

JAN 31 1991

SW/ACL WKSHP/TRANS

TO: TITLE I INTERESTED PARTIES

SUBJECT: ALTERNATE CONCENTRATION LIMIT WORKSHOP MEETING SUMMARY

I would like to take this opportunity to thank you for your participation in the Division of Low-Level Waste Management and Decommissioning workshop on Alternate Concentration Limits (ACLs). As you are aware, the purpose of this workshop was to discuss approaches for establishing ACLs at inactive uranium mill tailings sites regulated under Title I of the Uranium Mill Tailings Control Act, as well as to provide and solicit information on the methodology to be used to review ACL applications for Title I sites. Because of your active participation the workshop was a success and it more than achieved its purpose.

As stated at the close of the workshop, the NRC committed to provide a meeting summary with copies of all handouts. In fulfillment of this commitment, under cover of this letter, a copy of the meeting summary for the December 12, 1990 Alternate Concentration Limit Workshop is provided.

Sincerely,

ORIGINAL SIGNED BY

John J. Surmeier, Chief
Uranium Recovery Branch
Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: As Stated

cc: W. Rowe, Mitre
M. Wang, Mitre
R. Pikul, Mitre

Distribution: Central File# NMSS r/f LLUR r/f DGillen
JSurmeier JAustin PLohaus JGreeves RBangart
MFliegel SWastler WBeach, RIV RHall, RIV(URFO)
GKonwinski, RIV(URFO)

PDR YES X ACNW YES X *js* *See previous concurrence

SUBJECT ABSTRACT: ALTERNATE CONCENTRATION LIMIT WORKSHOP MEETING MINUTES

OFC :LLUR * :LLUR * :LLUR *js* :LLUR :LLWD :NMSS :NMSS :

NAME:SWastler :MFliegel :JSurmeier: : : :

DATE: 1/30/91 : 1/30/91 : 1/31/91 : / / : / / : / / : / / :

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Sincerely,

Paul H. Lohaus, Chief
Low-Level Waste Management Branch
Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: As Stated

cc: W. Rowe, Mitre
M. Wang, Mitre
R. Pikul, Mitre

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SUBJECT ABSTRACT: ALTERNATE CONCENTRATION LIMIT WORKSHOP MEETING MINUTES

OFC :LLUR	:LLUR	:LLWM	:LLUR	:LLWD	:NMSS	:NMSS	:
NAME: SWastler	:MFliegel	:PLOhaus	:JSurmeier:	:	:	:	:
DATE: 1/30/91	: 1/30/91	: / /	: / /	: / /	: / /	: / /	:



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 8 1 1991

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Sincerely,

A handwritten signature in cursive script that reads "John J. Surmeier".

John J. Surmeier, Chief
Uranium Recovery Branch
Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: As Stated

cc: W. Rowe, Mitre
M. Wang, Mitre
R. Tikul, Mitre

ENCLOSURE 1

MEETING SUMMARY

WORKSHOP ON ALTERNATE CONCENTRATION LIMITS (ACLs)
INACTIVE URANIUM MILL TAILINGS SITES
(TITLE I)

WORKSHOP SUMMARY

INTRODUCTION

The Nuclear Regulatory Commission (NRC) sponsored a workshop on Alternate Concentration Limits (ACLs) for Title I uranium mill tailings sites on December 12, 1990. The workshop was held in Maryland at the Bethesda Holiday Inn. Representatives from the NRC, Department of Energy (DOE), Environmental Protection Agency (EPA), state and tribal government agencies, DOE contractors and industry participated in the workshop.

The purpose of the workshop was to outline and discuss a technical approach for establishing ACLs at Title I sites. In addition to this goal, the workshop was also designed to provide participants an opportunity to ask NRC questions or register any concerns related to the proposed ACL methodology.

SUMMARY OF TOPICS COVERED IN PRESENTATIONS

The workshop consisted of five presentations and two panel discussions (agendas attached). The first presentation was given by William Rowe of the MITRE Corporation and covered the development of Ground-water Protection Standards under the Resource Conservation and Recovery Act (RCRA). The presentation traced the incorporation of these Standards, including the ACL provision, into EPA and NRC regulations under the Uranium Mill Tailings Radiation Control Act (UMTRCA). The second presentation was given by Gary Konwinski of the NRC and focused on the status of ACLs at Title II uranium mill tailings sites. This presentation highlighted specific NRC regulations in 10 CFR 40, Appendix A, related to the establishment of Ground-water Protection Standards at NRC-licensed sites. Concepts and terms integral to the establishment of ACLs were defined and discussed. Concepts and terms covered included "as low as reasonably achievable" (ALARA), Point of Compliance (POC) and Point of Exposure (POE). The third presentation was given by Ming Wang of MITRE and highlighted regulatory similarities and differences between Title I and Title II sites. This effort involved a comparison of the standards in 10 CFR 192, Subparts A-C with standards in 10 CFR 40, Appendix A. Shared concepts between Title I and II sites, including ACLs, were discussed in this presentation as well as concepts unique to Title I sites such as disposal, cleanup, passive restoration and supplementary standards. The fourth talk was given by Ming Wang of MITRE and covered the proposed approach to ACLs at Title I sites. Particular attention was given to the conduct of a Hazards Assessment and Corrective Action Assessment at a Title I site, as both assessments are required components of an ACL application. The final presentation, given by William Rowe of MITRE, summarized the concepts and considerations presented in the earlier talks, and applied them in a short walk-thru exercise on establishing concentration limits at a hypothetical disposal site and a hypothetical cleanup site.

Copies of the vugraphs for the five presentations, along with a list of acronyms and definitions and a handout on EPA's Integrated Risk Information System, were provided by NRC to all participants at the workshop.

Each of the two panel discussions lasted between 30 and 45 minutes. The panels were designed to be informal in nature in order to provide workshop participants an opportunity to register questions and concerns regarding the proposed approach to ACLs at Title I sites with NRC. Panel participants are listed below:

NRC

Myron Fliegel, HQ
Ed Hawkins, URFO
Gary Konwinski, URFO
Paul Lohaus, HQ
Sandra Wastler, HQ

MITRE

William Rowe
Ming Wang

SUMMARY OF ISSUES RAISED DURING PANEL DISCUSSIONS AND RESPONSE

A wide range of questions and comments were presented to the panel members during the Title I workshop on ACLs. Workshop participants asked a number of questions which were administrative in nature or involved procedural considerations in applying for an ACL. Several workshop participants asked questions which were legal or regulatory in nature. In this regard, general issues were raised related to the content of the UMTRCA regulations themselves and concerning the potential impact of the new clean air legislation on the corrective action and reclamation programs at mill tailings sites. The majority of the questions addressed to the panel, however, were technical in nature and related to applying the ACL methodology at mill tailings sites. Specific issues raised during the panel discussions are summarized under three broad subject categories below.

ADMINISTRATIVE AND PROCEDURAL ISSUES

EPA's Role. One participant asked the panel for a clarification of EPA's role in the ACL approval process at Title I sites. In response NRC indicated that discussions on this issue were ongoing between EPA and NRC. NRC indicated, however, that EPA was considering a concurrence role in the establishment of an ACL in instances where an ACL would result in primary standards not being met at the facility boundary or 500 meters from the disposal area, whichever is closer to the point of compliance.

Timing of ACLs. Several participants asked questions related to the timing of ACL applications at Title I sites. As indicated in the final presentation, ACL applications should be submitted following the completion

of a site-specific Hazards Assessment and Corrective Action Assessment, but typically before the implementation of disposal or cleanup actions. However, the need for an ACL may arise after implementation of disposal or cleanup actions if performance assessments indicate that projected concentration limits are not being met.

Relationship of ACLs to other standards. A number of participants sought clarification on the relationship of ACLs to supplementary standards and passive restoration. As stated during the last presentation, NRC does not expect that ACLs will be necessary where passive restoration is invoked under cleanup or in instances where supplementary standards apply. Discussions with DOE participants during the workshop indicated that supplementary standards were being considered for many cleanups rather than ACLs.

