

APPENDIX D

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Combined NRC Inspection Reports: 30-05900/89-01 Licenses: 35-00502-02
30-05901/89-01 35-00502-03
30-05902/89-01 35-00502-04G
150-00035/89-01 General License 10 CFR 31.5

Dockets: 30-05900
30-05901
30-05902
150-00035

Licensee: Halliburton Company
P.O. Drawer 1431
Duncan, Oklahoma 73536

Inspections At: Duncan, Enid, and Oklahoma City, Oklahoma

Inspectors: QZ Cain for 12/6/89
G. M. Vasquez, Radiation Specialist, Nuclear
Materials Inspection Section Date

QZ Cain for 12/6/89
S. Rajendran, Radiation Specialist, Nuclear
Materials Inspection Section Date

Approved: Charles L. Cain 12/6/89
Charles L. Cain, Chief, Nuclear Materials
Inspection Section Date

Inspection Summary

Inspection Conducted September 12 and October 10-12, 1989
(Report 30-05900/89-01, 30-05901/89-01, 30-05902/89-01, and
150-00035/89-01)

Areas Inspected: A routine, unannounced inspection was conducted on September 12, 1989, in Duncan, Oklahoma, followed by field office inspections at Duncan, Enid, and Oklahoma City, Oklahoma, on October 10-12, 1989, of fixed gauge and tracer material manufacturing, distribution, and use. Specific areas inspected included organization and scope of the radiation safety program, internal audits, and notifications and reports.

Results: In general, the licensee's radiation safety program appeared to be adequate. Identified weaknesses related to the licensee's audit program and materials accountability.

Four apparent violations were identified:

1. Failure to post required documents (Section 3).
2. Failure to perform an adequate audit of licensed materials (Section 4).
3. Failure to perform audits of licensed tracer materials every 3 months (Section 4).
4. Failure to notify NRC of a loss of licensed material (Section 5).

DETAILS

1. Persons Contacted

- *A1 Baker, President, Halliburton Services (Houston, Texas)
- *Ray Durbin, Corporate Attorney, (Duncan, Oklahoma)
- **Ronald L. Bechtel, Manager, Department of Government Regulations (Duncan, Oklahoma)
- **Richard Leonardi, Radiation Safety Officer (Duncan, Oklahoma)
- Ralph Houser, Assistant Radiation Safety Officer (Duncan, Oklahoma)
- Roger Ledford (Duncan, Oklahoma)
- Ron Coon (Duncan, Oklahoma)
- Gary Phelps (Duncan, Oklahoma)
- Dr. Ron Buchanan (Duncan, Oklahoma)
- Craig Smith, Field Supervisor, Vann Systems (Oklahoma City, Oklahoma)
- ¹Jim Lawson, District Manager (Enid, Oklahoma)
- ²A1 Rahimi, District Manager (Oklahoma City, Oklahoma)
- ³John Oswald (Duncan, Oklahoma)
- ³Ralph Voss (Duncan, Oklahoma)
- *Telephonic exit briefing conducted October 16, 1989
- **Preliminary exit briefing conducted October 12, 1989
- ¹Present during inspection at Enid field camp
- ²Present during inspection at Oklahoma City field camp
- ³Present during inspection at Duncan field camp

2. Licensee Actions on Previous Inspection Findings

(Closed) (30-05901/88-02 and 30-05902/88-01): Failure to perform sealed source leak tests within the required 3-year period. The licensee had revised their gauge computer program by adding additional instructions to require each field site to check for source leak tests that may be due. The inspectors found no sources that were overdue for leak testing.

(Closed) (30-05901/88-02 and 30-05902/88-01): Failure to leak test a Ni-63 plated source every 6 months. The licensee issued formal letters to appropriate departments located in Duncan, requiring confirmation that leak tests had been performed. The inspectors found no sources that were overdue for leak testing.

(Closed) (30-05901/88-02 and 30-05902/88-01): Failure to conduct physical inventories every 6 months of all sealed sources and/or devices. The licensee had issued a computer-generated notice to all appropriate departments in Duncan and has monitored the responses. Based on a random sampling of sources, inventories appeared complete.

(Closed) (30-05901/88-02 and 30-05902/88-01): Failure to label sealed sources "CAUTION RADIOACTIVE MATERIALS" or "DANGER - RADIOACTIVE MATERIALS." The inspectors reviewed labeling on selected devices, and all were found to be adequately labeled.

