

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

ORDER

DOE 5820.2

2-6-84

SUBJECT: RADIOACTIVE WASTE MANAGEMENT

1. PURPOSE. To establish policies and guidelines by which the Department of Energy (DOE) manages its radioactive waste, waste byproducts, and radioactively contaminated surplus facilities.
2. CANCELLATION. DOE 5820.1, MANAGEMENT OF TRANSURANIC CONTAMINATED MATERIAL, of 9-30-82.
3. SCOPE. The provisions of this Order apply to all DOE elements and, as required by law and/or contract, all DOE contractors and subcontractors performing work that involves management of radioactive waste and/or radioactively contaminated facilities for DOE under the Atomic Energy Act of 1954 as amended (Public Law 83-703).
4. REFERENCES.
 - a. DOE 5440.1B, IMPLEMENTATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT, of 5-14-82, which establishes the Department's policy for implementation of the National Environmental Policy Act of 1969 (Public Law 91-190).
 - b. DOE 5480.1A, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION PROGRAM FOR DOE OPERATIONS, of 8-13-81, which establishes an overall framework of program requirements for safety and environmental and health protection, including criteria for radiation exposure and radioactive effluent releases for operating facilities and sites.
 - c. DOE 5480.2, HAZARDOUS AND RADIOACTIVE MIXED WASTE MANAGEMENT, OF 12-13-82, which provides interim guidance for managing mixed waste (radioactive waste containing nonradioactive hazardous constituents).
 - d. DOE 5484.1, ENVIRONMENTAL, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 8-13-81, which establishes requirements and practices for reporting environmental, health, and safety information for DOE operations.
 - e. DOE 5484.2, UNUSUAL OCCURRENCE REPORTING SYSTEM, of 8-13-81, which establishes the Department's policy and provides instructions for a system of reporting, analyzing, and disseminating information on programmatically significant events.

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INITIATED BY:
Assistant Secretary for
Defense Programs

- f. DOE 5481.1A, SAFETY ANALYSIS AND REVIEW SYSTEM, of 8-13-81, which establishes uniform requirements for the preparation and review of safety analyses of DOE operations.
- g. DOE 5632.2, PHYSICAL PROTECTION OF SPECIAL NUCLEAR MATERIALS, of 2-16-79, which establishes minimum physical protection standards for special nuclear materials.
- h. DOE 5700.6A, QUALITY ASSURANCE, of 8-31-81, which sets forth principles and assigns responsibilities for establishing, implementing, and maintaining programs of plans and actions to assure quality achievement in the Department's programs.
- i. DOE 1540.1, MATERIALS TRANSPORTATION AND TRAFFIC MANAGEMENT, of 5-3-82, which establishes the Department's policies for management of materials transportation activities.
- j. DOE 4320.1A, SITE DEVELOPMENT AND FACILITY UTILIZATION PLANNING, of 3-17-83, which establishes policies and procedures and assigns responsibilities and authorities for site development and facility utilization planning.
- k. DOE 6410.1, MANAGEMENT OF CONSTRUCTION PROJECTS, of 5-26-83, which establishes policies and procedures for the planning and execution of construction programs and projects.
- l. DOE 4300.1A, REAL ESTATE MANAGEMENT, of 7-7-83, which establishes Departmentwide policies and procedures for the acquisition, use, and disposal of real estate (real property) or interests therein.
- m. DOE 1430.1, MANAGING THE DEPARTMENT OF ENERGY'S SCIENTIFIC AND TECHNICAL INFORMATION, of 2-23-83, which establishes the policy that scientific and technical information developed during work supported by DOE shall be promptly and fully reported to the Technical Information Center (MA-28), located in Oak Ridge, Tennessee, for inclusion in the Department's information data base.
- n. WIPP-DOE-069, "TRU Waste Acceptance Criteria for the Waste Isolation Plant," of 9-81, as updated, which specifies basic requirements for disposal of contact-handled and remote-handled transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP). Copies of this and other DOE WIPP reports can be obtained from the Albuquerque Operations Office.
- o. RLO/SFM-83-12, "Program Plan," volume I, of 10-83, as updated, which is issued by the Department of Energy's Surplus Facilities Management Program and provides procedures for managing surplus radioactively contaminated facilities. Copies may be obtained from the Director of the Surplus Facilities Management Program, Richland Operations Office.
- p. DOE/NE-0017-1, "Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics," of 10-82, which with annual updates, summarizes data in the Integrated Data Base program on all domestic spent fuel and

radioactive waste. Copies may be obtained from the Office of Nuclear Energy, Germantown, or the Technical Information Center, Oak Ridge.

- q. Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604), which establishes national policy for control of uranium mill tailings.
 - r. Nuclear Waste Policy Act of 1982 (Public Law 97-425), which provides for the development of repositories for the disposal of high-level waste and spent nuclear fuel.
 - s. RLO/SFM-82-7, "Surplus Facilities Management Program Methodology for Establishing Decommissioning Priorities," of 6-82, which establishes methods for developing priorities for decommissioning surplus facilities.
 - t. Title 5 CFR 1320, "Controlling Paperwork Burdens on the Public," which serves as the implementing regulation for Public Law 96-511, "Paperwork Reduction Act of 1980," and directs the identification and clearance of information collections levied on the public, including contractors, State and local government units, and persons who perform services for the Department on an individual basis.
5. OBJECTIVE. To establish requirements to assure that all DOE operations involving the management of radioactive waste, waste byproducts, and surplus facilities pursuant to the Atomic Energy Act of 1954 as amended (Public Law 83-703) are conducted to adequately protect the public health and safety, and in accordance with radiation protection standards specified in DOE Orders.
6. DEFINITIONS.
- a. Buffer Zone. The portion of a DOE site that surrounds the storage/disposal site and is not used for storage/disposal, but where public access is restricted.
 - b. Byproduct Material. Waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface waste resulting from uranium solution extraction processes. The term excludes fission products and other radioactive material covered in 10 CFR Part 20.3(3).
 - c. Certified Waste. Waste that has been confirmed to comply with disposal site waste acceptance criteria.
 - d. Decontamination. The removal of radioactive contamination from facilities, soils, or equipment by washing, chemical action, mechanical cleaning, or other techniques.
 - e. Decommissioning. Actions taken to reduce the potential health and safety impacts of surplus facilities, including activities to stabilize, reduce, or remove radioactive contamination.

