

Mr. Ronald A. Milner, Director  
for Program Management and Integration  
Office of Civilian Radioactive Waste Management  
U.S. Department of Energy, RW 30  
1000 Independence Avenue, SW  
Washington, DC 20585

July 12, 1995

0410

SUBJECT: MINUTES OF THE JANUARY 17, 1995, MANAGEMENT MEETING ON THE ISOLATION  
DEMONSTRATION STRATEGY

Dear Mr. Milner:

Enclosed are the minutes of the January 17, 1995, management meeting between the staff of the Nuclear Regulatory Commission and representatives of the U.S. Department of Energy (DOE). Representatives of the State of NV; Nye County, NV; the Center for Nuclear Waste Regulatory Analyses; and DOE contractors also participated in the meeting. The meeting, held by video-teleconference at DOE Headquarters in Washington, DC, and DOE's Yucca Mountain Site Characterization Office in Las Vegas, Nevada (NV), was requested by NRC staff to gain further understanding of the Isolation Demonstration Strategy (IDS) component of DOE's program approach.

During this meeting, DOE representatives responded to several concerns raised by NRC staff. DOE discussed the changes in the strategy presented in the Site Characterization Plan (SCP) and how these changes, when coupled with the demands of the program approach, have led to developing the IDS. The DOE explained the factors that determined prioritization of tests under the program approach and assured NRC staff that the program approach did not fundamentally change the SCP approach. NRC staff stated that it still expects to see a complete discussion of the tests DOE plans to do, which previously scheduled tests will not be done, and reasons for the differences.

If you have any questions regarding this letter, or the meeting minutes, please contact Pauline Brooks or Mark Delligatti of my staff. Ms. Brooks can be reached at 415-6604 and Mr. Delligatti can be reached at (301) 415-6620.

Sincerely,  
Original Signed By John Thoma  
for Joseph Holonich, Chief  
High-Level Waste and Uranium Recovery  
Projects Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated

cc: See attached list  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

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Sincerely,

*John O. Thoma for*

Joseph Holonich, Chief  
High-Level Waste and Uranium Recovery  
Projects Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated

cc: See attached list

**LIST FOR LETTER TO R. MILNER DATED July 12, 1995**

cc: R. Loux, State of Nevada  
J. Meder, Nevada Legislative Counsel Bureau  
W. Barnes, YMPO  
C. Einberg, DOE/Washington, DC  
M. Murphy, Nye County, NV  
M. Baughman, Lincoln County, NV  
D. Bechtel, Clark County, NV  
D. Weigel, GAO  
P. Niedzielski-Eichner, Nye County, NV  
B. Mettam, Inyo County, CA  
V. Poe, Mineral County, NV  
W. Cameron, White Pine County, NV  
R. Williams, Lander County, NV  
L. Fiorenzi, Eureka County, NV  
J. Hoffman, Esmeralda County, NV  
C. Schank, Churchill County, NV  
L. Bradshaw, Nye County, NV  
W. Barnard, NWTRB  
R. Holden, NCAI  
A. Melendez, NIEC  
S. Brocoum, YMPO  
R. Arnold, Pahrump, NV  
M. Stellavato, Nye County, NV

## MINUTES

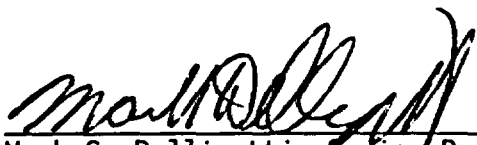
### JANUARY 17, 1995, MANAGEMENT MEETING ON THE ISOLATION DEMONSTRATION STRATEGY

Staff from the U.S. Nuclear Regulatory Commission and representatives of the U.S. Department of Energy (DOE) met via video-teleconference at DOE headquarters in Washington, DC and at DOE's Yucca Mountain Site Characterization Project Office in Las Vegas, Nevada (NV) to discuss the Isolation Demonstration Strategy (IDS) of DOE's program approach. This meeting was requested by the NRC staff so that it could gain a clearer understanding of the IDS, which is an important component of the DOE program approach. Representatives from the State of NV; Nye County, NV; the Center for Nuclear Waste Regulatory Analyses; and DOE contractors were also present. Attendance lists are included as Attachment 1 to these minutes.

In their presentation (Attachment 2), the representatives of DOE discussed DOE's understanding of how the strategy described in the Site Characterization Plan (SCP) has changed. Among the factors which the representatives of DOE believe have changed or matured since the SCP are: an increased recognition of potential for fast flow paths; the potential role of thermal load on performance; the advent of the multi-purpose canister as a component in the repository system; in-drift emplacement; and the increased role of the saturated zone under a dose-based standard. Changes to the SCP strategy, along with the exigencies of the program approach, led to the development of the IDS which has five key elements. These are: a favorable environment for waste package provided by unsaturated rock; robust waste packages to address near-field uncertainties; limited mobilization of radionuclides with waste packages; slow release of radionuclides through engineered barriers; and slow migration of radionuclides in the geosphere.

The NRC staff raised several concerns which echoed the comments made in the November 29, 1994, Bernero-Dreyfus letter providing the staff's comments on the DOE Five Year Plan. Of particular interest to the staff was the way in which testing had been prioritized as part of the implementation of the program approach. The DOE representatives indicated that prioritization was based on information needs, resources, availability of staff and equipment, and site access.

A DOE representative responded to the NRC staff's concerns about the place of performance allocation in the program approach (Attachment 3). In this presentation, it was explained that the basis for the technical elements of DOE's program approach was the performance allocation tables from the SCP. Furthermore, the DOE representative assured the staff the program approach did not fundamentally change the SCP approach to safety or compliance strategies. At the conclusion of this presentation, the NRC staff noted that it still expects to see a complete description and discussion of which tests DOE plans to do during site characterization, which previously scheduled tests will not be done, and the reasons for the differences.



Mark S. Delligatti, Senior Project Manager  
High-Level Waste and Uranium Recovery  
Projects Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards  
U.S. Nuclear Regulatory Commission



Priscilla Bunton  
Regulatory Integration Division  
Office of Civilian Radioactive  
Waste Management  
U.S. Department of Energy

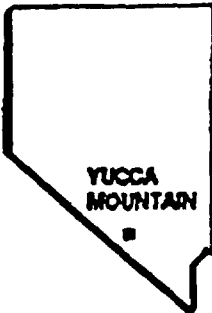
Enclosure

**DOE/NRC MANAGEMENT MEETING  
WASTE ISOLATION DEMONSTRATION STRATEGY  
JANUARY 17, 1995**

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE NUMBER</u>
Priscilla Bunton	DOE	202-586-8365
Mark Delligatti	NRC\HLUR	301-415-6620
Malcolm Knapp	NRC\NMSS	301-415-7437
Joseph Holonich	NRC\HLUR	301-415-7238
Patty Reyes	R. F. Weston	202-646-6668
Sue Gagner	NRC\PA	301-415-8200
Robert Johnson	NRC\HLUR	301-415-7282
Lester Berkowitz	M&O\TRW	202-488-2309
Dave Fenster	M&O\WCFS	703-204-8866
Chris Einberg	DOE\HQ	202-586-8869
Larry Rickertsen	M&O	703-204-8587
Bob Andrews	M&O	702-794-7380
John Russell	CNWRA	703-416-1129
John Thoma	NRC\HLUR	301-415-7293
Michael Bell	NRC\ENGB	301-415-7286
John Trapp	NRC\ENGB	301-415-8063
Ray Wallace	USGS\HQ	202-586-1244
Paul Krishna	M&O\TRW	202-488-2303
Richard Goffi	R. F. Weston\Jacobs	202-646-6743
Christopher Kouts	DOE/HQ	202-586-9761

