Nevada Site Specific Advisory Board
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Full Board Meeting Handouts for Wednesday, January 15, 2020

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NSSAB FULL BOARD MEETING ATTENDANCE

October 2019 through September 2020 (FY 2020)

Name	11/13/19	1/15/20	3/18/20	5/20/20	7/15/20	9/23/20	Max Terms
MEMBERS							
Amina Anderson	√						2020
Francis Bonesteel	√						2022
William DeWitt	√						2024
Pennie Edmond	E						2020
Karen Eastman	√						2022
Charles Fullen	√						2022
Richard Gardner	E						2022
Anthony Graham	√						2024
Tanya Henderson	E						2024
Donald Neill	√						2020
Steve Rosenbaum	√						2020
Janice Six	√						2024
Richard Stephans	√						2022
Richard Twiddy	√						2022
Dina Williamson-Erdag	E						2022
LIAISONS							
Clark County	√						
Consolidated Group of Tribes & Organizations	E						
Elko County Commission (limited)							
Esmeralda County Commission	U						
Lincoln County Commission	U						
Nye County Commission	U						
Nye County Emergency Management	√						
Nye Co. Nuclear Waste Repository Project Office	√						
State of NV Division of Env Protection	√						
U.S. Natl Park Service (limited)							

KEY: √ - Present E - Excused V - Vacant U - Unexcused

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

U.S. Department of Energy (DOE) and U.S. Nuclear Regulatory Commission (NRC) Waste Classification Systems

Susan Krenzien

Inspection Experts, Inc.

January 15, 2020

Contents

- Authority - Why We Have Two Systems
- NRC Classifications
- DOE Waste Classifications
- Why the Systems are Different
- Waste Types
- Spent Nuclear Fuel

Radioactive Waste

- Any garbage, refuse, sludges, and other **discarded** material, including solid, liquid, semisolid, or contained gaseous material that must be managed for its radioactive content
- No programmatic use

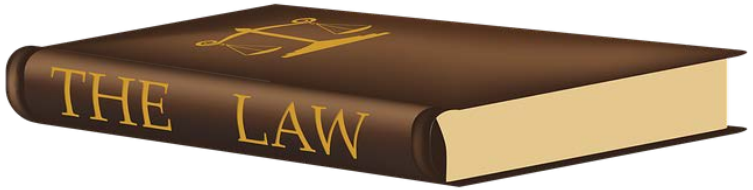
Garbage

Radiopharmaceuticals

Well logging equipment

Atomic Energy Act as Amended

- *Atomic Energy Act* of 1954 (AEA)
  - Established Atomic Energy Commission (AEC)
- *Energy Reorganization Act* of 1974
  - Divided the AEC into two separate entities
    - NRC
    - Energy Research and Development Administration (DOE – 1977)
- *Nuclear Waste Policy Act* of 1982
- *Low-level Radioactive Waste Policy Amendments Act* of 1985
- *Energy Policy Act* of 2005



Waste and Responsibility

Waste Class	Regulatory Responsibilities	Planned Disposition Path
High-Level Waste (HLW)	• DOE for disposal • U.S. Environmental Protection Agency (EPA) disposal standards • NRC licenses	Geologic repository
Greater-than-Class C (GTCC)	• DOE for disposal • NRC regulates disposal	LLW not for near-surface disposal; Geologic repository
Transuranic (TRU) Waste	• DOE for disposal • EPA certification • New Mexico permit	Waste Isolation Pilot Plant (WIPP), DOE owned/operated
Low-Level Waste (LLW)	• DOE for disposal • EPA/State permit if mixed	DOE near-surface disposal facilities
LLW Class A, B, C	• Agreement State licenses commercial facilities	Commercial near-surface disposal facilities

– NRC and DOE definition

– NRC definition

– DOE definition

Implementation

- DOE
  - DOE Directives system under DOE Order 435.1, *Radioactive Waste Management,* Manual 435.1-1, Guide 435.1-1 and DOE-STD-5002-2017 *Disposal Authorization Statement and Tank Closure Documentation* technical standard
  - HLW, TRU, and LLW
- NRC
  - Title 10 *Code of Federal Regulations* (CFR) Parts 1–199 and/or state implemented regulations
  - 37 Agreement States
  - HLW, Class A, B, C, and GTCC

Questions on Authority?

NRC LLW Classification System

- 10 CFR 61.55, *Waste Classification*
  - LLW classification according to its radiological hazard
    - Waste characteristics
    - Long-lived radionuclides
    - Short-lived radionuclides
  - The classification includes Class A, B, C, and GTCC
  - As the waste class and hazard increase, the regulations require progressively greater controls

LLW Characteristics

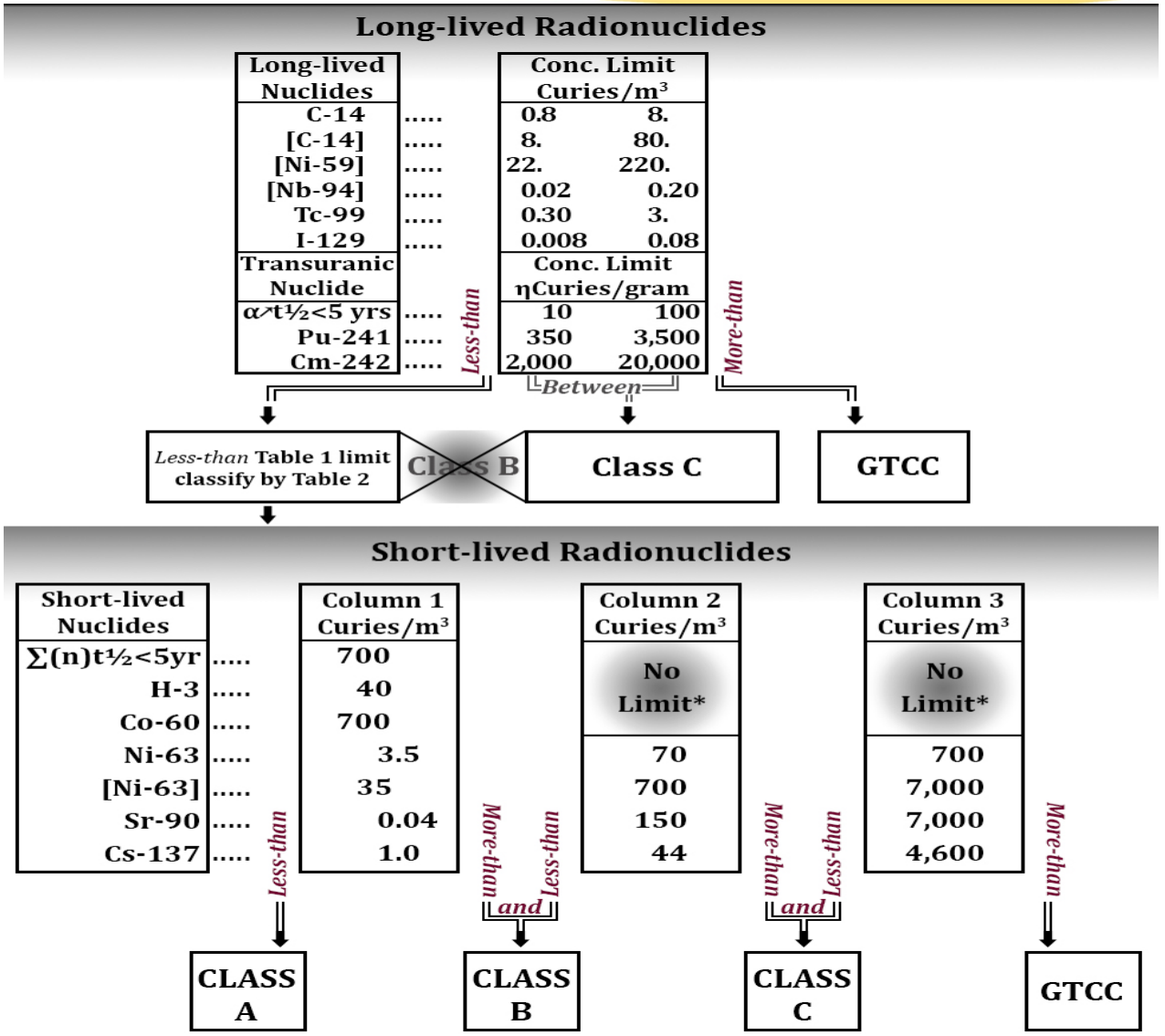
- Both the NRC and DOE have minimum physical, chemical, and stability requirements for LLW
  - DOE has five (5) physical/chemical/stability requirements
  - NRC has eight (8) physical/chemical and three (3) stability requirements
- See handout
  - DOE (1) ≈ NRC b(1) and (3)
  - DOE (2) ≈ NRC a(2), a(3), and b(2)
  - DOE (3) ≈ NRC a(4) and a(6)
  - DOE (4) ≈ NRC a(5)
  - DOE (5) ≈ NRC (7)
- DOE establishes equivalence to NRC a(1) and a(8) in Waste Acceptance Criteria specific to the disposal facility

