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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION V  
1450 MARIA LANE, SUITE 210  
WALNUT CREEK, CALIFORNIA 94596



*Attn: Remley*

MAR 19 1987

MEMORANDUM FOR: Herbert N. Berkow, Director  
Standardization and Special Projects Directorate  
Division of PWR Licensing-B, NRR

FROM: Frank A. Wenslawski, Chief  
Emergency Preparedness and Radiological  
Protection Branch

SUBJECT: CLOSEOUT INSPECTION FOR ROCKWELL INTERNATIONAL L-85  
REACTOR, DOCKET NO. 50-375

Pursuant to your memorandum dated February 25, 1986, we have conducted closeout inspections of the Rockwell International L-85 reactor. Inspection Reports Nos. 50-375/86-01 and 50-375/87-01 are enclosed.

Based on the inspection findings, including the results of the independent measurements performed by our contractor, Oak Ridge Associated Universities, we confirmed that all the nuclear fuel had been removed from the reactor facility, residual contamination levels were consistent with the criteria in Table 1 of Regulatory Guide 1.86, and the residual radiation exposure rate was consistent with the criteria in the Safety Evaluation supporting the Dismantling Order.

Region V concurs with the licensee's request that the facility license be terminated and the facility released for unrestricted use.

*Frank A. Wenslawski*

Frank A. Wenslawski, Chief  
Emergency Preparedness and  
Radiological Protection Branch

Enclosure:  
As stated

cc w/enclosure:  
M. E. Remley, Rockwell International ✓  
J. Dosa, NRR

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION V  
1450 MARIA LANE, SUITE 210  
WALNUT CREEK, CALIFORNIA 94596

MAR 19 1987

Docket No. 50-375

Rocketdyne Division  
Rockwell International Corporation  
6633 Canoga Avenue  
Canoga Park, California 91304

Attention: Dr. M. E. Remley, Director  
Nuclear Safety and Licensing

Gentlemen:

Subject: NRC Decommissioning Inspection - Rockwell International Research  
Reactor L-85

This letter refers to the special inspection conducted by Mr. E. M. Garcia, Team Leader, and staff members of NRC's contractor, Oak Ridge Associated University, on September 30 through October 31 1986 of activities authorized by NRC License No. R-118 and to the discussion of our findings held by Mr. Garcia with Dr. Remley and other members of your staff at the conclusion of our site visit on October 2, 1986. We also reference our letter to you dated December 2, 1986 forwarding Inspection Report 50-375/86-01 which addressed the findings as of the completion of the site visit.

As noted in our letter to you dated December 2, 1986 this inspection was conducted to verify that the condition of the facility was as described in Rockwell's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A" submitted to the Commission on March 6, 1986; that the additional measurements committed to in "Response to 'Request for Additional Information on the Termination Survey of the Rockwell International Research Reactor L-85,' Docket No. 50-375," submitted to the Commission on June 13, 1986 had been performed; and that the release criteria for unrestricted use had been met. This inspection also examined your submittal of February 3, 1987 titled "Summary Report of Ambient Exposure Rate Measurements at the L-85 Research Reactor Facility After Repair of Concrete Floor."

The enclosed Inspection Report includes the results of the measurements made by our contractor and an in office review of the results of your radiation survey of the repaired floor in the reactor room.

No violations of NRC requirements were identified within the scope of this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure will be placed in the NRC Public Document Room.

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MAR 19 1987

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

Sincerely

*F. A. Wenslawski*

F. A. Wenslawski, Chief  
Emergency Preparedness and  
Radiological Protection Branch

Enclosures:

Inspection Report No. 50-375/87-01

ORAU's "Confirmatory Radiological Survey of the L-85 Reactor Facility  
Rocketdyne Division Rockwell International Corporation Santa Susana,  
California"

cc w/enclosure:

H. N. Berkow, NRR

J. Dosa, NRR

State of California, Office of Intergovernmental Management

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U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-375/86-01

Docket No. 50-375

License No. R-118

Licensee: Rocketdyne Division  
Rockwell International Corporation  
6633 Canoga Avenue Canoga Park,  
California 91304

Facility Name: Rockwell International Research Reactor L-85

Inspection at: Rockwell's Field Laboratory, Santa Susana, California

Inspection conducted: September 30 through October 31, 1986

Inspector: Emilio M. Garcia Dec. 2, 1986  
E. M. Garcia, Emergency Response Coordinator Date Signed  
Team Leader

