

# Facilitator Introduction

**Bret Leslie, PhD**

**NRC Public Meeting on Potential Changes to Commercial  
LLW Regulation: 10 CFR Part 61**

**March 2, 2012**

**Marriott Renaissance Phoenix Downtown Hotel  
Phoenix, Arizona 85004**

# **NRC Public Meeting on Potential Changes to Commercial LLW Regulation: 10 CFR Part 61**

**Larry W. Camper, CEP, Director**

Division of Waste Management and Environmental Protection

**March 2, 2012**

**Marriott Renaissance Phoenix Downtown Hotel  
Phoenix, Arizona 85004**

# Welcome

**Mark A. Satorius, Director**

Office of Federal and State Materials and Environmental  
Management Programs

**March 2, 2012**

**Marriott Renaissance Phoenix Downtown Hotel  
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# Part 61

## Public Meetings

- Recent Commission Direction (01/19/2012)
  - [SRM-COMWDM-11-0002/COMGEA-11-0002](#)
- Emergent Policy/Technical Issues
- SECY-10-0165 Options/Other Options
- Stakeholder Feedback
- First of Several Public Meetings
- Impact on Future Direction



# Recent Commission Direction (01/19/2012)

- Process
- Policy
- Timeline
- Public Outreach

# Emerging Policy/ Technical Issues

- Role of Institutional Controls
- Exposure Scenarios
- 61.55 Concentration Tables
- Engineered Barriers System Performance
- Clearance
- Revise Part 61 EIS Assumptions
- Protection of Intruder

# SECY-10-0165 Options/ Other Options

- Risk-Inform the Current Part 61 Waste Classification Framework
- Comprehensive Revision
- Site-Specific Waste Acceptance Criteria
- International Alignment
- Supersede Direction in SECY-08-0147

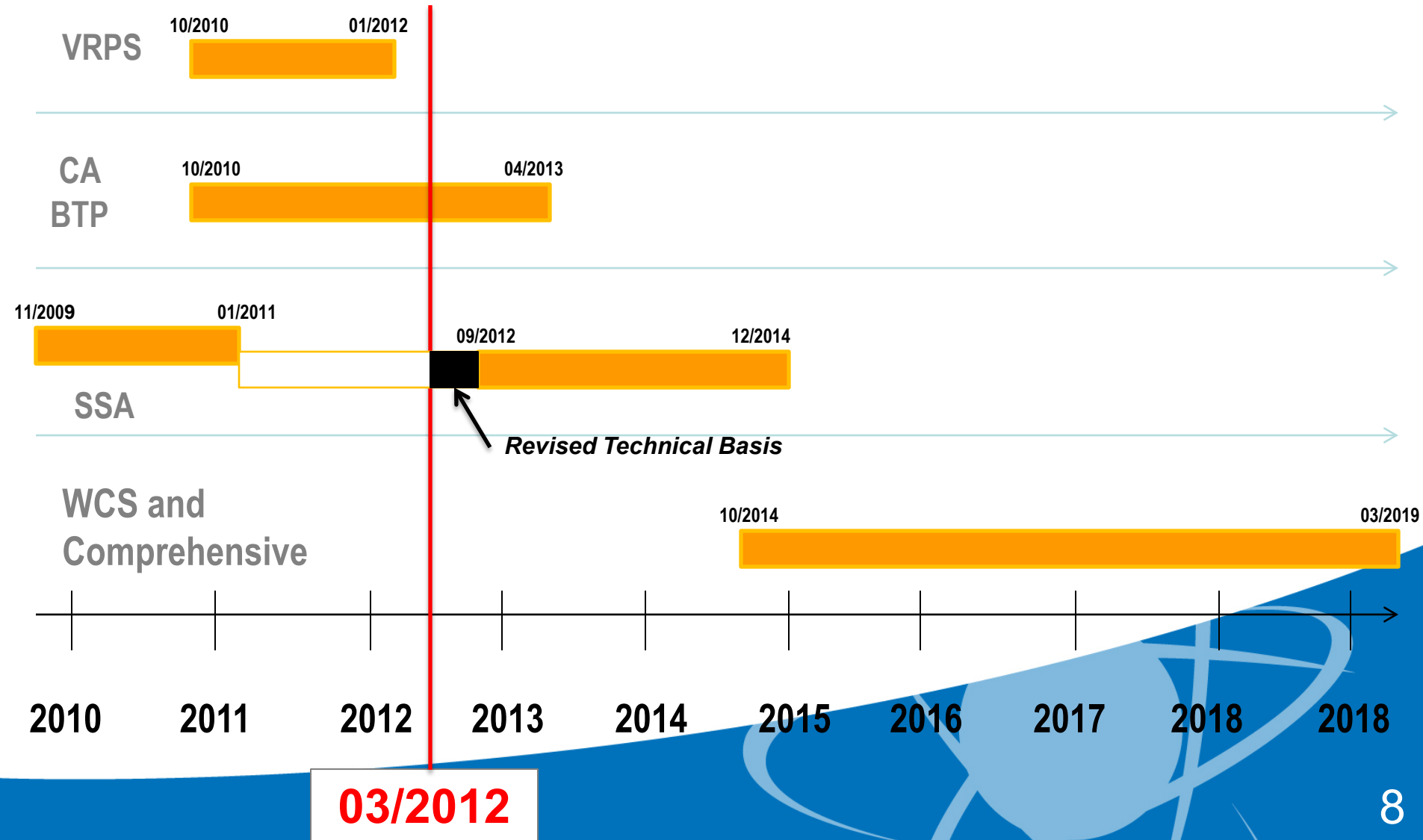
# Maximizing Stakeholder Input (Recent Events)