LEGAL AND REGULATORY ISSUES

Passive restoration for Title II sites. A number of comments were received by the panel regarding the lack of a passive restoration provision in the Title II regulations. One participant asked whether passive restoration would be considered for Title II sites after the Title I regulations were finalized. NRC responded that this is an issue for EPA consideration in the general standards and that it was not aware of any decision to incorporate passive restoration into Title II standards.

Impact of Clean Air Act requirements. One participant questioned the panel about the potential impact of the new Clean Air Act requirements on site reclamation schedules, particularly for Title II sites. The commentors primary concern related to the impracticability of meeting the new air requirements in two years time. EPA responded to this issue by indicating that the Clean Air Act allows responsible parties two years to achieve compliance with new standards, and that during this period EPA would not negotiate time extensions for compliance. Any negotiations on the compliance period would not begin until after this two-year period. NRC responded to the commentor by indicating that they recognize the problems associated with meeting the Clean Air Act requirements and would actively seek to find a solution.

ALARA requirement. A strong concern was raised by one participant that the ALARA requirement in the regulations should be abandoned and that efforts be focused on assuring the protection of public health and the environment. NRC responded that ALARA is a regulatory requirement set by EPA and that NRC as well as other parties were required to address ALARA. NRC also stressed that the ALARA demonstration is not an unreasonable requirement.

TECHNICAL AND GUIDANCE ISSUES

Secondary drinking water standards. Questions were raised relating to monitoring for secondary drinking water constituents such as sulfate and

whether ground-water with elevated sulfate, for instance, could be used for agricultural purposes. NRC responded that it typically requires monitoring for these constituents and that it was aware of state concerns relating to secondary ground-water constituents. NRC also stated that it was not necessary to apply for ACLs for these constituents. NRC indicated that discussions on the costs and benefits of restoring contaminated ground-water to various beneficial uses (agricultural uses versus drinking water) should be well documented in ACL applications.

Health and environmental limits. Two participants highlighted their concern that some aquatic and/or plant health and environmental concentration limits were greater than corresponding limits for humans and indicated that NRC should take these considerations into account in Hazard Assessment reviews. Recognition of these differences, it was stated, would help assure that ACLs were established at sensible levels. NRC responded generally by indicating that ACLs are set at levels that are protective of human health and the environment and are derived from available toxicity data.

Risk assessment methodology. One participant was concerned with conceptual differences between NRC's and EPA's approach to performing risk assessments. The commentator stated that NRC's ACL methodology does not consider cumulative risks posed by ground-water while EPA's risk assessment methodology for ACLs is cumulative. NRC made specific note of this concern, however it should be noted that NRC guidance does not preclude the consideration of cumulative risks in Hazards Assessments.

Definition of POC and POE. Several questions were addressed to the panel relating to the definition and/or location of POCs and POEs at mill tailings sites. One participant asked to what extent land could be acquired at a site in establishing POEs. Another participant asked NRC to further define compliance locations within an aquifer, particularly in the vertical sense. A question was also asked regarding the exact procedures to follow in making measurements at the POC. NRC responded to the question on land acquisition by indicating that the POE will usually be located at the facility boundary and that it is generally not acceptable to purchase additional property to increase the distance between the POC and POE. NRC made specific note of the need for further guidance on defining compliance within an aquifer and on making measurements at the POC.

Background determination. Several participants raised concerns to the panel regarding approaches for determining background concentrations at mill tailings sites. One participant noted that NRC typically used the average concentration over time at a well to determine background levels while EPA often set forth other statistical approaches in its guidance. NRC responded they will accommodate some flexibility in the approach used for determining background, but that it does not advocate the use of involved statistical algorithms to arrive at background. The use of the 75th and 90th percentile concentrations for a well or set of wells was given as an example approach for determining background concentrations.

Analytical costs. One participant was concerned over the cost of laboratory analyses for hazardous constituents which is largely driven by requirements for low levels of detection. The commentor went on to suggest that NRC develop standard analytical procedures and guidelines that spell out quality assurance requirements for responsible parties. NRC made specific note of the need for further information in this area.

ACL case study. As a practical next step in providing guidance to the DOE, one participant suggested that NRC develop a full-blown case study for an existing mill tailings site covering the entire ACL process. The commentor suggested that such a case study could be developed from existing ACL applications received by NRC and that this would serve as an excellent guide for the DOE and its contractors in preparing ACL packages. The NRC responded that it had received two ACL applications for Title II sites and had reviewed one application in detail. NRC indicated that upon review of both applications it would consider to what extent they might be useful as examples for the DOE.

NEXT STEPS

NRC ended the afternoon session by indicating its intent to mail all participants a list of meeting attendees and a complete package of materials prepared for the workshop. This package would include a copy of the proposed Title I regulations not provided in the workshop handouts. The workshop formally adjourned at about 4:00 pm.

ENCLOSURE 2

ATTENDANCE LIST

ALTERNATE CONCENTRATION LIMIT WORKSHOP
DECEMBER 12, 1990
ATTENDEES

<u>Name</u>	<u>Affiliation & Mailing Address</u>
John S. Hamrick	Umetco Minerals Corporation P.O. Box 669 Blanding, UT 84511-3032
Kent Bostick Don Metzler Len Flowers Frank Titus Denise Bierley	Jacobs Engineering Group 5301 Central Ave., NE Suite 1700 Albuquerque, NM 87108
Ming Wang Robert Pikul William Rowe	Mitre Corporation 7525 Colshire Drive McLean, VA 22102-3481
Bill Ferdinand	Rio Algom Mining Corporation
Don Simpson	State of Colorado Radiation Control Division 4210 E 11 Avenue Denver, CO 80220
John L. Russell Kurt Feldmann	U.S. Environmental Protection Agency Washington, D.C. 20460
Joel Grimm Gary Konwinski Raymond E. Hall Edward Hawkins Cynthia D. Miller-Corbett	U.S. Nuclear Regulatory Commission Uranium Recovery Field Office P.O. Box 25325 Denver, CO 80225
Andy Backus	INTERA/Kennecott INTERA, Inc. 6850 Austin Center Blvd. - Ste. 300 Austin, TX 78731
Jake Gatrell Dave Mathes Tony Braisley	U.S. Department of Energy Office of Nuclear Energy Washington, D.C. 20545
Robert Poyser	Pathfinder Mines Corporation 7401 Wisconsin Avenue Bethesda, MD 20882
Stephanie Baren	Western Nuclear, Inc. 200 Union Blvd. Suite 300 Lakewood, CO 80228

ALTERNATE CONCENTRATION LIMIT WORKSHOP
DECEMBER 12, 1990
ATTENDEES (continued)

<u>Name</u>	<u>Affiliation & Mailing Address</u>
Peter LaGoy	DHM Corporation 2950 Buskirk Avenue Walnut Creek, CA 94596
Steve Pfaff	Petrotomics Company P.O. Box 8509 Shirley Basin, WY 82615
Bob Medlock	Union Pacific Resources 8774 Yates Drive, #100 Westminster, CO 80030
Banad Jagannath Mark Thaggard Dennis Sollenberger Sandra Wastler Myron Fliegel Paul Lohaus	U.S. Nuclear Regulatory Commission 11555 Rockville Pike Rockville, MD 20852
William Salisbury	American Nuclear Corporation P.O. Box 2713 Casper, WY 82602
Clinton Smythe Steve Hamp Paul T. Mann Mark L. Matthews	U.S. Department of Energy Uranium Mill Tailings Project Office Department of Energy Albuquerque Operations Office P.O. Box 5400 Albuquerque, New Mexico 87115
Mel Feather	SAIC/DOE HQ. 20030 Century Blvd., Suite 201 Germantown, MD 20874
Jack C. Moore Roger Jones	Umetco Minerals Corporation P.O. Box 151 Gas Hills Station Riverton, WY 82501
Stephen D. Etter	Texas Department of Health Bureau of Radiation Control 1100 West 49th Street Austin, TX 78756-3189
John Martelli	DOH - State of Washington Mail Stop LE-13 Olympia, WA