Team Members: Glen Murphy, ORAU Field Team Leader, Assistant Manager,  
Radiological Site Assessment Program, ORAU  
Dale Condra, Assistant Radiochemist, Radiological Site  
Assessment Program, ORAU  
David Gibson, Health Physics Technician, Radiological Site  
Assessment Program, ORAU

Approved By: R. F. Fish 12/2/86  
R. F. Fish, Chief Date Signed  
Emergency Preparedness Section

Summary:

Inspection on September 30 through October 31, 1986 including onsite  
inspection on September 30 through October 2, 1986 (Report No. 50-375/86-01)

Areas Inspected: Special announced team inspection by a regionally based inspector and staff of the Radiological Site Assessment Program, Oak Ridge Associated University (an NRC contractor) of the Rockwell International L-85 Reactor Facility, Building T093. This inspection was to verify that the contamination and radiation levels required by the February 22, 1983 Order Authorizing Dismantling of Facility and Disposition of Component Parts from the Office of Nuclear Reactor Regulation, had been satisfied. The guidance provided in Inspection Procedure 83890 was utilized.

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Results: Preliminary evaluation of those measurements performed by ORAU confirmed the findings described in the licensee's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A." Nuclear fuel has been transferred to an authorized recipient and the contamination and radiation limits for release of facilities and equipment for unrestricted use appear to have been satisfied. The ORAU measurements have confirmed the presence of an area where the gamma radiation level exceeds 5  $\mu$ r per hour above background at a meter above the surface. This area is located in the hole generated from the removed concrete. The licensee will conduct additional exposure rate measurements after the hole is filled with concrete. No violations or deviations of NRC requirements were identified.

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## DETAILS

### 1. Persons Contacted

#### Rockwell International

\*Dr. M. E. Remley, Director Nuclear Safety and Licensing  
\*Robert Tuttle, Manager Radiation and Nuclear Safety  
Vernon J. Schaubert, Manager Nuclear Materials Management  
James A. Rowles, Radiation and Nuclear Safety Specialist  
John Moore, Radiation and Nuclear Safety Specialist  
Jeff A. Chapman, Radiation and Nuclear Safety Specialist

#### State of California, Department of Health Services

\*Larry R. Carter, Health Physicist

\* Denotes those individuals present at the exit interview.

### 2. Release Criteria for Unrestricted Use

The radiation levels for release of the reactor facility to unrestricted use were established in "Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Order Authorizing Dismantling of Facility and Disposition of Component Parts Rockwell International Corporation L-85 Reactor Docket No. 50-375," dated February 22, 1983. The safety evaluation states that surfaces must be decontaminated to levels consistent with Table 1 of Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors." Radioactive material (Co-60, Eu-152, and Cs-137) other than surface contamination that may exist in concrete, components, structures, and soil must be removed such that the radiation level from these nuclides is less than 5  $\mu$ r/hr above natural background, as measured at 1 meter from surface or that no person will receive more than 10 mrem/year. Natural background is defined in the Safety Evaluation as "radiation from naturally occurring radioisotopes as measured at a comparable uncontaminated structure or exterior soil surface."

### 3. Disposition of Material

The reactor has been dismantled and the fuel has been transferred to Exxon Nuclear Idaho, a Department of Energy (DoE) contractor. Records maintained by the licensee indicate that radioactively contaminated components have been transferred to U. S. Ecology, Richland, an agreement state licensed radioactive material disposal site. The Radium-Beryllium neutron source was transferred to Rockwell Richland for disposal at the DoE facility. This source was not licensed by the NRC.

A review of DoE/NRC Form 741 indicated that the fuel was transferred and shipped from NRC license SNM-21 to Exxon Nuclear Idaho on September 28, 1982, and acknowledgement was received from Exxon Nuclear Idaho on May 18, 1983. The inspector noted that the transfer was made from the

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special nuclear materials (SNM) license and not the reactor license. Discussions with the licensee and a review of the Form 741 originally transferring possession of the fuel to the licensee from the Atomic Energy Commission (AEC), indicated that the fuel was originally transferred to the SNM license and, due to an administrative oversight, it was never transferred to the reactor license. Although, Rockwell is not licensed to utilize the fuel in the L-85 reactor under license SSN-21, this error appears to be of a purely record keeping nature since Rockwell is licensed to possess and did utilize the fuel under the reactor license, R-118. This matter is being noted for the record and it is considered closed.

