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AUTH. NAME AUTHOR AFFILIATION
BASKIN, K.P. Southern California Edison Co.
RECIP. NAME RECIPIENT AFFILIATION
KNIGHTON, G.W. Licensing Branch 3

SUBJECT: Amends util 821028 ltr summarizing status of electrical
equipment environ qualification program. Review &
determination of acceptability of as-installed condition
will be completed by 821215.

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Southern California Edison Company



P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

K. P. BASKIN
MANAGER OF NUCLEAR ENGINEERING,
SAFETY, AND LICENSING

TELEPHONE
(213) 572-1401

December 7, 1982

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Branch Chief
Licensing Branch No. 3
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

The purpose of this letter is to amend SCE's letter of October 28, 1982 which summarized the status of the San Onofre Units 2 and 3 electrical equipment environmental qualification program. In that submittal SCE stated that with the exception of the auxiliary feedwater pump motors all electrical equipment located in a harsh environment which is required to meet NUREG-0588 guidelines for a Category II plant was qualified. As a result of a recent investigation of the installation requirements for resistance temperature detectors (RTD's) and transmitters supplied by Rosemount, SCE has determined that these instruments as currently installed at San Onofre Units 2 and 3 could now be considered as unqualified. A listing of the affected instruments by plant tag number and function is provided as Table I to this letter.

In order to be considered qualified a piece of equipment must be installed at the plant in a manner similar to its configuration during the test sequence. The cause of the difference between the as-installed condition and SCE's current understanding of the as-tested condition of the subject instruments is ambiguous wording in the associated test reports and installation drawings. The test reports (Rosemount Test Reports RMT 67626 and RMT 1762, Rev. A for the RTD's; Rosemount Test Report RMT 3788 for the transmitters) do not provide any terminal head area environmental seal requirement for the instruments, and there is no indication in any of the reports that a conduit sealant was used on the sample instruments to effect an environmental seal prior to the test sequence. The installation drawings do not clearly indicate that the terminal head area must be environmentally sealed, rather Rosemount Drawing H3631-8601, Revision C (transmitters) states

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"The terminal side of the electronics housing must be sealed from the external environment. As a minimum requirement to effect a seal at this interface, Rosemount recommends using a male taper pipe thread (NPT) fitting and qualified thread sealant."

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and Rosemount Drawing G33385-9002, Revision C (RTD's) states

"Loss of Coolant Accident. With sealed conduit connections the connection head is capable of withstanding conditions such as encountered in a loss of coolant accident. Connection Head Interfaces. Rosemount recommends that the conduit and sensor fitting interfaces be made with tapered pipe threads and a pipe sealant approved for use in the environment in which the head is used".

During installation of this equipment at San Onofre Units 2 and 3, these notes were interpreted as requiring that use of a qualified thread sealant (e.g. Kopper Seal or anti-seize compound) would satisfy the specified seal requirements. It is SCE's current understanding that both the Rosemount RTD's and transmitters underwent a test sequence with their terminal head areas completely sealed from the abnormal environment, a condition which does not presently exist in their as-installed configuration at San Onofre Units 2 and 3.

A review has been made of available environmental seals and the Conax environmental seal assembly has been determined to be acceptable for both RTD and transmitter usage. These Conax environmental seal assemblies are used at San Onofre Units 2 and 3 and are already included in the list of equipment considered environmentally qualified for inside containment post-accident use. The Conax environmental seal assemblies are identical to those used by the utility owners group in the Rosemount 1153 Series D test sequence, therefore the 1153 Series A transmitter/Conax assembly is considered seismically qualified by similarity. The RTD seismic qualification has been reviewed and it has been determined that the addition of the Conax environmental seal assemblies is acceptable. SCE is vigorously pursuing purchase and installation of the Conax environmental seal assemblies on an expedited basis. SCE has obtained several Conax environmental seal assemblies, however there are not enough seals immediately available to be installed on all affected San Onofre Units 2 and 3 instruments.

SCE has reviewed the function of the instruments listed on Table I and established a sequence and schedule for installation of the Conax environmental seal assemblies. A discussion of this sequence and basis for plant operation consistent with the proposed schedule follow.

PT-0102 -1 thru -4. These four instrument channels monitor pressurizer pressure and provide the pressurizer pressure input to the safety injection actuation signal. Conax environmental seal assemblies have been installed on the San Onofre Unit 2 transmitters and accordingly these transmitters are considered qualified. The San Onofre Unit 3 transmitters will have the Conax environmental seal assemblies installed prior to initial criticality.

PDT-0978 -1 thru -4 and PDT-0979 -1 thru -4 These eight instrument channels monitor primary side steam generator differential pressure and provide two functions. One function is to provide a reactor trip signal during a Reactor Coolant Pump (RCP) sheared shaft event. This event does not result in a harsh environment; therefore, these instruments remain qualified for that event. A second function is to provide a reactor trip for a steam line break inside containment with concurrent loss of offsite power. This event does result in a harsh environment, therefore these instruments are not qualified for that event. The San Onofre Units 2 and 3 instruments will have the Conax environmental seal assemblies installed at the first outage of sufficient duration following receipt of the Conax environmental seal assemblies at the site. In any case the Conax environmental seal assemblies will be added prior to completion of the startup test program.

SCE has reviewed the trip function of these transmitters and has concluded that continued plant operation, until the Conax environmental seal assemblies can be installed, is acceptable on the basis that 1) this trip is only required for steam line break events which do not rapidly actuate reactor trip on high containment pressure; 2) it is highly improbable that such a steam line break will occur in combination with a loss of offsite power, therefore the event involves a compound occurrence, which is a low probability occurrence; and 3) the number of steam lines located inside containment is minimal thereby decreasing the probability of occurrence.

