

SUBJECT: ADMINISTRATIVE CHANGE TO DOE M 441.1-1, *Nuclear Material Packaging Manual*

EXPLANATION OF CHANGES: DOE M 441.1-1 was issued in March 2008, and was last certified in November 2010. An Administrative Change is requested consistent with the September 3, 2015 DRB request. AU commits to converting the Manual to either a DOE Order and/or Standard when it comes up for its requisite FY 2017 review since Manuals are no longer part of the DOE Directives System.

LOCATIONS OF CHANGES:

Page	Paragraph	Changed	To
Overall	Front Cover Header/Footer and Header of whole document	Cover Header: Approved: 3-7-08 Footer: Office of Health, Safety and Security Header on all pages: 3-7-08	Cover Header: Approved XX-XX-XX Footer: Office of Environment, Health, Safety and Security Header on all pages: XX-XX-XX
i	1.a	Department of Energy (DOE) Policy (P) 441.1 <i>Department of Energy Radiological Health and Safety Policy</i> , dated 4-26-96	Deleted, and paragraphs renumbered.
i	1.b	DOE P 450.4, <i>Safety Management System Policy</i> , dated 10-15-96;	Department of Energy (DOE) Policy (P) 450.4A <i>Integrated Safety Management Policy</i> , dated 4-25-11;
iii	6	<u>CONTACT</u> . Questions concerning this Manual should be addressed to office of Health, Safety and Security, Office of Nuclear Safety and Environment, at 202-586-5680.	<u>CONTACT</u> . Questions concerning this Manual should be addressed to Office of Environment, Health, Safety and Security, Office of Nuclear Safety, at 301-903-8396.

Page	Paragraph	Changed	To
I-1	1.a	DOE Policy 441.1 Department of Energy Radiological Health and safety Policy, dated 4-26-96, states that DOE will conduct its radiological operations in a manner that ensures the health and safety of all its employees.	DOE Policy 450.4A, <i>Integrated Safety Management Policy</i> , dated 4-25-11, states that work be conducted safely and efficiently and in a manner that ensures protection of workers, the public, and the environment.
I-1	2.c	Chief, Health, Safety and Security Officer.	Associate Under Secretary for the Office of Environment, Health, Safety, and Security.
II-1	2.e.	nuclear material packaged for shipment in approved shipping containers in compliance with Department of Transportation (DOT), DOE O 460.1B, <i>Packaging and Transportation Safety</i> (or successor document), or DOE O 461.1A, <i>Packaging and Transfer or Transportation of Materials of National Security Interest</i> (or successor document) requirements;	nuclear material packaged for shipment in approved shipping containers in compliance with Department of Transportation (DOT), DOE O 460.1C, <i>Packaging and Transportation Safety</i> (or successor document), or DOE O 461.1B, <i>Packaging and Transportation for Offsite Shipment of Materials of National Security Interest</i> (or successor document) requirements;
III-3	2.m	<u>Quality Assurance</u> . Packages must be designed, tested, and procured in accordance with the quality assurance requirements of 10 CFR Part 830 and DOE O 414.1C, <i>Quality Assurance</i> .	<u>Quality Assurance</u> . Packages must be designed, tested, and procured in accordance with the quality assurance requirements of 10 CFR Part 830 and DOE O 414.1D, <i>Quality Assurance</i> .
III-5	4.a	<u>Records Retention</u> . Packaging and surveillance records must be maintained in accordance with DOE O 243.1, <i>Records Management Program</i> .	<u>Records Retention</u> . Packaging and surveillance records must be maintained in accordance with DOE O 243.1B, <i>Records Management Program</i> .