EVENT	DATE
Conduct public workshop on CA BTP *	February 2011
DOE/NRC workshop on Part 61 Revision (Phoenix) *	March 2011
Issue blending Interim Guidance	March 2011
Close comment period on CA BTP *	April 2011
Conduct public meeting on Part 61 Period of Performance *	May 2011
Brief ACRS on Part 61 SSA Rulemaking (2x)	July/August 2011
Brief ACRS on CA BTP (2x)	June/December 2011
Issue draft VRPS for public comment *	October 2011
Conduct public workshop on CA BTP (Albuquerque) *	October 2011
Issue Commission paper with proposed final VRPS	January 2012

# Maximizing Stakeholder Input (Future Events)

LOCATION	DATE	EVENT
Phoenix, AZ	March 2, 2012	NRC-Sponsored Public Meeting #1 (following WM2012 Meeting)
San Francisco, CA	April 23, 2012	LLW Forum Spring Meeting
Orlando, FL	May 7, 2012	CRCPD Annual Meeting
Dallas, TX	May 15, 2012	NRC-Sponsored Public Meeting #2
Tucson, AZ	June 22, 2012	EPRI Annual LLW Meeting
Rockville, MD	Mid-July, 2012	NRC-Sponsored Public Meeting #3
Sacramento, CA	July 22, 2012	HP Society Annual Meeting

# LLW Program Timeline



# Site-Specific Analyses Rulemaking

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# Overview

- Background
- Commission Direction
- Site-Specific Analyses
- Issues
- Path Forward





# BACKGROUND

# 10 CFR Part 61

- Requirements for land disposal of LLW
- Performance objectives assure safe disposal
  - Protection of general public
  - Protection of inadvertent intruders
  - Protection of individuals during operations
  - Stability after site closure
- Demonstrate performance via technical analyses and waste classification



# Recent Developments



- Waste classification limits based on 1980's understanding of low-level waste streams<sup>1</sup>
- Recent waste streams not envisioned during development of Part 61
- Disposal may be appropriate, but not under all conditions<sup>2</sup>