No violations or deviations of NRC requirements were identified.

#### 4. Records of Personnel Exposure

A review of a licensee log book titled "L-85 Reactor Clean-up" identified the individuals involved in the dismantling of the reactor components and the decontamination of building T093, the reactor facility. This log book covers the period of July 1, 1985 to September 26, 1985. A review of personnel external exposure reports and bioassay results for the same period indicates that personnel exposures were below the regulatory limits established by 10 CFR 20. External radiation dosimetry services were provided by R. S. Landauer, Jr. & Co.. The bioassay consisted of urine samples analyzed for mixed fission products and collected for different individuals, selected at the discretion of the responsible Health Physicist. The urine samples were analyzed by U. S. Testing Laboratories of Richland Washington.

No violations or deviations of NRC requirements were identified.

#### 5. Additional Information the Licensee's Termination Survey Report

By a letter dated June 2, 1986, the Office of Nuclear Reactor Regulation (NRR) requested additional information from the licensee beyond that included in Rockwell's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A." The licensee's response is dated June 13, 1986. Items B, C, E, and F in this response committed the licensee to additional measurements.

Item B noted that four locations showed surface activity exceeding the limit appropriate for Sr-90 (1000 dpm/100 cm<sup>2</sup> from Table 1 of Regulatory Guide 1.86). The licensee stated that the four locations would be sampled and analyzed specifically for Sr-90 and other radionuclides. Further, if it was shown that greater than 5% of the total activity was due to Sr-90, the Sr-90 surface contamination limit would be invoked.

The inspector reviewed a report of the analysis for Sr-90 conducted on September 9, 1986, by U. S. Testing Laboratories. Four samples noted as being from four separate locations were reported. The samples ranged in Sr-90 content from 0.044 pCi/g to 0.230 pCi/g. The licensee's analysis determined that the gross beta activity ranged from 12.8 to 20.5 pCi/g. Based on these results, the licensee reported that no more than 1.1% of the beta activity was due to Sr-90.

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Item C stated that "natural background" would be determined by measurements made in a nearby, uncontaminated building of similar construction and age. Records reviewed by the inspector indicate that the licensee used the nearby building T453 to determine a background level of 11.9  $\mu\text{r/hr}$ . This measurement was made using a Reuters-Stokes high pressure ion chamber (Model RSS-111).

Item E stated that the licensee would resurvey the reactor room using a Reuters-Stokes RSS-111. Records maintained by the licensee indicate that in the reactor room 990 separate measurements were made using the RSS-111. The measurements were made on a 1 meter by 1 meter square grid with the detector set 1 meter from the local floor surface. The highest recorded reading was 18.9  $\mu\text{r/hr}$ . Based on the background measured in building T483 the maximum exposure rate above background was 7  $\mu\text{r/hr}$ . These ion chamber values are lower than those determined with a Sodium Iodide detector and reported earlier by the licensee. Therefore the licensee's conclusion, reported in "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A," that it would be unlikely for any individual to receive more than 10 mrem/year above background appears to be reasonable one.

On page 33.8 of Rockwell's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A," the licensee proposed to cover those areas that exhibit exposure rates above 5  $\mu\text{r/hr}$  with concrete to further reduce the dose rate. In their response to NRR's request for additional information the licensee agreed to make dose rate measurements after these areas are covered with concrete, and report the results to the Commission.

With the exception of the pending measurements on the areas to be filled with concrete, the licensee has completed the items committed to in their response for additional information. No violations or deviations of NRC requirements were identified.

#### 6.- Independent Confirmatory Measurements

Oak Ridge Associated Universities (ORAU), the NRC contractor, performed a verification survey of Building T093 and surrounding area. This survey was performed to independently verify that the release criteria for unrestricted use, described in Paragraph 2 above, was fulfilled. ORAU is also reviewing all the documentation provided by the licensee in support of the licensee's surveys. Rockwell's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A" presents summary data only. ORAU has requested from the licensee copies of the actual field survey results to re-construct and verify the licensee's summaries.

The ORAU survey included:

Direct measurements of total alpha, total beta, and gamma exposure rates.

Measurements of removable (transferable) and non-removable alpha and beta contamination.



Collection of miscellaneous samples of dirt, residue, paint, and concrete chips from throughout the facility, to be returned to ORAU laboratories for gamma spectroscopy analyses.

Collection of surface soils from around the facility and at four locations offsite for gamma and alpha spectroscopy analyses.