- f. Defense Waste. Radioactive waste from any activity performed in whole or in part in support of DOE atomic energy defense activities. The term excludes radioactive waste under purview of the Nuclear Regulatory Commission or generated by the commercial nuclear power industry.
- g. Department of Energy Radioactive Waste. Radioactive waste generated directly by activities of the Department (or its predecessors) and its contractors or subcontractors or other radioactive waste for which the Department is responsible. Such waste may be referred to as DOE waste.
- h. Disposal. Emplacement of waste in a manner that assures isolation from the biosphere without maintenance and with no intent of retrieval and that requires deliberate action to gain access to the waste after emplacement.
- i. Disposal Site. The area dedicated to waste disposal and related activities.
- j. Engineered Barrier. A manmade addition to the disposal site that is designed to retard or preclude radionuclide transport and/or to preserve the integrity of the disposal site.
- k. Geologic Repository. An underground mined cavity used for the disposal of radioactive waste.
- l. Greater Confinement. A technique for disposal of waste that uses natural and/or engineered barriers which provide a degree of isolation greater than that of shallow land burial but possibly less than that of a geologic repository.
- m. High-Level Waste (HLW). The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of TRU waste and fission products in concentrations as to require permanent isolation.
- n. Low-Level Waste (LLW). Radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material as defined by this Order.
- o. Natural Barrier. The physical, chemical, and hydrological characteristics of the geological environment at the disposal site that, individually and collectively, act to retard or preclude transport of radioactivity.
- p. Naturally Occurring Radionuclides. Radionuclides and their decay products (except transuranium radionuclides) that occur naturally in the environment.
- q. Radioactive Waste. Solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities except for radioactive material from post weapons test activities.

- r. Radioactive Waste Management. The planning, coordination, and control of those functions related to handling, treatment, storage, transportation, and disposal of radioactive waste, as well as associated surveillance and maintenance activities.
- s. Remedial Action. Activities conducted to reduce potential radiation exposure to people and potential harm to the environment from radioactive contamination.
- t. Shallow Land Burial. Disposal of waste in near-surface excavations that are covered with a protective overburden.
- u. Spent Nuclear Fuel. Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.
- v. Storage. Retention of waste in a retrievable manner that requires surveillance and institutional control.
- w. Storage Site. The area dedicated to waste storage and related activities.
- x. Surplus Facility. Any facility or site (including equipment) that has no identified programmatic use and is radioactively contaminated to levels that require controlled access.
- y. Threshold Quantity. With reference to DOE waste, a quantity or concentration of radioactivity above which the waste must be managed according to the requirements of this Order and below which the waste may be disposed of as nonradioactive waste at an approved sanitary landfill.
- z. Transuranium Radionuclide. Any radionuclide having an atomic number greater than 92.
- aa. TRU Waste. Without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g. Regarding the Waste Isolation Pilot Plant, high-level waste and spent nuclear fuel as defined by this Order are specifically excluded by this definition.
- bb. Waste Byproducts. Material, other than special nuclear material, that if separated and recovered from nuclear fuel cycle waste streams can be used for safe, environmentally acceptable, and cost-effective applications.
- cc. Waste Container. A containment vessel for radioactive waste, including any liner or shielding material that is intended for disposal.
- dd. Waste Package. The radioactive waste, waste container, and absorber that are intended for storage or disposal as a unit. In the case of

contaminated, damaged, leaking, or breached waste packages, any overpack shall be considered the waste container, and the original container shall be considered part of the waste.

7. RESPONSIBILITIES.

- a. Assistant Secretary for Defense Programs (DP-1) has primary authority for establishing policy for the management of DOE radioactive waste and responsibility for assuring that DOE radioactive waste generated by the Department's activities under DP-1 cognizance, or any other radioactive waste within the purview of DP-1, is managed according to the requirements of this Order and that DP-1 programmatic decisions include waste management considerations, as appropriate. Specific responsibilities include:
- (1) Implementing safe storage and disposal of all DOE waste except LLW and byproduct materials disposed of by the Assistant Secretary for Nuclear Energy and radioactive waste and spent nuclear fuel stored or disposed of by the Director of Civilian Radioactive Waste Management, and for developing and implementing beneficial uses for waste byproduct materials;
 - (2) Implementing alternative technologies and processes to support disposal of DOE waste;
 - (3) Developing the Waste Isolation Pilot Plant (WIPP), a facility near Carlsbad, New Mexico, for conducting research and development to demonstrate safe disposal of radioactive waste from defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission;
 - (4) Conducting research and development for DOE waste transportation systems, and providing for safe, efficient, and economic transport of materials pursuant to DOE 1540.1;
 - (5) Managing surplus facilities from the Department's defense program activities;
 - (6) Assuring that environmental, safety, health, transportation, quality assurance, unusual occurrence, construction project management, real estate management, and facility design requirements set forth in DOE Orders are implemented for DOE waste management programs under DP-1 authority;
 - (7) Operating documentation systems to provide data to the Integrated Data Base program (see page 2, paragraph 4p) from defense program activities and providing, in cooperation with RW-1, for maintenance and operation of the Integrated Data Base program; and