<sup>1</sup> NUREG-0945, NUREG-0782

<sup>2</sup> SECY-08-0147, SECY-10-0043



# COMMISSION DIRECTION

# Initial Commission Direction

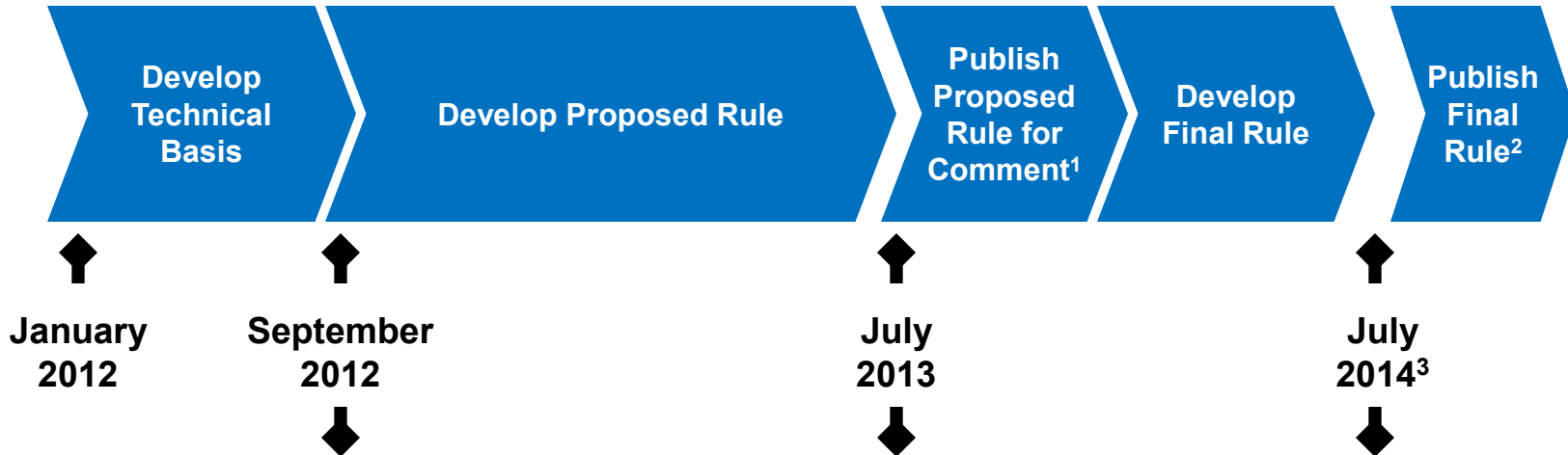
- Require site-specific analyses to demonstrate compliance with the performance objectives
- Specify technical requirements of the analyses
- Develop accompanying guidance
- Other Assignments

# New Commission Direction

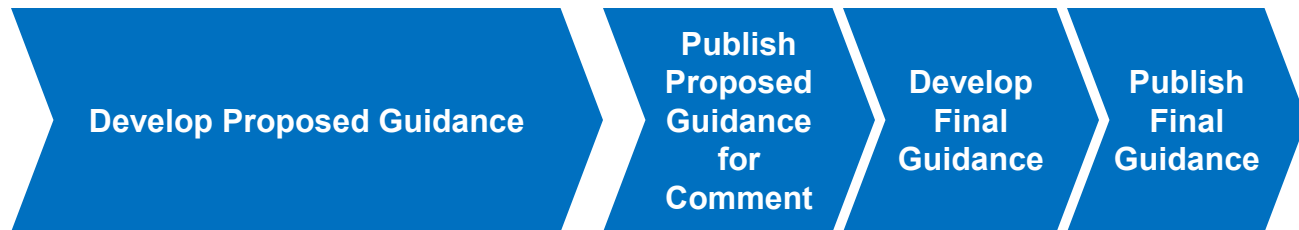
- Consider:
  - Flexibility to use current International Commission on Radiological Protection (ICRP) dose methodologies
  - Two-tiered period of performance:
    - Reasonably foreseeable compliance period
    - Longer period of performance that is not *a priori*
  - Flexibility to establish site-specific waste acceptance criteria
  - Balance Federal-State alignment and flexibility

# Path Forward

## Rulemaking



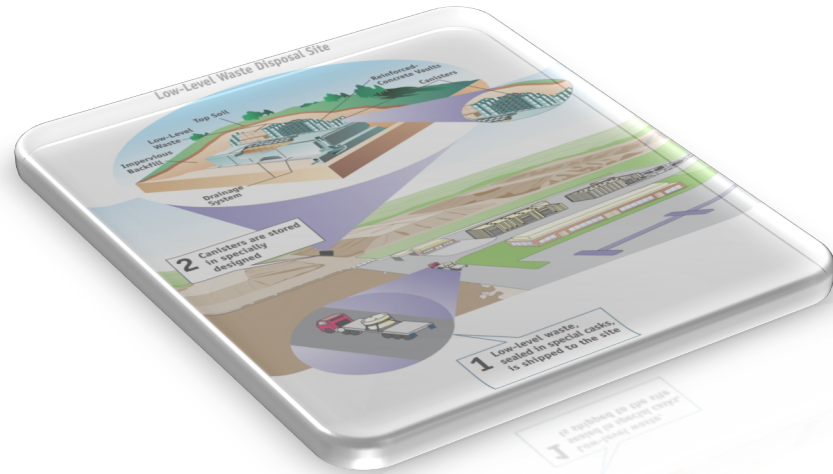
## Guidance



<sup>1</sup> Pending Commission approval; Comment period lasts approximately 75 days