ALTERNATE CONCENTRATION LIMIT WORKSHOP
DECEMBER 12, 1990
ATTENDEES (continued)

<u>Name</u>	<u>Affiliation & Mailing Address</u>
Raissa Kirk	American Mining Congress 1920 N Street NW, Suite 300 Washington, DC 20036
David Scherer	Illinois Department of Nuclear Safety 1035 Outer Park Drive Springfield, IL 62704
Bob Nelson	Dawn Mining Co. Ford, WA
Tom Shepherd	Shepherd Miller Ft. Collins, CO
Diana Lucero	The Hopi Tribe P.O. Box 123 Kykotsmovi, AZ
Mark Logsdon	Adrian Brown Consultants Hopi Tribe 155 So. Madison #302 Denver, CO 80209
John C. Ferguson	American Nuclear Corporation 550 N. Poplar, Suite 6 P.O. Box 2713 Casper, WY 82602

ENCLOSURE 3

VIEWGRAPHS

Uranium Mill Tailings Sites

Workshop on Alternate Concentration Limits

December 12, 1990

Historical Background of ACLs

William D. Rowe

December 12, 1990

MITRE

Outline

- **Historical background of ACLS**

- **Status of ACLS at Title II Sites**

- **Differences between Title I and Title II Sites**

- **Proposed approach to ACLS at Title I Sites**

- **Substantive considerations in applying for an ACL at a Title I Site**

Historical Background: Resource Conservation and Recovery Act (RCRA)

- **Alternate Concentration Limits (ACLs) first developed pursuant to RCRA**
 - **Groundwater Protection Standards (GWPS)
July 26, 1982**
 - **Subpart F of 40 CFR 264
"Releases from Solid Waste Management Units"**

Historical Background: Resource Conservation and Recovery Act (RCRA) (Continued)

- GWPS of 40 CFR 264 consists of four parts
 - List of hazardous constituents
 - Concentration limits for hazardous constituents
 - Point(s) of compliance
 - Compliance period

ACL Definition

- Element of a *Groundwater Protection Standard* at a facility
- One of three possible *Concentration Limits* established for a Hazardous Constituent at a Compliance Point
- A limit that assures protection of Human Health and the Environment at Exposure Point

GWPS

↓

**HAZARDOUS CONSTITUENTS
CONCENTRATION LIMITS**

- Background
- Drinking Water Limits
- *Alternate Concentration Limits*

**POINT(S) OF COMPLIANCE
COMPLIANCE PERIOD**

Historical Background: Resource Conservation and Recovery Act (RCRA) (Continued)

- **Why needed under RCRA?**
 - **Essential to deal with minor projected seepage from waste management units**
 - **Mechanism needed to establish acceptable concentration limits at waste management units for those constituents without drinking water limits**

Historical Background: Resource Conservation and Recovery Act (RCRA) (Concluded)

- **Criteria specified for Concentration Limits include ACLs. A Regional Administrator is allowed to:**

"establish an alternate concentration limit for a hazardous constituent if he finds that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded"

[40 CFR 264.94(B)]

- **Implementation discussed in 1987 EPA guidance document**

Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA)

- UMTRCA directs EPA to promulgate *general standards* to protect human health and the environment from radiological and nonradiological hazards at uranium mill tailings sites
 - Consistent with RCRA groundwater protection provisions in 40 CFR 264
 - Title I sites: Subparts A-C of 40 CFR 192
January 5, 1983
 - Title II sites: Subparts D and E of 40 CFR 192
October 7, 1983

Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA) (Continued)

- Title I regulations did *not* set general standards for acceptable concentration limits of hazardous constituents in groundwater or surface water
- Title II regulations did incorporate GWPS, including ACL provisions, under RCRA

Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA) (Continued)

- Title II regulations allowed for establishment of ACLs provided two criteria met:
 - 1) After considering practical corrective actions, the proposed ACLs are as low as reasonably achievable (*ALARA*)
 - 2) Levels of hazardous constituents in groundwater will not pose a threat to human health or the environment as long as ACL limits are not exceeded beyond *Point(s) of Compliance (POC)*

Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA) (Continued)

- **Title I regulations challenged in Tenth Circuit Court of Appeals**
 - **Standards upheld except for 40 CFR 192.20(A)(2) and (3) in Subpart B**
 - **Remanded to EPA for conformance with Title II regulations**
- **New Title I regulations proposed September 24, 1987**
 - **Modified Subpart A, B, and C**
 - **Incorporated GWPS (including ACL provisions) under RCRA**

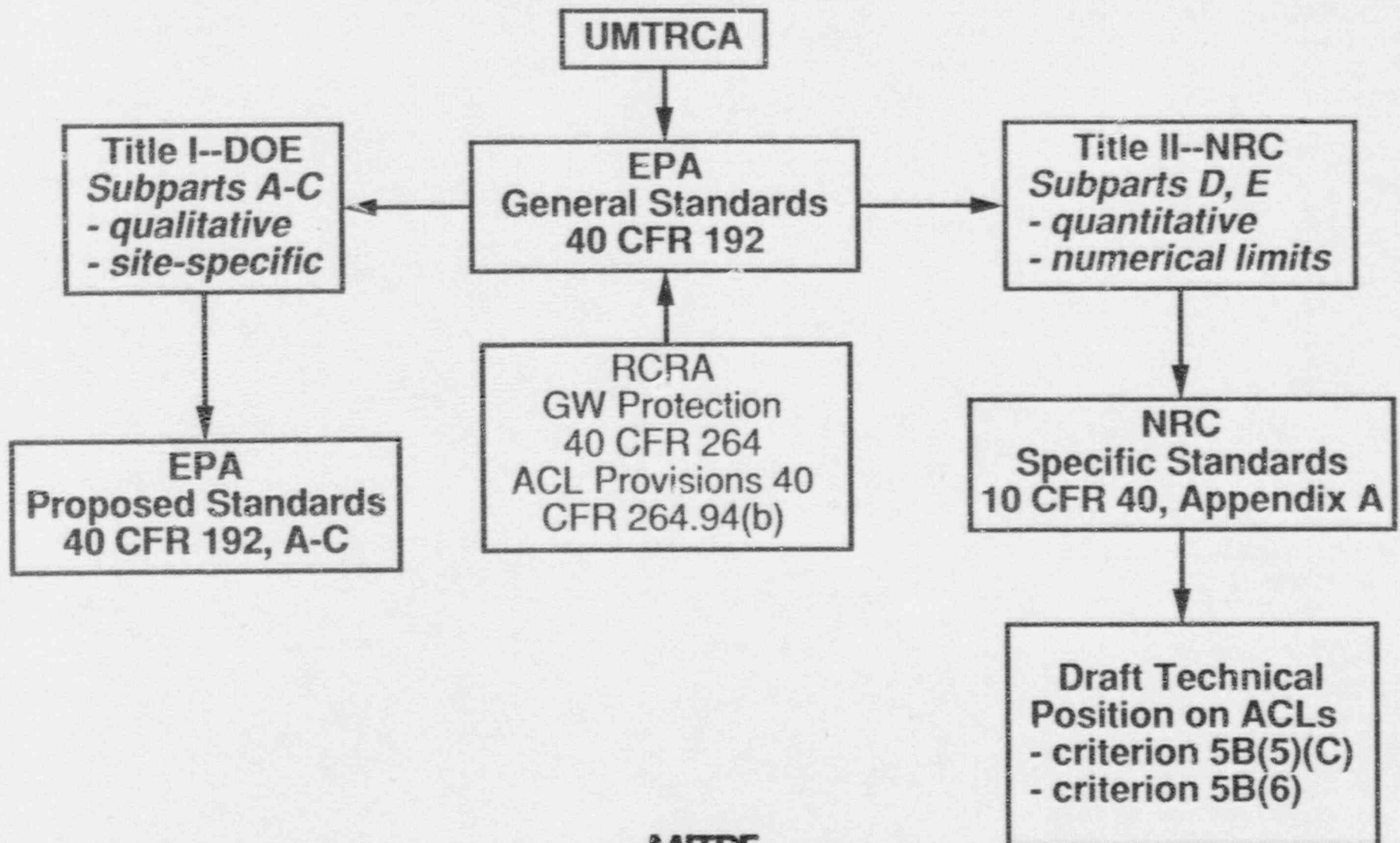
Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA) (Continued)