NRC LLW Classes

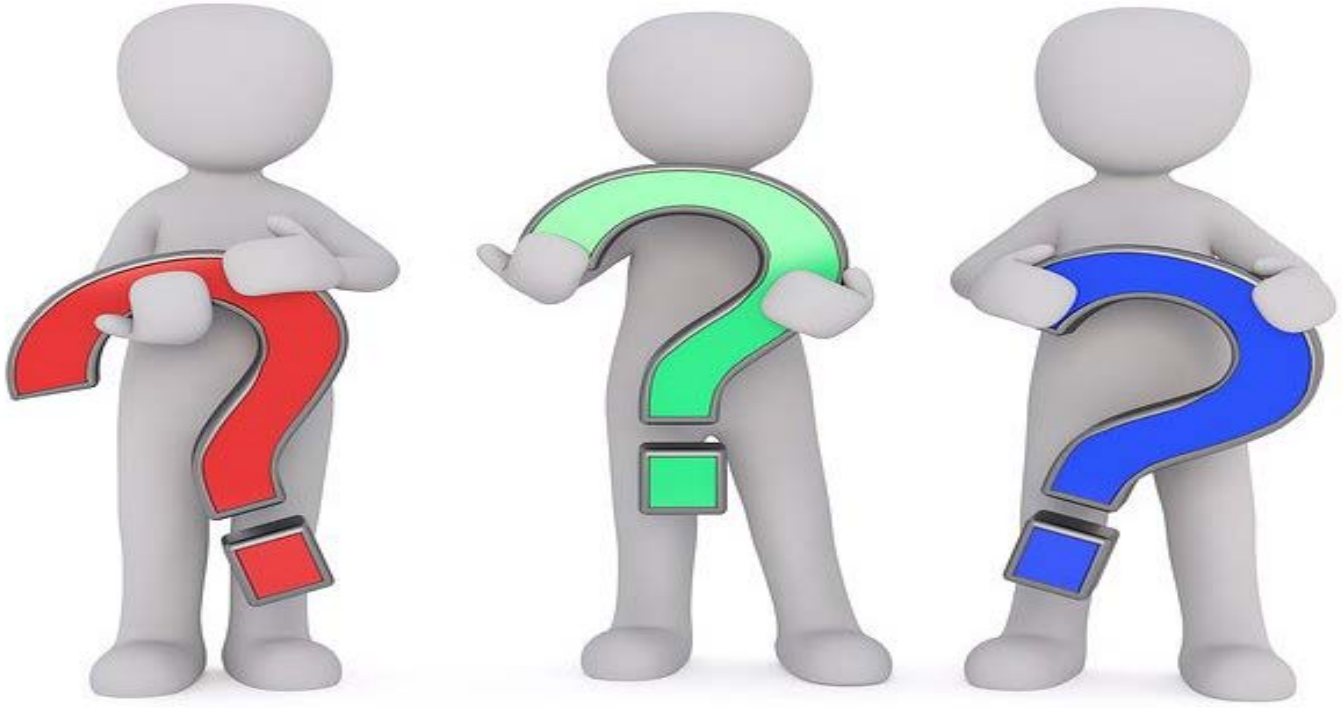
- Class A
  - Lowest class of radioactive waste – 96% of LLW
  - Contains radionuclides which decay to safe levels within decades – no stabilization requirements, usually segregated from other waste classes
- Class B
  - Contains mostly radionuclides which decay to safe levels within a few decades
  - Requires shielding during handling and transport
- Class C
  - Contains radionuclides in the highest amount suitable for shallow land burial – takes hundreds of years to decay to safe levels
- GTCC
  - Highest level of LLW
  - Requires stringent disposal methods, although some may be appropriate for shallow land burial

Tables

- Radioactive waste with no nuclides in either table is Class A
- For wastes containing mixtures, see 10 CFR 61.55(5) and (7) Sum of fractions



Questions on NRC LLW Classification?



DOE Classification System

- DOE Manual 435.1-1, *Radioactive Waste Management Manual*
  - Classifies waste by source and concentration
  - HLW is defined by its source
  - TRU is defined by its concentration
  - LLW is defined by what it is not

HLW

Manual 435.1-1, Chapter II, Section A

- 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 other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation. (Emphasis added)
- Commercial reprocessing stopped in 1977, DOE stopped reprocessing in 1992
- DOE sites in Washington, South Carolina, and Idaho have HLW
- HLW must ultimately comply with DOE/EM-0093, *Waste Acceptance Product Specifications for Vitrified High-Level Waste Forms,* or DOE/RW-0351P, *Waste Acceptance System Requirements Document*, for non-vitrified, immobilized HLW

HLW Interpretation

- Published June 6, 2019
- DOE interprets the statutes to provide that a reprocessing waste may be determined to be non-HLW if the waste meets either of the following two criteria:

  I. does not exceed concentration limits for Class C low-level radioactive waste as set out in section 61.55 of Title 10 CFR, and meets the performance objectives of a disposal facility; or

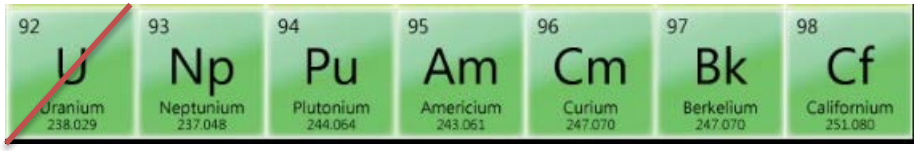
  II. does not require disposal in a deep geologic repository and meets the performance objectives of a disposal facility as demonstrated through a performance assessment conducted in accordance with applicable requirements.

- DOE's first step in determining whether and how to implement the HLW interpretation specific to a particular waste stream is initiating a *National Environmental Policy Act* (NEPA) process which includes input from affected stakeholders (e.g., federal, state, local and tribal officials; and members of the public)
  - https://www.energy.gov/em/high-level-radioactive-waste-hlw-interpretation
  - Public comment period for the Draft Environmental Assessment for the Commercial Disposal of Defense Waste Processing Facility Recycle Wastewater from the Savannah River Site extended to 2/10/2020

TRU Waste

Manual 435.1-1, Chapter III, Section A

- Radioactive waste containing more than 100 nanocuries of alpha-emitting TRU isotopes per gram of waste (100 nCi/g), with half-lives greater than 20 years, except for:
  - (1) HLW;
  - (2) Waste that DOE and EPA agree does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or
  - (3) Waste that the NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61
- Atomic number greater than 92, including neptunium, plutonium, americium, and curium
- TRU must comply with the WIPP Waste Acceptance Criteria



LLW

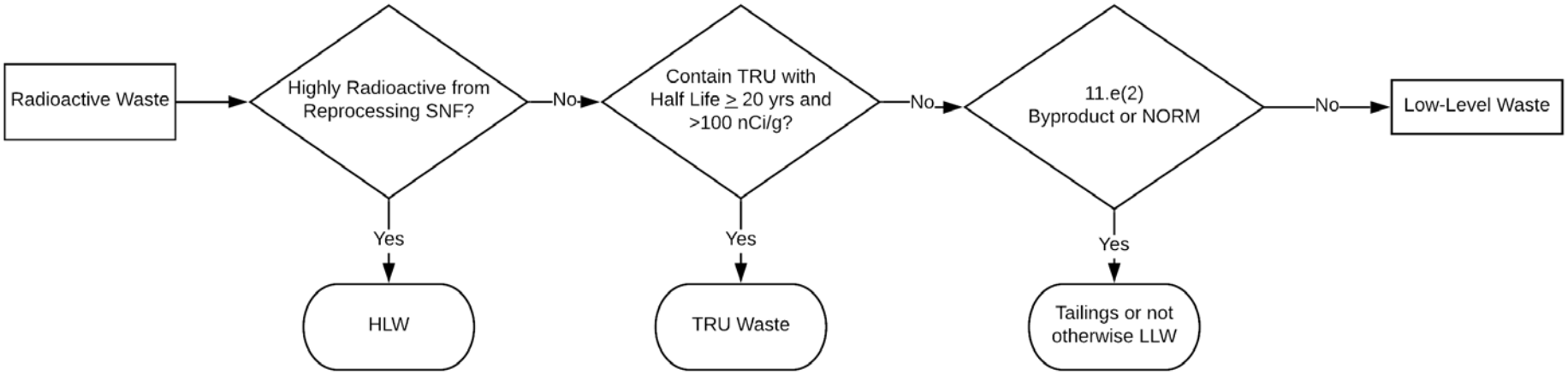
Manual 435.1-1, Chapter IV, Section A

- Radioactive waste that is **NOT**:
  - HLW
  - Spent nuclear fuel (SNF)
  - TRU
  - By-product material
  - Naturally-occurring radioactive material (NORM)
- Examples of LLW (physical forms):
  - Soil, personal protective equipment (PPE), metal, tools, contaminated items, construction debris, sealed sources

DOE LLW

- But it can be:
  - Highly radioactive
  - Hazardous
- Must meet site-specific waste acceptance criteria of disposal facility

DOE Classification System

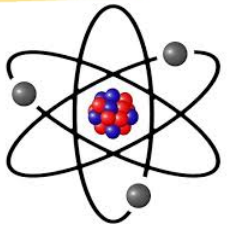


Questions on DOE Classification?

