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SEP 13 1971

NMS:FJM
50-206

Southern California Edison Company
Attn: Mr. Jack B. Moore
Vice President
P. O. Box 800
Rosemead, California 91770

Gentlemen:



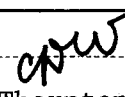
On December 7 through 9, 1970, our District II Safeguards Office conducted a safeguards inspection of the special nuclear material possessed pursuant to AEC License No. DPR-13. Based on our review of the inspection results, inventory verification analyses, and records audit, it appears that there were no items of noncompliance with present regulatory requirements.

Sincerely,

Original signed by
C. D. W. Thornton

C. D. W. Thornton, Director
Division of Nuclear Materials
Safeguards

cc: Mr. Hans Ottoson, Superintendent
San Onofre Nuclear Generating Station
Mr. John Ladesich, Southern California
Edison Company

OFFICE ▶	NMS 	NMS 	NMS 			
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DATE ▶	9/8/71	9/9/71	9/10/71			

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIAL AT
SAN ONOFRE NUCLEAR GENERATING STATION
SAN ONOFRE, CALIFORNIA

INSPECTION NO. SO-II-63

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIAL AT
SAN ONOFRE NUCLEAR GENERATING STATION
SAN ONOFRE, CALIFORNIA

INSPECTION NO. SO-II-63

I. INTRODUCTION

1.01 - An inspection of safeguards control over special nuclear material at the San Onofre Nuclear Generating Station (SONGS) was made by the District II Safeguards Office, Division of Nuclear Materials Safeguards. The inspection covered the period of operation from July 1, 1968, through the end of Cycle 1 - October 2, 1970, with the field work being done from December 7-9, 1970.

1.02 - SONGS is jointly owned by the Southern California Edison Company (80%) and San Diego Gas and Electric Company (20%), jointly referred to as Edison-San Diego. Southern California Edison operates the plant. The reactor is a pressurized water unit with maximum licensed power of 1,347 MWt (430 MWe). The core for Cycle 1 contained 157 fuel assemblies of UO₂ of three initial enrichments (3.15, 3.40, and 3.85 w/o U-235) clad in stainless steel. The facility is located on the Southern California coast about midway between Los Angeles and San Diego near San Clemente. In addition to the reactor, there are facilities for storing both irradiated and unirradiated fuel. Operations at SONGS are conducted under License No. DPR-13.

1.03 - SONGS operated with the same core loading from initial criticality, June 14, 1967, through the shutdown on October 2, 1970. The Cycle 2 core contains 153 enriched uranium assemblies and four plutonium-depleted uranium assemblies.

II. SCOPE

2.01 - The inspection was made to determine the adequacy of Edison-San Diego's conformance to safeguards requirements contained in Title 10, Code of Federal Regulations, Part 70, "Special Nuclear Material," and specific requirements contained in License No. DPR-13.

2.02 - The licensee's safeguards controls were reviewed for inventory procedures and identification practices, internal control, records and reports, calculation of reactor thermal output, and subsequent determination of nuclear material depletion and production. In addition, the inspection team performed independent checks of reported depletion and production and conducted audit tests of nuclear material, depletion/production, internal control and reactor thermal output records.

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III. CONCLUSIONS

3.01 - The licensee was found to be in compliance with the safeguards requirements of 10 CFR 70 and with current licensee possession limits.

3.02 - During the period under review, the licensee received and loaded to the reactor > 5 kgs. of plutonium in fabricated fuel assemblies. The inspector discovered no items of noncompliance with 10 CFR 73 criteria. All of the SNM currently at San Onofre is exempt from 10 CFR 73.

IV. DISCUSSION

A. Safeguards Requirements of 10 CFR 70

4.01 - The inspection revealed that SONGS has met the following safeguards requirements prescribed by 10 CFR 70:

1. Edison-San Diego was not required to submit FMC's or written material control and accounting procedures under the exclusion provision of 10 CFR 70.51(c).
2. Possession and use of special nuclear material have been confined to the locations and purposes authorized in the license as required by 10 CFR 70.41.
3. SNM has not been transferred except to an authorized recipient as required by 10 CFR 70.42.
4. Records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all special nuclear material at San Onofre have been maintained as required by 10 CFR 70.51(a).
5. Written material control and accounting procedures have been established and maintained as required by 10 CFR 70.51(b)(1).
6. A physical inventory has been conducted as required by 10 CFR 70.51(b)(2).
7. There have been no losses that required reporting under 10 CFR 70.52.
8. Material status reports have been submitted at the frequency prescribed by 10 CFR 70.53. The last report reviewed during this inspection was submitted as of September 30, 1970.
9. Transfer reports on shipments and receipts have been properly executed as required by 10 CFR 70.54.

B. Requirements of the License DPR-13

4.02 - Authorized limits and actual possession of SNM under the above license as of October 2, 1970, were as follows:

Authorized Limits

Possession

3300 kgs. U-235
47 kgs. plutonium

1913 kgs. U-235
45 kgs. plutonium

C. Inventory

4.03 - The inventory of SNM at San Onofre consisted of 153 enriched uranium and four mixed oxide (plutonium and depleted uranium) assemblies in the reactor and 52 enriched uranium assemblies in the spent fuel storage basin. There was also a 0.8 gram plutonium source used for instrument calibration. The source was purchased from the AEC in early 1971.

4.04 - The SNM content of the fuel was accepted based on San Onofre's depletion and production calculations (performed by Westinghouse under contract) as applied to the fabricator's stated SNM content and as confirmed by the inspection team's calculations. Material balance statements covering all SN material at San Onofre are included as Appendices A, B and C.

4.05 - During most of the period under review all fuel assemblies at the site were in the reactor and not amenable to inventory. Written inventory procedures are available and have been used since receipt of the 52 reload assemblies.