- **NRC specific standards for Title II sites in 10 CFR 40, Appendix A**
 - **13 Technical Criteria**
 - **Criteria 5A-D incorporate the basic GWPS in Subparts D and E of 40 CFR 192**
 - **Criterion 5B(5)(C) and 5B(6) provide for establishing and approving ACLs**
- **Amended In 1986, 1987, and 1988 to conform with general EPA requirements**

Historical Background: Uranium Mill Tailings Radiation Control Act (UMTRCA) (Concluded)

- NRC established workgroup to develop an ACL methodology for mill tailings sites
- NRC developed Draft Technical Position on ACLs for mill tailings sites
- Published for comment in Federal Register, June 30, 1988

Groundwater Provisions under UMTRCA



Recent Developments

- **Development of DOE Guidance**

- **Draft Technical Position for DOE compliance with proposed GWPS in Subpart A-C of 40 CFR 192**
- **References Draft Technical Position on ACLs**

Recent Developments (Continued)

- **Conduct of Workshop on ACLs for Uranium Mills (October 21, 1988, Lakewood, CO)**
 - **Topics included NRC's direction in Groundwater Monitoring Programs, when to apply for ACLs, ACI case study**
 - **Concepts covered applicable to Title I sites**

Recent Developments (Concluded)

- **Title I Workshop**
 - **Differences between Title I and II sites**
 - **Applicability of Draft Technical Position to Title I sites**
 - **Other issues related to ACLs**

Outline

- Historical background of ACLS
- Status of ACLS at Title II Sites
- Differences between Title I and Title II Sites
- Proposed approach to ACLS at Title I Sites
- Substantive considerations in applying for an ACL at a Title I Site

Differences Between Title I and Title II Sites

Ming P. Wang

12 December 1990

MITRE

Outline

- Historical background of ACLs
- Status of ACLs at Title II Sites
- Differences between Title I and Title II Sites
- Proposed approach to ACLs at Title I Sites
- Substantive considerations in applying for an ACL at a Title I Site

Highlights

- **Introduction**
- **Regulations**
- **Comparison**
 - **Overview**
 - **Components of groundwater protection standard**
 - **Hazardous constituents**
 - **Concentration limits**
 - **(background, MCLs, and ACLs)**
 - **Passive restoration**
 - **Supplemental standards**

Introduction

	<u>Title I</u>	<u>Title II</u>
Agency	DOE - Perform Remediation NRC - Review RAP	NRC - Grant License
Regulation	EPA Regulation 40 CFR 192, A-C, as proposed in 1987	NRC Regulation 10 CFR 10, Appendix A
Guidance	Draft Groundwater Guidance* Draft ACL Guidance**	Draft ACL Guidance**

* Draft Technical Position "Information Needs to Demonstrate Compliance with EPA's Proposed Groundwater Protection Standards in 40 CFR Part 192, Subparts A-C" (NRC, June 1988)

** "Draft Technical Position on Alternate Concentration Limits for Uranium Mills, Standard Format and Content Guide and Standard Review Plan for Alternate Concentration Limit Applications" (NRC, June 1988)

Introduction (Concluded)

-Definition of terms-

- **Groundwater protection standard (GWPS)**
 - This presentation adopts a narrow definition
 - Concentration limits of hazardous constituents at POCs
 - Does not include design standard

- **Disposal**
 - Activities to minimize future risk

- **Cleanup**
 - Activities to eliminate or reduce contamination that occurred prior to disposal

- **Disposal period**
 - March 7, 1983 to September 30, 1994
 - Needs to complete all Subpart A requirements, except for post-disposal activities
 - Does not apply to groundwater cleanup

Governing Regulations

- Title I - 40 CFR 192, Subparts A-C, as proposed by EPA in 1987

- Title II - 10 CFR 40, Appendix A

- Much in common

- UMTRCA:

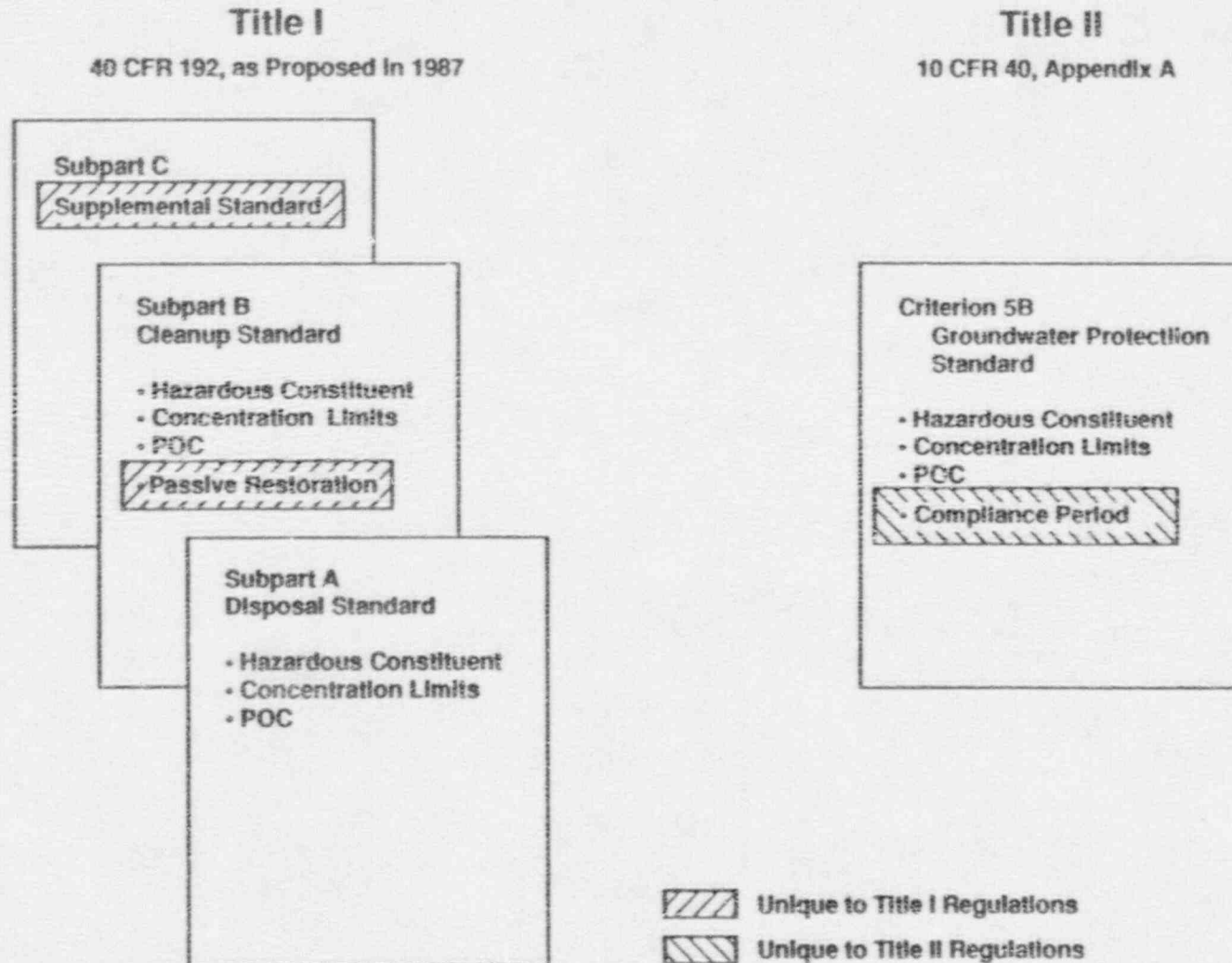
Consistent, to the maximum extent practicable, with RCRA requirements

- Court directive:

"...treat these toxic chemicals that pose a groundwater risk as it (EPA) did in the active mill site regulations."

