NRC Welcome and Overview

Public Workshop on Unique Waste Streams including Depleted Uranium

Larry Camper, Director
Division of Waste Management and Environmental Protection
September 2009

Welcome

- NRC will host two public workshops
- Purpose
  - To gather information on key technical issues
- Scope
  - Depleted Uranium (DU) and other unique waste streams
- Collaborative Discussion

Background

- Significant quantities of DU:
  - "Unique waste stream"
  - Concentrations and quantities not commercially generated
  - Not considered in 10 CFR Part 61
  - Behavior over time
  - Mitigation Possible

Increase burial depth

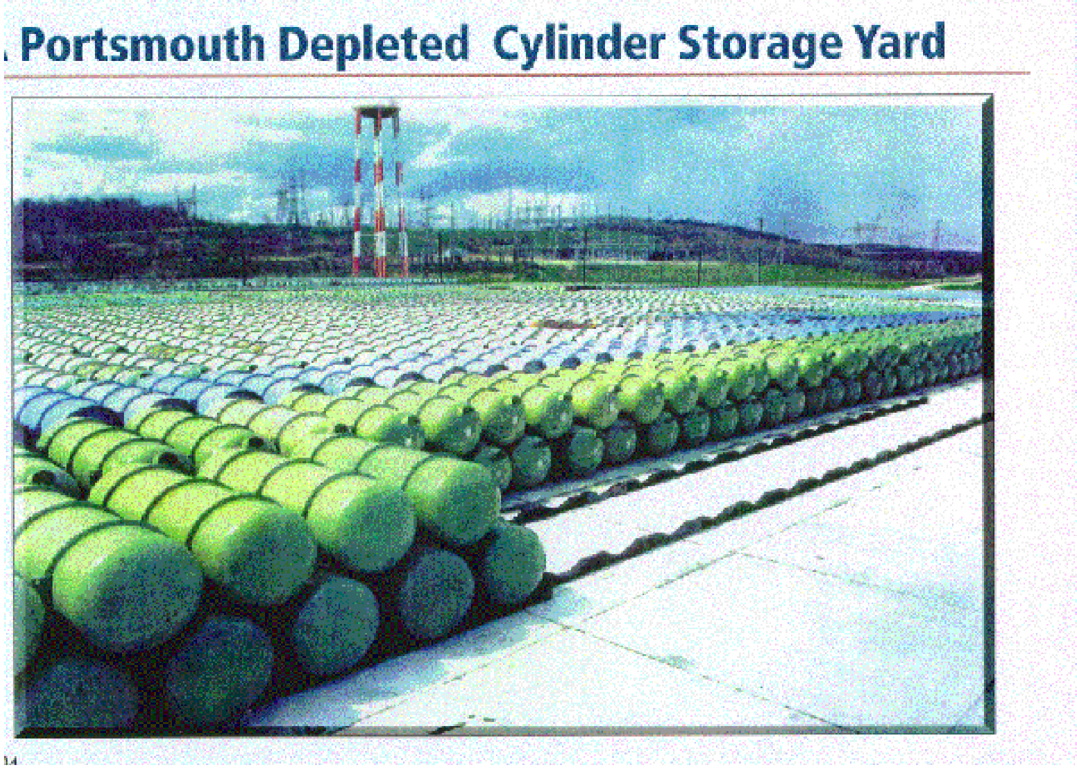
Install robust radon barrier

Background

- DU is currently Class A waste
  - Default provision in regulations
  - Assumed that only small quantities would be disposed

Current Situation

- Emerging commercial enrichment
- Significant quantities for disposal
- Commission Direction

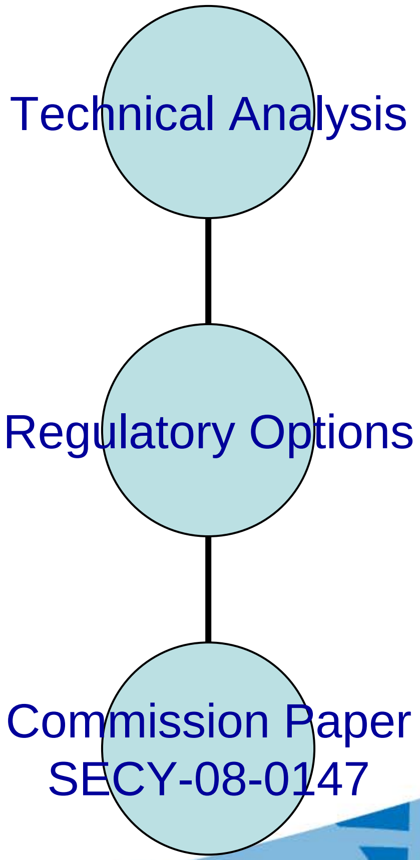


Commission Direction

- Memorandum and Order CLI-05-20, 10/19/05
  - Commission directed staff, “outside of the LES adjudication, to consider whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55 (a)(6) or the section 61.55 (a) waste classification tables.”

Commission Paper

- Range of options informed by Technical Analysis
- Provided recommendation
- Staff completed a Commission Paper – October 2008



Options Evaluated

- Generic Communication
- Require site-specific analysis
- Classification of DU within existing classification framework
- Re-examine existing waste classification framework

Path Forward

- Commission chose a two-tiered approach
  - Site-specific performance assessment
  - Budget to re-examine the waste classification framework in the long-term

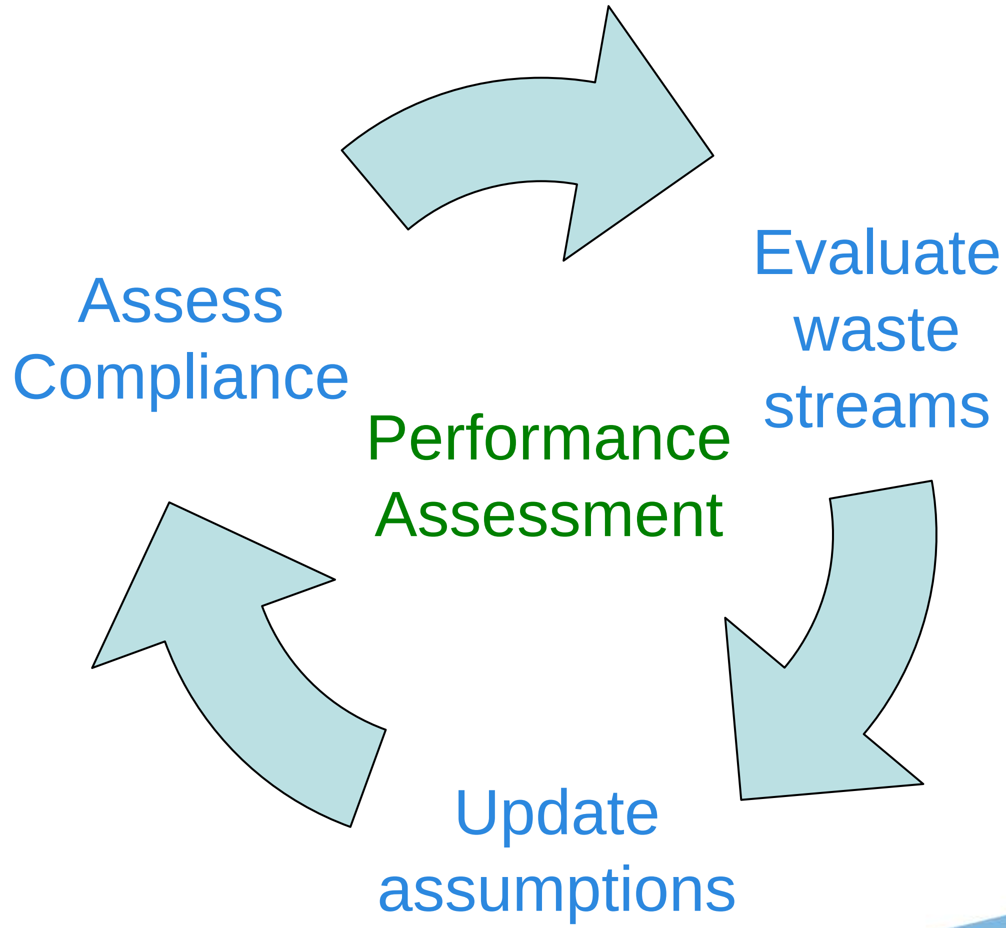
Site-specific PA + Re-examine framework

Initial Rulemaking

- Require site-specific analysis
- Meet performance objectives
- Specify criteria needed for analysis
- Develop supporting guidance

Site-specific
PA

Role of Performance Assessment



Commercial LLW Disposal Sites

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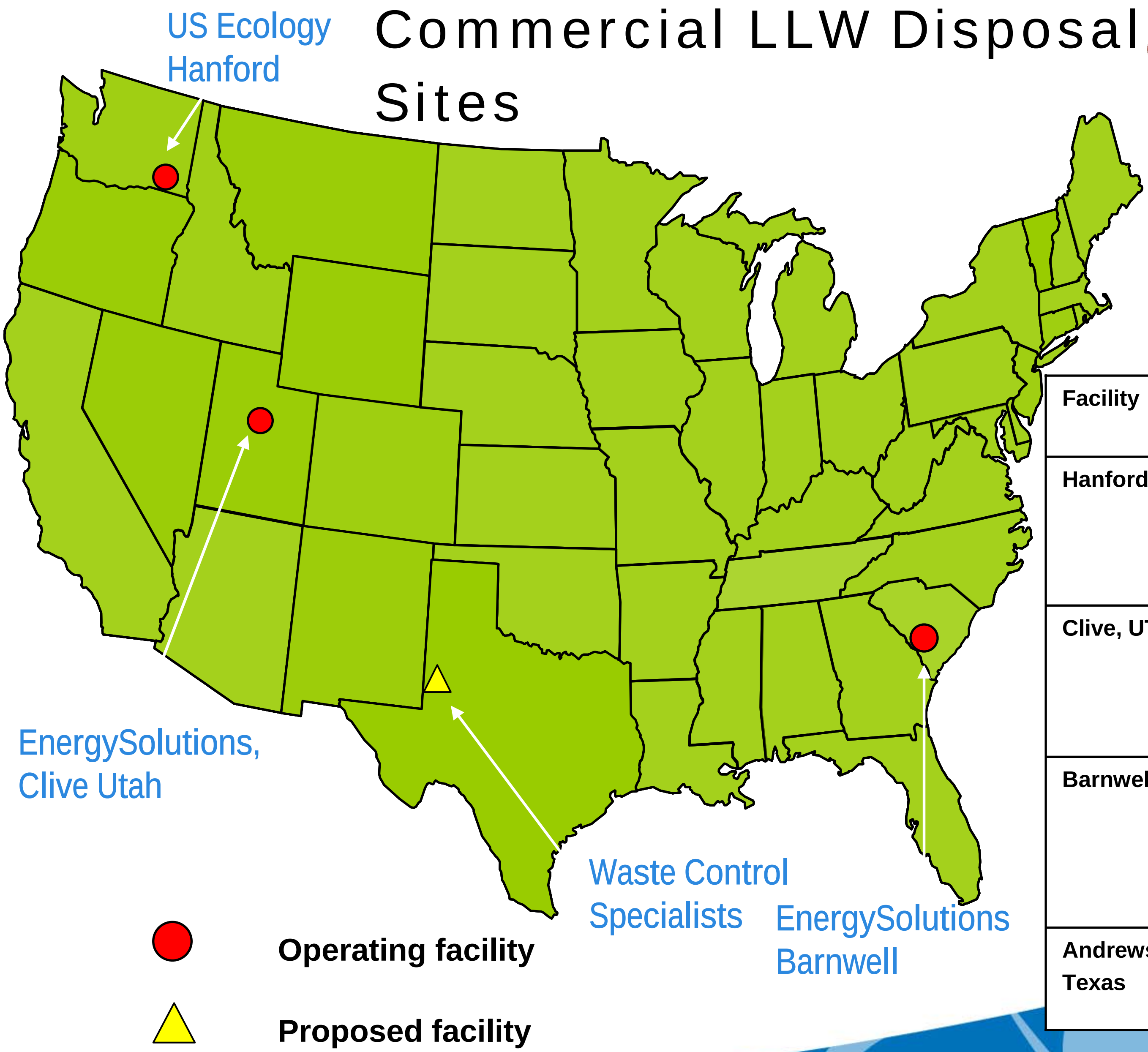

Facility	Waste	Compact Restrictions
Hanford, WA	Class A, B, C	11 western states in 2 LLW Compacts only
Clive, UT	A only	None, all US generators OK (NW and RM Compacts must approve)
Barnwell, SC	A, B, C	SC, NJ, CT only beginning mid-2008 (Atlantic Compact)
Andrews Cty, Texas	A, B, C	Texas and VT only (Texas Compact)

Long-Term Rulemaking

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- Risk-inform waste classification framework
- Change conforming legislation as needed
- Evaluate and revise waste classification tables
  - Explicitly address classification of depleted uranium
  - Consider full range of alternatives

Re-examine framework

Other Considerations

Previously disposed DU → Initial Rulemaking

Disposal of significant amounts of DU before the rulemaking is complete → Initial Rulemaking

DU disposed of under the initial rulemaking, if waste classification is changed → Long-Term Rulemaking

Initial Rulemaking

Long-Term Rulemaking

Agenda

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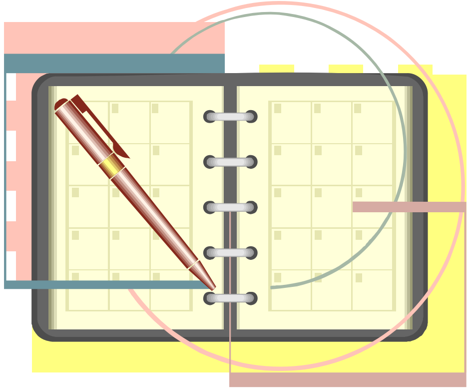
- Technical aspects of site-specific analysis
- Compatibility issues for Agreement States
- Long-term rulemaking
- Other Considerations



Questions?

