

Gaps Related to Recycling

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Overview of Topics

Introduction – Jack Bailey

Waste Discussions:

- Gap 3: Waste Incidental to Reprocessing – John Greeves
- Gap 16: Waste Classification – John Greeves
- Gap 15: Waste Confidence (WC) – Rodney McCullum
- Gap 2: Independent Storage of High Level Waste – Felix Killar
- Gap 6: Definition of Terms – Felix Killar

Safeguards Discussions – Steve Schilthelm

Gap 3 – Definition in Part 7x for HLW

HLW is the **highly radioactive** material resulting from recycling of spent nuclear fuel, including liquid wastes produced directly in recycling (i.e., 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) and any solid material derived from such liquid waste that contains fission products in **sufficient concentrations**. HLW does not include waste incidental to recycling.

Gap 3 – Definition in Part 7x for Waste Incidental to Recycling (WIR)

Waste material resulting from recycling of spent nuclear fuel, including liquid wastes produced directly in recycling and any solid material derived from such liquid waste that contains fission products that is **not so highly radioactive or contains insufficient concentrations of fission products to be classified as HLW**.

Such waste is not so highly radioactive or of sufficient concentration if it

- (1) has been **processed to remove key radionuclides to the maximum extent that is technically and economically practical**, and
- (2) either **meets Class C concentrations** under 10 CFR part 61 **or will meet the performance objectives** in 10 CFR part 61, subpart C if disposed of in a near surface disposal site based on a site specific performance assessment.

This definition does not relieve the Department of Energy from its responsibility for the disposal of radioactive material which is greater than Class C under the Low-Level Radioactive Waste Policy Act of 1985.

Gap 3 – Waste Incidental to Recycling (WIR)

- NWPA and AEA defines HLW based on source and hazard
- Long standing policy of AEC , NRC, and DOE that HLW does not include WIR
- AEC /NRC set criteria:
 - Appendix F 1969+1970; 1993 WIR Rulemaking Denial, SRS Review 2000; West valley 2002
- DOE Order 435.1 adopts NRC criteria and modifies it
- Litigation pursued on DOE Order 435.1
- Section 3116, Ronald W. Reagan National Defense Authorization Act defines WIR for ID and SC
- Part 7x, first time criteria adopted by rule

REGULATORY HISTORY

- Appendix F (1970) 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.
- 10CFR Part 60 (1981) defined HLW as:
(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.
- NWPA (1982) defined 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**.

REGULATORY HISTORY (cont.)

- DOE Order 435.1 (1999) defines WIR as

Citation Method –if:

- 1) Radioactive hulls, other irradiated and contaminated hardware
- 2) Other solid wastes from operation of commercial fuel reprocessing plants, such as ion exchange beds, sludges, and contaminated items, clothing, tools, etc.

Evaluation Method – If:

- 1) Has been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical;
- 2) Will be managed to meet safety requirements comparable to the performance objectives set out in **10 CFR Part 61, Subpart C, Performance Objectives**; and
- 3) Are managed, pursuant to DOE's authority under the *AEA of 1954* provided waste will be incorporated at a concentration that does **not exceed Class C concentrations** in 10 CFR 61.55, *Waste Classification*; or will meet alternative requirements as DOE may authorize.

REGULATORY HISTORY (cont.)

- 10CFR Part 63 (2001) defined HLW as:
 - (1) highly RAM resulting from reprocessing of spent nuclear fuel, including liquid waste and related solid materials that contain fission products in **sufficient concentrations**;
 - (2) Irradiated reactor fuel; and (3) Other highly RAM that the Commission, consistent with existing law, determines by rule **requires permanent isolation**.
- Section 3116 (2005) Ronald W. Reagan National Defense Authorization Act
 - (1) **Does not require permanent isolation in a deep geologic repository** for spent fuel or high-level radioactive waste
 - (2) Radioactive radionuclides removed to the maximum extent practical; and
 - (3)A. Does **not exceed concentration limits for Class C** and will be disposed of in compliance with the performance objectives in 10 CFR Part 61, Subpart C; **or**
 - (3)B. Exceeds concentration limits for Class C but will be in **compliance with the performance objectives of 10 CFR Part 61**, Subpart C, and pursuant to plans developed by DOE in consultation with the NRC.

