History of Hanford Tank Waste Classification and Regulatory Activities

1944 – December 26, 1944, nuclear fuel reprocessing wastes produced and stored in underground Single-Shell Tanks (SST) at Hanford by the US Army Corp of Engineers Manhattan Project.

1946 – Atomic Energy Commission (AEC) created by the McMahon Atomic Energy Act of 1946 [1] to operate the Manhattan Project facilities.

1954 – Atomic Energy Amendments Act of 1954 [2] superseded previous legislation, providing for broader control of nuclear materials and making possible the creation of a civilian nuclear power program.

1970 – HLW was first defined by the AEC in terms of the source of the material in 10 CFR Part 50, Appendix F [3]. The AEC defined HLW as:

> "those aqueous wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent in a facility for reprocessing irradiated reactor fuels."

1972 – The term HLW first used by Congress in the Marine Protection Research and Sanctuaries Act of 1972 [4].

1974 – The AEC was reorganized into the Nuclear Regulatory Commission (NRC) and the Energy Resource and Development Administration (ERDA, later to become the Department of Energy, DOE, in 1977) by the Energy Reorganization Act (ERA) of 1974 [5]. Congress found it in the public interest to separate the licensing and regulation of nuclear power from the development and promotion of nuclear power. NRC was given regulatory authority for long term storage and disposal of HLW. The NRC definition of high-level waste is at 10 CFR 60.2, (which is consistent with the definition of high-level radioactive waste in 10 CFR Part 50, Appendix F). Specifically, 10 CFR Part 60.2 states high-level radioactive waste is:

> "(1) irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (3) solids into which such liquid wastes have been converted."

1977 – In a document on long-term management of Hanford HLW [6], ERDA described Hanford HLW as waste resulting from the chemical processing of spent nuclear fuel and stored in 149 underground Single-Shell storage Tanks (SST) ranging in size from 55,000 to 1,000,000 gallons.

1978 – The National Academy of Sciences stated "A total of 152 tanks have been built at Hanford for the storage of high-level wastes" and "during the period 1952-58 all uranium-containing high-level wastes were successfully processed to produce purified UO3 and 'reconstituted' high level wastes that were returned to the buried waste tanks". [7]

1979 – The Natural Resources Defense Council (NRDC) sued NRC over licensing of Hanford HLW storage/disposal Double-shell Tanks (DST) [8]. The District of Columbia Circuit Court of Appeals ruled that ERDA construction of 22 nuclear waste storage tanks was not subject to the licensing jurisdiction of the NRC but that it was a major federal action requiring the preparation of a project-specific environmental impact statement (EIS). The court upheld the NRC determination that it lacked jurisdiction over the construction of the waste storage tanks under § 202(4) of the Energy Reorganization Act of 1974 on the ground that § 202(4) gives the NRC jurisdiction over only those ERDA activities relating to the permanent storage of high-level nuclear waste. Defendants characterized the tanks in question as designed only for short- to mid-term use.

The US District Court for the District of Columbia then directed ERDA to prepare an Environmental Impact Statement (EIS) to address the design and safety alternatives of the waste storage tanks for HLW at the Hanford Site. [9]

1980 – DOE issued a Double-Shell Tank EIS evaluating alternatives for 13 new tanks to "supplement the 156 tanks (149 single-shell and 7 double-shell) built at Hanford since 1943 to store the high-level wastes". [10]

1982 – The Nuclear Waste Policy Act of 1982, as amended, (NWPA) [11,12] provided for the disposal of high-level radioactive waste and established a program of research, development, and demonstration regarding the disposal of high-level radioactive waste. The NWPA contains a HLW definition different than the definition in 10 CFR Part 60. The NWPA defines HLW as:

(A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and

(B) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.

1986 – The NRC made the following statement in the NRC comments [13] on the DOE draft environmental impact statement (DEIS), "Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes".

> "First, as you are aware, under Section 202(4) of the Energy Reorganization Act of 1974, any facilities expressly authorized for disposal of defense high-level wastes are subject to the licensing and related regulatory authority of the Commission. Whether the express authorization for particular facilities is legislative or administrative in our judgment has no bearing upon the concerns that led Congress to provide for licensing by NRC. Also, it appears that the Hanford 'tank wastes,' which from the information presented in the draft EIS would have been regarded as HLW when the Energy Reorganization Act was passed, remain HLW for purposes of determining whether or not NRC has such jurisdiction. If DOE believes that subsequent processing of the 'tank wastes' may have altered the classification of some of the materials being stored, more detailed waste characterization information would be necessary to support that view."

1987 – NRC published Advanced Notice of Proposed Rulemaking, announcing its intent to revise the definition of HLW in 10 CFR Part 60 in a manner that would apply the term HLW to materials in amounts and concentrations exceeding numerical values that would be stated explicitly in the form of a table [14].