<sup>2</sup> Pending Commission approval

<sup>3</sup> Dependent upon the complexity of public comments received



# SITE-SPECIFIC ANALYSES



## Overview of Performance Assessment

### What is Performance Assessment?

- Systematic analysis of what could happen at a site

### What is assessed?

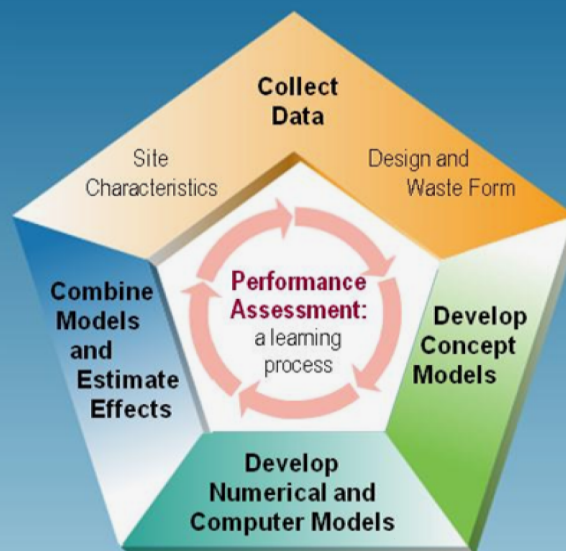
- What can happen?
- How likely is it?
- What can result?

### Why use it?

- Complex system
- Systematic way to evaluate data
- Internationally accepted approach

### How is it conducted?

- Collect data
- Develop scientific models
- Develop computer code
- Analyze results



### NRC would require a Performance Assessment to:

- Provide site and design data
- Describe barriers that isolate waste
- Evaluate features, events, and processes that affect safety
- Provide technical basis for models and inputs
- Account for variability and uncertainty
- Evaluate results from alternative models, as needed

# Intruder Assessment

- Demonstrate protection of inadvertent intruder
  - Currently Part 61 relies on waste classification
- Identify design and control measures to:
  - Preclude intrusion
  - Limit radiological impacts
- Similar to PA, except assumes intrusion

# Long-Term Assessment



- Estimates potential performance beyond compliance period
- Identify features to reduce long-term impacts



# NEW DIRECTION

# ICRP Methodology: *Direction*

- Consider allowing licensees the flexibility to use ICRP dose methodologies in a site-specific performance assessment for the disposal of all radioactive waste

# ICRP Methodology: Context



- NRC regulations based on various methodologies
- Commission policy<sup>1</sup> presently allows exemption for current methodology

# ICRP Methodology: *Feedback*

- Commission is seeking stakeholder feedback on allowing licensee's the flexibility to use ICRP dose methodologies in a site-specific performance assessment for the disposal of radioactive waste

# Period of Performance: *Direction*



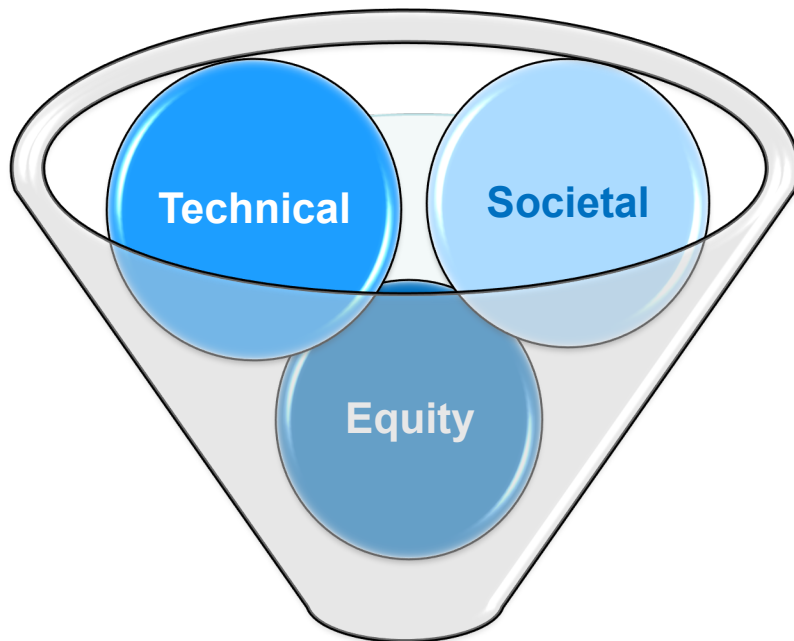
- Consider a two-tiered PoP for analyses:
  - *Tier 1*: Compliance period covering reasonably foreseeable future
  - *Tier 2*: Longer period based on site characteristics and peak dose to a designated receptor