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NRC's Rulemaking Process

Public Workshop on Unique Waste Streams including Depleted Uranium

Andrew Carrera
Division of Intergovernmental Liaison and Rulemaking
September 2009

What is Rulemaking?

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- A process of developing regulations.
- NRC regulations apply to applicants and licensees.

NRC Rulemaking Authority

United States Nuclear Regulatory Commission
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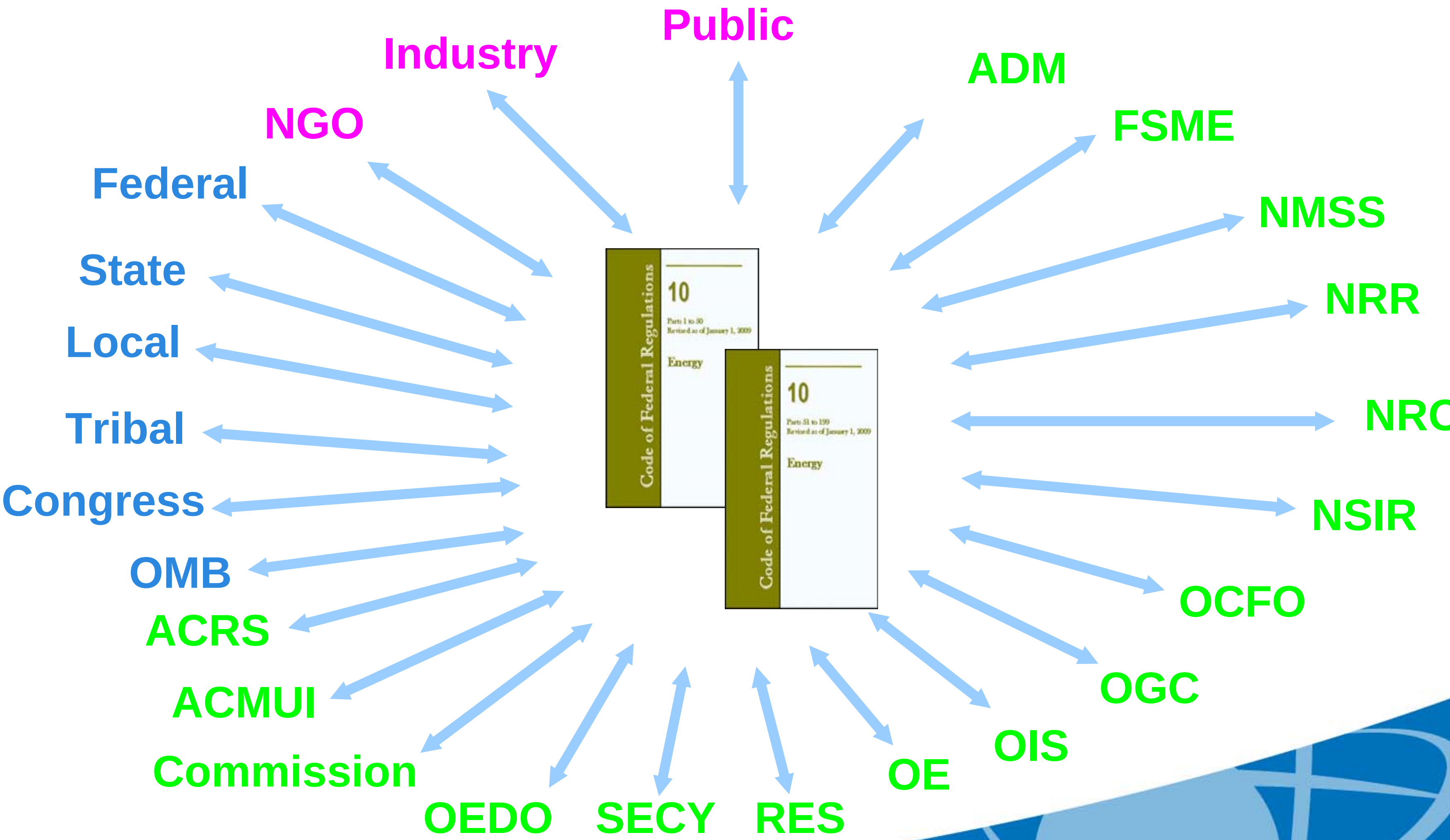
- Atomic Energy Act -1954 (AEA).
- Administrative Procedure Act - 1946 (APA).

Rulemaking Stakeholders



Rulemaking Process

Regulatory Basis*

(* A preliminary step to the rulemaking process)

↓

Proposed Rule

↓

Final Rule

↓

Implementation of the rule

Regulatory Basis

- Technical Office/Division has the lead.
- Foundation of effective regulation.
- Regulatory Basis is expected to be completed by September 2010.

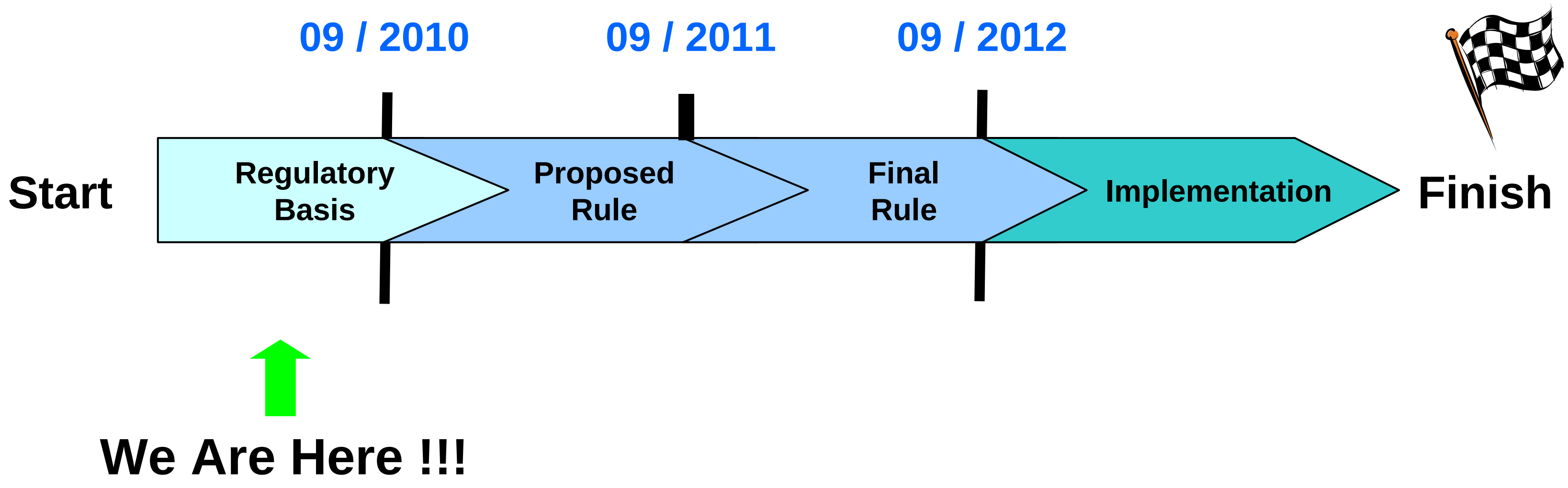
Proposed Rule

- Working group is formed.
- Agreement States participation.
- Publish Proposed Rule in the *Federal Register.*

Final Rule

- Comments reconciliation.
- Agreement States participation.
- Publish Final Rule in the *Federal Register.*

Unique Waste Streams Rulemaking Timeline



Questions/Comments?

Contact Information:

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Site-Specific Performance Assessment and NRC Depleted Uranium Technical Analysis Overview

Public Workshop on Unique Waste Streams including Depleted Uranium

David Esh, Ph.D.
Division of Waste Management and Environmental Protection
September 2009

Overview

- Performance Assessment
- Low-Level Waste Analyses
- Analysis of Depleted Uranium Disposal
- Key Issues

Part I: Performance Assessment and Low-Level Waste Analyses

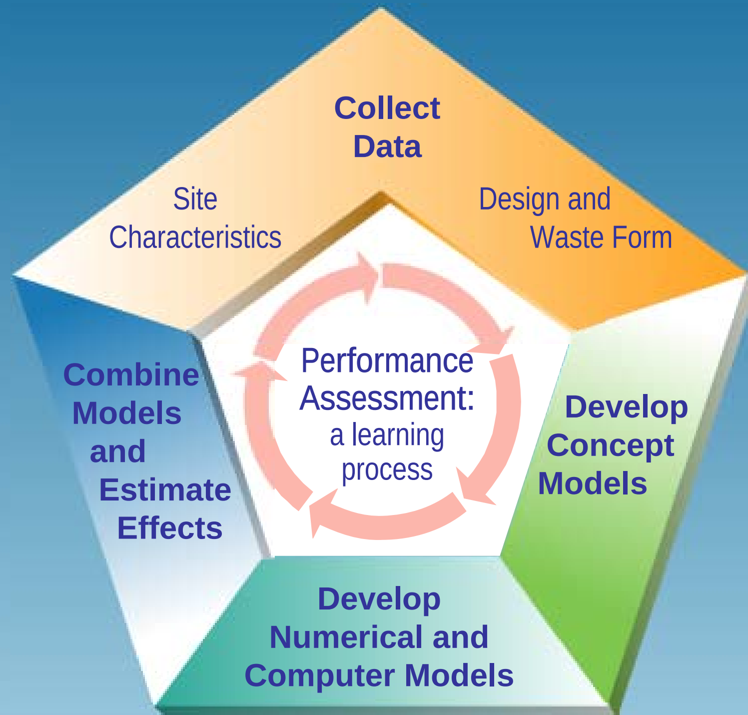
Overview of Performance Assessment

What is Performance Assessment?

- Systematic analysis of what could happen at a site

Why use it?

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



What is assessed?

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

How is it conducted?

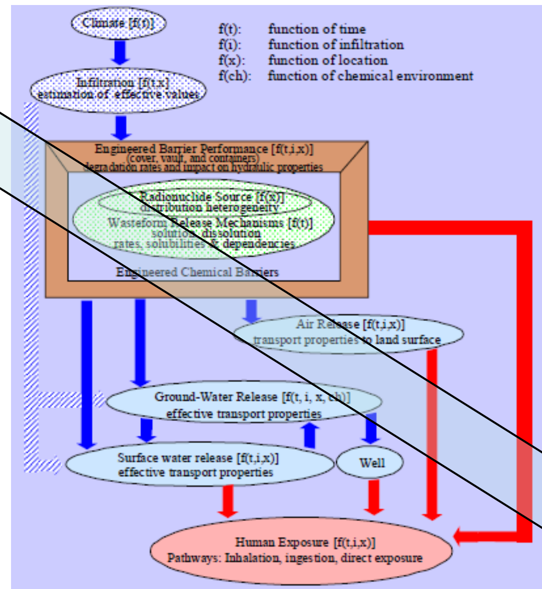
- Collect data
- Develop scientific models
- Develop computer code
- Analyze results

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

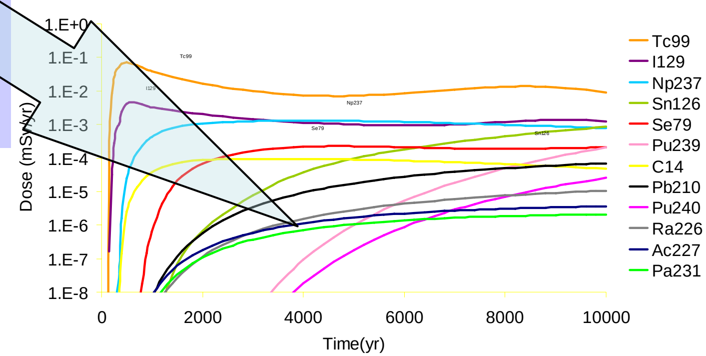
Performance Assessment - Example

Real system



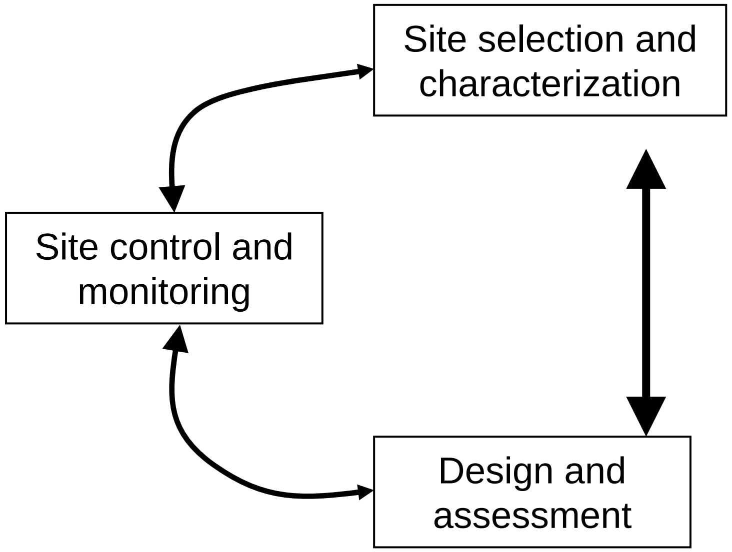
Mathematical model (abstraction)