1988 – NRC withdrew the proposed Rulemaking for changing HLW source based definition to a concentration or risk based definition [15]. Instead, the Commission continued to embrace the definition at 10 CFR Part 60. In summary, the Commission stated that the preferable construction of the statute was to conform to the traditional definition, i.e., to define high-level waste by its source, not by its concentrations of fission products, and thus equate Nuclear Waste Policy Act of 1982, as amended, wastes with those wastes which have traditionally been regarded as high-level waste under Appendix F of 10 CFR Part 50 and the Energy Reorganization Act of 1974 (ERA). The NRC stated:

> "NWPA (clause (a)) wastes have little significance for purposes of the NWPA since the Federal Government was already responsible for the disposal of all reprocessing waste at the time the statute was passed." Thus "materials that are high-level waste for purposes of licensing-jurisdiction provisions of the ERA will also be regarded as high-level waste under the NWPA. This would include the primary reprocessing waste streams at DOE facilities, though not the incidental wastes produced in reprocessing" (53 FR 17709).

1989 – The NRC issued a letter concurring with DOE that a fraction of treated DST wastes could disposed in a grout facility and not subject to NRC licensing for HLW disposal. [16] The waste treatment system used:

(1) Solids leaching, complexant destruction, liquid-solids separation, and cesium ion exchange to separate DST wastes into HLW and incidental waste fractions; and

(2) Grout for treatment and disposal of the DST incidental waste fraction.

The procedural methodology used by the NRC to classify waste as "incidental " wastes was:

(1) Have been processed (or will be further processed) to remove key radionuclides to the maximum extent that is technically and economically practical;

(2) Will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR Part 61; and

(3) Are to be managed, pursuant to the Atomic Energy Act, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 are satisfied.

1990 – The States of Washington and Oregon petitioned the NRC regarding the classification of HLW [17]. The petition requested the NRC revise the source based definition of HLW in 10 CFR Part 60 and establish a procedural framework on a tank-by-tank basis for determining whether certain Hanford wastes are HLW or incidental wastes.

1993 – The NRC denied the petition for rulemaking submitted by the States of Washington and Oregon for the process and criteria of classifying radioactive wastes [18]. The petition was denied because the NRC concluded that the principles for waste classification are well established and can be applied on a case-by-case basis without revision to the regulations.

1997 – DOE published their first comprehensive analysis of the sources and contamination generated by the production of nuclear weapons, "Linking Legacies, Connecting the Cold War Nuclear Weapons Production Processes To Their Environmental Consequences" [19]. DOE states in the document (p 35):

> "Hanford – At Hanford, high-level waste alkaline liquid, salt cake, and sludge are stored in 149 single-shell underground tanks and 28 double-shell underground tanks. …. all tank waste is classified at Hanford and managed as high-level waste."

1997 – The NRC issued a letter giving a provisional agreement that on-site disposal of treated Hanford DST and SST wastes were not subject to NRC licensing [20]. The treatment system for 177 tanks included:

(1) Solids leaching, complexant destruction, liquid-solids separation, and cesium ion exchange to separate tank wastes into HLW and incidental waste fractions; and

(2) Vitrification (glass) for treatment and disposal of the incidental waste fraction.

The NRC stated the staff preliminary finding of the proposed LAW fraction as incidental waste is a provisional agreement and not sufficient to make an absolute determination at that time. If the Hanford tank waste is not managed using a program comparable to the technical basis analyzed in the reference letter[20], the waste classification must be revisited by DOE.

1999 – DOE issued DOE Order 435.1, "Radioactive Waste Management", assuming authority to classify incidental wastes [21]. DOE Order 435.1 uses the NWPA nonspecific HLW concentration basis definition stated as "waste that contains fission products in sufficient concentrations".

2001 – In a summary of NRC involvement with DOE in the Tank Waste Remediation System the NRC stated [22]:

> " Under the present system, unless the NRC determines that this LAW/incidental waste is not HLW, the waste must be disposed of as HLW in a federal repository. "

2002 – NRDC, the Snake River Alliance, the Confederated Tribes and Bands of the Yakama Nation, and the Shoshone-Bannock Tribes filed suit in the US District Court of Idaho challenging the incidental waste exemption of DOE Order 435.1 [23]. The States of Idaho, Washington, Oregon, and South Carolina filed a "friend-of-the-court" brief supporting the NRDC position.

2003 – The US District Court of Idaho ruled that the DOE violated the NWPA when it granted itself the authority to reclassify HLW and declared invalid the incidental waste portion of Order 435.1 [24].

2003 – DOE Secretary Abraham requested Congress on July 17, 2003 to modify the NWPA and grant DOE the authority to reclassify HLW to incidental wastes. DOE also appealed the Idaho District Court ruling in August 2003.

References

[1] The McMahon Atomic Energy Act of 1946, Aug. 1, 1946, ch. 724, 60 Stat. 755.

[2] The Atomic Energy Act Amendments of 1954, Aug. 30, 1954, ch. 1073, Sec. 1, 68 Stat. 919.