# Period of Performance: *Context*

- Part 61 does not currently specify a PoP
- In response to initial direction, NRC staff developed technical analysis of factors for Commission to consider in selecting PoP<sup>1</sup>
  - Recommended a two-tiered approach

# Tier 1: Compliance Period



***Reasonably  
Foreseeable  
Future***

- Possible factors
  - ***Societal*** – human activities
  - ***Technical*** – hazard, site characteristics
  - ***Equity*** - inter- and intra-generational
- Fixed, Site-specific, Combo

# Compliance Period Comparisons

Material	Hazard	Hazard Duration	Action	Compliance Period
EPA RCRA	Chem	∞	Disposal	30+ yrs
Uranium Mill Tailings	Rad	LL	Remediate	200 yrs (<1000 yrs)
Part 20 Decommission Criteria	Rad	VSL	Release	1000 yrs
DOE Order 435.1	Rad	SL	Disposal	1000 yrs
LLW Disposal Facility	Rad	SL	Disposal	[10,000 yrs]
EPA Underground Injection	Chem	∞	Disposal	10,000 yrs
DOE WIR Determinations	Rad	SL-LL	Remediate	DOE: 1000 yrs NRC: 10,000 yrs
DOE Siting Guidelines (10 CFR 960)	Rad	LL	Screening Action	100,000 yrs
EPA HLW/SNF/TRU Generic Standards	Rad	LL	Disposal	10,000 yrs
EPA HLW/SNF Site-Specific Standards	Rad	LL	Disposal	10,000 yrs – 15 mrem 1,000,000 yrs – 100 mrem

# Tier 2:

## Site Characteristics

- Commission identified characteristics for consideration:
  - Waste Package
  - Waste Form
  - Disposal Technology
  - Cover Technology
  - Hydrogeology
- §§61.50 and 61.51 specify site suitability and design requirements
- Uncertainty in characteristics over time

# Tier 2:

## Designated Receptor

- Receptor Characteristics
  - Metabolic
  - Behavioral
  - Physical
- Fixed, site-specific, combination
  - Current biosphere

# Tier 2:

## Performance Metric

- Should NRC consider metrics for a second tier?
- What metrics should NRC consider?
  - Quantitative (Dose, Risk)
  - Qualitative

# Period of Performance: *Feedback*

Commission is seeking public feedback on a two-tiered approach:

- Defining a reasonably foreseeable compliance period
- Defining a longer period of performance that is not *a priori*, but developed based on site characteristics and the peak dose to a designated receptor

# **Waste Acceptance Criteria: *Direction***

Commission directed staff to consider flexibility to establish site-specific WAC based on the results of the site's performance assessment and intruder assessment



# Waste Acceptance Criteria:

## *Context*

- General WAC specified in §§61.55-61.57
- §61.58 currently allows requests for alternative waste classification
  - Site-specific exemption
  - Compatibility: H&S (i.e., State adoption not required)
- Generic or site-specific; other ways?

# **Waste Acceptance Criteria: *Feedback***

Commission is seeking public feedback on adding flexibility for disposal facilities to establish site-specific waste acceptance criteria based on the results of the site's performance assessment and intruder assessment

