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MEMO TO : All Well Logging Licensees

FROM : Terry L. O'Clair, P.E.
Director
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TLO

RE : NRC Information Notice 2004-003: "Radiation Exposures to Members of the Public in Excess of Regulatory Limits Caused by Failure to Perform Appropriate Radiation Surveys During Well-Logging Operations"

DATE : March 23, 2004

Enclosed is a copy of the United States Nuclear Regulatory Commission (NRC) information notice 2004-003: "Radiation Exposures to Members of the Public in Excess of Regulatory Limits Caused by Failure to Perform Appropriate Radiation Surveys During Well-Logging Operations". This information notice was issued to alert licensees to several events resulting in oilfield workers receiving radiation doses in excess of the 100 mrem per year dose limit.

As indicated in the notice, it is expected that you will review this information for applicability to your licensed activities and consider actions, as appropriate, to ensure the safe and legal use of radioactive materials in the State of North Dakota.

This notice is for your information only. No specific action nor written response is required. If you have any questions concerning this issue, please contact the Radiation Control Program at 701.328.5188.

TLO/JMG:csc
Enc:

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555

February 24, 2004

NRC INFORMATION NOTICE 2004-003: RADIATION EXPOSURES TO MEMBERS OF THE PUBLIC IN EXCESS OF REGULATORY LIMITS CAUSED BY FAILURES TO PERFORM APPROPRIATE RADIATION SURVEYS DURING WELL-LOGGING OPERATIONS

Addressees:

All well-logging licensees.

Purpose:

The U.S. Nuclear Regulatory Commission (NRC) is issuing this Information Notice (IN) to alert addressees to several events, some of which resulted in oilfield workers receiving radiation doses in excess of 1.0 millisievert (mSv) [100 millirem (mrem)] per year, NRC's dose limit for members of the public. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this IN are not new NRC requirements; therefore, no specific action nor written response is required.

Description of Circumstances:

During May 2002, NRC conducted a reactive inspection to review an event involving the loss of control of a cesium-137 (Cs-137) well-logging source and the unintended radiation exposure to several members of the public (rig workers). During the course of the inspection, NRC performed interviews with several individuals from various well logging licensees and equipment manufacturers. Based on these interviews and by observation of source-handling techniques employed by multiple well-logging licensees, the inspection team determined that well-logging sources do, periodically, fall off the handling tools during source transfers. However, compared to the overall number of well-logging operations, these incidents are infrequent and when they do occur, the logging crews usually identify the fact that the source has become detached, and recovery of the source is accomplished quickly and safely.

Although the number of incidents where loss of control occurs may be small in comparison to the total number of successful source transfers accomplished each day by well-logging licensees, the potential for unnecessary exposures, and of exposures exceeding NRC's dose limit to members of the public, is high whenever such an event occurs. The inspection disclosed that the licensee had experienced several additional instances similar to the May 2002 event, in which logging personnel failed to identify when sources were improperly transferred to their

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shielded containers and loss of control occurred. In at least two of the instances, oil/gas rig workers were inadvertently exposed to radiation. In each instance a contributing cause regarding the loss of control and exposure events was the failure of licensee personnel to perform an adequate survey of source shields (transport containers) and/or the source transfer area, before leaving the site.

Examples of events the licensee experienced during the past 15 years in NRC and Agreement State jurisdictions are described below. A contributing cause in each of these events was the failure of the logging crew to perform a radiation survey of the source container or well area before leaving the site.

- The May 2002 event involved the loss of control of a nominal 48-gigabecquerel (GBq) [1.3-curie (-Ci)] Cs-137, source which was left unshielded on the rig floor. This incident resulted in 31 members of the public (drilling-rig workers) receiving unnecessary radiation exposures, 13 of whom received doses in excess of 1.0 mSv (100 mrem). The licensee's review of the incident determined that the logging engineer accidently pulled the source back out of the shield at the conclusion of the source-transfer procedure.

- In 2001, an event occurred involving the loss of control of a nominal 63 GBq (1.7 Ci) Cs-137 source which was left unshielded on the rig floor. This incident resulted in 16 members of the public (drilling-rig workers) receiving unnecessary radiation exposures, seven of whom received doses in excess of 1.0 mSv (100 mrem). The licensee's review of the incident determined that the logging engineer accidently pulled the source back out of the shield at the conclusion of the source-transfer procedure.

- In 1987, control of a nominal 592 GBq (16 Ci) americium-241 neutron source was lost when, after removing the source from the logging tool, the engineer placed the handling tool, with the source still attached, on the catwalk section of the drill rig and left the site. The source remained on the job site, unshielded, for approximately 1 day.

Discussion:

Although 10 CFR Part 39, "Licenses and Radiation Safety Requirements for Well Logging," does not specifically require that a licensee perform a radiation survey of source containers before leaving a temporary job site, 10 CFR 39.63 (c) does require licensees to develop and follow written operating procedures involving methods and occasions for conducting radiation surveys. Section 20.1302 of 10 CFR Part 20, "Standards for Protection Against Radiation," requires that a licensee perform adequate surveys to ensure compliance with the radiation dose limits for individual members of the public. In this regard, the inspection team noted that each well-logging licensee interviewed during the inspection did in fact have standard operating procedures in place requiring logging personnel to perform some type of confirmatory radiation survey, before leaving the well site, to confirm the proper transfer of sealed sources to their shielded containers. The inspection team also concluded that, for each of the events described

above, if a radiation survey had been properly conducted, the logging crews would have been alerted to the fact that the sources were not properly shielded, thereby avoiding unnecessary exposures to members of the public (rig workers).

The regulations in 10 CFR 20.1802 require that licensees "... control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and not in storage." NRC considers a licensee's failure to secure or constantly maintain surveillance of licensed material a significant safety issue. Implementation of adequate oversight and control practices is intended, in part, to prevent: (1) inadvertent exposure of workers and members of the public to radioactive material; and (2) the loss or theft of licensed material. Because of NRC's concern over licensee failure to maintain control and constant surveillance of licensed material, such violations have normally been categorized in accordance with the "General Statement of Policy and Procedure for Enforcement Actions" (Enforcement Policy), NUREG-1600, at Severity Level III. Issuance of escalated enforcement for such actions may also subject licensees to a civil penalty and increased inspection effort.

Direct, Contributing, and Root Causes

In summary, the direct, contributing, and root causes for the May 2002 event are:

- The direct cause of the event was the failure of a logging engineer to properly transfer the Cs-137 source to its storage container immediately after removal of the source from the logging tool. This led directly to the loss of control event, without any additional intervening actions.

- Contributing causes of the event included: (1) the failure to perform appropriate radiation surveys; (2) a false indication by the source shield plug assembly; and (3) the failure to include a design specification for the cable attachment for the plug assembly.

- It appears that the investigation of the similar events did not focus sufficient attention on why improper source transfers continue to happen, and why logging engineers failed to conduct proper radiation surveys.

- The root cause of the event was the licensee's failure to investigate precursor events adequately, focusing primarily on the direct cause of events and not on factors that made recurrent events more probable. Consequently, the licensee's limited review of precursor events failed to prevent similar incidents from happening.

Although individual licensees are not required to take any specific action, they should consider reviewing the contents of this IN with those responsible for well-logging source transfers, to reinforce the need and importance of confirming the proper transfer of sources from logging tools to their respective shielded transport containers, before leaving the well site.

This IN requires no specific action nor written response. If you have any questions about the information in this notice, please contact the technical contact listed below, or the appropriate regional office.

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Attachments:
1. List of Recently Issued NRC Information Notices
2. List of Recently Issued NMSS Information Notices