UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

September 29, 2000

Larry Hatley, Plant Manager
Muskogee Generating Station
Oklahoma Gas & Electric Company
P. O. Box 321
Oklahoma City, Oklahoma 73101

SUBJECT: NRC INSPECTION REPORT 999-90004/00-01

Dear Mr. Hatley:

On May 22-23, 2000, the NRC conducted a reactive inspection of activities associated with the use of generally-licensed sources at Oklahoma Gas & Electric Company's (OGE) Muskogee Generating Station, Fort Gibson, Oklahoma. The inspection was prompted by your notification of the loss of a source previously used in a nuclear gauge for level control at your Muskogee Generating Station.

The inspection included a review of relevant records, a search and radiation survey of plant facilities, interviews of your staff on May 22-23, 2000, and our review of records subsequently provided to us by your staff. The inspection findings were discussed with Mr. Bill Hall of your staff during a telephonic exit briefing on September 27, 2000. The enclosed inspection Report 999-90004/00-01 documents the NRC's review of this incident.

The NRC considers the loss of byproduct material to be of concern because of the potential for members of the public to receive unintended and possibly significant radiation exposures, the potential for contamination of other material, and the impact on the environment of improper disposal of byproduct material. Although OGE had some controls in place, as described below, to prevent improper disposal of generally-licensed material, in this case OGE personnel should have exercised greater caution in evaluating the physical and radiological condition of the source heads immediately after the warehouse containing the source heads was destroyed by a tornado. The loss of the source may have been prevented if licensee personnel had physically examined and surveyed each source head to insure that each radioactive source was in its fully shielded position.

Based on information developed during the inspection and information provided in your 30-day report dated May 26, 2000, the NRC has determined that a violation of 10 CFR 31.5 occurred. 10 CFR 31.5 requires, in part, that each general licensee shall transfer or dispose of a device containing byproduct material only by transfer to a person holding a specific license to receive the device, or to another general licensee only if the device is used at a particular location. However, the NRC's Interim Enforcement Policy for Generally-Licensed Devices Containing

NMED No. 000331

Byproduct Material states that, enforcement action normally will not be taken for violations of 10 CFR 31.5, if the violations are identified by the general licensee, and reported to the NRC if reporting is required, and if the general licensee takes appropriate corrective action to address the specific violations and prevent recurrence of similar problems. NRC concluded that OGE identified the fact that a source was missing, notified NRC of the loss of that source in a timely manner, and implemented appropriate corrective action. Therefore, the NRC is exercising discretion in accordance with the interim policy and no enforcement action is being taken.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available **electronically** for public inspection in the NRC Public Document Room **or** from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room)."

Should you have any questions concerning this letter, please contact Mr. Richard Leonardi at (817) 860-8187 or Mr. Mark R. Shaffer at (817) 860-8287 of my staff.

Sincerely,

/RA/

Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket No. 999-90004
License No. General License Pursuant to 10 CFR 31.5

Enclosure:
NRC Inspection Report
999-90004/00-01

cc w/enclosure:
Oklahoma Radiation Control Program Director

bcc w/Enclosure 1 to DCD (IE-07):

bcc w/Enclosure 1 (via ADAMS distrib):
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DDChamberlain
LLHowell
MRShaffer
CLCain
GFSanborn
RALeonardi
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	999-90004
License No.:	General License Pursuant to 10 CFR 31.5
Report No.:	999-90004/00-01
Licensee:	Oklahoma Gas & Electric Company
Facility:	Muskogee Generating Station
Location:	Fort Gibson, Oklahoma
Dates:	May 22 through September 27, 2000
Inspectors:	Richard A. Leonardi, Jr., Health Physicist Randy R. Erickson, Health Physicist
Approved By:	Mark Shaffer, Chief Nuclear Materials Inspection Branch
Attachment:	Supplemental Inspection Information

EXECUTIVE SUMMARY

Oklahoma Gas & Electric Company, Muskogee, Oklahoma
NRC Inspection Report 999-90004/00-01

This reactive inspection was conducted in response to a report of the loss of a generally-licensed sealed source by Oklahoma Gas & Electric (OGE) to the NRC Operations Center on May 18, 2000. The inspection included a facility search and survey, a review of circumstances associated with the use of licensed materials, and a review of the licensee's radiation protection program as it related to the possession and use of generally-licensed sources and devices.