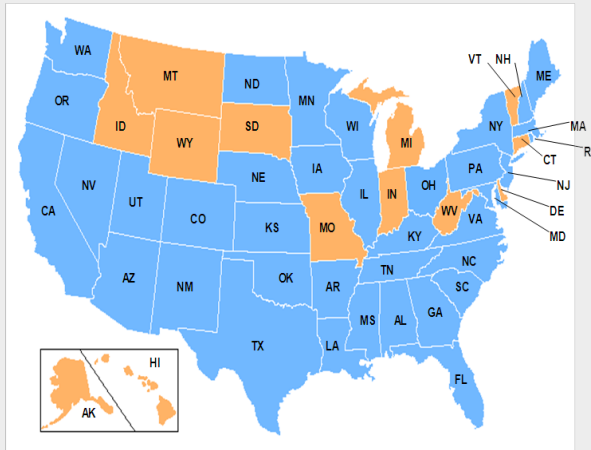
# Compatibility: *Direction*

- Category for the site-specific analyses and site-specific WAC requirements that:
- Ensures alignment between the States and Federal government on safety fundamentals
- Provides States with the flexibility to determine how to implement these requirements

# Compatibility: Context

## THE AGREEMENT STATES

As of October 2011



Agreement States (37)

NRC States (13)

NRC States (13)

Agreement States (37)

- Section 274 of the Atomic Energy Act
- Promote orderly regulatory pattern
- Discontinuation of certain NRC authorities
- NRC maintains oversight

# Compatibility: Context

- Essentially Identical Categories
  - A – Basic standards and related definitions
  - B – Direct trans-boundary implications
- Essential Objective Categories
  - C – Required to avoid conflicts, duplications or gaps
  - H&S – Particular health and safety significance
  - States can be more restrictive
- Other Categories
  - D – Not required for compatibility
  - NRC – Cannot be relinquished to States

# Compatibility: *Feedback*

- Commission is seeking public feedback on a compatibility category for the elements of the revised rule that establish:
  - the requirements for site-specific performance assessments and
  - the development of site-specific waste acceptance criteria
- Alignment between States and Federal government on safety fundamentals
- Providing the States with the flexibility to determine how to implement these safety requirements

# Public Feedback

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# Part 61 Emerging Technical Issues

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# Outline

- Background
- Stakeholder Involvement
- Emerging Issues
- Path Forward

# Stakeholder Involvement

- Public Workshop on BTP (February 2011)
- Public Comment on Updated Volume Reduction Policy Statement (August 2011)
- ACRS Meetings on BTP (October and December 2011)
- Rulemaking Development (DU Workshops 2009, Waste Management 2011)

# Emerging Issues

- Inadvertent Intruder Protection
  - Concept of an Inadvertent Intruder is flawed
  - Assumption that intrusion will occur is not risk-informed (probability of 1)
  - Need to protect future generations is over emphasized

# Emerging Issues (continued)

- Institutional Control Period
  - Current 100 Year control period too short
  - Financial Assurance requirements for some states preclude loss of control indefinitely

# Emerging Issues (continued)

- Definitions and Concepts
  - “Reasonably Foreseeable” is not understood or well defined
  - “*De minimus*” or clearance levels should be established
  - Separate disposal requirements and criteria should be established for depleted uranium, distinct from classic ‘LLW’

# Emerging Issues (continued)

- Definitions and Concepts
  - Compatibility category for 10 CFR Part 61.58 should be changed to 'B' from 'D'
  - Changes should be restricted to new sites (Grandfather current sites)
  - Eliminate the 10 CFR Part 61.55 Waste Classification Tables

# Emerging Issues (continued)

- Definitions and Concepts
  - Explicitly account for uranium and its daughter products in waste classification tables
  - Reflect latest ICRP dosimetry
  - Expand tables to include a more comprehensive suite of isotopes

# Path Forward

- Engage Stakeholders and Public
  - Gather comments to inform decision-making
  - Facilitate information exchange through web page
  - Docket # **NRC-2011-0012** at [www.regulations.gov](http://www.regulations.gov)
- Report Back to the Commission



# Public Feedback

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# Summary of SECY-10-0165

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# Background

- Part 61 Revision First Suggested in LLW Strategic Assessment (SECY-07-0180)
  - Low priority item
- SECY-08-0147
  - Near-surface of DU may be appropriate
  - Recommend introducing an explicit performance assessment requirement to Part 61
- SECY-10-0165
  - Outline approach to initiate activities to revise Part 61

# Background (continued)

- First Public Meeting: March 4, 2011 in Phoenix, AZ
  - Concepts for comprehensively revising Part 61 introduced
  - Briefing materials and transcript posted on NRC web-site
    - <http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/potential-part61-revision.html>
- Questions for Stakeholders
  - Should existing Part 61 be revised or left as is?
  - What recommendations do you have for specific changes to the current rule?
  - What are your suggestions for possible new approaches to commercial LLW management?