(Closed) (30-05901/88-02 and 30-05902/88-01): Failure to provide constant surveillance and immediate control of licensed material in an unrestricted area. The inspectors observed no material in an unrestricted area that was not under constant surveillance and immediate control.

3. Organization and Scope of the Radiation Safety Program

The Halliburton division and subsidiaries licensed by the NRC to possess and use radioactive materials include: Halliburton Services (HS), Halliburton Reservoir Services (HRS), Vann Systems, Jet Research Center, Otis Engineering, Halliburton Logging Services (HLS), and Halliburton Geophysical Services, Inc. (HGS). Each division and subsidiary has had its own administrative structure and has operated independently of each other. All divisions and subsidiaries were owned by Halliburton Company, which has been viewed as a holding company.

The licensed activities of the Jet Research Center, HLS, and HGS were not inspected.

Despite their autonomy, the Radiation Safety Officer (RSO) for HS has also been the RSO for HRS, Vann Systems, and Otis Engineering. The licensed activities for these four companies has been authorized by four NRC licenses:

- A. License No. 35-00502-02 authorizes HS, Otis Engineering, and Vann Systems to perform tracer studies in oil and gas wells, as well as to use depleted uranium sinker bars. However, of the three companies, Vann Systems was the only one in possession of licensed materials for tracer activities. The Vann Systems field office in Oklahoma City possessed only 14 microcuries of Co-60 beads at the time of the inspection.

HS, which previously had tracer materials at their field camps, has transferred these materials to other licensed companies and has performed final radiation surveys at field camps to ensure this.

Otis Engineering, which previously possessed uranium sinker bars has transferred all licensed materials to HRS. A license amendment request to that effect had been submitted to NRC on August 21, 1989.

- B. License No. 35-00502-03 authorizes HS to research, develop, and manufacture density gauges and logging instruments; manufacture tracer sands; test decontamination procedures in the laboratory; use calibration standards; and use laboratory devices containing licensed material. Of these activities, the licensee has ceased

decontaminating reactor components, manufacturing logging instruments, and manufacturing tracer sands. However, the licensee stated that they would like to maintain authorization to manufacture tracer sands and logging instruments as an option for the future.

The licensee's most significant use of radioactive materials authorized under this license appeared to be the manufacturing of the density gauges. Between November 1, 1988, and November 1, 1989, they manufactured approximately 24 gauges per month. These gauges were then distributed under License No. 35-00502-04G to persons generally licensed pursuant to 10 CFR 31.5, mostly to HS field camps. Each gauge contained a Cs-137 sealed source with activity of 10 mCi, 20 mCi, 55 mCi, or 100 mCi.

- C. License No. 35-00502-04G authorizes HS to distribute density gauges to persons who possess a general license pursuant to 10 CFR 31.5. Most of these gauges were distributed to Halliburton divisions or subsidiaries.
- D. HS utilizes the general license provided by 10 CFR 31.5 which authorizes use of density gauges that are distributed under License No. 35-00502-04G. Most of these gauges have been located at various Halliburton field camps in the United States and abroad. Many have been attached to equipment on trucks and transported to and from temporary job sites. Several of Halliburton's divisions and subsidiaries have been located in Agreement States and abroad.

The inspectors reviewed material transfer reports that were sent to the NRC as required under 10 CFR 32.52. Also, labeling and markings of gauges at the Enid, Oklahoma City, and Duncan field camps complied with license conditions.

The RSO responsible for NRC License Nos. 35-00502-02, 35-00502-03, 35-00502-04G, and for the general license pursuant to 10 CFR 31.5, was part of the Government Regulations Department at HS. The Manager of the Government Regulations Department has supervised a contract with a consultant to perform routine field site audits required by the licensee's audit program; however, the consultant has not reported to the RSO. The consultant has reported to the Manager of the Government Regulations Department.

The licensee has provided 40 hours of initial training to all personnel associated with gauge manufacturing. Training records were sampled and appeared to meet the requirements of 10 CFR Part 19. Interviews with selected personnel also verified this. The Vann Systems authorized user also appeared to be well trained.

The inspectors reviewed records of receipt for Cs-137 sealed sources shipped by the supplier. The licensee stated that incoming transport containers were surveyed to verify that material had not shifted in transport. Records of material transfer within Halliburton subsidiaries were sampled and found to be adequate.

Film badge records were reviewed and were found to be complete. Typical whole body exposures have been low. The maximum annual personnel exposure for 1988 was 250 mRem.