U.S. DEPARTMENT OF ENERGY

**DOE  
WM**



**YUCCA MOUNTAIN  
SITE CHARACTERIZATION  
PROJECT**

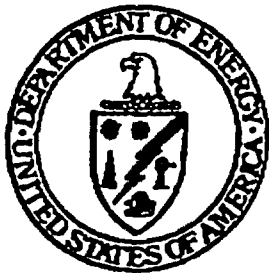
**DOE/NRC MANAGEMENT MEETING**

**UPDATE ON WASTE CONTAINMENT  
AND ISOLATION STRATEGY**

*PRESENTED BY*

**DR. STEPHAN BROCOUM**

**ASSISTANT MANAGER FOR SUITABILITY AND LICENSING**



**JANUARY 17, 1995**

# **Outline of Presentation**

- **Role of waste containment and isolation strategy in the Program Approach**
- **Implementation of the strategy**

# **Role of Waste Containment and Isolation Strategy in the Program Approach**



# **Role of Waste Containment and Isolation Strategy in Overall Program**

- **Overall licensing strategy is broader than waste containment and isolation**
- **Testing must address complete suite of data needs:**
  - **Waste containment and isolation**
  - **Detection of unsuitable site features or conditions**
  - **Compliance with preclosure NRC criteria**
  - **Testing to support design development**
  - **Testing to support other tests**
  - **Scientific confidence**

# **Top-Level Strategy 1988 Site Characterization Plan**

(Section 8.0, pgs. 4-9)

- **The strategy places primary reliance on low flux conditions, slow water movement, and long radionuclide transport times in the unsaturated zone**
- **Low-probability, potentially disruptive processes and events that could have significant impacts on performance of the repository will be identified and characterized**
- **Preclosure repository designs will incorporate appropriate seismic design criteria**

STATECG.BFR/1-28,29-88

# Schematic of Top Level Strategy

(SCP Section 8.0, pgs. 4-6)

POSTCLOSURE		PRECLOSURE	
<b>E N G I N E E R S</b>	<b><u>COMPONENT</u></b>	<b><u>COMPONENT</u></b>	<b><u>OBJECTIVES</u></b>
	UNSATURATED ROCK/AIR GAP	SURFACE AND UNDERGROUND FACILITY CONSTRUCTION	PROVIDES BENEFICIAL OR NO IMPACT ON POSTCLOSURE SYSTEM PERFORMANCE
	CONTAINER	SURFACE AND UNDERGROUND FACILITY OPERATION	SAFE OPERATION UNDER NORMAL AND ACCIDENT CONDITIONS
	WASTE FORM		
<b>N A T U R A L S</b>	<b><u>OBJECTIVES</u></b>		
	UNSATURATED ROCK UNITS BELOW THE REPOSITORY		
	SATURATED ROCK BELOW THE UNSATURATED ROCK		

STATECG.BFR/1-28,29-88

# **Details of Top-Level Strategy Have Matured Since Site Characterization Plan**

- **Increased recognition of potential for fast flow paths**
- **Potential role of thermal load on performance**
- **Multi-purpose canister as component in repository system**
- **Large, robust waste packages**
- **In-drift emplacement and new backfill/airgap options**
- **Increased role of saturated zone under a dose-based standard**
- **Consideration of extended performance-confirmation testing period**
- **Consideration of extended retrievability period**

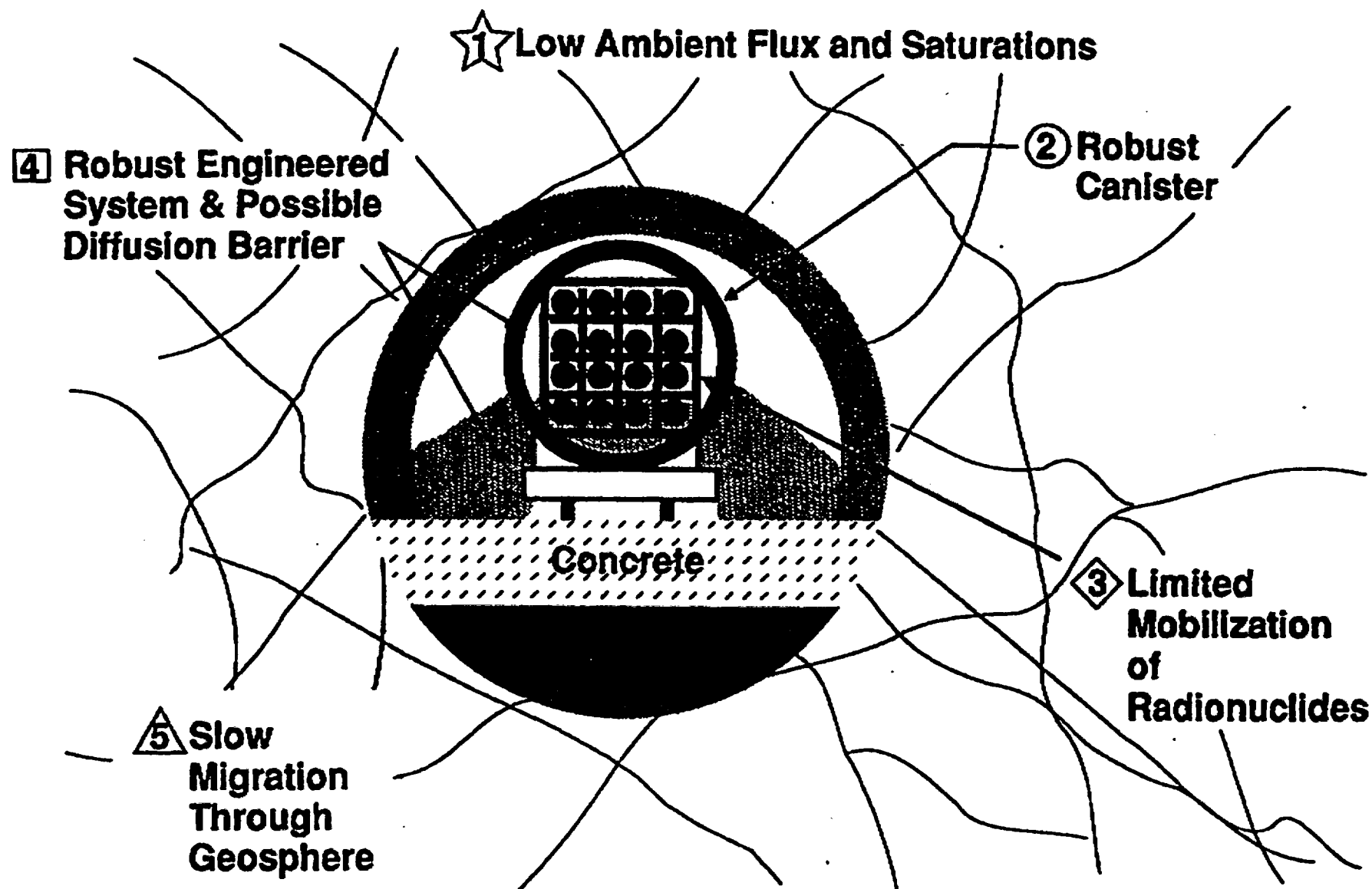
# **Implementation of Program Approach**

