



SACRAMENTO MUNICIPAL UTILITY DISTRICT ☐ 6201 S Street, P.O. Box 15830, Sacramento, CA 95813; (916) 452-3211
RJR 85-521 AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

October 31, 1985


DIRECTOR OF NUCLEAR REACTOR REGULATION
ATTENTION HUGH L THOMPSON JR DIRECTOR
DIVISION OF LICENSING
U S NUCLEAR REGULATORY COMMISSION
WASHINGTON D C 20555

DOCKET 50-312
RANCHO SECO NUCLEAR GENERATING STATION
UNIT NO 1
REGULATORY GUIDE 1.97 REQUEST FOR ADDITIONAL INFORMATION

The District is enclosing in Attachment I, its response to the NRC's request for additional information concerning conformance to Reg. Guide 1.97. The NRC sent this request based on an interim report prepared by its contractor, INEL, who reviewed the District's various Reg. Guide 1.97 submittals. The District submitted these reports on September 14, 1983, July 13, 1984, September 14, 1984, and July 9, 1985. The last two reports also contain implementation schedules. The District used its Living Schedule process to schedule the Reg. Guide 1.97 modifications.

To facilitate the review of the information in Attachment I, the District has included in Attachment II, revisions to its September 14, 1984 Reg. Guide 1.97 report. Attachment II consists of replacement pages with revision change bars in the margin. Revisions include not only the District's revised positions, but also typographical and editorial changes. All scheduler revisions will follow the District's Living Schedule procedures.

If you have any questions, please contact Jerry Delezenski at Rancho Seco.



R. J. RODRIGUEZ
ASSISTANT GENERAL MANAGER
NUCLEAR

Attachments (2)

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Attachment I

RANCHO SECO CONFORMANCE TO

REG GUIDE 1.97

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

1. Neutron Flux

Request:

"Neutron Flux - The licensee should identify the specific portion(s) of this instrumentation for which a deviation of Category 3 is being sought, justify these specific deviations and verify that the other portions are Category 1."

Response:

The District has decided not to seek deviations from Category 1 requirements for any portions of the neutron flux instrumentation. Thus, the District will upgrade neutron flux instrument loops to Category 1 prior to Cycle 9 startup. The District Living Schedule will reflect this addition.

2. RCS Cold Leg Water Temperature

Request:

"RCS cold leg water temperature--the licensee should provide justification for the deviation in the upper limit of the range."

Response:

The District's RCS Cold Leg Water Temperature range of 500°F to 650°F provides the capability to measure in excess of 15% of the saturation temperature for the steam generator. The saturation temperature is less than 560°F (based on 1102.5 psig, the highest main steam safety valve setting). An upper range of 650°F for the RCS Cold Leg Water Temperature instrumentation provides 16% margin over the saturation temperature. In addition, widening the range would reduce the sensitivity of the indication. Therefore the District maintains this range is adequate. (This is consistent with the B&WOG Reg. Guide 1.97 task force's generic position.)

3. RHR (Decay Heat) Heat Exchanger Outlet Temperature

Request:

"RHR heat exchanger outlet temperature--the licensee should upgrade this instrumentation to Category 2."

Response:

The District will upgrade this variable to Category 2. Temperature loops TE-26043 & TE-26044 will be upgraded for cycle 9 startup. The District's Living Schedule will reflect this addition.

4. Pressurizer Level

Request:

"Pressurizer level--the licensee should supply additional analysis to support the deviations from the recommended range."

Response:

The District, in concert with the B&W Owners Group, is developing a generic response to this item. The District will submit its position to the NRC by January 6, 1986.

5. Pressurizer Heater Status

Pressurizer heater status--the licensee should provide the instrumentation recommended by Reg. Guide 1.97.

Response:

The District, in concert with the B&W Owners Group, will develop a generic response to this item. A submittal is planned by January 6, 1986.

6. Quench Tank Temperature

Request:

"Quench tank temperature--the licensee should either show that instrumentation will remain on scale or provide 50°F lower limit of range."

Response:

The District will widen the indicated range during the cycle 8 refueling outage to include the lower limit of 50°F. The District's living schedule will include this addition.

7. Containment Spray Flow

Request:

"Containment spray flow - the licensee should identify the specific deviation from Category 2 instrumentation and either justify or correct the deviation."

Response:

Reg. Guide 1.97 defines the purpose of containment spray flow to be for monitoring operation of the containment cooling system.