Why Different?

- NRC basis
- DOE basis
- LLW disposal requirement similarities

The Split



- NRC/States
  - Regulates commercial reactors, radiological laboratories, medical entities, and other federal agencies (e.g., FBI, Army)
- DOE
  - Regulates development and production of nuclear weapons, nuclear research, and National laboratories (22 new elements discovered)
- The performance objectives (quantitative radiological standards) for protection of workers, the public, and the environment for 10 CFR 61 and DOE Order 435.1 are similar
- Both systems relied on International Commission on Radiological Protection (ICRP) recommendations to develop performance criteria
- Shallow-land burial LLW disposal facilities

Main Goals for Both Systems

- Protection of the general population and environment from radioactive releases
- Protection of individuals from inadvertent intrusion
- Protection of individuals during operations
- Stability of the disposal site after closure

NRC LLW Basis

- NRC requirements were developed for generic, but unknown facilities and locations
  - Until specific location/site proposed, the geological and environmental settings are unknown
- A performance assessment of generic disposal facilities in various locations and inadvertent intrusion generated the waste classification system – identified Class A, B, C, and GTCC categories
  - Specific and quantitative concentration limits
- Based on a well-developed understanding of commercial LLW characteristics
- Facilities licensed to dispose of Class A, B, and/or C

NRC Example Wastes

- Hospitals use a limited number of radionuclides in defined procedures, so no matter which hospital the waste comes from, it has similar characteristics
- Nuclear reactors built to generate power have some design differences, but the waste streams have similar characteristics
  - Typical nuclear reactor waste types:
    - Dry waste - paper, plastic, and cloth, tools, wiring, and metals
    - Wet waste - resin, charcoal, and filters
    - Irradiated hardware

Disposal Sites

- Licensed commercial disposal facility timeframes:
  - Beatty, NV (1962 – 1992)
  - West Valley, NY (1963 – 1975)
  - Maxey Flats, KY (1963 – 1977)
  - Sheffield, Il (1967 – 1978)
  - Richland, WA (1965 – present)
  - Barnwell, SC (1971 – present)
  - Clive, UT (1991 – present)
  - Andrews, TX (2012 – present)

Blue – operational when regulations developed

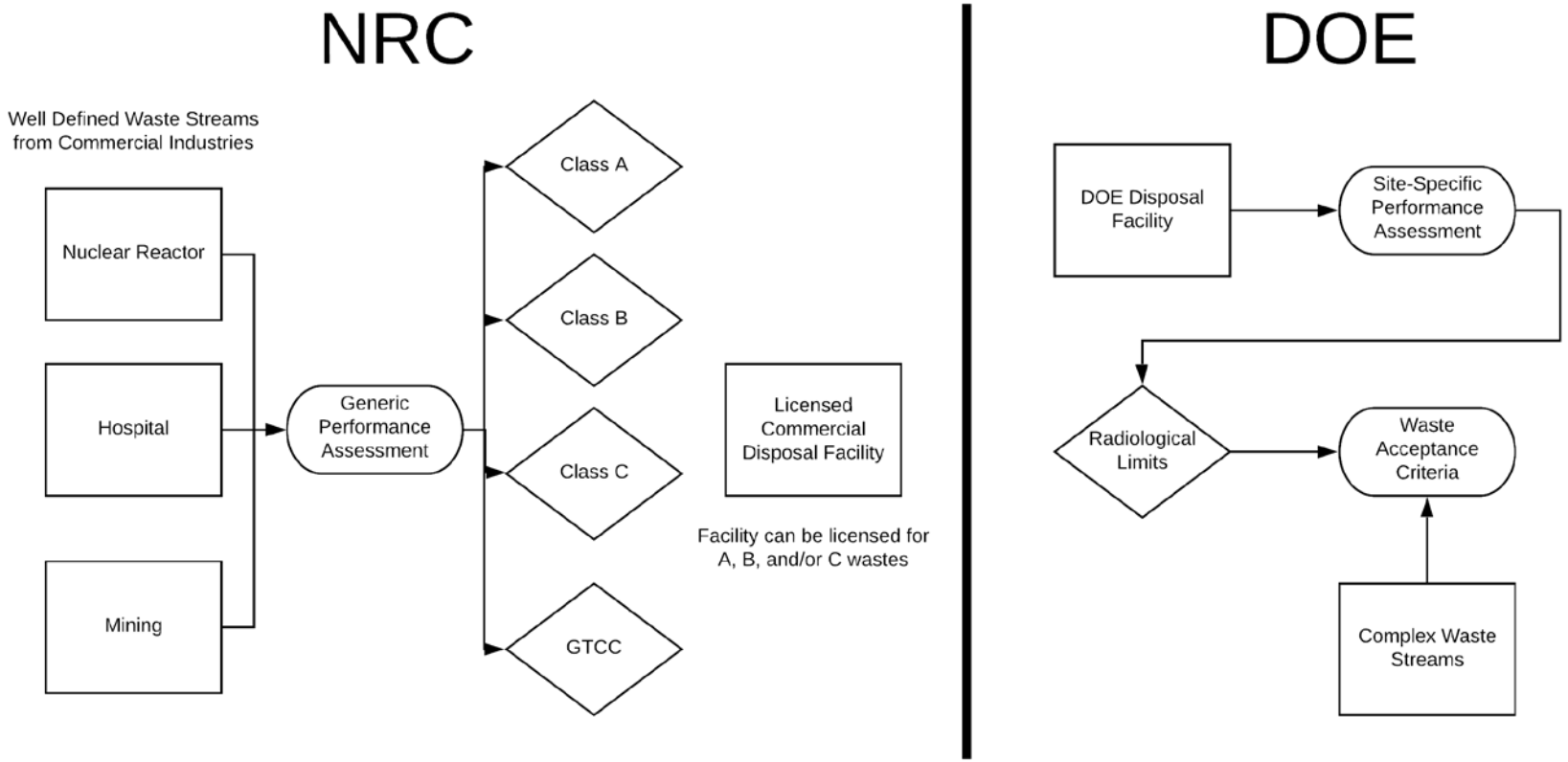
DOE LLW Basis

- Disposal locations well known, but varied and complex waste characteristics
  - Existing facilities operating for many years
- Site-specific performance-based system
  - Site conditions considered in site-specific performance assessment to develop radiological limits for facility
  - Waste acceptance criteria for each facility
- Permissible levels of radioactivity depend on the ability of the disposal system (i.e., the site and design) to contain the radioactive material

DOE Waste Examples

- National laboratories discovering new elements
- Plutonium production
- Uranium enrichment
- Nuclear research
- Decontamination and decommissioning waste
- Legacy waste

NRC vs. DOE LLW



LLW Disposal Regulation Comparison

Requirement	DOE Manual 435.1-1	NRC 10 CFR Part 61
Basic Requirements for performance objectives for LLW disposal facilities	DOE Manual 435.1-1 Ch. IV.P.1: LLW disposal facilities shall be sited, designed, operated, maintained, and closed so that a reasonable expectation exists that performance objectives will be met for waste disposed of after September 26, 1988	10 CFR Part 61.40: Land disposal facilities must be sited, designed, operated, closed, and controlled after closure so that reasonable assurance exists that exposures to humans are within the limits established in the performance objectives
Protection of the general population from releases of radioactivity	DOE Manual 435.1-1 Ch. IV.P.1: (a) Dose to representative members of the public shall not exceed 25 mrem in a year total effective dose equivalent from all exposure pathways, excluding the dose from radon and its progeny in air. (b) Dose to representative members of the public via the air pathway shall not exceed 10 mrem in a year total effective dose equivalent, excluding the dose from radon and its progeny. (c) Release of radon shall be less than an average flux of 20 pCi/m2/s at the surface of the disposal facility. Alternatively, a limit of 0.5 pCi/1 of air may be applied at the boundary of the facility.	10 CFR 61.41: Concentrations of radioactive material which may be released to the general environment in groundwater, surface water, air, soil, plants, or animals must not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.