- (8) Implementing the information collection and clearance requirements contained in 5 CFR 1320 as they apply to Defense Program contractors, their employees, and other members of the public from whom information is collected under the provisions of this Order.
- b. Director of Defense Waste and Byproducts Management (DP-12) has lead responsibility for general overview, and for preparing and interpreting policy set forth in this Order, and for Headquarters implementation of requirements under this Order for DOE radioactive waste management programs under DP-12 cognizance. Specific responsibilities include: storage/disposal operations for defense waste; management of defense surplus facilities; consultation with other Headquarters organizations, as appropriate, and field organizations when new or alternative site-specific waste management practices are proposed; arranging for independent health, safety, and quality assurance audits to assess the degree of field organization implementation of the requirements of this Order; issuing updated guidance; and reviewing documents and plans required on page 9, paragraph 7i and page 10, paragraph 8.
- c. Director of Civilian Radioactive Waste Management (RW-1) is responsible for selected research and development, siting, construction, operation, and management activities assigned to the Secretary of Energy by the Nuclear Waste Policy Act of 1982 (Public Law 97-425) for the interim storage and disposal of HLW and spent nuclear fuel and for long-term care of closed commercial LLW sites transferred to DOE; has lead responsibility, in cooperation with the Assistant Secretaries for Defense Programs and Nuclear Energy, for managing the Integrated Data Base program (see page 2, paragraph 4p); and is responsible for assuring that environmental, safety, health, transportation, quality assurance, unusual occurrence, construction project management, real estate management, facility design requirements, and information collection and clearance procedures set forth in DOE Orders are implemented for RW-1 activities.
- d. Assistant Secretary for Nuclear Energy (NE-1) is responsible for assuring that DOE radioactive waste generated by all DOE operations under NE-1 cognizance are managed according to the requirements of this Order and that program decisions include waste management considerations, as necessary. Specific responsibilities include:
- (1) Managing DOE radioactive waste from NE-1 projects, including designated inactive uranium mill tailings sites, formerly utilized sites, surplus facilities, and the Three Mile Island and West Valley projects, until transferred to a DOE or licensed storage/disposal site;
 - (2) Managing DOE radioactive waste generated by the Department's uranium enrichment operations and disposed at sites located at the Oak Ridge, Portsmouth, and Paducah gaseous diffusion plants;

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- (3) Managing DOE radioactive waste generated by the Department's breeder reactor, space nuclear, and naval reactor programs until it is transferred to a DOE or licensed storage/disposal site;
 - (4) Developing alternative technologies and processes to support storage and disposal of radioactive waste or spent fuel generated by the Department's nuclear energy program;
 - (5) Managing surplus facilities from the Department's nuclear activities and radioactive waste storage/disposal sites that are the responsibility of NE-1;
 - (6) Developing and implementing commercial applications for waste byproducts;
 - (7) Assuring that environmental, safety, health, transportation, quality assurance, unusual occurrence, construction project management, real estate management, and facility design requirements set forth in DOE Orders are implemented for nuclear energy waste programs;
 - (8) Operating support documentation systems to provide data to the Integrated Data Base program (see page 2, paragraph 4p) and providing, in cooperation with RW-1, for maintenance and operation of the Integrated Data Base program; and
 - (9) Implementing the information collection and clearance requirements contained in 5 CFR 1320 as they apply to Nuclear Energy contractors, their employees, and other members of the public from whom information is collected under the provisions of this Order.
- e. Assistant Secretary for Policy, Safety, and Environment (PE-1) is responsible for providing an independent overview and advising the Secretary of the status of Departmental compliance with the requirements of this Order and, as they apply to radioactive waste management and decommissioning operations, other applicable Orders such as DOE 5480.1A, DOE 5480.2, and DOE 5440.1B.
- f. Directors of Other Headquarters Program Organizations are responsible for implementing the requirements of this Order for all radioactive waste generated by their programs until it is transferred to a DOE or licensed storage/disposal site and for assuring that program decisions include waste management considerations as necessary, and that environmental, safety, health, transportation, quality assurance, construction project management, real estate management, and facility design requirements set forth in DOE orders are implemented for their radioactive waste management programs.
- g. Office of General Counsel (GC-1) provides legal advice to program organizations regarding DOE waste management and decommissioning activities involving DOE-owned and privately owned sites. Renders legal opinion on DOE authority to undertake remedial action and other waste

management activities. Renders legal opinions and concurs in program actions to comply with the National Environmental Policy Act (see page 1, paragraph 4a) and other legal authorities in conjunction with proposed waste management and decommissioning activities.

- h. Assistant Secretary, Management and Administration (MA-1), through the Director of Procurement and Assistance Management (MA-4) is responsible for providing contractual and business advice to program offices regarding DOE waste management activities, including use of DOE management and operating contractors in such activities.
- i. Heads of Field Organizations are responsible for assuring that day-to-day radioactive waste management operations and surplus facility programs at their sites are conducted in compliance with the requirements of this Order. Field organizations in consultation with DP-12, PE-1, and other Headquarters organizations as appropriate, may establish threshold quantities and new or alternate waste disposal practices at their specific sites based on appropriate documented safety, health protection, and economic analyses. Specific responsibilities include:
 - (1) Documenting detailed radioactive waste management practices and procedures that apply to all operations at their respective sites. These documents shall include appropriate references to safety, health, environmental, economic, and other analyses. They shall also include procedures for performance of impact analyses and obtaining exemptions from their respective site-specific requirements for storage/disposal of radioactive waste that are consistent with applicable law.
 - (2) Preparing annual updates of Waste Management Plans for all operations under their cognizance according to the format in Attachment 1. These plans shall be submitted at the end of each fiscal year and distributed to DP-12, PE-1, and other appropriate Headquarters Program Offices for review and comment.
 - (3) Fiscal responsibility for waste transportation and establishing fees, as necessary, for storage and disposal of DOE waste at their sites.
 - (4) Maintaining environmental, safety, health and quality assurance programs for all radioactive waste management programs under their cognizance.
 - (5) Managing surplus facilities for which they are responsible according to the requirements of this Order.
 - (6) Reporting any unusual occurrences (including potential excessive radiation exposures) associated with DOE waste management operations at their sites per the requirements of DOE 5484.2.
 - (7) Approval authority for certification programs, standard containers, transportation, waste acceptance criteria (see page 2, paragraph 4n),

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and all other aspects related to TRU waste emplacement at the WIPP have been delegated to the Manager of Albuquerque Operations Office.