At Rancho Seco, the Reactor Building (RB) spray system consists of two separate spray trains of equal capacity, each including:

- . RB spray pump
- . Spray header
- . Spray additive tank
- . Spray additive eductor
- . Isolation valves and the necessary piping
- . Instrumentation and controls

The safety features signal on high RB pressure automatically initiates the RB Spray System operation. Hence, for this mode of operation, RB pressure is the primary variable to indicate cooling system operation. Therefore, RB spray flow indication is a backup variable. At Rancho Seco RB pressure is a Reg. Guide 1.97 Category 1 variable.

All RB spray piping is Rancho Seco QA Class 1 and seismic category 1. All piping inside the RB is designed to ANSI B31.1. All remaining piping and connections to the spray system are in accordance with ANSI B31.7. The controls for the pumps and all valves which are not locked open are Class 1 with indication in the main Control Room. The District has performed single failure analysis on all active components of the RB spray system to show that the failure of any single active component will not prevent the fulfilling of the design function following a LOCA. Each train of the RB spray system also includes a unqualified flow transmitter which provides indication in the Control Room.

The primary indication of the adequacy of the containment cooling systems are building pressure and temperature. At Rancho Seco RB pressure is Category 1 and RB temperature will be upgraded to Category 2. The Class 1 pump and valve control monitors indicate RB spray system actuation. In conclusion, the District maintains that indication of RB spray flow is a backup variable and therefore should be Category 3.

8. Containment Atmosphere Temperature

Request:

"Containment Atmosphere Temperature - the licensee should upgrade this instrument to Category 2."

Response:

The District will upgrade temperature loops TE-52010 & TE-52015 to Category 2 prior to Cycle 9 Startup. The District's Living Schedule will reflect this addition.

9. Containment Sump Water Temperature

Request:

"Containment sump water temperature--the licensee should provide category 2 instrumentation with the recommended range or identify alternate instrumentation."

Response:

According to Reg. Guide 1.97 Revision 3, the purpose for Containment Sump Water Temperature is to monitor operation of the Containment Cooling Systems.

At Rancho Seco Containment Sump Water Temperature would only be useful following a high energy line break in containment. While containment sump water temperature trends may be indicative of leaking high energy fluid and containment cooling it would be slower & less effective than other available indications. Reactor Building pressure and temperature provide more direct indication. Currently, Rancho Seco does not indicate or record Reactor Building sump water temperature because it is not required to mitigate the consequences of a design basis accident on a B&W designed plant. The operator is not required to take action based on this variable. However, indication of the Decay Heat/Reactor Building Spray flow suction lines temperature is available with a range of 0-300°F.

Reactor Building spray flow provides additional information concerning core cooling. Back up variables are Reactor Building fan breaker status and the flow rate of cooling water to the cooling units. The District believes this instrumentation is sufficient for monitoring the operation of the containment cooling systems. (This is consistent with the B&WOG Reg. Guide 1.97 task force's generic position.)

10. Component Cooling Water Temperature to ESF System

Request:

"Component cooling water temperature to ESF system--the licensee should provide Category 2 instrumentation for the NSCW temperature, and further justification for the deviation to Category 3 instrumentation for the NSRW temperature (Section 3.3.24)."

Response:

The District will provide Category 2 instrumentation for Nuclear Service Cooling Water (NSCW) temperature by upgrading TI-48003 and TI-48004 during the cycle 9 refueling outage. The District's Living Schedule will reflect this addition.

Heat from the NSCW is transferred to the Nuclear Service Raw Water (NSRW) system in the heat exchangers. From there it is transferred to the Rancho Seco ultimate heat sink (atmosphere) via spray ponds which form a part of the NSRW. Design outlet temperature from the NSRW spray ponds is 95°F. That is, components which are directly cooled by the NSRW are designed to accept inlet temperatures as high as 95°F and function normally. In a standby mode with no flow in the NSRW, and consequently no pond spray, the bulk spray pond temperature will be approximately the median of the daily maximum and minimum dry-bulb temperatures. For the hottest month of record (August 1958), the estimated maximum initial pond temperature would be 86.5°F (see Rancho Seco U.S.A.R. Section 9.4, page 20). After the operators start NSRW flow (and pond spray), the pond temperature will approach the wet-bulb temperature. Figure 9.4-9 of the Rancho Seco U.S.A.R. shows that for the hottest month of record (August 1958), the average wet-bulb temperature never exceeded 79°F.

