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BAER,R.L. Light Water Reactors Branch 2

SUBJECT: Forwards near-term OL generic concerns re proposed Revision 2 to Reg Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant & Environs Conditions During & Following Accident."

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February 13, 1980

Director of Nuclear Reactor Regulation
Attention: Mr. Robert L. Baer, Chief
LWR Branch 2, DPM
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

Reference: (A) J. G. Haynes (SCE) letter to R. L. Baer (USNRC) dated January 21, 1980

The Reference A letter provided NRC with San Onofre Nuclear Generating Station, Units 2 and 3 plant specific comments concerning proposed Revision 2 to Regulatory Guide 1.97 (Instrumentation for Light Water Cooled Nuclear Power Plants to assess Plant and Environs Conditions During and Following an Accident). These plant specific comments were intended to help fulfill the NRC's request to consider existing plant instrumentation that provides a post accident monitoring capability in light of the recommended list in Table 2 of the Guide.

Reference A noted that Edison supports the generic position developed by the group of utilities considered as near term operating license applicants by NRC (S. A. Varga (USNRC) letter to J. H. Drake (SCE) and B. W. Gilman (SDG&E) dated 11-23-79). The enclosure to this letter provides this generic position, and should be considered in conjunction with the plant specific comments of Reference A as Edison's response to your request for comment on Revision 2 to Regulatory Guide 1.97.

If you have any questions concerning this subject or require further information, please call me.

Very truly yours,

J. G. Haynes
Chief of Nuclear Engineering

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SE
1/1

Enclosure

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ENCLOSURE

Table 1

DESIGN CRITERIA[1]

CRITERIA	INSTRUMENTATION TYPES[2] A	B	C	D	E
1. Seismic qualification per ~~Regulatory Guide 1.100~~ 25	yes	yes	yes	no	no
2. Single failure criteria per ~~Regulatory Guide 1.53~~ 25 26	yes 26	yes 26	yes 26	no	no
3. Environmental qualification per ~~Regulatory Guide 1.89~~ 25 23	yes	yes	yes[4]	~~yes~~ NO	no
4. Power source	~~21 Emr[6]~~	~~21 GD[7]~~	~~21 GD[7]~~	~~22 Emr[6]~~	~~22 Emr[6]~~
5. Out-of-service interval before accident	8	8	8	~~9~~ 10	10
6. Portable	no	no	no[11]	no[11]	no[11]
7. Quality assurance level	12	12	12	~~12~~ 24	~~12~~ 24
8. Display type[13]	Con[14]	Con[14]	~~Con[14]~~ OD[15]	OD[15]	OD[15]
9. Display method	Rec[16]	Rec[17]	Rec[17]	Ind[18]	Ind[18,19]
10. Unique identification	yes	yes	yes	no	no
11. Periodic testing per ~~Regulatory Guide 1.118~~ 25	yes	yes	yes	~~yes~~ NO	no

DELETE

~~[1]Unless different specifications are given in this regulatory guide, the specifications in ANSI N320-1979, "Performance Specifications for Reactor Emergency Radiological Monitoring Instrumentation", apply to the high range containment area monitors, area exposure rate monitors in other buildings, effluent and environmental monitors, and portable instruments for measuring radiation or radioactivity.~~

[2]Type A - Those instruments that provide information required to take preplanned manual actions.

Type B - Those instruments that provide information to monitor the process of accomplishing critical safety functions.

Type C - Those instruments that indicate the potential for breaching or the actual breach of the barriers to fission product release.

Type D - Those instruments that indicate the performance of individual safety systems.

Type E - Those instruments that provide information for use in determining the magnitude of the release of radioactive materials and for continuously assessing such releases, for defense in depth, and for diagnosis.

~~[3]Radiation monitors should meet the requirements of ANSI N320-1979, Section 5.14 and/or Section 9.1.15, as appropriate.~~

(Footnotes continued)

Footnotes continued for Table 1

[4]See paragraph 6.3.6 of Draft Standard ANS-4.5.

~~[5]Qualified to the conditions of its operation and, for radiation monitors, ANSI N320-1979.~~

~~[6]Emergency power source.~~

~~[7]Critical Instrument Bus - Class 1E Power.~~

[8]Paragraph 4.11, "Exemption", of IEEE Standard 279-1971.

[9]Based on normal Technical Specification requirements on out-of-service for the safety system it serves.

[10]Not necessary to include in the Technical Specifications unless specified by other requirements.

[11]Radiation monitoring outside containment may be portable if so designated in Tables 2 and 3.

[12]Level of quality assurance per Appendix B to 10 CFR Part 50.

