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SUBJECT: Forwards clarifications re fuel handling sys,design basis fuel handling accidents & spent fuel cask drop accidents.

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March 18, 1988

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
TAC Nos. 66970 and 66971
San Onofre Nuclear Generating Station
Units 2 and 3

Reference: February 22, 1988 letter from M. O. Medford (SCE) to Document Control Desk (NRC); Subject: Same as above

By the above Reference Southern California Edison (SCE) submitted to the NRC a formal application for Amendments 38 and 24 to the San Onofre Units 2 and 3 Facility Operating Licenses, respectively. This formal application for license amendments included Proposed Change PCN-242 requesting NRC authorization to receive and store spent fuel produced by operation of San Onofre Unit 1 at Units 2 and 3. In response to requests for additional information by the NRC staff, SCE is providing, in an enclosure to this letter, clarifications concerning the Fuel Handling system, Design Basis Fuel Handling Accidents and Spent Fuel Cask Drop Accidents and the SCE Environmental Evaluation for receipt and storage of Unit 1 spent fuel at Units 2 and 3.

Approval by the NRC of Amendment Applications 38 for Unit 2 and 24 for Unit 3 is necessary prior to receipt of Unit 1 fuel at either Unit 2 or Unit 3. Approval is needed as soon as possible to provide for transshipment of at least one cask with seven spent fuel elements from Unit 1 to Units 2 and 3 before the end of the current Unit 1 outage. A short extension to the current Unit 1 outage schedule was made yesterday. Your prompt action would be most appreciated.

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If you have any questions or would like additional information, please let me know.

Very truly yours,

M. O. Medford

Enclosure

cc: D. Hickman, NRR Senior Project Manager, San Onofre Units 2 and 3
J. B. Martin, Regional Administrator, NRC Region V
F. R. Huey, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3
J. O. Ward, California Department of Health Services

ENCLOSURE

SUPPLEMENTAL INFORMATION
SPENT FUEL TRANSSHIPMENT FROM UNIT 1 TO UNITS 2 AND 3
SAN ONOFRE NUCLEAR GENERATING STATION

I. INTRODUCTION

In order to encompass the entire transshipment operation beginning with removing the Unit 1 spent fuel from the Unit 1 spent fuel pool through deposit of the Unit 1 spent fuel into the Units 2 and 3 spent fuel pools, SCE has developed and issued a special procedure S0123-X-9, "Transshipment of Spent Fuel Using the IF-300 cask." SCE has received NRC certification as a user of the IF-300 cask by NRC letter from Charles E. MacDonald dated March 8, 1988 (Copy attached). This certification includes evaluation of the general SCE Quality Assurance program which encompasses the Quality Assurance requirements of 10 CFR 71 related to spent fuel shipment.

II. CLARIFICATION OF DEVIATIONS FROM CASK CERTIFICATION

A. Lifting Trunions and Valve Covers

The lifting trunions must be removed and the valve box covers must be in place for the cask to be certified to withstand potential impact accidents that could occur during over-the-road shipment at highway speeds. These accidents will not occur because the loaded cask will be travelling only on site at five miles per hour. This procedure is consistent with onsite cask handling operations at other nuclear plants. The IF-300 cask will be lifted using supplied trunions and then secured in its companion skid atop a wheeled trailer. No single failure of the companion skid/trailer will cause the cask to fall from the trailer.

B. Wet Cask Shipment

If a Unit 1 spent fuel assembly exceeds the heat load limit for dry shipment in the IF-300 cask it would be shipped wet in the IF-300 cask. The IF-300 cask is not certified for over-the-road wet spent fuel shipment without the thermal/pressure relief valve. This relief valve would be needed only to mitigate the consequences of a fire and resultant cask pressurization by slowly releasing any volatile noble gases (e.g. KR-85). However, the IF-300 will be moved very slowly between Unit 1 and Units 2 and 3 at a speed of five (5) miles per hour. Moving the IF-300 between Unit 1 and Units 2 or 3 is not over-the-road; therefore, there is no identified risk of an accident or an accident which could cause a fire. Further, fire truck and other fire fighting capabilities are available on site for quick response if needed, the fire fighters will be notified prior to and be on alert status when wet shipment of the cask is in progress, and a fire watch will be posted with the cask whenever Unit 1 spent fuel is in a wet IF-300 cask.

The IF-300 cask was tested and certified for wet shipment without a relief valve to accomodate a heat load of 210,000 BTU/hr indefinitely with no mechanical cooling. The basis for this 210,000 BTU/hr limitation is the restriction of internal cask pressure to less than 346 psig assuming no mechanical cooling at an ambient temperature of 130^{0} F. Thermal expansion of the water from this 210,000 BTU/hr heat load will be provided for by establishing a 21

cubic foot void in the 81.7 cubic foot cask prior to wet shipping by a measured draining according to procedure. The neutron shielding evaluation of the cask includes the 21 cubic foot void. The total heat load for wet shipments will be within the 210,000 BTU/hr limit.