D. Inventory Verification

4.06 - The inspection team had no means of independently determining the SNM content of the fuel. Accordingly, inventory verification is limited to certification of the San Onofre inventory records. The inspectors confirmed the presence of the 52 assemblies in the basin and confirmed the location and serial number of 33 of them to facility records. No discrepancies were noted. Based on its review, the inspection team has 95% confidence that at least 90% of the serial numbers and locations of spent San Onofre fuel assemblies are correctly entered in facility inventory records. The serial numbers and locations of all fuel in the reactor were traced to facility records.

E. Reactor Thermal Output

4.07 - SONGS continues to determine thermal output by recording daily production of electricity from the kilowatt-hour meter and calculating heat production from the design heat rate curve. Heat balances are performed periodically to confirm the general acceptability of the heat rate curve. An on-line computer will eventually be used to perform more frequent heat balances and determination of the variation in heat rate with operating conditions. Written procedures were available detailing the method currently in use.

F. Nuclear Material Depletion and Production

4.08 - Core inventory calculations for the San Onofre reactor are performed under contract by Westinghouse Electric Corporation, Pittsburgh, Pennsylvania. The computerized calculation is done for the material status report and at the end of each fuel cycle using operating data furnished by San Onofre. The code used is applicable to pressurized water reactors and appropriate procedures are available describing the sources of data and the basic characteristics of the code. The inspection team audited the computation of depletion/production from the computer printouts of inventory but noted no errors of significance.

4.09 - The inspection team employed manual calculations to determine the adequacy of depletion and production reported by the licensee through the end of Cycle 1 operation, October 2, 1970. In contrast to calculations performed during the previous review, the reported quantities were found to be within the limits of error of the calculations employed. Review of depletion and production for each status report period indicates that revisions were made to the calculational procedures employed by Westinghouse during Cycle 1 operation. A comparison of SONGS and AEC depletion/production is shown in Appendix D.

G. Internal Control

4.10 - The procedures employed at San Onofre for the control of SNM within the facility were reviewed and considered acceptable. The actions and responsibilities involved in moving SN material were detailed and a review of the records indicated that the procedures had been followed.

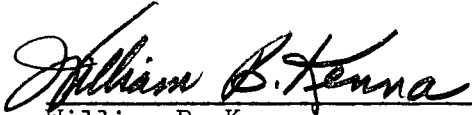
H. Records and Reports

4.11 - Under terms of the fuel management contract Westinghouse maintains the material control records for San Onofre and prepares the periodic material status report. The records were found to be satisfactory in that all external activity was recorded and reported to the AEC as required. The records relating to receipts of SNM (there were no shipments during the period under review) were examined and no errors were noted. Material status reports issued during the inspection period were audited and no discrepancies were noted.

I. Physical Protection

4.12 - San Onofre is licensed to possess up to 47 kilograms of plutonium in fabricated fuel assemblies. Four mixed oxide assemblies containing approximately 11 kgs. of plutonium each were received on September 8, 1970. The San Onofre plant is surrounded by a chain-link and barbed wire fence and access is controlled by guards or watchmen. Access to the new fuel storage facility is under control of authorized individuals and it appears

that San Onofre meets the in-use criteria of 10 CFR 70.32(a). The storage facility would qualify as a vault-type room if the door were equipped with a combination lock rather than a cylinder lock. Approximately two months after receipt, the plutonium assemblies were loaded to the reactor. Thereafter the assemblies were irradiated and exempt from the requirements of Part 73.


William B. Kenna
Director
District II Safeguards Office

Attachments:

Appendices A, B, C and D

Date of Report: MAY 18 1971

EDISON-SAN DIEGO
 SAN ONOFRE NUCLEAR GENERATING STATION
 ENRICHED URANIUM
 MATERIAL BALANCE STATEMENT
 AS OF OCTOBER 2, 1970

UNITS: Grams

	<u>Number of Assemblies</u>	<u>Total U</u>	<u>U-235</u>
Beginning Inventory 7/1/68	157	57,117,000	1,842,790
Receipts	52	17,455,104	699,072
Shipments	0	0	0
Burnup	--	1,128,150	628,898
Ending Inventory	207	73,443,954	1,912,964

APPENDIX A

EDISON-SAN DIEGO
 SAN ONOFRE NUCLEAR GENERATING STATION
 PRODUCED PLUTONIUM
 MATERIAL BALANCE STATEMENT
 AS OF OCTOBER 2, 1970

UNITS: Grams

	<u>Total Pu</u>	<u>Pu-239 + 241</u>
Beginning Inventory 7/1/68	79,738	78,143
Reactor Production	303,787	239,330
Shipments	0	0
Ending Inventory	383,525	317,473

APPENDIX B

EDISON-SAN DIEGO
 SAN ONOFRE NUCLEAR GENERATING STATION
 LEASED PLUTONIUM
 MATERIAL BALANCE STATEMENT
 AS OF OCTOBER 2, 1970

UNITS: Grams

	<u>Total Pu</u>	<u>Pu-239 + 241</u>
Beginning Inventory 7/1/68	0.80	0.71
Receipts	44,964.00	38,436.00
Shipments	0	0
Ending Inventory	44,964.80	38,436.71

APPENDIX C

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EDISON-SAN DIEGO
SAN ONOFRE NUCLEAR GENERATING STATION
COMPARISON OF DEPLETION/PRODUCTION CALCULATIONS
BOC-1 THROUGH EOC-1

UNITS: Kilograms

	<u>Reported (SONGS)</u>	<u>Hand Calculations</u>
Total U depletion	1,309.4	1,300.7
U-235 depletion	775.2	780.4
Total Pu production	383.5	371.6

APPENDIX D

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