Estimated future performance



Low-Level Waste - Framework

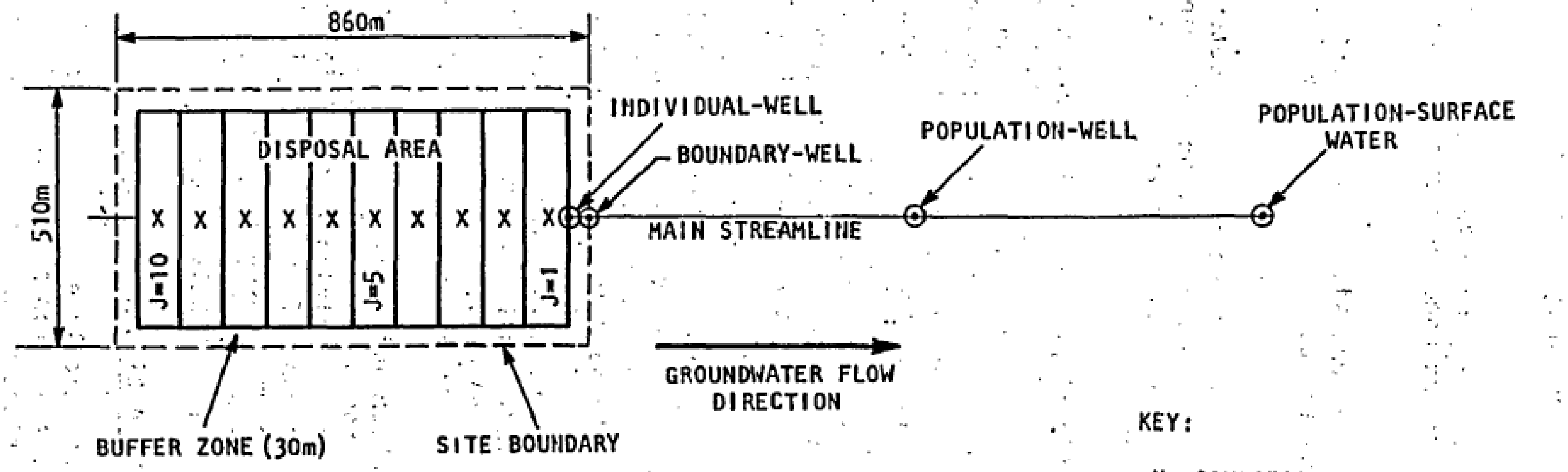
- Cornerstone of the system is stability
- Isolate waste
- Federal and State ownership (allow 100 years institutional control)
- Evaluate public exposures (offsite, workers, inadvertent intrusion)
- Disposal site shall be capable of being characterized, modeled, analyzed and monitored



Low-Level Waste – Part 61 EIS Developmental Analyses

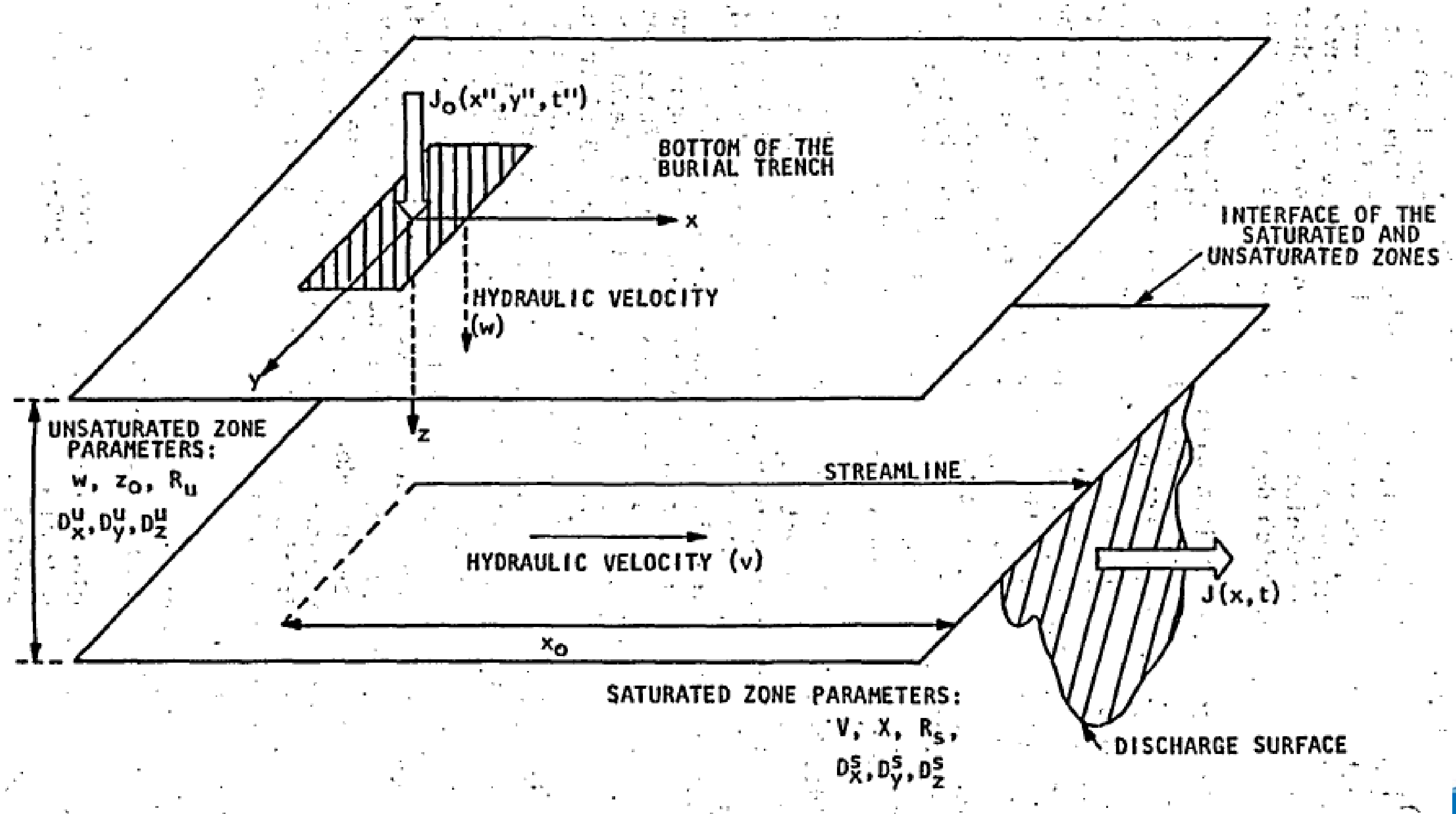
- Commercial LLW waste stream (early 1980's)
- Four reference disposal site environments
- Impacts to the public evaluated (environmental transport)
- Waste classification system developed
- Waste class concentrations based primarily on inadvertent intruder exposure

Low-Level Waste – Water Pathway Receptors



100 m = 330 ft

Low-Level Waste – Groundwater Analyses



Low-Level Waste – Site-Specific Technical Data

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Table 10.2 Retardation Coefficients Assumed for Regional Disposal Facility Sites

Isotope	Regional Site NE	SE	MW	SW
H-3	1	1	1	1
C-14	10	10	10	10
Fe-55	5,400	2,640	2,640	1,290
Ni-59	3,600	1,750	1,790	860
Ni-63	3,600	1,750	1,750	860
Co-60	3,600	1,750	1,750	860
Sr-90	73	36	36	18
Nb-94	10,000	4,640	4,640	2,150
Tc-99	5	4	4	3
I-129	5	4	4	3
Cs-135	720	350	350	173
Cs-137	7,200	350	350	173
U-235	7,200	3,520	3,520	1,720
U-238	7,200	3,520	3,520	1,720
Np-237	2,500	1,200	1,200	600
Pu-238	7,200	3,520	3,520	1,720
Pu-239/240	7,200	3,520	3,520	1,720
Pu-241	7,200	3,520	3,520	1,720
Pu-242	7,200	3,520	3,520	1,720
Am-241	2,500	1,200	1,200	600
Am-243	2,500	1,200	1,200	600
Cm-243	2,500	1,200	1,200	600
Cm-244	2,500	1,200	1,200	600

MI Sheppard and DH Thibault provides a compendium of distribution coefficients (Kd's) *Health Physics*, Vol. 59, No. 4 pp. 471-482 (October) 1990

$$R_f = 1 + \frac{\rho_b K_d}{\theta}$$

	min	max	GM
Sr	1	1400	90
Tc	1	3	1
Cs	2600	280000	21000
U	2	21000	70
Pu	500	30000	5000

Calculated retardation coefficients

ρ_b=1.6 g/cm^3

θ= 0.35

Part II: Depleted Uranium and NRC Analyses (SECY-08-0147)

Depleted Uranium Disposal

- Problem Context
- Uranium and Radon
- Uranium Geochemistry
- Scenarios and Receptors
- Period of Performance

Nuclear Fuel Cycle

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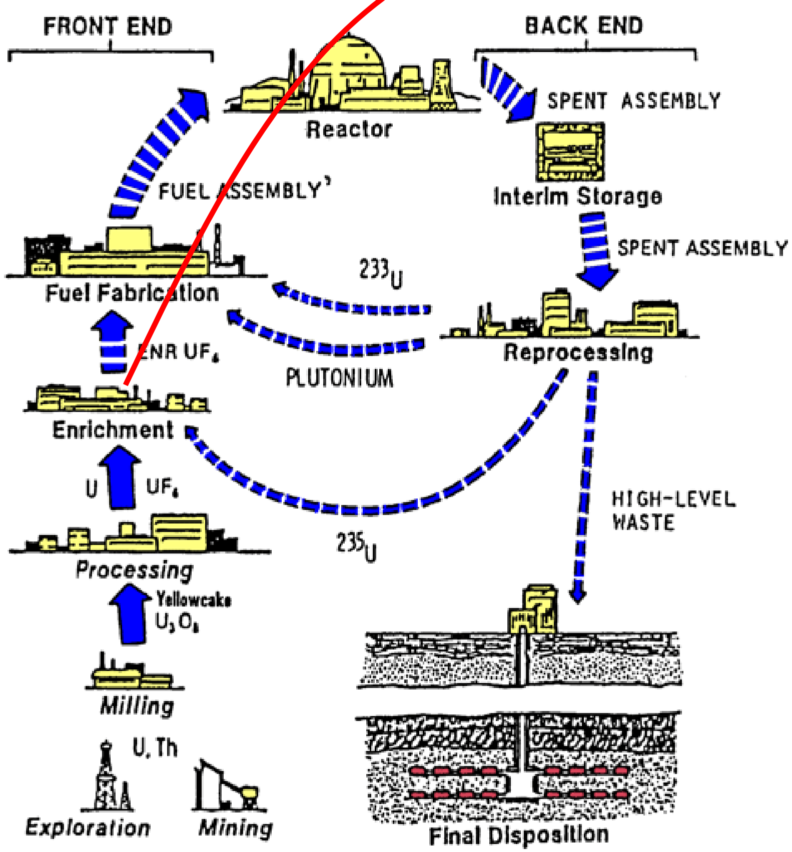
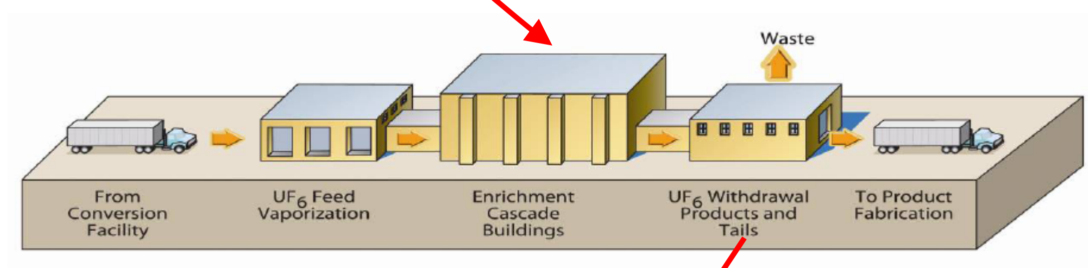