The licensee's procedures for radioactive waste disposal were reviewed. Since the last inspection they have not disposed of any material.

The inspectors reviewed the licensee's transportation activities to determine compliance with 10 CFR Part 71 and the applicable regulations of the Department of Transportation. Proper shipping papers describing the sealed sources in gauges were found to be in several trucks carrying the materials. At the Vann Systems facility, Co-60 beads had been secured in a locked storage box in back of a truck. They also reportedly carried the necessary documents to the job sites in the truck. Records of shipments of gauges between Halliburton subsidiaries and temporary field sites also appeared to comply with applicable regulations.

The inspectors also reviewed required postings. The Vann Systems field office located in Oklahoma City, where approximately 14 microcuries of Co-60 beads were stored, did not have the required postings. This was identified as a violation of 10 CFR 19.11 for License No. 35-00502-02.

The inspector observed, through a random sampling, that radiation survey instruments at the manufacturing and research facilities had been calibrated at 6-month intervals. Some users have sent their instruments directly to the vendors and maintained their own calibration records.

The radiation safety program's organization was very complex and has been in a state of change since the previous inspection. Halliburton has several subsidiaries that are autonomous, yet whose licensed activities overlap. Overall, the program's organization appeared acceptable.

One violation was identified.

4. Licensee Internal Audits

On September 23, 1987, the NRC issued an Order Modifying License, along with a Notice of Violation and a Proposed Imposition of Civil Penalty. The Order originated when NRC determined that the licensee's completed and proposed corrective actions for identified violations did not extend far enough to ensure thorough management involvement. The Order described the requirements for a corporate audit program. The current approved audit program was submitted in a letter dated December 21, 1988.

Since 1987, the Manager of Government Regulations has supervised a contract with an individual to perform routine audits of Halliburton's field offices. The contractor has submitted all audit findings to the Manager of Government Regulations. The RSO has also performed some of these audits and submitted all findings to the Manager of Government Regulations.

The licensee stated that as of November 1988, all HS field camps in the country have been audited. The licensee performed radiation surveys of all field camps regardless of whether records indicated the camp possessed any licensed material. This was to ensure that none of the camps had tracers, to document closeout surveys for those camps that in the past possessed tracers, and to look for unaccounted for sources, in addition to fulfilling their audit program requirements.

The inspectors visited several Halliburton facilities in order to determine the effectiveness of the corporate audit program. It appeared that the research departments and the gauge manufacturing operations in Duncan were audited as required. The inspectors also visited three HS field camps and one Vann Systems facility. The three HS field camps appeared to have been audited, but two had discrepancies that should have been discovered by the audits.

At the Oklahoma City facility, the inspector determined sealed source Serial No. S277, a 9.5 mCi Cs-137 source, was received in the facility in February 1984 but was not on the facility's inventory. Additionally, sealed source Serial No. S750 was on the facility's inventory, but the source was not at the facility and the district engineer had no records of ever possessing the source. These items were discovered during the inspection despite audits conducted by the contractor on December 30, 1987, and December 15, 1988.

During the inspection of the Duncan facility, sealed source Serial No. X350 was found during the inspector's facility tour in an authorized storage location in plain view with other gauges. The licensee stated that the source had previously been on the list of unaccounted for sources for approximately 1 year. The district engineer was aware of the device and stated that it had been at the camp for several years. However, it was not on their inventory. Despite an audit conducted by the contractor on September 22, 1988, the licensee presumed this source was missing.

The fact that the audit program had not identified the discrepancies indicated inadequate audits of the field camps. This was identified as a violation of License Condition 19 of License No. 35-00502-03 which references the Radioactive Safety and Material Audit Program, originally submitted to the NRC in a letter dated October 22, 1987, revised February 3, 1988, and revised again on December 21, 1988.

The Vann Systems facility in Oklahoma City was also inspected. The inspector determined that no audits had been performed in calendar year 1989. Failure to perform comprehensive audits of licensed tracer

materials every 3 months was identified as a violation of License Condition 13 of NRC License No. 35-00502-02. This license condition references a letter dated December 21, 1988, which describes the audit program.

In general, it appeared that facilities had been audited within the required time periods; however, some of the audits were not effectively performed.

Two violations were identified.

5. Notifications and Reports

When an inspector asked if the licensee had a loss or theft of licensed material, the licensee's management stated that they had no lost sources, but they did have some sources that were unaccounted for.