- Some differences

Comparison of GWPS - An Overview



Compliance Period

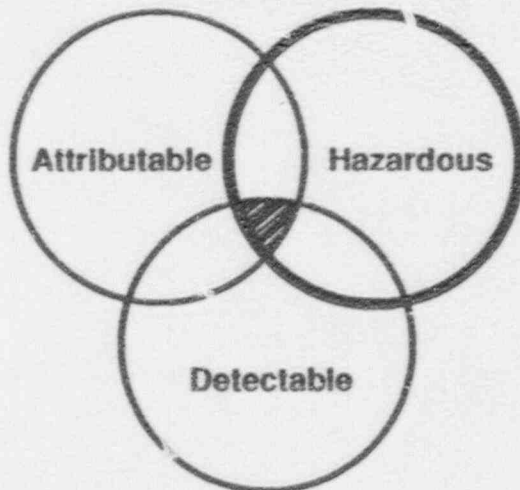
- **Title I**
 - **N/A; there is no mineral processing activities**

- **Title II**
 - **Beginning: the Commission sets secondary groundwater protection standard**
 - **End: the license is terminated and the site is transferred for long-term care**

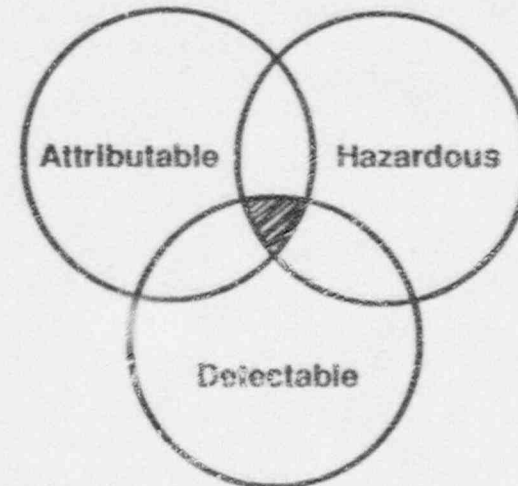
Hazardous Constituents

Title I

Disposal same as Cleanup



Title II



- **Attributable** - In or derived from byproduct material.
- **Detectable** - detected in uppermost aquifer.
- **Hazardous** - Title I
 - Criterion 13 of 10 CFR 40, Appendix A, plus $\text{NO}_3\text{-N}$, and combined U-234 and U-238
- **Hazardous** - Title II
 - Criterion 13 of 10 CFR 40, Appendix A

Point of Compliance

Title I

- Disposal:

- Vertical surface at hydraulically downgradient limit of the disposal site that extends down into the uppermost aquifer underlying the site

- Cleanup:

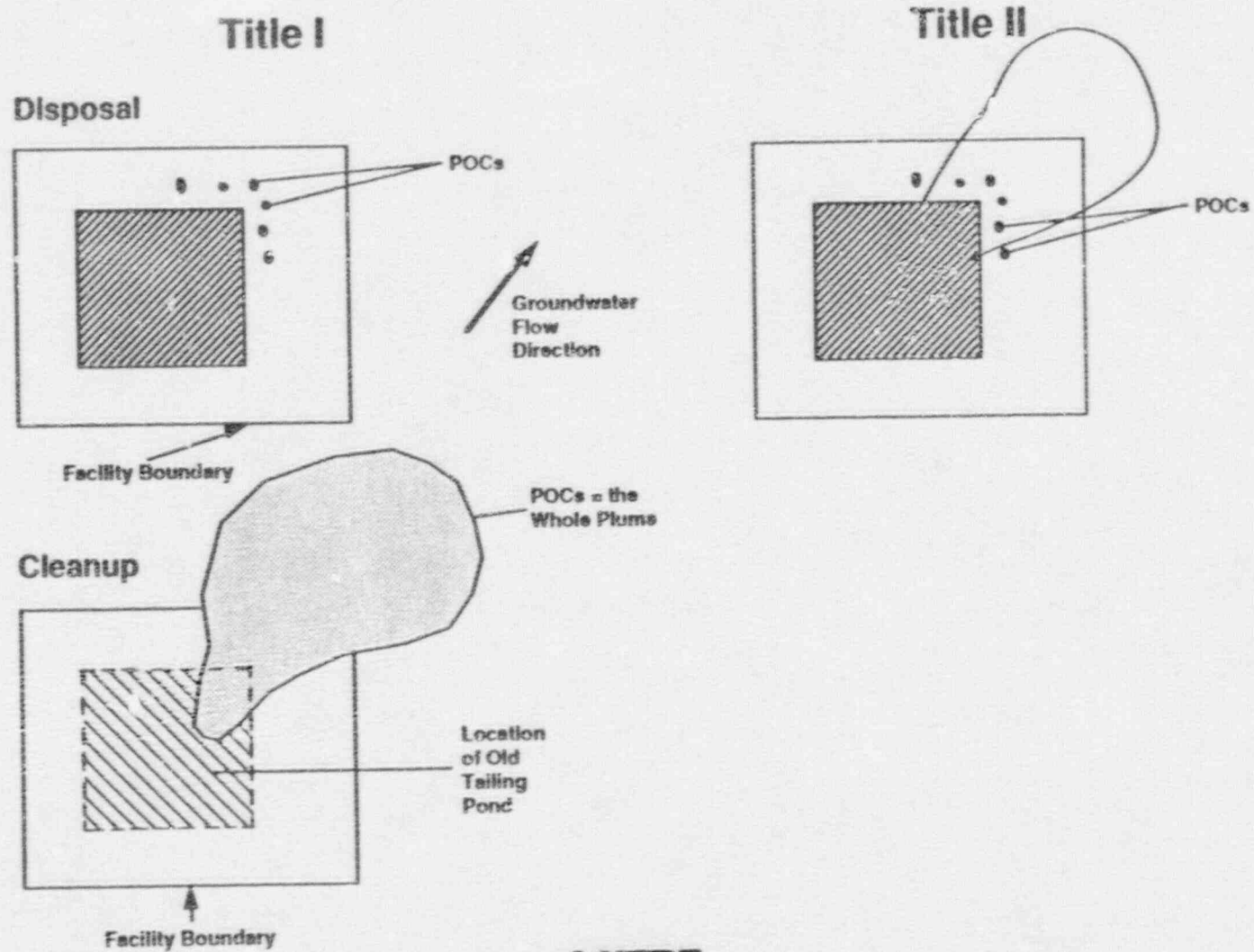
- Any point where contamination is found in groundwater

Title II

- One definition:

- Site-specific
- To provide prompt indications of groundwater contamination on the hydraulically downgradient edge of the site

Point of Compliance (Concluded)



Concentration Limits

Shared Concepts

- **Three Concentration Limits**
 - Background
 - MCLs
 - ACLs

- **ACLs must be protective of health and environment, and be ALARA**

- **19 ACL Factors**

Difference

- **MCL Database**
 - **Title I:** disposal same as cleanup;
Table 5C of 10 CFR 40, Appendix A, plus
Mo, NO₃⁻, and combined U-234 and U-238

 - **Title II:** Table 5C of 10 CFR 40, Appendix A

MITRE

Passive Restoration

- Available for cleanup only
- Use institutional control to permit groundwater restoration through natural flushing
- Remedial period may be extended up to 100 years, if:
 - Groundwater not a public drinking water source
 - Projected concentration will not exceed concentration limit
 - Institutional control as part of the remedial action
 - Satisfy the requirements of disposal standards (40 CFR 192 Subpart A)