- **Testing prioritized to support milestones, to measure progress toward those milestones, and to manage resources**
- **Early emphasis on Technical Site Suitability Evaluation**
- **Increased emphasis on near-field environment and substantially complete containment for 2001 License Application**
- **Testing after 2001 will provide increased confidence about long-term performance and may support higher thermal load for 2008 update to License Application**

# **Key Elements of Waste Containment and Isolation Strategy**

- ★ 1 Favorable environment for waste package provided by unsaturated rock**
- ② Robust waste packages to address near-field uncertainties**
- ◇ 3 Limited mobilization of radionuclides within waste packages**
- 4 Slow release of radionuclides through engineered barriers**
- △ 5 Slow migration of radionuclides in the geosphere**

# Top-Level Strategy for Waste Containment and Isolation



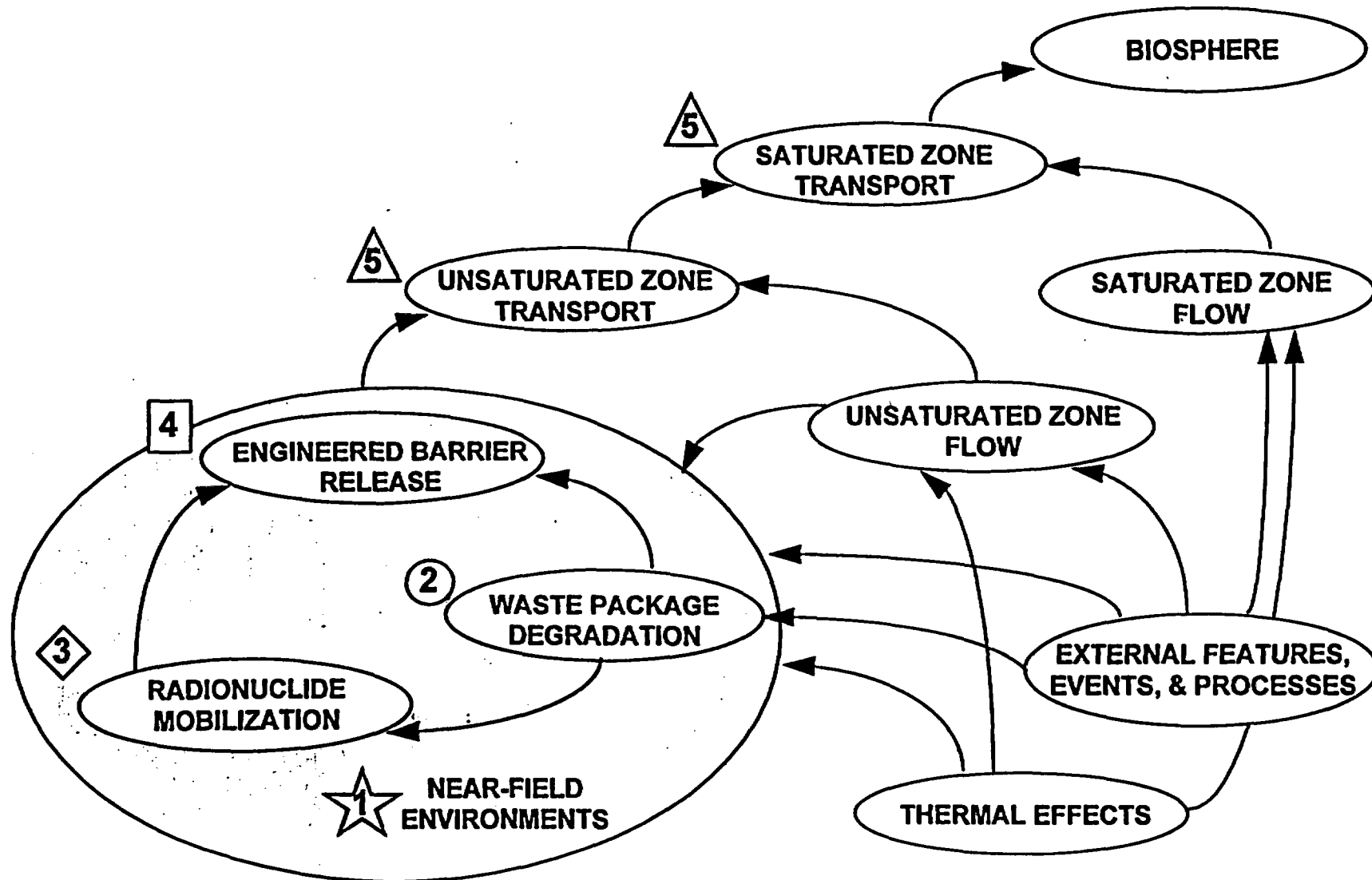
# **Implementing the Waste Containment and Isolation Strategy**

- **Establish key uncertainties in the elements of the strategy and the approaches to address them**
- **Review uncertainties in three areas:**
  - **Nominal, undisturbed conditions**
  - **Thermal effects**
  - **Effects of disruptive features, events, and processes**



# **Implementation of the Strategy**



# Barriers and Elements of the Waste Containment and Isolation Strategy



# **Relative Roles of Barriers and Strategy Elements**

- **Strategy utilizes multi-barrier approach to increase confidence in postclosure performance**
- **Near-field elements contribute as a system--unsaturated environment and engineered barriers equally important in this system**
- **Far-field barriers add confidence that waste isolation will be achieved**
- **Uncertainties in all these elements and barriers must be addressed**

# Overview: Waste Containment and Isolation Strategy

Element or Barrier	Key Uncertainties	Approaches to Address Uncertainties
 <b>Waste Package Environment</b>	<ul style="list-style-type: none"> <li>• Extent of perched water and seeps</li> <li>• Flow mechanisms within drifts</li> <li>• Travel times to repository</li> <li>• Focusing/channeling of flux</li> <li>• Water chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• Infiltration monitoring</li> <li>• Observations from deep boreholes</li> <li>• Observations in ESF                         <ul style="list-style-type: none"> <li>– Water chemistry</li> <li>– Isotopic analyses</li> <li>– Behavior of seeps</li> </ul> </li> <li>• Site and drift-scale hydrogeologic modeling</li> <li>• Analysis of fracture-matrix coupling</li> </ul>
 <b>Waste Package Performance</b>	<ul style="list-style-type: none"> <li>• Pitting corrosion                         <ul style="list-style-type: none"> <li>– Corrosion-resistant inner barrier</li> <li>– Zircaloy cladding</li> </ul> </li> <li>• Extent of microbiologically-induced corrosion</li> </ul>	<ul style="list-style-type: none"> <li>• Modeling &amp; testing of pit corrosion processes</li> <li>• Analogs for material durability</li> <li>• Test materials for resistance to microbial-induced corrosion</li> </ul>