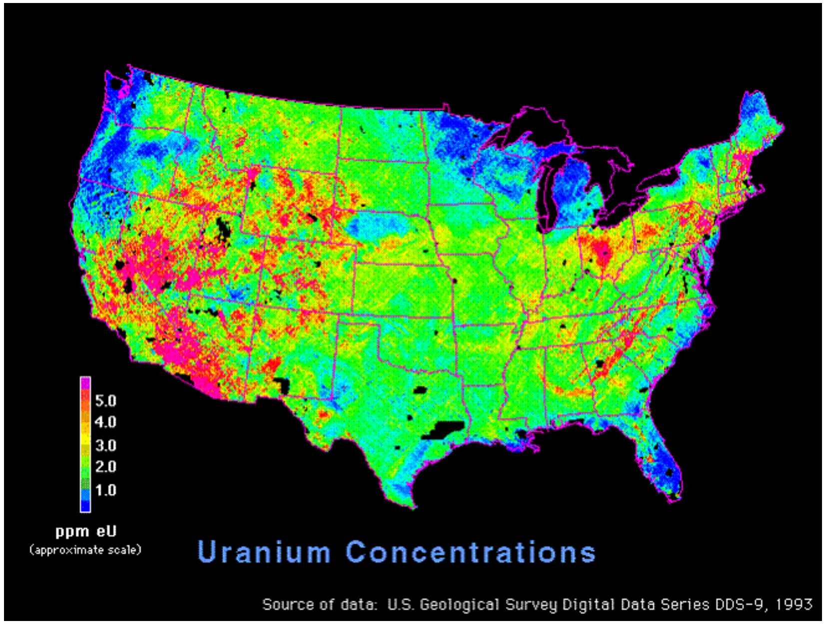
Depleted Uranium

Depleted Uranium Disposal: Problem Context

- Large quantities of uranium were not evaluated in the EIS for 10 CFR Part 61
  - 17 Ci of ^{238}U (in 1 million m^3 of waste)
  - 3 Ci of ^{235}U
- The quantity of DU is ~ 470,000 Ci ^{238}U

Uranium in the Environment

- Uranium in surface soils ~ 1 to 5 ppm
- Mean atmospheric radon is ~ 0.25 pCi/L
- Indoor average radon levels ~ 1.5 to 4.2 pCi/L
- Radon contributes roughly 70% of the average annual dose in the United States (~250 mrem/yr)



Depleted Uranium : Source Comparison

- US uranium mill tailings contain:
  << 1 weight percent U oxide
  26 to 400 pCi/g ^{226}Ra,
  70 to 600 pCi/g ^{230}Th
- DU contains:
  ~ 40 weight percent U oxide (as disposed)

Time (years)	Ra-226 (pCi/g)
0	~ 0
1,000	~400
1,000,000	~300,000

Activity Ratio: DU to other LLW

Time (yr)	Activity (DU/LLW)
1	0.03
10	0.1
100	0.8
1,000	11
10,000	13
100,000	22
1,000,000	24

Depleted Uranium: NRC Analysis

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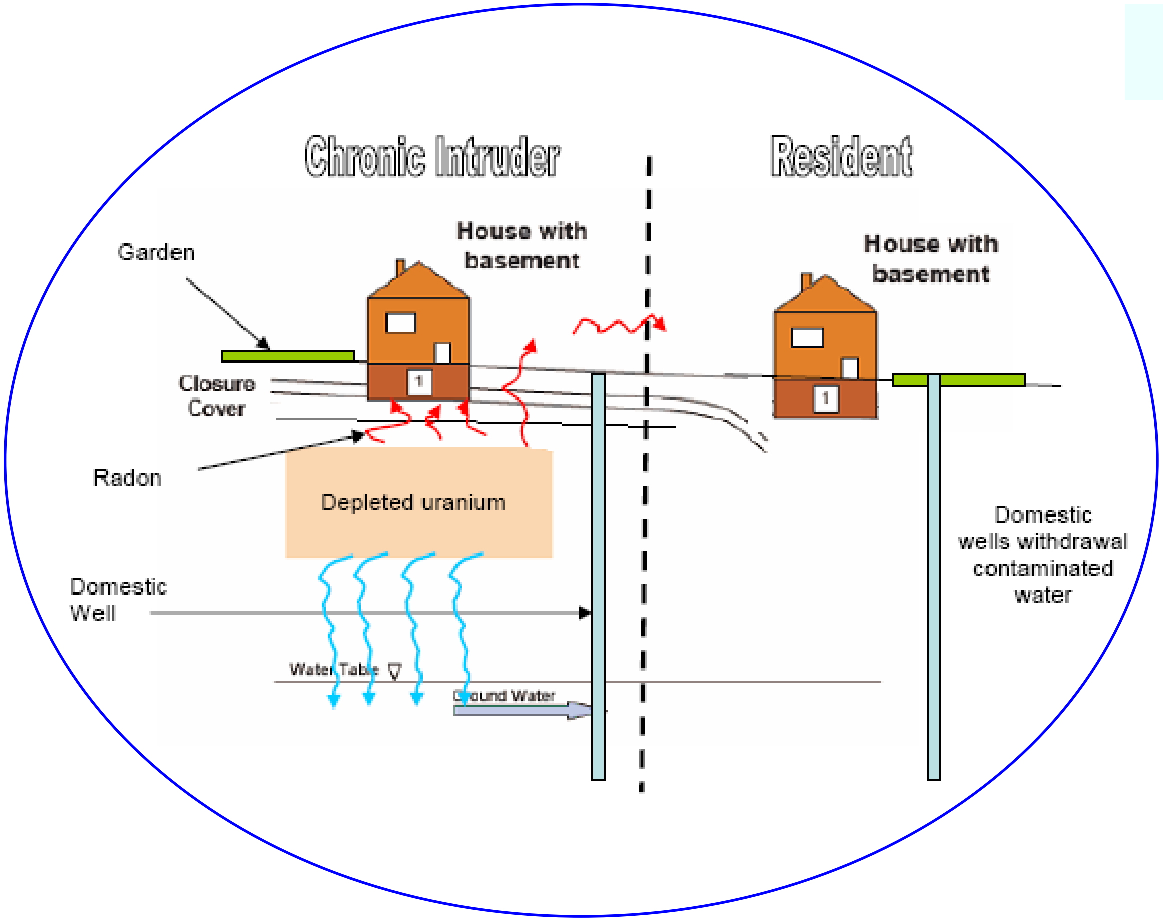
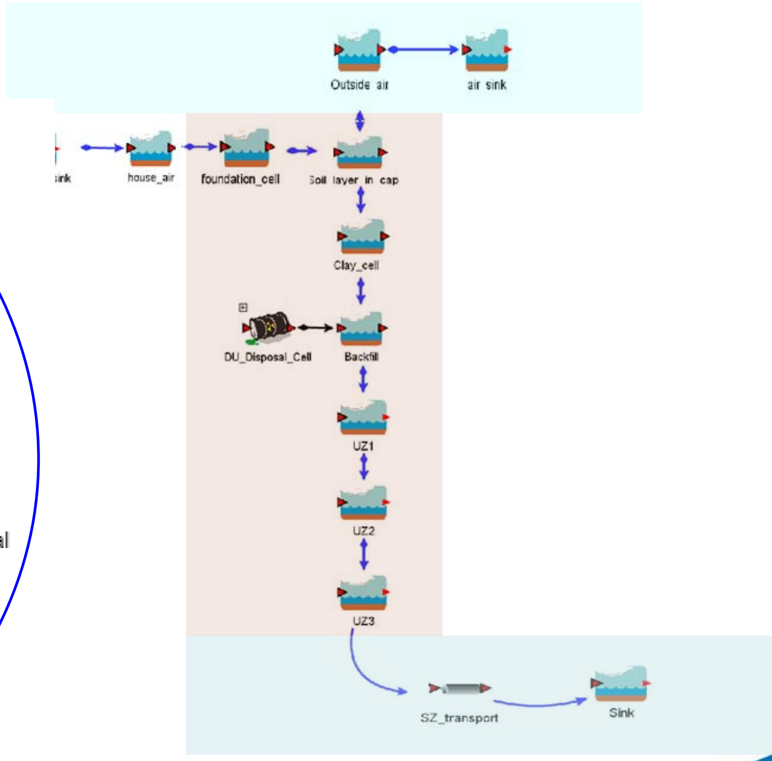
- Screening model developed for SECY-08-0147
- Developed to examine key variables:
  - Period of performance
  - Disposal depth
  - Receptor types and scenarios
  - Site characteristics
- Performed probabilistic assessment
- Analysis methodology for unique waste streams consistent with original Part 61 analysis

Depleted Uranium: NRC Analysis



Receptor Scenarios



Depleted Uranium: NRC Analysis

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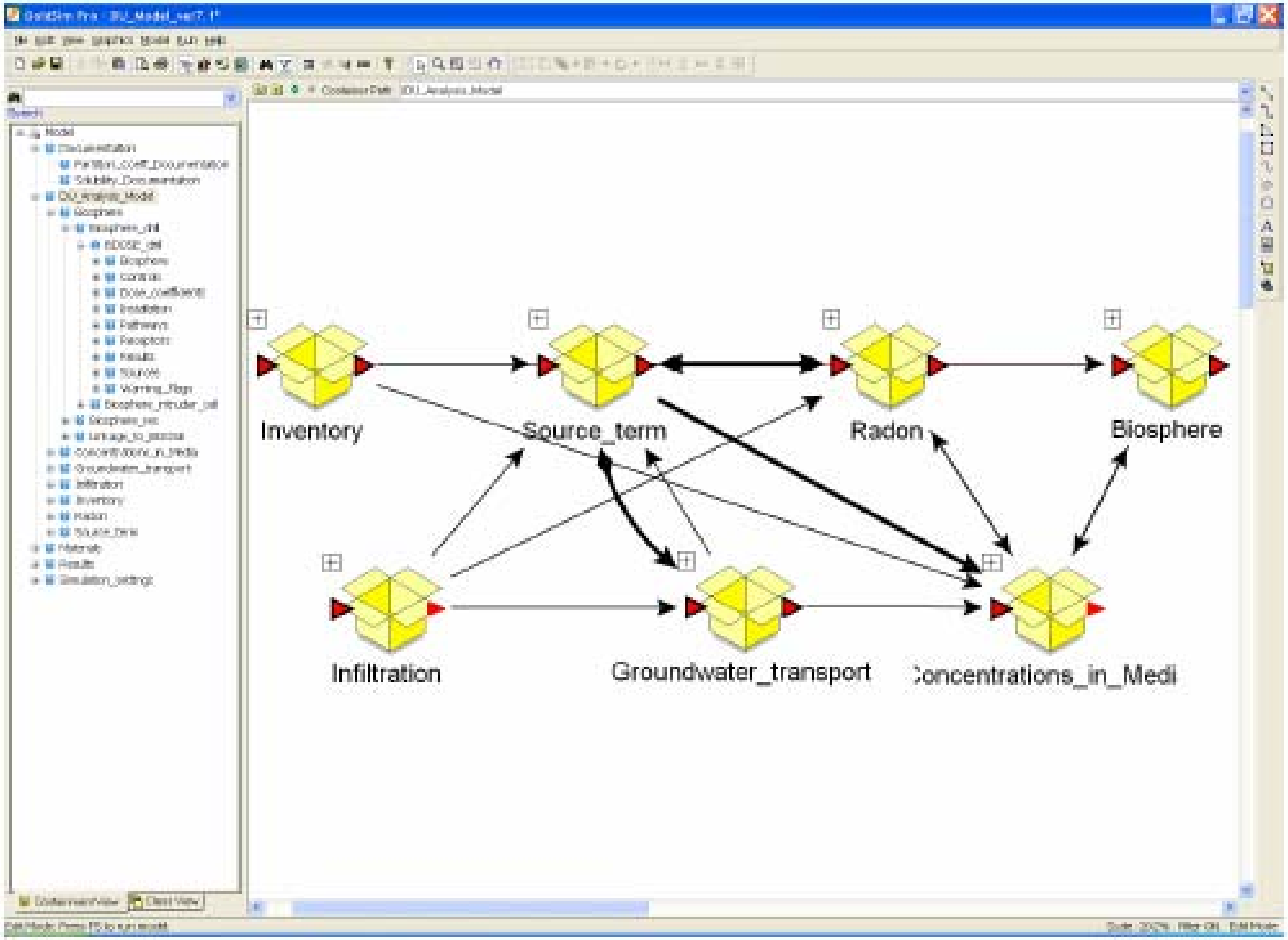

Depleted Uranium: NRC Analysis

- Major variables: period of performance, disposal depth, receptor scenarios
- Uncertainty analysis performed with genetic algorithms
- Key parameters:
  - Hydraulic conductivity and gradient of the aquifer
  - Infiltration rate
  - Geochemical conditions
  - Liquid saturation
  - Properties of the house and scenario (radon related)

Depleted Uranium: NRC Analysis

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Table I Percent of realizations that met regulatory limits

Scenario	Performance Period (yr)	Resident[1]			Chronic Intruder[2]
		All Pathways	Drinking water	Inhalation	All Pathways
Arid, 1 m disposal depth	1,000	**100**	**100**	**100**	<2
	10,000	40	**90**	**50**	0
	100,000	10	**60**	20	0
	1,000,000	<1	40	8	0
Arid, 3 m disposal depth	1,000	**100**	**100**	**100**	2
	10,000	**80**	**90**	**100**	0
	100,000	**50**	**60**	**80**	0
	1,000,000	20	40	**70**	0
Arid, 5 m disposal depth	1,000	**100**	**100**	**100**	**100**
	10,000	**80**	**90**	**100**	**100**
	100,000	**50**	**60**	**90**	**90**
	1,000,000	30	40	**90**	**70**
Humid, 5 m disposal depth	1,000	**70**	**70**	**100**	**100**
	10,000	0	0	**100**	20
	100,000	0	0	**100**	0
	1,000,000	0	0	**97**	0
Arid,[3] 5 m disposal depth, Grout	1,000	**100**	**100**	**100**	**100**
	10,000	**90**	**90**	**100**	**100**
	100,000	**70**	**70**	**100**	**90**
	1,000,000	**60**	**60**	**90**	**80**

radon

radon

GW

GW

Not doses!

