



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

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DEC 0 8 1981

MEMORANDUM FOR: Harold D. Thornburg, Director, Division of Safeguards and Radiological Safety Inspection, IE:HQ

FROM: Thomas T. Martin, Director, Division of Engineering and Technical Inspection, RI

SUBJECT: RESPONSE TO QUESTIONS CONTAINED IN LEO B. HIGGINBOTHAM'S MEMORANDUM DATED OCTOBER 7, 1980, "PROBLEMS WITH THE NFS-4 (NAC-IE) CASK"

In the subject memorandum, it was requested that Region I assume lead responsibility for conducting a combined/coordinated investigation of operational shipment difficulties with the NFS-4 (NAC-IE) cask and that recommendations pertaining to the broader issues identified should be provided. Attached are the responses to the specific issues addressed in the subject memorandum and the recommendations developed as a result of the investigation.

Information relating to enforcement matters for Connecticut Yankee and Battelle will be addressed separately by memorandum, R. Carlson to D. Thompson.

Should you have any questions, I will be pleased to discuss them with you.

Thomas T. Martin, Director
Division of Engineering and
Technical Inspection

Enclosure: Response to Questions Contained in Leo B. Higginbotham's Memorandum dated October 7, 1980, "Problems with the NFS-4 (NAC-IE) Cask"

- cc w/encl:
- J. M. Allan
- P. J. Knapp
- P. Clemons
- R. Starostecki
- D. Thompson, IE:HQ
- L. B. Higginbotham, IE:HQ
- A. W. Grella, IE:HQ
- D. Sly, IF:HQ
- C. E. Alderson, RII
- R. F. Warnick, RIII
- A. D. Johnson, RV

RESPONSE TO QUESTIONS CONTAINED IN LEO B. HIGGINBOTHAM'S MEMORANDUM
DATED OCTOBER 7, 1980, "PROBLEMS WITH THE NFS-4, (NAC-IE) CASK"

References: See List of Enclosures

Detailed below are the responses to the specific issues addressed in the subject memorandum and the recommendations developed as a result of the investigation conducted.

1. Specific Shipment Questions

a. Conn Yankee to Battelle Shipment

(1)- Miscalculation of Heat Load

Response: The referenced investigation report (Enclosure 2) shows that Conn Yankee personnel initially calculated the heat load using a proposed 1971 ANSI Standard 5.1 technique. Calculations subsequent to the shipment, using the adopted 1979 ANSI Standard 5.1 technique, performed by NAC, Battelle and Conn Yankee personnel, indicated that the heat load of the failed fuel element was higher than initially calculated (2.97 to 3.51 KW vs. 2.09 KW). Conn Yankee was notified by Battelle on May 12, 1980 that the heat load of the shipment made on May 1, 1980 from Conn Yankee was in excess of the 2.5 KW authorized by the cask Certificate of Compliance.

The shipper's miscalculation of the heat load resulted in the shipment of a cask containing up to ~ 140% of the maximum heat load authorized in the Certificate of Compliance. Review of the circumstances of the shipment did not indicate that the heat generation rate was a physical problem. The greater than anticipated concentration of radioactive materials that caused the excessive heat generation rate resulted in a radiation shielding problem that was properly managed by the shipper.

(2)- Modification/Replacement of Drain Valves

Response: One drain valve was replaced with a pipe plug by NAC personnel at the Conn Yankee site prior to use of the cask by Conn Yankee. However, as written, the cask Certificate of Compliance would allow replacement of all drain and vent valves with pipe plugs. For additional information on this subject see paragraph 2(b).

(3)- Provisions for Loading/Containment of Failed Fuel

Response: The Cask Safety Analysis Report, dated September 29, 1972, in Section 2.2.3 states, in part, that "the NFS-4 cask will contain up to: 1) one intact or defective design basis PWR fuel

assembly; or 2) two design basis BWR fuel assemblies, one of which may be defective... Defective assemblies will be packaged in the fuel canisters." Section 2.1.9.1 indicates that the fuel canisters were provided with coolant flow holes (screens), that these flow holes permit natural convection coolant flow into and out of the fuel canister volume, and that spacers placed in the canisters will fill the gaps between smaller fuel assemblies and the canister walls. Cask cavity contamination was not addressed as a safety consideration.

Review of the circumstances of this shipment indicated that a fuel canister with spacers was used to contain the failed fuel assembly. However, the canister design was apparently not adequate to assure that fuel particulates from the defective fuel assembly would not be released from the fuel canister into the cask cavity. See paragraph 2(a) for additional information.

b. Unloading Conn Yankee Shipment at Battelle

(1)- Events Surrounding Activity Release Upon Unloading the Failed Fuel

Response: Details of the review of the events that occurred at Battelle have been reported in the referenced investigation report and in Region III Inspection Report No. 70-008/80-02 (Enclosure 5).

(2)- Adequacy of Battelle's Procedures Prior To Shipment of the Cask To Oyster Creek

Response: Battelle's procedures were reviewed by a Region III inspector and no violations of requirements were identified (Region III Inspection Report No. 70-008/80-02). There were no NAC or Battelle procedural requirements to remove the pipe plug from the drain line prior to flushing the cask before shipment to Oyster Creek. See paragraph 2(b) for additional information.

c. Oyster Creek

(1)- Why wasn't the problem with excess cask internal activity fully acknowledged between all parties (Battelle, Oyster Creek and NAC) before the cask was sent to San Onofre?

Response: We have no information to suggest that the problem was not fully acknowledged by the involved parties. Upon arrival of the cask at Oyster Creek, receiving surveys indicated external contamination levels in excess of the DOT 49 CFR 173.397(b) limit of 22,000 dpm/100cm², and radiation levels in excess of the DOT 49 CFR 173.393(j)(2) limit of 200 millirem/hr at one location under the trailer. As a result, Oyster Creek refused to accept the shipment.

NRC inspectors contacted the NAC and Battelle representatives who arrived at the Oyster Creek site to conduct the cask cleanup and made them aware of the observed problems identified above. The fact that there had been an apparent shift of radiation levels on the cask during transportation was also identified to the NAC and Battelle personnel. The reasons for the observed problems could not be determined without opening the cask, which Oyster Creek refused to allow. Oyster Creek provided limited assistance to NAC and Battelle personnel in the cleanup of the cask exterior and cask trailer so that NAC/Battelle could transport the cask from Oyster Creek in compliance with the NRC/DOT transportation regulations.

High radiation level under the trailer was identified by Region I to Region III. This item was identified as unresolved in the Region III Inspection Report No. 70-008/80-02 pending the completion of the referenced investigation. No additional information has been obtained as a result of our investigation.

The excessive cask contamination level was also identified by Region I to Region III. Surveys conducted by the Oyster Creek personnel and by the NRC indicated that there were no contamination or radiation level problems with the cask upon departure from Oyster Creek to San Onofre.

d. San Onofre

Contamination and radiation surveys were conducted by the San Onofre personnel upon arrival of the cask at the site. Contamination levels did not exceed the NRC/DOT limits. However, the radiation level in the tractor was 4.4 mrem/hr, which exceeded the DOT 49 CFR 173.393(j)(4) limit of 2.0 mrem/hr.

During the referenced investigation it was determined that the empty cask was shipped from Battelle to Oyster Creek on freight bill number 350318 (Investigation Report, Page 6 of Exhibit 8) and then shipped from Oyster Creek to San Onofre on freight bill number 350320 (Investigation Report, Exhibit 14) after receipt of the cask was refused by Oyster Creek. During the trip from the Oyster Creek site to San Onofre, the transporting vehicle made a stop at Battelle where the lifting yoke was removed from the trailer. In addition, the investigation revealed that there had been at least one change in tractor during the trip from Oyster Creek to San Onofre. The change in tractor and the removal of the lifting yoke from the trailer may have contributed to the excessive radiation level observed in the tractor upon arrival at the San Onofre site.

- (1)- Adequacy of health physics procedures for receipt and sampling of the cask.

Response: San Onofre's procedures and activities were reviewed by a Region V inspector and are described in Region V Inspection Report No. 50-206/80-26 (Enclosure 3). As a result of this inspection the licensee was cited with four items of noncompliance in connection with the handling of this cask and was assessed with a Civil Penalty in the cumulative amount of \$50,000 (Enclosure 4).

- (2)- What to do next with the cask?

On May 7, 1981, the NAC-IE cask was transported from San Onofre Unit 1 to a Department of Energy contractor (Energy Systems Group (ESG), a Division of Rockwell International, Santa Susana, CA) for decontamination. ESG was informed by Region V of the previous radiological problems associated with handling of this cask. The decontamination was to be carried out with the cost of materials and labor borne by NAC.

ESG called Region V on July 21, 1981 to advise that cask decontamination efforts have been terminated at NAC's request. NAC has spent about \$80,000 and feels they cannot justify additional expenditures. ESG estimates that 150 grams of fuel fragments still remain either in, or under, the fuel basket. The next step would have likely been to remove the fuel basket and clean the cask barrel. ESG is now holding the cask.

It is recommended that the cask owner be required to arrange for complete decontamination of the cask at an appropriate facility prior to releasing the cask for further use.

2. Cask Questions

- (a)- Is the Certificate of Compliance adequate with respect to failed fuel containment requirements?

Response: From review of the Certificate of Compliance, it is evident that the use of this cask for the transport of failed fuel is not adequately addressed. However, the use of the cask for the transport of failed fuel is described in the Cask Safety Analysis Report, dated September 29, 1972, as previously discussed in paragraph 1.a.(3).

Based on decontamination efforts by ESG, the use of the fuel canister with failed bundles is conducive to accumulation of failed fuel particulates in the four- to six-inch reservoir located in the bottom of the canister. Draining of the cask does not result in flushing of this area. When the cask is placed in a horizontal position for transport, residual fluid in the reservoir may drain into the cask cavity. Fuel and fission product fragments can then fall through the coolant flow holes

(screens) in the canister and accumulate in the cask cavity and/or in the vent and drain lines in close proximity to teflon valve internals, causing potential leakage pathways and radiological hazards in handling the cask.

In one instance, this residual fluid has been found to contain 14 uCi/ml of transuranic isotopes and 480 uCi/ml of gross gamma activity. Such residual activity could conceivably have been discharged into the unsuspecting licensee's spent fuel storage pool. This could create operational problems for cask users trying to dispose of spent fuel pool filters and cleanup demineralizers highly contaminated with transuranic isotopes.

It is recommended that the cask Certificate of Compliance be revised to specifically address requirements for the handling of failed elements; ie, canister design requirements, cask decontamination requirements, etc.

(b)- Was the drain valve modification authorized and appropriate?

Response: As previously discussed in paragraph 1.a, the Certificate of Compliance, as written, allows replacement of all drain and vent valves with pipe plugs. The initial problems identified at San Onofre were associated with the removal and draining of residual liquids from a drain line on the cask which had been previously capped with a pipe plug at Conn Yankee by NAC personnel. During the cask flushing operation at Battelle, this pipe plug was not removed to facilitate flushing of the cask following transport of the failed fuel assembly. It is recommended that the cask Certificate of Compliance be modified to delete authorization for the use of pipe plugs in Condition 9 or to add requirements for adequate procedures to assure complete cleaning/flushing of the cask cavity after the transport of failed assemblies.

(c)- Is the problem relevant to the earlier history of problems with this cask "family"?

