



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

April 30, 2019

Mr. Philip Simpkin
Radiation Safety Officer
Baker Hughes Oilfield Operations, LLC
2001 Rankin Road
Houston, TX 77267-0968

SUBJECT: NRC INSPECTION REPORT 030-06402/2018-001

Dear Mr. Simpkin:

This letter refers to the unannounced inspection conducted on May 17, 2018, at your facility in Mount Pleasant, Michigan and at a temporary job site outside of Marion, Michigan. The inspection was an examination of activities conducted under your license as they relate to public health and safety, to confirm compliance with the U.S. Nuclear Regulatory Commission's (NRC's) rules, regulations, and with the conditions of your license. Within these areas, the inspection consisted of a selected examination of procedures and representative records, observations of activities, independent radiation measurements and interviews with personnel. The preliminary inspection findings were discussed with you and your staff following the conclusion of the onsite portion of the inspection on July 23, 2018. A final exit briefing was conducted telephonically with you on April 11, 2019.

Based on the results of the inspection, the NRC has determined that no violations of NRC requirements were identified; therefore, no response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter and the Enclosure will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions concerning this matter, please contact Mr. Ryan Craffey of NRC Region III at (630) 829-9655, or the undersigned at (817) 200-1455.

Sincerely,

/RA/

Patricia A. Silva, Chief
Materials Licensing and Inspection Branch
Division of Nuclear Materials Safety

Docket No. 030-06402
License No. 42-02964-01

Enclosure:
NRC Inspection Report 030-06402/2018-001

cc (w/Enclosure):
R. Kugler, Manager
Michigan Department of Licensing and
Regulatory Affairs
Charlotte Sullivan, Manager
Texas Department of State Health Services

NRC INSPECTION REPORT 030-06402/2018-001 – DATED April 30, 2019.

Distribution:

- M. Shaffer, DRA
- T. Pruett, D/DNMS
- L. Howell, DD/DNMS
- R4DNMS_MLIB
- R. Erickson, SAO/DNMS
- J. Cook, SAO/DNMS
- B. Maier, SLO/ORA

S:\DNMS\Lynn DOC\Baker Hughes Clear Letter and Narrative Report.docx

ADAMS ACCESSION NUMBER: ML19121A216

SUNSI Review: ADAMS: Non-Publicly Available Non-Sensitive Keyword:
 By: Yes No Publicly Available Sensitive

OFFICE	RIII:DNMS	RIII:DNMS	RIV:DNMS	RIV:C:MLIB		
NAME	RJCraffey	EFHarvey	JEvonEhr	PASilva		
SIGNATURE	/RA/	/RA/	/RA/	/RA/		
DATE	4/8/19	4/10/19	4/1/19	4/30/19		

OFFICAL RECORD COPY

**U.S. NUCLEAR REGULATORY COMMISSION
REGION IV**

Docket: 030-06402

License: 42-02964-01

Report: 2018-001

EA No.: N/A

Licensee: Baker Hughes Oilfield Operations, LLC

Locations Inspected: 2222 Enterprise Drive, Mount Pleasant, Michigan
TJS outside of Marion, Michigan

Inspection Dates: May 17, 2018, with in-office review through April 11, 2019

Inspector: Ryan Craffey, Health Physicist
Division of Nuclear Materials Safety
NRC Region III

Edward Harvey, Health Physicist
Division of Nuclear Materials Safety
NRC Region III

Approved By: Patricia A. Silva, Chief
Materials Licensing and Inspection Branch
Division of Nuclear Materials Safety
NRC Region IV

Attachment: Supplemental Inspection Information

Enclosure

EXECUTIVE SUMMARY

Baker Hughes Oilfield Operations, LLC NRC Inspection Report 030-06402/2018-001

This was an unannounced reactive inspection conducted in response to an incident in NRC jurisdiction regarding conduct of Baker Hughes Oilfield Operations, LLC employees use of licensed material at a temporary job site on December 19, 2017. This incident involved the possible energizing of a reservoir pulsed monitoring neutron generator, which had the potential to expose employees and on-site contractors beyond NRC established radiation dose limits.