Passive Restoration (Concluded)

Institutional Control

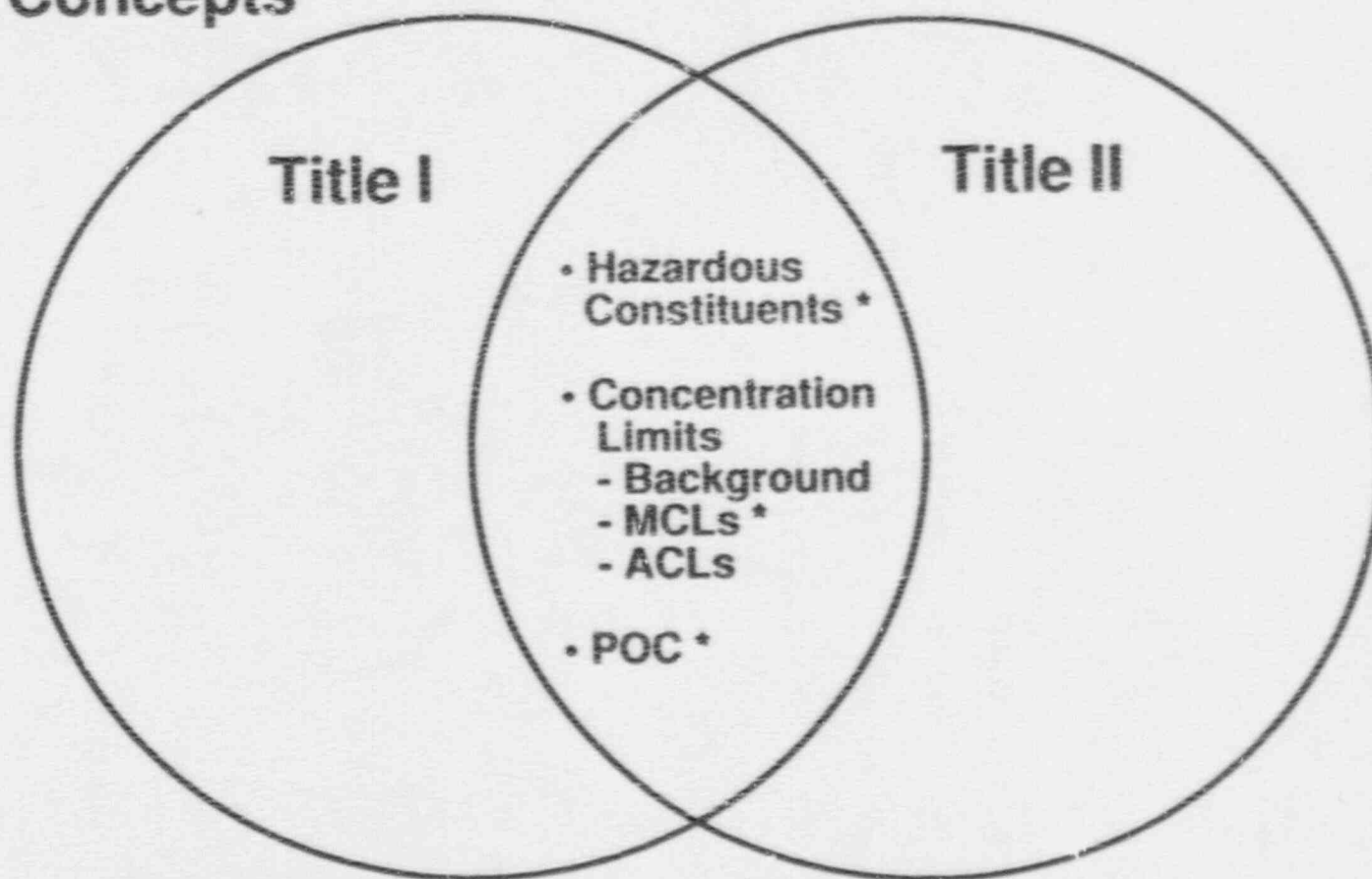
- **Must be effective over the entire period of time**
- **Acceptables**
 - **Enforceable, such as**
 - **Legal use restrictions enforceable by government**
 - **Federal or State ownership**
 - **Combinations, such as providing alternate source of drinking water supply plus a deed restriction**
- **Non-Acceptables**
 - **Require voluntary cooperation, such as**
 - **Health advisories**
 - **Signs**
 - **Posts**
 - **Admonitions**

Supplemental Standards

- Available for Title I Sites
- If any of the following criteria apply
 - Injury
 - Excessive Harm
 - Impracticability
 - Class III

Summary

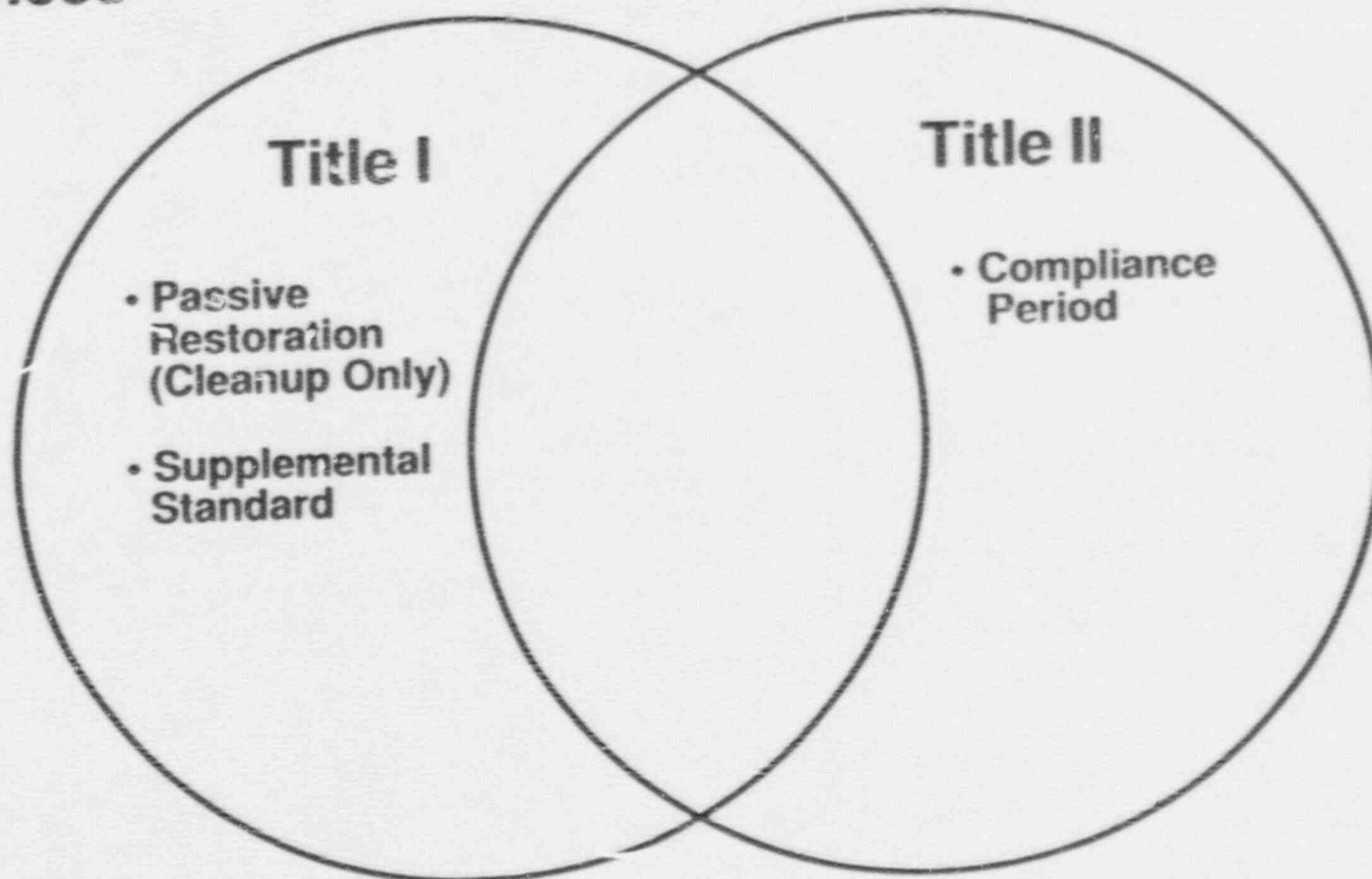
Shared Concepts



* minor differences in definitions

Summary (Continued)