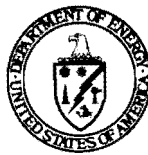
- j. Deputy Assistant Secretary for Naval Reactors (NE-60) assumes the same responsibility as Heads of Field Organizations for his program activities.

8. IMPLEMENTING PROCEDURES AND REQUIREMENTS.

- a. Within 6 months of the date of issuance, Heads of Field Organizations shall prepare and submit an implementation plan containing schedules and costs for compliance with the requirements of this Order to appropriate program organizations with a copy to PE-1 and DP-12 for review and comment. Thereafter, the status of compliance shall be reported in the annual waste management plans (Attachment 1).
- b. Chapters I through V address specific requirements and guidance for managing radioactive wastes.

9. CLEARANCE UNDER THE PAPERWORK REDUCTION ACT OF 1980. This directive has been determined to contain information collections coming under the provisions of 5 CFR 1320, "Controlling Paperwork Burdens on the Public." The Office of Management and Budget (OMB) has issued a clearance to the Department (OMB No. 1901-0261) which covers these information collections through 3-31-84. Action is underway within the Department to obtain subsequent OMB clearances, as mandated by 5 CFR 1320. Further information about this clearance action can be obtained from the program office.

BY ORDER OF THE SECRETARY OF ENERGY:



WILLIAM S. HEFFELFINGER
Director of Administration

WASTE MANAGEMENT PLAN

1. PURPOSE. To provide guidance on the development of a radioactive waste management plan for each site as required by page 9, paragraph 7i(2).
2. DISCUSSION. Existing conditions at the various facilities shall require different types and degrees of effort to meet the operating criteria of this Order. Accordingly, the plans need not be identical in degree of detail but must be unclassified (classified addenda are permissible). Appropriate references to supplement or substantiate the information or conclusions stated in the plan should be provided. A suggested outline of a waste management plan is given in paragraph 3, below.
3. FORMAT FOR THE SITE WASTE MANAGEMENT PLANS.
 - a. Program Administration.
 - (1) Site
 - (2) Office Responsible
 - (3) Contractors
 - (4) Lead Responsibility for Site Plans
 - (5) Source of Funds for Waste Management
 - (6) Status of Compliance with DOE 5820 Requirements
 - b. Description of Waste Generating Processes.
 - (1) Waste Process Flowcharts
 - (2) Radiological and Chemical Characteristics of Waste
 - c. Description of Waste Management Facilities
 - (1) Identification and Location of Facilities
 - (2) Description of Waste Treatment Facilities
 - (3) Description of Waste Storage and Disposal Sites
 - (4) Description of Surplus Facilities
 - (5) Description of Effluent Control Systems
 - (6) Site Administration Limits on Effluents
 - d. Radioactive Waste Disposed of or Stored.
 - (1) High-Level Waste from Chemical Processing Operations
 - (2) TRU waste
 - (a) Certified
 - (b) Uncertified
 - (3) Low-Level Waste
 - (4) Waste Contaminated with Naturally Occurring Radionuclides
 - (5) Other Radioactive Materials

- e. Schedules and Major Milestones for Waste Management Activities.
 - (1) High-Level Waste
 - (2) TRU Waste
 - (3) Low-Level Waste
 - (4) Other Waste (liquids, gases)
- f. Quality Assurance Implementation Plans. (per DOE 5700.6A)
- g. Environmental Monitoring Programs. (Radioactive and Nonradioactive)
- h. Radioactive Waste Documentation Systems.
 - (1) High-Level Waste
 - (2) TRU Waste
 - (3) Low-Level Waste
 - (4) Waste Containing Only Naturally Occurring Radioactivity
 - (5) Other Waste

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CHAPTER I

MANAGEMENT OF HIGH-LEVEL RADIOACTIVE WASTE

1. OVERVIEW. This Chapter establishes policies and guidelines for managing the Department's high-level waste (HLW) and any other materials which, because of their hazardous nature (health risk, longevity of hazard, and thermal activity), are determined by Heads of Field Organizations to require similar handling.
2. POLICY. All HLW generated by DOE operations shall be safely stored, treated, and disposed of in a geologic repository or at a DOE-owned site according to requirements set forth in this Order. To the extent practical, waste byproducts shall be recovered and utilized or stored. Operations other than disposal involving HLW shall comply with applicable Environmental Protection Agency (EPA) standards and, to the extent practical, with comparable Nuclear Regulatory Commission (NRC) regulations. Disposal of HLW will comply with applicable laws and regulations.
3. REQUIREMENTS.
 - a. Interim Storage.
 - (1) HLW shall be stored in interim engineered tank systems that, together with intertank transfer systems are designed to meet applicable engineering standards.
 - (2) Stored HLW should be contained so as to be retrievable for removal and transfer elsewhere. The physical and chemical forms of the waste and the method of storage shall be predicated on safety, cost-effectiveness, minimization of environmental releases and health concerns, and on maintaining options for beneficial use and disposal where practical.
 - (3) Monitoring and leak detection systems shall be incorporated in the engineered systems to provide rapid identification of failed containment, and routine surveillance and inspection of the engineered systems shall be performed.
 - (4) The volume, radioactive content, and chemical and physical characteristics of HLW in storage shall be documented and updated at least annually in the Waste Management Plan (Attachment 1). This data shall be supplied as necessary to the Integrated Data Base program (see page 2, paragraph 4p).
 - (5) For emergencies, spare capacity with adequate heat dissipation capability for each tank farm shall be maintained to receive the largest volume of liquid contained in any one tank. Adequate spare transfer pipelines shall also be maintained. Interconnected tank

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farms with adequate waste transfer capabilities and spare capacity may be considered as a single tank farm for purposes of this requirement.