# Overview: Waste Containment and Isolation Strategy

(Continued)

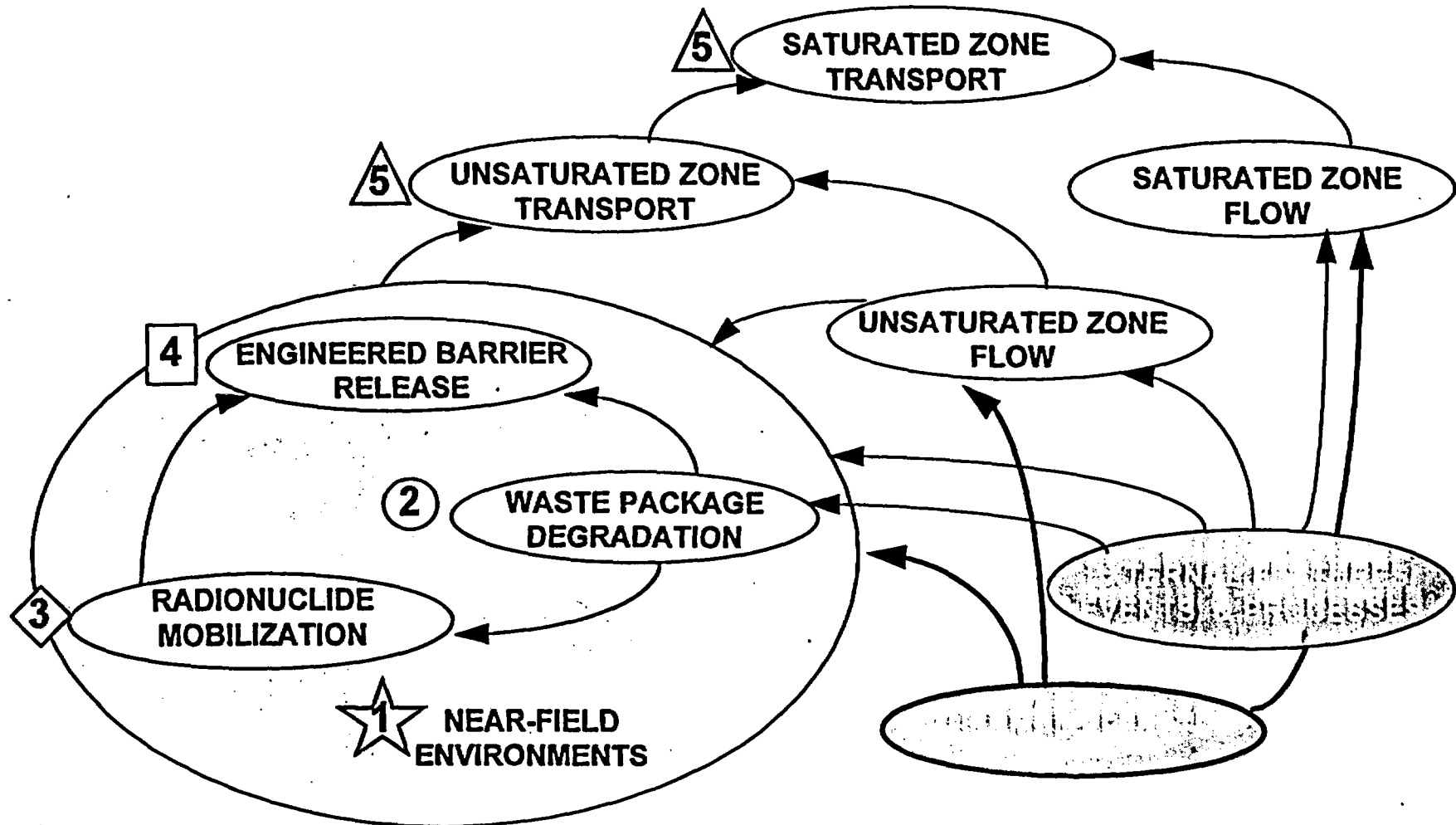
Element or Barrier	Key Uncertainties	Approaches to Address Uncertainties
<b>3</b> Radionuclide Mobilization	<ul style="list-style-type: none"> <li>• Oxidation state of spent fuel</li> <li>• Surface area of waste matrix exposed</li> <li>• Dissolution in presence of limited water</li> <li>• Colloid existence/stability</li> <li>• Bounding Np/Tc solubilities</li> <li>• Probability of criticality</li> </ul>	<ul style="list-style-type: none"> <li>• Conservative assumptions for cladding performance</li> <li>• Lab testing of waste form dissolution</li> <li>• Colloid investigations</li> <li>• Np and Te solubility experiments</li> <li>• Probabilistic analyses of criticality potential</li> </ul>
<b>4</b> Release through EBS	<ul style="list-style-type: none"> <li>• Fraction of waste package surface degraded</li> <li>• Potential for liquid film to support diffusive release</li> <li>• Diffusion rates in backfill material</li> <li>• Advective flow in engineered barriers</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor seeps in ESF</li> <li>• Lab measurements of diffusion rates</li> <li>• Drift-scale thermohydrologic sensitivity analyses</li> </ul>

# Overview: Waste Containment and Isolation Strategy

(Continued)

Element or Barrier	Key Uncertainties	Approaches to Address Uncertainties
 Radionuclide Migration in Geosphere	<ul style="list-style-type: none"> <li>• Magnitude of infiltration flux</li> <li>• Fracture-matrix coupling</li> <li>• Dispersion due to heterogeneity</li> <li>• Nature/role of steep gradient</li> <li>• Dilution in saturated zone</li> </ul>	<ul style="list-style-type: none"> <li>• C-well tracer tests</li> <li>• Investigate steep gradient</li> <li>• Bounding analysis for mixing depths</li> <li>• Sensitivity analysis for UZ/SZ flow and transport models</li> <li>• Regional-scale aquifer testing</li> <li>• Ages of seeps from ESF and boreholes</li> </ul>

# External Effects On Barriers and Elements



## External Effects On Elements/Barriers

Effects on Strategy Elements/Barrier	Key Uncertainties	Approaches to Address Uncertainties
Thermal Effects	<ul style="list-style-type: none"> <li>• Effect on rock mass stability</li> <li>• Effect on near-field humidity</li> <li>• Effect on corrosion rates</li> <li>• Effect on radionuclide mobilization rates</li> <li>• Effect on release from EBS</li> <li>• Effect on moisture distribution in unsaturated rock</li> <li>• Effect on minerals along flow paths</li> </ul>	<ul style="list-style-type: none"> <li>• Short-term heater tests in ESF</li> <li>• Long-duration coupled testing in ESF</li> <li>• Lab tests of corrosion rates for range of temperature/humidity</li> <li>• Lab tests of waste form dissolution and solubility for range of conditions</li> <li>• Rock properties testing</li> </ul>
Future Climate Changes	<ul style="list-style-type: none"> <li>• Potential increases in infiltration</li> <li>• Potential changes in UZ moisture content/flux</li> <li>• Potential increases in recharge                             <ul style="list-style-type: none"> <li>– Changes to water table elevation</li> <li>– Changes to ground-water velocities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Model future climates</li> <li>• Determine relationship between climate/hydrologic conditions</li> <li>• Estimate effects on infiltration rates</li> <li>• Estimate effects on saturation profiles</li> <li>• Evaluate saturated zone response</li> </ul>