[13]Continuous indication or recording displays a given variable at all times; intermittent indication or recording displays a given variable periodically; on-demand indication or recording displays a given variable only when requested.

[14]Continuous display.

[15]Indication on demand.

*[16]Where trend or transient information is essential to planned operator actions during and after an accident.

* [17]Recording for those parameters for which trend or historical information is required during and after an accident.

[18]Dial or digital indication.

[19]Effluent release monitors require recording, including effluent radioactivity monitors, environs exposure rate monitors, and meteorology monitors.

~~[20]Radiation monitors should be periodically tested in accordance with the requirements of ANSI N320-1979.~~

[21]Class "1E" Power.

[22]High Reliability NON-1E Power Source battery backed when momentary interruption is not tolerable for the connected equipment.

[23]Types A, B & C - assume LOCA environment for in-containment instruments. Types D & E - assume worst case non-accident environment for in-containment instruments.

[24]Purchased to "commercial grade" standards with installation and engineering practices consistent with Nuclear Power Plant applications.

[25]FSAR Licensing Commitments for safety grade equipment.

[26]Single failure criteria can be met by using either redundant inputs from a given parameter or by diversity through inputs from different Instrumentation Types (A, B or C) for the given parameter or by independent diverse parameters.

* = indicates notes where Near Term OL Group added underlined portions.

Table 2

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
CORE				
Core Exit Temperature	150°F to ~~2300°F~~ 1650°F	T/C E	ANS-4.5, Section 6.2.3. To provide incore temperature measurements to identify localized hot areas. (Approximately ~~50~~ 4/quadrant measurements)	Change 50 to 16 as this is a reasonable cross section. 1650°F is about 2> Critical Temperature and T/C with stainless steel sheath will maintain physical capability to 1650°F.
Control Rod Position	Full in or not full in	Φ E	To provide positive indication that the control rods are fully inserted. ~~(Minimum 5 days after accident)~~	Mechanism power is adequate means to assure rods are on bottom. Accident plus stuck rods which requires corrective action is beyoud design basis.
OR	MECHANISM POWER ON/OFF	D		
Neutron Flux	1 c/s to 1% power ~~(at least one fission counter)~~	E	ANS-4.5, Section 6.2.2. For indication of approach to criticality.	Fission counter would be destroyed in normal power operation.
REACTOR COOLANT SYSTEM				
RCS Hot Leg Temperature	150°F to 750°F	B	ANS-4.5, Section 6.2.3. To aid in determining reactor system subcooling and to provide indication of natural circulation.	
RCS Cold Leg Temperature	150°F to 750°F	B	ANS-4.5, Section 6.2.3. To provide indication of natural circulation; to provide input for heat balance calculations; to provide direct indication of ECCS injection.	
RCS Pressure	~~15 psia to 4000~~ 0 TO 3000 psig	B,C	ANS-4.5, Sections 6.2.3 and 6.2.4. For indication of an accident and to indicate that actions must be taken to mitigate an event.	The range of this measurement has been limited to 3000 psig since this may be the current maximum range available in a qualified pressure transmitter. It should be noted, however, that this transmitter should be able to withstand pressurization up to 4000 lbs without damage to the transmitter or a significant shift in calibration.
RCS PRESSURE	0 TO 4000 psig	E		It is suggested that a single type E 4000 psig transmitter be added to assure coverage of the short duration high pressure transient associated with ATWS phenomena.

Table 2 (continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
Pressurizer Level	~~Bottom tangent to top tangent~~ WIDE RANGE	B,D	ANS-4.5, Section 6.2.3. To assure proper operation of the pressurizer and to assure safe operation of heaters. It is also used in conjunction with changes in reactor pressure to determine leak and void sizes.	
Degree of Subcooling	200°F subcooling to 35°F superheat	E	For indication of margin in core cooling and the need for emergency coolant additions or reductions as the margin changes and to obviate the necessity to consult steam tables.	

