



DOE Order 458.1

Radiation Protection of the Public and the Environment

Environmental Radiological Assistance Directory
(ERAD) Webinar
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Why Was DOE 5400.5 Updated



- Consistency with 10 CFR Part 835: DOE's Occupational Radiation Protection Rule amended Jun 07.
- To reflect:
 - Current radiation protection concepts.
 - Technical standards and practices recommendations : i.e. ICRP and NCRP.
- Consistency with DOE O 251.1C, *Departmental Directives Program*:
 - Format and content requirements.
 - Addition of a Contractor Requirements Document (CRD).
- Revise Orders and Manuals in 4-digit to 3-digit system
- Organizational Structure Changes



What was Deleted from DOE 5400.5



- **Chapter I, “General”**
 - Analogous to an executive summary.
 - Contained policy which is now included in DOE P 441.1.
- **Background information**
 - Technical bases for requirements
 - DOE policy statements
 - Summaries of applicable provisions of EPA regulations, etc.) that was interspersed with requirements.
 - EPA Dose limits for management and storage of spent fuel, HLW, and TRU at a disposal facility still apply (40 CFR 191).
- **Interim management and storage of U/Th wastes.**



What was Deleted from DOE 5400.5(Cont.)



- **Chapter III DCGs → DOE STD-1196-2011, *Derived Technical Concentration Standards (DCS)***
- **Removed references to out-of-date compliance tools and models such as AIRDOSE/RADRISK.**
- **Removed guidance on doses from underground nuclear Weapons Testing.**
- **Removed guidance on soil columns. Soil columns are prohibited.**



Public Dose for DOE O 458.1



- **Total Effective Dose (TED) 100 mrem/yr (1 mSv/yr)**
- **New:**
 - Lens of the eye: 1500 mrem/yr (15 mSv/yr)
 - Skin or Extremities: 5000 mrem/yr (50 mSv/yr)
- **No Change**
 - Radon:
 - Doses from Radon regulated separately.
 - 40 CFR Part 61 Subparts Q and T.
 - Occupational Doses: DOE general employees regulated under 10 CFR 835.



Showing compliance with Public Dose



- TED to members of the public from external exposure to radiation, airborne effluents, and liquid effluents, of DOE origin.
- Calculate dose to the “Representative Person” (ICRP 103) or the Maximally Exposed Individual (MEI) as alternative benchmark receptor.
- MEI must include members of the public both on DOE sites outside of controlled areas and off DOE sites.
- If any dose in DOE O 458.1 or dose to public exceeds 25 mrem/yr then must calculate dose to lens of eye and extremities.
- Use of CAP-88 or another EPA approved model or method to evaluate dose from airborne effluents.



Temporary Dose Limits



DOE O 458.1 limits approval of requests for temporary dose limits to no more than 500 mrem (5mSv) TED, provided that the average TED over any 5 contiguous years (instead of over a lifetime) does not exceed 100 mrem per year.



ALARA



- ALARA process must be documented.
- Detailed requirements and guidance were deleted, but overarching, higher level ALARA requirements were retained.



ALARA



- Implement ALARA process to optimize control and management of radiological activities so exposures to public and the environment are kept as low as reasonably achievable.
- Consider all sources, modes of exposures, probable pathways of release of radioactive materials to environment and the public.
- Use a **graded approach** which provides the flexibility to perform qualitative or quantitative ALARA analyses. For low doses, qualitative evaluations normally will suffice.



ALARA(Cont)



- ALARA process:
 - Applicable to:
 - All routine DOE radiological activities.
 - Recovery and remediation activities associated with a non-routine event.
 - Not applicable to:
 - Non-routine radiological events.
 - Accidental
 - Unplanned
 - Inadvertent
- Coordinate with 10 CFR 835 ALARA process to the extent practical and when appropriate.



Graded Approach



- The graded approach means:
 - Use common sense.
 - Don't spend significant resources on insignificant matters.
- In assessing significance consider:
 - Potential Risk
 - Complexity of Activity
 - Level of uncertainty
 - Potential Public perception of risk
 - Institutional and social sensitivities.



Environmental Radiological Protection Program



- DOE O 458.1 establishes an environmental radiological protection program:
 - Composite of plans, procedures, and other documents describing the methods used to achieve compliance.
 - Purpose:
 - ensure that appropriate actions are planned and executed and that appropriate organizational entities and positions are assigned identifiable responsibilities for executing these actions and complying with the requirements of DOE O 458.1.
 - Facilitate effective oversight.
- Contractor develops and implements a documented program to address compliance with the relevant Specific Requirements of CRD.
- Program is tailored to activities and reflects a graded approach.



Biota Protection



Conduct radiological activities with the potential to impact the environment, in such manner that it will protect the biota population from the adverse affects of radiation and radioactive materials released from DOE operations.