# External Effects On Elements/Barriers

(Continued)

Effects on Strategy Elements/Barrier	Key Uncertainties	Approaches to Address Uncertainties
Tectonics	<ul style="list-style-type: none"> <li>• Effect on EBS</li> <li>• Impact on fault permeabilities</li> <li>• Potential for water table rise</li> </ul>	<ul style="list-style-type: none"> <li>• Constrain Quaternary fault displacement histories</li> <li>• Characterize seismic sources</li> <li>• Evaluate alternate tectonic models</li> <li>• Evaluate ground motion attenuation with depth</li> <li>• Model water table response to earthquakes</li> </ul>
Volcanism	<ul style="list-style-type: none"> <li>• Direct effects on repository/waste package</li> <li>• Effects on water table</li> </ul>	<ul style="list-style-type: none"> <li>• Drill magnetic anomalies in Crater Flat</li> <li>• Study basaltic volcanism patterns</li> <li>• Establish probability of basaltic volcanism</li> <li>• Bound secondary volcanic effects</li> <li>• Evaluate consequences of volcanism</li> </ul>

# External Effects On Elements/Barriers

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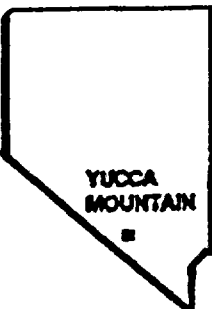
Effects on Strategy Elements/Barrier	Key Uncertainties	Approaches to Address Uncertainties
Human Interference	<ul style="list-style-type: none"><li>• Direct intrusion by exploratory drilling</li><li>• Introduction of fluids</li></ul>	<ul style="list-style-type: none"><li>• Evaluate resource potential</li><li>• Establish probability of exploratory drilling</li><li>• Model consequences</li></ul>

# **Scientific Confidence vs. Significance of Uncertainties**

- **Characterize features and conditions to address uncertainties**
  - Rigorous review of assumptions
  - Testing of alternative conceptual models
  - Develop confidence in underlying process models
- **Evaluate significance of uncertainties with respect to waste containment or isolation**
  - Through iterative performance assessments
  - Realistic representation of effects in assessments

U.S. DEPARTMENT OF ENERGY

YUCCA  
MOUNTAIN



**YUCCA MOUNTAIN**

**SITE CHARACTERIZATION**

**PROJECT**

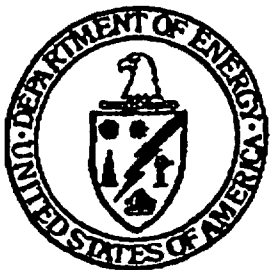
**DOE/NRC MANAGEMENT MEETING**

# **PERFORMANCE ALLOCATION**

*PRESENTED BY*

**DR. MICHAEL D. VOEGELE**

**DEPUTY TECHNICAL PROGRAMS**



**JANUARY 17, 1995**

# **“DOE Should Specify as Early as Possible the Barriers to be Relied on and the Level of Performance Sought from each Barrier”**

**September, 1985 NRC White Paper**

- **Design goals would be the minimum performance goals needed to ensure compliance with regulatory provisions**
- **Expected performance goals based on optimistic but realistic expectations of barrier performance**
- **Performance allocation would clearly state that any values within the range would produce acceptable repository performance**
- **Designate selected barriers to be held in reserve**
- **Provisions for redundancy would ensure that regulatory requirements will be met and provide a basis for revising the performance allocation through periodic iterations**

# **Performance Allocation**

**Performance allocation should be developed as early as possible in order to guide development of plans for site characterization. It should specify:**

- 1. The particular barrier which will be relied upon to provide waste isolation**
- 2. The level of performance sought from each barrier**
- 3. The level of confidence with which DOE will demonstrate that this level of performance is achieved**

**The performance allocation should be revised periodically to reflect SC test results**

# Performance Allocation - SCP

- DOE developed and applied a performance allocation methodology that met intent of agreements
- The SCP annotated outline was based on derivation of test programs through an issue resolution strategy
- DOE has addressed NRC SCA concerns related to the SCP
- DOE has reported program changes in the SCP Progress Reports and worked with the NRC to improve this vehicle

# **SCP Issue Resolution Strategies**

**The issue resolution process was intended to be iterative**

- **On the basis of the engineered system designs and the site characteristics and conditions, performance assessment calculations will be made**
- **Information acquired during site characterization may cause revision to earlier plans and strategies**
- **Changes to issue resolution strategies and plans will be reported in progress reports**

**By acquiring data to support resolution of the performance and design issues the DOE will systematically establish the information to support demonstrations of compliance with requirements**



# **SCP Issue Resolution Strategies**

**The steps in this process are to conduct the investigations dictated by the testing strategies in the SCP, to analyze the results of these investigations, and to check that the information obtained satisfies the information needs in these strategies**

- A full performance assessment cannot be conducted after each study to determine if the information obtained is sufficient to resolve issues**
- It is expected that some of the conceptual models for the site will be modified as a result of the site characterization, and that the strategies may need to change**
- It may be discovered that site characteristics are actually much different than originally thought; new strategies could be developed, consistent with the new information**