Depleted Uranium: NRC Analysis

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- If radon is included, shallow disposal at an arid site is challenging
- For humid sites, the groundwater pathway can exceed the performance objectives
- Greater consideration of long-term stability needed
- Site-specific conditions can result in large variance in impacts

Part III: Key Issues for Depleted Uranium Disposal

Depleted Uranium: Radon

- Radon is a decay product from Uranium
- Radon is ubiquitous in the environment
- Radon is transported via diffusion and advection in gas or liquid
- The rate of radon transport is strongly affected by moisture content (diffusivity and tortuosity are non-linear functions of saturation)
- Complexities include discrete features, barometric pumping, and emanation
- LLW EIS did not include radon

Depleted Uranium : Uranium Geochemistry

- Observed uranium concentrations and transport rates vary widely, dependent on site-specific conditions
- Uranium is relatively mobile under humid and oxidizing conditions
- Uranium is fairly immobile under reducing conditions
- Uranium is available for transport under arid conditions, but the availability of water can result in long transport times

Depleted Uranium : Scenarios and Receptors

- Institutional controls required for up to 100 years
- Multiple scenarios for land use normally considered
- Normal public exposures evaluated near but not on the disposal facility
- Unanticipated public exposures (intruder) evaluated on the disposal facility
- Limiting scenarios usually involved residential and agricultural practices

Depleted Uranium : Period of Performance

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- US NRC LLW regulations do not provide a value for period of performance
- Outside of Yucca Mountain, a period of performance longer than 10,000 years has not been applied in the US
- There is not an international consensus

Depleted Uranium: NRC Analysis

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- SECY-08-0147 provides basic description of assessment and assumptions
- Analysis not intended to replace site-specific evaluations
- All future calculations supporting proposed regulations will be fully-documented and will be provided for stakeholder review and comment
- Basic conclusion: rule change needed to address unique waste streams

Thank you, questions?

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Definition of Significant Quantities of Depleted Uranium

Public Workshop on Unique Waste Streams including Depleted Uranium

David Esh, Ph.D.
Division of Waste Management and Environmental Protection
September 2009

Overview

- Background
- Significance level
- Methods to determine significance

Insignificant Quantities

- Development of 10 CFR Part 61 considered Uranium
- Quantities were limited
- No need for waste classification limits for uranium based on the limited quantities expected
- Risk is a function of quantity and concentration

→ – 17 Ci of ^{238}U
(in 1 million m^3 of waste)
– 3 Ci of ^{235}U

→ ~30 ppm U
homogeneous

→ ~90 drums
(55 gallons)
concentrated

Methods to Determine Significance

- Historical values (e.g., NRC DEIS)
- Comparison to local background
- Defined in regulation
  - Calculation based
  - Source based
- Other

Public Feedback

- NRC is seeking public feedback on considerations for developing criteria for significant quantities of depleted uranium.
  - Factors to consider
  - Alternative approaches

Period of Performance

Public Workshop on Unique Waste Streams including Depleted Uranium

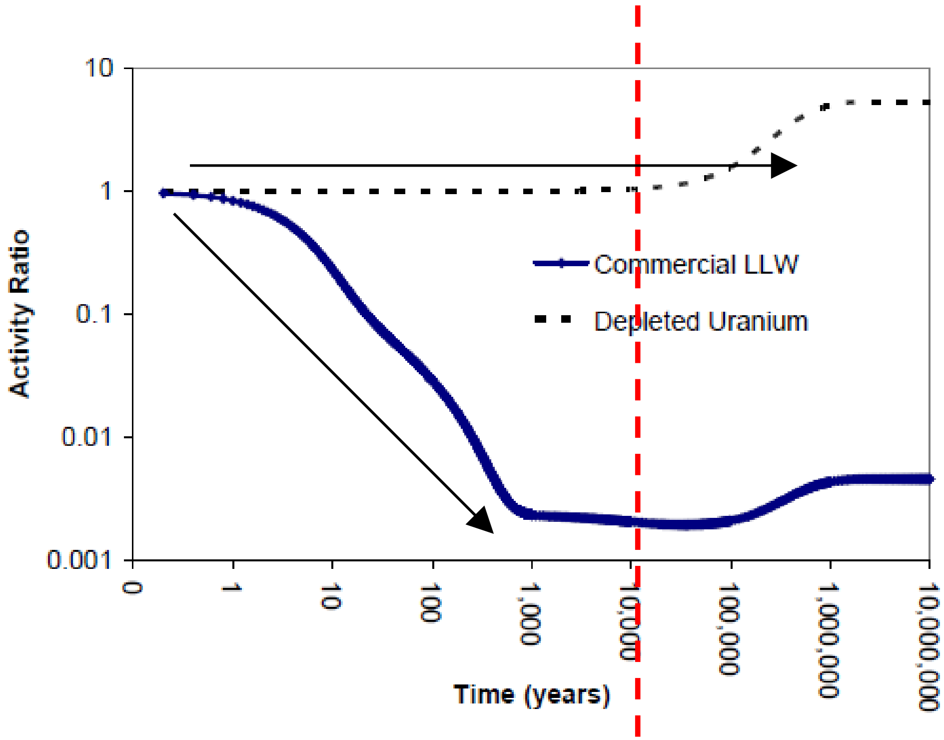
David Esh, Ph.D.
Division of Waste Management and Environmental Protection
September 2009

Overview

- Background
  - 10 CFR Part 61
  - NUREG-1573
  - Other waste programs
- Key considerations
- Approaches to period of performance

Background

- Development of 10 CFR Part 61 initially considered a 10,000 year performance period
- 10 CFR Part 61 does not provide a value
- Site and waste characteristics influence timing of projected doses



Background

- NUREG-1573 considered a 10,000 year performance period sufficient with some exceptions, to:
  - Capture risk from short-lived radionuclides
  - Assess risk from more mobile long-lived radionuclides
  - Bound potential peak doses at longer times
- Exceptions:
  - Ingrowth of daughters from large inventories of uranium
  - Peak doses at humid sites from large inventories of long-lived transuranics

Background

- Within the US:

  Geologic Disposal:

  - Yucca Mountain-specific regulations (10 CFR Part 63) – 1,000,000 years
  - WIPP-specific standards (40 CFR 191) – 10,000 years
  - General regulations for HLW disposal (10 CFR Part 60) – 10,000 years

  Near-Surface Disposal:

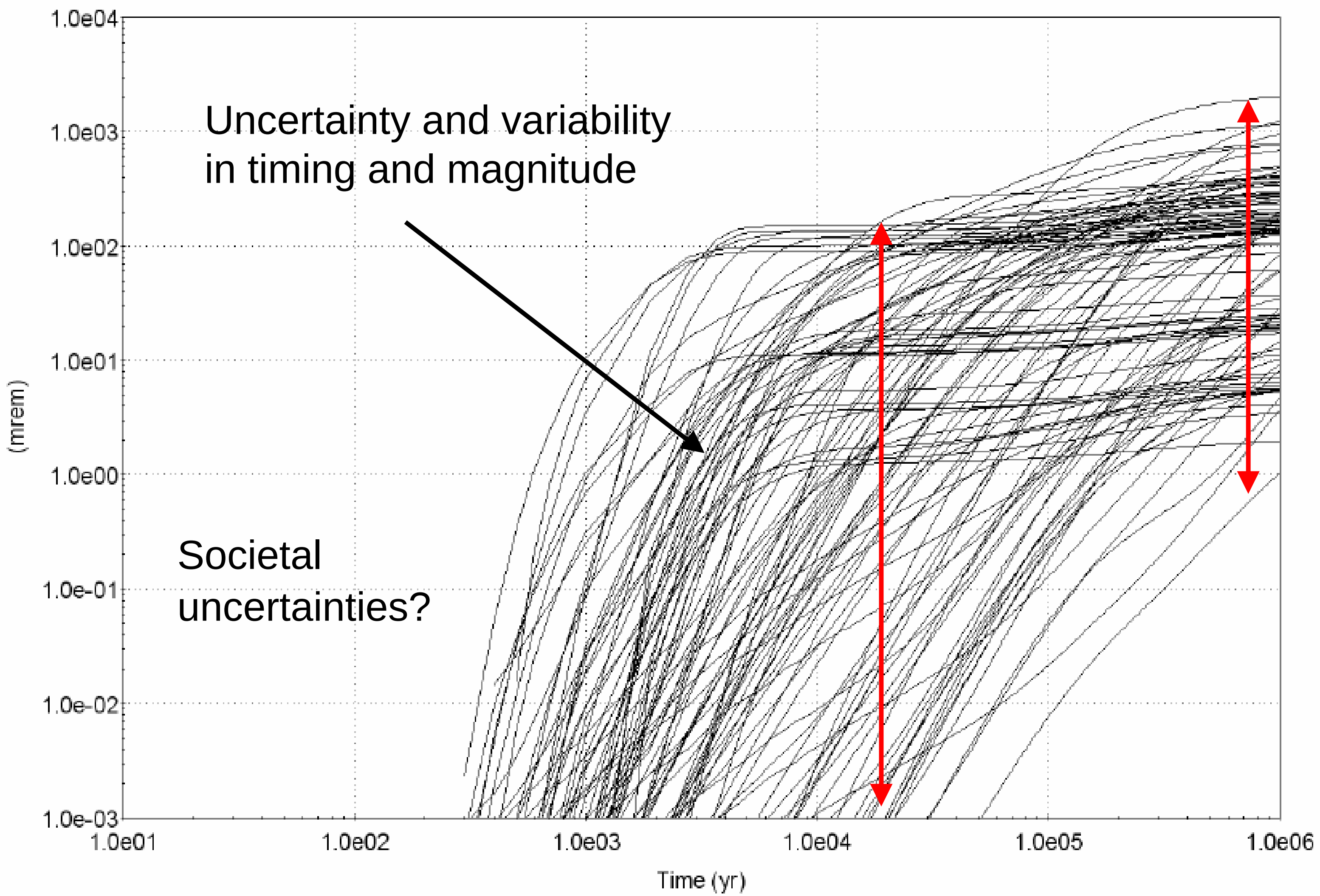
  - Decommissioning (10 CFR Part 20) – 1,000 years
  - Mill tailings (10 CFR Part 40, App. A) – 1,000 years (goal)

- There is no international consensus.