At the inspector's request, the licensee developed a list of all the sources whose whereabouts were unknown to the licensee. On October 11, 1989, the licensee presented the list to the inspectors. A copy of this list is attached as Appendix E.

Halliburton Company's divisions and subsidiaries operate field camps in nonagreement states, agreement states, and abroad. Though the field camps have low turnover of these devices, they do transfer them among their numerous locations both domestically and abroad. Therefore, it appears that each of the divisions and subsidiaries, while in NRC jurisdiction, have been individually authorized under 10 CFR 31.5 to possess, store, and use these gauges. However, the Government Regulations Department at HS has been designated by Halliburton Company to act on behalf of the various divisions and subsidiaries in regulatory matters. Also, the manager of Government Regulations has been the chairperson of the corporate radiation safety committee.

In the latter part of 1986, the Government Regulation Department in HS, began working on a computer program to track the locations of generally and specifically licensed sources, as well as their leak tests. They sent letters to all the field camps in an attempt to determine the locations of all gauges. Additionally, the Government Regulations Department has kept logs of material transfers among the camps. The computer-based tracking program was based on the responses from the field camps, the logs, and other records.

By the middle of 1987, the first reports were generated from the computer, and the licensee started auditing their field sites. By November 1988, all domestic Halliburton field locations had been audited and the list of unaccounted for gauges was substantially shorter than originally estimated.

Since November 1988, the only new action taken by the licensee to look for these lost sources has been to contact overseas operations and have them report their inventory. Though the licensee had demonstrated progress in attempting to locate these gauges through November 1988, very little progress has been made since then.

The following Cs-137 source serial nos. were last known to be in Oklahoma, a state where NRC maintains jurisdiction: S-622 (10 mCi), X-030 (10 mCi), CS2-751 (10 mCi), Y-211 (10 mCi), Y-61 (10 mCi), A-424 (50 mCi), and X-375 (10 mCi). Since November 1988, the licensee has neither located the sources nor reported them to NRC as missing. Failure to notify NRC of a theft or loss of material was identified as a violation of 10 CFR 20.402(a) for the General License authorized under 10 CFR 31.5.

One violation was identified.

6. Exit Interview

A preliminary exit briefing was conducted on October 12, 1989, with the individuals identified in Section 1.

A telephonic exit briefing was conducted on October 16, 1989, with the individuals identified in Section 1; the Chief, Nuclear Materials Inspection Section; and the inspector. The specific findings were not discussed; however, NRC's concerns about a clear delineation of responsibility associated with the management of the radiation safety program were discussed.

APPENDIX E

UNACCOUNTED FOR RADIOACTIVE DENSOMETERS

Source Serial #	Densometer Serial #	Source Act. (MCi)	Last Leak Test Date	Last Known Location	Date Densometer Acknowledged Missing
Z-103	W35-0018	55.8	03/24/86	Unknown	8/86
S-662	730508	10.0	01/11/79	Unknown	?
X-030	3IV111 (or) 3IV136	10.0	03/25/80	Unknown	?
X-007	73716	10.0	11/19/79	Palistine, TX.	?
CS2-724	W41-0043	55.0	05/04/83	Vernal, UT.	?
CS2-751	73-1101	10.0	01/13/84	Unknown	?
X-211	3IV442	10.0	12/23/86	Duncan, OK.	09/28/89
Y-61	6IN6199SC	20.0	01/21/85	Davis, OK.	?
A-424	Unknown	50.0	02/21/73	Duncan, OK.	?
X-375	Unknown	10.0	01/05/82	Duncan, OK.	?
918	MD-002	10.0	02/10/72	Turkish Pet.	?
S-188	MS-341	10.0	04/15/75	Mission Marine South Africa or United Dubai, Arab Emirates	?
855	MS-13	10.0	07/15/71	Key West South Am.	?
A-454	MS-246	10.0	03/26/73	Sold to Sedco N. Sea	?
A-597	PFD-244	10.0	12/10/73	Scarborough IN Drill Ship, Italian Oil Co.	?
829	73-1515	10.0	08/22/84	Egypt	?
A-499	MS-106	10.4	08/22/73	Global Marine Unit #712, Orange, TX.	?
S-664	73635	10.0	01/11/79	Dubai, United Arab Emirates	?
S-553	73538	10.0	08/30/78	Qatar	?
821	MS-6	10.0	10/28/69	Atwood Oceanonic, (Big John), Sabine Pass, TX.	?