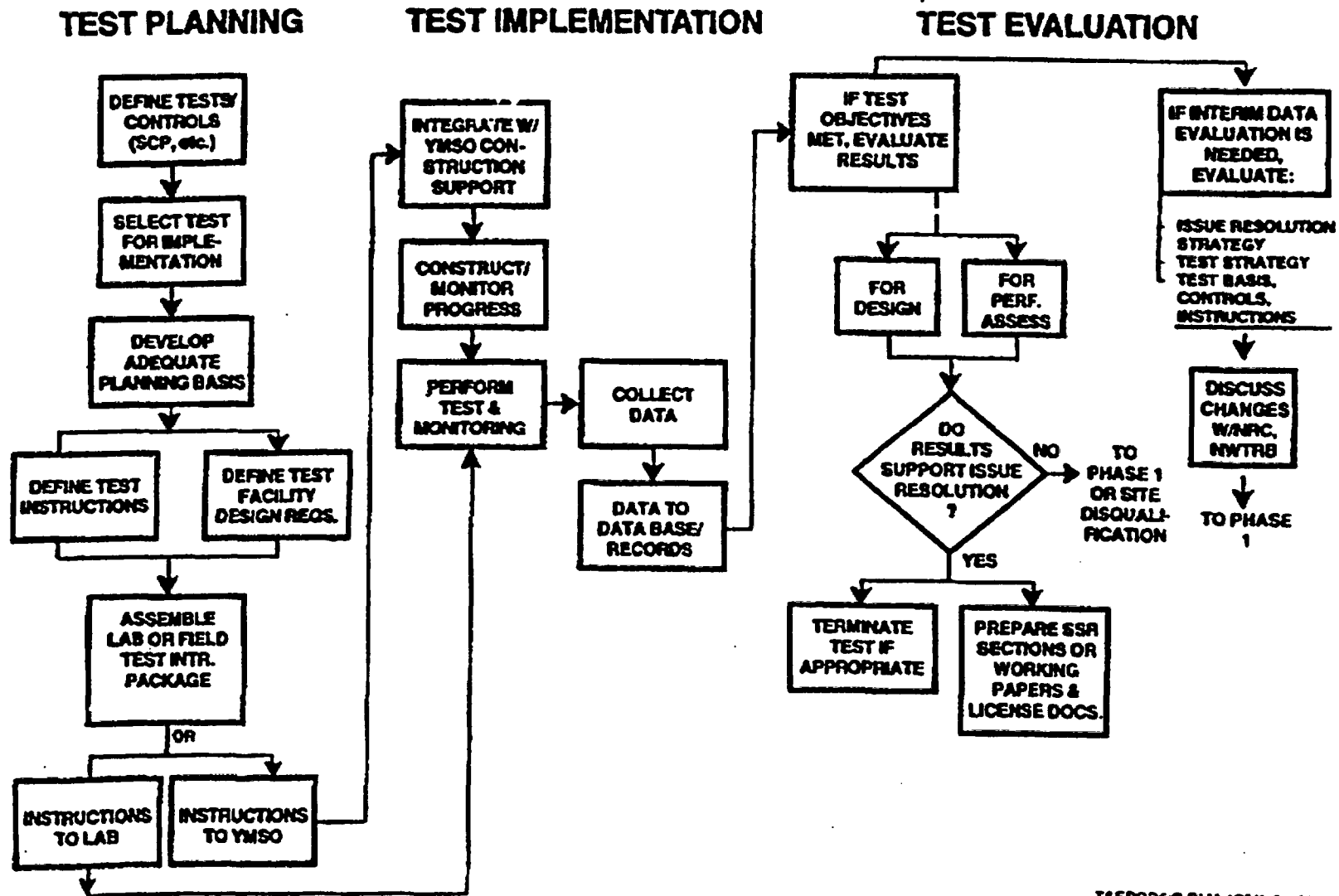
# Schematic of Top Level Strategy

(SCP Section 8.0, pgs. 4-6)

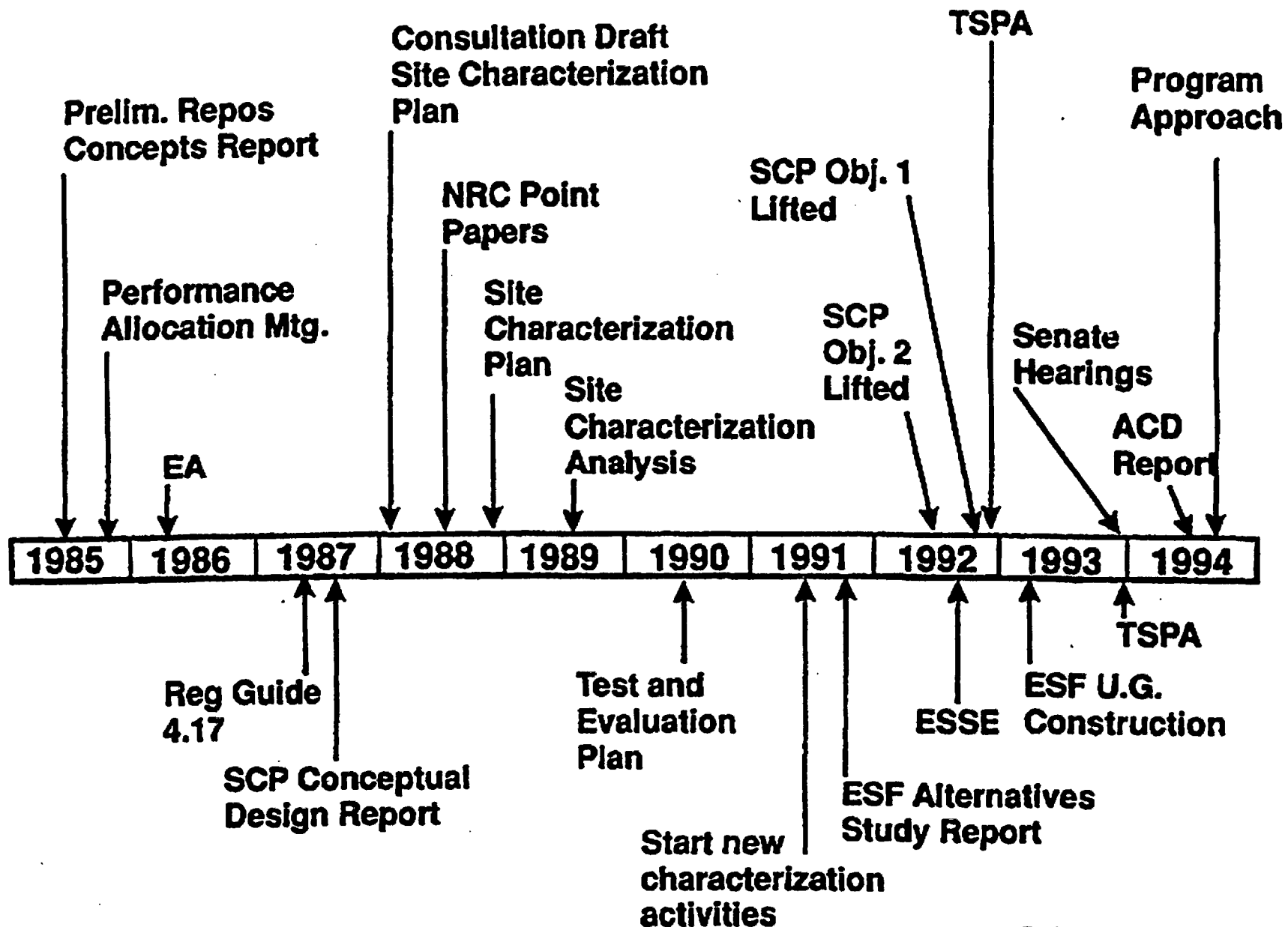
POSTCLOSURE		PRECLOSURE	
ENGINEERED	<u>COMPONENT</u>	<u>OBJECTIVES</u>	
	UNSATURATED ROCK/AIR GAP	LIMIT THE WATER AVAILABLE TO CONTACT AND CORRODE CONTAINERS AND DISSOLVE WASTE	
	CONTAINER	SERVE AS PRINCIPAL CONTAINMENT BARRIER DURING EARLY RADIATION AND HEAT PEAK	
	WASTE FORM	LIMIT DISSOLUTION AND LEACHING OF RADIONUCLIDES DUE TO LIMITED WATER CONTACT	
NATURAL	<u>COMPONENT</u>	<u>OBJECTIVES</u>	
	UNSATURATED ROCK UNITS BELOW THE REPOSITORY	ACT AS BARRIER TO RADIONUCLIDE TRANSPORT BY PROVIDING LONG RADIONUCLIDE TRAVEL TIMES	
	SATURATED ROCK BELOW THE UNSATURATED ROCK	EXTEND THE TOTAL TRAVEL-TIME OF RADIONUCLIDES	

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# Plans to Revisit the Performance Allocation Tables were Predicated on Evaluation of Progress