LLW Disposal Regulation Comparison (continued)

Requirement	DOE Manual 435.1-1	NRC 10 CFR Part 61
Disposal Authorization Statement (DAS)/license	DOE Manual 435.1-1 Ch. IV.P.5: The DAS is issued by EM-4 and is based on LLW Disposal Facility Federal Review Group (LFRG) recommendation	Agreement State: The Agreement State issues a license. NRC has delegated regulatory authority to license LLW disposal facilities
Disposal Facility Operations Requirements	DOE Manual 435.1-1 Ch. IV.P.6.(a)-(e): Minimize chance for subsidence, achieve long-term stability and minimize need to maintain, meet closure/post-closure plans, install permanent markers, minimize void space, don't adversely impact other disposal onsite, document waste placement by generator, maintain buffer	10 CFR Part 61.52: Wastes must be emplaced in a manner that maintains the package integrity during emplacement, minimizes the void spaces between packages, and permits the void spaces to be filled; maintain buffer, covered in a manner that limits the radiation dose rate at the surface

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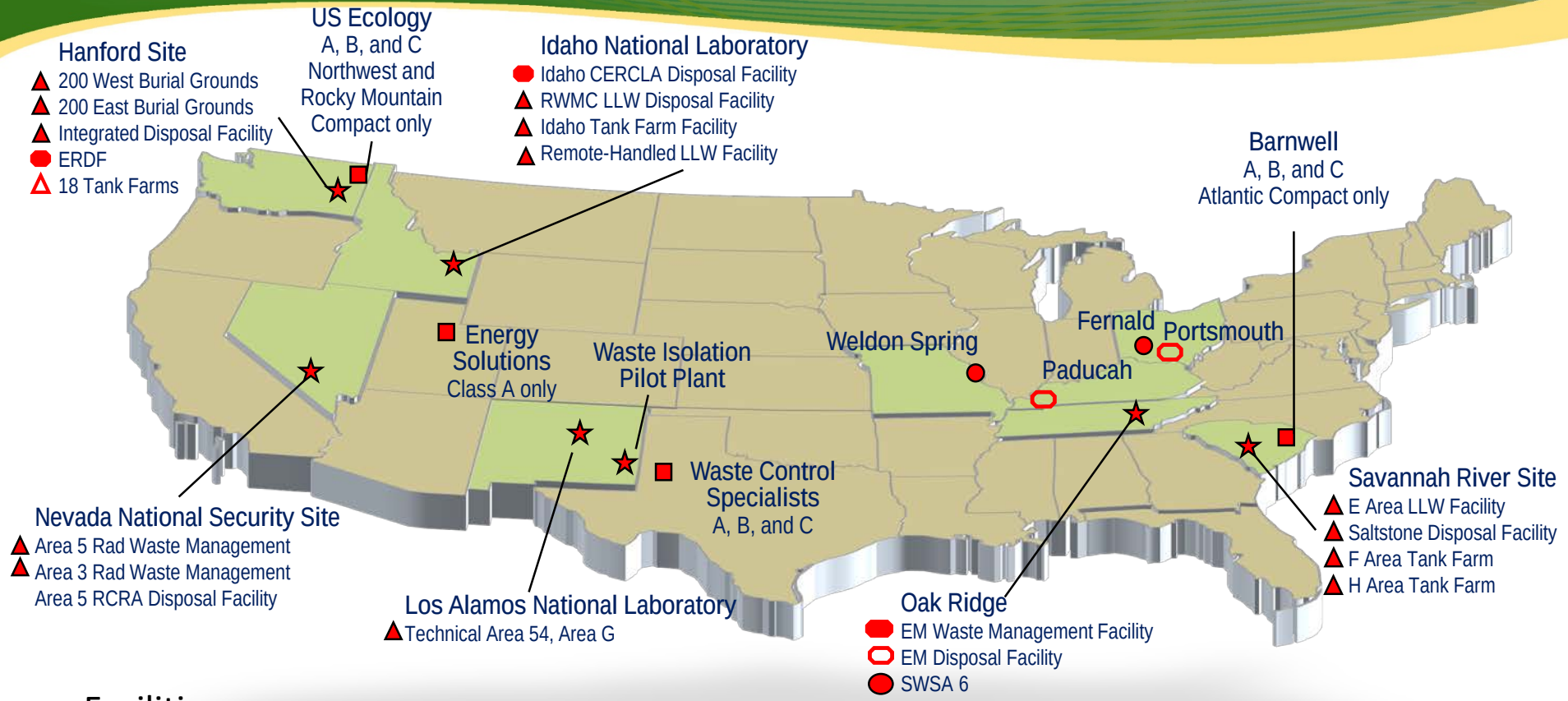
DOE Onsite Facilities and Commercial Options



Facilities

- Existing CERCLA Disposal Facility*
- Proposed CERCLA Disposal Facility
- LLW Operations Disposal Facility/Tank Farm Closure
- Proposed LLW Disposal Facility/Tank Farm Closure
- Closed Disposal Facility
- Commercial LLW Disposal Facility

*Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
https://www.epa.gov/superfund/superfund-cercla-overview

ID 2168 - 1/15/2020
2020-004-EMRP

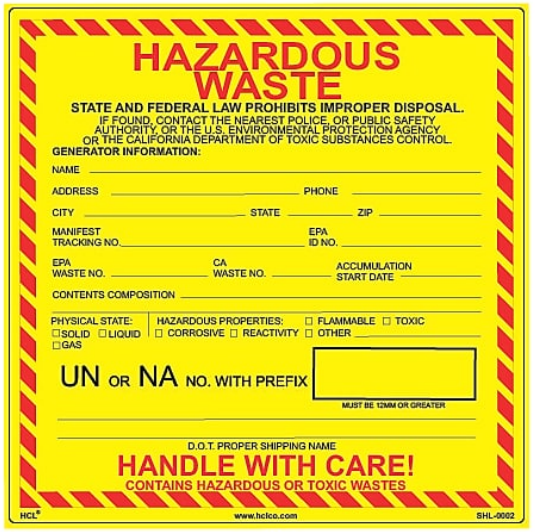
Questions on Basis and Similarities?

Waste Types

- *Resource Conservation and Recovery Act* (RCRA)
- *Toxic Substances Control Act* (TSCA)
- Classified

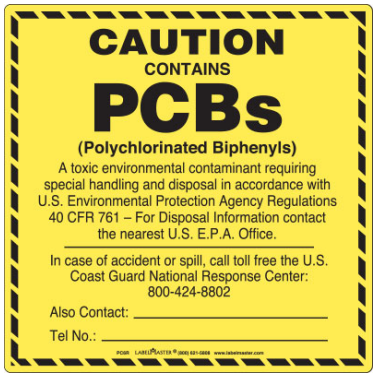
Radioactive Hazardous Waste (Mixed)

- Contains both source, special nuclear, or by-product material subject to the *AEA of 1954*, as amended, and a hazardous constituent subject to the RCRA, as amended
  - Examples of hazardous constituents - chromium, lead, mercury
- EPA regulations 40 CFR 260-280
  - May have additional state requirements
- Unless demonstrated otherwise, all HLW is considered to be **mixed waste**



Radioactive TSCA Waste

- ***Toxic Substances Control Act* - Regulated Waste:** contains polychlorinated biphenyls (PCBs), asbestos, or other such regulated toxic components identified in the waste
  - PCBs (>50 parts per million) managed per 40 CFR Part 761
  - Asbestos managed per 40 CFR Part 62, Subpart M



- TSCA-regulated waste is not mixed waste, but has similar storage and treatment requirements
- May have additional state requirements

Radioactive Classified Waste

- Radioactive waste to which access has been limited for national security reasons and cannot be declassified
- Regulated under:
  - DOE Order 471.6, *Information Security*
  - National Nuclear Security Administration Policy Letter NAP-70.4, *Information Security,* and/or
  - DOE Order 475.2A, *Identifying Classified Information*

Spent Nuclear Fuel (SNF)

- SNF: fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing
  - Material in storage; still has possible programmatic use; can recover valuable constituents
- DOE Order 435.1, *Radioactive Waste Management*, Section 3, Applicability, subsection d, exemptions, (6) states "This Order does not apply to either spent nuclear fuel or non-waste materials."
- DOE responsible for SNF disposal in deep geologic repository; NRC responsible for licensing facility

Review

- Authority - Why We Have Two Systems
- NRC Classifications
- DOE Waste Classifications
- Why the Systems are Different
- Waste Types
- SNF

Key Messages

- **NRC LLW classification system** developed for generic unknown facilities and locations based on well known waste characteristics
- **DOE classification system** developed with site-specific conditions for complex waste characteristics
- **The systems have different basis, but** both developed for the protection of workers, the public, and the environment
- **The systems have many similar requirements**

References

- RL32163, *Congressional Research Service (CRS) Report to Congress, Radioactive Waste Streams: Waste Classification for Disposal,* 12/13/06
  - https://www.everycrsreport.com/reports/RL32163.html
- DOE Order 435.1, *Radioactive Waste Management* and 435.1-1 Manual
  - https://www.directives.doe.gov/
- 10 CFR 61.55, *Waste Classification*
  - https://www.nrc.gov/reading-rm/doc-collections/cfr/
- General Safety Guide No GSG-1, *Classification of Radioactive Waste*
  - https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf
- NWP-REP-134-October 2016, *International Approaches to Radioactive Waste Classification*
  - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/697667/NWP-REP-134-International-Approaches-to-RW-Classification-Oct-2016.pdf