Key Considerations

- Hazard and longevity of the waste
- Analysis framework
- Socioeconomic uncertainties
- Uncertainty in extending models

Key Considerations



Perspective

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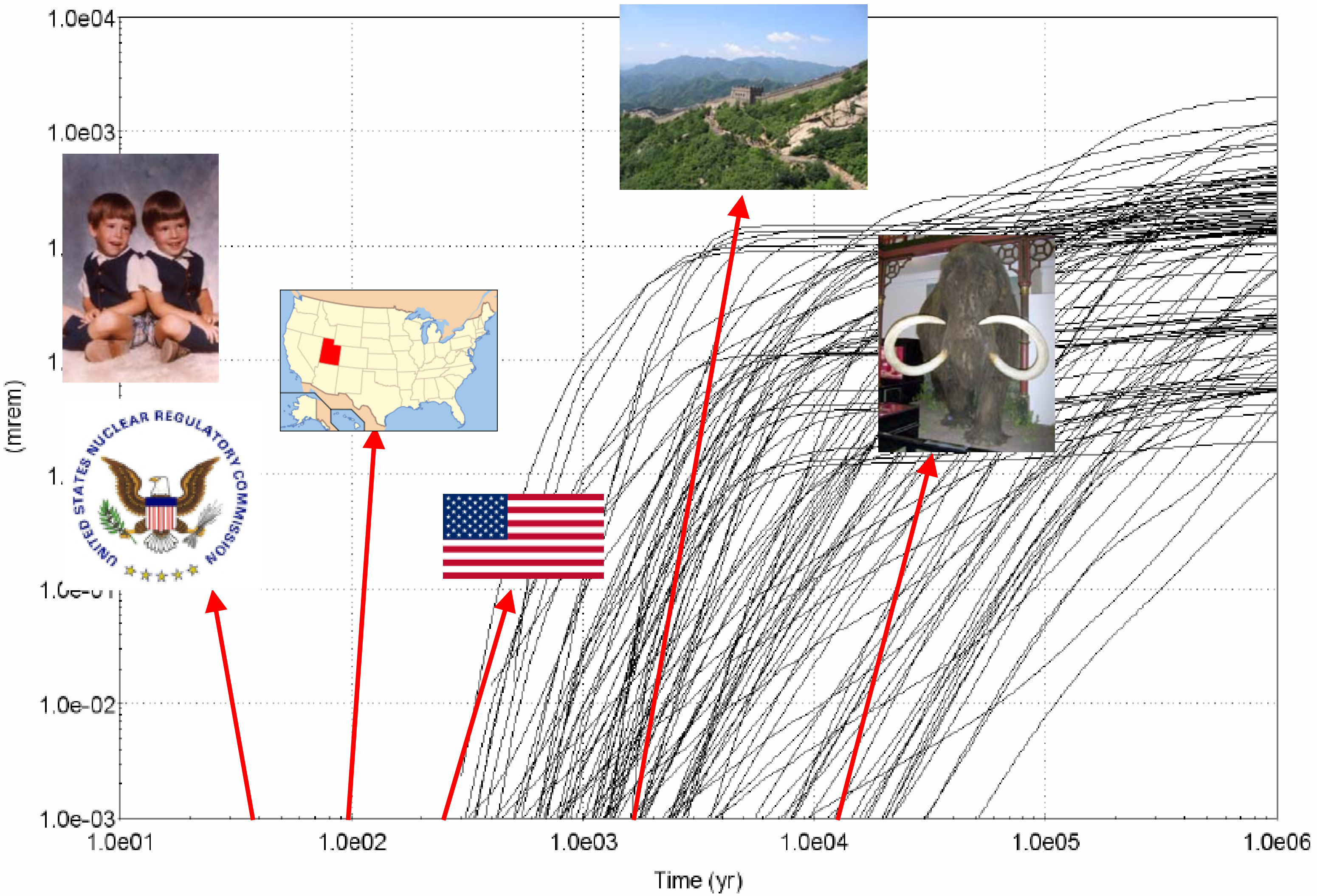

http://en.wikipedia.org/wiki/File:GreatWall_2004_Summer_4.jpg
http://en.wikipedia.org/wiki/File:Mammoth2.jpg

Approaches to Period of Performance

- NRC specify performance period
- NRC specify factors to consider, Licensee justify
- Factors to consider for either approach
- Other

Public Feedback

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- NRC is seeking public feedback on considerations for developing criteria for the period of performance in site-specific analyses.
  - Factors to consider
  - Alternative approaches

Exposure Scenarios for a Site-Specific Analysis

Public Workshop on Unique Waste Streams including Depleted Uranium

David Esh, Ph.D.
Division of Waste Management and Environmental Protection
September 2009

Overview

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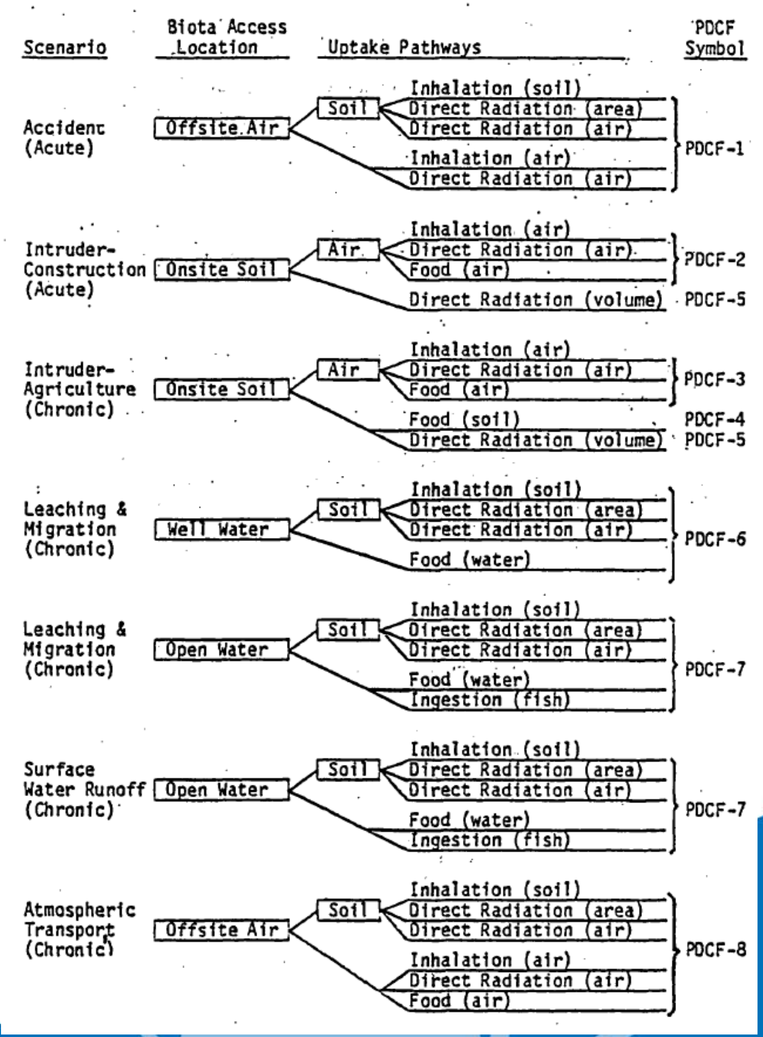
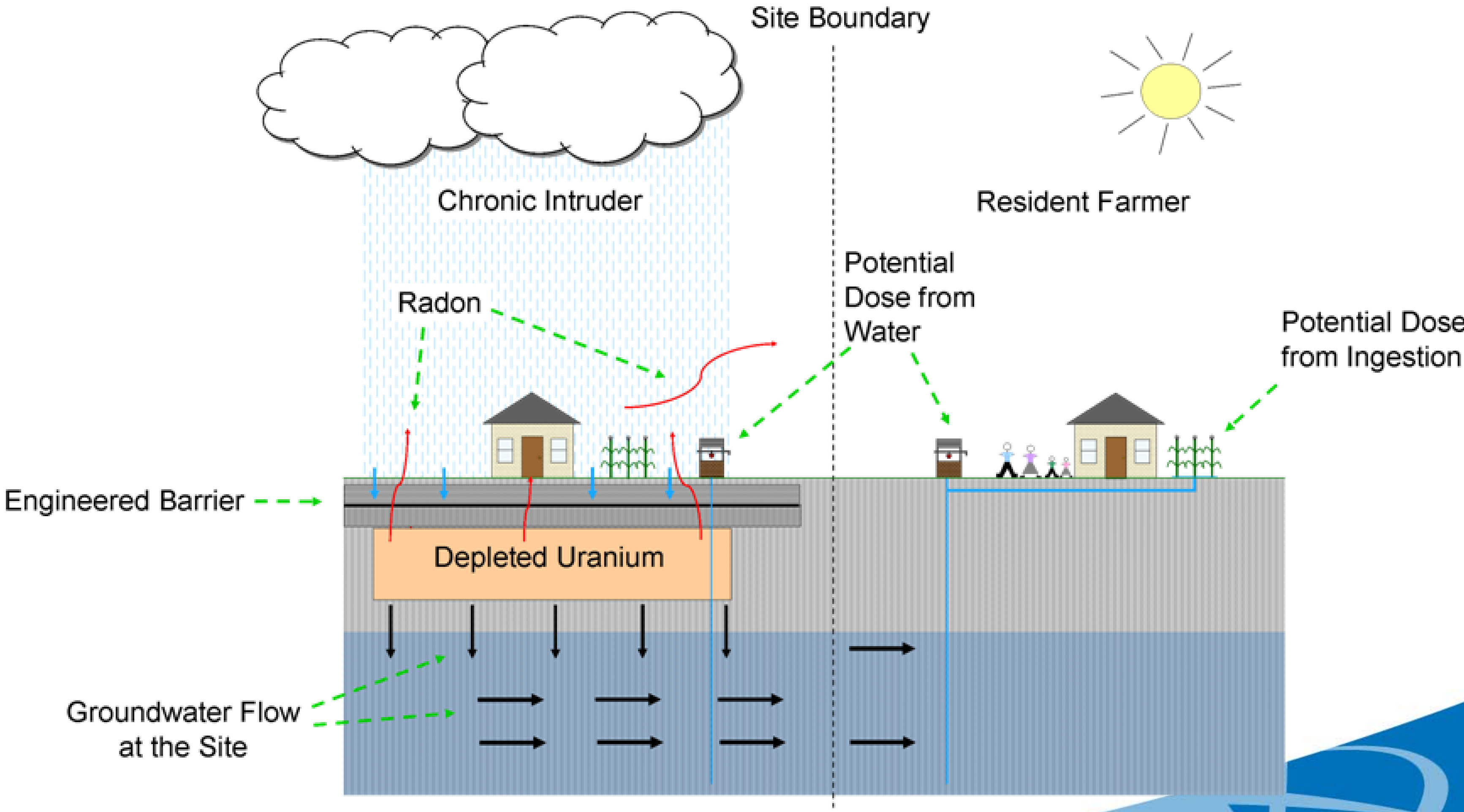
- Background
  - 10 CFR Part 61
- Key considerations
- Site-specific exposure scenarios

Background

- Development of 10 CFR Part 61 (NUREG-0782, NUREG-0945)
  - residential, agricultural, or other activities near the disposal area
  - inadvertent intrusion on the disposal area



Background


Site Boundary
Chronic Intruder
Resident Farmer
Radon
Potential Dose from Water
Potential Dose from Ingestion
Engineered Barrier
Depleted Uranium
Groundwater Flow at the Site

Key Considerations

- Historical approach
  - Offsite resident
  - Onsite intruder (acute and chronic)
- Relationship of receptor scenarios to characteristics of the waste
- Inclusion of radon and regulatory limits
- Regulatory defined scenarios or site-specific

Public Feedback

- NRC is seeking public feedback on the development of exposure scenarios for evaluating unique waste streams.
  - Factors to consider
  - Alternative approaches

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Source Term Issues for a Site-Specific Analysis

Public Workshop on Unique Waste Streams including Depleted Uranium

Karen Pinkston, Ph.D. and Christopher Grossman
Division of Waste Management and Environmental Protection

September 2009

Background

- Modeling of the source term estimates the amount of radionuclides released from the waste into the environment over time
- The release of radionuclides is a function of:
  - Inventory of radionuclides present
  - Chemical and physical form of material
- Performance Assessments are living documents and should be updated as new inventory is added to the disposal system

Chemical form of Uranium

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- Depleted uranium commonly stored as UF_6
- UF_6 reacts with water to form corrosive HF
- NRC screening analysis assumed UF_6 was deconverted to more stable oxide form
- Stabilizing materials (e.g., grout) could affect the release from waste form

Modeling of the Source Term

- Physical configuration of disposal facility
- Inventory
- Influence of the chemical form of uranium on release (e.g., UF_6 vs uranium oxide)
- Effect of stabilizing materials
- Long term performance of stabilizing materials

Public Feedback

- NRC is seeking public feedback on specifying criteria for or developing guidance related to the:
  - Inventory of DU included in modeling
  - Physical or chemical forms used in disposal
  - Use of stabilizing materials
  - Modeling of the source term

Issues with Site-Specific Geochemistry

Public Workshop on Unique Waste Streams including Depleted Uranium

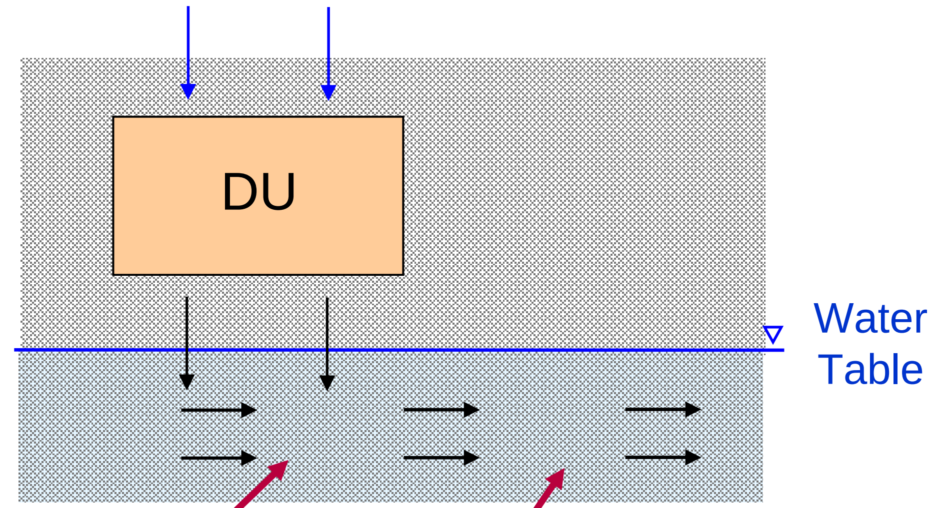
Karen Pinkston, Ph.D. and Christopher Grossman
Division of Waste Management and Environmental Protection
September 2009

Background

- Uranium and its daughters can move through the environment at different rates depending on *geochemical conditions* and *concentrations* present.
- Geochemistry was treated as epistemic (lack of knowledge) uncertainty over a range of sites, but could be constrained at a specific site.
- Results suggest that the *site geochemistry* may be key for the safety of near-surface disposal of significant quantities of depleted uranium.