Response: Based on a review of the earlier history of operating experience with this cask "family", internal cask contamination was not identified as a "problem". However, excessive contamination and "leaching" or "weeping" of contamination from the external surfaces of these casks has been a problem. The NRC July 22, 1981 "Order to Show Cause" (Enclosure 6) regarding surface contamination of the NAC-ID cask was specific to the NAC-ID cask and did not address similar contamination problems previously identified with the NFS-4A, 4B and NAC-1A, 1B, 1C, 1D and 1E casks. It is recognized that the NFS-4A, 4B and NAC-1A and 1C casks are out of service as a result of cask cavity dimensional variations as specified by the NRC "Order to Show Cause" dated April 6, 1979 (Enclosure 11). These dimensional variations are not associated with the internal or external cask contamination problems previously discussed. Prior history of external cask contamination problems indicate that these problems have been more prevalent with

the NAC-1 A-E casks than with the NFS-4 A&B casks. During discussions with Nuclear Fuel Services (NFS) personnel, it was determined that the surfaces of the NFS-4 A&B casks had been bead-blasted with fine mesh glass beads to increase the cask heat transfer surface, while the NAC 1A-E casks had been sand-blasted with fine mesh angular sand. The use of sand to increase the cask surface area would tend to create angular pores in the surface of the cask which would be more difficult to decontaminate than the smooth surface pores created by glass-bead blasting. It is recommended that the cask licensee be required to evaluate the various techniques for increasing surface area in order to identify the technique which combines the advantage of increasing the cask surface area but reduces the tendency to "weep" contamination after decontamination.

Because of the unnecessary risk of personnel exposure and dispersion of radioactive material which currently exists, it is recommended that all the Model NFS-4 casks be removed from service until a solution to the cask surface decontamination problem is found.

3. Generic Questions

(a)- The system of controls, responsibilities and management relationships between the utility and the contractor who provides leasing equipment and services involving spent fuel casks.

Response: Attached is a note from J. I. Riesland to W. Reinmuth (Enclosure 10), dated March 11, 1975, "Reactor Spent Fuel Shipping Casks - Action Plan," which defines the relationships between cask owners, manufacturers and licensees. This document fails to specifically address the "contractor" (owner) who provides leased equipment and services involving spent fuel casks, but who is not a licensee. It is evident that a cask owner who is not a licensee cannot today be held responsible by NRC for any actions relating to the use or maintenance of the cask. Based on the operating experiences with respect to the problems of surface contamination (NAC-1D and NAC-1E) and internal contamination (NAC-1E) of casks during the last year, it is recommended that: a) cask owners be made licensees (more accountable than at present), b) cask owners be required to provide facilities to perform the required maintenance, inspections, tests, decontamination, etc., rather than relying upon the "goodwill" of users to conduct these operations at user facilities, c) a cask owner inspection program be devised and instituted, and, d) the 1975 "Action Plan" referenced above be updated and implemented.

(b)- The adequacy of health physics procedures of licensees during unloading/loading of casks.

Response: No attempt was made to assess the adequacy of the health physics procedures of licensees during unloading/loading of casks other than the licensees who were involved with the referenced investigation. The results of the review of these procedures are incorporated into the applicable investigation/inspection reports. It is recommended that regional inspectors be required to review and assess the adequacy of these specific procedures during the next routine inspection of each licensee's transportation program.

On the basis of the information presented above, it is evident that there were many issues identified relative to the use of the Model NFS-4 spent fuel shipping casks. It is recommended that a program be established, possibly along the lines presented in Enclosure 10, to assure that the adequacy of the cask fabrication, use, control and inspection can be followed by the NRC and to assure that the issues identified previously have been addressed.

Enclosures:

1. Memo, Higginbotham to Smith et al., dated October 7, 1980
2. Combined Investigation Report Nos. 50-213/80-20 and 50-219/80-38 (Conn Yankee and Oyster Creek) with Exhibits
3. (Partial) Inspection Report No. 50-206/80-26 (San Onofre 1), dated November 25, 1980
4. Letter, Stello to Papay, Southern California Edison Company, dated January 23, 1981
5. Inspection Report No. 70008/80-02 (Battelle) with Letter of Transmittal, dated December 8, 1980
6. Letter, Davis to Those On the List, dated July 22, 1981, forwarding "Order Prohibiting Use of NFS-4 (NAC-ID) Cask."
7. Letter, Milford to Keppler, dated July 18, 1980 (Battelle Part 21 Report)
8. Table - Status: Spent Fuel Casks (as of June 22, 1981)
9. Memo, Book to Higginbotham, dated July 22, 1981
10. Note to W. Reinmuth from J. I. Riesland, dated March 11, 1975
11. Letter, Dircks to Those On the List, dated April 6, 1979, forwarding "Order to Show Cause (Immediately Effective)" concerning fabrication deficiencies of Model NFS-4 Casks
12. Letter, Dircks to Those On the List, dated December 12, 1979, forwarding "Order Amending Certificate and Terminating In Part Order to Show Cause"



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

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DEC 9 1981

MEMORANDUM FOR: Dudley Thompson, Director
Enforcement and Investigation Staff, IE

FROM: Robert T. Carlson, Director
Enforcement and Investigation Staff, RI

SUBJECT: ENFORCEMENT MATTERS FROM INVESTIGATION OF OPERATIONAL
DIFFICULTIES WITH THE NFS-4 (NAC-1E) CASK
(Ref. Memorandum, Martin to Thornburg, dated
December 3, 1981)

By copy of the referenced memorandum, the enclosures to which included a copy of the report of the subject investigation, you were advised that you would be informed of related enforcement matters pertaining to Connecticut Yankee and Battelle. Doing so seems appropriate in light of the multi-regional nature of the investigation.

Enclosure 1 is a copy of the Notice of Violation we propose to issue to Connecticut Yankee. Enclosure 2 is a draft writeup of citations that appear applicable to Battelle. By copy of this memorandum and the previously supplied referenced memorandum, Enclosure 2 is being referred to Region III for such action as may be deemed appropriate.

If I do not hear from you or the other recipients of this memorandum with regard to this matter, the report of the subject investigation will be issued to the Connecticut Yankee Atomic Power Company (together with Enclosure 1) and the Jersey Central Power & Light Company on the fourteenth day following the date of this memorandum.

Robert T. Carlson
Robert T. Carlson, Director
Enforcement and Investigation Staff

Enclosures: As Stated

cc w/encl:
H. D. Thornburg, IE
L. B. Higginbotham, IE
A. W. Grella, IE
D. Sly, IE
C. E. Alderson, RII
R. F. Warnick, RIII
A. D. Johnson, RV

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Enclosure 1

PROPOSED

APPENDIX A

NOTICE OF VIOLATION

Connecticut Yankee Atomic Power Company
Hartford, Connecticut

License No. DPR-61

As a result of an investigation conducted from October 6, 1980 to January 14, 1981 of the circumstances surrounding the transportation and use of the Model No. NFS-4, Serial No. NAC-1E cask shipped from your facility in Haddam, Connecticut on May 1, 1980, and in accordance with the "Criteria for Enforcement Action ---" we sent to you on December 3, 1979, the following item of noncompliance was identified:

10 CFR 71.12(b)(1)(ii) states, in part, that a general license is hereby issued to persons holding a general or specific license pursuant to this chapter, to deliver licensed material to a carrier for transport in a package for which a certificate of compliance has been issued by the Commission's Director of Nuclear Material Safety and Safeguards, provided that the person using the package complies with the terms and conditions of the certificate. Certificate of Compliance No. 6698, Revision 9, dated December 12, 1979, which is applicable to the Model No. NFS-4, Serial No. NAC-1E cask, states in Condition 5(b)(2) that the maximum quantity of material per package will not exceed a decay heat generation of 2.5 Kw.

Contrary to the above, on May 1, 1980, the Model No. NFS-4, Serial No. NAC-1E cask, loaded with failed fuel bundle H07, was delivered to a carrier for transport with a decay heat generation in excess of 2.5 Kw (2.97 to 3.51).

This item is an Infraction.

Pursuant to the provisions of 10 CFR 2.201, Connecticut Yankee Atomic Power Company is hereby required to submit to this office within thirty days of the date of this Notice, a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further items of noncompliance; and (3) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation. Where good cause is shown, consideration will be given to extending your response time.

Enclosure 2

Following is a draft writeup of citations that appear to be applicable to Battelle Columbus Laboratories as findings resulting from investigation of operational shipment difficulties with the Model No. NFS-4, Serial No. NAC-1E cask. The severity levels listed were taken from the Stello letter to all NRC licensees, "Criteria for Enforcement Action for Failure to Comply with 10 CFR 71," dated December 3, 1979.

10 CFR 71.5(a) requires that NRC licensees comply with the applicable packaging and transportation requirements of the Department of Transportation (DOT) in 49 CFR Parts 170-189.

1. 49 CFR 173.393(j) requires, in part, that packages for which the radiation dose rate exceeds the limits specified in paragraph (i) of this section, but does not exceed at any time during transportation any of the limits specified in paragraphs (j)(1) through (4) of this section may be transported in a transport vehicle which has been consigned as exclusive use (except aircraft). Paragraph (j)(2) specifies a limit of 200 millirem per hour at any point on the external surface of the car or vehicle (closed transport vehicle only). Paragraph (j)(4) specifies a limit of 2 millirem per hour in any normally occupied position in the car or vehicle.

Contrary to the above,

- (a) On July 22, 1980, the licensee delivered the Model No. NFS-4, Serial No. NAC-1E cask to a carrier for exclusive use transport in a closed transport vehicle and upon arrival at the Jersey Central Power and Light Company facility in Forked River, New Jersey, on July 23, 1980, the radiation dose rate on the external surface underneath the transport vehicle exceeded 200 millirem (240 millirem) per hour.

Severity Level II

- (b) On August 15, 1980, the licensee delivered the Model No. NFS-4, Serial No. NAC-1E cask to a carrier for exclusive use transshipment in a closed transport vehicle from the Jersey Central Power and Light Company facility in Forked River, New Jersey, and upon arrival at the Southern California Edison Company facility in Fort Pendleton, California on August 20, 1980 the radiation dose rate in the tractor (a normally occupied position in the vehicle) exceeded 2 millirem (4.4 millirem) per hour.

Severity Level I

2. 49 CFR 173.393(h) requires that there must be no significant removable radioactive surface contamination on the exterior of the package (see paragraph 173.397). Paragraphs 173.397(a) and (b) define removable (non-fixed) radioactive contamination as being significant if the level of contamination on packages consigned as exclusive use exceeds 22,000 dpm/100 cm².

Contrary to the above, on July 22, 1980, the licensee delivered the Model No. NFS-4, Serial No. NAC-1E cask to a carrier for exclusive use transport in a closed transport vehicle and upon arrival at the Jersey Central Power and Light Company facility located in Forked River, New Jersey on July 23, 1980, the level of contamination on the front of the cask collision shield was in excess of 22,000 dpm/100 cm² (23,000 dpm/100 cm²).

Severity Level II

(5)

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

Report No. 50-206/80-26

Docket No. 50-206 License No. DDP-13 Safeguards Group _____

Licensee: Southern California Edison Company

2244 Walnut Grove Avenue

Rosemead, California 91770

Facility Name: San Onofre Unit 1 (SONGS-1)

Inspection at: Camp Pendleton, California

Inspection conducted: September 22-26, October 14-17, 1980

Inspectors: M. Gillis, Radiation Specialist 11-25-80
Date Signed

G. P. Yupas, Radiation Specialist 11-25-80
Date Signed

Approved by: F. A. Wenslawski, Chief, Reactor Radiation Safety Section 11/25/80
Date Signed

Approved by: H. E. Book, Fuel Facility and Material Safety Branch 11/25/80
Date Signed

Summary:

Inspection on September 22-26, October 14-17, 1980 - Report No. 50-206/80-26

Areas Inspected: Special unannounced inspection by regional based inspectors to review implementation of the radiation protection program during the steam generator repair activity including: planning and preparation, qualification and training, exposure control, respiratory protection, posting and control of radiation and radioactive materials, and surveys. Use of the MFS-4 spent fuel shipping containers was reviewed from a radiation protection point of view. In addition, the licensee's evaluation of previously identified unresolved item regarding personnel exposures inside steam generator channel heads, and the licensee's response to Immediate Action letters dated September 5 and October 2, 1980 were reviewed. The inspection involved 100 inspector-hours on site by two regional based inspectors.