Purpose of Inspection and Licensee Program Overview

- The purpose of the inspection was to review the facts associated with the loss of a generally-licensed sealed source. The licensee has possessed and used sealed sources contained in fixed nuclear gauges used throughout the generating plant to measure fly ash levels in fly ash hoppers under the provisions of a general license pursuant to 10 CFR 31.5 (Section 1).

Loss of Source Incident Description

- The sequence of events were based on: interviews of OGE personnel involved with the event; a review of OGE's written 30-day report; the interview of pertinent nuclear gauge manufacturer personnel; the interview of personnel associated with a sealed source service company; and the review of licensee source use records (Section 2).

Source Recovery Efforts

- Attempts by OGE, NRC, and Oklahoma Radiation Management Section personnel to locate and recover the missing sealed source were unsuccessful. A search and survey of OGE's facility, a metal recycling facility, and a general refuge disposal company facility failed to locate the missing source (Section 3).

Event Causes

- The direct cause leading to the loss of the cesium-137 sealed source was attributed to damage of the source head, providing a means for the source to detach itself from the source head, and it is believed the source was subsequently removed during the clean-up operation by any one of several metal and refuge salvage companies.

- Contributing causes included: (1) failure of licensee personnel to physically examine each of the gauge source heads for visible damage after a tornado spilled the source heads onto the warehouse floor; and (2) failure of licensee personnel to have performed a radiation survey of each source head after the above damage to the warehouse to ensure that each source head still contained its radioactive source.

- The probable root cause of the event was the licensee's failure to identify that a nuclear gauge had been damaged as a result of a tornado that damaged a warehouse containing 33 nuclear gauges in storage. The loss of the source may have been prevented if licensee personnel had examined and surveyed each source head to ensure that each radioactive source was in its fully shielded position (Section 4).

Regulatory Significance

- Although the missing sealed source was not transferred in accordance with provisions of 10 CFR 31.5 (c)(8), NRC's interim enforcement policy for generally-licensed devices provides for exercising enforcement discretion and no violations are being cited based on the circumstances of this case.

Exit Meeting Summary

- The inspection findings were presented to OGE management via a telephonic exit briefing on September 27, 2000. During the exit briefing, the NRC Enforcement Policy was discussed with licensee management. No proprietary information was identified.

Report Details

1 Purpose of Inspection and Licensee Program Overview (87114)

1.1 Inspection Scope

The inspector reviewed the license application, supporting documents, and other records maintained by the licensee. Collectively, these documents describe the licensee's radiation safety program. Interviews with licensee personnel were also conducted.

1.2 Observations and Findings

On May 18, 2000, OGE reported the loss of a 7.4 gigabequerel (200 millicurie) cesium-137 sealed source contained in an Ohmart Model SHDP (Serial Number 977) gauge source head to NRC's Operations Center and the NRC Region IV office. The OGE radiation safety officer (RSO) stated that he became aware that a sealed source was missing as a result of a telephone notification from Radiation Technology, Inc.(RTI), OGE's sealed source service vendor, that a sealed source was missing from a gauge source head that had been picked up for final disposal. NRC Region IV initiated a reactive inspection to review the circumstances associated with the event, and to review pertinent aspects of the licensee's radiation safety program.

OGE operates the Muskogee Generating Station and until recently, possessed 56 generally-licensed gauges to control fly ash levels in processing and storage hoppers throughout OGE's facility under NRC license (License 35-19819-03). Just prior to NRC's arrival at OGE's facility on May 22, 2000, the licensee had transferred 33 generally-licensed nuclear gauges to RTI, a sealed source service vendor, on May 13, 2000. Upon arrival at RTI's facility in Odessa, Texas, RTI personnel unloading the 33 gauge source heads discovered that the sealed source for Ohmart Model SHDP (Serial No. 977) was missing from its source head.

1.3 Conclusions

The licensee's use of licensed materials appeared to follow the requirements contained in 10 CFR 31.5.

2 Loss of Source Incident Description (87114, 87103)

2.1 Inspection Scope

The inspector interviewed OGE personnel involved with the incident, contacted the sealed source device manufacturer regarding the source head description, reviewed pertinent source records maintained by the licensee, and conducted a search and

radiation survey of OGE's facility, and visited a metal recycling company in Muskogee, Oklahoma.

2.2 Observations and Findings

Based on interviews with OGE personnel and a review of OGE's written report dated May 26, 2000, the sequence of events involving the incident were as follows:

- In March 1982, OGE purchased 32 Ohmart fixed nuclear gauges and had them installed on fly ash hoppers for level control at its Muskogee Generating Station.