Program Overview

Baker Hughes Oilfield Operations, LLC was authorized by the U.S. Nuclear Regulatory Commission Materials License 42-02964-01 to use a variety of sealed sources and unsealed byproduct material for well logging, tracer studies, densitometer use, and other related applications. Storage and use is authorized at the licensee's installations located in Mount Pleasant, Michigan; Buckhannon, West Virginia; Anchorage and Deadhorse, Alaska, in addition to the authorization for licensed activities at temporary job sites in areas of the Nuclear Regulatory Commission's jurisdiction. (Section 1)

Inspection Findings

No violations were identified regarding requirements under the Nuclear Regulatory Commission. The results of the inspection are documented Sections 2, 3, and 4.

Corrective Actions

Since no violations were identified regarding requirements of the Nuclear Regulatory Commission, no corrective actions were necessary on the part of the licensee.

REPORT DETAILS

1. Program Overview (Inspection Procedure 87103 & 87123)

Baker Hughes Oilfield Operations, LLC was authorized by the U.S. Nuclear Regulatory Commission (NRC) Materials License 42-02964-01 to use a variety of sealed sources and unsealed byproduct material for well logging, tracer studies, densitometer use, and other related applications at field stations in Mount Pleasant, Michigan, Buckhannon, West Virginia, Anchorage and Deadhorse, Alaska, and at temporary jobsites in NRC jurisdiction.

At the field station in Mount Pleasant, the licensee possessed a variety of americium-241 and cesium-137 sealed sources and pulsed neutron generators containing hydrogen-3 for well logging applications, as well as various sealed calibration and reference sources including americium-241, cesium-137, radium-226, and thorium-228. Eight authorized users were stationed at this field station, utilizing the well logging sources on a near-daily basis and the pulsed neutron generators a few times per month.

The NRC last inspected the conduct of licensed activities at the Mount Pleasant field station on August 30, 2012. The NRC last conducted a routine inspection of the licensee's main office on March 7, 2017. No violations of NRC requirements were identified as a result of these inspections.

2 Radiation Safety Program (Inspection Procedure 87123)

2.1 Inspection Scope

This was an unannounced reactive inspection conducted in response to an incident in NRC jurisdiction regarding conduct of Baker Hughes Oilfield Operations, LLC employees use of licensed material at a temporary job site on December 19, 2017. In the review of the incident and the circumstances surrounding it, the inspectors conducted a review of elements of the licensee's radiation safety program at its field station in Mount Pleasant, Michigan. This review included observations of the facility, discussions with staff members, independent radiation surveys, and a review of selected records.

2.2 Observations and Findings

The inspectors found all licensed material to be adequately secured against unauthorized removal. The inspectors confirmed that the licensee did not possess an aggregated category 2 quantity of radioactive material on the premises. Independent gamma exposure surveys of the facility using a Canberra UltraRadic meter (serial number 13000317, calibrated on January 23, 2018) found no readings in any unrestricted area which exceeded regulatory limits to members of the public.

The inspectors reviewed and discussed with staff the licensee's mechanisms for source tracking and accountability, verified a selection of the licensee's sealed source inventory, reviewed a selection of sealed source leak test, dosimetry, and training records, and verified that the licensee possessed calibrated and operable radiation survey meters which were suitable for the radiation fields they encountered during the conduct of licensed activities.

2.3 Conclusions

The inspectors reviewed the implementation of the licensee's radiation safety program at its field station in Mount Pleasant, Michigan. The inspectors identified no violations of NRC requirements in this area.

3 Incidents Involving Radioactive Material (Inspection Procedure 87103)

3.1 Inspection Scope

While interviewing staff at the Mount Pleasant, Michigan field station, the inspectors reviewed an incident involving equipment and personnel based there. This review included discussions with staff members and a review of selected records.

3.2 Observations and Findings

The inspectors reviewed the circumstances surrounding the December 19, 2017 incident involving use of a reservoir pulsed monitoring (RPM) neutron generator containing hydrogen-3 at a nearby temporary job site. Office management had been notified following completion of the work that an authorized user on the job site may have activated the device above ground, contrary to licensee procedures.

The inspectors discussed the matter with a trainee who was present on the day of the incident. The trainee stated that two other licensee personnel and two members of the rigging crew were present on the job site, and that following a disagreement between the other licensee personnel, he was directed by one of the two to leave the immediate vicinity of the work because the second intended to test the function of the neutron generator and connected components while it was still above ground, outside of the approved test barrel (which is permanently located at the Mount Pleasant, Michigan field station).