Results: Of the areas inspected, four items of noncompliance: 10 CFR 20.101, 10 CFR 20.201(b), 10 CFR 20.202, and Technical Specification 6.11 associated with personnel entries into the steam generator channel heads are described in Paragraph 2. Four items of noncompliance: 10 CFR 20.103(a)(3), 10 CFR 20.201(b) and Technical Specifications 3 and 6.11 associated with handling the MFS-4 shipping container are described in Paragraph 3. Two items of noncompliance: 10 CFR 20.103(c), and 10 CFR 20.203(f) not associated with a specific event are described in Paragraph 4.

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in spent fuel shipping container Model No. NFS-4, Serial No. ID to determine compliance with Condition 14 stated in USNRC Certificate of Compliance No. 6698 Revision 11. Condition 14 requires that the cask inner container dimensions be measured at intervals not to exceed seven months and that the measurements deviate by no more than ± 0.015 inch comparable to previously established points or the cask must be removed from service.

Based on a record review and from discussions with licensee representatives the inspector determined that the cask inner container was measured by the cask owner within the time period specified. The licensee, Southern California Edison Company (SCE) was informed by the cask owner, Nuclear Assurance Corporation (NAC) by letter dated August 22, 1980 that the cask was acceptable for use in accordance with the conditions of the Certificate of Compliance. On September 4, 1980 an irradiated nuclear reactor fuel element was shipped from San Onofre to General Electric Company's Morris, Illinois facility in the 1D cask. On September 5, 1980 NAC informed NRC that reevaluation of the 1D cask measurements indicated that they appeared to exceed the values specified in Condition 14. NAC notified General Electric by letter dated September 5, 1980 that the 1D cask was withdrawn from service and that a request for amendment of the Certificate of Compliance 6698 would be submitted. On arrival at the Morris facility there was no indication of release of radioactive materials from the cask.

No item of noncompliance was identified in review of this matter.

- b. On August 20, 1980 at 9:50 a.m. Tri-State Motor Transit Company delivered via exclusive use shipment an empty NAC-1E cask (Freight Bill Number 350320) from Oyster Creek Power Station. The cask, labeled with a Radioactive Yellow Label III, identified the Transport Index as 14. In an accompanying document from Battelle Columbus Laboratory the contents of the cask were described as solid metallic oxides containing less than 3.0 curies of ^{144}Ce , ^{106}Ru , ^{134}Cs and ^{137}Cs .

The cask was surveyed in accordance with Radiation Protection Procedure S-VII-1.13 at 11:00 a.m. on August 20, 1980. The survey determined that the dose rate measured in the tractor sleeper was 4.4 mrem/hr. Since this exceeded the 2.0 mrem/hr value specified in 49 CFR 173.393(j)(4) the licensee notified the carrier, shipper, Department of Transportation and NRC by 3:00 p.m. that afternoon. The maximum removable contamination measured exterior to the cask was 7,710 dpm/100 cm^2 beta gamma and 35 dpm/100 cm^2 alpha. These levels did not exceed the reporting limits specified in 10 CFR 20.205.

The licensee representative contacted the cask owner to discuss why the radiation levels exceeded the limits and to establish a course of action necessary to make the cask available for use. The licensee expressed concern that the cask contents may not be compatible with his systems and solicited assurance from the owner regarding this matter.

In a letter to the licensee dated August 28, 1980 the cask owner, Nuclear Assurance Corporation (NAC) outlined a proposed plan to accomplish decontamination of the NAC 1E cask. The intent of the plan was to identify the source of radiation and isotopic content of material in the cask cavity.

On September 4, 1980 NAC representatives arrived at San Onofre and met with licensee representatives to discuss their plan of action. They intended to move the cask to the decon area of the Fuel Handling building, survey the upper impact limiter, lid closure bolts, remove valve port covers, remove lower drain valve assembly and take a sample of crud at the base of the cask cavity for isotopic and transuranic analysis.

The Chemistry/Radiation Protection Foreman assigned to radwaste, stated to the inspector that the likelihood of fuel fragments being present and potential radiological hazard was discussed at this meeting.

On September 5, 1980 Radiation Exposure Permit (REP) No. 28855 was initiated for "Cask 1E inspection/pull bolts". This REP listed the general area radiation level as 2 mrem/hr, hot spot radiation level of 40 r/hr on cask, general contamination of 220 to 2200 dpm/100 cm² with maximum contamination levels greater than 2200 dpm/100 cm² and airborne activity less than 0.01 the maximum permissible concentration. The REP required coveralls over street clothes, gloves, plastic booties and rubber shoe covers, three pocket dosimeters and a finger dosimeter. In addition the following direction was provided, "Contact H.P. tech to cover work and monitor radiation levels when pulling bolts."

A contractor health physics technician assigned to the containment was called by another technician and told to provide radiation monitoring for individuals working under REP 28855. The Chemistry/Radiation Foreman stated that he was not aware of this technician's qualifications and said he was selected merely because he was assigned in the area.

The inspectors interviewed this technician, reviewed his resume and concluded that he did not meet the requirements stated in Technical Specification 6.3, "Qualifications" in that he did not have two years of experience in power reactor health physics as is required in ANSI 18.1, 1971 for technicians in responsible positions. He

was not familiar with the operating characteristics of the survey instrument (Xetex Fission Pole) and had not been trained in use of that instrument. He had no familiarity with irradiated fuel shipping casks. He received no briefing or instruction with regard to the potential hazard associated with the NAC 1E cask or what procedure or actions were going to be performed.

The technician was responsible for performing radiation surveys and taking action to control the hazard identified. He was not continuously supervised.

Failure to provide a qualified technician in a responsible position represents noncompliance with Technical Specification 6.3 (50-206/80-26-06).

The NAC representatives suspected that a hot particle may have been lodged in the lid bolt holes. Each lid bolt was removed using an impact wrench and a radiation survey performed. No engineering controls were implemented to prevent the potential spread of contamination, no respiratory protection was worn and no air samples were taken in the area. The health physics technician surveyed each bolt hole with the Xetec and reported two holes read 11 r/hr and 22 r/hr respectively. The bolts read between 50 to 150 mr/hr at contact. Smears taken in the holes read less than 10 mr/hr.

The individuals concluded that a hot particle trapped in the bolt hole was not the cause of the high dose rate in front of the cask but rather something contained within the cask. The high dose rates in two bolt holes were explained in terms of radiation streaming from the cask vent line penetration.

Next, the drain valve port covers were removed. The port containing a drain valve was found not to be highly radioactive. The other port in which the drain valve had been replaced with a pipe plug was surveyed and found to read 2 r/hr at the cask edge and 30-40 r/hr in the 4" diameter by 12" deep port. A plastic bag was taped under the port to contain any debris. A socket wrench with extended drive was procured to remove the pipe plug. The plan was to remove the plug, then using a paper smear on the end of a brush, collect a sample of crud from within the dry drain line.

When the pipe plug was loosened tainted water began to flow from the port. The plug was immediately tightened and the flow of water stopped. About 200-300 ml of water and crud were caught in the plastic bag. A survey of the bag indicated 50 to 100 r/hr at contact. The NAC representatives then reached inside the drain port and wiped up about one third of the standing residue with a piece of absorbent paper. The absorbent paper was placed in a polyethylene bag and surveyed. The bag read about 300 r/hr on contact. The individual's glove read 4-6 r/hr and was removed and placed in the bag. The bag was removed, carried by the health physics technician and placed behind the spent fuel pool filter shield.

At that point it was decided to collect a sample of liquid from the bag taped under the port. The Chemistry/Radiation Protection Foreman provided a 10 ml sample vial. The NAC representative using a pair of pliers and wearing additional protective clothing including eye protection dipped the vial into the liquid and collected about 8 ml of the tainted liquid.

The liquid sample read 4 r/hr at contact using the Xetec. The individuals then left the area for lunch.

During this evolution no air samples were taken to evaluate the potential airborne radioactivity. No surveys other than the Xetec readings were made. The Xetec does not measure beta dose or alpha contamination present.

On leaving the Fuel Handling building both individuals were found to be highly contaminated in their protective clothing. No survey results were available except that they recalled the personnel survey instrument read full scale. After their anti contamination clothing was removed they were found to be contaminated on their face, head, back and legs. Nasal smears from one individual indicated that he had inhaled radioactive materials. They showered three times and one individual received a whole body count before going to lunch. The whole body count data was not evaluated in terms of the major gamma emitting isotope present. The individuals turned in their finger rings and went to lunch.

Radiation Protection Procedure S-VII-1.8, Revision 2, dated January 10, 1979, "Decontamination Procedure-Personnel" states in section E.1 that: "A record of any skin contamination shall be made in the personnel decontamination log book. The entry shall include name, date, time, work location, cpm of contaminated area before and after decontamination, and notice if person was given a whole body scan."

Review of the personnel decontamination log entries for September 5, 1980 indicates that one individual was contaminated on the "left knee 10K, back of neck 2K, right side of face at eye 30K". The other individual was recorded as, "small of back 2000 cpm".

The log book entry did not include nasal smear results, whether the contamination was checked for alpha activity, the time, work location, results of survey after decontamination, and notice if the persons were given a whole body scan.

The Chemistry Radiation Protection Foreman recalled telling the individuals not to start work on the NAC 1E cask after lunch until checking with him. The Chemistry Radiation Protection Foreman did not terminate or amend the REP.

After lunch the NAC representatives did not contact the Chemistry Radiation Protection Foreman. They donned additional protective clothing including two sets of coveralls, 4 or 5 pairs of gloves and half face respirators and returned to the Fuel Handling Building to decontaminate the cask and pick up the waste.

They contacted another contractor supplied health physics technician assigned to the containment and informed him they needed his coverage while they cleaned up the cask. This technician did not check their REP. He was not briefed on the hazards associated with the job. He also used a Xetec instrument and was not familiar with its limitations. He recalls a dose rate of about 44 r/hr as measured with the Xetec inside the port. Based on this information and knowing the individual was wearing a hand dosimeter he permitted the NAC representative to wipe out the port with his hand using wet swabs. He did not measure the beta dose rate or the alpha contamination present.

The NAC representative wet swabs with alcohol and proceeded to wipe out the remaining liquid and residue from the port. The health physics technician recalls these swabs read 1-3 r/hr. The port access covers were replaced and the bags of waste including the one containing liquid was placed behind the spent fuel pool filter shield.

During the decontamination no air samples were taken.

The Chemistry/Radiation Protection Foreman arranged for a shielded container for the sample vial and a shielded drum for the waste to be delivered to the Turbine Deck outside the Fuel Handling Building. During the wait period the NAC representatives removed their respirators. On arrival of the sample shield, the vial was transferred into it and removed from the area. When the shielded waste drum was placed on the Turbine Deck each bag of waste from behind the spent fuel pool filter shield was surveyed. The bag containing the 300 r/hr smear had decreased to 50 r/hr. The bag with water decreased to 30 r/hr. The NAC representatives concluded these decreases in dose rate were the result of ⁸⁵Kr offgassing.

