



OFFICE OF  
**INSPECTOR GENERAL**  
U.S. DEPARTMENT OF THE INTERIOR

# PORTABLE NUCLEAR GAUGES



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Memorandum

To: Michael S. Black, Director, Bureau of Indian Affairs  
Robert V. Abbey, Director, Bureau of Land Management  
Michael L. Connor, Commissioner, U.S. Bureau of Reclamation  
Marcia McNutt, Director, U.S. Geological Survey

From: Kimberly Elmore *Kimberly Elmore*  
Assistant Inspector General for Audits, Inspections, and Evaluations

Subject: Final Evaluation Report – Portable Nuclear Gauges  
Report No. C-EV-MOA-0010-2010

This memorandum contains our findings and recommendations pertaining to the portable nuclear gauge radiation protection programs of the U.S. Department of the Interior bureaus, including the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Bureau of Reclamation (USBR), and U.S. Geological Survey (USGS). We evaluated these programs because misuse of a portable nuclear gauge poses a radiation hazard and creates a potentially high-dollar impact if lost, stolen, or improperly disposed. Although we found some encouraging practices used by the bureaus, we also found some shortcomings that should be addressed to strengthen management of these gauges.

**Background**

Gauges are portable tools that use small radioactive sources to determine moisture and density levels for various types of projects. BIA, BLM, and USBR use gauges to engineer roads and other construction projects. USGS uses gauges to take scientific measurements of moisture content in soils above the water table.

Gauges contain radioactive sources harmful to users and to the public if not properly stored, used, transported, and disposed. Because of these radioactive materials, the U.S. Nuclear Regulatory Commission (NRC) regulates them, in part, by issuing licenses and performing compliance inspections.

Since several types of NRC licenses exist, individual licenses may differ. For specific gauge licenses, NRC generally requires that a radiation safety officer (RSO) manages the license holders' radiation protection program and ensures compliance with all NRC requirements, including license conditions. NRC requires RSOs and gauge users to have appropriate training in the safe use, storage, and transportation of gauges. This includes refresher training every 3 years on the transportation of hazardous materials as required by the U.S. Department of

Transportation. NRC also requires licensees to conduct annual self-reviews of their programs and to maintain program records.

The Departmental Manual's Safety and Occupational Health Program Chapter 21, Part 485 titled "Radiation Safety" requires each bureau to have a written radiation safety program. Each bureau has a designated safety and health official, as well as safety managers who oversee specific safety programs, including radiation protection. The radiation safety program requires a qualified officer to oversee radiation safety at each applicable facility.

At DOI, seven NRC licenses are held by BIA, BLM, USBR, and USGS. These four bureaus manage about 30 portable nuclear gauges in 9 states. BIA has 3 licenses in 3 states (15 gauges); BLM has 1 license in 1 state (2 gauges); USBR has 2 licenses in 2 states (5 gauges); and USGS has 1 license with gauge permits in 3 states (8 gauges). Eight licenses for gauges have been terminated since 2006, reducing the total number of gauges by about two-thirds.

## **Findings**

Overall, we found gauges to be properly secured during storage and transportation. We also noted a decrease in the number of violations issued by NRC during their inspections. We found, however, a number of shortcomings in program management that could pose safety risks and lead to additional NRC violations in the future. Specifically, we evaluated seven key areas related to the bureaus' nuclear gauge programs, and found deficiencies in six of these areas as shown in our Attachment 1 summary table.

Although we found that the BIA radiation safety and protection program demonstrated the most deficiencies out of all the programs we reviewed, its Muskogee, OK, program proved to be the best program we observed across all the bureaus. The level of care and security focus there could be modeled as a best practice by all bureau radiation safety programs. Similarly, because BLM and USBR already have sound gauge use policies in place and because they use gauges in much the same way as BIA, BIA could benefit from reviewing their policies and retooling them to fill its own policy gap.

We are pleased that, during our field data collection process, each bureau and RSO began to take corrective actions to address the issues we identified. We note that problems with user training, annual self-reviews of programs, and recordkeeping could have been avoided with adequate RSO training. Appropriate training would have permitted RSOs to be better prepared to understand the requirements of effective program management.

## **Recommendations**

Based on the Bureaus' responses to our draft report, we consider one recommendation resolved, but not implemented and the other recommendation resolved and implemented (Attachment 2).

We recommend that:

1. BIA promptly develop the required bureau-wide policy for radiation safety and protection of portable nuclear gauges.

**BIA Response:** BIA informed us that the Office of Facilities, Environmental, and Cultural Resources concurred with the findings and will have a policy completed in December 2011.

**OIG Reply:** We consider this recommendation resolved, but not implemented.

2. All bureaus develop and implement plans to address and remedy noted deficiencies within 6 months of receipt of this evaluation.

**BIA Response:** BIA concurred with our findings except for the issue South Dakota RSO training. BIA noted that the RSO training is only required once and that the South Dakota RSO had received RSO training in 2006. BIA also responded that corrective actions have already been taken to correct the other deficiencies identified in the report, including RSO training in Wisconsin, user refresher training in both South Dakota and Wisconsin, and an annual self-audit in Wisconsin.

**OIG Reply:** The issue with the South Dakota RSO was that he was overdue for hazardous materials transportation refresher training, rather than that his RSO-specific training had not been taken. Records indicated that the South Dakota RSO had taken RSO training in 2006, but his responsibility for safe transportation of gauges classified as a hazardous material required the RSO also to be current with transportation refresher training, due in 2009. With their response, BIA provided a copy of the transportation refresher training certificate for the South Dakota RSO, dated 2011. We consider this recommendation resolved and implemented by BIA.

