Chapter 12: Radon Monitoring

1. Purpose

This chapter establishes the procedures and responsibilities for implementing the Army Radon Reduction Program at Fort Greely Alaska (FGA). Radon is a naturally occurring radioactive gas found in soils, rock, and water. Radon forms from the decay of uranium and radium, elements that are naturally present in rock and soil. Indoor accumulations of Radon pose a serious health hazard. Radon causes lung cancer and is a threat to human health because it tends to collect in enclosed structures, sometimes to a very high concentration. Radon is a heavy gas, which accounts for its tendency to collect in basements. When Radon breaks down it produces charged particles that adhere to dust and other fine matter that can be inhaled and deposited in the lungs. Although Radon can also be ingested, almost all risk from Radon comes from inhalation. The purpose of this procedure is to establish monitoring, notification, and abatement procedures regarding Radon in accordance with established Army regulations.

2. Scope

This procedure is applicable to all installation activities, tenants, contractors, and other activities or personnel that occupy, use, build, repair or maintain facilities at FGA in accordance with Chapter 9 of both AR 200-1 and DA PAM 200-1 (Attachments 1 & 2).

3. Responsibilities

a. FGA Garrison Commander

The Garrison Commander is the responsible official for environmental compliance at FGA and provides overall policy and guidance associated with environmental compliance. The Commander will consult regularly with FGA Environmental (FGA ENV) to ensure that the installation's environmental policies and procedures are consistent with Federal, State and Army requirements and are properly implemented. The Commander will consult regularly with all installation tenant organizations and departments and facilitate resolution of conflicts regarding environmental matters that cannot be resolved at lower levels.

b. Installation Management Agency – Pacific Area Region (IMA PARO)

The IMA PARO oversees environmental management and compliance activities at FGA and provides resources for environmental program implementation. IMA PARO ensures FGA's environmental program conforms to DoD and Army requirements and provides policy and programmatic guidance to FGA ENV.

c. USASMDC Environmental Division (SMDC ENV)

SMDC ENV facilitates contractual support to FGA ENV upon request, and provides assistance when requested by FGA ENV with environmental program management and execution. SMDC ENV coordinates permitting activities with MDA and assists FGA ENV in liaison with state and federal regulatory agencies.

d. Missile Defense Agency – Ground-Based Missile Defense (GMD)

The GMD Site Manager manages all operations and activities at the Missile Field Complex (MFC). The Site Manager will ensure that all contractors and personnel providing services or conducting operations at the MFC comply with this procedure and related federal and state environmental requirements. The Site Manager will promptly consult with FGA ENV and/or the Garrison Commander, regarding any special considerations (e.g. security) or other issues that may affect environmental compliance at the MFC.

e. FGA Director of Public Works (FGA DPW)

The FGA DPW Director manages all DPW activities at FGA. The FGA DPW will ensure that all newly constructed buildings are monitored for Radon prior to occupancy. The FGA DPW will assure that all Radon test results are attached to the real property records, IAW AR 200-1, Chapter 9-2(d)(Attachment 1). The FGA DPW is responsible for notifying tenants of any elevated Radon levels IAW DA PAM 200-1, Chapter 9.3 (Attachment 2).

f. FGA Environmental Coordinator (FGA ENV)

As the Garrison Commander's environmental representative, the FGA ENV will be the point of contact for interface with Federal, State, and local environmental regulatory agencies on all environmental compliance matters associated with Garrison and tenant activities. The FGA ENV will provide technical support to the FGA DPW on Radon issues.

g. FGA Safety Officer (FGA SO)

The FGA SO will assist in making appropriate recommendations regarding the health risks involved and actions necessary in cases of elevated indoor radon levels.

4. Operations

a. General

All Army structures that are routinely occupied must have their radon levels measured. This is especially important for buildings with below ground-level offices, where radon gas accumulates. A priority of 1, 2, or 3 will be assigned by the FGA ENV to all facilities on Fort Greely in accordance with the DA PAM 200-1, Chapter 9-3 b. (9) (a)-(c) (Attachment 2), as follows:

(1) Priority 1. Daycare centers, hospitals, schools, and living areas (that is, family housing, bachelor officer quarters/bachelor enlisted quarters (BOQ/BEQ), and billets).
(2) Priority 2. Areas having 24-hour operations, such as operations and training centers or RDT&E facilities.
(3) Priority 3. All other routinely occupied structures.

Indoor radon levels should be measured in newly constructed units, in units converted to housing, and in continuously occupied structures not previously tested. A survey of all existing structures should be documented and on file in the FGA DPW office. Any facilities without the proper documentation will need to be tested. The testing will be overseen by the FGA ENV.

The unified facilities guide specifications (UFGS-13287N September 1999, Division 13, Section 13287N) should be used as guidance for radon reduction in new construction.

b. Monitoring

Radon monitoring should be done in accordance with EPA 402-R-92-003 and EPA 402-R-92-004 protocols. It is recommended that both long and short term monitoring be done inside buildings. For long term monitoring (91 days to 12months), the Alpha track (RADTREK) electret ion chamber or approved equivalent should be used. For short term monitoring (48 hours to 90 days), a charcoal, electret ion chamber or approved equivalent should be used.