The trainee stated that he and the first member of the licensee's crew moved between 50 and 75 feet away with the rig in between them and the tool string, while the second member of the crew remained in the rig, approximately 8-10 feet from the string. The trainee stated that the two members of the rigging crew were sitting in their truck at the time, and were approximately 75 feet away from the well, also with the rig between them and the string.

After several minutes, the trainee and the crew member who directed him away from the job site returned to the rig. The other crew member had continued with preparations for the work, assisted by the rigging crew. The trainee was unsure whether the other crew member had actually activated the neutron generator while they were away. During the inspection, the licensee's office manager stated that the crew member recalled energizing the components connected to the generator when questioned after the fact. The office manager estimated that the individual had energized the components to test them for no longer than 30 seconds. However, during a subsequent NRC investigation, the NRC concluded that although the connected components may have been energized, the device itself had not in fact been activated while above ground, since these actions are controlled independently.

The inspectors reviewed the evaluation from the Registry of Radioactive Sealed Sources and Devices No. TX-0261-D-101-S, which provided a safety analysis of the neutron generating device a Baker Hughes model No. 186235, including expected radiation fields at various distances.

The inspectors reviewed dosimetry reports for the fourth quarter of calendar year 2017 and found that the crew members' dosimeters received cumulative exposures between 0 and 25 millirem for the entire quarter.

The licensee's application dated November 14, 2014, includes procedure HSES-WI-RAD-015, Revision A, "Operating a Pulsed Neutron Generator Work Instruction". This procedure states, in part, that Pulsed Neutron Generators may only be powered up above ground if the tool is in the approved test barrel.

The circumstances surrounding the conduct of well logging operations in December 2017 relative to the statements in these procedures were resolved during an NRC investigation from June 18, 2018 to December 6, 2018.

As a preliminary corrective action for issues related to the event, the licensee reprimanded the employee with a written disciplinary notice for his actions. The licensee retrained the employee and reminded other involved staff of the procedures restrictions on activating reservoir pulsed monitoring tools above-ground.

3.3 Conclusions

During the inspection and subsequent NRC investigation, the NRC concluded that the reservoir pulsed monitoring had not been activated above ground, and therefore no health and safety risks existed to the licensee employees or members of the public, and the NRC further determined that there was no non-compliance as a result of the events described above.

4 **Field Observations (Inspection Procedure 87123)**

4.1 Inspection Scope

The inspectors visited a temporary job site outside of Marion, Michigan to observe and evaluate the conduct of well logging activities by licensee personnel.

4.2 Observations and Findings

The inspectors found that the sealed source of americium-241 present on the job site was adequately labeled, blocked and braced, and documented on shipping papers for transport on public highways, and was adequately secured against unauthorized removal when not under the control and constant surveillance of licensee personnel. The inspectors noted the satisfactory use of restricted area boundaries and engineering controls (i.e. shielding and long-handled tools) to minimize radiation exposures. The crew was knowledgeable of radiation protection principles and licensee procedures, wore their assigned dosimetry, and used calibrated and operable survey meters during these operations. The inspectors conducted additional independent radiation surveys while on the job site, which confirmed the adequacy of the licensee's restricted area boundaries and engineering controls.

4.3 Conclusions

The inspectors observed the conduct of licensed activities at a job site in NRC jurisdiction and had no findings in this area.

5 Exit Meeting Summary

The NRC inspector presented preliminary inspection findings following the onsite inspection on July 23, 2018. The licensee did not identify any documents or processes reviewed by the inspectors as proprietary. The licensee acknowledged the findings presented. The NRC conducted a final exit briefing with the Radiation Safety Officer, Mr. Philip Simpkin, on April 11, 2019. The licensee again acknowledged the findings presented and did not dispute any of the facts presented.

SUPPLEMENTAL INSPECTION INFORMATION

LIST OF PERSONS CONTACTED

Edward Dinnan - Field Operator
Jesse Gaiser - General Operator
Todd Glaser - Field Specialist
Robert Kellogg - Field Operator
Steven Pressley - District Operations Manager
Mark Shannon - Field Engineer, Site RSO, Mount Pleasant
Philip Simpkin - Corporate RSO

INSPECTION PROCEDURES USED

87103 Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing
87123 Well Logging Programs

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS AND ABBREVIATIONS USED

ADAMS	Agencywide Documents Access and Management System
CFR	<i>Code of Federal Regulations</i>
NRC	Nuclear Regulatory Commission
RPM	Reservoir Pulsed Monitoring [Neutron Generator]
TJS	Temporary Job Site