Measurements of gamma exposure rates using a Reuter-Stokes, model RSS-111, high pressure ionization chamber, and collection of insitu gamma spectrums to determine the nuclides generating the gamma exposure rates.

The preliminary evaluation of these measurements indicates that with the exception of a small isolated area of the scabbled reactor floor the release criteria for unrestricted use has been met. This scabbled area exceeds the gamma exposure rate of 5  $\mu$ r/hr at a meter from the local surface, and it is consistent with the licensee findings. The licensee projects that the exposure rate will meet the 5  $\mu$ r/hr criteria after the scabbled area is filled with concrete.

ORAU projects that their final report on this verification survey will be issued in January 1987.

No violation or deviations of NRC requirements were identified.

#### 7.- Exit Interview

At the conclusion of the October 2, 1986 site visit, the inspector and the ORAU Field Team Leader met with the individuals denoted in Paragraph 1. The preliminary findings of the inspection were presented. It was agreed that the inspector would inform the licensee when all analysis of samples collected by the NRC's contractor were successfully completed and no further samples would be required. At that time, the licensee could proceed with the filling of the scabbled area of the reactor room floor. The licensee was informed that no violations or deviations of NRC requirements had been identified.

On November 13, 1986 the licensee submitted a letter to USNRC Region V providing for the record results of the measurements committed to in "Response to 'Request for Additional Information on the Termination Survey of the Rockwell International Research Reactor L-85,' Docket No. 50-375." On November 19, 1986, the inspector informed the licensee that they may proceed with the filling of the scabbled area in the reactor room and the subsequent measurements.

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U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-375/87-01

Docket No. 50-375

License No. R-118

Licensee: Rocketdyne Division  
Rockwell International Corporation  
6633 Canoga Avenue  
Canoga Park, California 91304

Facility Name: Rockwell International Research Reactor L-85

Inspection at: Rockwell's Field Laboratory, Santa Susana, California

Inspection conducted: September 30 through October 31, 1986, and in office  
review February 6 through March 2, 1987.

Inspector: Emilio M. Garcia 3/13/87  
E. M. Garcia, Emergency Response Coordinator Date Signed  
Team Leader

Team Members: Glen Murphy, ORAU Field Team Leader, Assistant Manager,  
Radiological Site Assessment Program, ORAU  
Dale Condra, Assistant Radiochemist, Radiological Site  
Assessment Program, ORAU  
David Gibson, Health Physics Technician, Radiological Site  
Assessment Program, ORAU

Approved By: R. F. Fish 3/13/87  
R. F. Fish, Chief Date Signed  
Emergency Preparedness Section

Summary:

Onsite inspection on September 30 through October 2, 1986, and in office  
review February 6 through March 2, 1987 of licensee submittal of February 3,  
1987 and final NRC contractor report (Report No. 50-375/87-01).

Areas Inspected: This inspection consisted of an in office review of the  
Licensee's submittal of February 3, 1987 and of the Oak Ridge Associated  
Universities final report on their confirmatory radiation survey of the  
Rockwell International Research Reactor L-85 facility. This inspection was to  
verify that the contamination and radiation levels required by the February  
22, 1983 Order Authorizing Dismantling of Facility and Disposition of  
Component Parts from the Office of Nuclear Reactor Regulation, had been  
satisfied. The guidance provided in Inspection Procedure 83890 was utilized. 9

**Results:** The measurements performed by ORAU confirmed the findings described in the licensee's "Radiation Survey for Release for Unrestricted Use - L-85 Reactor Facility, Revision A" (final survey report). The in office review of Rockwell's February 3, 1987 "Summary Report of Ambient Exposure Rate Measurements at the L-85 Research Reactor Facility After Repair of Concrete Floor." indicated, that the gamma radiation levels were less than 5 micro-r per hour above background at a meter above the surface. No violations or deviations of NRC requirements were identified.

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## DETAILS

### 1. Persons Contacted

#### Rockwell International

\*Dr. M. E. Remley, Director, Nuclear Safety and Licensing  
\*Robert Tuttle, Manager, Nuclear Radiation and Nuclear Safety  
Vernon J. Schaubert, Manager, Nuclear Materials Management  
James A. Rowels, Radiation and Nuclear Safety Specialist  
John Moore, Radiation and Nuclear Safety Specialist  
Jeff A. Chapman, Radiation and Nuclear Safety Specialist

#### State of California, Department of Health Services

\*Larry R. Carter, Health Physicist

\* Denotes those individuals present at the exit interview on October 2, 1986.