EPA protocols require that both the type of monitor used and the exact location of the monitor in the building be documented. Samples will be sent to an EPA approved lab to determine the results. These logs are to be kept in the FGA DPW office along with the sample results and these documents should all become part of the real property record.

c. Monitoring Results

If any of the buildings test results show average levels over 4 picoCuries per liter (pCi/l), then the people who occupy the building must be notified and action must

be taken to mitigate the radon levels. The time frame for accomplishing mitigation is dependent upon the measured radon concentration and is presented in the following table.

Mitigation Time Frames From Receipt of Test Results

Radon Concentration (pCi/l)	Mitigation Required Within:
≥200	1 month or move the occupants
<200 to ≥ 20	6 months
<20 to ≥ 8	1-4 years (depending on the level of the measurement)
<8 to ≥ 4	5 years
<4	No action required

Occupants of Priority One facilities that contain elevated radon levels will be notified in writing by the either the Director FGA DPW or the Chief FGA ENV of specific test results, the planned or executed mitigation, and the results of any mitigation efforts. Occupants of priority two and priority three facilities with elevated radon levels will receive assessment results. Attachment 3 is a sample of a notification letter. Because radon levels vary from day to day, an additional assessment will be performed to obtain a better indication of the average radon level. If the results of that testing indicated average radon levels at or above 4.0 pCi/L, then mitigation measures to reduce the radon level will be evaluated and implemented.

IAW AR 200-1, Chapter 9-2(g) (Attachment 1), the FGA DPW will identify elevated radon levels to the Installation Medical Officer or the Civil Works District Safety and Occupational Health Officer for assessment of health risks. Since there is no such entity at Fort Greely this will be reported to the FGA Safety Officer (FGA SO). The FGA SO in conjunction with the FGA ENV and the FGA DPW will make appropriate recommendations regarding the health risks involved and actions necessary in cases of elevated indoor radon levels. Assistance in determining health effects as well as general radon program management knowledge can also be obtained from the USACHPPM, *Industrial and Environmental Health Physics organization.*

If needed, mitigation assistance can be obtained from the EPA, the US Army Center for Public Works, or the USACE, Engineering and Construction Division.

5. Surveillance

The FGA ENV will oversee the Radon monitoring activities at FGA.

6. Record Keeping

The FGA DPW will keep copies of all Radon test results with the corresponding real property records and will ensure these documents are included in any property transfer. Records are to include; building number, sample results, laboratory identification, date of placement, date of removal, and location within the structure.

7. Reporting

In accordance with AR 200-1, Chapter 9-2(g) (Attachment 1), elevated levels must be reported to the FGA SO who will make recommendations regarding the health risks involved and the necessary actions to take.

8. References

a. AR 200-1, Environmental Protection and Enhancement, February 1997

b. DA PAM 200-1, Environmental Protection and Enhancement, January 2002

c. EPA 402-R-92-004, Indoor Radon and Radon Decay Product Measurement Device Protocols, July 1992

d. UFGS-13287N, Division 13, Section 13287N, Unified Facilities Guide Specifications, September 1999

9. Attachments

a. Excerpt from AR 200-1

b. Excerpt from DA PAM 200-1

c. Sample Notification Letter

Excerpt from AR 200-1
Chapter 9
Radon Reduction Program

9-1. Scope

a. This chapter contains policy for identifying, assessing, and mitigating indoor levels of radon in U.S. Army facilities. See DA PAM 200-1 for procedures and facility priorities for radon assessments and mitigation.

b. The objective of the Army Radon Reduction Program is to reduce health risk from exposure to radon.

9-2. Policy

Army installations and civil works facilities will:

a. Comply with legal regulations concerning elevated indoor radon levels applicable to Army operations.

b. Maintain and update records of radon assessments conducted under the Army Radon Reduction Program. See DA PAM 200-1 for instructions.

c. Ensure occupants of Priority One facilities which contain elevated radon levels are notified in writing of specific test results, planned or executed mitigation, and results of mitigation efforts. Facility managers will distribute assessment results for Priority Two and Three facilities with elevated radon levels.

d. Attach radon test results to real property records. Attach complete record when property is transferred.

e. Measure radon in newly constructed Army facilities.

f. Measure radon in facilities converted to housing and in continuously occupied structures prior to occupancy.

g. Identify elevated radon levels to the Installation Medical Officer or the Civil Works District Safety and Occupational Health Officer.

h. Follow U.S. Army Center for Public Works guidance on mitigation of elevated radon levels.

i. Use USACE design criteria for radon reduction in new construction.

j. ICs will designate their facilities as priority 1, 2, or 3 in accordance with definitions and parameters in DA PAM 200-1.

9-3. Technical Assistance

Technical assistance relating to health and environmental aspects of radon can be obtained from the USACHPPM. Technical assistance relating to facility management can be obtained from the USACPW

Excerpt from DA PAM 200-1
Chapter 9
Radon Reduction Program

9-1. Scope

This chapter outlines the procedures and facility priorities for radon assessments and mitigation to meet the requirements of AR 200-1, chapter 9.