A NAC representative hand carried the bags of waste to the shielded container. Because the bags would not fit into the shield cavity he stated that he held his breath, turned his head, pushed the bags into the cavity while puncturing them with a screwdriver. Both the health physics technician and the Chemistry/Radiation Protection Foreman were in the immediate vicinity at this time, however neither observed this act.

The NAC representatives then left the area. Both found that they were again contaminated. The contamination was located on their face, head and shoulders. They recalled levels of about 9000 cpm on their face. One individual recalled contamination on nasal smears. They again decontaminated themselves but were not told to get a whole body count or submit a bioassay sample. They turned in their finger ring dosimeters and left the facility.

Review of the personnel decontamination log indicates no entry was made for the personnel contamination received by these individual on the afternoon of September 5, 1980.

Failure to adhere to Radiation Protection Procedure S-VII-1.8 with respect to personnel contamination entries represents noncompliance with Technical Specification Section 6.11, Radiation Protection Program (50-206/80-26-07).

One milliliter of the collected liquid sample was diluted and analyzed by the licensee at 2:30 p.m. on September 6, 1980. The sample activity is noted below.

Spent Fuel Cask Drain Sample

<u>Isotope</u>	<u>Activity</u>	
144 Ce	6.77 E-1 mCi/ml	+ 0.77%
133 Xe	3.47 E-2 mCi/ml	+ 5.77%
109 Cd	2.65 E-3 mCi/ml	+ 21.2%
57 Co	9.35 E-3 mCi/ml	+ 5.28%
134 Cs	2.72 E-1 mCi/ml	+ 0.7%
85 Sr	8.52 E-2 mCi/ml	+ 1.16%
85 Kr	1.89 E+1 mCi/ml	+ 1.16%
137 Cs	3.15 E-1 mCi/ml	+ 0.57%
95 Zr	8.10 E-3 mCi/ml	+ 13.43%
95 Nb	1.63 E-2 mCi/ml	+ 4.11%
TOTAL	20.32 mCi/ml	

The remaining portion of the sample was sent to General Atomic's facility several days later. The results of their analysis is summarized below.

Gross gamma activity	480 uCi/ml
Gross alpha activity	14 uCi/ml
90 Sr	90 uCi/ml
242 Cm	7.0 uCi/ml
244 Cm	4.0 uCi/ml
238 Pu 241 Am	2.4 uCi/ml
239 Pu	0.5 uCi/ml

At the conclusion of NAC's activities on September 5, 1980 a survey of the cask and decon pad area was made and documented. The survey was made by taking a two square foot smear with a "maslin" cloth. The results are noted below.

NAC 1E Cask and Areas Smears

<u>Location</u>	<u>Beta Gamma</u>
1. Upper ledge above drain port	400,000 dpm
2. Hand hole cover	100,000 dpm
3. Deck around cask	2 mr/15 mrad/hr
4. Cask pad	20 mr/170 mrad/hr
5. Exit from fuel pool area	4 mr/35 mrad/hr
6. Off cask pad heading toward door	3,000 dpm
7. Part way from cask pad to door	100,000 dpm
8. Deck in front of step-off-pad	250,000 dpm
9. Step-off-pad	1,000 dpm

The health physics technicians permitted the NAC representatives to directly handle this highly radioactive material based only on the gamma radiation measurements made with the Xetec instrument. They assumed since the individuals hand would be in contact for a short period of time only a small extremity dose would result and would be measured by the finger dosimeters.

The finger dosimeter worn consisted of a lithium fluoride chip attached to a finger ring. The ring was worn such that the chip faced the palm of the workers right hand.

The dose measured by these thermoluminescent dosimeters was reported to the individuals in letter dated September 11, 1980.

The licensee's evaluation dated September 9, 1980 summarized the finger ring results as noted below:

	Individual A	Individual B
First entry	3930 mrem	590 mrem
Second entry	none	12600 mrem
Total Extremity Exposure	3930 mrem	13190 mrem

The evaluation concluded that the 18.75 rem hand dose limit of 10 CFR 20.101 had not been exceeded.

Lithium fluoride TLD-100 chips used by these workers are not calibrated to measure beta dose. The inspector notes the major isotopes known to be present ^{85}Kr , ^{144}Ce , ^{137}Cs , ^{134}Cs , ^{90}Sr and ^{90}Y all emit beta radiation. A representative of the licensee's dosimetry vendor informed the inspector that the TLD 100 finger rings would be expected to significantly under respond to the beta dose present from a mixture of these isotopes.

Using the recorded gamma dose rate of 44 r/hr and Individual B's estimated contact time of 3 minutes one could estimate a gamma dose of 2.2 rem to the hand. This then would require an evaluation of the remaining 10.4 rem. If this 10.4 rem measured by the TLD-100 was due to beta radiation then a survey or evaluation of this dose must be made to establish how much the actual hand dose was underestimated.

Failure to perform a survey or evaluation of the radiation hazard incident to handling this highly radioactive material as necessary to comply with the extremity radiation dose limits specified in 10 CFR 20.101 represents noncompliance with 10 CFR 20.201(b) "Surveys" (50-206/80-26-08).

The hazardous nature of the radioactive material suspected of being present in the NAC-1E cask was discussed with licensee management including representatives of the Chemistry and Radiation Protection Department in advance of the job and yet no engineering controls were implemented or approved respiratory protective devices used to limit the intake of radioactive materials when action was performed

resulting in the dispersal of these materials. In addition no measurements of the concentration of radioactive material in the air in the vicinity of the workers was made. Further, appropriate measurements of radioactivity in the body and measurements of radioactivity excreted from the body as necessary for timely detection and assessment of the individuals intake were not made as of the inspector's visit. Failure to make such measurements represents noncompliance with 10 CFR 20.103(a)(3) (50-206/80-26-09).

On October 2, 1980 NRC Region V issued an Immediate Action letter confirming actions the licensee agreed to take to minimize further exposure associated with this cask and to promptly evaluate the uptake of radioactivity by individuals involved.

4. Radiation Protection During Steam Generator Repair

a. Planning and Preparation

NRC Inspection Report 50-206/80-23 documented the state of radiation protection planning as of August 22, 1980. A management meeting was held at the NRC Region V office on September 5, 1980 to discuss additional measures considered necessary to ensure adequate radiological preparations for the steam generator repair activity. These measures were documented in an Immediate Action Letter dated September 5, 1980.

The inspectors interviewed individuals, reviewed records, and conducted several tours of the restricted area to establish the licensee's response to each item of the letter.

1. Senior corporate level management attention to the San Onofre radiation protection program is readily apparent. Evidence of corporate support is noted below.

- Meetings between the Vice President, Nuclear Engineering and Operations and the Managers of Nuclear Operations, Nuclear Engineering and Safety, and Quality Assurance have been held to discuss the radiation protection program. In addition, internal memoranda indicates the Corporate Officers and the Board of Directors have been informed of the conclusions of these meetings.
- Effective September 1, 1980 the licensee reorganized the Nuclear Engineering and Operations Department creating the position of Supervisor Health Physics and Emergency Planning reporting to the Manager, Nuclear Engineering and Safety. Recognizing the need to fill this position expeditiously the licensee contracted with Proto-Power Management Corporation to supply qualified individuals until a permanent selection can be made. The inspector

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Docket No. 50-206
EA 81-10Southern California Edison Company
P. O. Box 800
2244 Walnut Grove Avenue
Rosemead, California 91770Attention: Dr. L. T. Papay, Vice President
Advanced Engineering

Gentlemen:

The apparent items of noncompliance listed in Appendix A to this letter were identified during our September 22-26 and October 14-17, 1980 inspection of the Radiation Protection Program at San Onofre Nuclear Generating Station Unit 1. These apparent items of noncompliance are the latest in a continuing series of problems and inadequacies associated with your radiation protection program in the last nine months. Since April 1980 you have been cited for repeated failure to follow radiation protection procedures, failure to perform surveys, failure to limit a worker's exposure to 3 rem in a calendar quarter, failure to post radiation areas, and failure to label containers of radioactive materials.

On September 5, 1980, the Director of our Region V office met with your management to discuss our concerns about the radiation protection program at San Onofre Unit 1. At the time of that meeting your staff was evaluating an apparent series of radiation exposures associated with steam generator repair, the potential for which had been previously pointed out to your management by one of our inspectors. During that meeting you were informed that the over-exposures would likely result in a civil penalty.

Shortly after the September 5, 1980 meeting, we became aware of an additional occurrence that had substantial potential for personnel exposure in excess of regulatory limits. This occurrence involved work on a spent fuel shipping cask. Your evaluation of that situation concluded that although a high hand exposure had occurred, there were otherwise no particular problems. Our inspector's evaluation of that occurrence concluded that significant radiation protection inadequacies did in fact exist.

The nature of the apparent violations set forth in Appendix A to this letter and other related inspection findings involving radiation protection brought to your attention by letters dated May 23, 1980, May 28, 1980, June 11, 1980, August 15, 1980, August 20, 1980, September 3, 1980 and September 30, 1980 indicate the need for your organization to improve the radiation protection program, especially during major plant outage conditions. With specific regard to the violations identified in Appendix A to this letter, the events of the

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radiation overexposures and the work on the shipping cask indicate a need to substantially improve your ability to fully evaluate radiological hazards and to implement appropriate precautions. As you are aware, our review of your preparations for steam generator decontamination and tube sleeving raised similar concerns and the steam generator repair preparations were specifically discussed with you by our Region V office during the September 5, 1980 management meeting.

In addition, we are concerned about your ability to insure employees' adherence to approved radiation protection procedures. Our letters to you dated May 23, 1980, June 11, 1980, August 20, 1980 and September 3, 1980 each identified instances of failure to follow procedures. Appendix A to this letter again identifies such instances. It is apparent that corrective actions taken to date have not been effective.

Your letter dated September 30, 1980 to our Region V office delineated specific actions being taken by you to improve the Radiation Protection Program at San Onofre. We believe that the actions outlined in your letter represent a positive step toward long range improvement in your program. We remain concerned, however, with the apparent lack of depth or understanding demonstrated in the evaluation of radiological hazards associated with various maintenance activities and with employees' apparent disregard for established and approved procedures. It is the NRC's expectation that all licensees will pay meticulous attention to detail and strive to achieve a high standard of compliance. Your performance concerning the radiation overexposures that occurred inside the steam generators, the inadequate evaluations of hazards and the lack of adequate radiological surveys associated with work on the spent fuel shipping cask do not meet NRC requirements for radiological safety.

In view of the serious nature of the violations for which civil penalties are proposed and in view of the enforcement history related to your radiation protection program over the course of the last nine months, the new interim enforcement criteria (45 F.R. 66754, October 7, 1980), are being applied for these violations.

We consider the first event involving the overexposure of employees to be particularly egregious because: (1) a large number of employees were involved; (2) the situation existed for a long period of time and might have continued for a considerably longer period of time if it had not been discovered by an NRC inspector; (3) the event was readily preventable; (4) the enforcement history referred to above with regard to health physics violations; and (5) you have calculated that 42 individuals received total occupational doses to the whole body in excess of 3 rem in the second calendar quarter. In view of these problems, and to emphasize the importance of improving the performance of your radiation protection program and complying with NRC requirements, we are proposing a civil penalty of \$100,000 for the event involving the overexposures.

In view of this enforcement action for the 24 overexposures during the third quarter, enforcement action is not being taken for the 42 overexposures in the second quarter.

With regard to the second event involving the handling of the spent fuel cask, given the above-mentioned history, you should have been alerted that improvements were necessary in your radiation monitoring program at a much earlier date. Therefore, the civil penalty for this event has been increased by 25% pursuant to the interim enforcement criteria.

