



**US Army Corps  
of Engineers**

# ENGINEERING AND CONSTRUCTION BULLETIN

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No. 2010-5

Issuing Office: CESO

Issued: 30 March 2010

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**Subject:** Safety Issues with Portable Density Gauges and Moisture-Density Gauges.

**Applicability:** Information and Guidance. This document is applicable to US Army Corps of Engineers (USACE) districts with a mission for support and oversight on USACE Construction projects.

**1. Purpose.** To provide necessary information for the identification of portable density gauge and moisture-density gauge usage on construction sites, as well as guidance on proper safety procedures and Army/USACE requirements.

**2. References.**

- a. Army Regulation (AR) 385-10, "The Army Safety Program," dated 07 November 2008.
- b. Department of the Army Pamphlet (DA PAM) 385-24, "The Army Radiation Safety Program," dated 24 August 2007.
- c. Army Corps of Engineers Manual (EM) 385-1-1, "Safety and Health Requirements," dated 15 September 2008.
- d. Code of Federal Regulations (CFR).
  - (1) 10 CFR, Part 20: Radiation Protection Programs.
  - (2) 10 CFR, Part 30: Rules of General Applicability to Domestic Licensing of Byproduct Material.
  - (3) 32 CFR, Part 655.10: Use of Radiation Sources by Non-Army Entities on Army Land.

**3. Background.** Density gauges and moisture-density gauges (hereafter, "gauges"), also called nuclear densimeters, are used on construction sites to determine compaction and/or moisture content of media such as soil, crush run, and asphalt for the construction of roads, buildings, and other projects. These portable gauges contain sealed sources of radioactive material (RAM) that produce ionizing radiation. Ionizing radiation may present a significant physical hazard which must be controlled or mitigated to ensure protection of workers and the public. The gauges are therefore licensed by the US Nuclear Regulatory Commission (NRC) or by an Agreement State<sup>1</sup>.

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<sup>1</sup> Certain States, called Agreement States, have entered into agreements with NRC that give them the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within their borders. Reciprocity with the NRC is necessary when an Agreement State licensed gauge is used on property under exclusive federal jurisdiction.

There are several manufacturers of gauges, including Troxler Electronic Laboratories and Humboldt, which are common to construction sites. These gauges are relatively small, approximately 1 cubic foot in size, not including the attached handle, and are easily overlooked and damaged by heavy machinery. Several incidents involving damage to gauges by heavy machinery have occurred on USACE construction projects in recent years resulting in NRC notices of violation and fines. These incidents not only increase the potential for unwarranted personnel radiation exposure, but can also create public affairs issues, which negatively affect project resources and customer relations. Additionally, there is a direct impact to project cost and schedule while construction is stopped for investigation, root cause analysis, retraining of personnel, and project restart. Finally, if the contractor using the gauge loses its NRC or State license to operate the gauge as a result of the violation(s), then the project may be shut down until a new contractor is obtained.

#### **4. Proper Use.**

a. USACE General Requirements. EM 385-1-1, Section 06.E.01, requires that the Government Designated Authority (GDA) be notified in writing of any RAM containing gauge brought onto a USACE construction site. This notification must include the following: a description of the device and its intended use, the location of use and storage of the device, and copies of any applicable licenses and/or permits.

EM 385-1-1, Section 06.E.02, requires that operations involving radiation hazards, use of radioactive material, or use of radiation generating devices shall be performed under the direct supervision of a Radiation Safety Officer (RSO), who is qualified and responsible for radiological safety as per the applicable license. Under no circumstances should a gauge be left unattended on a construction site. When not in use and/or under direct supervision of a Competent Person, gauges should be either locked in covered vehicle compartments, stored in a locked building, or removed from the work site to a proper storage location, as permitted by the license.

The project Accident Prevention Plan (APP) shall include an Activity Hazard Analysis (AHA) for all activities related to the gauge, including, but not limited to: use, storage, and transportation.

b. Use on Army Installations. Non-Army agencies (including other military services, vendors, and civilian contractors) require an Army Radiation Permit (ARP) to use, store, or possess ionizing radiation sources on an Army installation (32 CFR 655.10). Use of a RAM-containing gauge by any non-Army agency on a property controlled or utilized by the Army requires the issuance of an Army Radiation Permit (ARP) by the Installation Commander prior to the gauge being brought onto the installation. The permit application should be submitted to the Installation Commander at least 30 days prior to bringing the gauge onto Army property and must include a copy of the current license as well as any notices of violation issued by the licensing agency pertinent to the license (DA PAM 385-24).

c. Non-Army USACE Construction Sites. Any contractor or vendor must possess a valid NRC or Agreement State radioactive material license to possess a RAM-containing gauge. The property owner and property safety officer (if applicable) of the non-Army construction site must be notified prior to bringing a gauge onto the construction site.

**5. Emergency Response.** A licensee should bring a copy of its operating and emergency response procedures to each job site. These procedures should include instructions for using the portable gauge according to the manufacturer's recommendations, instructions for maintaining security during storage and transportation, instructions to keep the gauge under control and surveillance during use, steps to


control access to a damaged gauge, and steps to take, and whom to contact when a gauge has been damaged.

The project APP should reference the licensee's procedures for emergency response in the event of a lost or damaged gauge, or when it is suspected that an unwarranted exposure to ionizing radiation has occurred. At a minimum, the project RSO and USACE District Safety Office shall be contacted immediately for further guidance. Contact information for the project RSO and District Safety Office shall be posted with high visibility on the Construction site. Additionally, the USACE Radiation Safety Support Team (RSST), consisting of Health Physicists who specialize in radiation safety, is available to provide guidance on use, storage, transportation, and emergency response for RAM-containing gauges, and radiation generating devices. The RSST point of contact is the USACE Radiation Safety Staff Officer (402-697-2592).

## **6. Roles and Responsibilities.**

- a. The USACE Resident Engineer shall:
  - (1) Determine whether RAM-containing gauges will be used on the project to establish soil compaction and/or soil moisture content.
  - (2) Inform the USACE Safety Office that RAM-containing gauges will be used on the project.
  - (3) Instruct the onsite USACE representative to verify issuance of an ARP by the installation commander prior to the non-Army agency bringing a gauge on site.
  
- b. The USACE District Safety Office shall:
  - (1) Ensure the performance of random safety inspections to verify proper use and storage of gauges on USACE construction projects.
  - (2) Notify the USACE District RSO, if one has been designated, when gauges will be used on a USACE construction project.
  - (3) Ensure the project APP includes an Activity Hazard Analysis (AHA) for all activities related to the gauge, including, but not limited to: use, storage, and transportation.
  - (4) Provide assistance in response to a lost or damaged gauge, or when unwarranted personnel exposure is suspected.
  
- c. The onsite USACE representative for the project shall:
  - (1) Verify issuance of an ARP (if required) and receive written notification of the contractor's plan to bring a gauge onto a USACE construction project.
  - (2) Verify that the licensee has operating and emergency procedures in its possession and that the contact information in the procedures is accurate.
  - (3) Ensure prompt notification to the USACE District Safety Office in the event of a lost or damaged gauge, or when unwarranted personnel exposure is suspected.

## **7. HQUSACE POC is Andrea Pouliot, CESO, 202-761-8691.**

  
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