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Mr. R. Dietch
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 Southern California Edison Company
 2244 Walnut Grove Avenue
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Dear Mr. Dietch:

SUBJECT: NUREG-0737, ITEM II.B.2 "PLANT SHIELDING"
 POST IMPLEMENTATION REVIEW

The staff has completed its review of the above item for the SONGS-1 facility. Based upon the evaluation contained in the enclosed Safety Evaluation Report (SER), we conclude that SCE's post accident shielding modifications at SONGS-1 meet staff criteria for NUREG-0737, Item II.B.2, and accordingly this item is considered to be closed.

Sincerely,

Original signed by WAPaulson for/

Dennis M. Crutchfield, Chief
 Operating Reactors Branch #5
 Division of Licensing

Enclosure:
 As stated

cc w/enclosure:
 See next page

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April 18, 1983

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

NRC SAFETY EVALUATION
NUREG-0737 ITEM II.B.2 "PLANT SHIELDING"
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1
DOCKET NO. 50-206

I. INTRODUCTION

A. DESCRIPTION OF THE PROPOSED ACTION

This Safety Evaluation Report (SER) addresses Southern California Edison's (SCE's or the licensee's) compliance with the recommendations contained in NUREG-0737, Item II.B.2 (Plant Shielding) for the San Onofre Nuclear Generating Station, Unit 1.

B. BACKGROUND INFORMATION

Following the accident at Three Mile Island, Unit 2, the staff developed the NRC Action Plan, NUREG-0660, to provide a comprehensive and integrated plan to improve safety at power reactors. Specific NUREG-0660 items, approved by the Commission for implementation at power reactors, were issued as NUREG-0737.

As discussed in NUREG-0737, Item II.B.2, each licensee was requested to perform a radiation and shielding design review of the spaces around systems that can, as a result of an accident, contain highly radioactive materials. The design review was intended to identify the location of vital areas and equipment where personnel occupancy could be unduly limited, or safety equipment could be unduly degraded, by radiation fields during post-accident operation of these systems. Additionally, each licensee was to provide for safe post-accident access to vital areas through design changes, increased permanent or temporary shielding or post-accident procedural controls. The design review was to determine which types of corrective actions were needed for vital areas throughout the facility. Licensees were to have available the final design details of the implementation of this item for post implementation review by the NRC.

C. SCOPE OF REVIEW

The staff's post-implementation review consisted of 1) an inspection of the shielding modifications made as a result of the shielding design review, and 2) an audit to verify that, following the assumed accident, plant personnel can leave the control room and safely gain access to a selected vital area. Additionally, the staff reviewed the assumptions used by SCE in performing their shielding design review. The scope of this review was as follows.

1. Source Terms

For both liquid-containing systems and gas-containing systems, the minimum radioactive source terms used by SCE in the shielding calculations were examined to determine if they were equivalent to the source terms recommended in NUREG-0737.

2. Systems Containing the Source

The plant systems assumed by the licensee to contain high levels of radioactivity in a post accident situation were compared to the listing of possible radioactive systems identified in NUREG-0737.

3. Dose Rate Criteria

The design dose rates for personnel occupying vital areas in a post accident situation were reviewed against NUREG-0737 criteria.

The following items, associated with NUREG-0737, Item II.B.2, are not evaluated in this SER:

1. Post Accident Sampling System (PASS)

Shielding for the PASS will be evaluated separately under Item II.B.3 "Post Accident Sampling Capability".

2. Radiation Qualification of Safety Related Equipment

This topic is separately addressed under NRC Multi-Plant Action Item B-60 "Environmental Qualification of Electric Equipment for Nuclear Power Plants".

3. Shielding Calculations

The staff did not review SCE's detailed shielding calculations, nor perform independent verification calculations.

For the purpose of the shielding design review, those areas which must be accessible to aid in the mitigation of, or recovery from, an accident are classified as "vital areas". This definition of vital areas does not necessarily include all of the vital areas defined in 10 CFR 73.2 for security purposes.

II. EVALUATION

A. SHIELDING DESIGN REPORT REVIEW

The results of SCE's shielding design review were submitted to the NRC in Reference 1, as modified by Reference 2.

In reviewing the licensee's shielding design review report, the staff determined that 1) the source terms utilized by the licensee in performing the shielding calculations were in accordance with NUREG-0737 recommendations, 2) the proper systems had been evaluated for impact on post accident access and 3) the permissible dose rates specified in NUREG-0737 were used by the licensee in their shielding design review. In regard to the last item, however, one of the design objectives stated in NUREG 0737 is that the integrated dose rate (averaged over 30 days) for areas requiring continuous occupancy should not exceed 15 mrem/hr. A review of the results of the licensee's shielding calculations indicated that although this criterion was satisfied for most of the Control Room, including the Control Console area; it was not satisfied for the northwest corner of the Control Room, which primarily contains instrument cabinets. In this area, the 30 day averaged exposure rate was 17.4 mrem/hr instead of the specified 15 mrem/hr. The licensee justified this difference on the basis that this was not a continuously occupied area. While the staff agrees that this is not a continuously occupied area, the staff also indicated that prudence would suggest the posting of this area as a potential high radiation area in the event of a serious accident. In response to the staff's suggestion, the licensee committed in Reference 3 to post appropriate warnings prior to startup from the current refueling outage. We find this an acceptable means for satisfying the dose rate criterion.

Discussions between Region V representatives and the licensee, concerning this design review, were conducted at the San Onofre site on November 8 and 9, 1982. As a result of these discussions, additional information was requested from and supplied by the licensee to clarify information previously submitted (References 3 and 4).