C. 35,000 MWD/MTU Burnup Limit

The IF-300 is certified for burnups of 35,000 MWD/MTU based on neutron emissions. Unit 1 spent fuel with a burnup greater than 35,000 MWD/MTU will only be transported if the required neutron emission criterion is met because of either a long decay time prior to shipment or additional shielding provided by wet shipment.

D. Helium Leak Test

Helium leak tests of the cask head seal, which are required by 10 CFR 71 only for over-the-road shipments, will be performed by formally trained site personnel rather than by a Level II inspector (Society of Nondestructive Testing certified). Use of site personnel who have been formally trained to perform and evaluate this specific helium leak test is acceptable because of the specific nature of the test, because the loaded cask will not leave the San Onofre site, the cask will be monitored for airborne and radiation streamings before leaving the Unit 1 protected area, and health physics personnel will accompany a loaded cask when it is not within a posted radiation area.

III. FUEL HANDLING ACCIDENT FISSION PRODUCTS

Based on SONGS 2/3 FSAR (Table 15.7-5) the gap inventory for 16 peak pins (50,000 MWD/MTU) in a SONGS 2/3 assembly is 19,437 curies (the sum of the contributions of I-131, I-133, I-135, Xe-131m, Xe-133m, Xe-133, Xe-135, and Kr-85, all taken at 72 hours after shutdown). Based on this inventory, the results of the limiting fuel handling accident for SONGS 2/3 were acceptable. As a very conservative measure, assume that the 14 peak pins of a SONGS 1 fuel assembly have a gap inventory of two times the SONGS 2/3 value, or, say, 40,000 curies. The minimum duration of time between shutdown and transfer of SONGS 1 fuel assemblies to SONGS 2/3 pools is 120 days. At this time the 40,000 curies of gap inventory have decayed to a value of 3105 curies of which 99.9% is KR-85. In terms of release to the water of the fuel pool, the SONGS 1 assembly with 3105 curies available is easily bounded by the SONGS 2/3 accident analysis which was based on 19,437 curies available.

IV. CASK DROP HEIGHT

As stated in the Units 2 and 3 FSAR, the cask drop height of 29 feet into the Units 2 and 3 spent fuel cask handling pool was previously evaluated. This evaluation of the 29 foot drop bounds the maximum possible drop height of 28 feet 6 inches.

V. HOT PARTICLE CONTAMINATION CONTROLS

Extensive health physics and operational controls and procedures are used to provide assurance that a hot particle of fuel will not result in radiation exposures. Detailed procedures are followed, and the most important cleaning activities taken during the spent fuel cask handling process are the following:

1. Wet the cask with demineralized water just before insertion into the pool.
2. Rinse the cask with demineralized water as it is removed from the pool.
3. Steam clean the cask.
4. Hand wash using brushes with soap and demineralized water.
5. Rinse with demineralized water.
6. Dry cask with sanitary wipes.

Normal health physics practices are followed including surveys and swipes to ensure proper decontamination, and the cask will be covered with a nylon bag for transfer between the units. In addition, water will be drained from the cask at Unit 2 or 3 prior to return of the cask to Unit 1. Health Physics Work Control Plan 8805 will implement Health Physics controls during transshipment of Unit 1 spent fuel to Units 2 and 3 fuel handling buildings. This work control plan will provide detailed guidance during the transshipment process which will implement the requirements of the following SONGS procedures:

SOI23-VII-7.13, Removal of Contaminated Objects from Pools

SOI23-VII-8.2.1, Shipment of Spent Fuel

SOI23-VII-8.6.2, Decontamination Work Planning

SOI23-VII-7.12, Fuel Fragment Exposure and Contamination Control

SOI23-X-9.0, Transshipment of Spent Fuel Using the IF300 Cask

Additionally, Units 1, 2, and 3 cask pools were cleaned. Specifically, the Unit 1 cask pool was vacuumed, and the Unit 2 and 3 cask pools were drained and steam cleaned.

VI. CONTROL OF DAMAGED UNIT 1 SPENT FUEL

Procedures will be implemented to ensure that Unit 1 assemblies with damaged or leaking fuel pins or loose pellets would be handled to minimize potential transfer problems or radiation exposure. These procedures include the following:

1. Underwater remote television surveillance of spent fuel assemblies in the Unit 1 pool to identify damaged pins or loose pellets.
2. Any assembly with damaged or leaking pins or loose pellets would be placed within a special insert in the cask which would contain any debris from this assembly. Special procedures would be used for placing the identified assembly in the special insert.

VII. ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action

The proposed license change for the San Onofre Plant, Unit Nos. 2 and 3 would permit spent fuel from Unit No. 1 to be stored in the Unit No. 2 and 3 spent fuel storage pools. The spent fuel assemblies from Unit No. 1 would be transferred up to seven at a time by an NRC-approved shipping cask between the Unit No. 1 spent fuel pool and the Unit Nos. 2 and 3 spent fuel pools, a distance of approximately one quarter of a mile. The Unit No. 1 spent fuel pool does not have enough space at the present time for

a Unit 1 reactor core off load. The SCE license application was dated February 22, 1988 and has been supplemented by letters dated December 30, 1987, January 12, and March 11 and 18, 1988. SCE has prepared the following Environmental Assessment of the proposed action.