Long standing policy of AEC , NRC, and DOE that HLW does not include WIR

- Appendix F does not define all waste associated with reprocessing as HLW needing geologic isolation. Proposed Appendix provided that certain reprocessing waste did not have to be disposed of as HLW.

HLW does not include incidental wastes resulting from reprocessing plant operations such as ion exchange beds, sludges, and contaminated laboratory items, clothing, tools, and equipment. Neither are radioactive hulls and other irradiated and contaminated fuel structure hardware within the Appendix F definition - Advanced Notice of Proposed Rulemaking, Definition of "High-Level Radioactive Waste," 52 FR 5992, 5993 (February 27, 1987).

- 1993 petition denial – first criteria for WIR
 - 1) The wastes have been processed (or will be processed) to remove key radionuclides to the maximum extent that is technically and economically practical;
 - 2) The wastes 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) The wastes 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, Subpart C are satisfied
- DOE Order 435.1 (1999) modified 2nd criterion:
 - 2) does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR 61.55, *Waste Classification*; or will meet alternative requirements for waste classification and characterization as DOE may authorize.

Long standing policy (cont.)

- NRC review of SRS (2000) and West Valley (2002)
 - 1) Wastes have been processed (or will be processed) to remove key radionuclides to the maximum extent that is technically and economically practical; and
 - 2) Wastes to be managed, pursuant to the AEA, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C are satisfied
- DOE litigation on DOE Order 435.1 NRDC v Abraham
 - NRDC claimed that DOE Order 435.1 was invalid as it exceeded DOE's authority under the NWPA
 - The Court (2003):
 - 1) NWPA allows DOE to reclassify the waste. by treating solids to remove fission products include the sludges in tanks
 - 2) NWPA does not offer option to reclassify liquids – “sufficient concentration” applies only to solids
 - 3) The second 435.1 criterion associated with the performance objectives had no independent meaning stating “DOE will treat waste that it deems to be low-level waste as low-level waste.”
 - 4) Did not accept provision in 435.1 that allows DOE “to meet such alternative requirements for waste classification and characterization as DOE may authorize.” Alternative requirements are not defined and subject to the whim of DOE
 - The Court of Appeals in 2004 vacated the case on the basis it was not ripe for judicial review. Court did not reach the merits and the case does not serve as a legal precedent.

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HLW and WIR Summary

- Defines “highly radioactive” and “sufficient concentration”
- Provides regulatory certainty
- Provides predictability for industry
- Provides transparency for all parties
- Builds on section 3116 and past NRC policies and practices

GAP 16 – Waste Classification

- Issue is treatment of large quantities of radionuclides that were not discussed in the EIS for Part 61
- Current DU rulemaking is considering these unique waste streams
- NRC is also considering risk informing Part 61
- These rulemakings can address waste from recycling

GAP 15 – Waste Confidence (WC)

- Past WC decisions (1984 and reaffirmation in 1990) addressed recycle
- Currently pending draft rule addresses recycling
- The FRF application will address environmental impacts of storage of solidified HLW
- Industry believes the administration's position on used fuel management should have no effect on an affirmative Waste Confidence decision, and it would like to see NRC re-notice rulemaking and issue a final rule no later than the first part of calendar year 2010.
- There is no impact on power plant licensing. The issue remains under active consideration by the Commission and, therefore, is not appropriate for adjudication in individual licensing proceedings.

GAP 2 – Independent Storage of HLW

- Fuel recycle facility (FRF) needs to address on-site storage of:
 - Used Nuclear Fuel (UNF) to feed FRF
 - Solidified HLW
- Industry's positions are:
 - Initial storage of UNF under Part 72 or Part 7x license
 - Storage of UNF in process under Part 7x license
 - On site storage of HLW under Part 7x license

Gap 2 – Part 7x Features

- Part 7x requires liquid HLW solidified within 5 years
- Part 7x would allow for inclusion of both UNF storage and solidified HLW storage
- Part 7x includes baseline design criterion (10 & 11) to address storage of UNF and solidified HLW and design criterion (27 & 28) specific to UNF storage
- Fuel Recycle Facility would need a contract with DOE for disposal of HLW

No modifications to Part 72 are needed

GAP 6 – Definition of Terms

- Part 7x provides the term “Recycling” and defines it accordingly
- Industry intends to process UNF and reuse products thereby recycling it, while not creating large inventories of weapons useable materials