Handout for U.S. Department of Energy (DOE) and
U.S. Nuclear Regulatory Commission (NRC)
Waste Classification Systems

DOE Low-Level Waste physical, chemical, and stability requirements: DOE Manual 435.1-1, Chapter IV, Section G

1. Low-level waste must contribute to and not detract from achieving long-term stability of the facility, minimizing the need for long-term active maintenance, minimizing subsidence, and minimizing contact of water with waste. Void spaces within the waste and, if containers are used, between the waste and its container shall be reduced to the extent practical.
2. Liquid low-level waste or low-level waste containing free liquid must be converted into a form that contains as little freestanding liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the waste volume when the low-level waste is in a disposal container, or 0.5 percent of the waste volume after it is processed to a stable form.
3. Low-level waste must not be readily capable of detonation or of explosive decomposition or reaction at anticipated pressures and temperatures, or of explosive reaction with water. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.
4. Low-level waste must not contain, or be capable of generating by radiolysis or biodegradation, quantities of toxic gases, vapors, or fumes harmful to the public or workers or disposal facility personnel, or harmful to the long-term structural stability of the disposal site.
5. Low-level waste in a gaseous form must be packaged such that the pressure does not exceed 1.5 atmospheres absolute at 20C.

NRC physical, chemical, and stability requirements: 10 Code of Federal Regulations 61.56

(a) The following requirements are minimum requirements for all classes of waste and are intended to facilitate handling at the disposal site and provide protection of health and safety of personnel at the disposal site.

(1) Waste must not be packaged for disposal in cardboard or fiberboard boxes.

(2) Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(3) Solid waste containing liquid shall contain as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.

(4) Waste must not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(5) Waste must not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with paragraph (a)(7) of this section.

(6) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.

(7) Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20 °C. Total activity must not exceed 100 curies per container.

(8) Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

(b) The requirements in this section are intended to provide stability of the waste. Stability is intended to ensure that the waste does not structurally degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(1) Waste must have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(2) Notwithstanding the provisions in § 61.56(a) (2) and (3), liquid wastes, or wastes containing liquid, must be converted into a form that contains as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(3) Void spaces within the waste and between the waste and its package must be reduced to the extent practicable.

Update to Evaluation of the Audit Determination Process from Fiscal Year (FY) 2019

Marilew Bartling
Radioactive Waste Acceptance Program (RWAP) Manager
Navarro
January 15, 2020

Nevada Site Specific Advisory Board (NSSAB) Work Plan Item from FY 2019

- From a community perspective, provide a recommendation regarding if the existing RWAP risk-informed process for scheduling facility evaluations is supported and how it could be enhanced

History of Work Plan

- January 2019 – NSSAB received work plan briefing
  - NSSAB requested more detail on the risk score calculations contained in the RWAP risk-informed spreadsheet
- March 2019 – NSSAB received a white paper with the risk attributes and detail on the calculation of the risk score and a follow-up briefing
- March 2019 – NSSAB provided recommendations
- June 2019 – U.S. Department of Energy (DOE) provided response
  - NSSAB requested update on the status of recommendations

NSSAB Recommendation #1

- **NSSAB Recommendation:** Use a per unit score for risk attributes in place of assigning point values to the top generators.

- **DOE Response (June 2019):** The RWAP team will be reviewing the protocols previously used for the fiscal year FY 2019 ranking and will consider the NSSAB recommendation during the development of the FY 2020 risk-informed facility evaluation scheduling.

NSSAB Recommendation #1
(continued)

- **Update:** The scoring was reviewed and in consideration of the NSSAB recommendation, unit scores per risk attributes have been used. There is no allowance for subjective rankings.

  A copy of the rankings methodologies used for FY 2020 are being provided for your information, including a white paper describing the mechanism for assigning the points.

NSSAB Recommendation #2

- **NSSAB Recommendation:** Conduct facility evaluations with no prior notice to the generators.

- **DOE Response (June 2019):** This recommendation remains under consideration at this time. As discussed during NSSAB meetings, pre-scheduling facility evaluations may be necessary due to what is going to be observed and/or reviewed. Access to some areas or material can require time periods that are not conducive to “surprise” visits. This recommendation will be considered if a pre-visit notification is not warranted due to access constraints.

NSSAB Recommendation #2
(continued)

- **Update:** The DOE response is maintained in that the logistics for travelling, waste production schedules, and accessing controlled sites impedes visits with no prior notice.

  Commencing in FY 2021, it is recommended that surveillances be scheduled based on input from the generators on scheduled projects and work on a quarterly basis. Audits will continue to be scheduled on an annual basis.

  DOE is considering the feasibility for on-site Federal staff stationed at the generator sites to conduct on-the-spot checks.

NSSAB Recommendation #3

- **NSSAB Recommendation:** Add the generator's overall ranking to the RWAP facility evaluation schedule.

- **DOE Response (June 2019):** There are sensitivities with this information and the potential for misinterpretation, so distribution would require control. DOE will work with the NSSAB to share pertinent information regarding rankings for transparency while protecting sensitive information.

NSSAB Recommendation #3
(continued)

- **Update:** No new information.

NSSAB Recommendation #4

- **NSSAB Recommendation:** Include historical information from DOE's Occurrence Reporting and Processing System (ORPS) regarding near-miss incidents, primarily in transportation, although more study could be done to determine if other areas would also apply.

- **DOE Response (June 2019):** DOE agrees with the NSSAB that the ORPS is a key source of information regarding issues across the complex. The RWAP team will look at the feasibility for performing an ORPS search prior to each facility evaluation to determine any issues that require review and to ensure generators are making notifications as required per the Nevada National Security Site Waste Acceptance Criteria (NNSSWAC).

NSSAB Recommendation #4
(continued)

- **Update:** Based on the NSSAB recommendation, the risk rankings for the FY 2020 scheduling effort included information obtained from ORPS. For all DOE generators, the ORPS reporting system was queried from August 2018 through August 2019 for any ORPS entry pertaining to regulatory violations regarding offsite waste management or transportation issues. Identified issues were assigned points to the waste generator site and contributed to their overall score and ranking.

Risk-Informed Spreadsheet Criteria Methodology 10/01/2019

Purpose: The Risk-Informed Spreadsheet was prepared as a management tool to allow the Environmental Management (EM) Nevada Program to determine the relative risk of each generator site. The term "relative risk" is based on the comparison of scores assigned to each active generator to identify sites with a higher indication or potential for a non-compliance. The scores are based on past compliance performance; the volume and activity of wastes forecasted for shipment; and mission of the generating site. This is a tool to be used to aid managers in targeting where oversight resources will provide the most benefit. The goal is to target resources to minimize the potential for a non-compliance of the *Nevada National Security Site Waste Acceptance Criteria* (NNSSWAC).

Background: Annually, the Radioactive Waste Acceptance Program (RWAP) prepares a Facility Evaluation (FE) schedule. This schedule identifies whether an audit, surveillance, or tabletop assessment will be performed for each site; the dates for the FE; and the scope of assessment. RWAP subject matter experts (SMEs) are then assigned based on the specific focus areas of the FE.

By determining the relative risk score, federal and contractor RWAP personnel can place additional focus on the higher-risk generator sites. Audits verify programmatic and performance-based compliance to the NNSSWAC and assess the five critical programmatic elements:

Radiological Characterization and Categorization
Chemical Characterization and Categorization
Quality Assurance
Transportation & Shipping
Waste Traceability

Each element is reviewed to ensure the generator's waste disposal program is compliant with the NNSSWAC. There is an on-site inspection of the facilities where the waste is generated and packaged for transportation, as well as reviews of procedures and process documentation, and personnel interviews. Audits are conducted generally for a duration of three days.

Surveillances can be modified to meet the needs of the EM Nevada Program. Surveillances may be targeted to the review of a specific scope of work. While limited in scope, this allows for a concentrated view of any areas of interest or concern. Examples of scope-specific surveillances include evaluation of the implementation of corrective actions from findings; reviews of high-profile wastes or shipments (e.g., super-loads or other over-dimensional shipments) prior to release from site; and on-site confirmation of critical information such as classified records to substantiate the basis of characterization. For sites with ongoing generation operations and no specific identified areas of concern, the surveillance may be conducted in a manner similar to an audit, but with a focus on two to three of the program elements instead of all five. Surveillances are conducted at the generator site but are usually scheduled for two days.

Tabletop surveillances are programmatic reviews conducted without traveling to the generator site. Tabletops will be reserved for waste-generating sites that are not currently shipping waste/matter to the Nevada National Security Site (NNSS). If a generator has gone for more than 12 months without an

on-site review, an on-site FE must be conducted prior to resumption of shipment even if a tabletop has been conducted in that fiscal year.

