



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

October 29, 1978

Docket No. 50-206

Southern California Edison Company
ATTN: Mr. James H. Drake
Vice President
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

Gentlemen:

Enclosed are copies of our draft evaluation of two Systematic Evaluation Program (SEP) topics. You are requested to examine the facts upon which the staff has based its evaluation and respond either by confirming that the facts are correct, or by identifying any error. If in error, please supply corrected information for the docket. We encourage you to supply for the docket any other material related to these topics that might affect the staff's evaluation.

It would be most helpful if your comments were received within 30 days of the date you receive this letter.

Sincerely,

Dennis L. Ziemann
Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
Topics XV-17
XV-18

cc w/enclosures:
See next page

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cc w/enclosures:

Rollin E. Woodbury, Vice President
and General Counsel
Southern California Edison Company
Post Office Box 800
Rosemead, California 91770

David R. Pigott
Samuel B. Casey
Chickering & Gregory
Three Embarcadero Center
Twenty-Third Floor
San Francisco, California 94111

David W. Gilman
Robert G. Lacy
San Diego Gas & Electric Company
P. O. Box 1831
San Diego, California 92112

Mission Viejo Branch Library
24351 Chrisanta Drive
Mission Viejo, California 92676

K M C, Inc.
ATTN: Jack McEwen
1747 Pennsylvania Avenue, NW
Suite 1050
Washington, D. C. 20006

San Onofre Unit 1

Topic XV-17 Radiological Consequences of Steam Generator Tube Failure (PWR)

The safety objective of this topic is to assure that the releases from this postulated event will not result in exposures in excess of the established guidelines.

The double ended severance of a steam generator tube is considered a limiting fault not expected to take place during the lifetime of the plant. Nevertheless, it is analyzed because the consequences of this postulated event could include the release of significant amounts of radioactive material. The significance of this accident, compared with a small loss-of-coolant accident, is due to the path created for the release of reactor coolant via the secondary side of the steam generator, out of the reactor containment structure to the turbine and/or condenser, or if there is a concurrent loss of offsite power, to the environment through the safety and relief valves.

The sudden complete failure of a steam generator tube is a highly unlikely event. Based on analyses of the types of tube degradation that have been observed at the San Onofre Unit 1 steam generators the most likely event would be the gradual increase of the primary to secondary leakage over a time period. To assure that the integrity of the steam generator tubes is maintained through the life of the plant, periodic inspections are performed as specified in the San Onofre Unit 1 Technical Specifications, Section 4.16. In addition, Technical Specification 3.1.4 limits the allowable primary to secondary leakage

to 0.3 gpm in any one steam generator. If this limit is exceeded, shutdown procedures must be initiated.

An analysis of the radiological consequences of a steam generator tube failure at the San Onofre Unit 1 plant has been performed following the assumptions and procedures indicated in the S.R.P. 15.6.3, "Radiological Consequences of a Steam Generator Tube Failure (PWR)". The specific assumptions made regarding the plant conditions prior to the postulated accidents and the expected systems responses are listed in Table XV-1.

In particular, it has been conservatively assumed that the accident is followed by a complete loss of off-site power. Therefore, the plant is cooled down by releasing secondary steam to the environment through the safety and relief valves. In addition, it has been assumed that prior to the accident the primary and secondary coolant activities were at the maximum levels allowed by the Technical Specifications 3.1.1 and 3.4.2. The estimated site boundary doses resulting from this postulated accident (see Table XV-2) have been found to be within the 10 CFR Part 100 guidelines as specified in the Acceptance Criteria for S.R.P. 15.6.3.

On the basis of these results, we conclude that operation of the San Onofre Unit 1 Generating Station is safe with regard to a possible steam generator tube failure, and that the risk presented by this

postulated accident is similar to that of plants licensed under current criteria.

Since the plant design conforms to current licensing criteria, this completes the evaluation of this SEP topic.

San Onofre Unit 1

Topic XV-18 Radiological Consequences of Main Steam Line Failure
Outside Containment

The safety objective of this topic is to assure that the releases from this postulated event will not result in exposures in excess of the established guidelines.