Page	Paragraph	Changed	To
Attachment 1 Page I-1	2.e	nuclear material packaged for shipment in approved shipping containers in compliance with DOT, DOE O 460.1B, <i>Packaging and Transportation Safety</i> (or successor document), or DOE O 461.1A, <i>Packaging and Transfer or Transportation of Materials of National Security Interest</i> (or successor document) requirements;	nuclear material packaged for shipment in approved shipping containers in compliance with DOT, DOE O 460.1C, <i>Packaging and Transportation Safety</i> (or successor document), or DOE O 461.1B, <i>Packaging and Transportation for Offsite Shipment of Materials of National Security Interest</i> (or successor document) requirements;
Attachment 1 Page II-4	2.m	<u>Quality Assurance</u> . Packages must be designed, tested, and procured in accordance with the quality assurance requirements of 10 CFR Part 830 and DOE O 414.1C, <i>Quality Assurance</i> .	<u>Quality Assurance</u> . Packages must be designed, tested, and procured in accordance with the quality assurance requirements of 10 CFR Part 830 and DOE O 414.1D, <i>Quality Assurance</i> .
Attachment 1 Page II-4,5	3.	3., 4., 5., 5.b., 5.c., 5.d., 5.e., 6	Renumbered to be correct and consistent with Chapter III.3. PACKAGING SURVEILLANCE PROGRAM 3.a., 3.b.,3.c.,3.d.,3.e.,3.f.,and 4.DOCUMENTATION
Attachment 1 Page II-5	6.a	6.a. <u>Records Retention</u> . Packaging and surveillance records must be maintained in accordance with DOE O 243.1, <i>Records Management Program</i> .	4.a. <u>Records Retention</u> . Packaging and surveillance records must be maintained in accordance with DOE O 243.1B, <i>Records Management Program</i> .
Attachment 2 Page 1	1.a	DOE-HDBK-1081-94, <i>Primer on Spontaneous Heating and Pyrophoricity</i> , December 1994.	DOE-HDBK-1081-2014, <i>Primer on Spontaneous Heating and Pyrophoricity</i> , January 2015.
Attachment 2 Page 1	1.b.	DOE-HDBK-1129-2007, <i>Tritium Handling and Safe Storage</i> , March 2007.	DOE- STD-1129-2015, <i>Tritium Handling and Safe Storage</i> , September 2015.

Page	Paragraph	Changed	To
Attachment 2 Page 1	1.c.	DOE-STD-3013-2004, <i>Stabilization, Packaging, and Storage of Plutonium Bearing Materials</i> , April 2004.	DOE-STD-3013-2012, <i>Stabilization, Packaging, and Storage of Plutonium Bearing Materials</i> , March 2012.
Attachment 2 Page 1	1.e.	DOE O 414.1C, <i>Quality Assurance</i> , dated 6-17-05.	DOE O 414.1D, <i>Quality Assurance</i> , dated 4-25-2011; Admin Change: 5-8-2013.
Attachment 2 Page 1	1.f.	DOE O 420.1B, <i>Facility Safety</i> , dated 12-22-05.	DOE O 420.1C, <i>Facility Safety</i> , dated 12-4-2012; Change 1: 2-27-2015.
Attachment 2 Page 1	1.g.	DOE O 435.1 Chg 1, <i>Radioactive Waste Management</i> , dated 7-9-99.	DOE O 435.1, <i>Radioactive Waste Management</i> , dated 7-9-99; Change 1: 8-28-2001: Certified: 1-09-2007.
Attachment 2 Page 1	1.h.	DOE O 440.1B, <i>Worker Protection Program For DOE (Including The National Nuclear Security Administration) Federal Employees</i> , dated 5-17-07.	DOE O 440.1B, <i>Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees</i> , dated 5-17-07; Change 2: 3-14-2013.
Attachment 2 Page 1	1.i.	DOE P 441.1, <i>Department of Energy Radiological Health and Safety Policy</i> , dated 4-26-96	Deleted. This Policy was cancelled by DOE P450.4A.
Attachment 2 Page 1	1.j.	DOE P 450.4, <i>Safety Management System Policy</i> , dated 10-15-96.	1.i. DOE P 450.4A, <i>Integrated Safety Management Policy</i> , dated 4-25-2011.
Attachment 2 Page 1	1.k.	1.k. DOE G 460.1-1, <i>Implementation Guide for use with DOE O 460.1A Packaging and Transportation Safety</i> , dated 6-5-97.	1.j. DOE G 460.1-1, <i>Implementation Guide for use with DOE O 460.1A Packaging and Transportation Safety</i> , dated 6-5-97.