Biota	O 5400.5 ^b .	O 458.1 ^a . b.
Aquatic Animals	Interim guidance: 1 rad/d	1 rad/d
Terrestrial Plants	No limit or guidance	1 rad/d
Terrestrial Animals	No limit or guidance	0.1 rad/d

a. DOE-STD-1153-2002, Table 2.2

b. Limits that triggers an assessment of impact to the biota population.

•A graded approach designed for flexibility.

•The underlying basis is to ensure that populations of plants and animals are adequately protected.



Airborne Radioactive Effluents



- No significant change from DOE O 5400.5.



Protection of Drinking Water & Ground Water



- Drinking water protection: clarification
 - DOE drinking water systems must meet public system concentration limits.
 - DOE discharges must not cause public systems to exceed limits.
- Ground water protection activities are specified in DOE O 458.1.



Release & Clearance of Property



- More emphasis on process knowledge.
- Added specificity to monitoring and surveys.
 - Can meet objectives of MARSSIM or MARSAME or equivalent.
- Specific dose constraints included.
 - Real Property: TED 25 mrem/yr
 - Personal Property: TED 1 mrem/yr
- Independent verification (IV) program described.
- Interface with CERCLA specified.



Release & Clearance of Property *(cont'd)*



- Use current pre-approved limits until revised.
- Options for updating surface contamination guidelines
 - Issue guidance or technical standard, or
 - Adopt ANSI 13.12
- Public notification program required.
- Clarifies that use restrictions and institutional controls can be part of authorized limit.
- Prior to clearance or disposal of metals must evaluate DOE reuse or recycle.



Release & Clearance of Property *(cont'd)*



Action Memo Approved

- Action Memo from NNSA on Clearance of Recycle Scrap Metal and Materials from Radiological Areas August 25th, 2011.
- Secretary approves the Action Memo 2 Sep 28th, 2011.



Release & Clearance of Property

(cont'd)



1. Delegation of decision-making authority given to the Under Secretaries. Clearance must follow DOE O 458.1.
2. Authority could be exercised only after the site has implemented recommendations contained in the report *"Radiological Clearance of Scrap and Personal Property" at NNSA Sites: Evaluation of Current Practices and Recommendations for Improvement,* dated May 2010.
3. Public notification and involvement at sites authorized to resume clearance of scrap metal for recycle would be conducted and coordinated with local communities through existing frameworks established for public interaction (e.g., local government and regulatory agencies, site specific advisory boards, citizens advisory boards, etc.).
4. Perform and Environmental Assessment (EA). EA allows for:
 - a. Open dialogue with Public about DOE's intent to clear property
 - b. Proper implementation of DOE O 458.1



Liquid Discharges



- Removed requirement for best available technology plan, implementation schedule and approval. Selection factors now included in the DOE O 458.1 definition of “BAT Selection Process”.
- DOE STD-1196-2011, *Derived Technical Concentration Standards (DCS)*.
- DOE O 458.1 requirements explicitly address disposition of non-process water, and consideration of storm water runoff as potential pathway of exposure.



DOE-STD-1196-2011 DCS



- **Radiation & tissue weighting factors**
 - ICRP 60 dose Methodologies.
 - Used for implementation of the DCS to facilitate revision as science advances and as new information becomes available.
- **New dose coefficients developed (previously DCF's)**
- **References used for dose coefficients**
 - EPA FGR 13
 - ICRP 72: *Age-dependent Doses to the Members of the Public from Intake of Radionuclides*
 - ICRP-89 *Basic Anatomical and Physiological Data for Use in Radiological Protection*
 - ICRP 107 *Nuclear Decay Data for Dosimetric Calculations*



Radioactive Waste and Spent Nuclear Fuel



- DOE O 458.1 explicitly clarifies that DOE continues to regulate AEA 11e.(3) and 11e.(4) byproduct material as before.
- Requirements for interim management and storage of U/Th wastes are not included in DOE O 458.1. (FUSRAP)
- DOE O 458.1 requires that plans for management and disposal of wastes provide for institutional controls and long-term stewardship.



Records, Retention & Reporting Requirements



- Improved documentation requirements and consolidated recordkeeping and reporting requirements into one section.
- ASER is still the only compliance reporting mechanism.
- DOE O 232.2 ORPS and DOE O 231.1B ES&H orders recently issued. 458.1 refers to manuals not the new orders.



Lessons Learned



- Skyshine for Accelerators: Models to not need HSS approval nor should be addressed in 458.1.
- Public Dose apply if not under 10 CFR 835. Up to control zone for occupational. Outside the control zone public dose apply.
- May need clarification that DOE O 458.1 does not apply to waste disposed in commercial facilities licensed by the NRC or States.
- Reporting Requirements: Just let DOE FEM know of any Non-Compliance. Reporting process must be in place.



Next at HS-22



- Revision of DOE-0173T *Environmental Reg Guide Rad Effluent Monitoring & Environmental Surveillance Standard*.
- Revision of Surface Contamination Guidelines.
- 12 Month Review DOE O 458.1 early 2012.
- ALARA Technical Standards.
- Biota technical Standard.



Points of Contact for DOE O 458.1



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