The rupture of a main steam line is considered a limiting fault not expected to take place during the lifetime of the plant. Nevertheless, it is postulated because its consequences could include the release of significant amounts of radioactive material. In particular, the failure of a steam line outside containment would result in the release of activity contained within the secondary system, in addition to opening a potential, albeit small path for the release of reactor coolant to the environment via postulated steam generator leaks.

An analysis of the radiological consequences of a main steam line failure at the San Onofre 1 plant has been performed following the assumptions and procedures indicated in the Appendix to S.R.P. 15.1.5, "Radiological Consequences of Main Steam Line Failures Outside Containment (PWR)." The specific assumptions made regarding the plant conditions prior to the postulated accident and the expected responses are listed in Table XV-i.

In particular, it has been assumed that the three steam generators are blown dry immediately following the accident, and that 1 gpm of reactor coolant is released directly to the environment during the first two hours. This is in accordance with Technical Specification 3.1.4 which limits the allowable steam generator primary to secondary leakage to 0.3 gpm in any one steam generator.

In addition, it has been assumed that prior to the accident the primary and secondary coolant activities were at the maximum levels allowed by the Technical Specifications 3.1.1 and 3.4.2. An evaluation of this accident for the Cycle 6 Reload in March 1977 concluded that no additional fuel clad failures would occur. The estimated site boundary doses resulting from this postulated accident (see Table XV-2) have been found to be within the 10 CFR Part 100 guidelines as specified in the Acceptance Criteria for S.R.P. 15.1.5.

On the basis of these results, we conclude that operation of the San Onofre Unit 1 Generating Station is safe with regard to a possible main steam line failure, and that the risk presented by this postulated accident is similar to that of plants licensed under current criteria.

Since the plant design conforms to current licensing criteria, this completes the evaluation of this SEP topic.

TABLE XV-1

Assumptions Made in Analysis of the Radiological Consequences
of Postulated Tube Failure, Main Steam Line
Failure and Rod Ejection Accident

1. 103% of rated reactor power = 1387 Mwth.
2. Loss of offsite power following the accident.
3. Primary coolant activity prior to the accident of 1. μ Ci/g of Dose Equivalent I-131 and 100/ \bar{E} μ Ci/g of noble gases.
4. Iodine spiking factor of 500 after the accident.
5. Primary coolant activity of 60. μ Ci/g of Dose Equivalent I-131 at time of accident for cases assuming a previous iodine spike.
6. Secondary coolant activity prior to the accident of 0.1 μ Ci/g Dose Equivalent I-131.
7. Iodine decontamination factor of 10 between water and steam.
8. Meteorological conditions corresponding to a 30 meter elevated release with fumigation and 1 m/sec wind speed at a distance of 284 meters ($X/Q = 1.1 \times 10^{-3}$ sec/m³).*
9. No additional fuel clad failures as a result of any of the accidents.

For the Steam Generator Tube Failure Accident

1. Failed steam generator is not isolated following the accident.
2. 50,000 lb. of primary coolant leak to the secondary side of the failed steam generator through the failed tube during the first 2 hours; (one half during the first 30 minutes).
3. All releases through the secondary side safety and relief valves.

For the Main Steam Line Failure Accident

1. Total primary to secondary leak rate of 1. gpm.

For the Control Rod Ejection Accident

1. All releases through the secondary side safety and relief valves.
2. Total primary to secondary leak rate of 1. gpm.

*As per Regulatory Guide 1.5, "Assumptions Used for Evaluating The Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors". The 0-2 hour X/Q for a ground release is 9.5×10^{-4} sec/m³ based on the site meteorological data. Use of this X/Q would result in a reduction of about 10% in the calculated offsite doses.

TABLE XV-2

ACCIDENT DOSES AT NEAREST SITE BOUNDARY

	<u>2-hour Dose to the Thyroid (rem)</u>	<u>2-hour Whole Body Dose (rem)</u>
Tube Failure Accident	55.	0.6
Tube Failure Accident with Previous Iodine Spike*	150.	0.6
Steam Line Failure Accident	15.	0.01
Steam Line Failure Accident with Previous Iodine Spike*	26.	0.01
Rod Ejection Accident	1.4	0.01
Rod Ejection Accident with Previous Iodine Spike*	2.4	0.01

*For this accident sequence it is assumed that an iodine spike was initiated some time before the accident resulting in the highest coolant activity allowed by the Technical Specifications.