The following criteria have been developed to assign point values to each generating site, allowing for an objective and transparent method of identifying sites for both audits and surveillances. The RWAP Manager will use the weighted criteria to develop the FE schedule for fiscal year 2020.

Risk Attributes:

Category A: Previous Fiscal Year Compliance Performance 40%

RWAP-Issued Findings (Category 1): Regulatory Violation
RWAP-Issued Findings (Category 2): NNSSWAC Non-Compliance
RWAP-Issued Findings (Category 3): Generator Procedure Non-Compliance
Notice of Violation or Occurrence Reporting and Processing System (ORPS) pertaining to waste management or transportation
ORPS relating to waste management and transportation not resulting in a Notice of Violation (NOV) or RWAP finding
Receipt Discrepancies: Trending Criteria from receipt at Area 5
RWAP-Issued Observations

Category B: Waste Evaluation 20%

Forecasted Shipments
Total Activity 2018/2019

Category C: Generator Classification 40%

Tier One: National Laboratories; NNSA Production Facilities; Special Projects
Tier Two: Non-DOE Generators
Tier Three: Ongoing decontamination and decommissioning (D&D) Projects with no major changes in scope

Calculating the Risk Score: The risk score is calculated by first assigning an appropriate point value to each of the individual attributes; summing the points for each attribute in a given category (A, B, and C); and multiplying those sums for each category to the weight assigned by category. The weight of each of the categories was based on its correlation to previous findings. Details for the individual attributes are described on the following table.

Category	Criterion	Points	Description
Compliance Performance 40%	RWAP-Issued Findings (Cat 1): Regulatory Violation	20	Regulatory Violations are any violation of state or federal law, including DOE Orders, which are detected during the course of an FE. This pertains to the entire life cycle of waste management in all key areas: Radiological Characterization, Chemical Characterization and Classification, Quality Assurance, Waste Traceability, and Transportation & Shipping.
	RWAP-Issued Findings (Cat 2) NNSSWAC Non-Compliance	15	A violation of NNSSWAC requirements that is not a regulatory violation as defined above. Examples include, Package Shipment Disposal Request (PSDR) violations, failure to submit required notifications, failure to maintain required program elements.
	RWAP-Issued Findings (Cat 3) Generator Procedure Non-Compliance	10	By definition, failure to follow internal site procedures is a finding.
	NOV or ORPS pertaining to waste management or transportation	20	An NOV issued by any authority (state or federal) must be identified to the NNSS. *Note: failure of timely notification may result in additional points as a Cat 2 WAC Non-Compliance.*
	ORPS pertaining to waste management or transportation not resulting in an NOV	15	ORPS entries relating to Waste or Transportation are reviewed, and if they involve wastes transported off-site will be assigned points. *Note: If the ORPS issue is followed by an NOV, the points will be subtracted from the ORPS entry.*
	ORPS pertaining to waste management or transportation not resulting in an NOV	15	ORPS entries relating to Waste or Transportation are reviewed, and if they involve wastes transported off-site will be assigned points. *Note: If the ORPS issue is followed by an NOV, the points will be subtracted from the ORPS entry.*
	Receipt Discrepancies: Trending Criteria	10	Issues with paperwork or computer entries that do not meet the criteria of an NNSSWAC violation but may be indicative of operational concerns.
	Observations	5	Total number of observations from the previous fiscal year FE.

Category	Criterion	Points	Description
Waste Evaluation 20%	Forecasted Shipments	Varies	Divide generators into quartiles based on shipment projections as provided by the generators. Assign 20, 15, 10, 5 from highest to lowest volumes.
	Total Activity 2018/2019	Varies	Divide generators into quartiles based on total activity reports for each generator. Assign 20, 15, 10, 5 from highest to lowest.
Generator Classification 40%	Tier One: National Laboratories; NNSA Production Facilities; Special Projects	20	Due to the diversity of waste and the number of potential generators, national laboratories and production facilities are assigned the maximum points. Special projects, which may be of concern to NNSS stakeholders, are also allocated maximum points.
	Tier Two: Non-DOE Generators	15	Treatment, storage, and disposal facilities (TSDFs) highly diverse wastes and multiple generators. Non-DOE sites, varying reporting criteria not necessarily aligned to ORPS.
	Tier Three: Ongoing D&D Projects	10	Steady-state operations.

Special Considerations

Certain circumstances will require an audit of the program prior to shipment of waste, as defined in the NNSSWAC:

New generator
Restart after an NNSS-issued program suspension (self-suspensions determined on a case-by-case basis)

Other circumstances generally will result in scheduling of an audit within a given fiscal year, although it is not mandatory:

Three years since last audit for an active shipper
Change in the site or program prime contractor
Restart after a >12-month suspension of shipping

For restarts of limited scope, specialized surveillances may be deemed appropriate.

Presentation Information Approach

- Intro by Rob Boehlecke, U.S. Department of Energy (DOE), Environmental Management (EM) Nevada Program
- Briefing by Marilew Bartling, Navarro
- Nevada Site Specific Advisory Board (NSSAB) Discussion and Path Forward
- Navarro Recommendations
  - Note: NSSAB recommendations, Navarro's recommendations, and input from the State of Nevada Division of Environmental Protection (NDEP) will be used by the EM Nevada Program to formulate its final Verification Strategy

Waste Verification Strategy – Work Plan #1

Marilew Bartling
Radioactive Waste Acceptance Program Manager
Navarro
January 15, 2020

NSSAB Work Plan Item #1

- Provide a recommendation, from a community perspective, on the potential verification strategies identified and/or how these strategies may be implemented
- NSSAB recommendation is due no later than July 2020

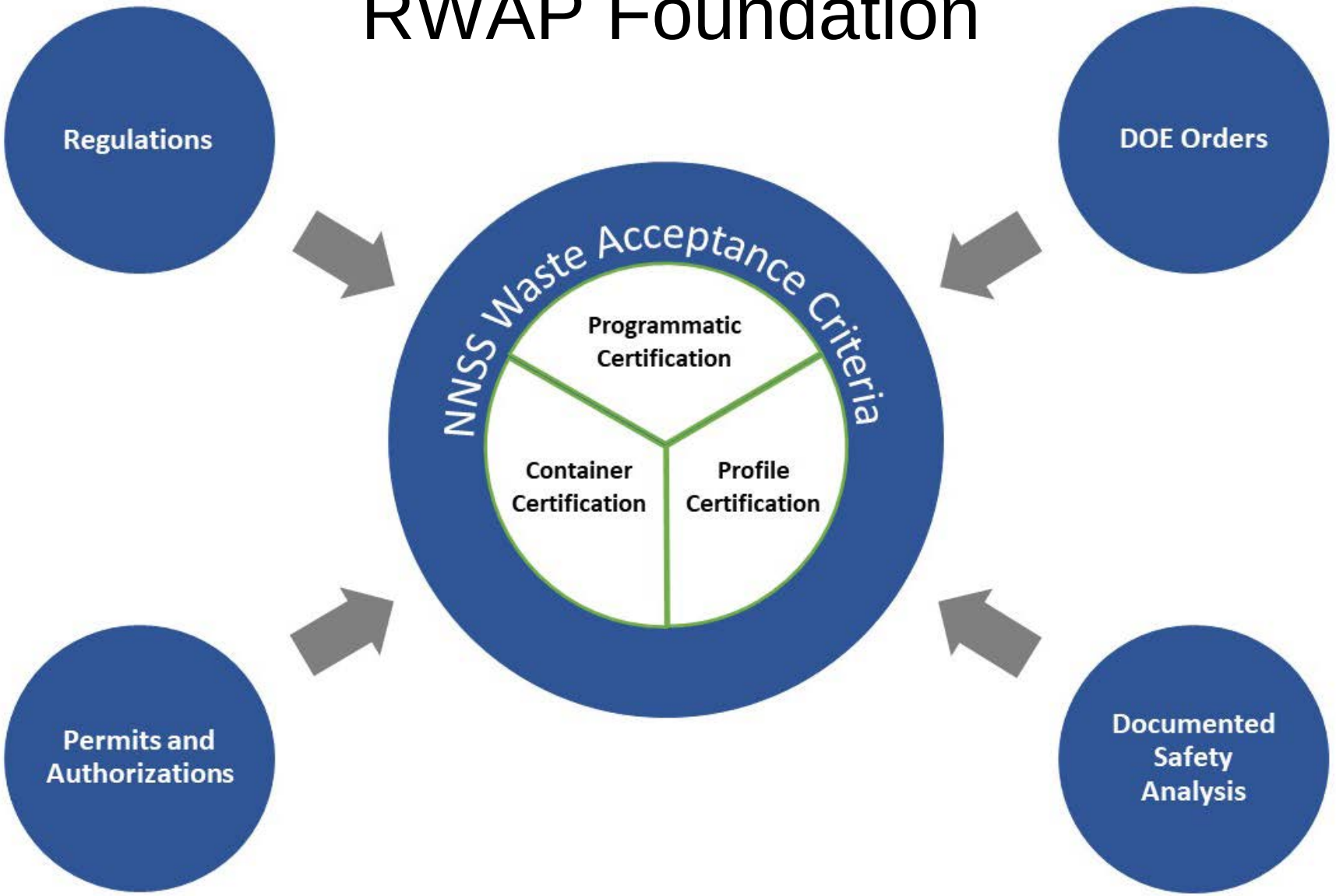
Outline

- Waste Verification Purpose and Objectives
- Strengthening Verification
- Evaluating Verification Activities
- Verification Elements
  - Programmatic
  - Profile
  - Container
- Disposal Sites Verification Comparisons (Benchmarking)
- Verification Planning of Forecasted Waste
  - Historical Analysis of Waste Categories and Containers
- Path Forward