Summary of Environmental Assessment

SCE has reviewed the potential environmental impact of the proposed license change to transfer Unit No. 1 spent fuel to Units 2 and 3. This evaluation considered the previous environmental studies, including the "Environmental Report, Operating License Stage for San Onofre Plant, Units 2 and 3."

The proposed amendment would not alter the type or amount of fuel that can be received, used and possessed at the site and the Unit 1 spent fuel has been evaluated and found to be conservatively within bounds previously evaluated for Units 2 and 3 spent fuel. Limitations on the amount of fuel that may be stored in the Unit Nos. 2 and 3 spent fuel pools and the manner in which it may be stored and handled would also not be changed. Only the Unit No. 1 spent fuel that has been sufficiently aged would be transferred, and an NRC-approved shipping cask would be used to transfer the fuel between units. The cask is certified for dry shipment, and equivalent accident prevention and mitigation is provided for wet and dry shipments within the site boundary. The only potential radiological environmental impacts that are affected deal with occupational and public radiation exposure.

Radiological Impacts

The occupational exposure for the proposed transfer operation is estimated to be less than 0.088 person-rems per spent fuel assembly with a maximum of 216 assemblies shipped in any year. Exposure estimates for each step in the transfer operation are provided in Table 1. Based on present and projected operations, SCE estimated that the proposed transfer of Unit No. 1 spent fuel between the units should only add a small fraction to the total annual occupational radiation dose at the facility. The total occupational dose for 1986 and 1987 at the site was approximately 760 person-rems per year. Thus, SCE has concluded that the proposed transfer of spent fuel will not result in any significant increase in doses received by workers.

10 CFR 71.43 provides that a package (shipping cask) must be designed, constructed, and prepared for shipment over-the-road so that under specified tests for normal conditions of operation, there will be no loss or disposal of radioactive contents, no significant increase in external radiation levels and no substantial reduction in the effectiveness of the packaging. 10 CFR 71.47 provides that radiation levels external to the package must not exceed 10 millirem/hour at any point two meters beyond the outermost sides of the transporting vehicles. For a cask meeting this criterion, the corresponding dose rate is conservatively 0.01 millirem/hour at the nearest site boundary.

SCE estimated the annual total dose commitment to a maximally exposed individual at the nearest site boundary due to the proposed transfer of spent fuel, and found it to be within the limitation of the plant Technical Specifications which are based on the offsite dose requirements of 10 CFR Parts 20 and 30 and 40 CFR Part 190. Likewise, SCE estimated that the annual population dose to workers and the general public due to the proposed transfer would be a small fraction of the 2.5 person-rem population dose estimated in the Unit Nos. 2 and 3 NRC Final Environmental Statement for transportation of fuel to and from a power reactor. The estimated annual total population dose including the proposed transfer of spent fuel would be very small compared to the annual dose to this same population from background radiation. Thus, SCE concluded that the proposed transfer of spent fuel would not result in any significant increase in doses received by the public.

SCE has also reviewed the potential consequences of three postulated design basis accidents which involve spent fuel. These accidents are the fuel handling, cask drop, and cask transport accidents. The previous evaluations of the fuel handling and cask drop accidents do not require reevaluation because the operations potentially involved with these accidents are not modified by the proposed license amendment.

Non-Radiological Impacts

SCE has evaluated the potential non-radiological environmental impacts associated with the proposed spent fuel transfer and concluded that they are not significant. SCE has concluded that the proposed license change would not cause a significant increase in the impact to the environment and will not change any conclusions reached by the Commission in the Final Environmental Statement for each unit.

Table 1

OCCUPATIONAL EXPOSURE DURING SPENT FUEL TRANSSHIPMENT FROM UNIT 1 to UNITS 2 AND 3 SAN ONOFRE NUCLEAR GENERATING STATION

DOSE* (person-millirem)	ACTIVITY
0	Pick up cask at south end of Unit 1 turbine deck.
0	Transport cask to Unit 1 decon area.
0	Prepare cask for insertion into Unit 1 pool.
0	Place cask into pool.
0	Load cask with Unit 1 spent fuel.
20	Remove cask from Unit 1 pool.
200	Tension head.
25	Leak test.
200	Decon cask.
20	Pick-up cask.
8	Transport cask to south end of Unit 1 turbine deck.
4	Place cask on tractor trailer.
20	Transport cask to Unit 2 or 3.
0	Open cask hatch to Unit 2 or 3 Fuel Handling Building.
4	Place cask in decon area.
45	Prepare cask for insertion into pool.
0	Close cask hatch to Unit 2 or 3 Fuel Handling Building.
20	Place cask into pool.
20	Unload Unit 1 spent fuel from cask.
0	Remove cask from pool.
0	Tension cask head.
0	Cask head leak test.
0	Decon cask.
0	Open cask hatches.
0	Place cask on truck.
0	Transport cask to Unit 1.
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*Dose is for each trip with 7 Unit 1 spent fuel assemblies in the cask. No dose is expected when no spent fuel is in the cask.

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