- March 1983, OGE was having problems getting the level gauge systems to work, and contacted the gauge supplier for assistance.

- In April 1984, OGE relocated the level gauge detectors in an effort to get the systems to work.

- In February 1991, 14 level gauge heads (including the missing source/source head No. 977) were returned to the gauge supplier for repair of remote shutter cables.

- In June 1998, OGE removed 32 Ohmart Model SHDP gauge source heads and one Kay-Ray Model 7063P source head from service, and these source heads were placed in two fiberglass bins (side-panel pallets) and placed in an upright storage rack in OGE Warehouse No. 3 (hereafter Warehouse 3).

- In June 1999, a tornado struck the Muskogee Generating Station and demolished Warehouse 3, leaving the two source head storage bins turned over and spilling the source heads on the warehouse floor. OGE personnel recovered all source heads and along with the two storage bins, they were relocated to OGE's Warehouse 7. OGE indicated that all source heads were accounted for but a survey on each individual source head was not performed at the time of the recovery.

- In June 1999, after the tornado had demolished Warehouse 3, OGE contracted with a Muskogee metal recycling company and at least two general refuge companies to come in and remove the debris from the Warehouse 3 concrete foundation, and have the collected debris disposed of either through reprocessing or final disposal in the area sanitary landfill.

- On May 11, 2000, RTI arrived at OGE to prepare the 33 source heads that were to be transferred from OGE to RTI. RTI leak tested each source head and packaged the source heads for shipment.

- On May 13, 2000, RTI departed OGE's facility with 33 source heads and returned to RTI's processing facility in Odessa, Texas, arriving the same day. Upon arrival, RTI personnel began removing the sealed sources from each

source head, at which time RTI personnel discovered that the sealed source from Ohmart Model SHDP (Serial No. 977) gauge was not in its source head.

- RTI was unable to contact the RSO with OGE on either May 13 or 14 but OGE's RSO was notified of the missing sealed source on May 15, 2000.

- On May 15-17, 2000, OGE's RSO and personnel searched for the missing sealed source and used a Victoreen Minimonitor survey instrument to conduct area surveys during OGE's facility search. No evidence of the missing source was found.

- On May 18, 2000, OGE's RSO notified NRC's Operation Center and NRC Region IV of the missing source.

- On May 22-23, 2000, inspectors from NRC Region IV traveled to OGE's Muskogee Generating Station and conducted a detailed search and radiation survey of OGE facilities. NRC was unable to locate the missing source.

- On May 23, 2000, NRC inspectors visited a metal recycling company in Muskogee and determined that the facility utilized a radiation gate monitor that had been in operation prior to the June 1999 tornado that damaged OGE's Warehouse 3. The metal recycling company indicated that its radiation monitor had not identified a source of radiation that had come through the company's entrance gate and fit the description of the missing source.

- In early June 2000, personnel from Oklahoma's Department of Environmental Quality, Radiation Management Section (DEQ), visited a refuge disposal company in Muskogee, Oklahoma, known to have picked up refuge at OGE after the tornado, and conducted a radiation survey of the refuge company's facilities. No evidence of a radioactive source was found.

2.3 Conclusions

The sequence of events described above accurately depicts the time-line of events, in which the location of the missing source remains unknown. The source was most likely removed during the clean-up operation of Warehouse 3 after the tornado of June 1999, and the source was either processed as scrap metal, or was buried in an area sanitary landfil.

3 Source Recovery Efforts (87114, 87103)

3.1 Inspection Scope

The inspection describes OGE's efforts to locate the missing sealed source, as well as NRC Region IV 's attempt to locate the missing source.

3.2 Observations and Findings

During discussions with the RSO, he indicated that OGE was notified of the missing source by their source disposal service vendor on May 15, 2000. The RSO immediately initiated a search and radiation survey of locations on OGE's facilities where the missing source might be located. Only after the RSO was unsuccessful in locating the source did he notify the NRC of the missing source.

NRC inspectors conducted an independent search and survey of OGE facilities using a sensitive high energy gamma (sodium iodide) detector. The survey included a drive-through of OGE facilities outside of the plant operating facilities, as well as locations within plant operations. This search and a radiation survey was not successful in locating the missing source.