This results in the proposed imposition of civil penalties in the cumulative amount of one hundred fifty thousand dollars (\$150,000) for the items of noncompliance identified in Appendix A. Appendix B to this letter is the Notice of Proposed Imposition of Civil Penalties.

You are required to respond to this letter, and in preparing your response you should follow the instructions in Appendices A and B. In addition to your specific replies to the items identified in Appendix A you should also include a description of what measures you will take to assure that: (1) personnel assigned to evaluate radiological hazards are knowledgeable and capable, (2) hazards are fully evaluated and the appropriate precautions are taken, (3) an appropriate level of management oversight is being exercised to assure a meticulous attention to detail in the performance of (1) and (2) above, and (4) all personnel are aware of and will adhere to radiation protection procedures.

Your written reply to this letter and Notice of Violation and findings of our continuing inspections of your licensed activities will be considered in determining whether further enforcement actions such as additional civil penalties or orders to suspend, modify or revoke the license may be required to assure future compliance.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and its enclosures will be placed in the Nuclear Regulatory Commission's Public Document Room.

Sincerely,

Original signed by
Victor Stello

Victor Stello, Jr., Director
Office of Inspection and Enforcement

Enclosures:

1. Appendix A, Notice of Violation
2. Appendix B, Notice of Proposed Imposition of Civil Penalties

cc w/enclosures:

J. M. Curran

Distribution:

PDR
 LPDR
 NSIC
 TIC
 ACRS
 SECY
 V.Stello, IE
 R.C.DeYoung, IE
 J.Sniezek, IE
 CA
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 D.Crutchfield, NRR:ORS
 S.Nowicki, NRR:ORS
 F.Ingram, PA
 J.P.Murray, ELD
 J.Lieberman, ELD
 J.Crooks, MPA
 J.Cummings, OIA
 Enforcement Coordinators RI, RII, RIII, RIV, RV
 TWBrockett, IE
 IE Files
 Central Files
 Civil Penalty Book
 CON
 EI Reading File
 EDO Reading File

Department of Justice
 ATTN: Hon. George Deukmejian
 Attorney General
 800 Tishman Bldg
 3580 Wilshire Blvd
 Los Angeles, CA 90010

State Department of Health Services
 ATTN: Mr. Joseph O. Ward, Chief
 Radiologic Health Section
 714 P Street
 Sacramento, CA 95814

Public Utilities Commission
 ATTN: Mr. Robert Batinovich
 President
 350 McAllister St.
 San Francisco, CA 94012

Handwritten notes:
 To: [unclear]
 Subject: [unclear]
 [unclear] by [unclear]
 [unclear] [unclear]
 [unclear] [unclear]

WPU:JD	EI: <i>TE</i>	D: EI: IE	ELD: <i>SS</i>	DD: IE	D: IE
1/9/81	Gearber	DThompson	<i>SS</i>	RCDéYoung	VStello
THOM4(L)	1/15/81	1/17/81	1/15/81	1/15/81	1/ /81

APPENDIX ~~11~~
NOTICE OF VIOLATION

Southern California Edison Company
San Onofre Unit 1

Docket No. 50-206
License No. DPR-13
EA 81-10

As a result of the inspection conducted on September 22 thru 26 and October 14 thru 17, 1980 and in accordance with the Interim Enforcement Policy, 45 FR 66754 (October 7, 1980), the following violations and associated problem areas were identified.

I. Civil Penalty Violations.

A. A number of violations associated with individuals entering the steam generator channel heads have occurred. The Severity Level assigned to the violations associated with this problem area is Severity Level III. Because of the particularly egregious nature of these violations, a cumulative civil penalty of \$100,000 is proposed. The civil penalties have been assessed to the separate violations as indicated below:

1. 10 CFR 20.101 (b), (1) "Radiation dose standards for individuals in restricted area," states in part that, "During any calendar quarter the total occupational dose to the whole body shall not exceed 3 rems."

Contrary to the above, during the third calendar quarter of 1980 twenty-four individuals received total occupational doses to the whole body in excess of 3 rem.

This is a severity level III violation (Supplement IV)
(Civil Penalty \$75,000).

2. 10 CFR 20.201(b) "Surveys", requires licensees to make surveys as may be necessary to comply with the regulations in 10 CFR 20. Surveys are defined in 20.201(a) as "an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present." 10 CFR 20.202 "Personnel Monitoring", requires that "Each licensee shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

"(1) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in paragraph (a) of 20.101."

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Contrary to the above, during the third calendar quarter of 1980 surveys or evaluations of the radiation hazard inside the steam generator channel heads were not made as necessary to assure compliance with the whole body dose limits specified in 10 CFR 20.101(b) in that individuals received doses in excess of 3 rem and 10 CFR 20.202 in that appropriate personnel monitoring equipment was not provided to measure the dose to the heads and lens of eyes of individuals permitted to work inside the channel head.

This is a severity level III violation (Supplement IV) (Civil Penalty \$25,000).

- B. A number of violations associated with the September 5, 1980 operations involving the NFS-4, NAC 1E spent fuel shipping cask have occurred. The Severity Level associated with these violations is a Severity Level III. Civil penalties for these violations have been increased by 25% over Table 1 of the Interim Enforcement Policy because you could reasonably have been expected to have taken effective measures to prevent these occurrences. Therefore a cumulative Civil Penalty of \$50,000 is proposed for this problem area. The civil penalties have been assessed to the separate violations as indicated below:

1. 10 CFR 20.201(b) "Surveys", requires licensees to make surveys as may be necessary to comply with the regulations in 10 CFR 20. Surveys are defined in 20.201(a) as "an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present."

Contrary to the above, on September 5, 1980 two individuals working under Radiation Exposure Permit No. 28855 were permitted to handle highly radioactive material associated with a spent nuclear fuel shipping cask and a survey of the radiation hazard to the workers' hands was not made as necessary to assure compliance with the hand dose limit specified in 10 CFR 20.101 in that the beta dose rate was not measured and a survey or evaluation to correct the dose measured by the thermoluminescent finger dosimeter was not made.

This is a Severity Level III violation (Supplement IV) (Civil Penalty \$18,750).

2. 10 CFR 20.103(a)(3) "Exposure of individuals to concentrations of radioactive material in air in restricted areas", states in part: "For purposes of determining compliance with the requirements of this section the licensee shall use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas and in addition, as appropriate, shall use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals."

Contrary to the above, on September 5, 1980 two individuals were permitted to handle highly radioactive materials in the restricted area under Radiation Exposure Permit No. 28855, in a manner that dispersed the materials resulting in facial contamination; no measurement of the concentration of radioactive materials in air in the individuals breathing zone were made; and appropriate measurements of radioactivity in the body and measurements of radioactivity excreted from the body as necessary for timely detection and assessment of the individuals intake were not made.

This is a Severity Level III violation (Supplement IV)
(Civil Penalty \$18,750).

3. Technical Specification 6.3, "Facility Staff Qualifications" requires that each member of the facility staff meet or exceed the minimum qualifications of ANSI N18.1-1971, "Selection and Training of Personnel for Nuclear Power Plants", for comparable positions. Chemistry and Radiation Protection Technicians are shown as members of the facility staff in Figure 6.2.2.2 of Technical Specification 6.2. ANSI N18.1-1971 requires in Section 4 that, "Nuclear power plant personnel shall have that combination of education, experience, health, and skills commensurate with their level of responsibility which provides reasonable assurance that decisions and actions during all normal and abnormal conditions will be such that the plant is operated in a safe and efficient manner", and that Technicians in responsible positions must have at least two years of working experience in their specialty.

Contrary to the above, on the morning of September 5, 1981, the Radiation Protection Technician who provided direct radiation safety monitoring and control for operations involving the NFS-4, NAC 1E spent fuel shipping cask as required by REP No. 28855 did not have two years of working experience in radiation protection. An interview conducted by an NRC Inspector confirmed that he was not familiar with the shipping cask, was not aware

of the potential radiation hazard, and did not understand the limitations of the survey instrument he used.

This is a Severity Level III violation (Supplement IV) (Civil Penalty \$6,250).

4. Technical Specification Section 6.11 requires that written procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure. San Onofre Nuclear Generating Station Radiation Protection Procedure SVIII.8, Revision 2, dated January 10, 1979, "Decontamination Procedure Personnel" states in section E.1 that: "A record of any skin contamination shall be made in the personnel decontamination log book. The entry shall include name, date, time, work location, cpm of contaminated area before and after decontamination, and notice if person was given a whole body scan."

Contrary to the above, on September 5, 1980 two individuals working under Radiation Exposure Permit No. 28355 received skin contamination on two occasions while working with highly radioactive material and the log book record for the first occasion did not include the time, work location, cpm after decontamination and notice whether the person was given a whole body scan. In addition, no log book entry was made regarding the second occurrence of skin contamination for these individuals on the afternoon of September 5, 1980.

This is a Severity Level III violation (Supplement IV) (Civil Penalty \$6,250).

II. Violations Not Assessed Civil Penalties.

- A. 10 CFR 20.103(c) "Exposure of individuals to concentrations of radioactive materials in air in restricted areas" requires in part that: "When respiratory protective equipment is used to limit the inhalation of airborne radioactive material pursuant to paragraph (b)(2) of this section, the licensee may make allowance for such use in estimating exposure of individuals to such materials provided that such equipment is used as stipulated in Regulatory Guide 8.15, 'Acceptable Programs for Respiratory Protection'. Section C.8.1 of Regulatory Guide 8.15 states in part: "respirable air of approved quality and quantity is to be provided...NUREG-0041 Section 9.8" NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials", specifies in Section 9.8 that: "All fittings and components shall be standardized so that the introduction of gases other than pure breathing air or pure breathing oxygen into a respirator system is impossible."

Contrary to the above, on September 25, 1980 the type of fittings used on distribution hoses to connect the breathing air portion of the service air system located in the containment and mockup buildings to breathing air distribution boxes were also used throughout the facility on nonrespirable air and other fluid systems making it possible to introduce gases other than pure breathing air into the respirator system.

This is a Severity Level IV violation, (Supplement IV)
(No Civil Penalty).

- B. 10 CFR 20.203(f) "Caution signs, labels, signals and controls," states: "Except as provided in subparagraph (3) of this paragraph, each container of licensed material shall bear a durable, clearly visible label identifying the radioactive contents."

Contrary to the above, on September 22, 1980 the inspector observed an unlabeled, closed 55 gallon drum containing licensed quantities of radioactive material in the "Clean Area" near the spare transformer and none of the exceptions provided in subparagraph (3) applied.

This is a Severity Level V violation, (Supplement IV)
(No Civil Penalty).

- C. Technical Specification Section 6.11 requires that written procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure. San Onofre Nuclear Generating Station Radiation Protection Procedure SVIII.4, Revision 5, dated April 27, 1979, "Entering and Leaving Steam Generators" states in D.5 that: "The Chemical Radiation Technician shall record the entry time starting when the worker's head enters the manway. The technician shall notify the worker when he must be out. The technician shall record the time and dosimeter data on Form PSSO 245, High Radiation Exposure Dosimeter Log."

Contrary to the above, of ten PSSO 245 forms selected at random for steam generator channel head entries made in the period June 14 thru June 29, 1980 no record of entry time was made on any of the forms. In addition in at least three instances individuals are known to have made steam generator entries and no PSSO 245 forms were maintained.

This is a Severity Level VI violation (Supplement IV)
(No Civil Penalty).