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
REACTOR COOLANT SYSTEM (Continued)				
Reactor Coolant Loop Flow	0 to 120% ~~-10% to 10%~~ design flow[1]	~~B~~ E	To provide indication that the core is being cooled.	The low range flow indication has been deleted since it is not now technically achievable. Further, we feel that this indication is redundant to other primary indications of natural circulation.
Primary System Safety Relief Valve Positions (including PORV and code valves) or flow Through or Pressure in Relief Valve Lines	Closed-not closed	C ~~B~~ D	By these measurements the operator knows if there is a path open for loss of coolant and that an event may be in progress.	The classification has been modified reflecting appropriate use of this variable.
Radiation Level in Primary Coolant Water	10 μCi/cc to 10 Ci/cc	C	ANS-4.5, Section 6.3.2. For early indication of fuel cladding failure and estimate of extent of damage.	Plant specific. See RG 1.101.
CONTAINMENT				
Containment Pressure	10 psia pressure to 3 times design pressure[2] for concrete; 4 times design pressure for steel	~~B~~ C	ANS-4.5, Sections 6.2.5, 6.3.3, 6.3.4, and 6.3.5. To indicate the integrity of the primary or secondary system pressure boundaries; to indicate the potential for leakage from the containment; to indicate integrity of the containment.	The type B requirement has been eliminated since the wide range containment pressure indication is only for short term transients. See comment below.
CONTAINMENT PRESSURE	NARROW RANGE	B		It is suggested that the existing containment pressure indications (narrow range) are adequate to meet the intent of type B monitoring.
Containment Atmosphere Temperature	40°F to 400°F	E	For indication of the performance of the containment cooling system and adequate mixing.	
Containment Hydrogen Concentration	0 to 10% (capable of operating from 10 psia to maximum design pressure[2])	~~B~~ C	ANS-4.5, Sections 6.2.5 and 6.3.5. For indication of the need for and to measure the performance of the containment hydrogen recombiner.	Type B requirements have been eliminated consistent with appropriate use of the variable.

[1]Design flow - the maximum flow anticipated in normal operation.
[2]Design pressure - that value corresponding to ASME code values that are obtained at or below code-allowable material design stress values.

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
CONTAINMENT (Continued)				
Containment Isolation Valve Position	Closed-not closed	B,D	ANS-4.5, Section 6.2.5. To indicate the status of containment isolation and to provide information on the status of valves in process lines that could carry radioactive materials out of containment.	If not subject to single failure, do not need redundant indication.
Containment Sump Water Level PLANT SPECIFIC	Narrow range (sump). Wide range (bottom of containment to 600,000-gallon level equivalent)	C	ANS-4.5, Section 6.3.3. For indication of leakage within the containment and to ensure adequate inventory for performance of the ECCS.	Plant specific - NSSS vendor should confirm needed inventory. Type B requirements have been eliminated consistent with appropriate use of the variable.
High-Range Containment Area Radiation	1 to 10^7 R/hr (60 keV to 3 MeV photons with ±20% accuracy for photons of 0.1 to 3 MeV)[10^7 R/hr for photons is approximately equivalent to 10^6 rads per hour for betas and photons]	C E	To help identify if an accident has degraded beyond calculated values and to indicate its magnitude to determine action to protect the public.	Plant specific. See RG 1.101. Type B requirements have been eliminated consistent with appropriate use of the variable.
SECONDARY SYSTEMS				
Steam Generator Pressure	From atmospheric pressure to 20% above safety value setting	D	For indication of integrity of the secondary system and an indication of capability for decay heat removal.	
Steam Generator Level OR	From tube sheet to separators SG WIDE RANGE LEVEL	D	For indication of integrity of the secondary system and an indication of capability for decay heat removal.	Steam generator wide range level.
Auxiliary Feedwater Flow	0 to 110% design flow[1]	D	To indicate an adequate source of water to each steam generator upon loss of main feedwater.	
~~Main Feedwater Flow~~ DELETE	0 to 110% design flow[1]	E	To indicate an adequate source of water to each steam generator.	Main feedwater flow is not required as a type E variable. Feed flow only indicates water into each SG; it does not indicate an adequate source of water to each steam generator.

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
SECONDARY SYSTEMS (Continued)				
Safety/Relief Valve Positions or Main Steam Flow	Closed-not closed	B,D	To indicate integrity of secondary system (vis-a-vis pipe break).	Plant specific.
Radioactivity in Condenser Air Removal System	10^{-7} to 10^{5} μCi/cc Xe-133 calibration	E	To indicate leakage from the primary to the secondary system and measure of noble gas release rate to atmosphere.	Plant specific. See RG 1.101.
DELETE Radioactivity in Effluent from Steam Generator Safety Relief Valves or Atmospheric Dump Valves	10^{-7} to 10^{5} μCi/cc (alternatively, ambient background to 2 Ci/sec/Mwth) Xe-133 calibration	E	An indication of release from the secondary system and measure of noble gas release rate to atmosphere.	Plant specific-Delete-this instrument is beyond the state of the art and actual sample is preferred measurement.
AUXILIARY SYSTEMS				
Containment Spray Flow	0 to 110% design flow 1	D	For indication of system operation.	
Flow in HPI System	0 to 110% design flow[1]	D	For indication of system operation.	
Flow in LPI System	0 to 110% design flow[1]	D	For indication of system operation.	
Emergency Coolant Water Storage Tank Level	Top to bottom	D	To determine the amount of water discharged by the ECCS. This provides indication of the nature of the accident, indication of the performance of the ECCS, and indication of the necessity for operator action.	
Condensate Storage Tank Level	Plant specific	(1,2) D	(For those plants where the condensate storage tank is the principal source of auxiliary feedwater.) To ensure water supply for auxiliary feedwater pumps.	¢ C Type BArequirements have been eliminated consistent with appropriate use of the variable.
Accumulator Tank Level	~~Top to bottom~~ NARROW RANGE	D	To indicate whether the tanks have injected to the reactor coolant system.	Narrow range is only instrument currently available.