NRC inspectors visited a local metal recycling company that was involved in the routine collection of scrap metal generated by OGE, and was involved in the clean-up of metal debris after the tornado in 1999. The inspectors determined that this metal recycling company had in place at the time of the damage to OGE's Warehouse 3, a radiation monitor located at its entrance that screened all incoming and outgoing loads of metal processed through the metal recycling company's facilities. In discussions with the company's president and owner, he indicated that the facility radiation detection system had not detected any source of radiation during calendar years 1999 and 2000 that was not identified and the proper actions taken. He was confident that a source of the activity described above would be easily detected with his gamma detection system, and that no such source had been through his facility.

In a separate action, members of the Oklahoma DEQ, visited a general refuge collection company's facilities in Muskogee, Oklahoma, and conducted a radiation survey of this company's facilities in search of the missing source. This search and survey was also unsuccessful in locating the missing source.

3.3 Conclusions

Attempts by OGE, NRC, and Oklahoma DEQ personnel to locate and recover the missing sealed source was unsuccessful. A search and survey of OGE's facility, a metal recycling facility, and a general refuge disposal company facility failed to locate the missing source.

4 Event Causes (87114, 87103)

4.1 Inspection Scope

The inspection included interviews with OGE personnel, a review of records associated with the licensee's use of nuclear gauges, and a tour of OGE facilities.

4.2 Observations and Findings

Based on a review of diagrams contained in the device's sealed source and device registry, and photographs of the damaged source head (Serial No. 977) provided by OGE's source service vendor, it appears that the remote shutter cable access is connected to various rods and springs and eventually a succession of rods come into contact with the source rod. It appears possible that the remote cable and cable access sleeve (metal pipe fitting) were sheared-off the bottom of the source head in question during the time the source heads were spilled out of the bins as a result of the force of the tornado that demolished the warehouse building containing the source heads. This condition had the potential of causing the various rods and springs holding the source rod to fall out of the source head, thus allowing the source rod to move through the source channel and out of the shielded body of the source head.

Based on interviews of OGE's RSO and plant electronics personnel, the review of a event report from OGE, and the review of information provided by OGE's source service vendor, the direct cause leading to the loss of the cesium-137 source was attributed to the damage of the source head containing the cesium-137 source, thus providing a means for the source to detach itself from the source head. The detached source is believed to have been removed during the clean-up activities by various metal and refuge salvage companies. During discussions with OGE's RSO regarding source head recovery activities, he indicated that OGE personnel were concerned with accounting for all 33 source heads, and did not examine each source head for evidence of physical damage. In addition, the RSO stated that during the source head clean-up, OGE personnel did notice that some of the gauge's remote shutter cables were separated from their respective source heads, but personnel were not concerned, since all source heads had been found and had been placed back into the fiberglass storage bins.

During discussions with OGE's RSO, the inspectors identified contributing causes that lead to the loss of the source. These included the failure of licensee personnel to physically examine each source head after the tornado damage to ensure that all source heads were in good condition. The RSO indicated that OGE personnel involved in the source head clean-up did not mention that any source head had been damaged and required repair. The RSO speculated that since OGE personnel were aware that the gauges would not be used again, perhaps personnel were not that concerned regarding the condition of the source heads after the damage caused by the tornado.

Another contributing cause was OGE personnel's failure to perform a radiation survey of each of the 33 source heads immediately after the source heads were involved in the tornado damaged warehouse, and prior to the same source heads being transferred to OGE's sealed source service vendor. The licensee possessed a survey instrument capable of detecting the presence of radiation from a sealed source in each of the source heads that were in storage. If licensee personnel had taken the time to survey each source head prior to the transfer of the recovered source heads to Warehouse 7, it is likely that personnel would have discovered that a source was missing from its source head. Knowing the high dose rate from an unshielded cesium-137 source of this activity (200 millicuries), the survey instrument used by OGE most likely would have detected elevated radiation levels at a distance of several feet away from the area where the source heads were in storage in the damaged warehouse.

The probable root cause was the licensee's failure to recognize the possibility that a source head could have been damaged, and the possibility that the source could have become detached from the source head. This led to the failure of OGE personnel to have identified that a source head had been damaged after the tornado spilled the source heads on the warehouse floor. The inspector determined that the RSO had received extensive training in radiation safety including a 3-day radiation safety training course in 1994, and a 40-hour "Installation and Nuclear Radiation Safety Course" in 1996. The 3-day course in 1994 included radiation safety training in the event of radiation emergencies, including measures to be taken in the event of source leakage, spills, loss of source, and injuries involving radioactive material. Having received this training, the RSO failed to ensure that each sealed source was secure in its source head following the damage to Warehouse 3. The failure to properly evaluate each of the 33 source heads for possible damage, including a physical examination and radiation survey of each source head prevented OGE personnel from identifying that a source was missing from a source head.