Pursuant to the provisions of 10 CFR 2.201, Southern California Edison Company is hereby required to submit to this office within twenty-five days of the date of this Notice, a written statement or explanation in reply, including: (1) admission or denial of the alleged item(s) of noncompliance; (2) the reasons for the item(s) of noncompliance if admitted; (3) the corrective steps which have been taken and the results achieved; (4) corrective steps which will be taken to avoid further items of noncompliance; and (5) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation.

Original signed by
Victor Stello

Victor Stello, Jr., Director
Office of Inspection and Enforcement

Dated at Bethesda, Maryland
this 23rd day of January, 1981.

APPENDIX B

NOTICE OF PROPOSED IMPOSITION OF CIVIL PENALTIES

Southern California Edison Company
San Onofre Unit 1

Docket No. 50-206
License No. DPR-13

This office proposes to impose civil penalties pursuant to Section 234 of the Atomic Energy Act of 1954, as amended, (42 USC 2282), and to 10 CFR 2.205 in the cumulative amount of One Hundred Fifty Thousand Dollars (\$150,000.00) for the specific items of noncompliance set forth in Appendix A to the cover letter. In proposing to impose civil penalties pursuant to this section of the Act and in fixing the proposed amount of the penalties, the factors identified in the Statements of Consideration published in the Federal Register with the rule making action which adopted 10 CFR 2.205 (36 CFR 16894) August 26, 1971, and the "Interim Enforcement Policy" published in the Federal Register on October 7, 1980 (45 FR 66754) have been taken into account.

Southern California Edison Company may, within twenty-five days of the date of this notice, pay the total civil penalties in the amount of One Hundred Fifty Thousand Dollars (\$150,000.00) or may protest the imposition of the civil penalties in whole or in part by a written answer. Should Southern California Edison Company fail to answer within the time specified, this office will issue an order imposing the civil penalties in the amount proposed above. Should Southern California Edison Company elect to file an answer protesting the civil penalties, such answer may (a) deny the items of noncompliance listed in the Notice of Violation in whole or in part, (b) demonstrate extenuating circumstances, (c) show error in the Notice of Violation, or (d) show other reasons why the penalties should not be imposed. In addition to protesting the civil penalties in whole or in part, such answer may request remission or mitigation of the penalties. Any written answer in accordance with 10 CFR 2.205 should be set forth separately from the statement or explanation in reply pursuant to 10 CFR 2.201, but may incorporate by specific reference (e.g., giving page and paragraph numbers) to avoid repetition.

Southern California Edison Company's attention is directed to the other provisions of 10 CFR 2.205 regarding, in particular, failure to answer and ensuing orders; answer, consideration by this office, and ensuing orders; requests for hearings, hearings and ensuing orders; compromise, and collection.

Upon failure to pay any civil penalty due which has been subsequently determined in accordance with the applicable provisions of 10 CFR 2.205, the matter may be referred to the Attorney General, and the penalty, unless compromised, remitted, or mitigated, may be collected by civil action pursuant to Section 234c of the Atomic Energy Act of 1954, as amended, (42 USC 2282).

~~81020-0619~~
PDR



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

DEC 8 1980

ENCLOSURE 5

⑦

Docket No. 70-008
Docket No. 30-5728
Docket No. 50-006

Battelle Columbus Laboratories
ATTN: Dr. E. W. Ungar, Director
505 King Avenue
Columbus, OH 43201

Gentlemen:

This refers to the routine inspection conducted by Mr. C. C. Peck of this office on September 22-26 and November 12, 1980, of activities at Battelle Columbus Laboratories authorized by NRC Special Nuclear Material License No. SNM-7, Byproduct Material License No. 34-06854-05, and Facility Operating License No. R-4 and to the discussion of our findings with Mr. H. L. Toy and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

The inspection report includes a description of the meeting at our office on November 12, 1980, in which we met with members of your staff to discuss your apparent violation of a radiation limit of the Department of Transportation during the shipment of a spent fuel cask from your facility. Your representatives presented information indicating that significant actions were taken to achieve compliance with applicable regulations before the shipment was made. Since the NRC is conducting an investigation covering the use of this cask from the time it left Haddam Neck until it arrived at San Onofre, we are deferring a determination of the appropriate enforcement action with respect to your activities, as described in this report, until the investigation is completed. Therefore, as shown in the report, we have left the matter as an unresolved item.

The inspection also included an examination of activities related to the report pursuant to 10 CFR Part 21 submitted by Dr. Milford on July 18, 1980, and a followup inspection of the employee overexposure described in Mr. Toy's report of August 19, 1980.

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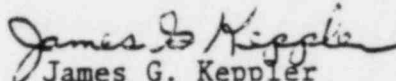
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During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as described in the enclosed Appendix A. A written response is required.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter, the enclosures, and your response to this letter will be placed in the NRC's Public Document Room, except as follows. If the enclosures contain information that you or your contractors believe to be proprietary, you must apply in writing to this office, within twenty-five days of the date of this letter, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,


James G. Keppler
Director

Enclosures:

1. Appendix A, Notice
of Violation
2. IE Inspection Report
No. 70-008/80-02,
No. 30-5728/80-02 and
No. 50-006/80-01

cc: Mr. H. L. Toy
Licensing Coordinator

cc w/encl:
Central Files
Reproduction Unit NRC 20b
PDR
NSIC
TIC

Appendix A

NOTICE OF VIOLATION

Battelle Columbus Laboratories

Docket No. 70-08

Based on the inspection conducted on September 22-26 and November 12, 1980, it appears that certain of your activities were in noncompliance with NRC requirements, as noted below. Item 1 is an infraction and item 2 is a deficiency.

1. 10 CFR 20.101(a) states that no licensee shall possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from radioactive material a dose exceeding the specified limits. The specified limit for hands and forearms, feet and ankles is 18 3/4 rems.


Contrary to this regulation, an employee received approximately 31 rems to the right hand on July 20, 1980.

2. License Condition 18 of Amendment No. 9 to Special Nuclear Material License SNM-7 limits radioactivity in the fuel storage pool to 1E-3 μ Ci/ml beta-gamma and 1E-4 μ Ci/ml alpha.

Contrary to this condition, concentrations of radioactivity in the fuel storage pool exceeded these limits for several weeks following the unloading of spent fuel on May 3, 1980.

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within twenty-five days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation.

Date December 3, 1980


James G. Keppler
Director

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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Reports No. 70-008/80-02; 30-5728/80-02; 50-6/80-01

Docket Nos. 70-08; 30-5728; 50-6 Licenses No. SNM-7; 34-06854; R-4

Licensee: Battelle Columbus Laboratories
505 King Avenue
Columbus, OH 43201

Facility Name: West Jefferson Nuclear Facility

Inspection At: Battelle Columbus Laboratories

Inspection Conducted: September 22-26 and November 12, 1980

Inspector: C. C. Peck *C. C. Peck*
Fuel Facility Inspector

11/25/80

Approved By: W. L. Fisher, Chief *W. L. Fisher*
Fuel Facility Projects and
Radiation Support Section

11/25/80

Inspection Summary

Inspection on September 22-26 and November 12, 1980 (Reports No. 70-008/80-02;
30-5728/80-02; 50-006/80-01)

Areas Inspected: Routine, unannounced health and safety inspection, including: operations review, training, transportation activities, technical specifications for the retired reactor facility, external exposure control, internal exposure control, and a followup inspection of a licensee report submitted pursuant to 10 CFR Part 21 describing a contamination incident.

Results: No items of noncompliance were identified in six of the seven areas inspected; two apparent items of noncompliance were identified in one area (infraction - overexposure of one individual to external radiation - paragraph 7f; deficiency - concentrations of radioactivity in fuel storage pool in excess of license limits - paragraph 7c).

SL04008TT
POR

DETAILS

1. Persons Contacted

*H. L. Toy, Licensing Coordinator
*D. A. McKown, Radiological Safety Officer
*W. J. Gallagher, Operations Manager, Hot Cell Laboratory
*H. M. Faust, Assistant Group Manager, West Jefferson Nuclear Services
*G. E. Kirsch, Health Physics Supervisor
T. R. Emsweiler, Transportation Supervisor
J. Wissinger, Plutonium Laboratory Health Physics Technician
E. R. Swindall, Hot Cell Laboratory Health Physics Technician

*Denotes those present at exit interview.

2. General

The inspection began at 8:30 a.m. on September 22, 1980, at the licensee's King Avenue office, where records of radiological safety meetings, case reviews by the Radiological Safety Committee, correspondence pertaining to NRC license SNM-7, and audits by the Radiological Safety Officer were examined. In addition records and correspondence related to the Hot Cell Laboratory contamination incident of May 3, 1980, and the employee over-exposure of July 20, 1980, were studied and discussed with licensee representatives (paragraph 7).

On September 23-25, the inspector toured the Hot Cell Laboratory, Plutonium Laboratory, retired reactor facility, and radioactive waste storage areas at the West Jefferson Nuclear Facility. The tours were supplemented by discussions with WJNF site personnel.

The inspection was concluded at King Avenue on September 26, 1980.

3. Operations Review

a. Plutonium Laboratory

The program of decontaminating the laboratory to limits that will permit use of the facility for nonradiological work is continuing. Decontamination of a portion of the laboratory consisting of the metallography laboratory, the plutonium-238 laboratory, and the accountability office has been completed. Representatives of the Department of Energy have surveyed this portion of the laboratory, and the licensee is awaiting affirmation that the area is releasable. DOE, the lead agency in the administration and approval of the decontamination effort, has agreed that the survey records of both the licensee and DOE related to the decontamination will be available for NRC approval.

The inspector examined licensee survey procedures and records for the completed portion of the laboratory during the inspection. The licensee used ANSI Standard N13.12, "Control of Radioactive Surface Contamination on Material, Equipment, and Facilities to be Released for Uncontrolled Use," in decontamination, supplemented by quality assurance procedures. The QA procedures used for the post-decontamination monitoring of the facilities were examined. QA procedure Pu-DF-10.0 prescribes the method for the layout of a one-meter grid system on all wall, floor, and ceiling surfaces in preparation for surveys for radiation and removable contamination. QA procedure Pu-DP-10 prescribes instruments to be used in the survey and establishes acceptable release limits. The radiation limit is 220dpm/100cm², and the limit for removable contamination is 20 dpm/100cm². The inspector reviewed survey results for the decontaminated rooms. The records of more than 2500 smears indicated that all surface areas are within the limits. A few areas found on the initial survey to be contaminated in excess of the limits were recleaned.

The decontamination effort in the remainder of the laboratory is continuing. The same standards and procedures will be used in final contamination surveys.

b. Hot Cell Laboratory

In a tour of the Hot Cell Laboratory the inspector made the following observations:

- . Posted fissile material inventories in the low level cell, high level cell, and high energy cell appeared up-to-date and totals corresponded with those on inventory cards.
- . Housekeeping, both in the cells and in the work areas outside the cells, appeared to have deteriorated since the inspection in April 1980. There was an unnecessarily large number of tools, supply items, and items of protective clothing lying about. The manipulator repair area was particularly cluttered.
- . Decontamination of the spent fuel pool area was stated to be virtually completed after the contamination incident of May 3, 1980 (Paragraph 7). Final contamination surveys and painting remain to be completed.
- . Rules established by the Radiological Safety Committee for the safe handling of various types of spent fuels in the High Energy Cell were posted at the cell window as is customary. At the time of the inspection there were five sets of rules for five types of fuels currently being studied. This is an unusually large number. The licensee is considering standardizing the fuel handling parameters to the extent that this can be done without reducing criticality safety. Such a change would reduce the number of RSC cases and simplify fuel handling rules.