**BLM Response:** BLM has two active nuclear gauges located in Lewistown, Montana. To address this recommendation as it pertains to BLM's required record keeping, BLM has appointed an RSO in the Montana State Office to be responsible for ensuring leak tests are conducted, training is provided, and accurate records are maintained in accordance with NRC's license. BLM's occupational health manager will assume oversight of these nuclear gauge devices as part of the overall radiation safety program. Copies of all records pertaining to these devices (leak tests and training) will be kept in BLM's Washington Office.

BLM has taken actions to address the record keeping findings and requests that OIG consider this recommendation implemented by BLM.

**OIG Reply:** We consider this recommendation resolved and implemented for BLM.

**USBH Response:** OIG identified two areas (written radiation protection program and an annual self-review) that needed improvement, both located in the Yuma Area Office

(YAO). YAO developed and approved the radiation protection program on July 11, 2011 and conducted an annual self-review in August 2010, providing OIG with copies of the review on November 5, 2010. USBR believes that the two areas identified by OIG as needing improvement should be revised to show that these areas are without shortcomings.

**OIG Reply:** We acknowledged in the body of our report that USBR took corrective action during our evaluation. We consider this recommendation resolved and implemented for USBR.

**USGS Response:**

*RSO Training* – At the time of the evaluation, the RSO was an interim appointment (collateral duty). Due to the expected short term of this appointment, the interim RSO was not required to receive detailed training on all possible radiation safety subjects. The NRC's NUREG 1556, Vol. II, does acknowledge that the RSO cannot be an expert in all areas of the broad scope program. NRC accepted the interim RSO's qualifications without recommending or requiring any additional training. The RSO did complete a course on hazardous materials safety during the time of the evaluation. This course is designed to meet NRC requirements for transportation of portable nuclear gauge operators. Since the OIG evaluation, a full-time health physicist was hired as RSO for the Denver license. The new RSO completed portable nuclear gauge training on July 8, 2011.

*Recordkeeping* – The RSO uses a recordkeeping system in Denver that has been in place for years prior to the OIG evaluation. This system contains hundreds of documents covering all projects under the Denver broad scope license. During the evaluation, OIG was shown the records, both hardcopy and electronic versions, on the radiation safety Web site, and was given hard copies of numerous records concerning the portable gauge users. The RSO and other radiation safety program employees present during the evaluation were not aware of any missing records that were sought by OIG. During a follow-up meeting, the OIG was shown the specific records in question and was satisfied that the records in question were present.

*User Training* – Carson City completed their latest refresher training in October 2010. As a result of the OIG evaluation, USGS determined that two out of the nine users were inactive and so were removed from the permit in February 2011. Also as a result of the evaluation, the Denver gauges were returned to the manufacturer in January 2011, since the Denver project is no longer active and the gauges are no longer in use. Both San Diego users are current in their training. One user was due for retraining in 2011 and has completed this refresher training. The second user's training is current through 2013. In a follow-up meeting, USGS presented its training records to the OIG. OIG concurred that the records were available and sufficient, as well as that a training cycle of every three years was acceptable. OIG assistance has been positive for USGS.

**OIG Reply:** During OIG's first meeting with the RSO, we were told that limited records were kept in Denver and that we would have to get the records we wanted from Carson City and San Diego. During this first visit, we also determined that the RSO had not

received required training. By the time of our final visit, all records appeared to be available in the Denver RSO office and, as stated by USGS, the RSO had taken the required training. We consider the recommendation resolved and implemented.

### **Scope and Methodology**

During the course of the review, we visited gauge locations, interviewed appropriate officials, and reviewed copies of pertinent documents.

We conducted this inspection in accordance with “Quality Standards for Inspections” adopted by the Council of Inspectors General on Integrity and Efficiency. We believe that the work performed provides a reasonable basis for our conclusions and recommendations.

If you have any questions about this report please contact me at 202-208-5745.

### Bureau and Primary Location of Gauge-holder RSO

| Issue                                  | BIA |    |    | BLM | USBR |    | USGS            |
|--|-----|----|----|-----|------|----|-----------------|
| Bureau-wide Policy                     | ✗   |    |    | ✓   | ✓    |    | ✓               |
| State Location                         | SD  | OK | WI | WY  | UT   | AZ | CO <sup>1</sup> |
| RSO Training                           | ✗   | ✓  | ✗  | ✓   | ✓    | ✓  | ✗               |
| Written Radiation Protection Program   | ✓   | ✓  | ✓  | ✓   | ✓    | ✗  | ✓               |
| Annual Self-Review of Program          | ✓   | ✓  | ✗  | ✓   | ✓    | ✗  | ✓               |
| User Transportation Refresher Training | ✗   | ✓  | ✗  | ✓   | ✓    | ✓  | ✗               |
| Required Recordkeeping                 | ✓   | ✓  | ✓  | ✗   | ✓    | ✓  | ✗               |
| Security                               | ✓   | ✓  | ✓  | ✓   | ✓    | ✓  | ✓               |

Figure I. Findings: the ✗ indicates an area needing improvement, the ✓ an area without shortcomings.

<sup>1</sup> USGS has one license. The RSO for this license was in Colorado. Under this license, USGS has three permits, one each in CO, CA, and NV. We grouped all of our findings under CO. All findings were the same at all locations.

**Status of Recommendations**

| <b>Recommendation</b> | <b>Status</b>             | <b>Action Required</b>  |
|-----------------------|---------------------------|---|
| 1                     | Resolved, not implemented | No further response to OIG is required for this recommendation. We will refer this to the Assistant Secretary for Policy, Management and Budget for tracking of implementation. |
| 2                     | Resolved and implemented  | No further action required.   |

Figure 2. Status of Recommendations



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