9/29/95
Expires: [1 year after initiation]

SUBJECT: RADIOLOGICAL PROTECTION FOR DOE ACTIVITIES

The Department of Energy (DOE) undertook an initiative to reduce the burden of unnecessary, repetitive, or conflicting requirements on DOE contractors that resulted in the elimination of numerous radiological protection requirements which were invoked via DOE Orders and Notices. The majority of pertinent radiological protection requirements have become codified through promulgation of Title 10 of the Code of Federal Regulations, Part 835, *Occupational Radiation Protection* (10 CFR 835). However, 10 CFR 835 does not address all essential areas, such as sealed radioactive source accountability, needed to form the basis of a comprehensive program for protection of individuals from the hazards of ionizing radiation in controlled areas.

The purpose of issuing this Notice is to establish radiological protection program requirements that, combined with 10 CFR 835 and its associated implementation guidance, form the basis for such a comprehensive radiological protection program. Accordingly, the Directives Management Board established DOE concurrence on a set of 16 top-level, performance-based requirements that are now incorporated in this Notice. These 16 requirements supplement and enhance the requirements of 10 CFR 835 to provide critical direction in the areas of administrative controls, radiation safety training, work authorizations, posting, exposure of minors, and sealed radioactive source accountability.

1. PURPOSE: To establish radiological protection program requirements that, combined with 10 CFR 835 and its associated implementation guidance, form the basis for a comprehensive program for protection of individuals from the hazards of ionizing radiation in controlled areas. These requirements shall remain in effect pending completion of the Department's rulemaking efforts to codify these, or equivalent, requirements.

2. CANCELLATION: The Orders listed below are canceled. Cancellation of an Order does not, by itself, modify or otherwise affect any contractual obligation to comply with such an Order. Canceled Orders that are incorporated by reference in a contract shall remain in effect until the contract is modified to delete the reference to the requirements in the canceled Orders.

a. DOE 5480.11, RADIATION PROTECTION FOR OCCUPATIONAL WORKERS

b. DOE 5480.15, DEPARTMENT OF ENERGY LABORATORY ACCREDITATION PROGRAM FOR PERSONNEL DOSIMETRY

c. DOE N 5400.13, SEALED RADIOACTIVE SOURCE ACCOUNTABILITY

d. DOE N 5480.11, EXTENSION OF RADIOLOGICAL CONTROL MANUAL, REVISION 1 (DOE Radiological Control Manual (DOE/EH-0256T) remains as guidance)

3. APPLICABILITY:

a. DOE Elements. Except for the exclusions in paragraph 3c, this Notice applies to all defense nuclear facilities (defined in 10 CFR 830, as amended) classified as hazard categories 1, 2, or 3 which are subject to the requirements of 10 CFR 835.

b. Contractors. Except for the exclusions in paragraph 3c, this Notice applies to contractors that operate defense nuclear facilities and other contractors as determined by the cognizant contracting officer. Contractor compliance with this Notice will be required to the extent set forth in a contract. Contractors shall be directed to continue to comply with the requirements of Orders canceled by this Notice until their contracts are modified to delete the reference to the requirements of the canceled Orders.

c. Exclusions. Activities conducted under the authority of the Director, Naval Nuclear Propulsion Program, as described in Public Law 98-525.

4. BACKGROUND: The need for interim requirements for implementation of radiological protection programs arises from recent Departmental efforts to revise and streamline its directives system. The Department has identified certain requirements previously promulgated in the DOE Radiological Control Manual and DOE N 5400.13, SEALED RADIOACTIVE SOURCE ACCOUNTABILITY, and recommendations of recognized scientific organizations that it believes are crucial to the accomplishment of its radiological protection objectives. This Notice establishes interim requirements for radiological protection programs that will remain in effect pending completion of the Department's rulemaking efforts to codify these, or equivalent, requirements. Other provisions, previously promulgated in the DOE Radiological Controls Manual and standards referenced therein, are considered acceptable methods to satisfy 10 CFR 835 and its associated Implementation Guides. Alternative methods to those contained in the Implementation Guides which provide equivalent margins of protection in satisfying the requirements of 10 CFR 835 are also acceptable.

5. DEFINITIONS.

Terms used in this Notice are consistent with their definitions in 10 CFR 835. The following additional terms and definitions are provided:

a. Accountable sealed radioactive source means a sealed radioactive source having an activity equal to or greater than the applicable value provided in Attachment 1 of this Notice.

b. Administrative control level means a numerical dose constraint established at a level below the occupational exposure limits provided in 10 CFR 835 to administratively control and help reduce individual and collective doses.

c. Radiological work permit means an authorization to conduct work involving exposure to radiation or radioactive materials that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals.

d. Sealed radioactive source means a radioactive source specifically manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. The sealed radioactive source consists of a known quantity of radioactive material contained within a sealed capsule, sealed between layers of non-radioactive material, or firmly fixed to a non-radioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material.

e. Source integrity test means a test to determine if a sealed radioactive source is leaking radioactive material.

f. Technical work document means a formally approved document that directs work, such as a procedure, work package, laboratory protocol, or job or research plan and that also identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals.

