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March 2, 1984

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Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
Reactor Coolant Gas Vent System
San Onofre Nuclear Generating Station, Unit 1

- References: 1) Letter, J. G. Haynes, SCE, to J. B. Martin, NRC, Region V,
Informational Report, Licensee Event Report No. 83-006,
December 12, 1983
- 2) Letter from R. W. Krieger (SCE) to D. M. Crutchfield (NRC),
NUREG-0737, Item II.B.1 - Reactor Coolant System Vents,
September 1, 1983

As discussed in Reference 1, the Reactor Coolant System (RCS) vent system at San Onofre Unit 1 was used to purge nitrogen which had accumulated in the reactor vessel head. The purpose of this letter is to provide additional details for your information.

On November 18, 1983, San Onofre Unit 1 was being maintained in cold shutdown (MODE 5) with the RCS depressurized, and one loop of the Residual Heat Removal (RHR) system in operation. In accordance with approved operating instructions, the charging system Volume Control Tank (VCT) was being maintained with a nitrogen blanket pressure of 45 psig and was aligned to provide flow to the RCS through flow control valve FCV-1112. With the Pressurizer level at 78% and a nitrogen blanket pressure of approximately 4 psig in the Pressurizer Relief Tank, it was concluded that Pressurizer level should be lowered to less than 50% as a precautionary measure since one of the two Power Operated Relief Valves (PORV) was taken out of service and, consistent with a pending Technical Specification change addressing such a condition, this would provide a greater margin of safety for an inadvertent RCS overpressure event.

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Pressurizer level was subsequently reduced to approximately 43% and over the next three days slowly increased to an indicated level of nearly 50%. Pressurizer level was again reduced on November 21, 1983 while a search for suspected RCS in-leakage was conducted. After reducing pressurizer level on two additional occasions over the next five days, it was concluded on November 27, 1983 that no liquid in-leakage path existed. It was further concluded that a possible cause for slowly increasing pressurizer level, under existing system conditions, could be the ingress of gas to the RCS or gasses coming out of solution in the depressurized RCS and collecting in the reactor vessel head.

As indicated in the Reference (2) submittal, SCE considered that the restrictions on implementation of the installed RCS vent system noted in NUREG 0737 Item II.B.1 did not apply in the cold shutdown or refueling modes and as such the system would be used for fill and vent operations in these modes. The system was therefore utilized in an attempt to determine if gas had indeed collected in the reactor vessel head and after confirming that this was the case, normal fill and vent procedures were utilized to restore RCS inventory to the expected conditions.

A total of 3974 gallons was added to the RCS during fill operations, indicating that a gas bubble accumulation of approximately 500 cubic feet existed in the 741 cubic foot volume of the reactor vessel above the flange. Thus, just prior to venting, the lower level of the nitrogen bubble was calculated to be 28 inches above the top of the reactor vessel hot leg nozzle.

Analyses have indicated that the source of the gas was the nitrogen blanket being maintained at 45 psig in the VCT. Dissolved nitrogen gas in the VCT water at 45 psig apparently comes out of solution in the essentially depressurized reactor vessel and over a period of time will collect in the reactor vessel head displacing RCS water to the pressurizer.

As corrective action, the VCT nitrogen pressure was reduced to 35 psig and the RCS has been and will continue to be periodically vented using the RCS vent system while nitrogen pressure in the VCT is maintained above RCS pressure. All operating shifts will be made aware of this occurrence and the manner in which it developed. Operating Instruction SO1-4-6, "Charging and Letdown System", has been revised to address venting nitrogen accumulation in the reactor vessel head using the RCS vent system in Modes 5 or 6. Other high points in the system (i.e. steam generator tubes) will be vented or purged as necessary to minimize accumulation of nitrogen in the Reactor Coolant System. As further corrective action, an alternate charging flowpath to the RCS via the pressurizer spray lines was utilized. This method of charging, to be used in Mode 5 only, was reviewed with the assistance of representatives of the Westinghouse Electric Corporation, and was determined to be a safe method of charging while reducing the nitrogen buildup in the RCS. Subsequent to implementing this charging flowpath, the rate at which nitrogen came out of solution in the RCS was reduced by a factor of ten.

March 2, 1984

Use of the RCS vent system for fill and vent operations in Modes 5 and 6 does not constitute an unreviewed safety question pursuant to the criteria of 10 CFR 50.59. Accordingly, we revised the procedure for normal RCS fill and vent in MODE 5 to include the use of the RCS vent system. The operators were trained in the manipulation of the RCS vent system and we have concluded that its use under the conditions that existed in the RCS at the time (depressurized in Mode 5) was appropriate and entirely consistent with our position outlined in Reference (2).

Public health and safety were unaffected by the nitrogen accumulation and subsequent venting. The Residual Heat Removal System remained in operation throughout this period and RCS temperature remained below 125 degrees Fahrenheit. RCS specific activity has remained within Technical Specification limits and no high radiation alarms in the release path were received during venting operations.

If you have any questions regarding the above discussed incident, please let me know.

Very truly yours,



cc: J. B. Martin, NRC Region V Administrator
A. E. Chaffee, NRC Resident Inspector