Page	Paragraph	Changed	To
Attachment 2 Page 1	1.l.	1.l. DOE O 460.1B, <i>Packaging and Transportation Safety</i> , dated 4-4-03.	1.k. DOE O 460.1C, <i>Packaging and Transportation Safety</i> , dated 5-14-2010.
Attachment 2 Page 1	1.m.	1.m. DOE O 460.2A, <i>Departmental Materials Transportation and Packaging Management</i> , dated 12-22-04.	1.l. DOE O 460.2A, <i>Departmental Materials Transportation and Packaging Management</i> , dated 12-22-04.
Attachment 2 Page 2	1.n.	1.n. DOE O 461.1A, <i>Packaging and Transfer or Transportation of Materials of National Security Interest</i> , dated 4-26-06.	1.m. DOE O 461.1B, <i>Packaging and Transportation for Offsite Shipment of Materials of National Security Interest</i> , dated 12-20-2010.
Attachment 2 Page 2	1.o.	1.o. DOE M 470.4-7, <i>Safeguards and Security Program References</i> , dated 8-26-05.	1.n. Current Safeguards and Security Program References can also be found at Safeguards and Security Policy Information Resource (http://pir.pnl.gov/).
Attachment 2 Page 2	1.p.	1.p. DOE O 5400.5 Chg2, <i>Radiation Protection of the Public and the Environment</i> , dated 1-7-93.	1.o. DOE O 458.1 Admin Chg 3, <i>Radiation Protection of the Public and the Environment</i> , dated 2-11-11.
Attachment 2 Page 2	1.q.	1.q. DOE O 5660.1B, <i>Management of Nuclear Materials</i> , dated 5-26-94.	1.p. DOE O 410.2, <i>Management of Nuclear Materials</i> , dated 8-17-2009; Admin Change 1: 4-10-2014.
Attachment 2 Page 2	1.r.	1.r. DOE O 243.1, <i>Records Management Program</i> , dated 2-3-06.	1.q. DOE O 243.1B, <i>Records Management Program</i> , dated 3-11-2013; Admin Change 1: 7-8-2013.

Page	Paragraph	Changed	To
Attachment 2 Page 2	1.s.	1.s. <i>Criteria for Interim Storage of Plutonium-Bearing Materials</i> , issued by a memo to field from DOE Secretary Curtis, January 25, 1996.	1.r. DOE-STD-3013-2012, <i>Stabilization, Packaging, and Storage of Plutonium-Bearing Materials</i> , dated March 2012.
Attachment 2 Page 2	1.t.	1.t. DOE HDBK 3010-94, Change Notice 1, <i>Airborne Release Fractions/Rates and Respirable Fractions for Non-Reactor Nuclear Facilities</i> , March 2000.	1.s. DOE HDBK 3010-94, Change Notice 1, <i>Airborne Release Fractions/Rates and Respirable Fractions for Non-Reactor Nuclear Facilities</i> , March 2000; Change 1: March 2013.
Attachment 2 Page 2	1.u.	1.u. <i>The Use of Teflon® Components in National Nuclear Security Administration Nuclear Facilities</i> , issue by memo to the field from E. Beckner, Deputy Administrator for Defense Programs, May 20, 2004.	1.t. <i>The Use of Teflon® Components in National Nuclear Security Administration Nuclear Facilities</i> , issue by memo to the field from E. Beckner, Deputy Administrator for Defense Programs, May 20, 2004.
Attachment 2 Page 3	3.a	ANSI N14.5-1997, <i>Radioactive Materials – Leakage Tests on Packages for Shipment</i> , February 1998.	ANSI N14.5-2014, <i>Radioactive Materials – Leakage Tests on Packages for Shipment</i> , June 2014.
Attachment 2 Page 3	3.b	ANSI N43.6-1977, <i>Sealed Radioactive Sources, Classification</i> , August 1998; Revised: 2008.	ANSI N43.6-2007, <i>Sealed Radioactive Sources, Classification</i> , Revised: 2013.
Attachment 2 Page 3	3.c.	ISO 2919, <i>Radioactive Protection - Sealed Radioactive Sources—General Requirements and Classification</i> , February 1999.	ISO 2919, <i>Radioactive Protection - Sealed Radioactive Sources—General Requirements and Classification</i> , Revised: February 2012.