Verification Purpose

- Verification is the monitoring of Nevada National Security Site Waste Acceptance Criteria (NNSSWAC) compliance
- NNSSWAC provides the criteria to ensure protection of workers and the public
  - Prescribes regulatory, health and safety, technical, and administrative requirements for programmatic, container, and profile certification
  - Generator programs and profiles are reviewed by Radioactive Waste Acceptance Program (RWAP) for NNSSWAC compliance
  - Generators are required to certify that the wastes submitted to NNSS are compliant with the NNSSWAC

RWAP Foundation



Verification Objectives

- Assess generator programs to determine that:
  - Radionuclides present are correctly identified with the correct concentrations for proper radioactive categorization
  - Chemical constituents are sufficiently evaluated so that waste is correctly categorized as low-level radioactive waste (LLW) or mixed low-level radioactive waste (MLLW)
  - Other hazards, such as, polychlorinated biphenyls or asbestos are correctly identified
  - No prohibited items are present
  - Waste conforms to the waste profile as approved

Strengthening Verification

- In early 2019, Navarro was tasked with evaluating effectiveness of the verification strategy and recommending enhancements informed by safety, effectiveness, reliability, and cost considerations
  - In July 2019, the waste generator at Y-12 notified the EM Nevada Program that classified waste components previously shipped to NNSS were discovered to be inadequately characterized
  - Several reviews were undertaken as a result of the Y-12 classified waste issue, including formal causal analysis reviews by Y-12 and at NNSS (both RWAP and disposal operations) and by DOE Headquarters (HQ)

This presentation reflects information collected from the Y-12 reviews and the information previously collected by Navarro

Evaluating Current Verification Activities

- Identified verification practices used by the industry, both programmatic and for individual containers
- Benchmarked to five (5) disposal facilities:
  - Two (2) commercial facilities
  - One (1) DOE facility that accepts waste from other DOE sites
  - Two (2) DOE facilities dedicated for the disposal of on-site generated waste
- Obtained preliminary implementation cost information for verification activities
- Performed a data call to identify major types of waste through fiscal year (FY) 2030 for determining the most applicable waste verification activities

Programmatic Verification

- Verification checks of generator waste certification programs before waste is shipped to the NNSS include:
  - RWAP Facility Evaluations (e.g., audits, surveillances) that monitor the implementation of policies and procedures
  - Independent Waste Certification Official (WCO) at the generator site
- Waste certification declarations require that compliance be verified with documented processes and procedures

- Waste Acceptance Review Panel (WARP) process which requires a detailed review of each waste stream proposed for disposal at NNSS

Programmatic Verification (continued)

Methodology	Primary Use	Current NNSS Capability	Effectiveness/ Limitations	Costs*	Other Factors
Facility Evaluation Program	Evaluation of programmatic systems used by the waste generator	RWAP maintains staff to conduct facility evaluations in core areas	Identifies issues prior to shipment and receipt Programmatic function - limited review of individual containers	Capital expenditures **minimal** Operational costs **moderate**	Funded by DOE EM Nevada Program
Independent Waste Certification Program	Evaluation of programmatic systems and review of each individual waste package	NNSS requires each waste generator to have an Independent WCO and requisite resources	Provides for review of each individual container as well as programmatic elements	Capital expenditures **none** Operational costs **minimal**	Ownership and cost assumed by the generator
Defined Profile Submission and Review Program	Provides detailed technical basis for the characterization and categorization of each waste stream	WARP chartered to review all profiles	Programmatic function - no review of individual containers	Capital expenditures **minimal** Operational costs **moderate**	Reviews funded by DOE EM Nevada Program

*__Capital Costs__: “high” is more than $10 million, “moderate” ranges from $1 million to $10 million, and “minimal” is less than $1 million
__Operational Costs__: “high” is more than 10 full-time equivalent employees (FTE), “moderate” is 2 to 10 FTE, and “minimal” is less than or equal to one (1) FTE

Programmatic Verification
(continued)

- Programmatic controls emphasize consistent waste characterization and management to ensure compliance <u>prior to shipment</u>
  - Deviates from commercial sites with large numbers of generators
- Advantages include:
  - Opportunities to identify issues prior to transport
  - Generators required to establish documented systems with evidence of implementation
  - Generators know they will be held accountable through on-site evaluations
  - On-site evaluations can be rapidly implemented based on issues or special wastes

Programmatic Verification
(continued)

- Potential weaknesses include:
  - Generator gaps in the flow of information to WCOs
  - Security/classification requirements may impede the transfer of critical data
- Recommended improvements include:
  - Improving the tools used for facility evaluations
  - Ensuring empowerment of the WCO at each site
  - Shadowing with the DOE HQ Office of Enterprise Assessment also provides opportunities to strengthen the facility evaluation program

Profile Verification

- Profiles, prepared by generators for each waste stream proposed for NNSS disposal, contain pertinent details, including:
  - Radionuclides and concentration amounts
  - Chemical characteristics and regulatory categorization
  - Generating description and physical form
  - Packaging and shipping specifications
- Profiles are submitted for review by WARP and for approval by EM Nevada Program
- Waste profiles are used by all radioactive waste disposal sites, DOE and commercial

Profile Verification
(continued)

- Advantages include:
  - Profile review process allows for EM Nevada Program, WARP (inclusive of RWAP and Disposal Operations), National Nuclear Security Administration, and NDEP to submit comments that the generator reconciles before the profile can be approved
- Potential weaknesses include:
  - Current profile template has resulted in inconsistent level of detail among generators
- Recommended enhancements include:
  - Requiring generators to use the new Lines of Inquiry to collect additional documentation to strengthen the profile
  - Targeting on-site verifications as part of the profile review process prior to approval

Container Verification

- Tools or techniques used to verify individual containers conform to the waste profile, most common include:
  - Visual verification
  - Real-time radiography (RTR)
  - Waste sampling and analysis (fingerprinting)
  - Non-destructive radiological analysis
  - Radiological scanning

Radiological Scanning

Container Verification
(continued)

- Techniques are used for waste categorization by waste generators and RWAP

Waste Sampling and Analysis (Fingerprinting)

Real-Time Radiography

Container Verification (continued)

Methodology	Primary Use	Current NNSS Capability	Safety Considerations	Effectiveness/ Limitations	Costs*
Visual Verification	Detect prohibited items; evaluate void space; confirm profile description	None, currently performed at generator by RWAP staff	Opening waste containers has inherent risks; requires appropriate engineering and administrative controls and personnel protective equipment	No chemical or radiological information	Capital expenditures **moderate** Operational costs **moderate**
RTR	Detect prohibited items; evaluate void space; confirm profile description	Full capabilities to perform RTR on drums and boxes	Minimal with standard controls	Visuals may be indeterminate due to the resolution limitations; No chemical or radiological information	Capital expenditures **minimal** Operational costs **minimal**
Fingerprinting via Analytical Sampling	Confirming chemical and or radiological categorization of waste	None, NNSSWAC allows for splits to be collected at generator site	Same as Visual Verification when performed at NNSS	Chemical and radiological information obtained; Effective for particulates; Limited effectiveness for debris	Capital expenditures **moderate** Operational costs **moderate**
Radiological Scanning	Radiological data indicator	Full capability	Minimal with standard controls	Gross indications on radiological activity or contamination	Capital expenditures **minimal** Operational costs **moderate**
Non-Destructive Assay	Radiological data confirmation	None	Minimal with standard controls	To be effective must be calibrated to expected radionuclides	Capital expenditures **moderate to high** Operational costs **moderate**

*__Capital Costs__: “high” is more than $10 million, “moderate” ranges from $1 million to $10 million, and “minimal” is less than $1 million
__Operational Costs__: “high” is more than 10 FTE, “moderate” is 2 to 10 FTE, and “minimal” is less than or equal to one (1) FTE

Container Verification
(continued)