- (6) All new HLW handling, transfer, and storage facilities (e.g., tanks, bins, pipelines, and capsules) shall be doubly contained. Existing singly contained systems for handling, transfer, and storage of HLW shall be replaced with doubly contained systems as practical.

b. Treatment.

- (1) Development and implementation of programs to safely and economically separate and recover valuable waste byproducts and safely store them or make them available for beneficial use shall be encouraged, as practical.
- (2) As soon as practical, programs shall be developed and implemented to reduce the volume and mobility of HLW in interim storage so that it will meet applicable disposal requirements.

c. Disposal. New and readily retrievable existing HLW shall be processed for disposal in a geologic repository according to the requirements of the Nuclear Waste Policy Act of 1982 (Public Law 97-425). Other waste will be stabilized in place if, after the requisite environmental documentation, the stabilization in place meets applicable EPA standards. Analytic predictions of disposal system performance shall be prepared in accordance with applicable EPA standards and incorporated in the NEPA process (see page 1, paragraph 4a).

- (1) Any radioactive waste disposed prior to implementation of this Order shall be periodically monitored insitu. Program organizations, in consultation with DP-12 and PE-1, shall reevaluate the safety of such waste to determine the need for corrective measures as necessary.
- (2) Heads of Field Organizations shall assure that disposal of HLW from their operations provides adequate protection for the public and the environment from the potential hazards of nonradioactive constituents per the requirements of DOE 5480.2, and may impose additional requirements deemed necessary to achieve such protection.
- (3) HLW shall be placed in approved waste containers that meet transportation and disposal site acceptance criteria prior to shipment offsite.

CHAPTER II

MANAGEMENT OF TRU WASTE

1. OVERVIEW. This Chapter establishes policies and guidelines for managing the Department's TRU waste.
2. POLICY. TRU waste shall be certified as practical, and stored in preparation for disposal at the WIPP, or by exception at other sites as appropriate. TRU waste impractical to certify for acceptance at the WIPP shall be evaluated for alternate disposal. Operations involving TRU waste shall comply with applicable EPA standards.
3. REQUIREMENTS.
 - a. Waste Classification.
 - (1) Any material that is known or suspected to be contaminated with transuranium radionuclides shall be evaluated and determined to be recoverable scrap, TRU waste, LLW, or waste below threshold quantities as soon as practical in the generating process to avoid commingling the various material streams.
 - (2) Materials to be managed as TRU waste are, with the exception of HLW, those that meet the requirements of the definition (see page 5, paragraph 6aa) or are determined on a case-by-case basis to have a comparable long-term health hazard by Heads of Field Organizations.
 - (3) The concentration limit for TRU waste (100 nCi/g) shall apply to any single waste package. In determining whether the concentration limit for TRU waste is exceeded, corrections shall be made for radioactive decay during institutional control periods (in the absence of other formal guidance, assume 100 years from the date of waste package certification) and the ingrowth of transuranium daughter products. For isotopes with other decay modes or alpha half-lives less than 20 years, the radioactivity concentration at the time of maximum activity for the radionuclide of concern must correspond, by calculation, to the concentration limit for TRU waste. For example, ^{241}Pu is a beta emitter which decays with a 14.37 year half-life to ^{241}Am , an alpha emitter with alpha half-life of 438 years. The peak buildup of ^{241}Am is 2.9 percent of the initial ^{241}Pu activity in the waste. By dividing the 100 nCi/g maximum alpha activity by 0.029, a concentration limit of 3400 nCi/g (beta) is obtained for waste contaminated with only ^{241}Pu .
 - (4) Radioactive waste with radioactivity concentrations above threshold quantities but below the limit for TRU waste shall be considered LLW and disposed of according to the requirements of Chapter III.

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b. Waste Certification.

- (1) Each site that generates TRU waste shall prepare, document, and implement a certification program to demonstrate that the waste meets disposal site acceptance criteria. Implementation costs for all TRU waste certification operations, except those in paragraph 3b(2) of this Chapter, shall be the responsibility of the program generating the waste.
- (2) TRU waste stored prior to issuance of this Order shall be certified prior to disposal. Stored waste that cannot be certified without treatment shall be treated, as practical, using safe cost-effective techniques to meet disposal site acceptance criteria or otherwise disposed of (see paragraph 3c(3) of this Chapter). Costs for certifying stored TRU waste shall be the responsibility of the storage site operator and DP-12 or other appropriate program organizations.
- (3) Administrative controls shall be directed toward reducing or completely eliminating the generation of TRU waste that cannot be certified in a practical manner. In unusual circumstances, small amounts of TRU waste may be impractical to certify, and acceptance of this material at a storage or disposal site may be approved on a case-by-case basis by a controlled review and approval process under the direction of the responsible field organization.

c. Storage and Disposal.