[3] AEC, 1970. "Siting of Commercial Fuel Reprocessing Plants and Related Waste Management Facilities, 10 CFR Part 50, 'Licensing of Production and Utilization Facilities'," Federal Register, Vol. 35, No. 17530-17533, Atomic Energy Commission, Washington, D.C., November 14, 1970.

[4] The Marine Protection Research and Sanctuaries Act of 1972, P.L. 92-532, as amended by P.L. 93-254 (1974), codified at 33 U.S.C. Section 202 of ERa. 52 Fed. Reg. 5992, 5993.

[5] Energy Reorganization Act of 1974, P.L. 93-438, Oct. 11, 1974, 88 Stat. 1233, (U.S.C. Title 42, Sec. 5801 et seq.).

[6] ERDA, 1977, "Alternatives for Long-Term Management of Defense High-Level Radioactive Waste, Hanford Reservation, Richland, Washington", ERDA 77-44, Energy Research and Development Administration, Richland, Washington, September 1977.

[7] National Research Council, "Radioactive Wastes at the Hanford Reservation A Technical Review", Panel on Hanford Wastes, Committee on Radioactive Waste Management, Commission on Natural Resources, National Academy of Sciences, Washington, D.C., 1978.

[8] Natural Resources Defense Council, Inc. v. Nuclear Regulatory Commission, Nos. 77-1489, -1576, -1798 (D.C. Cir. August 17, 1979).

[9] Natural Resources Defense Council, Inc. v. Nuclear Regulatory Commission, No. 76-11691 (D.C. Cir. September 29, 1979).

[10] DOE, 1980, "Final Environmental Impact Statement, Supplement to ERDA-1538, December 1975, Double-Shell Tanks for Defense High-Level Radioactive Waste Storage", DOE/EIS-0063, Waste Management Operations, U.S. Department of Energy, Washington, D.C., April 1980.

[11] The Nuclear Waste Policy Act, P.L. 97-425, Jan. 7, 1983, 96 Stat. 2201 (Title 42, Sec. 10101 et seq.).

[12] Nuclear Waste Policy Amendments Act of 1987, P.L. 100-203, title V, subtitle A, Sec. 5001-5065, Dec. 22, 1987, 101 Stat. 1330-227 to 1330-255.

[13] DOE , "Final EIS: Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes", DOE/EIS-0113, U.S. Department of Energy, Richland, Washington, December 1987.

[14] NRC, 1987. "Advanced Notice of Proposed Rulemaking; 10 CFR Part 60, 'Definition of High-Level Radioactive Waste,'" Federal Register, Vol. 52, No. 5992, U.S. Nuclear Regulatory Commission, Washington, DC, February 27, 1987.

[15] NRC, 1988. "Proposed Rule; 10 CFR Part 61, Disposal of Radioactive Wastes", U.S. Nuclear Regulatory Commission, Washington, D.C., Federal Register, Vol. 53, No. 17709, May 18, 1988.

[16] Bernero, R. M., 1989, Director Office of Nuclear Materials Safety and Safeguards, U. S. Nuclear Regulatory Commission, Washington, D.C., letter dated September 11, 1989 to A. J. Rizzo, Assistant Manager for Operations, U. S. Department of Energy, Richland, WA.

[17] NRC, 1990, "Definition of the Term 'High-Level Radioactive Waste' ", U.S. Nuclear Regulatory Commission, Washington, D.C., Federal Register, Vol. 55, No. 51732, December 17, 1990.

[18] NRC, 1993, "States of Washington and Oregon: Denial of Petition for Rulemaking", U.S. Nuclear Regulatory Commission, Washington, D.C., Federal Register, Vol. 58, No. 12342, March 4, 1993.

[19] DOE, 1997, "Linking Legacies, Connecting the Cold War Nuclear Weapons Production Processes To Their Environmental Consequences", DOE/EM-0319, Office of Environmental Management, U.S. Department of Energy, Washington, D.C., January 1997.

[20] Paperiello, C. J., 1997, Director, Office of Nuclear Material Safety and Safeguards, U. S. Nuclear Regulatory Commission, Washington, D.C., letter dated June 9, 1997 to J. Kinzer, Assistant Manager, Office of Tank Waste Remediation System, U. S. Department of Energy, Richland, WA

[21] DOE, 1999, "Radioactive Waste Management", DOE O 435.1, Office of Environmental Management, U.S. Department of Energy, Washington, D.C., July 9, 1999.

[22] NRC, 2001, "Overview and Summary of NRC Involvement with the DOE in the Tank Waste Remediation System-Privatization (TWRS-P) Program", NUREG-1747, U.S. Nuclear Regulatory Commission, Washington, D.C., June 29, 2001, p. 215.

[23] NRDC et al. v. Department of Energy, et al., Civ. No. 01-CV-413 (BLW), Idaho District Court, February 28, 2003.

[24] NRDC et al. v. Department of Energy, et al., Civ. No. 01-CV-413 (BLW), Idaho District Court, July 2, 2003.