PT-0104-2 and -0106-4. These two instrument channels monitor pressurizer pressure and provide the reactor coolant system pressure interlock signal which prevents opening two of the Shutdown Cooling System (SDCS) suction line isolation valves at pressures greater than the SDCS design pressure limits. The San Onofre Units 2 and 3 instruments will have the Conax environmental seal assemblies installed at the first outage of sufficient duration following receipt of the Conax environmental seal assemblies at the site. In any case the Conax environmental seal assemblies will be added prior to completion of the startup test program.

SCE has reviewed the interlock function of these transmitters and has concluded continued plant operation without the Conax environmental seal assemblies is acceptable on the basis that: 1) they are required only to achieve Mode 4 (hot shutdown) conditions - the plant can be safely brought to Mode 3 (hot standby) without these instruments; and 2) during the time interval required to get to hot shutdown entry conditions (greater than two hours for the most limiting scenario), the operator can take action to bypass or jumper the interlock to allow suction valve operation.

LT -1115 -1, -2; LT-1125 -1, -2; TE -0111X, -0111Y, -0911X, -0911Y, -0121X, -0121Y, -0921X, -0921Y, -0115, -0125, -0915 and -0925 -
These sixteen instrument channels monitor steam generator wide range water level (the LT series) and reactor coolant temperature (the TE series) and supply signals for post-accident monitoring information. The San Onofre Units 2 and 3 instruments will have the Conax environmental seal assemblies installed at the first outage of sufficient duration following receipt of the Conax environmental seal assemblies at the site. In any case, the Conax environmental seal assemblies will be added prior to completion of the startup test program.

Qualified Class IE instrumentation (Foxboro transmitters) provide redundant indication for the Steam Generator wide range level instruments, therefore failure of the Rosemount transmitters would not prevent the operator from monitoring the steam generator water level under post-accident conditions.

Although there is no redundant direct temperature indication for San Onofre Unit 2, Reactor Coolant System (RCS) temperature and subcooled margin can be ascertained from other qualified parameters. Steam generator pressure is available to the operator from qualified instrumentation. Since steam generator temperature is saturated, RCS loop temperature can be determined with acceptable accuracy. The subcooled margin can be developed from the calculated RCS temperature and pressurizer pressure using steam tables. Backup indication for RCS temperature is available to the operators from the core exit thermocouples. In the San Onofre Unit 3 configuration, these are part of the qualified Inadequate Core Instrumentation System and provide redundant indication for both temperature and subcooled margin.

In addition to the justification provided for each of the individual instruments, certain factors exist which serve to minimize the potential for instrument failure. The primary concern is the failure to seal off the terminal head areas from the spray/steam environment, thus creating the potential for steam intrusion into the terminal head area. This in turn could potentially produce leakage currents which would create erroneous signals from the instruments. In order to effect this steam intrusion event, the steam must first penetrate the conduit and diffuse into the terminal box. Since there is no outlet (drain) in the terminal head area, the steam would compress any air trapped in the conduit and terminal head areas, creating condensation. A sufficient amount of moisture would have to build up inside the terminal head area in order to degrade the terminal connections. In the event that such a condensation buildup was to occur, the conduit is routed in such a manner as to preclude a direct flow path for water into the terminal head area. For each instrument the terminal head area is protected from direct steam/spray impingement by its head assembly.

December 7, 1982

By this letter SCE is amending its previous statements on the status of equipment environmental qualification, and to the list of unqualified equipment provided in the October 28, 1982 letter, SCE adds the instruments discussed in this submittal. Upon installation of an appropriate qualified conduit sealing device (e.g. Conax environmental seal assemblies) these instruments will revert to the original qualified status. SCE is vigorously pursuing acquisition of these conduit sealing devices, and will install them on a schedule compatible with plant operations, and in compliance with the San Onofre Units 2 and 3 License Condition 2.C.5.a requirement for installation of fully qualified equipment. SCE will provide instructions to the operators to exercise caution in relying on any of these instruments for emergency operator action until the conduit seal devices have been installed. SCE is reviewing all other electrical equipment located in a harsh environment which must meet NUREG-0588 guidelines and has confidence that the situation described above does not impact the qualification status of that equipment. The review and determination of the acceptability of the as-installed condition will be completed by December 15, 1982.

If you have any questions or comments, please contact me.

Very truly yours,



Enclosure

cc: Mr. R. H. Engleken, Director, Region V, Office of Inspection and Enforcement

Mr. H. Rood, Project Manager
NRC (to be opened by addressee only)

TABLE I

<u>Instrument</u>	<u>Function</u>
PT-0102-1, -2, -3, -4	Pressurizer Pressure
PDT-0978-1, -1, -3, -4	Steam Generator Differential Pressure
PDT-0979-1, -2, -3, -4	Steam Generator Differential Pressure
PT-0104-2	Pressurizer Pressure (SDCS interlock)
PT-0106-4	Pressurizer Pressure (SDCS interlock)
LT-1115-1, -2	Steam Generator Level
LT-1125-1, -2	Steam Generator Level
TE-0911X, -0911Y	Reactor Coolant Temperature
TE-0111X, -0111Y	Reactor Coolant Temperature
TE-0121X, -0121Y	Reactor Coolant Temperature
TE-0921X, -0921Y	Reactor Coolant Temperature
TE-0115, -0915	Reactor Coolant Temperature
TE-0125, -0925	Reactor Coolant Temperature