U.S. Department of Energy
Washington, D.C.

NOTICE
DOE N 5400.9
12-24-91
EXPIRES: 12-24-95

SUBJECT: SEALED RADIOACTIVE SOURCE ACCOUNTABILITY

1. PURPOSE. To establish Department of Energy (DOE) interim policy and to provide guidance for sealed radioactive source accountability.

2. SCOPE. The interim policy described in this Notice applies to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

3. BACKGROUND. The need for issuing Departmental policy and guidance is based upon numerous reported improper storage, transfers, and loss of accountability of sealed radioactive sources at several Departmental facilities. This Notice sets forth interim features of a source accountability system that will be discussed in greater detail in a guidance document being developed for release in January 1992.

4. AUTHORITY.

   a. Assistant Secretary for Environment, Safety and Health (EH). The Secretary of Energy, in SEN-6D-91, DEPARTMENTAL ORGANIZATIONAL AND MANAGEMENT ARRANGEMENTS, of 5-16-91, delegated to the Assistant Secretary for Environment, Safety and Health the authority to develop policy related to environmental protection, radiation safety, worker safety, and those aspects of public health and safety that deal with radiological protection.

   b. Deputy Assistant Secretary for Naval Reactors (NE-60). Executive Order 12344, statutorily prescribed by P.L. 98-525 (42 USC 7158, note), establishes the responsibilities and authorities of the Director, Naval Nuclear Propulsion Program (who is also the Deputy Assistant Secretary for Naval Reactors within the Department) over all facilities and activities which comprise the Program, a joint Navy-DOE organization. These responsibilities include prescribing and enforcing standards and regulations for the control of radiation and radioactivity (associated with Program facilities and activities) as they affect the safety and health of workers, operators and the general public. In view of these responsibilities, the provisions of this Notice do not apply to Naval Reactors.

5. DEFINITIONS.

   a. Accountable Sealed Radioactive Source is a sealed source with an activity equal to or greater than those listed in the attached Table 1.

   b. Exempted Radioactive Materials are radioactive materials exempted from accountability under this policy, but are subject to the requirements of DOE 5480.11, RADIATION PROTECTION FOR OCCUPATIONAL WORKERS. Exempted radioactive materials include: materials in process, activated shielding materials, liquid and gaseous sources. Materials defined as consumer products (e.g., exit signs, smoke detectors, welding rods, etc.) are not subject to DOE 5480.11.

   c. Exempted Sealed Radioactive Source is a sealed source with a half-life of less than 30 days or an activity less than the values for various radionuclides in the attached Table 1.

   d. Sealed Radioactive Source is radioactive material that is contained in a sealed capsule, sealed between layers of nonradioactive material, or firmly fixed to a nonradioactive surface by electroplating or other means. The confining barrier prevents dispersion of the radioactive material under normal and most accidental conditions related to use of the source.

   e. Source Custodian is an individual that is responsible for physical

control of the sealed source and for physical inventory of the sealed sources assigned to him.

f. Source Integrity Test is a test to determine if a sealed radioactive source is leaking radioactive material. The test must be capable of detecting the presence of 0.005 micro Ci (200 Bq) or less of radioactive material on the test sample.

6. IMPLEMENTATION.

a. Each facility that possesses or uses sealed radioactive sources shall establish procedures that will address inventory, receipt, labeling, control, storage, transfer, disposal, recordkeeping, training, surveying, and integrity testing consistent with the provisions of this Notice for sealed radioactive sources. In keeping with the Secretary's previous direction that line organizations are fully responsible for operating programs related to environmental protection, radiation safety, and worker and public health and safety, each program office shall maintain direct responsibility for ensuring the establishment of programs for sealed radioactive source accountability.

b. DOE 5480.11 will be modified to incorporate the changes outlined in this Notice.

7. PROCEDURES.

a. Source Inventory

(1) The Radiation Protection Organization shall maintain or cause to be maintained the records related to the accountability of sealed radioactive sources for the facility. The Radiation Protection Organization shall as a minimum provide or cause to be provided to each source custodian an inventory, list of sources assigned to them, provide integrity testing, assist the source custodian in training users, survey storage areas, and provide guidance on control and disposal of leaking sources.