- Advantages include:
  - Scalable to risk
  - Validates effectiveness of generator processes and procedures
  - Flexibility for some approaches to be executed prior to shipment
- Potential weaknesses include:
  - Non-conformances potentially not detected until receipt
  - Some waste is not amenable to sampling, such as large metal components
  - RTR use is limited for dense materials
  - Security/classification requirements inhibit visual verification at generator sites and no current capabilities upon receipt at NNSS
  - RTR not currently executed on classified material

Benchmarking

Disposal Facility	Verification Approach
DOE On-site Disposal	• Waste generators are **restricted** • Program verification varies • No chemical verification of container contents at disposal • No services for treatment • Limited nuclides; radionuclide activity varies
Commercial	• Waste generators **not restricted or limited** • Limited or no program verification • Containers routinely verified upon receipt via fingerprint sampling • Services maintained for treating non-conforming waste • Diverse nuclides; lower radionuclide activity • Generator is held responsible by the State for non-compliant waste

Benchmarking (continued)

Disposal Facility	Verification Approach
DOE Limited-Access Facilities (NNSS)	• Waste generators are **limited** • Verification of program controls through facility evaluations • On-site verification of profiles • Limited container verification upon receipt via RTR • No treatment services at site • Diverse nuclides; higher activity
DOE Limited-Access Facilities (Waste Isolation Pilot Plant [WIPP])	• Waste generators are **more limited** • Verification of profiles • Container verification for prohibited items prior to receipt • Independent container verification for radioactivity prior to receipt • Transuranic nuclides; higher activity

Benchmarking (continued)

Facility	Programmatic Verification Strategies				Container Verification Strategies							
	Generator Access Limitations*	Waste Generator Limitations	Generator Waste Certification Program Required	On-Site Facility Evaluation Program	Visual Verification		RTR		Sampling and Analysis		Radiological Scanning	
					Pre-Ship	Receipt	Pre-Ship	Receipt	Pre-Ship	Receipt	Pre-Ship	Receipt
NNSS	Limited	Limited	Yes	Yes, 5 core areas	Yes	No	No	Yes %	No	No	Yes	Yes
WIPP	Limited	Limited	Yes (independent)	Yes	Yes	No	No	No	No	No	Yes - Verified Non-Destructive Analysis	Yes
DOE	Restricted	Restricted	Yes/No	No	No	No	No	No	No	No	No	Yes
Commercial Facility (1)	None	None	No	No	No	Yes %	No	No	Yes % except debris	Yes % except debris	No	Yes
Commercial Facility (2)	None	None	No	Limited	No	Yes %	No	No	Yes % except debris	Yes % except debris	Varies	Yes

***Limitations**: Limited: DOE Nexus/Department of Defense only; Restricted: Only on-site disposal facilities/wastes;
None: All generators/wastes that meet Site License and Waste Acceptance Criteria

Verification Planning

- Assessing wastes forecasted for disposal at the NNSS facilitates identification of the best verification techniques
- In March 2019, generators provided forecasts of waste to be shipped to the NNSS through FY 2030
- Four (4) years of NNSS waste receipts were reviewed to determine the percentage of waste container types received
- Information used to assess the applicability of container verification strategies

Analysis of Waste Received by Category

- Approximately 70% of waste is equipment, debris, or compactable
  - Waste is not amenable to sampling due to representativeness; amenable to RTR based on container type
- Approximately 25% of waste described as particulate, sludge, or solid
  - Amenable to sampling but, due to density, is not a good RTR candidate
- Sources, asbestos, and classified wastes all have issues for sampling and RTR

Categories of Waste	Percentage of Total by Volume
Equipment, Compactable, and Debris	70
Soils, Particulates, Filters	***20***
Sludges, Solidified Waste	***5***
Sources	Less than 1
Asbestos	Less than 1
Classified	5
Source, March 2019 data call: approximate based on projections; does not include MLLW	

Analysis of Waste Received by Container Type

- Approximately 65% of containers are amenable to RTR
- Approximately 22% are soils predominately packaged in soft-sided containers
  - Not amenable to RTR due to container restrictions
- About 3% of LLW arrives in cargos, visual verifications have been focused on cargo containers with debris and compactable wastes

Container Type	Disposal Volume (cubic meters)	Percentage of Waste Containers
Misc. - casks, self-contained equipment	7,020	7
Cargo	3,443	3
Soft-sided	22,979	22
RTR eligible drums	40,499	38
RTR eligible boxes	28,525	27
Other drums/boxes	1,583	3
Source: FY 2018 and FY 2019 year-to-date information		

Review

- The NNSS Program has built in verification to the three (3) key areas:
  - Programmatic
  - Profile
  - Container
- All three (3) key areas are critical to ensuring NNSSWAC compliance
- Program and Profile Verification improvements discussed will be implemented
- Future enhancements will be focused on Container Verification

EM Nevada Program Path Forward

- Collect input from NSSAB and NDEP
- Navarro to finalize and submit verification strategy report to EM Nevada Program
- EM Nevada Program makes a determination on the NNSS waste verification strategy


Q
A

NSSAB Path Forward

- Provide a recommendation, from a community perspective, on the potential verification strategies identified and/or how these strategies may be implemented
- NSSAB recommendation is due no later than July 2020

NSSAB Discussion

Navarro Recommendations: Program Verification

- Continue with current NNSS programmatic controls approach to assess generator compliance early
- Enhance the risk-based approach that focuses **Facility Evaluation** resources on a generator's recent compliance performance, complexity of operations, and other special considerations (e.g., new generator or new operation)
  - More surveillances focused on targeting specific wastes prior to profile approval
- Continue requirement for generators to fund waste certification operations
  - More emphasis on assessing how well WCOs are empowered
  - Review requirements for site senior management regarding waste information ownership

Navarro Recommendations: Profile Verification

- Implement a waste characterization hierarchy that prioritizes **sampling and analysis** for waste types that are amenable to sampling (e.g., soils, particulates, filters)
  - Will allow NNSS to increase the collection of split samples for independent verification
  - Sampling and analysis is effective for identifying chemical hazards not detectable by other verification methods, such as visual and RTR
  - While costs can be high, placing the requirement on the generator does not impact NNSS funds

Navarro Recommendations: Profile Verification (continued)

- Strengthen profile verification through the following mechanisms:
  - Enhanced lines of inquiry for reviewing profiles to ask more probing questions
  - On-site verification of profile information prior to approval
  - Expand use of subject matter experts (such as for classified waste) through WARP for **Profile Reviews**

Navarro Recommendations: Container Verification

- Commit to continued funding for RWAP to conduct **LLW Visual Verifications** at generator sites
  - Continue to coordinate with on-site facility evaluations to minimize costs to NNSS
  - Explore strengthening the program through coordination with the DOE site offices
  - Explore expanding timing to allow for moving ‘up stream’ to the actual point of generation at the generator site

Navarro Recommendations: Container Verification (continued)

- Commit to continue funding **RTR** to be performed at the NNSS upon receipt of containers
  - Explore potential upgrades to enhance the current capabilities (e.g., shaker table to detect liquids)
  - Explore systems to manage RTR of classified waste containers
  - Explore costs for establishing the systems and controls for opening and inspecting containers that have indeterminate items viewed during RTR

Navarro Recommendations: Overall Approach

- Maintain a balanced verification approach that builds confidence into the system throughout waste generation, characterization, packaging, shipment, and receipt
- Several opportunities to enhance systems currently in place
- Use risk analysis to best direct resources

Definition of Terminology

Waste Verification Strategy – Work Plan #1

Benchmarking – identification of peer facilities and comparing systems and controls

Container Verification – the application of tools or techniques on individual containers to ensure conformance to the waste profile

Documented Safety Analysis – identifies hazards and defines protections to ensure worker safety during waste operations

Nevada National Security Site Waste Acceptance Criteria (NNSSWAC) – document that establishes the requirements, terms, and conditions required for wastes to be accepted at the NNSS

Performance Assessment – a required analysis that ensures compliance with the DOE Performance Objectives during disposal operations and for 1,000 years after closure to ensure the safety of the public

Programmatic Verification – application of verification checks to the waste generator system prior to the shipment and receipt of waste

Radioactive Waste Acceptance Program (RWAP) – Program designed to assess waste generator programs and specific waste for compliance with the NNSSWAC. Navarro executes the program on behalf of the DOE EM Nevada Program

Real-Time Radiography (RTR) – X-ray unit used to examine waste packages

Sampling and Analysis (Fingerprinting) – obtaining split samples of the waste from a generator and having it analyzed to confirm the accuracy of the generator's data

Visual Verification – the visual observation of wastes being placed in a container for disposal to ensure it aligns with the waste profile and no prohibited articles are present

Waste Acceptance Review Panel (WARP) – panel convened to review incoming waste profiles. WARP includes members of RWAP plus other subject matter experts including Performance Assessment, Nuclear Facility Safety, DOE representatives; NDEP observes and has the opportunity to make inquiries to the generator

Waste Profile – data form completed by the waste generator that provides pertinent waste details, such as, radionuclides and chemicals known to be present, volumes, packaging and shipping specifications