Item 2 of Reference 3 contains a description of the criteria and assumptions used by SCE in performing their shielding design review. A fundamental assumption used by SCE in their analysis, is that letdown flow will be isolated in a post-accident situation. By making this assumption, SCE eliminates the need for additional shielding to be installed around portions of the chemical and volume control system (CVCS) to allow access to nearby areas. Although the licensee, thus, places considerable reliance on the isolation of letdown to obviate the need for installation of certain shielding, the licensee could not show where isolation of letdown was clearly and unambiguously required by plant operating procedures. Therefore, the NRC staff requested SCE to provide clear assurance that, in a post-accident situation, letdown flow would be isolated, and that letdown flow would remain isolated until the effect of reinitiation of letdown flow on access to vital areas of the plant was evaluated by SCE. In Reference 3, SCE indicated that new emergency operating procedures, developed in response to NUREG-0737, were being reviewed to

verify that 1) applicable procedures require letdown isolation, and 2) operations personnel will consider the radiological effects of reinitiation of letdown flow. In a subsequent telephone conversation, SCE was requested to submit a draft of these procedures to Region V.

As a result of Region V's review of the draft procedures, SCE committed in Reference 5 to incorporate the following provisions in the SONGS-1 Emergency Operating Instruction S01-1.5-3 "Technical Guideline For Response To High Containment Radiation Level" and its supporting document, the SONGS-1 "Background Document For Response To High Containment Radiation Level".

TECHNICAL GUIDANCE DOCUMENT S01-1.5-3:

"CAUTION

During high containment radiation conditions all process lines penetrating containment shall be isolated. Letdown and radwaste systems will remain isolated to allow access to the west side of containment, to the alternate hot leg recirculation valve and to the wide range gas monitor.

Letdown and radwaste systems will not be restored to service without the Emergency Coordinator's approval."

BACKGROUND DOCUMENT S01-1.5-3:

"Caution Before Step 4

During a major casualty (sic), fuel damage may be evident. Radiation levels in the containment and RCS activity could be higher than plant systems outside the containment (i.e., radwaste and shielding) are designed to accommodate (Reference 4 and 5). Reinitiation of letdown and/or radwaste systems may prevent access to equipment in the reactor auxiliary building area; such as, the alternate hot leg recirculation valve and the wide range gas monitor. Therefore the Emergency Coordinator will evaluate the need for future accessibility prior to any operator action to reinitiate letdown flow or to utilize the radwaste system".

Based on the above revisions to plant procedures, we conclude that the licensee has provided a high degree assurance that letdown flow will be isolated in a post accident situation, and that appropriate evaluations will be made prior to reinitiating letdown flow. Accordingly, we find the basis for the shielding calculations acceptable.

B. INSPECTION OF SHIELDING MODIFICATIONS

Modifications, required by the shielding design review, were identified by SCE at the November 8th site meeting. The

required modifications consist of additional shielding structures for the recirculation heat exchanger, the refueling water pump and associated piping, the personnel escape hatch, the dog house, vault, and pipe tunnel, and the large size vent openings of the sphere enclosure building. A diagram of these modifications is included in Reference 3.

On November 9, 1982 the Region V representatives conducted an inspection of the above listed items. The modifications were verified to be completed and in agreement with the listing and diagram supplied by SCE (included in Reference 3).

C. VERIFICATION OF ACCESSIBILITY TO SELECTED VITAL AREA

In order to verify accessibility to a vital area in a post-accident situation, the staff chose manual operation of the alternate hot leg recirculation valve as a test case. Access to this valve was verified on November 9, 1982 by traversing the route from the control room to the valve.

No potential sources of radiation (that were not included in the licensee's shielding design review) were identified, and the valve handwheel was found to be safely accessible.

CONCLUSION

Based on the above, we conclude that the licensee has:

- (1) performed the shielding calculations specified by NUREG-0737, Item II.B.2,
- (2) utilized the proper source term in the above calculations
- (3) modified plant procedures to conform with the basis for the shielding calculations,
- (4) committed to post areas in the Control Room which are not continuously occupied, but are subject to radiation levels somewhat greater than the levels specified for continuously occupied areas in the event of an accident,
- (5) installed the shielding specified by the design review, and
- (6) provided shielding for areas requiring shielding based on the design assumptions.

Accordingly, we further conclude that the licensee has acceptably complied with the guidelines of NUREG-0737, Item II.B.2 (Plant Shielding) for the SONGS-1 facility.

REFERENCES

- (1) K. P. Baskin (SCE) 1-17-80 letter to D. G. Eisenhut (NRC), "Additional Information in Support of Responses to NRC TMI Requirements", SONGS 1.
- (2) J. G. Haynes (SCE) 3-25-80 letter to D. L. Ziemann (NRC), "Implementation of Category A Lessons Learned Requirements", SONGS 1.
- (3) R. W. Krieger (SCE) 1-19-83 letter to D. M. Crutchfield (NRC), "NUREG-0737, Item III.B.2 - Post-Accident Shielding Post-Implementation Review", SONGS 1.
- (4) K. P. Baskin 2-22-83 letter to D. M. Crutchfield, "NUREG-0737, Item II.B.2 - Post-Accident Shielding Post-Implementation Review", SONGS 1.
- (5) R. W. Krieger 4-8-83 letter to D. M. Crutchfield, "NUREG-0737, Item II.B.2 - Post-Accident Shielding Post-Implementation Review", SONGS 1.