Since the spray ponds provide an assured source of sufficiently low temperature coolant, temperature of the NSRW system is not a vital feedback indication of system operation. Thus, the NSRW cooling water temperature indications meet the District's understanding of the provisions of Reg. Guide 1.97 as a Category 3 parameter.

11. Category 1 Indicators:

Request:

"Category 1 indicators--the licensee should provide additional information on the CRT displays."

Response:

- References: 1 SMUD letter, R. J. Rodriguez to J. F. Stolz, dated September 14, 1984, NUREG 0737 Supplement 1 - Regulatory Guide 1.97, Revision 1, Section II Instrument System Description
- 2 SMUD letter, R. J. Rodriguez to J. F. Stolz dated July 28, 1983, SPDS Safety Analysis and Implementation Plan, Section III.C.2 and III.D

* Why can't dedicated recorders be used?

Reference 1 provided the following reason for using the SPDS instead of recorders: "This approach is necessary due to space limitations in the control room and provides the opportunity to incorporate favorable human factors into the presentation." A copy of this section is duplicated in Appendix 1 for your review.

* Address the readability of the variables displayed (human factors)

Proper human factors criteria as determined by the CRDR process will apply to the display of all Category 1 variables. The District will modified SPDS in accordance with the Living Schedule.

* Are the displays redundant?

Reference 2 provided the following information:

- "a. For improved reliability and readability, two identical channels of display are provided. Each display can monitor either the A or B loops of the plant.
- b. All parameters and graphics are displayed on two (2) color video monitors. The size of the video monitors is nineteen (19) inches."

The District has seismically qualified all equipment except for the CRT's and control panel cabling. Although the system is partially redundant, power is not Class 1.

The District will modify SPDS to provide:

- Full redundancy (2 channels)
- Class 1 Power
- Necessary seismic qualification
- Indication of all Category 1 variables

The District believes that use of the SPDS for the display of RG 1.97 Category 1 variables, will result in improved human factors and an integrated approach to post accident monitoring and recovery at Rancho Seco.

* Are the displays dedicated to the real-time display of Category 1 variables?

In Reference 2, Section 5.0 the SPDS Functional Description states:

"All Category 1 variables will be implemented on the post-trip ATOG display of the SPDS" either in real time or alerts. All category 1 variables will also be available on the first page of the alphanumeric display as described below.

Also Section 2.0 states. "When a reactor trip occurs, the display shall switch to the post-trip "ATOG" display with history trace initialized."

This does not disable the system's "...flexibility of displays that allows the operator to select the most appropriate display for the existing plant condition." Therefore, trending is "continuously available" on reactor trip or operator request.

* How many displays are there?

The primary RG 1.97 Category 1 display is the post-trip ATOG display. The first page of the alphanumeric display will also list all category 1 variables including the average of the 5 highest incore temperatures and an alert for isolation valves. Individual incore temperatures will be available on the Core Map display and individual isolation valve positions will be available on additional alphanumeric displays. The R.G. 1.97 displays use primarily category 1 variables. The remaining SPDS displays also use the category 1 variables.

* How many variables are displayed per display?

The displays are still under development. The District anticipates that the primary RG 1.97 displays will be as follows:

POST-TRIP ATOG DISPLAY

Graph:

T-Cold, T-Hot¹ or T-Incore¹ vs. RPS Pressure¹
Secondary System Saturation Temperature
Percent Power¹
Percent Flow¹
Steam Generator Level¹ (operate and startup)

Alerts:

Containment Sump Level¹
Steam Generator Pressure¹
Reactor Vessel Level¹
Containment Isolation Valves¹
Containment Area Radiation¹
Containment H₂ Concentration¹
Pressurizer Level¹
Auxiliary Feedwater Flow¹
Condensate Storage Tank Level¹

ALPHANUMERIC DISPLAY

Alpha Numeric Page 1 will include:

T-Hot¹
T-Incore (average of 5 highest)¹
RPS Pressure¹
Steam Generator Level¹
Containment Sump Level¹
Steam Generator Pressure¹
Reactor Vessel Level¹
Containment Isolation Valves (alert)¹
Containment Area Radiation¹
Containment H₂ Concentration¹
Pressurizer Level¹
Auxiliary Feedwater Flow¹
Condensate Storage Tank Level¹

(¹ RG 1.97 Category 1 variable)

Appendix 1

Section II. Instrument Systems Description from SMUD
letter, R. J. Rodriguez to J. F. Stolz, dated September 14, 1984,
NUREG 0737 Supplement 1 - Regulatory Guide 1.97, Revision 1

II. INSTRUMENT SYSTEMS DESCRIPTION

In addition to existing hardwired indicators and recorders, the District will utilize computer driven displays and other means to present Reg. Guide 1.97 variables to the operator. This approach is necessary due to space limitations in the control room and provides the opportunity to incorporate favorable human factors into the presentation. The location and exact content of these displays will be developed as a part of the CRDR process.