- (1) Certified waste shall be shipped to disposal as soon as practical. Certified waste that cannot be disposed of immediately shall be stored in a manner that is unlikely to alter its certification determination.
- (2) TRU waste that is classified for security reasons must be treated to remove or destroy the characteristic(s) requiring classification prior to disposal at an unclassified site.
- (3) TRU waste that cannot be certified by practical techniques shall be stored or disposed of by greater confinement at the expense of the generating program.
- (4) TRU waste that has been buried in shallow land burial sites or emplaced on soil columns prior to issuance of this Order shall be periodically monitored in place to assess both radioactive and nonradioactive hazards. Program offices in consultation with DP-12 and PE-1 shall reevaluate the safety of such waste to determine the need for corrective measures, as necessary.
- (5) Heads of Field Organizations shall assure that disposal under this Order provides adequate protection for the public and the environment from potential hazards of nonradioactive constituents as required by DOE 5480.2, and may impose additional requirements deemed necessary to achieve such protection.

- (6) The Waste Isolation Pilot Plant is being developed as a facility for conducting research and development to demonstrate safe disposal of radioactive waste from defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission.

d. Other Requirements.

- (1) Technical and administrative controls shall be directed toward reducing the gross volume of TRU waste generated and the amount of radioactivity in such waste. Reduction shall be based on the implementation of practical techniques, such as process optimization, materials substitution, assay of suspect waste and new technology development. Volume reduction techniques (e.g., compaction, incineration, and decontamination processes) shall be implemented wherever cost-effective and practical.
- (2) TRU waste shall be placed in approved waste containers that meet transportation and disposal site acceptance criteria, as appropriate, prior to shipment offsite for storage or disposal.
- (3) A documentation system shall be developed and implemented that identifies TRU waste storage and disposal sites, waste quantities, and waste characteristics and provides data as necessary to the Integrated Data Base program (see page 2, paragraph 4p). The data collected by this system shall be included in the annual Waste Management Plans (Attachment 1) and site development plans required by DOE 4320.1A.



CHAPTER III

MANAGEMENT OF LOW-LEVEL WASTE

1. OVERVIEW. This Chapter establishes policies and guidelines for managing the Department's low-level waste (LLW).
2. POLICY. LLW generated by DOE operations shall be disposed of, where practical, by shallow land burial or greater confinement disposal. Site-specific requirements for waste acceptance and disposal, site selection, site design, site operation, and site closure/post closure shall be developed and implemented by field organizations according to the guidance set forth in this Chapter.
3. REQUIREMENTS.
 - a. Waste Disposal.
 - (1) Consistent with approved waste acceptance criteria, solid LLW shall be disposed of at DOE shallow land burial or greater confinement disposal sites.
 - (2) Disposal operations involving discharge of liquid LLW directly to the environment or on natural soil columns shall be replaced by other techniques such as solidification prior to disposal or in-place immobilization, unless specifically approved by Heads of Field Organizations in consultation with DP-12 and PE-1.
 - b. Waste Acceptance. Waste form acceptance criteria that assure that the objective of this Order is met for shallow land burial and, if necessary greater confinement disposal of LLW, shall be developed for each disposal site. General guidance is provided below for use by field organizations in developing their site-specific waste acceptance criteria. Waste acceptance criteria should address, as appropriate, the following for both shallow land burial and greater confinement disposal:
 - (1) Allowable quantities and/or concentrations of radioactivity, including threshold quantities for radioactive waste;
 - (2) Criticality safety requirements (waste forms and geometries);
 - (3) Radiative or thermal energy output for waste;
 - (4) Restrictions on the generation of harmful gases, vapors, or liquids in waste;
 - (5) Restrictions for radioactive waste having hazardous chemical properties, such as toxic, pyrophoric, ignitable, corrosive, or explosive material, which are covered by reference in DOE 5480.2;

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- (6) Mechanical stability requirements for waste packages and any special waste package requirements for greater confinement disposal;
 - (7) Restrictions for chelating and complexing agents or other substances with the potential to mobilize harmful contaminants;
 - (8) Physical properties of waste, including restrictions on respirable substances and quantities of free liquids; and
 - (9) Other items which are deemed necessary by the field organizations.
- c. Disposal Site Selection. Siting criteria shall be developed for establishing any new disposal sites for LLW. Such criteria shall apply to areas not contiguous with existing disposal sites designated prior to approval of this Order. General guidance is provided below for use by field organizations in developing their site-specific selection criteria. Site selection criteria should address, as appropriate, the following:
- (1) Size, including disposal and administrative areas, and buffer zones;
 - (2) Hydrogeologic characteristics which permit disposal completely above or completely below the transition zone (the zone between the unsaturated and saturated zones) and reliable prediction and control of radionuclide migration;
 - (3) Potential impacts of natural hazards such as floods, erosion, tornadoes, earthquakes, and volcanos on site performance; and
 - (4) Impacts on current and projected population distributions and local families or businesses; land use, resource development plans and nearby public facilities (i.e., parks, schools, and streets); accessibility to transportation routes, and utilities; and the location of waste generators.
- d. Disposal Site Design. Design criteria shall be established prior to selection of new disposal sites. These design criteria shall be based on analyses of environmental and hydrogeological data, assure that the objective of this Order can be met, and be based on assessments of projected waste volumes, waste characteristics, and site performance. Additional guidance is provided below for use by field organizations in developing their design criteria. Design criteria should address, as appropriate, the following:
- (1) Measures for reducing wind and water erosion and other effects of surface water runoff, efficient land use, enhancement of the natural physical characteristics of the area, long-term isolation of the waste, and minimizing the need for active maintenance or remedial action;
 - (2) Environmental monitoring, fire suppression, utility and security systems; disposal and buffer zone areas; administrative,

decontamination and maintenance facilities; access to road and rail systems; and formal emergency plans;