The calibration status of criticality monitors, continuous air monitors, radiation instruments, and stack monitoring instruments was noted. Only one constant air monitor was overdue for calibration, according to the dated sticker on the instrument. However, the instrument section has stated that there is difficulty in timely completion of the monthly calibration schedule prepared by Quality Assurance and has asked for a priority list based on the relative safety significance of the various instruments.

No items of noncompliance were identified.

4. Transportation Activities

The inspector verified that Certificates of Compliance for the four licensee owned shielded shipping casks (BMI-1, BCL-2, BCL-3, and BCL-4) are current. The certificates require that the casks be inspected and tested periodically in accordance with criteria contained in the cask license applications. Completed procedures provided evidence that the most recent periodic inspections for the four casks were conducted as follows:

	Annual	Biennial
BMI-1	3/28/80	3/28/80
BCL-2	3/27/80	3/28/80
BCL-3	5/1/80	5/2/80
BCL-4	5/1/80	5/2/80

During tours of the retired reactor building (JN-3) and the Hot Cell Laboratory, the inspector observed radioactive waste packaged for shipment to burial. Waste from the Plutonium Laboratory decontamination program is packaged in drums and Argonne bins and stored in locked rooms in JN-3. Most of the stored packages contain plutonium from DOE-sponsored programs and are destined for disposal at government waste facilities. The remainder contain NRC-licensed material. Disposition of the licensed material is a problem, because no NRC-licensed burial sites presently can accept transuranic materials. Wastes generated in the Hot Cell Laboratory are stored in the new waste storage facility. Access to the storage room, a high radiation area, is restricted and the room is posted in accordance with regulatory requirements. Burial site license requirements also create a problem in disposition of some of the Hot Cell wastes.

Records of radioactive material shipments to and from the licensee were reviewed. Particular attention was paid to survey records.

No items of noncompliance were identified.

5. Training

The licensee maintains training records of employees at the West Jefferson Nuclear Facility. The records are updated monthly. Representative records were examined and found to be current.

The inspector noted that training sessions in the Hot Cell Operational Safety Manual (HL-A-1) had been conducted and supplemented by a written examination on safety in the Hot Cell Laboratory.

No items of noncompliance were identified.

6. Retired Reactor Facility

Compliance with Amendment No. 13 to the operating license, R-4, for the retired research reactor was inspected. Findings are itemized below.

Specification

- 2.1 . Activity levels in the water discharged from the basement sump have not exceeded the limits of 10 CFR Part 20.
- 3.1 . Records disclosed that the water monitor is calibrated and a channel test performed weekly.
- 3.2a . Quarterly radiation surveys are performed and documented as required.
- 3.2c . Physical barriers preventing access to the reactor are inspected quarterly.
- 5.5.1 . Annual reports have been sent to the NRC as required. These describe radiation survey results, facility status, and security and surveillance measures.

No items of noncompliance were identified.

7. Followup Inspection - Part 21 Report

- a. The licensee submitted a report pursuant to 10 CFR Part 21, Reporting of Defects and Noncompliance, on June 27, 1980. The report described an incident of May 3, 1980, which the licensee subsequently concluded could have created a substantial safety hazard. The incident was the release of radioactive material when a spent fuel cask containing a failed fuel assembly was opened in the licensee's spent fuel pool. Part of the inspection was devoted to obtaining detailed information related to the incident and in particular to determine whether corrective actions proposed by the licensee have been implemented.
- b. The sequence of events comprising the incident is presented below. The information was obtained from the Part 21 report, licensee records, and discussions with licensee representatives.

- (1) An NFS-4 type spent fuel shipping cask, specifically identified as NAC-1E, departed the Connecticut Yankee Atomic Power Company facility on May 1, 1980. The shipment arrived at the West Jefferson Nuclear Facility about 24 hours later on May 2, 1980. The cask contained one spent fuel assembly, known to have failed cladding. Failed fuel has been received on previous occasions at WJNF.
- (2) The shipper's cask survey records, which were forwarded to WJNF with the shipping papers, show that radiation and contamination levels of the shipment were within DOT limits. Measurements made by the receiver were also within limits. A licensee representative stated that additional shielding in the form of lead between sheets of plywood was bolted to the side of the cask enclosure.
- (3) The licensee checked the internal atmosphere in the cask. A gage connected to the cask vent indicated ambient pressure. A sample collected in a one-liter bottle indicated a radiation level of 6 mR/hr and the presence of krypton gas. This finding was not considered unusual, because of the failed condition of the fuel cladding.
- (4) Before immersing the cask in the pool, the cask was backfilled with water to prevent thermal shock to the fuel when the cask lid was removed. This was done by attaching tubing to the upper and lower cask vents and introducing water into the cask through the lower vent. The upper tubing was vented into the High Energy Cell.
- (5) After immersion, the cask lid was removed. A dark cloud emanated from the cask, spread through the pool water, and rose to the surface. The event caused chirpers worn by the operators to respond and caused a radiation level of about 200 mR/hr three feet above the water level, as measured by a portable instrument. Floor smears taken about ten minutes later disclosed contamination. The lid removal took place at about 11:00 p.m. on May 2, 1980.
- (6) Work continued until the fuel assembly was removed from the cask and placed in a pool storage rack. The five persons (the Hot Cell Laboratory supervisor, three operations technicians, and a health physics technician) ceased operations about midnight. Subsequent entries into the pool area were made wearing respirators, which had not been previously required.

c. Principal consequences of the incident are summarized below:

- (1) Surface areas and equipment in the pool area were generally contaminated. Contamination levels before cleanup began on May 3, 1980 were 200-200,000 dpm/100cm² beta-gamma and 20-2800 dpm/100cm² alpha. The licensee control limits are 20 dpm/100cm² alpha and 200 dpm/100cm² beta-gamma. The

decontamination effort required significant labor and supplies. At the time of the inspection, decontamination was virtually completed except for some small areas above the high level cell and on crane parts.

- (2) Normal work activities in the laboratory were not interrupted. Two fuel assemblies from Connecticut Yankee were received and unloaded on May 8, 1980 and May 15, 1980 without incident. The cladding of these assemblies was intact. The cask used was NAC-1D.
- (3) Nasal swabs, film badge measurements, urinalyses, fecal samples, and in vivo counts were required from the five individuals involved in the incident. None of these indicated significant doses. The highest film badge measurement was 220 millirem gamma. Urinalyses disclosed no significant radioactive material. A series of fecal samples collected on May 4, May 6, May 8, and May 14, 1980, disclosed no significant radioactivity after the first samples. The highest initial sample measured 19,000 dpm. All five individuals received in vivo counts on May 3, 1980. Results were not significantly different from results of routine semiannual counts. A summary is tabulated below:

<u>Radionuclide</u>	<u>No. Individuals</u>	<u>Max. % MPBB</u>
Cobalt-58	1	0.116
Cobalt-60	3	0.740
Cesium-134	3	0.098
Cesium-137	5	0.057

- (4) Continuous air monitors were in operation during and after the cask opening. The highest air activity detected was for a period of approximately 1.5 hours shortly after the incident. The concentrations were $4.5 \text{ E-}11 \text{ } \mu\text{Ci/cc}$ alpha and $1.7 \text{ E-}10 \text{ } \mu\text{Ci/cc}$ beta. MPC limits are $2 \text{ E-}12 \text{ } \mu\text{Ci/cc}$ alpha and $1 \text{ E-}9 \text{ } \mu\text{Ci/cc}$ beta. While air concentrations were variable and sometimes exceeded MPC limits in days following the incident as measured by fixed air monitors and lapel samplers worn during decontamination, the licensee stated that MPC limits were not exceeded for any 40-hour period.
- (5) The concentration of radioactivity in the fuel pool water reached a peak of about $4 \text{ E-}1 \text{ } \mu\text{Ci/ml}$ beta and $5 \text{ E-}3 \text{ } \mu\text{Ci/ml}$ alpha after the incident. These concentrations were reduced over a period of weeks by circulating the water through the installed ion exchange resin beds. At the time of the inspection, concentrations were below the limits of $1 \text{ E-}3 \text{ } \mu\text{Ci/ml}$ beta and $1 \text{ E-}4 \text{ } \mu\text{Ci/ml}$ alpha imposed by License Condition 18 of SNM-7. The concentrations above the license limit are an item of noncompliance.

- d. The heat content of the cask containing the failed Connecticut Yankee fuel assembly was 2.09 kW according to information in the shipping papers accompanying the shipment. The license for NFS-4 casks permits a heat load of 2.5 kW for assemblies shipped in a dry cask, as was the Connecticut Yankee assembly. After the contamination incident, the licensee calculated the heat load to be 3.1 kW and informed the shipper of this estimate. Recalculations by the shipper established the heat load as 3.50 kW. The shipper notified Region I of the NRC of the excessive heat content by letter dated May 21, 1980, and acknowledged noncompliance with the cask license.
- e. After removal from the fuel pool, the NAC 1-E cask was prepared for reuse. Several internal flushes were made, using water, then a Turco solution, then water again. A temporary flushing system which included ion exchange resin columns and filters was used in flushing. Concentrations of radioactivity in final flush samples were about $1 \text{ E-}2 \text{ } \mu\text{Ci/ml}$ alpha and one $\mu\text{Ci/ml}$ beta. The cask was cleaned externally and prepared for shipment. Surveys indicated that radiation and contamination levels were within DOT limits. The empty cask was sent to the Oyster Creek nuclear power plant for the shipment of spent fuel rods to the Hot Cell Laboratory.
- f. During the cask flushing operation described in the preceding paragraph, an employee received a dose of about 31 rems to the right hand. This exceeds the limit of $18 \frac{3}{4}$ rems per quarter permitted by 10 CFR 20.101 and, therefore, is an item of noncompliance. The licensee notified NRC of the overexposure in a written report as required by 10 CFR 20.405. The overexposure occurred while the employee was removing a cartridge from a water filter in the temporary flushing system. This was a planned operation for which a work request had been approved, an exposure time of three minutes estimated, and a extremity dose estimate of 3 rems made. Although a second worker was available to provide assistance if needed, no time limit was established or enforced. The exposed worker apparently required longer than the estimated time to remove the cartridge, place it in a bag, and carry it to a shielded container for disposal. The dose was measured by a TLD finger ring worn on the right hand. The total body dose received by the worker during the two-week period including the hand overexposure was 850 millirems of gamma radiation. Corrective actions planned to prevent recurrence of similar overexposures include more strict time restraints and the use of remote handling equipment when possible. While these are appropriate actions, implementation must be general rather than specific, since the equipment involved was temporary and circumstances are unlikely to be repeated.
- g. After the empty NAC-1E cask arrived at the Oyster Creek plant on July 23, 1980, the receiver reported removable contamination on the cask. The contamination was present in a small area and did

not exceed the DOT limit of 2,200 dpm/cm² for removable contamination on a package in an exclusive use vehicle (49 CFR 173.397). However, the radiation level in an area on the under surface of the trailer was about 240 mR/hr, as measured by the receiver and confirmed by an NRC resident inspector. The high radiation area was beneath one of the two cask drain ports. 10 CFR Part 71.5 states that no licensee shall deliver licensed material to a carrier for transport unless the licensee complies with the applicable requirements of the Department of Transportation in 49 CFR Parts 170-189. 49 CFR 173.393(j)(2) limits the radiation level at any point on the external surface of a closed transport vehicle to 200 mR/hr. This matter is considered an unresolved item, pending further investigation. (See paragraphs 8 and 9.)

- h. The licensee provided assistance at Oyster Creek to decontaminate the empty cask. Three individuals were involved in an effort that lasted about three weeks. The last licensee representative departed Oyster Creek with the understanding that contamination was within DOT limits.