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic
AUXILIARY SYSTEMS (Continued)				
Accumulator Isolation Valve Positions	Closed-not closed	D	To indicate state of the isolation valves (per Regulatory Guide 1.47).	
RHR System Flow	0 to 110% design flow[1]	D	For indication of system operation.	
RHR Heat Exchanger Out Temperature	32°F to 150°F	D	For indication of system operation.	
Component Cooling	32°F to 200°F	D	For indication of system operation.	
Component Cooling Water Flow	0 to 110% design	D	For indication system operation.	
Flow in Ultimate Heat Sink Loop	0 to 110% design flow[1]	D	For indication of system operation.	
Temperature in Ultimate Heat Sink Loop	30°F to 150°F	D	For indication of system operation.	
Ultimate Heat Sink Level	Plant specific	D	To ensure adequate source of cooling water.	
Heat Removal by the Containment Fan Coolers	Plant specific	D	To indicate system operation.	Type B requirements have been eliminated consistent with appropriate use of the variable.
Boric Acid Charging Flow	0 to 110% design flow[1]	D	To provide indication of reactor cooling and inventory control in order to maintain adequate concentration for shutdown margin.	Type B requirements have been eliminated consistent with appropriate use of the variable.
Letdown Flow	0 to 110% design flow[1]	D	For indication of reactor coolant inventory control and boron concentration control.	
Sump Level in Spaces of Equipment Required for Safety	To corresponding level of safety equipment failure	E	To monitor environmental conditions of equipment in closed spaces.	Type D requirements have been eliminated consistent with appropriate use of the variable.
RADWASTE SYSTEMS				
High-Level Radioactive Liquid Tank Level	Top to bottom	E	Available volume to store primary coolant.	

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group General Comments
RADWASTE SYSTEMS (Continued)				
Radioactive Gas Hold-up Tank Pressure	0 to 150% of design pressure[2]	E	Available capacity to store waste gases.	
VENTILATION SYSTEMS				
Emergency Ventilation Damper Position	Open-closed status	D	To ensure proper ventilation under accident conditions.	
Temperature of Space in Vicinity of Equipment Required for Safety	30°F to 180°F	D	To monitor environmental conditions of equipment in closed spaces.	NRC has issued an equipment temperature monitoring position. See NRC Temp. Position.
POWER SUPPLIES				
Status of Class 1E Power Supplies and Systems	Voltages and currents	D	To ensure an adequate source of electric power for safety systems.	
Status of Non-Class 1E Power Supplies and Systems	Voltages and currents	E	To indicate an adequate source of electric power.	
RADIATION EXPOSURE RATES INSIDE BUILDINGS OR AREAS WHERE ACCESS IS REQUIRED TO SERVICE SAFETY-RELATED EQUIPMENT				
Radiation Exposure Rates	10^{-1} to 10^{4} R/hr for photons (permanently installed monitors)	E	For measurement of high-range radiation exposure rates at various locations.	Plant specific. See RG 1.101.
AIRBORNE RADIOACTIVE MATERIALS RELEASED FROM THE PLANT				
Effluent Radioactivity - Noble Gases	(Normal plus accident range for noble gas)	E	ANS-4.5, Section 6.2.6. To provide operator with information regarding release of radioactive noble gases on continuous basis.	Plant specific. See RG 1.101.
Containment	10^{-7} to 10^{5} μCi/cc Xe-133 calibration			Plant specific. See RG 1.101.

DELETE

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group General Comments
Secondary Containment (Reactor shield building annulus)	10^{-7} to 10^{4} µCi/cc Xe-133 calibration		Provisions should be made to monitor all potential pathways for release of gaseous radioactive materials to the environs in conformance with General Design Criterion 64. Note: Monitoring of individual effluent streams only is required where such streams are released directly to the environment. If two or more streams are combined prior to release from a common discharge point, monitoring of the combined stream is considered to meet the intent of this guide provided such monitoring has a range adequate to measure worst-case releases.	Plant specific. See RG 1.101.