- (3) Waste handling and treatment facility(ies) located and designed for ease of waste handling and minimizing the potential for human exposure and contamination spread;
- (4) A grid system for locating all disposal excavations on a site map which is referenced to U.S. Geological Survey or National Geodetic Survey benchmarks; and
- (5) Disposal excavations designed and constructed consistent with site hydrology, geology, and waste characteristics, and having excavation covers which provide for effective isolation of the waste.

e. Disposal Site Operations. Field organizations shall develop and implement operating procedures for new and existing LLW disposal sites that protect the environment and the health and safety of the public and site personnel, assure the security of the site, encourage good housekeeping practices, minimize the need for long-term control, and meet the requirements of the closure/post-closure plan. Disposal sites shall provide data on waste quantities and characteristics to the Integrated Data Base program (see page 2, paragraph 4p) and include it in the annual Waste Management Plans (Attachment 1) and site development plans required by DOE 4320.1A. Additional guidance is provided below for use by field organizations in developing operating procedures for their sites. Operating procedures should address, as appropriate, the following:

- (1) Training for operating personnel in radiological health and safety and in the use of the equipment and facilities for which they are responsible;
- (2) Techniques and procedures for waste volume reduction to the extent they are consistent with health, safety, and environmental requirements and economically attractive to implement;
- (3) Emergency response plans that identify persons to contact, response equipment, and testing procedures for both radiological and nonradiological emergency conditions;
- (4) A documentation system that identifies disposal excavations with reference to permanent surface markers, records the characteristics and location of bulk waste quantities or waste shipments, and maintains these records in a permanent archive compatible with the Integrated Data Base program;
- (5) A contingency plan for handling waste shipments that fail to meet waste acceptance criteria;
- (6) Personnel, equipment, and facilities for first aid treatment;
- (7) Availability, maintenance, and decontamination of operating equipment;

- (8) An environmental monitoring program having documented procedures and access to sampling and analytical equipment;
 - (9) Procedures to minimize interactions among the contents of waste packages that could jeopardize attainment of the objective of this Order;
 - (10) Access control to the waste disposal site; and
 - (11) Unusual occurrence reporting per DOE 5484.2 and quality assurance and control per DOE 5700.6A.
- f. Disposal Site Closure/Post-Closure. Field organizations shall develop a site-specific comprehensive closure plan prior to initiation of operations at new or closure of existing LLW disposal sites. The plan shall be reviewed and, if necessary, amended prior to initiation of closure activities to assure that the objective of this Order can be met. LLW disposal sites closed prior to implementation of this Order shall be periodically monitored to assess both radioactive and nonradioactive hazards, and program offices, in consultation with DP-12 and PE-1, shall reevaluate the safety of such sites to determine the need for corrective measures, as necessary. Guidance is provided below for use by field organizations in developing their site-specific plans. The plans should address, as appropriate, the following:
- (1) Stabilization of the disposal site for post-closure care including filling and capping of disposal excavations, as specified in design requirements, and removal of unneeded equipment and facilities;
 - (2) Residual radioactivity levels for surface soils that comply with site threshold quantity requirements;
 - (3) A security system to prevent unauthorized entry or removal of equipment or material during closure and a passive security system for the post-closure period;
 - (4) Maintenance of emergency response plans, facilities, and equipment until closure is complete;
 - (5) Permanent identification markers for locating disposal excavations and monitoring wells when closure is complete;
 - (6) Periodic surveillance and maintenance programs until closure is complete and modification of those programs, as necessary, to measure performance and assess the need for corrective measures following closure; and
 - (7) Corrective measures to be applied to existing disposal sites if conditions occur that could jeopardize attainment of the objective of this Order.

CHAPTER IV

MANAGEMENT OF WASTES CONTAMINATED WITH NATURALLY OCCURRING RADIONUCLIDES

1. OVERVIEW. This Chapter establishes policies and guidelines for managing DOE waste that contains only naturally occurring radionuclides, including uranium or thorium isotopes or their decay products and byproduct material as defined by this Order.
2. POLICY. Storage or stabilization in place shall be considered the primary technique for managing DOE waste containing only byproduct material. DOE waste containing only uranium and/or thorium isotopes shall be managed as LLW and if enriched uranium is involved, in compliance with the requirements of DOE 5632.2. Disposal shall be according to the requirements of Chapter III of this Order if practical, or applicable EPA standards.
3. REQUIREMENTS.
 - a. With the approval of the appropriate field organization, DOE waste contaminated with naturally occurring radionuclides, may be disposed of at existing DOE LLW disposal sites.
 - b. With the approval of the appropriate program organization, DOE waste contaminated with naturally occurring radionuclides may be disposed of at new, specially designated disposal sites that are selected, designed, operated, and closed according to Chapter III requirements.
 - c. With the approval of NE-1, other involved Federal agencies, States and Indian tribes, waste contaminated with naturally occurring radionuclides may be disposed of at tailings disposal sites established under the Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604).
 - d. Byproduct material that is owned or controlled by the Department and cannot be disposed of at existing DOE disposal sites shall be disposed of according to the intent of the EPA standard 40 CFR Part 192, Subpart A, promulgated in 1-83 pursuant to the Uranium Mill Tailings Radiation Control Act of 1978.
 - e. Data on waste location, quantities, and characteristics shall be provided to the Integrated Data Base program (see page 2, paragraph 4p).