Page	Paragraph	Changed	To
Attachment 2 Page 3	3.d.	Safety Guide No. TS G 1.1 (ST 2), Appendix 1, <i>Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material</i> , 2022.	IAEA Safety Standards SSR-6 <i>Regulations for the Safe Transport of Radioactive Material</i> , 2012.
Attachment 2 Page 3	3.f.	DOE/NNSA <i>Weapons Quality Policy</i> (QC-1) (rev10), 2004.	DOE/NNSA Policy Letter, <i>Weapons Quality Policy</i> NAP-24, 6-20-2013.
Attachment 3 Page 1	Footnote 9	A ₂ Thresholds in 49 CFR §173.435 correspond to the maximum amount of dispersible material that can be shipped via Type A packages (which have much less stringent testing criteria as compared to Type B packages). The values are based on not exposing workers to greater than 5 rem dose if the package were to fail (International Atomic Energy Agency [IAEA] Safety Guide TS-G-1.1 [ST-2] reports that inhalation from releases from packages would be on the order of 10 ⁻⁶ of the packaged material).	A ₂ Thresholds in 49 CFR §173.435 correspond to the maximum amount of dispersible material that can be shipped via Type A packages (which have much less stringent testing criteria as compared to Type B packages). The values are based on not exposing workers to greater than 5 rem dose if the package were to fail (International Atomic Energy Agency [IAEA] Safety Standards SSR-6 reports that inhalation from releases from packages would be on the order of 10 ⁻⁶ of the packaged material).
Attachment 3 Page 2	Table 1	Standards established by the International Atomic Energy Agency (IAEA) Safety Guide TS-G-1.1...	Standards established by the International Atomic Energy Agency (IAEA) Safety Standards SSR-6...
Attachment 4 Page 1	1.a	Utilize ANSI N14.5-1997 criteria for leaktight. ANSI N14.5-1997 defines leaktight as:	Utilize ANSI N14.5-2014 criteria for leaktight. ANSI N14.5-2014 defines leaktight as:

Page	Paragraph	Changed	To
Attachment 4 Page 2	2.	The basis for this value is that it is consistent with IAEA analysis utilized in establishing DOT shipping package requirements for Type B containers. IAEA Safety Guide TS-G-1.1 (ST-2),	The basis for this value is that it is consistent with IAEA analysis utilized in establishing DOT shipping package requirements for Type B containers. IAEA Safety Standards SSR-6,
Attachment 4 Page 2	3. First Par	The testing requirements can be met by translating the material release rate into a He leak rate as described by Appendix B Section 15.27 of ANSI N14.5-1997	The testing requirements can be met by translating the material release rate into a He leak rate as described by Appendix B Section 15.27 of ANSI N14.5-2014
Attachment 4 Page 3	3. Second Par	measuring the release rate utilizing the ANSI N 14.5-1997 methodology.	measuring the release rate utilizing the ANSI N 14.5-2014 methodology.
Attachment 4 Page 3	4. Second par	Consistent with DOE G 460.1-1, <i>Packaging and Transportation Safety</i> , the drop test should be performed...	Consistent with DOE G 460.1-1, <i>Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety</i> , the drop test should be performed...
Attachment 5 Page 1	First Par	This example outlines the steps involved in performing these calculations in accordance with the ANSI N14.5-1997 methodology...	This example outlines the steps involved in performing these calculations in accordance with the ANSI N14.5-2014 methodology..
Attachment 5 Page 4	Step 4	Using the approach in ANSI N 14.5, the gas leak rate can be converted to a He leak rate at the maximum operating differential pressure.	Using the approach in ANSI N 14.5-2014, the gas leak rate can be converted to a He leak rate at the maximum operating differential pressure.
Attachment 5 Page 7	Step 5	Using the methods outlined in ANSI N 14.5-1997, for Weapons Grade Pu, a bubble test (with a criterion of no bubbles released) or a pressure drop test may be shown to suffice.	Using the methods outlined in ANSI N 14.5-2014, for Weapons Grade Pu, a bubble test (with a criterion of no bubbles released) or a pressure drop test may be shown to suffice.
Attachment 8 Page 1	<u>Handling</u>	covered under DOE O 460.1B, <i>Packaging and Transportation Safety</i> .	covered under DOE O 460.1C, <i>Packaging and Transportation Safety</i> .