# Progress in Site Characterization

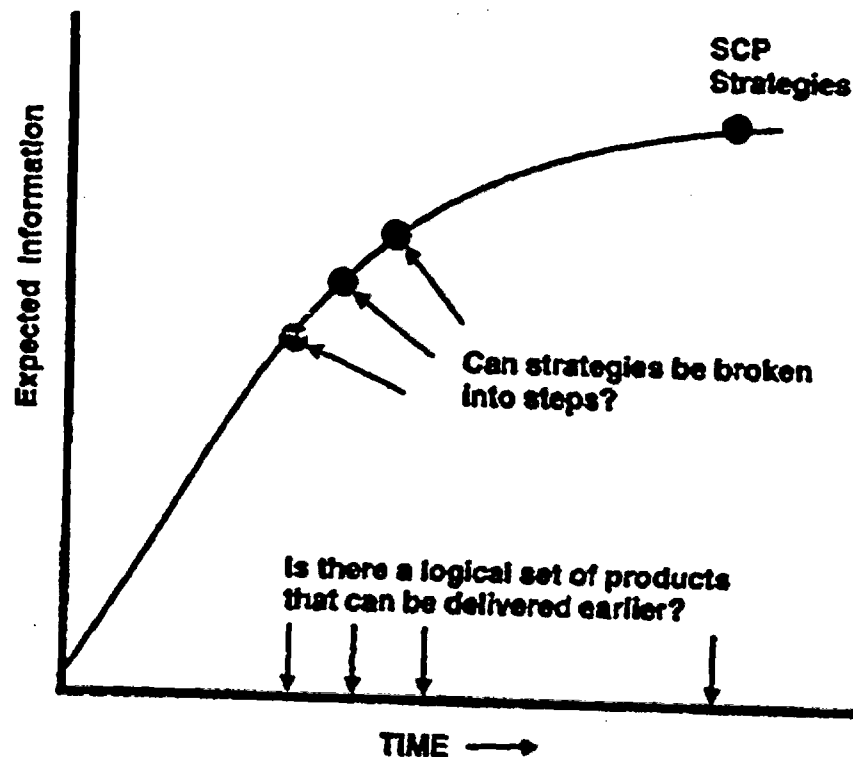


# Development of Program Approach

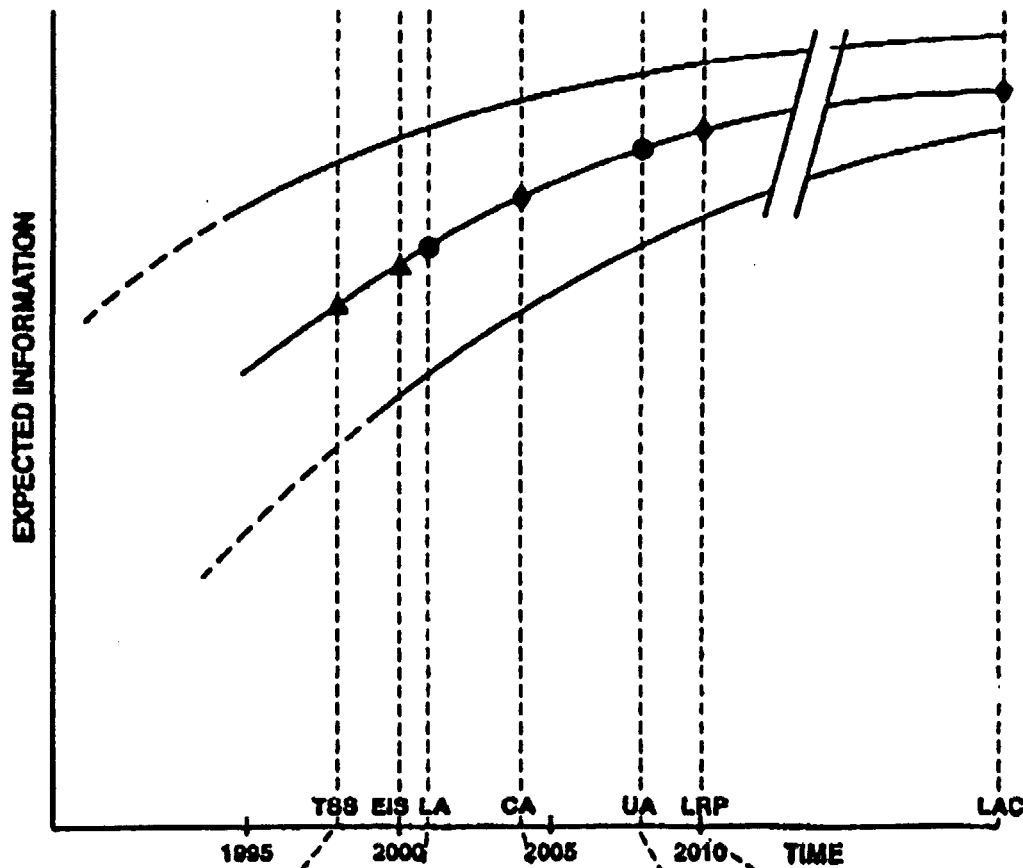
- **Basis for the technical elements of the Program Approach was the performance allocation tables of the SCP**
- **The Program Approach did not fundamentally change the SCP approach to safety/compliance strategies**
  - **It did change the DOE plans for getting information in front of the NRC**
- **OMB Five Year Plan**
  - **Plans for test sequences and cost were developed to address data needs for the technical elements**
  - **Program was sequenced to address the four part Program Approach strategy**

# Phasing the Site Characterization Plan Strategies

1. Develop logical breakdown considering compliance arguments
2. Identify products that can be defended for suitability, EIS, and licensing
3. Ensure sufficient information at each step to demonstrate that health and safety can be protected appropriately



# Program Approach to Increasing Confidence



	TSS/DEIS - 1998	LACA - 2001	CA - 2004	ULARP - 2008	LRAP - 2010	Perf. Confm. *
<b>NAT. BARRIER</b>						
GWIT	Bounded	Sub. Finished		Final		
Scenarios	Bounded			Sub. Finished		Final
Subsystem Analyses	Bounded	Sub. Finished		Final		Updated
TEPA Source Term	Bounded Model	Bounded Model		Complete		Confirmed
Post CI TEPA	Bounded	Bounded		Sub. Finished		Final
<b>REPOSITORY DESIGN</b>	ACD	Title I	Title II	Title III	Title III	Title III
Backfill/Seals		Title I (Plan)		Demonstrated		Decision
Materials Inter'n	Bounded	Bounded	Mat's Sat.			
Reliability		Title I	Proof of Princ.	Demonstrated		
Ar. Prot. Con.	Bounded	Bounded		APD Decision		Final APD
Emplacement Mode		Title I		Decision		
Final PA	Bounded	Sub. Finished		Final		
Log Storage	ACD	Title I	Title II	Title III		
Ref. Egr.	CD		Title III	Title III	Title III	
<b>WASTE PKG. DEMON</b>	ACD/Title I	Title II (Phys)	Full Scale	Phys Tested	Title III	Oper'n Conf.
Sub. Crp. Con.		Complete		Updated		
Critically Con.		Complete		Updated		
Constr. Rel.	Bounded	Conserv. Cases		Complete		
Materials	Concepts	Determined		Test Complete		Model Confirmed
Waste Form		Spec. Term Bnd'd		Final Spec. Term		
ES&S Thermal	Concepts	Bounded				