8. Unresolved Item

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is described in paragraphs 7g and 9.

9. Management Meeting

In a meeting at Region III on November 12, 1980, licensee management representatives met with Region III management and staff to discuss matters related to the condition of the NAC - 1E cask on arrival at Oyster Creek after being transported from the licensee's facility, in particular the high radiation level beneath the trailer (paragraph 7g). The licensee described in detail the extensive flushing procedures used in cleaning the cask interior, and presented data supporting their conclusion that the cask was in compliance with DOT and NRC regulations when shipped to Oyster Creek.

The following attended the meeting:

Licensee

W. J. Madia, Manager, West Jefferson Nuclear Facility
V. J. Pasupathi, Manager, Hot Cell Laboratory
H. L. Toy, Licensing Coordinator
G. H. Kirsch, Health Physicist

Region III

J. G. Keppler, Director
A. B. Davis, Chief, Fuel Facility and Materials Safety Branch
W. L. Fisher, Chief, Fuel Facility Projects and Radiation
Support Section
C. C. Peck, Fuel Facility, Inspector

10. Radiation Protection

a. External Exposure Control

Biweekly results of TLD badge measurements were reviewed from the period since the inspection in April 1980 (Report 80-01) through mid-August. No doses exceeding the limits of 10 CFR 20.101 were noted. The maximum whole body dose to any individual in the first half of the year was about 1600 millirems.

The overexposure to the hand of one individual was described in Paragraph 7f.

b. Internal Exposure Control

In vivo counts of Hot Cell Laboratory employees, most recently conducted in April 1980, indicated no mixed fission products exceeding 1% of the maximum permissible body burden in any individual.

Quarterly urinalyses for Plutonium and Hot Cell Laboratory workers for 1980 through mid-August indicated no significant concentrations of radioactivity.

Results of special bioassays of workers involved in the spent fuel cask incident of May 3, 1980, were described in Paragraph 7c.

No items of noncompliance were identified.

11. Exit Interview

In meeting with licensee representatives identified in Paragraph 1 at the conclusion of the inspection, the inspector summarized the scope of the inspection and the inspection findings.

The licensee acknowledged the noncompliance concerning the overexposure to the hand (Paragraph 7f). Concerning the noncompliance for exceeding radioactivity concentration limits in the fuel pool (Paragraph 7c.5), the licensee thought the citation unjustified, because the event was unavoidable. However, future contamination incidents, including contamination of the pool water, may be prevented by procedures requiring confirmation of heat load calculations and by modified packaging requirements for failed fuel shipments.



71-6698

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

ENCLOSURE 6

(8)

JUL 22 1981

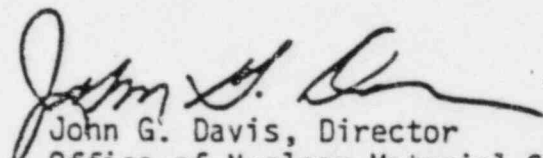
Gentlemen:

The attached order:

- (a) Prohibits the use of Model No. NFS-4, Serial No. NAC-1D packaging by NRC licensees until reasonable determination is made by NRC that DOT surface contamination limits will not be exceeded on subsequent shipments of this packaging.
- (b) Requires further order of the Commission to return the packagings to service.

This order is effective immediately.

Sincerely,


John G. Davis, Director
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc w/encl: See next page

Identical orders sent to those on
attached list.

AS

8109310052
PAR

cc w/encl: U. S. Department of Transportation
Materials Transportation Bureau
ATTN: Mr. Richard R. Rawl
DMT 221
Washington, D. C. 20590

Department of Energy
ATTN Dr. Donald M. Ross
MS E-201
Washington, D. C. 20545

Reynolds Electric and
Engineering Company, Inc.
ATTN: Mr. Arden E. Bicker
P.O. Box 14400
Las Vegas, NV 89114

Oak Ridge National Laboratory
ATTN: Mr. William E. Terry
P.O. Box X
Oak Ridge, TN 37830

Nuclear Assurance Corporation
ATTN: Mr. Charles R. Johnson
24 Executive Park West
Atlanta, GA 30529

Department of Energy
ATTN: Mr. A. T. Newmann
P.O. Box 14100
Las Vegas, NV 89114

Department of Energy
ATTN: Mr. James M. Peterson
P.O. Box 550
Richland, WA 99352

Identical orders sent to:

Babcock and Wilcox Company
ATTN: Mr. A. F. Olsen
P.O. Box 1260
Lynchburg, VA 24505

Baltimore Gas & Electric Company
ATTN: Mr. A. E. Lundvall, Jr.
P.O. Box 1475
Baltimore, MD 21203

Battelle Columbus Laboratories
ATTN: Mr. Harley L. Toy
505 King Avenue
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Boston Edison Company
ATTN: Mr. G. Carl Andognini
800 Boylston Street
Boston, MA 02199

Commonwealth Edison
ATTN: Director of Nuclear Licensing
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Dairyland Power Cooperative
ATTN: Mr. R. E. Shimshak
P.O. Box 135
Genoa, WI 54632

Duke Power Company
ATTN: Mr. W. O. Parker, Jr.
422 South Church Street
Charlotte, NC 28242

Florida Power and Light Company
ATTN: Mr. Robert E. Uhrig
P.O. Box 529100
Miami, FL 33152

Florida Power Corporation
ATTN: Dr. Patsy Y. Baynard
P.O. Box 14042
St. Petersburg, FL 33733

General Electric Company
ATTN: Mr. D. M. Dawson
175 Curtner Avenue
San Jose, CA 95125

Jersey Central Power & Light Company
ATTN: Mr. John Sullivan, Jr.
P.O. Box 388
Forked River, NJ 08731

Maine Yankee Atomic Power Company
ATTN: Mr. L. H. Heider
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Nuclear Fuel Services, Inc.
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P.O. Box 124
West Valley, NY 14171

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Southern California Edison Company
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Rosemead, CA 91770

Westinghouse Electric Corporation
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ATTN: Mr. Sol Burstein
231 West Michigan
Milwaukee, WI 53201

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)

) Docket No. 71-6698

)
) NRC CERTIFICATE OF COMPLIANCE
) NO. 6698 FOR RADIOACTIVE
) MATERIALS PACKAGES
)

ORDER TO SHOW CAUSE (IMMEDIATELY EFFECTIVE)

I

On November 14, 1972, a Certificate of Compliance under 10 CFR Part 71 was issued to Nuclear Fuel Services, Inc., for Model No. NFS-4 cask design. The latest license expired on December 31, 1980, and is currently under timely renewal.

The packaging ("cask") identified as Serial No. NAC-1D is one of seven casks manufactured to the Model No. NFS-4 design. All seven were suspended from service by the Commission's April 6, 1979 Order concerning structural integrity. On December 12, 1979, after further evaluation of the structural integrity, the Commission permitted three casks, including Cask Serial No. NAC-1D, to return to service with certain restrictions on their use.

II

On at least seven occasions between August 1980 and July 1981, following offsite transportation, the cask displayed impermissably high levels of surface contamination under the Department of Transportation's regulations, 49 CFR §173.397. Following the discovery of the excessive contaminations, the cask, before reshipment, was required to be decontaminated to the levels permitted by 49 CFR §173.397. After transportation following the decontaminations, the cask repeatedly arrived with surface contamination exceeding the permissible limits of 22,000 dpm/100 cm² by as much as 2,000,000 dpm/100 cm². The increase in surface contamination exhibited following transport suggests that contamination which originally was fixed, was released in transit. The reason for this excessive contamination, which may be related to the surface finish of the cask, is not fully understood. There appears to be no reasonable assurance that future shipments of the cask would be within the surface contamination limits set forth in 49 CFR §173.397.

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III

In view of the repeated instances of excessive surface contamination, in violation of 49 CFR §173.397, reasonable assurance does not now exist that the public health and safety will not be jeopardized by the continued use of this cask. Therefore, I find that the public health, safety and interest require immediate suspension of use of cask Model No. NFS-4, Serial No. NAC-1D.

IV

In view of the foregoing and pursuant to Sections 57, 62, 81, and 161(b) of the Atomic Energy Act of 1954, as amended, and the Commission's regulation in 10 CFR Parts 2 and 71, IT IS HEREBY ORDERED THAT:

- (A) Use of the cask designated as Model No. NFS-4, Serial No. NAC-1D, outside the confines of a licensed facility or plant is suspended, effective immediately; provided that, for the sole purpose of attempting to requalify the cask for use outside the confines of a licensed facility or plant, it may be transported (empty) once to an appropriate testing/rehabilitation site, subject to the following procedures:
- (1) Prior to shipment, surface contamination of the cask shall not exceed the levels permitted by 49 CFR §173.397.
 - (2) The cask shall be packaged in plastic bagging covering the entire external surface of the cask except the trunnions, which shall be covered with tape. The bagging shall be secured with tape and banding.
 - (3) A health physics technician carrying monitoring instruments and extra tape, shall accompany the shipment.
 - (4) The integrity of the bagging shall be verified at transport intervals of not more than 80 miles.
- (B) The owner/user show cause, as specified in Section V of this Order, why the suspension of the general license should not be continued until the Director, Office of Nuclear Material Safety and Safeguards, finds there is reasonable assurance that surface contamination levels will not exceed the requirements of 49 CFR §173.397 at any point during future shipments of the cask.

In determining whether there is reasonable assurance that the cask will not experience excessive contamination levels in transport, the Director will consider among other things:

- (1) The extent of the understanding of the cause of the excessive surface contamination (e.g., improper decontamination of cask surfaces and condition of cask surfaces).
- (2) The action taken to refurbish the cask surfaces and/or decontamination procedures to be used compatible with user waste treatment facilities.
- (3) Tests performed which simulate transport conditions to demonstrate the response to Items (1) and (2) above are correct and that excessive contamination levels will not be experienced.

V

An owner/user to whom this order applies may show cause within 25 days of the date of this Order by filing a written answer under oath or affirmation which sets forth the matters of fact and law on which the licensee relies. The owner/user may answer, as provided in 10 CFR §2.202(d), by consenting to the entry of an order in substantially the form proposed in this Order to Show Cause. Upon failure of the owner/user to file an answer within the specified time, the Director, Office of Nuclear Material Safety and Safeguards, may issue without further notice an order continuing the suspension as described in Section IV above.

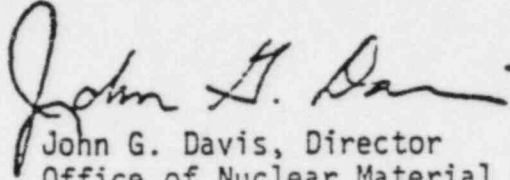
VI

The owner/user or any other person who has an interest affected by this order may request a hearing within 25 days of the date of this Order. Any answer to this Order or any request for hearing shall be filed with Mr. John G. Davis, Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies shall also be sent to the Secretary of the Commission and the Executive Legal Director at the same address. If a person other than the owner/user requests a hearing, that person shall describe specifically, in accordance with 10 CFR §2.714(a)(2), the nature of the person's interest and the manner in which that interest is affected by this Order. ANY REQUEST FOR A HEARING SHALL NOT STAY THE IMMEDIATE EFFECTIVENESS OF SECTION IV (A) OF THIS ORDER.

VII

If a hearing is requested, the Commission will issue an Order designating the time and place of any hearing. If a hearing is held, the issue to be considered at any such hearing shall be whether this Order should be sustained.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script, appearing to read "John G. Davis".

John G. Davis, Director
Office of Nuclear Material Safety
and Safeguards

Dated at Bethesda, Maryland
this 22 day of July 1981.