6. REQUIREMENTS.

a. *Administrative Control Levels*

A system of administrative control levels (ACLs) shall be implemented to control radiological worker doses at levels below the occupational exposure limits provided in 10 CFR 835.202.

(1) A DOE ACL of 2 rem (0.02 Sv) total effective dose equivalent (TEDE) per year shall be implemented. No individual shall be permitted to receive an occupational exposure during planned activities that would result in exceeding the DOE ACL without the specific written authorization of the cognizant Secretarial Officer or designee.

(2) A cumulative total effective dose equivalent (CTEDE) ACL of 1 rem (0.01 Sv) TEDE per year of age shall be implemented. When a radiological worker's CTEDE exceeds 1 rem TEDE per year of age, special ACLs shall be established during ensuing years as necessary to cause that individual's CTEDE to approach and, if possible, fall below 1 rem per year of age.

(3) A facility-specific ACL shall be approved each year by facility management to maintain radiological worker doses below the DOE ACL. Written authorization by facility management shall be required prior to allowing any radiological worker's dose resulting from planned activities to exceed the facility-specific ACL.

b. *Work Authorizations*

Authorizations to work in radiological areas shall be in accordance with the Radiological Protection Program, required by 10 CFR 835.101. This program, in part, shall describe a radiological work authorization program as specified in 835.501 which appropriately utilizes available work documents and procedures. The level of detail included in these documents shall be commensurate with the nature and magnitude of the hazard and complexity of the required controls.

c. *Radiation Safety Training*

(1) Radiation safety training for general employees, radiological workers, and radiological control technicians shall utilize those portions of the standardized core training materials published by DOE that are relevant to facility hazards and operations, augmented as necessary by site-specific materials. Documentation of satisfactory completion of the entire DOE standardized core course(s) shall be accepted by all DOE activities.

(2) Training requirements commensurate with the hazard within a posted area shall be completed prior to permitting an individual unescorted access to that area.

d. *Posting*

Any accessible area in which radioactive material is used, handled, or stored shall be posted with the words "Caution, Radioactive Material." The posting shall meet the requirements of 10 CFR 835.601. The following areas are exempt from this posting requirement:

(1) Areas containing ten or fewer sealed radioactive sources with activities below the accountability criteria established in Attachment 1;

(2) Areas containing only materials that are properly packaged and labeled for transport in conformance with Department of Transportation regulations or corresponding DOE directives and expected to enter into transportation in the immediate future (i.e., the current shift);

(3) Areas under continuous observation and control of an individual knowledgeable of and empowered to implement required access control measures;

(4) Areas posted as a radiological area in accordance with 10 CFR 835.603;

(5) Other areas posted with radiological warning signs meeting the criteria established in 10 CFR 835.601; and

(6) Areas containing radioactive materials in quantities below the site- or facility- specified posting threshold. This threshold shall be established at a level below that which is likely to cause any individual to receive a TEDE in excess of 0.1 rem in a year.

e. *Control of Sealed Radioactive Sources*

(1) Administrative procedures shall be developed and maintained to control sealed radioactive sources having values equal to or exceeding those in Attachment 1 (i.e., accountable sealed radioactive sources).

(2) Accountable sealed radioactive sources, or their storage containers or devices, shall be labeled with the standard radiation warning trefoil and the words, "Caution, Radioactive Material."

(3) An individual shall be designated to maintain control of assigned accountable sealed radioactive sources. Prior to being designated, the individual selected shall be trained as a radiological worker in accordance with 10 CFR 835.902 and instructed on site-specific source control procedures.

(4) Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. A 2 month grace period may be used to accommodate scheduling needs. This inventory shall establish:

(a) The physical location of each accountable sealed radioactive source;

(b) The adequacy of associated postings and labels; and

(c) The adequacy of storage locations, containers, and devices.

(5) Each accountable sealed radioactive source having an activity exceeding 0.005 mCi shall be subject to a source integrity test upon receipt, when damage is suspected, and at intervals not to exceed six months. A 6 week grace period may be used to accommodate scheduling needs. Source integrity tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 mCi.

(6) Notwithstanding the requirements of paragraph 6.e.(5), an accountable sealed radioactive source is not subject to a periodic source integrity test if that source has been documented to have been removed from service. Such sources shall be stored in a controlled location, subject to periodic inventory as required by paragraph 6.e.(4) of this section, and subject to a source integrity test prior to being returned to service.

(7) Notwithstanding the requirements of paragraph 6.e.(4) and 6.e.(5), an accountable sealed radioactive source is not subject to periodic inventory and source integrity tests if that source is located in an area that is inaccessible to individuals due to operational or environmental constraints.