9-2. Army Radon Reduction Program

The Army conducted an extensive Radon Assessment Program in the 1990s. About 85 percent of priority 1 structures were tested. The results indicated that indoor radon is not a problem in the majority of Army structures tested. However a small percentage of Army installations had elevated radon levels.

9-3. Guidance

a. The Army will comply with all laws or regulations as applicable and required.

b. The following actions will be taken to assure an effective Radon Reduction Program. Army installations and CWFs will—

(1) Maintain and update records of radon assessments conducted, including the building number, sample results, laboratory identification, date of placement, date of removal, and location within the structure.

(2) Include test results with real property and housing data for the purpose of notifying tenants and transferees of elevated radon levels (≥ 4 pCi/l). Use of joint information management systems is encouraged.

(3) Measure indoor radon levels in newly constructed units, in units converted to housing, and in continuously occupied structures not previously tested. Geographic areas of previously documented high radon levels should be given special priority.

(4) Periodically re-measure radon levels in structures that have already been mitigated on the basis of past test results showing elevated levels (≥ 4 pCi/l). Contact the installation radiation protection officer (RPO) for guidance on retesting intervals following successful mitigation.

(5) Follow EPA guidance to measure indoor radon levels.

(6) Identify elevated radon levels (≥ 4 pCi/l) to the IMA or CW district SOH officer for assessment of health risks. The IMA will make appropriate recommendations regarding the health risks involved and actions necessary in cases of elevated indoor radon levels.

(7) Follow USACE and EPA guidance on effective mitigation techniques to reduce elevated radon levels.

(8) Use USACE design criteria for radon reduction in new construction. 42 DA PAM 200–1 • 17 January 2002.

(9) Follow these priorities for radon assessment and mitigation:

(a) Priority 1. Daycare centers, hospitals, schools, and living areas (that is, family housing, bachelor officer quarters/bachelor enlisted quarters (BOQ/BEQ), and billets).

(b) Priority 2. Areas having 24-hour operations, such as operations and training centers or RDT&E facilities.

(c) Priority 3. All other routinely occupied structures.

c. The time frame for accomplishing mitigation is dependent upon the measured radon concentration and is presented in table 9-1.

Table 9–1
Mitigation time frames from receipt of test results

Radon concentration (pCi/l)	**Mitigation required within:**
≥200	1 month or move the occupants
<200 to ≥20	6 months
<20 to ≥8	1-4 years (depending on the level of the measurement)
<8 to ≥4	5 years
<4	No action required

9-4. Technical assistance
Installations and MACOMs may obtain technical assistance from the sources below. Managers at CWFs should consult their environmental compliance coordinator network for sources of technical assistance. (See app B for mailing addresses and Web sites.)

a. USACE, Engineering and Construction Division. Provide assistance with radon measurements and mitigating elevated levels or radon.

b. USACHPPM, Industrial and Environmental Health Physics. Provide assistance with radon measurements and health effects.

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT AGENCY
UNITED STATES ARMY GARRISON, FORT GREELY
DIRECTORATE OF PUBLIC WORKS
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REPLY TO THE
ATTENTION OF:

Directorate of Public Works

To: Occupants of Unit 805GH

Subject: Notice of Radon Assessment Results

Radon levels were assessed for Unit 805GH during November 2004. The assessments were short-term, 48-hour tests using co-located passive charcoal filters. The results of the testing are:

Facility No.	Sample No.	Start Date	End Date	Radon Level –pCi/L
805GH	AE133705	11/12/04	11/15/04	5.4

The U.S. Army and Ft. Greely radon policies require notification and additional actions for buildings with assessment results at or above 4.0 picoCuries per liter (pCi/L), which is also the action level above which the EPA recommends further actions in homes.

What the results mean: Radon is a radioactive gas that comes from the natural decay of uranium that is found in nearly all soils. It typically moves up through the ground into buildings through cracks and other holes in the foundation. Long-term exposure to radon increases the risk of lung cancer. The health risk increases with higher radon levels. The U.S. average indoor radon level is estimated to be about 1.3 pCi/L, but varies widely by geographic region and even varies from building to building within the same area.

The next step: The results represent the levels from 48 hours of testing. Because radon levels vary from day to day, another assessment will be performed to obtain a better indication of the average radon level. If the results of that testing indicated average radon levels at or above 4.0 pCi/L, then mitigation measures to reduce the radon level will be evaluated and implemented. U.S. Army radon reduction policy requires mitigation within one to four years for confirmed radon levels between 20.0 and 8.0 pCi/L, depending on the radon level, and within five years for levels between 8.0 and 4.0 pCi/L.

More information regarding radon is available on the Internet at www.epa.gov/radon/. If you have any questions about this notice, please contact the Ft. Greely Environmental Office at 873-4665.

Christine Boerst
Chief, Environmental Division
Directorate of Public Works