4.3 Conclusions

The inspection identified the damaged source head as the direct cause that lead to the loss of the source. Contributing causes included, a failure to examine each source head prior to transferring them to a second warehouse, and failure of licensee personnel to have performed a radiation survey of each source head to ensure that each source head still contained its radioactive source. The probable root cause was the licensee's failure to recognize the possibility that a source head could have been damaged, and the possibility of its source becoming detached from the source head.

5 Regulatory Significance (87114, 87103)

5.1 Inspection Scope

The inspector interviewed licensee personnel involved in the incident and reviewed licensee actions in response to the discovery of the missing source to determine if the licensee was in compliance with NRC rules and regulations.

5.2 Observations and Findings

The inspector reviewed pertinent sealed source use records, interviewed OGE's RSO and licensee personnel, and interviewed source supplier personnel, to determine the facts surrounding the disposition of the missing source. The licensee possessed and used sealed sources in nuclear gauges under the provisions of a general license pursuant to 10 CFR 31.5. Representatives of the gauge supplier verified that the gauges involved in the incident had been manufactured and distributed under a specific license which authorized the distribution of the source within the gauge to persons subject to a general license.

Based on the previous discussion of the possible separation of the missing sealed source from its source head, followed immediately by the clean-up of Warehouse 3 debris by several recycling and debris removal companies, two probable disposal pathways were identified. The missing sealed source capsule was probably recovered by a metal recycling company and was ultimately sent to a metal smelter for processing, or the source capsule was picked up by one of the general refuge companies and the source capsule was buried in a local sanitary landfill.

10 CFR 31.5 requires, in part, that each general licensee shall transfer or dispose of a device containing byproduct material only by transfer to a person holding a specific license to receive the device, or to another general licensee only if the device is used at a particular location. Current NRC enforcement policy pertaining to generally-licensed devices containing byproduct material (10 CFR 31.5) includes an interim policy that states that enforcement action will normally not be taken for violations of 10 CFR 31.5, if the violations were identified by the general licensee, reported to the NRC if required, and if the general licensee takes appropriate corrective action to address the specific violations, and prevent recurrence of similar problems. Exceptions to this interim policy were reviewed and the exceptions do not apply in this situation.

The inspector determined that OGE did identify the fact that a sealed source was missing from its inventory, and the licensee notified the NRC of the loss of radioactive material as required. In addition, OGE has implemented corrective measures to prevent a recurrence of similar problems, including annual safety meetings to discuss nuclear safety. Based on the above interim policy, NRC has decided to use enforcement discretion and not take enforcement action.

5.3 Conclusions

The inspection determined that, although the missing sealed source was not transferred in accordance with provisions of 10 CFR 31.5 (c)(8), NRC's interim enforcement policy for generally-licensed devices provides for exercising enforcement discretion and no violations are being cited based on the circumstances of this case.

6 Exit Meeting Summary (87110)

On September 27, 2000, a final telephonic exit briefing was held with OGE's Plant Manager and RSO to review the findings as presented in this report. Licensee representatives acknowledged the inspector's findings. No proprietary information was identified.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

S. Goebel, Superintendent of Equipment Support
B. Hall, RSO
B. Lester, OG&E Plant Electrician

Others

C. Brock, Customer Support Manager, Ohmart Customer Service
D. Bryan, Manager of Licensing & Regulatory Affairs, Radiation Technology, Inc.
T. Faulk, General Manager, Whittinghill Disposal Services
H. McCutchen, President, Yaffe Iron & Metal Co., Inc.
M. Broderick, Administrator, Oklahoma Radiation Management Section, DEQ

INSPECTION PROCEDURES USED

87114 Fixed and Portable Gauge Programs
87103 Inspection of Material Licensees Involved In An Incident or Bankruptcy Filing

ITEMS OPENED, CLOSED AND DISCUSSED

Opened
None

Closed
None

Discussed
None

List of Acronyms Used

CFR	Code of Federal Regulations
DEQ	Department of Environmental Quality
NRC	Nuclear Regulatory Commission
OGE	Oklahoma Gas & Electric Services
RSO	radiation safety officer
RTI	Radiation Technology, Inc.