(8) An accountable sealed radioactive source found to be leaking radioactive material at a level exceeding 0.005 mCi shall be controlled in a manner that prevents the escape of radioactive material to the workplace.

f. *Exposure of Minors*

The exposure of minors during direct on-site access to a DOE site or facility shall be controlled such that the dose to the extremities, lens of the eye, and other organs and tissues does not exceed 10% of the corresponding occupational exposure limits established in 10 CFR 835.202. Appropriate monitoring of external and internal dose shall be performed to demonstrate compliance with these limits.

g. *DOE Laboratory Accreditation Program*. The DOE Laboratory Accreditation Program (DOELAP) shall be maintained consistent with the applicable DOE standards, and dosimetry programs shall be accredited at periodic intervals consistent with the standards. Additional guidance for the various program elements are contained in the DOELAP Technical Standard.

7. RESPONSIBILITIES.

   a. Secretarial Officers. Authorize exposures that exceed administrative control levels stated in paragraph 6a(1).

   b. Managers of Operations Offices. Ensure through the contracting officer that contractors implement radiation protection programs that conform to the requirements of paragraph 6 above and 10 CFR 835.

   c. Contractors. Contractors that manage and operate DOE defense nuclear facilities and other contractors as determined by the contracting officer shall develop and implement radiological protection programs that conform to the requirements of paragraph 6, above.

8. REFERENCES. Title 10, Code of Federal Regulations, Part 835, *Occupational Radiation Protection.*

9. CONTACT. Questions concerning this Notice should be addressed to the Office of Worker Protection Programs and Hazards Management, EH-52, on (301) 903-2135.

BY ORDER OF THE SECRETARY OF ENERGY:

ARCHER L. DURHAM
Assistant Secretary for
Human Resources and Administration

VALUES FOR EXEMPTION OF SEALED RADIOACTIVE SOURCES FROM INVENTORY AND SOURCE INTEGRITY TESTS

Less than 300 **µ**Ci (10 MBq)

H-3	Be-7	C-14	S-35	Ca-41	Ca-45	V-49	Mn-53
Fe-55	Ni-59	Ni-63	As-73	Se-79	Rb-87	Tc-99	Pd-107
Cd-113	In-115	Te-123	Cs-135	Ce-141	Gd-152	Tb-157	Tm-171
Ta-180	W-181	W-185	W-188	Re-187	Tl-204		

Less than 30 **µ**Ci (1 MBq)

Cl-36	K-40	Fe-59	Co-57	Se-75	Rb-84	Sr-85	Sr-89
Y-91	Zr-95	Nb-93m	Nb-95	Tc-97m	Ru-103	Ag-105	In-114m
Sn-113	Sn-119m	Sn-121m	Sn-123	Te-123m	Te-125m	Te-127m	Te-129m
I-125	La-137	Ce-139	Pm-143	Pm-145	Pm-147	Sm-145	Sm-151
Eu-149	Eu-155	Gd-151	Gd-153	Dy-159	Tm-170	Yb-169	Lu-173
Lu-174	Lu-174m	Hf-175	Hf-181	Ta-179	Re-184	Re-186m	Ir-192
Pt-193	Au-195	Hg-203	Pb-205	Np-235	Pu-237		

Less than 3 **µ**Ci (100 kBq)

Be-10	Na-22	Al-26	Si-32	Sc-46	Ti-44	Mn-54	Fe-60
Co-56	Co-58	Co-60	Zn-65	Ge-68	Rb-83	Y-88	Zr-88
Zr-93	Nb-94	Mo-93	Tc-95m	Tc-97	Tc-98	Ru-106	Rh-101
Rh-102	Rh-102m	Ag-108m	Ag-110m	Cd-109	Sn-126	Sb-124	Sb-125
Te-121m	I-129	Cs-134	Cs-137	Ba-133	Ce-144	Pm-144	Pm-146
Pm-148m	Eu-148	Eu-150	Eu-152	Eu-154	Gd-146	Tb-158	Tb-160
Ho-166m	Lu-176	Lu-177m	Hf-172	Ta-182	Re-184m	Os-185	Os-194
Ir-192m	Ir-194m	Hg-194	Pb-202	Bi-207	Bi-210m	Cm-241	

Less than 0.3 **µ**Ci (10 kBq)

Sr-90	Cd-113m	La-138	Hf-178m	Hf-182	Po-210	Ra-226	Ra-228
Pu-241	Bk-249	Es-254					

Less than 0.03 **µ**Ci (1 kBq)

Sm-146	Sm-147	Pb-210	Np-236	Cm-242	Cf-248	Fm-257	Md-258

Less than 0.003 **µ**Ci (100 Bq)

Gd-148	Th-228	Th-230	U-232	U-233	U-234	U-235	U-236
U-238	Np-237	Pu-236	Pu-238	Pu-239	Pu-240	Pu-242	Pu-244
Am-241	Am-242m	Am-243	Cm-243	Cm-244	Cm-245	Cm-246	Cm-247
Bk-247	Cf-249	Cf-250	Cf-251	Cf-252	Cf-254		

Less than 0.0003 **µ**Ci (10 Bq)

Ac-227	Th-229	Th-232	Pa-231	Cm-248	Cm-250