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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO.116 TO PROVISIONAL OPERATING LICENSE NO. DPR-13

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-206

1.0 INTRODUCTION

By letter dated April 28, 1988, as supplemented April 25, June 10, September 23, October 18, November 10, and December 1, 1988, Southern California Edison Company (SCE or the licensee) requested a change to Provisional Operating License No. DPR-13 for operation of San Onofre Nuclear Generating Station, Unit No. 1 in San Diego County, California. The proposed change would permit the licensee to transship spent fuel from the spent fuel pool in Unit No. 1 to the spent fuel pools in Unit Nos. 2 and 3. This action would provide space in the Unit 1 spent fuel pool for a full core offload.

Authorization for the licensee to receive and store spent fuel from Unit No. 1 at Unit Nos. 2 and 3 was granted on June 22, 1988 in the form of License Amendment Nos. 63 and 52 for Unit Nos. 2 and 3 respectively. The proposed change evaluated herein would authorize shipment of spent fuel from the spent fuel pool in Unit No. 1 using the GE model IF-300 spent fuel shipping cask and thereby complete the authorization process needed to begin transshipment.

Previously, the licensee used an air pallet system to transfer a 30 ton spent fuel cask containing a single fuel element from the spent fuel pool to the trailer. SCE is planning to replace this approach with a system which uses the turbine gantry crane to transport a licensed spent fuel cask containing seven spent fuel elements. The total weight of the cask and fuel elements is approximately 70 tons. The new plan calls for the empty cask to be off-loaded from the transport trailer or railroad car located at the south end of the turbine building by means of the turbine gantry crane. The empty cask is carried to the north end of the turbine building (the north extension) where it is transferred to the spent fuel pool (in the fuel handling building). After being loaded with seven spent fuel assemblies, the cask is returned to the south end of the turbine building where it is loaded on a trailer or railroad car for transport to Unit 2 or Unit 3.

The 70 ton cask rides on the horizontal beam of the western A-frame of the turbine gantry crane when carried to and from the Unit 1 spent fuel pool. The cask will be stationed on a platform welded to the A-frame leg with a raised ring designed to prevent the cask from sliding. The main crane hook will be kept attached to the cask during movement to and from the Unit 1 spent fuel pool. Transshipment will only take place with the plant in Modes 5 (cold shutdown) or 6 (refueling). When traveling from Unit 1 to Unit 2 or 3, the tractor trailer used to transport the cask will travel at a speed not exceeding 5 miles per hour. The trailer will be escorted by Security and Health Physics personnel during movement of the cask. The path followed by the trailer will not be in the vicinity of or over any safety-related equipment.

This evaluation does not address the handling of the 70 ton cask and the fuel contained therein once the trailer or railroad car arrives at its destination within the Unit 2 or Unit 3 boundaries. These aspects have been previously reviewed and approved by the staff as shown above. The following evaluation addresses the safe heavy load handling concerns of NUREG-0612 for the cask transshipment (Section 2.0) and civil/structural aspects (Section 3.0).

2.0 CASK HANDLING EVALUATION

2.1 Cask Drop

2.1.1 Integrity of Cask and Contents

The licensee noted that the cask (GE IF-300) is designed to maintain its integrity and that of the fuel contained in it in the event of a vertical drop of 30 feet. Use of this cask for purposes of spent fuel transport has been previously approved by the staff.

2.1.2 Integrity of Structure and Equipment in Load Path in Unit 1 Turbine Building and Spent Fuel Pool Area

The licensee has evaluated the effect of a hypothetical cask drop when lifting the cask at the north end of the turbine building in both the decontamination area and cask handling areas of the spent fuel pool. These events are evaluated in Section 3.0 and the effects of such postulated drops have been found to be acceptable. The cask lift in the south end of the turbine building does not impact safety since there is no safety related equipment or structures which could be adversely affected by a cask drop in this area. To provide additional measures against a cask drop, the main crane hook will be engaged during transportation of the cask from the trailer to the spent fuel pool and back again. The cask is tethered to the vertical arms of the west A-frame of the turbine gantry crane while it is being moved in the turbine building and is further prevented from

sliding by a raised ring on the horizontal leg of the gantry crane west A-frame. The above features make a cask drop accident very unlikely, and even should it occur, it will not result in adverse safety consequences.