Mobility in the Environment

Waste Release:
Solubility, Leaching, Red-Ox Chemistry

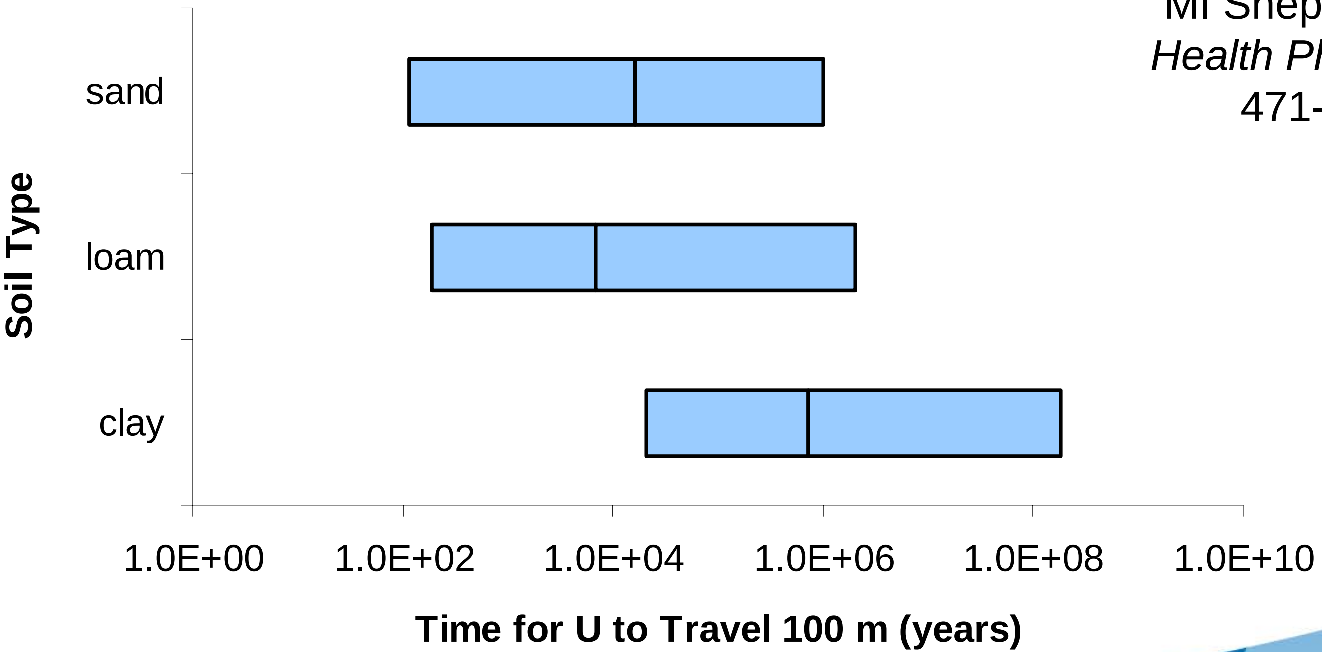


Solubility of uranium varies strongly with pH, oxidation state, and CO_2 concentration

Environmental Transport:
Sorption

Site Variability

- Geochemistry can vary greatly from site to site



Travel times estimated based on Kd value data provided by MI Sheppard and DH Thibault in *Health Physics*, Vol. 59, No. 4 pp. 471-482 (October) 1990

$$R_f = 1 + \frac{\rho_b K_d}{\theta}$$

assume:

ρ_b=1.6 g/cm^3

θ= 0.35

groundwater flow = 1 m/yr

Key Considerations

- Effect of oxidation-reduction potential, pH, and CO_2 concentration on release
- Modeling of spatial and temporal differences in geochemistry
- Differences between near-field and far-field chemistry
- Site specific differences in soil properties

Public Feedback

- NRC staff is seeking public feedback on considerations for developing criteria or guidance for geochemical parameters in site-specific analyses.
  - Factors to consider
  - Alternative approaches

Modeling of Radon in the Environment in a Site-Specific Analysis

Public Workshop on Unique Waste Streams including Depleted Uranium

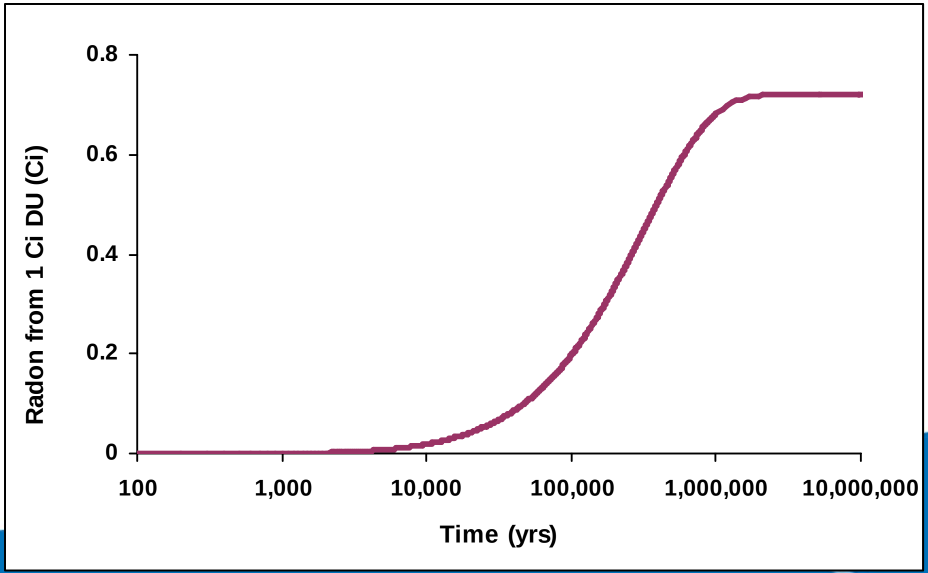
Karen Pinkston, Ph.D. and Christopher Grossman
Division of Waste Management and Environmental Protection
September 2009

Background

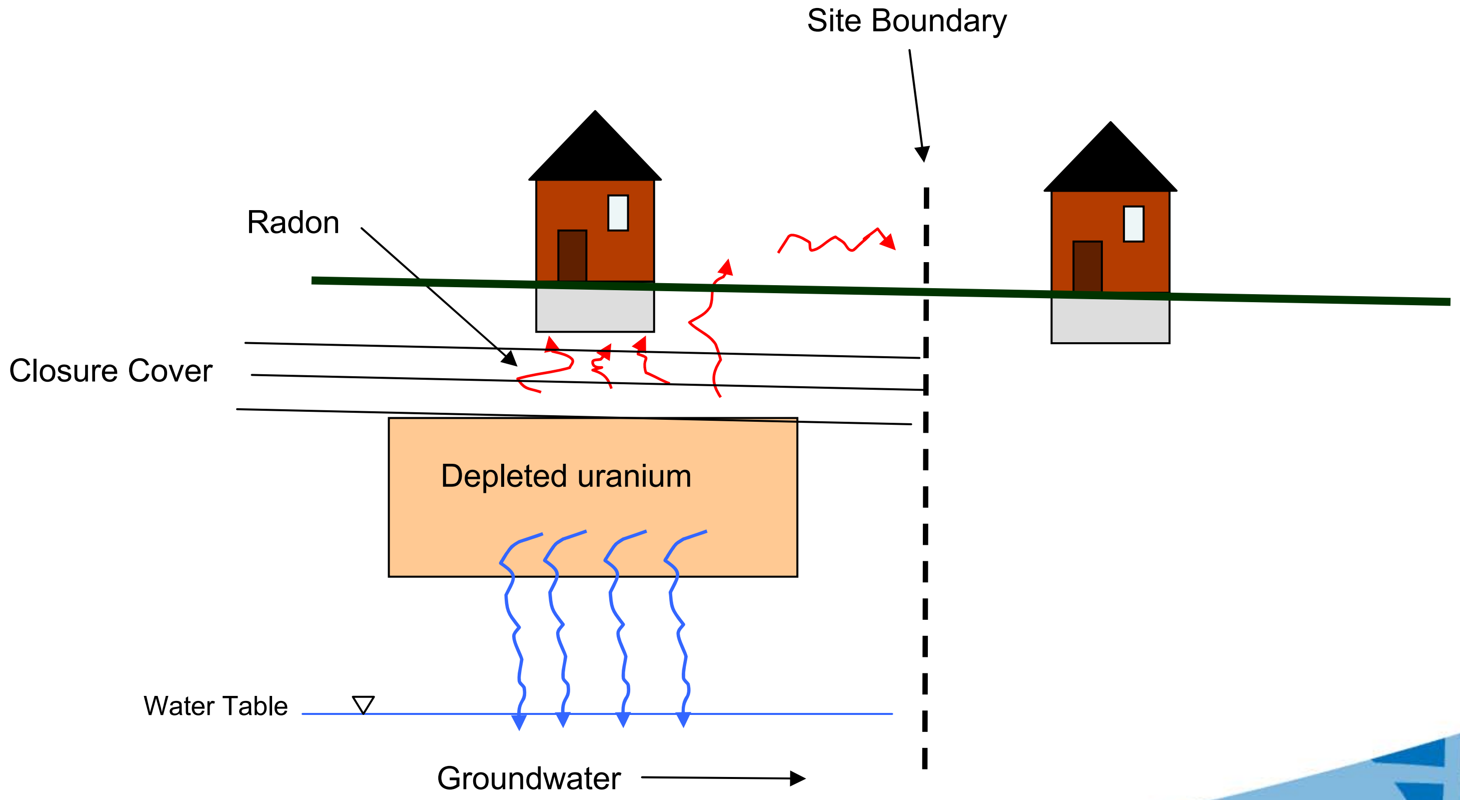
- Rn-222 is present in the U-238 decay chain

U-238 →Th-234 →Pa-234 →U-234 →Th-230 →Ra-226 → Rn-222

- Rn-222 has a half-life of 3.8 days
- Radon is a gas and has very different mobility than other radionuclides in the decay chain



Migration of Radon



Exposure Scenario and Societal Uncertainty

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Future land use
- Types of structures built
- Properties of structure
  - size of structure
  - presence of basement
  - ventilation system
  - radon mitigation system

Challenges in Modeling of Radon

U.S.NRC
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- Emanation of radon from radium in solid wasteform to gas in pore space
- Diffusion through partially-saturated porous media
- Gas phase diffusion of radon highly dependent on moisture content and saturation
- Long-term performance of clay radon barriers
- Barometric pumping

Public Feedback

U.S.NRC
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- NRC is seeking public feedback on:
  - Methods for evaluating and/or regulating the impact of radon gas exposures
  - Approaches for modeling radon emanation, transport, and exposure pathways
  - Parameter values used in modeling
  - Consideration of societal uncertainties in modeling of radon

Definition of Unique Waste

Public Workshop on Unique Waste Streams including Depleted Uranium

David Esh, Ph.D.
Division of Waste Management and Environmental Protection
September 2009

Background

- 10 CFR 61 developmental analysis considered 1980's waste streams.