The computer systems of interest to Reg. Guide 1.97 are the Safety Parameter Display System (SPDS), Interim Data Acquisition and Display System (IDADS), and Digital Radiation Monitoring System (DRMS). The SPDS, a seismically qualified 1 variables. IDADS will be used to provide diverse displays (e.g., to resolve ambiguities), while DRMS provides the operator access to data from a number of the radiation monitors installed as required by NUREG 0737.

Following is a description of each of these systems.

A. SPDS

The District contracted with Babcock and Wilcox (B&W) to design and deliver an SPDS to meet the appropriate requirement of NUREG 0696, Reg. Guide 1.97, NUREG 0737, and Supplement 1 to NUREG 0737. The SPDS was designed as a diagnostic tool compatible with the Abnormal Transient Operating Guidelines (ATOG) and the Emergency Operating Procedures (EOP's). The SPDS has been designed, constructed, vendor tested, and installed. The SPDS is currently in a test phase for operator familiarization and evaluation. Testing, modification (as required), EOP revision, and training will be complete prior to Cycle 7 start-up. The SPDS will then be operational.

Future enhancements will be made to the SPDS in accordance with the District's Living Schedule. These enhancements include:

- Continuing human factors engineering during the test phase. As part of the test phase, the control room operators will evaluate the SPDS and suggest near-term improvements and/or enhancements to the system.
- Seismic qualification and dual-channel redundancy will be completed to provide the display functions for Reg. Guide 1.97, Category 1 variables.
- The SPDS will be verified and validated according to the District's V&V plan.

B. IDADS

The main purpose of IDADS is to provide CRT displays for the Emergency Response Facilities (ERF) as required by NUREG 0696, and Supplement 1 to NUREG 0737. As a secondary objective, IDADS will provide enhanced operator functions not currently available in the Control Room.

IDADS consists of a central computer system located in the Computer Room. It has various types of input multiplexing equipment, display terminals and hardcopy equipment in the Control Room, TSC, and EOF, and display equipment at the assembly points. Plant inputs enter the system from the following sources: the Bailey Multiplexer, the MODCOMP Multiplexer, and the Anatec Remote Multiplexer (REMUX) System.

The following general features are to be provided:

- A. Data Acquisition
- B. Man-Machine Interface
- C. Alarm Annunciation
- D. Radioactive Release Monitoring
- E. Reactivity Calculations
- F. On-line Trending
- G. Data Link to EOF

Future enhancements will be made to the IDADS in accordance with the District's Living Schedule. These enhancements include:

- A data link with the GA Technologies' DRMS Computer so that radiation data will be available on IDADS
- A long term history storage and retrieval option for later interrogation of data.
- Alphanumeric group trending.
- Calculated values using predefined equations which can be alarmed or trended.

C. DRMS

The District contracted with GA Technologies (GA) to design and deliver a Digital Radiation Monitoring System (DRMS) to meet the appropriate requirements of NUREG 0737. The DRMS provides on-line information concerning radiation levels of selected radioisotopic concentrations within the plant processes and dose rate information for various areas within the plant facility. Process measurements provide diagnostic or status information for a particular portion of the plant operation, and monitor releases of radioactive material from the plant environment.

DRMS consists of subsystem elements including:

- RM-11 central control and display system
- Gaseous process monitors
- Liquid process monitors
- Wide range gas monitor (WRGM) control cabinet
- Strip chart recorders
- RM-23 portable control and display units
- High range in containment area monitor
- Main steam line radiation monitors

The RM-11 computer communicates with all the monitors using three loops of redundant communications lines. Communications between each monitor and the RM-23 module are accomplished over a single dedicated line separate from the RM-11 loops.

The DRMS design incorporates the following features:

- Distributed data processing
- Expansion capability
- Centralization of control and display
- Redundancy and reliability
- Independence of safety related monitors
- Trending