The licensee will also employ an impact limiter in the area of the decontamination pad to reduce the initial impact load in the event of a cask drop when removing the cask from the crane to place it in the decontamination area of the spent fuel pool. The impact limiter will be made of polyurethane foam surrounded by stainless steel plates. The limiter is stepped with one section two feet high (designed to reduce the impact of the casks if dropped from a height of 4 feet 6 inches) and another section 4 feet high (designed to reduce the impact of a cask dropped from a height of 10 feet 6 inches).

The turbine gantry crane itself is a double-leg A-frame type, designed for a maximum load of 125 tons (250,000 lbs) and is tested for a load of 100 tons. The east leg is counterweighted so as to allow a 100 ton load to be carried on the west leg without overturning. The turbine gantry crane cannot enter the spent fuel storage area in the spent fuel pool due to the plant arrangement. The cask handling area and spent fuel storage areas in the pool are separated by a concrete wall 2 feet 6 inches thick which will retain its integrity in the event of a cask drop and tilt thereby preventing damage to stored spent fuel. A stainless steel plate will also be installed at the bottom of the spent fuel pool in the cask handling area in order to prevent penetration of the pool liner in the event of a cask drop.

The staff finds the above features to be consistent with the guidelines of NUREG-0612 and to provide acceptable protection against adverse consequences due to a postulated cask drop accident.

2.1.3 Safe Load Paths

The load path for the cask within the Unit 1 turbine building and fuel handling building is constrained by the need to use the gantry crane. As discussed previously, an impact limiter will be used in the area of the decontamination pad in order to ensure the structural integrity of the north turbine deck extension and decontamination pad. The licensee stated that cable trays containing circuits for equipment used for shutdown including a residual heat removal pump, component cooling water pumps and a salt water cooling pump are located beneath the cask path of travel at the north end of the turbine building. However, the licensee also stated that safe shutdown can be maintained without this equipment because redundant equipment is available away from the cask path of travel. The licensee also indicated that there is no safety-related equipment in

the path of the trailer when traversing the area between Unit 1 and Units 2 and 3, nor is there any safety-related equipment at Units 2 or 3 under the path of the trailer. The trailer passes over a buried communication duct and underground fire water system, but neither is affected by the trailer load because they are sufficiently below grade.

The staff finds that the licensee has identified appropriate load paths for the cask travel as prescribed in the guidelines of NUREG-0612.

2.1.4 Load Handling Procedures and Training

The licensee noted that the procedure for transshipment of fuel has been revised for handling the 70 ton cask. Crane operator training, checkout of cranes, and testing of lifting rigs have been implemented as part of the transshipment program. In addition, the crane operators training will be completed with a dry run of the transshipment procedure.

The staff finds that adequate procedures and training will be provided for the transshipment per the guidelines of NUREG-0612.

2.1.5 70 Ton Cask Special Lifting Devices (Lifting Rigs)

The licensee indicated that the spent fuel cask and the lift rigs are the property of Pacific Nuclear Systems and have been leased by SCE for fuel transshipment during the Unit 1 Cycle 10 refueling outage. Since the lifting rigs may not be in the possession of SCE before initiation of a transshipment or after completing a transshipment, it is necessary that assurance be provided that they have not been damaged while out of SCE's possession and control. This will be done by conducting a 150% load test of each lifting rig prior to each usage period (usage period is defined as that period of time in which the lifting rig is in the immediate possession of the licensee, i.e., within the confines of the site boundary, or in transit between Units 1, 2 and 3 during or returning from a transshipment). The 150% load test may be conducted by SCE or by an agent designated by SCE with suitable certification. Subsequent examinations may be conducted either by a 150% load test or by non-destructive examinations as specified in ANSI N14.6-1978, pro-vided that the special lifting devices remain under licensee's control, and provided further that a 150% load test is conducted at least once per five years. The above is consistent with the criteria of NUREG-0612 and licensee's commitments contained in its letter of December 1, 1988.