TABLE 3-4 . Waste Groups and Streams

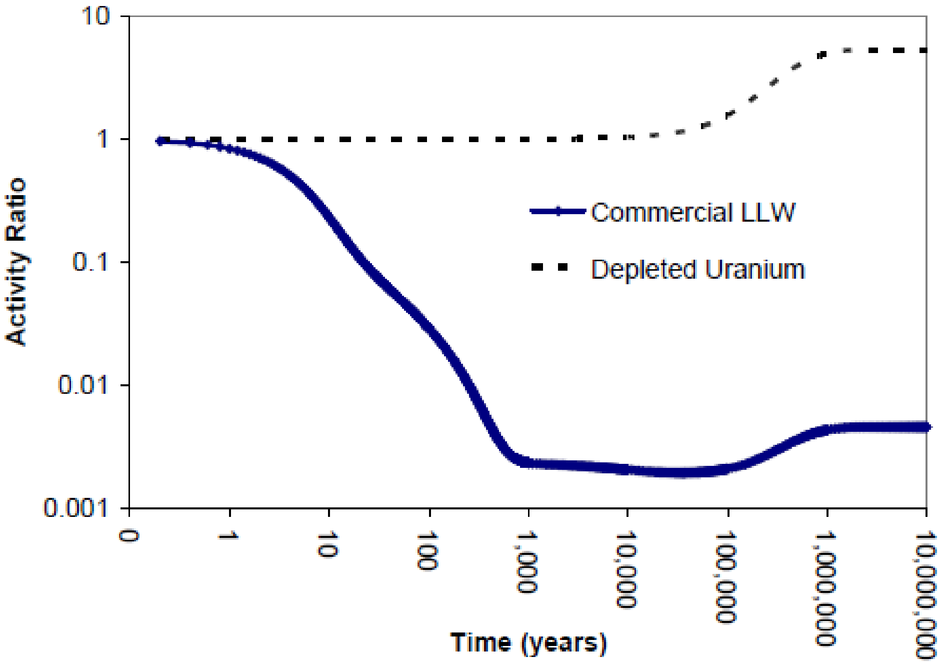
Waste Stream	Symbol
Group I : LWR Process Wastes	
PWR Ion Exchange Resins	P-IXRESIN
PWR Concentrated Liquids	P-CONCLIQ
PWR Filter Sludges	P-FSLUDGE
PWR Filter Cartridges	P-FCARTRG
BWR Ion Exchange Resins	B-IXRESIN
BWR Concentrated Liquids	B-CONCLIQ
BWR Filter Sludges	B-FSLUDGE
Group II : Trash	
PWR Compactible Trash	P-COTRASH
PWR Noncompactible Trash	P-NCTRASH
BWR Compactible Trash	B-COTRASH
BWR Noncompactible Trash	B-NCTRASH
Fuel Fabrication Compactible Trash	F-COTRASH
Fuel Fabrication Noncompactible Trash	F-NCTRASH
Institutional Trash (large facilities)	I-COTRASH
Institutional Trash (small facilities)	I+COTRASH
Industrial SS Trash (large facilities)*	N-SSTRASH
Industrial SS Trash (small facilities)*	N+SSTRASH
Industrial Low Trash (large facilities)	N-LOTRASH
Industrial Low Trash (small facilities)	N+LOTRASH
Group III : Low Specific Activity Wastes	
Fuel Fabrication Process Wastes	F-PROCESS
UF_6 Process Wastes	U-PROCESS
Institutional LSV Waste (large facilities)*	I-LIQSCVL
Institutional LSV Waste (small facilities)*	I+LIQSCVL
Institutional Liquid Waste (large facilities)	I-ABSLIQD
Institutional Liquid Waste (small facilities)	I+ABSLIQD
Institutional Biowaste (large facilities)	I-BIOWAST
Institutional Biowaste (small facilities)	I+BIOWAST
Industrial SS Waste*	N-SSWASTE
Industrial Low Activity Waste	N-LOWASTE
Group IV : Special Wastes	
LWR Nonfuel Reactor Components	L-NFRCOMP
LWR Decontamination Resins	L-DECONRS
Waste from Isotope Production Facilities	N-ISOPROD
Tritium Production Waste	N-TRITIUM
Accelerator Targets	N-TARGETS
Sealed Sources	N-SOURCES
High Activity Waste	N-HIGHACT

* SS : Source and Special Nuclear Material; LSV : Liquid Scintillation Vials.

3-18

Why is DU unique?

- Radioactive decay characteristics not typical of commercial LLW
- Quantities disposed are greater than expected



Public Feedback

- NRC seeking public feedback on considerations for defining unique waste streams requiring a site-specific analysis.
  - Current and foreseeable waste streams
  - Other

Compatibility of Agreement State and NRC Regulations

Public Workshop on Unique Waste Streams including Depleted Uranium

Duncan White
Division of Materials Safety and State Agreements
September 2009

Section 274 of Atomic Energy Act

- Enacted in 1959 (First Agreement State, 1962)
- Promote orderly regulatory pattern
- Discontinuation of certain NRC authorities
- Development of radiation standards
- NRC maintains oversight responsibility

Key Elements of Agreement State Programs

- Adequate and compatible program
- Sufficient staffing and technical training
- Adequate State funding
- Separate enabling legislation and regulations

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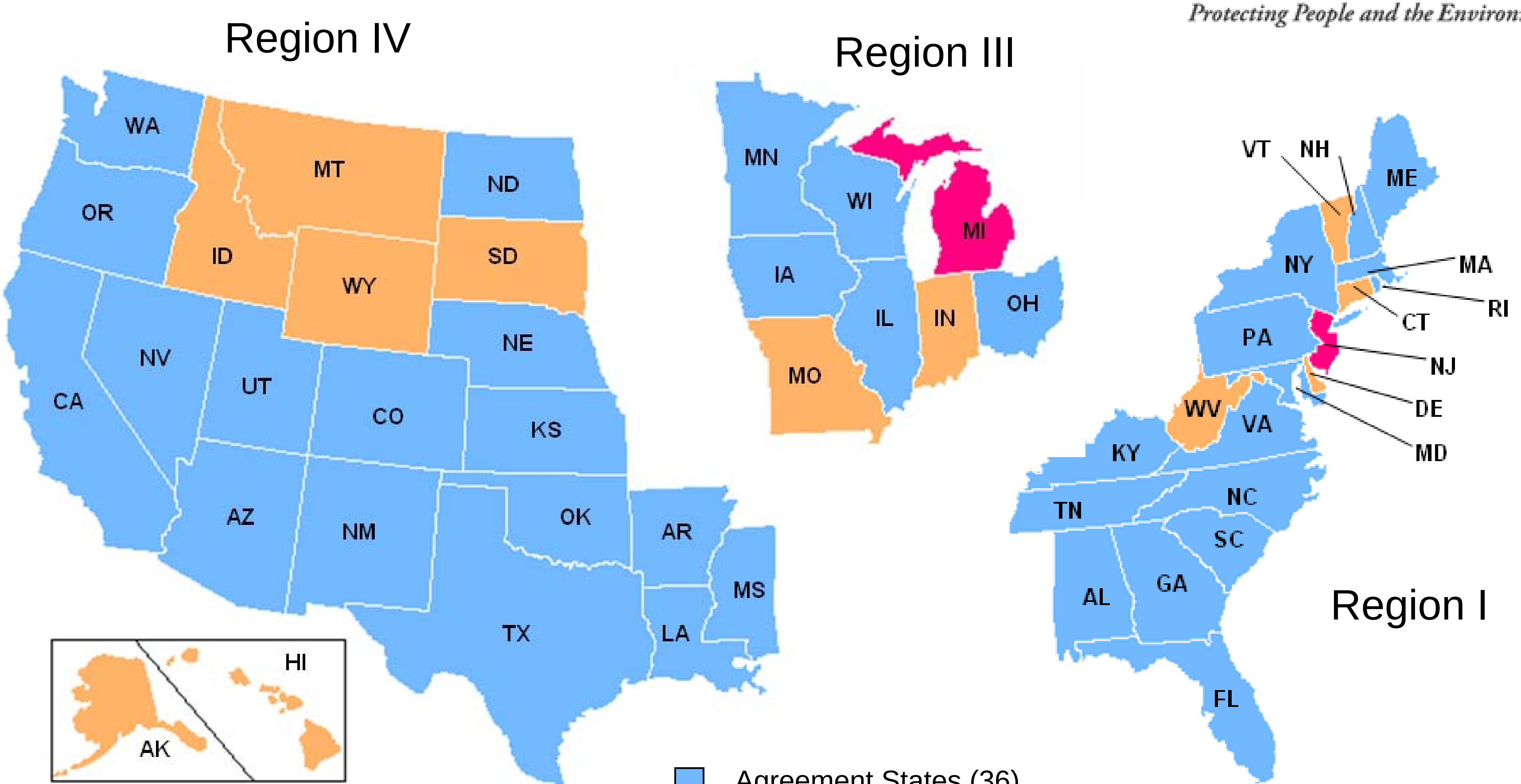


- Agreement States (36)
- NRC States (12)
- NRC States that have expressed intent to sign Agreement (2)

Note: 85% of licensees in Agreement States

NRC Oversight of Agreement States

- Integrated Materials Performance Evaluation Program (IMPEP)
- Review at least every 4 years
- Review team of NRC and Agreement State technical staff
- Senior management review
- Management Directive 5.6

What is Compatibility?

- Maintain orderly regulatory pattern
  - No conflicts, gaps or duplication

- Applies to program implementation
  - Regulations
  - Legally binding requirements
  - Program elements

- Management Directive 5.9

Compatibility Categories

- Essentially Identical Categories
  - “A” Basic standards and related definitions
  - “B” Direct trans-boundary implications

- Essential Objectives Categories
  - “C” Required to avoid conflicts, duplications or gaps
  - “H&S” Particular health and safety significance
  - States can be more restrictive

Compatibility Categories

- Other Categories
  - “D” Not required for compatibility
  - “NRC” Cannot be relinquished to States

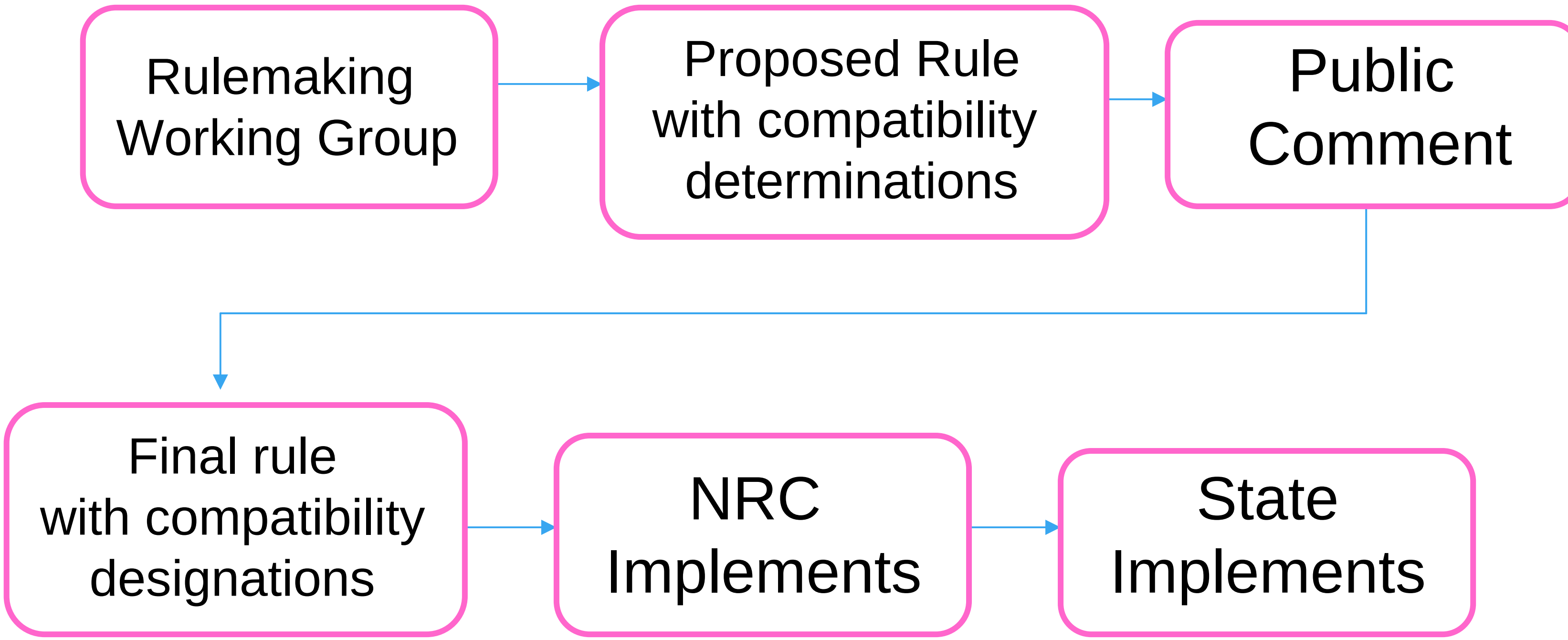
Key Provisions to Part 61

- 61.41 Protection of the General Population from the Releases of Radioactivity
  - Compatibility Category A

- 61.55 Waste Classification
  - Compatibility Category B

- 61.56 Waste Characteristics
  - Compatibility Category H&S

Compatibility and Rulemaking



Review of Agreement State Regulations

State revises rule,
Sends proposed and final rule to FSME

↓

FSME staff performs review

↓

Legal review by OGC

↓

Formal response to State;
FSME tracks status and comments

References

- FSME Public Website
  http://nrc-stp.ornl.gov/
- Regulation Toolbox
  http://nrc-stp.ornl.gov/regtoolbox.html
- IMPEP Toolbox
  http://nrc-stp.ornl.gov/impeptools.html
- Management Directives
  http://nrc-stp.ornl.gov/procedures.html#directives

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Long-Term Rulemaking: Waste Classification

Public Workshop on Unique Waste Streams including Depleted Uranium

Larry Camper, Director
Division of Waste Management and Environmental Protection
September 2009

Long-Term Rulemaking

- Risk-inform the waste classification framework
  - Updated assumptions
  - Latest International Committee on Radiation Protection methodology
  - Identify any changes to legislation needed
  - Technical analysis for public comment

Re-examine framework

Long-Term Rulemaking

- Explicitly address waste classification of depleted uranium
- Could result in different concentration limits for some radionuclides
- May result in different classification approach

International

- Different classification scheme
  - *Exempt waste (EW)*
  - *Very short lived waste (VSLW)*
  - *Very low level waste (VLLW)*
  - *Low level waste (LLW)*
  - *Intermediate level waste (ILW)*
  - *High level waste (HLW)*
- Role for site-specific analysis
- Storing depleted uranium for potential future use

Opportunities for Public Input

- Workshops
- Public meetings
- Public commentary
- Extensive outreach effort

Discussion