DELETE

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
AIRBORNE RADIOACTIVE MATERIALS RELEASED FROM THE PLANT (Continued)				See Reg. Guide 1.101 for radiation monitoring.
Auxiliary Building including buildings containing primary system gases, e.g., waste gas decay tank	10^{-7} to 10^{3} μCi/cc Xe-133 calibration			
Other Release Points (including fuel handling area if separate from Auxiliary building)	10^{-7} to 10^{2} μCi/cc XE-133 calibration (permanently installed monitors)			
Effluent Radioactivity - High-Range Radiohalogens and Particulates	10^{-3} to 10^{2} μCi/cc (permanently installed monitors)	E	To provide the operator with information regarding release of radioactive halogens and particulates. Continuous collection of representative samples followed by monitoring (measurements) of samples for radionalogens and for particulates.	
Environs Radioactivity - Exposure Rate	10^{-6} to 10^{2} R/hr (60 keV to 3 MeV) (permanently installed monitors)	E	ANS-4.5, Section 6.3.4. For estimating release rates of radioactive materials released during an accident from unidentified release paths (not covered by effluent monitors) - continuous readout capability. (Approximately 16 to 20 locations - site dependent.)	
Environs Radioactivity - Radiohalogens and Particulates	10^{-9} to 10^{-3} mCi/cc for both radiohalogens and particulates (permanently installed samplers)	E	For estimating release rates of radioactive materials released during an accident from unidentified release paths (not covered by effluent monitors). Continuous collection of representative samples followed by monitoring (measurements) of the samples. (Approximately 16 to 20 locations - site dependent.	

DELETE

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
AIRBORNE RADIOACTIVE MATERIALS RELEASED FROM THE PLANT (Continued)				See Reg. Guide 1.101 for radiation monitoring.
Plant and Environs Radioactivity (portable instruments)	High Range 0.1 to 104 R/hr photons 0.1 to 104 rads/hr betas and low-energy photons	E	During and following an accident, to monitor radiation and airborne radioactivity concentrations in many areas throughout the facility and the site environs where it is impractical to install stationary monitors capable of covering both normal and accident levels.	
	100-channel gamma-ray spectrometer	E	During and following an accident, to rapidly scope and composition of gamma-emitting sources.	
POSTACCIDENT SAMPLING CAPABILITY				
Primary Coolant Sumps Containment Air	As required based on Regulatory Guide 1.4 guidelines	E	ANS-4.5, Section 6.3.2. To provide means for safe and convenient sampling. These provisions should include:	We agree that these capabilities are a licensee function, however, they do not fit the "type" definitions A through E as stated in this guide.
POSTACCIDENT ANALYSIS CAPABILITY (ON-SITE)	1. gamma-ray spectrum 2. pH 3. hydrogen 4. oxygen 5. boron	E	1. Shielding to maintain radiation doses ALARA, 2. Sample containers with container-sampling port connector compatibility, 3. Capability of sampling under primary system pressure and negative pressure, 4. Handling and transport capability, and 5. Pre-arrangement for analysis and interpretation.	We agree that these capabilities are a licensee function, however, they do not fit the "type" definitions A through E as stated in this guide.
METEOROLOGY				
Wind Direction	0 to 360° (±5° accuracy with a deflection of 15° Starting speed 0.45 mps (1 mph))	E	For determining effluent transport direction for emergency planning, dose assessment, and source estimates.	See Reg. Guide 1.23

DELETE

DELETE

Table 2 (Continued)

PWR VARIABLES

Measured Variable	Range	Type	Purpose	Near Term OL Group Generic Comments
METEOROLOGY (Continued)				See Reg. Guide 1.23
Wind Speed	0 to 30 mps (67 mph) (±0.22 mps (0.5 mph) accuracy for wind speeds less than 11 mps (25 mph), with a starting threshold of less than 0.45 mps (1 mph))	E	For determining effluent travel speed and dilution for emergency planning, doses assessments, and source estimates.	
Temperature	-50°F to 120°F (±0.9°F accuracy)	E	For determining nature of precipitation and ground deposition for emergency planning.	
Vertical Temperature Difference	-9°F to +9°F (±0.3°F accuracy per 164-foot intervals)	E	For determining effluent diffusion rates for emergency planning, dose assessments, and source estimates.	Height requirements appear unreasonable.
Precipitation	Recording rain gage with range sufficient to ensure accuracy of total accumulation within 10% of recorded value - 0.01" resolution	E	For determining effluent transport and ground deposition for emergency planning.	

DELETE