2.1.6 Turbine Gantry Crane

The licensee noted that the satisfactory crane inspection proof load testing and maintenance has previously been completed on the turbine gantry crane. Further, the licensee stated that other inspection, testing and maintenance issues associated with the turbine gantry crane remain applicable to the new spent fuel cask handling methodology. The staff finds the above adequately addresses the NUREG-0612 guidelines for crane testing prior to use.

2.1.7 SUMMARY

Based on the above, the staff finds the licensee's plan to transship spent fuel from the San Onofre Unit 1 pool to the San Onofre Units 2 and 3 pools is in accordance with the applicable guidelines of NUREG-0612 for safe heavy load handling, and is, therefore, acceptable. The licensee should ensure that the cask special lifting device (lifting rig) is load tested to 150% of its rating prior to each period of use when receiving the device from the leasing company or other parties.

3.0 CIVIL/STRUCTURAL EVALUATION

The licensee has limited the transshipment to the use of the GE-IF-300 shipping cask, thereby limiting the total lifting weight to 141 kips and a total of seven spent fuel assemblies. The turbine gantry crane to be used for the transport of the cask along the turbine building deck is designed and tested to carry 150% of the specified cask weight and meets the applicable requirements of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants". Also, the cask will be positioned on a platform and receive redundant support by lateral tie-downs and the crane hook at the top.

The decontamination pad area has been evaluated for the postulated normal and accidental loads. The results of these analyses have required the use of an impact limiter during the removal of the cask from the gantry crane. The impact limiter consists of a movable polyurethane, step-like structure encased with a stainless steel plate. The top step would mitigate a drop from the 10-foot gantry crane platform and the lower step would reduce impact on the floor from an intermediate height.

The licensee has evaluated the effects of tipping of the cask during the unloading operation on the decontamination pad and the spent fuel pool. The structural components affected by the postulated tipping of the cask would be the horizontal beam of the gantry crane, the impact limiter, a non-Category I block wall, and the reinforced concrete floor. The other critical condition considered in the evaluation of the proposed transship-

ment of fuel is the postulated cask drop in the spent fuel pool. The components evaluated include the stainless steel plate that is placed at the bottom of the pool to mitigate the cask drop on the liner and to protect the liner, the reinforced concrete basemat and its supporting soil media.

The licensee has evaluated the above-mentioned conditions for the proposed movement of the spent fuel in the IF-300 shipping cask utilizing the gantry crane, along the turbine deck, the laydown area, the upender area, and the spent fuel pool. The licensee has evaluated the loads on the crane and the structural components (floors and walls) considering all postulated loads, including cask drops for all phases of the transshipment operation. The impact limiter and the stainless steel plate provide the necessary safety guard during the proposed operation. The evaluation of the cask tipping indicates no consequential damage on the horizontal beam of the gantry crane, and any damage to non-Category I scaffolding and the masonry block wall will not have a safety impact on the new fuel storage area. The worst postulated condition results from the cask drop in the spent fuel pool. The staff agrees with these conclusions.

At the request of the staff, the licensee has evaluated the liner for possible tear including a scenario requiring its repair and coolant make-up capabilities in the unlikely event of the liner leakage, and the potential cracking and high stress levels in the basemat (concrete and reinforcing steel) and subsoil strata. The results indicate that the concrete can crack and one reinforcing steel bar may exceed its yield stress during the postulated cask drop, but the liner would continue to provide the leak barrier. Also, the licensee has identified methods for repairing the liner by underwater welding or dewatering of the cask laydown area, and the provisions to assure the supply of available makeup water. The spent fuel pool leakage is monitored through the available leak chase system. The staff finds these conclusions acceptable.

Based on the evaluation of the licensee submittal, the supplementary information provided by the licensee, and discussions with the licensee at a meeting, the staff concludes that the licensee's structural analyses of the applicable components are in compliance with the acceptance criteria set forth in the FSAR and consistent with current licensing practice and, therefore, are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on November 30, 1988 (53 FR 48347). Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: December 2, 1988