MDVGRAPH.CDR.129-04-04

MDVGRAPH.CDR.129/12-28-04

# Synopsis of Program Approach for MGDS Performance Allocation

	TSS/DEIS - 1998	LA/CA - 2001	CA - 2004	ULA/R&P - 2008	L/R&P - 2010	Perf. Confirm. *
NAT.BAREVAL						
GWTT	Bounded	Sub. Finished		Final		
Scenarios	Bounded	Revised		Sub. Finished		Final
Subsystem Analyses	Bound			Final		Updated
TSPA Source Term	Bound			Complete		Confirmed
Post Cl. TSPA	Bo			Finished		Final
REPOSITORY DESIGN	At				Title III	Title III
Backfill/Seals						Decision
Materials Inter'n	Bounded					
Retrievability						
Ar. Pwr. Den.	Bounded					Final APO
Emplace. Mode						
Precl. P.A.	Bounded					
Lag Storage	ACD					
Rail Spur	CR					
WASTE PKG. DESIGN	ACT				Title III	
Sub Cmp Con					Title III	Oper'ns Conf.
Criticality Con.						
Contr. Rel.	Bo			Complete		
Materials	Conc.			Test Complete		Model Confirmed
Waste Form		once term End'd		Final Ssce Term		
EBS Thermal	Concepts	Bounded				

Elements  
Reflect

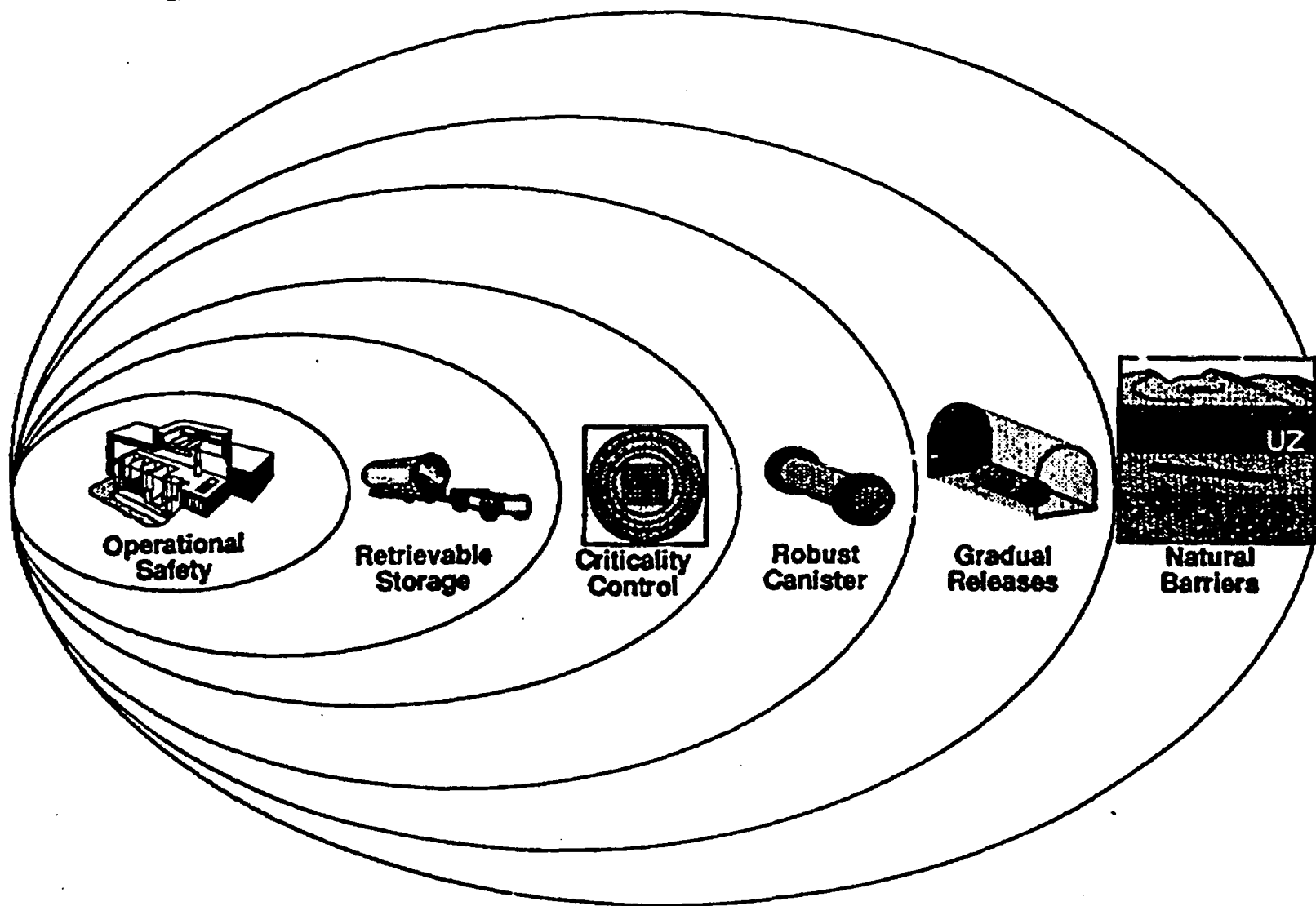
Part 60 Performance  
Objective and Additional  
Design Requirements

Performance Allocation  
Tables

Program Approach  
Considerations



# Program Approach relies on multiple barriers



**Defense in Depth/Ongoing Monitoring**  
(Increasing Long-Term Confidence)

# Details of Top-Level Strategies Have Matured Since Site Characterization Plan

## Components

Increased recognition of potential for fast flow paths

Potential role of thermal load on performance

Multipurpose canister component in repository

Large robust waste packages

In-drift emplacement and new backfill/air gap options

Increased importance of saturated zone under a dose based standard

Consideration of extended performance confirmation period

Consideration of extended retrieval period

## Program Requirements

High priority on Ghost Dance Fault access; perched water dating

System studies, test phasing, ranges of design

Indrift emplacement; potential for high thermal loads

Increased reliance on EBS performance

Backfill considerations; design alternatives

Increased emphasis on mixing in saturated zone

Increasing reliance on long term information

More importance in phased approach

3

[illegible]

# Conclusions

- **DOE has worked with NRC to refine:**
  - **Requirements documents and flow down**
  - **Issue resolution process and the LA-AO**
- **SCP approaches are evolving due to focus of Program Approach**
  - **Continued reliance on multiple barriers**
  - **Increased reliance on EBS performance**
- **Changes to components of the SCP compliance strategies respond to the Program Approach and new site information**

# Conclusions

- **Intent of SCP was to revise allocations as issues were resolved**
- **DOE will continue to allocate performance to assess regulatory compliance priorities**
  - **Consistent with other program priorities**
- **DOE is evaluating the most appropriate vehicle to report revisions to strategies and the allocations**
  - **(eg: Tables; Requirements Documents, LA-AO; Progress Reports; Regulatory Compliance Plan)**