### 2. Release Criteria for Unrestricted Use

The radiation levels for release of the reactor facility to unrestricted use were established in the "Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Order Authorizing Dismantling of Facility and Disposition of Component Parts Rockwell International Corporation L-85 Reactor Docket No. 50-375," dated February 22, 1983. The Safety Evaluation states that surfaces must be decontaminated to levels consistent with Table 1 of Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors." Radioactive material (Co-60, Eu-152, and Cs-137) other than surface contamination that may exist in concrete, components, structures, and soil must be removed such that the radiation level from these nuclides is less than 5 micro-r/hr above natural background, as measured at 1 meter from any surface or that no person will receive more than 10 mrem/year. Natural background is defined in the Safety Evaluation as "radiation from naturally occurring radioisotopes as measured at a comparable uncontaminated structure or exterior soil surface."

### 3. Independent Confirmatory Measurements

The Radiological Site Assessment Program of Oak Ridge Associated Universities (ORAU), the NRC contractor, performed a verification radiation survey of the L-85 reactor facility, Building T093 and surrounding area. This survey was conducted September 30 through October 2, 1986. The preliminary findings of the survey were documented on Inspection Report No. 50-375/86-01 which was issued on December 2, 1986. The survey was performed to independently verify that the release criteria for unrestricted use, described in Paragraph 2 above, was fulfilled. ORAU also reviewed all the documentation provided by the licensee in support of the licensee's radiation survey.

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The ORAU survey included:

#### Indoor Areas

Scans of the floors and lower walls with alpha, beta and gamma detectors.

Direct measurements of total and removable alpha and beta-gamma contamination levels on random floor, walls, ceilings, ledges, and other horizontal and vertical surfaces locations.

Gamma exposure rate measurements at 1 meter above the floor at random locations and areas of elevated gamma levels, identified by the surface scans.

Insitu gamma spectrums at each location where gamma exposure rate measurements were made.

#### Outside Areas

Walkover surface scans with gamma scintillation detectors, to a distance of 10 meters from the building in all directions. Scans were extended to cover the access roads and parking lots to a distance of 80 meters from the building.

Gamma spectrum analysis of surface soil samples collected in east, south, and west areas adjacent to Building T093. The area directly north of the building was covered by a small building and rock out croppings.

#### Background Measurements

Radiation exposure rate and gamma spectra measurements of Building T453, a building outside the restricted area but of similar construction history.

Gamma exposure rate measurements and gamma spectra of collected surface soil samples from four locations surrounding the Santa Susana Field Laboratory.

The survey findings indicate the total residual contamination meets the criteria for release for unrestricted use identified in Paragraph 2 above (Table 1 of Regulatory Guide 1.86). The survey also found that the radiation exposure rate criteria was fulfilled if the 10 mrem/year value is used based on the projected occupancy rates.

The complete final ORAU report is an enclosure to this inspection report.

No violation or deviations of NRC requirements were identified.

#### 4. Radiation Exposure Rate Measurements After Repair of Concrete Floor

As part of the decontamination of the facility a portion of the concrete floor of Building T093 was excavated to depths ranging from 2 to 22

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inches. The licensee stated in their final survey report that this surface was not directly useable as a floor, and that a person working 2000 hours a year at a desk adjacent to the excavated area would receive an exposure that would be less than the 10 mrem per year above background exposure criteria. This report was reviewed and the methodology used was concurred in by NRR.

For practical use of the facility the licensee had proposed to repair the excavated floor with concrete. The licensee had committed (to NRR) to determining the radiation exposure rate after the floor repair was completed. By a letter to USNRC Region V dated February 3, 1987 the licensee submitted the results of these additional measurements.

Review of the information provided by the licensee indicates that after the repairs to the floor the maximum radiation exposure rate is below the 5 micro-r/hr above background at a meter from the floor surface.

No violations or deviations of NRC requirements were identified.

5. Conclusions

The evaluations and measurements made by the licensee and the NRC's contractor indicate that the criteria for release for unrestricted use has been satisfied.

6. Exit Interview

At the conclusion of the October 2, 1986 site visit, the inspector and the ORAU Field Team Leader met with the individuals denoted in Paragraph 1. The licensee was informed of the preliminary inspection findings. The licensee was informed that no violations or deviations of NRC requirements had been identified. It should be noted that for this inspection report no additional exit interview has been conducted.