in the function and task analysis.

ANPP Recommendation for RG-2

The radioactive gas holdup tank pressure is displayed in the control room on the Emergency Response Facilities Data Acquisition and Display System (ERFDADS).

RG-3) High level radioactive liquid tank level does not have control room indicators, only local panel indicators. This parameter is a Reg. Guide 1.97 requirement only and is not called out as a task in the function and task analysis.

ANPP Recommendation for RG-3

The high level radioactive liquid tank level is displayed in the control room on the ERFDADS.

RG-4) The commitment to the NRC on the Reg. Guide 1.97 requirement for measuring boron concentration is for a class 1E device to monitor from 0-5000 ppm and for a non-class 1E device to monitor from 0 to 6000 ppm. Recorder CHN-AR-203 is a non class 1E device with a range from 0 to 5000 ppm to satisfy one of the requirements. However, indicator CHN-AI-203, which has a range from 0 to 9999 ppm, satisfies the range portion, but it is a non class 1E device.

ANPP Recommendation for RG-4

Licensing commitments were revised to indicate that class 1E boron concentration instrumentation is not required in the PVNGS control room as one of the RG 1.97 instruments.

RG-5) Containment temperature recorder RMW-UJR-5 has a range of 0 to 200°F. Task 6-2-10-15-0-0 requires a range from 70 to 300°F. Therefore, the only device in the control room to measure containment temperature is not adequate.

ANPP Recommendation for RG-5

The control room currently has on the ERFDADS the required temperature indication which provides containment temperature from 40°F to 400°F.

3.4 Availability and Suitability of SPDS Transmitters

S-1) There is no spent fuel pool level input.

ANPP Recommendation to S-1

The spent fuel pool level input to SPDS was not identified during the SPDS parameter selection as being a leading parameter that is useful to the operator when the operator uses the plant specific EOP's.

S-2) There is no radioactive gas holdup tank pressure input.

ANPP Recommendation to S-2

The radioactive gas hold-up tank pressure was not identified during the SPDS parameter selection as being a leading parameter that is useful to the operator when the operator uses the plant specific EOP's. This pressure is provided to the control room operator on the ERFDADS.

S-3) There is no high level radioactive liquid tank level input.

ANPP Recommendation to S-3

High level radioactive liquid tank level was not identified to be a leading parameter for the SPDS. This tank level is provided to the control room operator on the ERFDADS.

S-4) Feedwater flow, SGN-FT-1112/1122/1113/1123 algorithm is computed in lbs per hour, should be in gal per min (0 to 1000).

ANPP Recommendation to S-4

The parameter selection for SPDS identified that these parameters be computed in lbs/hr, rather than gpm. The NRC has audited SPDS and has found these parameter/units acceptable.

7. NRC QUESTION

LLNL review of the design improvements proposed to correct HEDs which were discovered as a result of the task analysis identified several items for which the proposed correction does not clearly resolve the HED.

° HED 201 concerns the lack of Essential Cooling Water System (ECWS) surge tank level and pump discharge pressure indication. The proposed resolution is to provide the needed level indication.

How will this correct the lack of pump discharge pressure indication?

° HED 218 relates to the lack of flow indication for one train of auxiliary feedwater (AFW). The proposed resolution would label what appears to be a total AFW flow indicator in different units.

How will this correct the lack of flow indication on a specific train of AFW?

° HED 219 deals with Reactor Makeup Water Tank level being displayed in different units than are used in the procedure. The proposed correction is to provide meter banding to indicate the acceptable range of tank levels.

Provision of meter banding may be appropriate, however, APS should also address the general principle of maintaining consistency between the measurement units displayed on the control boards and those used in procedures. The comment is also applicable to a number of other APS observations that resulted from the SFTA but did not become HED's.

ANPP RESPONSE

HED 201

The proposed resolution to provide the needed level indication did not recommend the addition of a pump discharge pressure indication, since the existing methods of verifying discharge pressure through the use of plant annunciator and plant monitoring computer are adequate.

HED 218

This HED identifies a discrepancy which relates to the "existing" flow meters having engineering units in "lb/hr" instead of the "required" information being in "gpm". The recommended fix is to provide an additional label to the flow meter such that the operator can also read in gpm and/or to allow the operator to convert information into the required lb/hr.

The fix to be implemented is a label on the flow indicator. By providing this label on the existing flow meters, the operator can convert the "lbs/hr" into "gpm" and/or read the scale in "gpm". This was committed to in Reference 2.

HED 219

Tech. Specs. require that the operator monitor the tank level in "feet". The emergency operating guideline from which the required data evolved, requires the operator to monitor tank when full. The engineering units between the indicators on the entire board and procedures are consistent, since procedure does not specifically call out the engineering units, it only requires the operator to monitor the tank to determine if it is full.

8. NRC COMMENT

The APS verification process satisfies the requirements of NUREG-0737 Supplement 1 in this regard. It is not clear, however, that APS has selected an optimal approach to the verification task. The APS process of reviewing control board changes after they have been implemented in the control room presents an opportunity for expensive mistakes. This approach also may not satisfy the requirements of 10CFR50.59, that will become applicable once an operating license is issued. It is suggested that APS consider supplementing their existing verification process with human factors review of control room design changes before they are installed in the plant. Ideally, this verification process would be applied to all changes to the control room, not just modification that result from the DCRDR. Pre-implementation review of complex changes could be enhanced by installing the change in the plant simulator and monitoring the effect of the changes on operations before modifying the plant.

APS could also reduce the likelihood of developing inappropriate control room modifications by preparing a standard set of human factors criteria and conventions to be used during the development of plant modifications. This document would address items such as:

- Standard nomenclature and abbreviations
- Color coding conventions
- Labeling conventions: hierarchy, size, font style
- Standard display and control types and functions for which each type is used.
- Meter banding criteria

LLNL will be happy to answer APS questions on this issue.

ANPP RESPONSE

To assist in all modifications being performed to the control room, ANPP is in the process of preparing a standard set of human factors criteria and conventions to be used during development of all future plant modifications. The standard will address such items as standard nonmenclature/abbreviations; color coding conventions; labeling conventions: hierarchy, size, and standard display and control types and function for which each type is used.

References

(1) ANPP-33302 dated August 30, 1985

(2) ANPP-34121 dated November 27, 1985

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DOCKET NO(S). 50-528-529
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SUBJECT: ARIZONA PUBLIC SERVICE COMPANY, ET AL.
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1 AND 2

The following documents concerning our review of the subject facility are transmitted for your information.

☐ Notice of Receipt of Application, dated _____.

☐ Draft/Final Environmental Statment, dated _____.

☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.

☐ Safety Evaluation Report, or Supplement No. _____, dated _____.

☐ Notice of Hearing on Application for Construction Permit, dated _____.

☐ Notice of Consideration of Issuance of Facility Operating License, dated _____.

☒ Bi-Weekly ~~Monthly~~ Notice; Applications and Amendments to Operating Licenses Involving no Significant Hazards Considerations, dated 12/30/86 (See pages 47074 and 47085)

☐ Application and Safety Analysis Report, Volume _____.

☐ Amendment No. _____ to Application/SAR dated _____.

☐ Construction Permit No. CPPR- _____, Amendment No. _____ dated _____.

☐ Facility Operating License No. _____, Amendment No. _____, dated _____.

☐ Order Extending Construction Completion Date, dated _____.

☐ Other *(Specify)* _____

_____

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

OFFICE➤	PD7						
SURNAME➤	JLee						
DATE➤	1/20/87						

NRC FORM 318 (1/84) NRCM 0240

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