# Challenges to Change

- Part 61 is fully protective of public health and safety
- Four decades of operations/regulatory experience
  - Adopted by all Agreement States
  - Implemented at 4 disposal sites (WA, UT, TX, SC)
  - Waste classification system understood by thousands of waste generators
  - Other Federal/State laws invoke Part 61

# SECY-10-0165

## Options

1. Risk-Inform Part 61 Waste Classification Framework
2. Comprehensive Revision Option
3. International Alignment Option
4. Site-Specific Waste Acceptance Criteria (WAC) Option
5. Maintain *Status Quo* Option

# 1. Risk-Inform Waste Classification Framework

- Original Regulatory Motivation
  - Address shortcomings in earlier disposal practices
  - Provide uniform set of standards for operation of future multiple disposal sites nationally
- Regulatory Thesis
  - Dose exposures managed by controlling source term
  - Radiological hazard diminishes with time

# 1. Waste Classification (continued)

- What-if Dose Studies Examining Influence of:
  - Dominant LLW isotopes
  - Engineering measures
  - Institutional controls
  - Administrative practices (waste segregation)
- Dose Calculations Yielded Tables 1 and 2 at §61.55
  - Based on inverse calculations (max 500 mrem)
  - Considered both activity- and exposure-limited pathways
  - Assumed exposure scenarios
  - Considered only humid sites



# 1. Waste Classification (continued)

- Option Consistent with Previous Commission Direction (SECY-08-0147)
  - Revisions Limited to Tables 1 and 2 at §61.55
    - Preserve existing waste classification system
    - Introduce additional radionuclides
    - Re-evaluate using updated ICRP dosimetry
  - §61.55 Table Revision Decisions
    - Rely on original Sandia Laboratory computer codes?
    - Conduct new generic modeling?
    - Conduct new generic modeling and consider receptor scenario?

## 2. Comprehensive Revision to Part 61

- Clean Slate Approach
- Embrace RI/PB Regulatory Philosophy
  - Focus on performance objectives
  - Strike a balance between regulations and guidance
- Re-visit Basic Questions Raised When Part 61 was First Developed
  - Identify types of LLW to be managed
  - Determine appropriate management method
  - Decide on *de minimis* provision

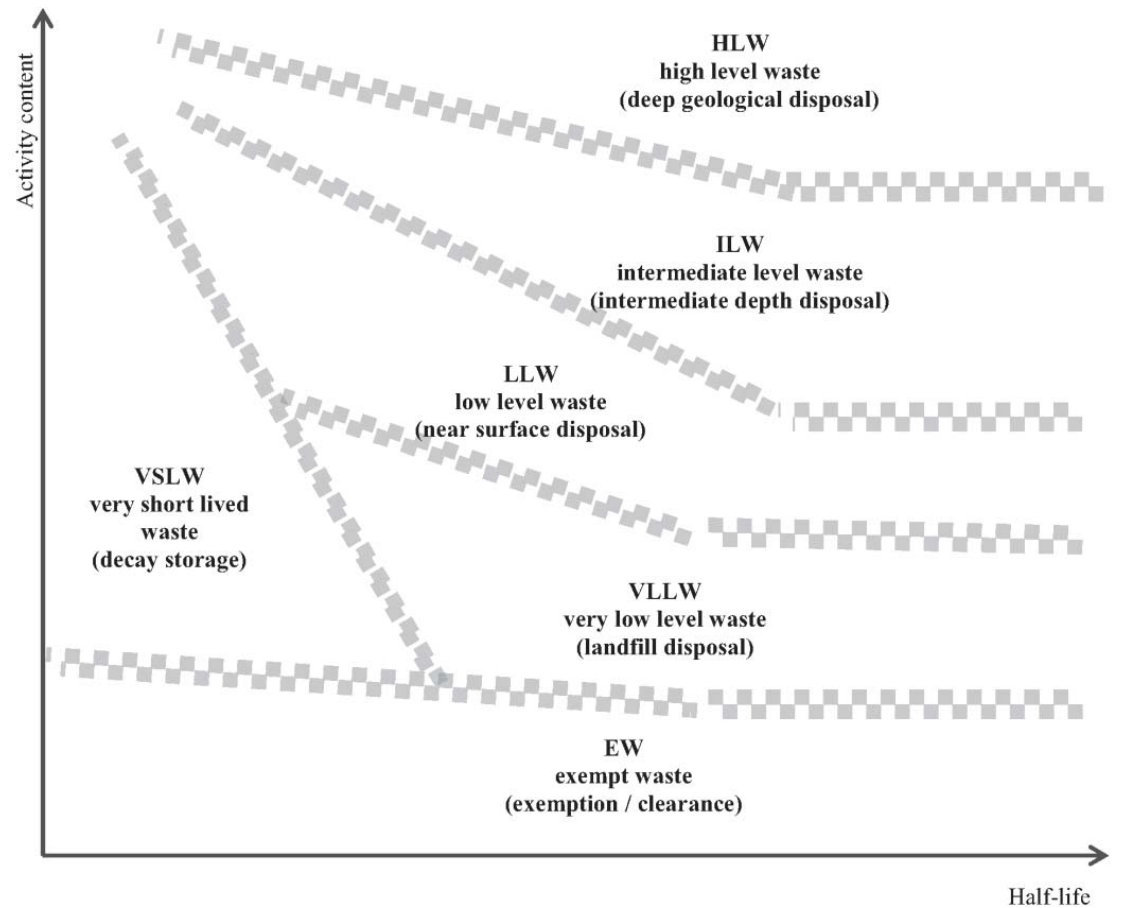
## 2. Comprehensive Revision (continued)