CHAPTER V
DECONTAMINATION AND DECOMMISSIONING OF SURPLUS
FACILITIES

1. OVERVIEW. This Chapter establishes policies and guidelines for the management, decontamination, and decommissioning of surplus facilities under DOE ownership or control.
2. POLICY. Surplus facilities for which DOE is responsible shall be managed in a safe, cost-effective manner to assure that exposure to radiation and hazardous chemicals complies with DOE standards. Facilities, equipment, and valuable materials shall be recovered and reused when practical.
3. REQUIREMENTS. Program organizations shall develop and document specific requirements for their decommissioning activities and shall manage their surplus facilities as follows:
 - a. General.
 - (1) Facilities in which radioactive or other hazardous materials (DOE 5480.2) are utilized shall be designed to limit dispersion of these materials and to simplify decontamination and decommissioning or reuse. To the extent feasible, features and procedures that facilitate decontamination during operation and ultimate decontamination and decommissioning shall be identified during the planning and design phase based upon a proposed decommissioning method or conversion to other use. Such features and procedures shall include:
 - (a) Walls, ceilings, and floors having suitable washable or strippable paints or coverings;
 - (b) Caulking (or otherwise finishing off) all cracks, crevices and joints to prevent contamination spread to inaccessible areas;
 - (c) Modular, moveable enclosures for actual work with contaminating materials;
 - (d) Modular radiation shielding, in lieu of or in addition to monolithic shielding walls;
 - (e) Separate contamination barriers within shielded areas to prevent or reduce shielding contamination;
 - (f) Air exhaust filters located near individual radioactive material (or other contaminant) enclosures to reduce contaminated exhaust ductwork;

- (g) Architectural/structural designs to ease dismantlement and removal of contaminated equipment from the facility (e.g., removal of gloveboxes or dismantlement and removal of air filtration equipment and ductwork); and
 - (h) Localized liquid transfer systems to reduce buried contaminated piping, equipment for batch solidification to reduce liquid waste volumes, and special design/construction methods to assure integrity of joints in transfer piping (particularly buried piping).
- (2) Headquarters or field organizations issuing new contracts, grants and cooperative agreements, or modifications to those in effect involving nuclear work at non-DOE owned or controlled facilities shall address DOE contractual responsibility, if any, for decommissioning in the contractual agreement.
 - (3) Available operational records for all nuclear facilities (e.g., facility design drawings and modifications, characterizational data on contamination levels, prior decontamination and decommissioning activities, and incident reports required by DOE Orders) shall be maintained by the cognizant field organization for use in preparing decommissioning plans (see page V-3, paragraph 3c(1)).
 - (4) The services of the surplus facilities program implemented under DP-1 and NE-1 shall be available on a reimbursable basis for voluntary use by other program organizations in conducting decommissioning activities.

b. Preproject Activities.

- (1) Field organizations, in consultation with appropriate Headquarters program organizations, shall identify surplus facilities under their jurisdiction, document the potential for reuse and recovery of materials and equipment, and develop schedules for decommissioning them. Project priorities shall be based on public health and safety impacts and assessed per the guidance of RLO/SFM-82-7 (see page 3, paragraph 4s). Contractual and legal requirements, economic impacts of immediate vs. delayed decommissioning, future site plans, cost-effective program management and other factors shall be considered in project implementation plans.
- (2) Surveillance and maintenance shall be provided for all surplus facilities prior to decontamination or decommissioning to assure adequate containment of contamination, provide physical safety and security, and reduce potential public and environmental hazards.
- (3) Radiological criteria for decontamination of surplus facilities shall be developed, as needed, based on accepted radiation protection standards (DOE 5480.1A) and consideration of natural background radiation levels.

c. Project Activities.

- (1) A decommissioning project plan shall be developed by the responsible field organization for each decommissioning project. The plan shall include, as appropriate, the following items:
 - (a) Physical, radiological, and chemical data to support subsequent planning efforts, including a complete characterization of the facility or references to available documents containing such data;
 - (b) A summary of an evaluation of decommissioning alternatives for the facility and a recommendation for a preferred alternative;
 - (c) Information on factors which could influence the decommissioning alternative selection process such as safety concerns, potential future use, long-range site plans required by DOE 4320.1A, facility condition, health, environment and safety risks, schedules, and costs;
 - (d) Plans for compliance with the applicable provisions of the National Environmental Policy Act (see page 1, paragraph 4a);
 - (e) Radiological criteria to be used for the project which meet the objectives of this Order; and
 - (f) Projections of radioactive waste generated by decommissioning.
- (2) Following approval of the decommissioning plan, the decommissioning project shall be conducted according to the requirements of the plan. Significant deviations shall be approved by the responsible field organization.
- (3) All waste generated by the project shall be managed according to the requirements of this Order or DOE 5480.2, as appropriate.
- (4) Information on waste quantities and characteristics shall be provided to the Integrated Data Base program (see page 2, paragraph 4p); and
- (5) Following completion of the project, a final report that includes a facility description and final radiation survey shall be prepared and forwarded to the appropriate Headquarters program office.

d. Transfer of Facilities.

- (1) Responsibility for individual surplus facilities may be transferred to other DOE program organizations, including in certain instances the NE Surplus Facilities Management Program or the DP Defense D&D Program, by mutual agreement of the program organizations involved.

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The acceptance procedures of RLO/SFM-83-12 (see page 2, paragraph 4o) shall be followed. The program organization to which the facility is transferred shall accept full responsibility for surveillance, maintenance, and decommissioning of the surplus facility according to the requirements of this Order.

- (2) DOE surplus facilities may be released to the public according to the requirements of DOE 4300.1A, if the responsible program organization in consultation with PE-1 certifies that they meet applicable release criteria for residual radioactivity;
- (3) When they do not meet applicable release criteria for residual radioactivity, DOE surplus facilities may be reused for program activities that may or may not involve radioactivity provided that adequate safety controls pursuant to DOE 5480.1A are maintained; and
- (4) Decommissioned facilities shall be identified by notations in the legal land records of the local government entity before they are released from DOE ownership. Permanent summary records of the site status following decommissioning shall be maintained by the responsible field and program organizations.