Differences



Summary (Concluded)

Identical Requirements

Title I & Title II

ACL

- Protective of health and environment
 - 19 factors
- ALARA

Proposed Approach to ACLs at Title I Sites

Ming P. Wang

December 12, 1990

MITRE

Outline

- Historical background of ACLS
- Status of ACLS at Title II Sites
- Differences between Title I and Title II Sites
- Proposed approach to ACLS at Title I Sites
- Substantive considerations in applying for an ACL at a Title I Site

Highlights

- Introduction
- Basic ACL Concepts
 - POC and POE
 - Concentration Limits based on σ_{FD} and slope factor
- Components of ACL Application
 - Hazard Assessment
 - Corrective Action Assessment
- Derivation of ACL

Introduction

	<u>Title I</u>	<u>Title II</u>
Agency	DOE - Perform Remediation NRC - Review RAP	NRC - Grant License
Regulation	EPA Regulation 40 CFR 192, A-C, as proposed in 1987	NRC Regulation 10 CFR 40, Appendix A
Guidance	Draft Groundwater Guidance* Draft ACL Guidance**	Draft ACL Guidance**

* Draft Technical Position "Information Needs to Demonstrate Compliance with EPA's Proposed Groundwater Protection Standards in 40 CFR Part 192, Subparts A-C" (NRC, June 1986)

** "Draft Technical Position on Alternate Concentration Limits for Uranium Mills, Standard Format and Content Guide and Standard Review Plan for Alternate Concentration Limit Applications" (NRC, June 1988)

BASIC CONCEPTS

Without ACL

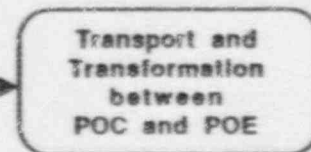


- Concentration Limits:
- MCLs
 - Background

With ACL



- Concentration Limits:
- ACLs



- Allowable Exposure Concentrations:
- MCLs
 - Background
 - R_f D based
 - Slope Factor (Cancer Potency Factor) based
 - Others

Introduction (Concluded)

- Title I same as Title II
- ACLs are
 - acceptable
 - protective of environment and human health
 - 19 factors (9 for groundwater, 10 for surfacewater)
 - as low as reasonably achievable (ALARA)

Basic Concepts (Continued)

Two Locations

- **Point of Compliance (POC)**
 - monitored location
 - downgradient edge of unit
 - compliance determined

- **Point of Exposure (POE)**
 - exposure location
 - downgradient of unit
 - risks determined

Basic Concepts (Continued)

Health and Environmental Limit (HEL)

- Protective of human health and environment
- Human health limits, based on
 - reference dose (non-carcinogens)
 - slope factor, or cancer potency factor (carcinogens, life-time excess cancer risk of 10^{-6})
- Environmental limits
 - ambient water quality criteria
 - ambient aquatic life advisory concentrations

Basic Concepts (Continued)

Derive HEL based on RfD

What is RfD?

- Non-carcinogens
- An EPA estimate of acceptable daily intake
- In units of mg/kg/day
- Available in
 - IRIS (EPA Information system)
 - Health Effects Assessment Summary Tables (EPA Quarterly Report)

How to Calculate HEL from RfD?

$$\begin{aligned} \text{HEL} &= (\text{RfD}) \times (\text{body weight}) / (\text{daily drinking water consumption}) \\ &= (\text{RfD}) \times 70 \text{ kg} / 2 (\text{liters/day}) \end{aligned}$$

Basic Concepts (Concluded)

Derive HEL Based on Slope Factor

What Is Slope Factor?

- An EPA estimate of carcinogenic potency
- In units of (lifetime cancer risk) /mg/kg/day
- Available in
 - IRIS
 - Health Effects Assessment Summary Tables (an EPA Quarterly Report)

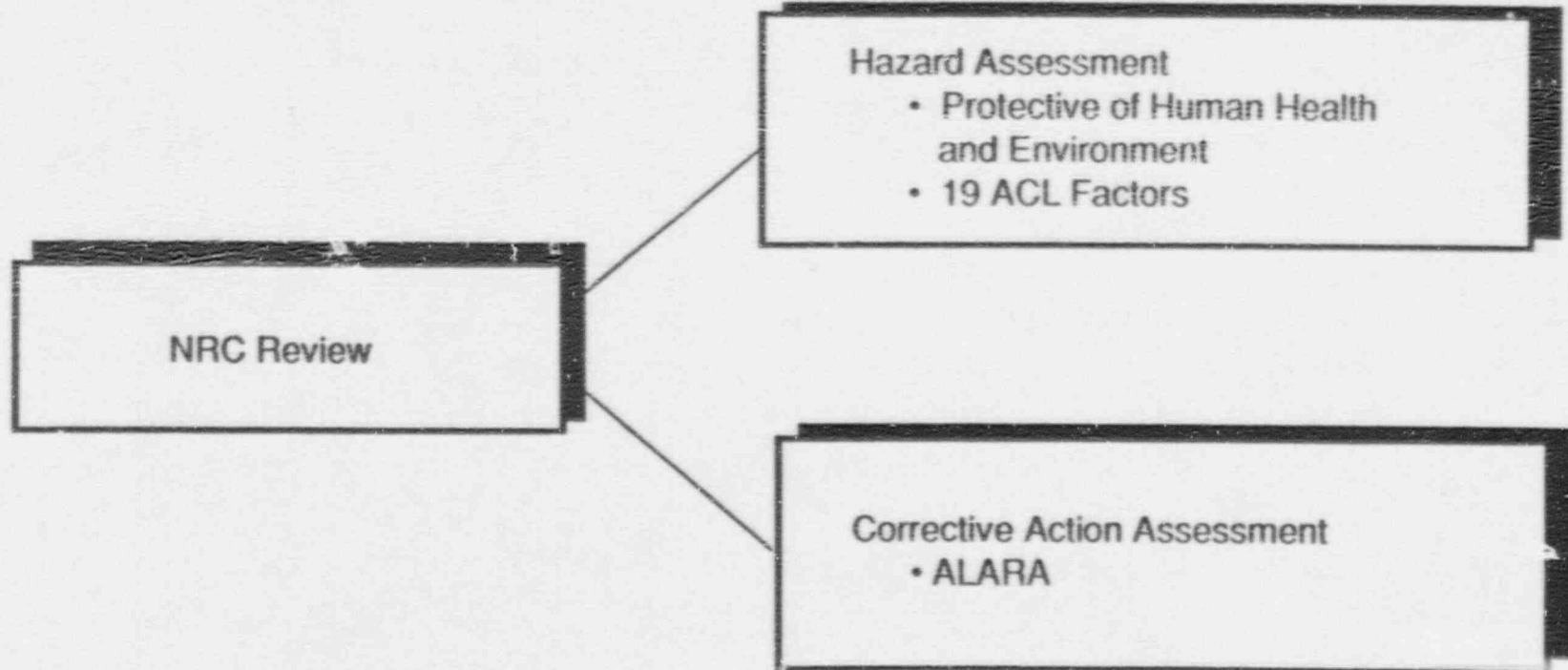
How to Calculate HEL from Slope Factor?