(2) Records related to the accountability of sealed radioactive sources for a facility shall as a minimum be organized into a single filing system. A comprehensive system may require a combination of media (paper, microfilm, magnetic media, etc.). The system shall maintain both original and updated information related to the sealed sources including such data as: radionuclide, physical and chemical form, manufacturer, date of receipt, shipping records, source custodian (with local address, and telephone number), location of source, amount of activity, date of assay, source model and serial number (and device containing the source), amount of removable contamination (including original leak test results, if available), date of leak or integrity tests and results, and source accountability records (with dates of source inventory checks, integrity test, and transfers or loss). Records missing prior to the date of this Notice may be noted as not available (N/A). The records related to source accountability shall be auditable.

b. Source Custodian. A source custodian must be trained or instructed (prior to designation as a source custodian) as a radiation worker in accordance with DOE 5480.11 and in site-specific source accountability procedures and this Notice. The source custodian shall notify the Radiation Protection Organization of major changes in the use of a sealed source, onsite transfer to a new permanent storage location, modification of a device containing a sealed source, disposal or offsite transfer of a sealed source, and any procurement or acquisition of additional sealed sources. The source custodian shall be responsible for insuring tests to establish the integrity of a sealed source are conducted and inventory checks are performed at least every 6 months. The source custodian shall know the storage and use location of all sources assigned to them.

c. Labeling and Storage

(1) Storage containers and devices containing a sealed source shall be clearly marked with the radiation symbol and a durable label/tag with the following data: radionuclide, amount of activity, date of assay, model and serial number, and source custodian's name and telephone number. Storage rooms or cabinets containing sealed sources shall be locked, posted according to DOE 5480.11, chosen to minimize damage from fire, free of flammable substances, isolated from occupied areas or located in radiological areas, and selected such that in continuously occupied controlled areas the radiation level at the closest approach is as low as reasonably achievable and does not exceed 0.5 mrem (5 micro Sv) per hour on average.

(2) Sealed sources not in storage containers or devices and not labeled by the manufacturer should have a durable label/tag attached that identifies the source as a radioactive source. The label/tag should also contain the following information; radionuclide, amount of activity, name of manufacturer, date of assay, model and serial numbers (where available).

d. Source Integrity A test of source integrity shall be made at least every 6 months or whenever damage might have occurred. The integrity of the sealed source may be established by a wipe test or other leak test procedures. A wipe test may be made of the surface of the source, except for the active surface of an electroplated source. The integrity of a source contained in a shield or device may be checked by wiping the area of the shield or device, where contamination is most likely to occur from a failure of the source integrity. Sources in storage, for periods longer than 6 months, need only to have their integrity determined when they are removed from storage and before being placed in use. The integrity test must be capable of verifying the removable activity is less than 0.005 micro Ci (200 Bq) per 100 cm. A test result that reveals the presence 0.005 micro Ci (200 Bq) or more of removable radioactive material shall be an indication the source has lost its integrity and the source shall be removed from service and treated as a nonsealed source. An integrity test is not required if the source contains a radioactive material with a half life of less than 30 days, tritium or a noble gas, or a radionuclide with an activity smaller than the value listed in the attached Table 1.

8. INQUIRIES. Questions on this Notice should be directed to the Office of Health, EH-40, on (301) 903-5865 or FTS 233-5865.

BY ORDER OF THE SECRETARY OF ENERGY:

JOHN J. NETTLES, JR.
Director of Administration
and Human Resource Management

TABLE 1.
Values for exemption of sealed sources from inventory*

Less than 300 micro Ci (1×10^7 Bq)

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 micro Ci (1×10^6 Bq)

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-186	Ir-192
Pt-193	Au-195	Hg-203	Pb-205	Np-235	Pu-237		

10^5 Bq (Less than 3 micro Ci)

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	

10^4 Bq (Less than 0.3 micro Ci)

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

10^3 Bq (Less than 0.03 micro Ci)

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

10^2 Bq (Less than 0.003 micro Ci)

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	

10^1 Bq (Less than 0.0003 micro Ci)

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

* These activities were selected to yield a committed effective dose equivalent to 10 mrem (100 usv) or less for a credible incident to a member of the general public.