- Approach Likely to Include
  - Updated waste generator survey, including consideration of DOE inventory
  - One or more generic performance assessments
  - Updated Environmental Analysis
  - Review of engineering ‘best practices’ in waste management
  - Consideration of international experience
  - Revised and/or updated guidance

# 3. International Alignment Option

- Adopt Recommendations of the International Atomic Energy Agency (IAEA)
  - IAEA system focuses on entire nuclear fuel cycle
    - Spent nuclear fuel and other high-level radioactive waste
    - Greater-than-Class-C LLW (or transuranic radioactive wastes)
    - Naturally occurring radioactive material
    - Wastes amendable to decay in storage
  - Disposal strategy defined by nature of radiological hazard
  - Depleted uranium not classified by IAEA

# 3. International Alignment (continued)



# 3. International Alignment (continued)

- IAEA Guidance Documents
  - Classification of Radioactive Waste: General Safety Guide-1
  - Disposal of Radioactive Waste: Specific Safety Requirements-5
- <http://www-pub.iaea.org/MTCD/publication>

# 4. Site-Specific Waste Acceptance Criteria Option

- Part 61 Intended as a ‘One-Size-Fits-All’ Regulation
  - Applicable to any geographic/geologic setting
  - Relies on generic waste acceptance criteria
- Regulatory Framework Based on:
  - Assumed waste streams
  - Static disposal practices/technology
  - Conservative site performance scenario

# 4. Site-Specific WAC (continued)

- Eliminate §61.55 waste classification tables
- Each site develops site-specific WAC
  - Concentration limits
  - Inventory limits (if necessary)
  - Waste form requirements
- Site-specific WAC consistent with:
  - Part 61 performance assessment
  - Subpart C performance objectives



# 4. Site-Specific WAC (continued)

- Increased Flexibility
  - Rely on site characteristics
  - Site-specific engineered features
  - Current operational approaches/practices
- Reflects RI/PB Regulatory Approach
  - Performance assessment informs acceptability of waste stream
  - Focus on management of radiological hazard
  - Improved nexus between WAC and risk assessment
- Compacts could site and design a disposal for wastes with specific radiological properties

# 4. Site-Specific WAC (continued)

- Increased Flexibility
  - Rely on site characteristics
  - Site-specific engineered features
  - Current operational approaches/practices
- Reflects RI/PB Regulatory Approach
  - Performance assessment informs acceptability of waste stream
  - Focus on management of radiological hazard
  - Improved nexus between WAC and risk assessment
- Compacts could site and design a disposal for wastes with specific radiological properties

# 5. No Action Option

- No additional changes to Part 61
  - Complete site-specific analysis rulemaking (SECY-08-0147)
- No update of Tables 1 and 2 at §61.55

# Public Feedback

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# Summary of Stakeholder Comments and Opportunity for Public Exchange

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# Recap and Closing

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Office of Federal and State Materials and Environmental  
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