- Assuming acceptable excess lifetime cancer risk of 10^{-6}

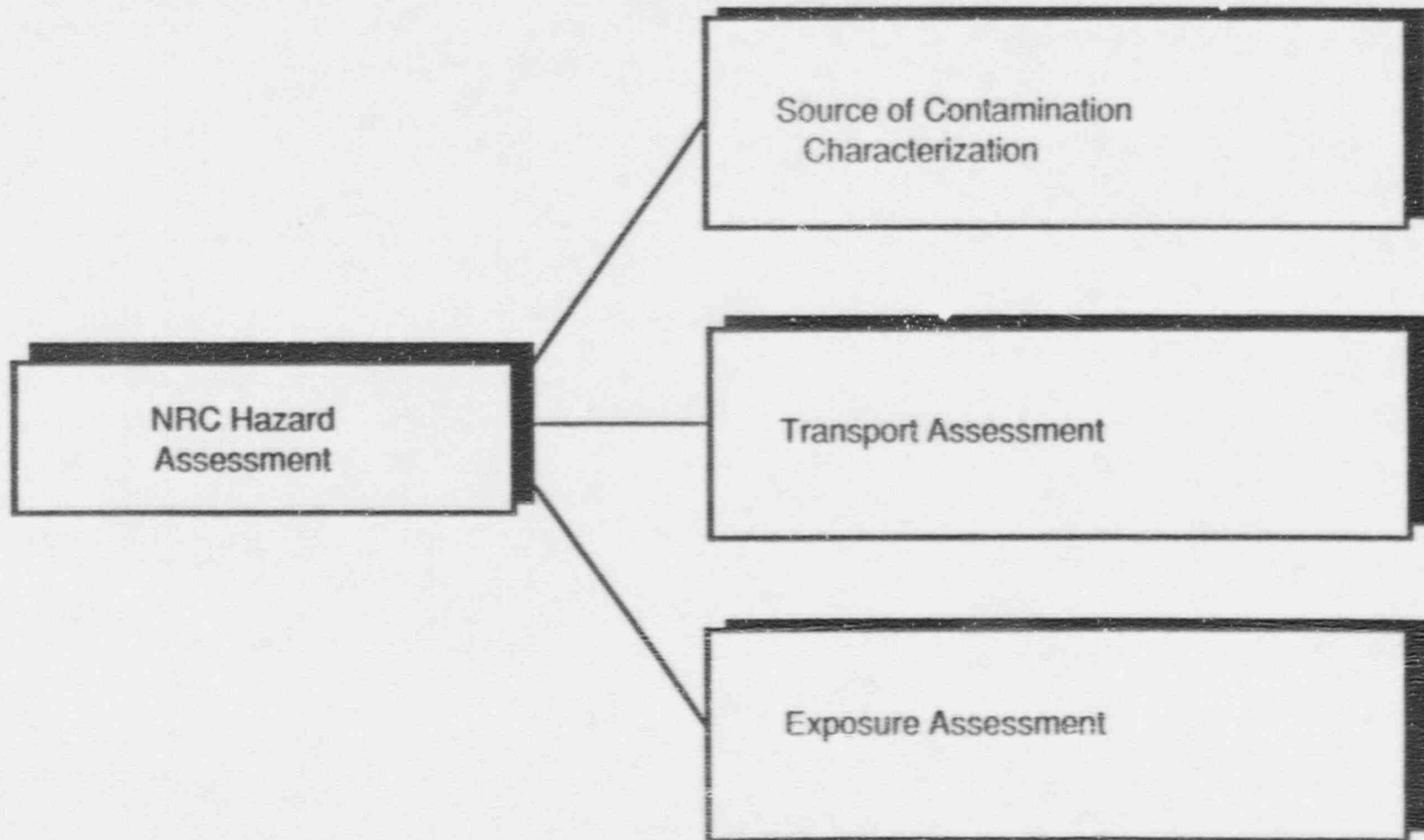
$$\text{HEL} = 10^{-6} \times (\text{body weight}) / (\text{slope factor}) / (\text{daily drinking water consumption})$$

$$= 10^{-6} \times 70 \text{ kg} / (\text{slope factor}) / (2 \text{ liters/day})$$

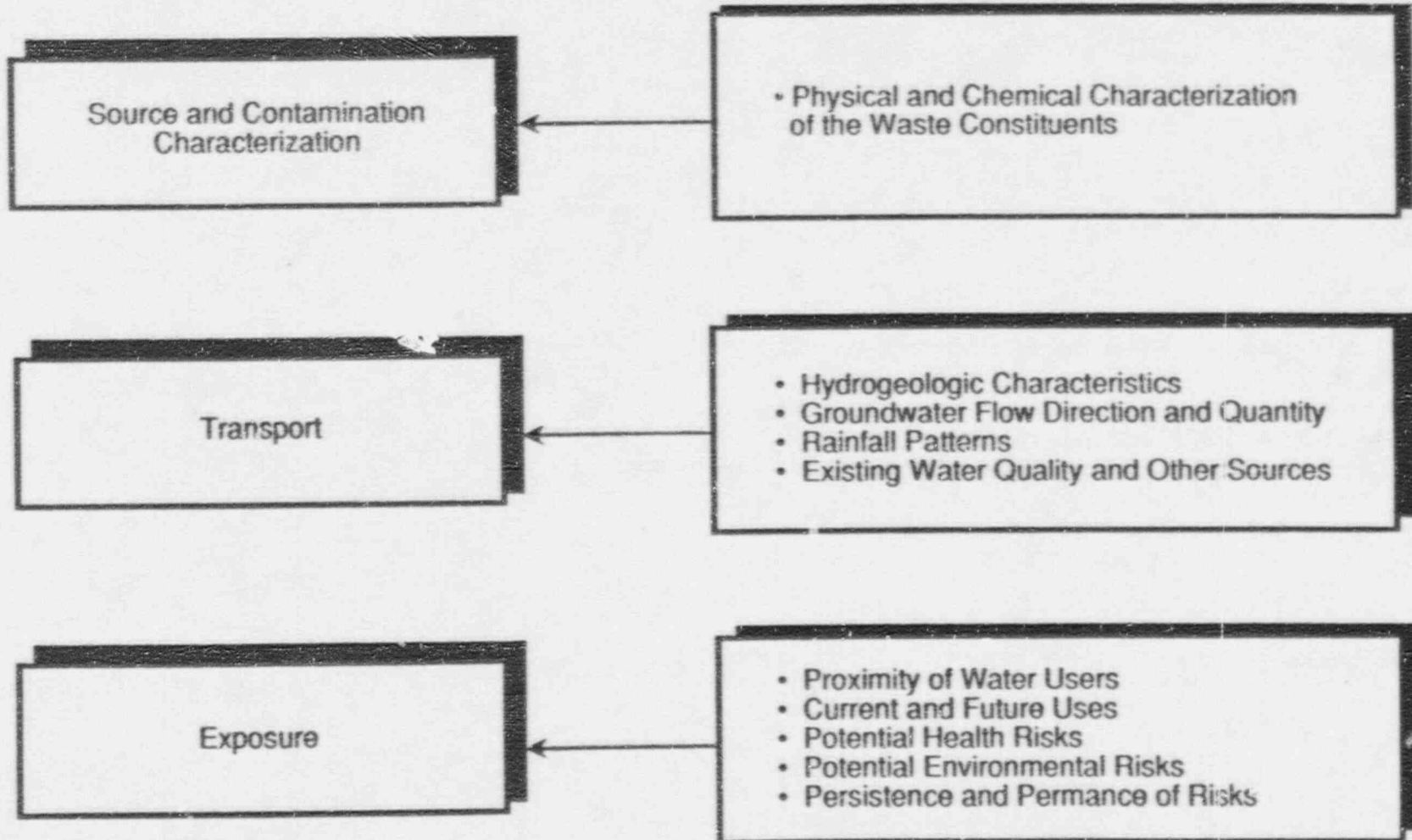
NRC Review of ACL



Hazard Assessment Review

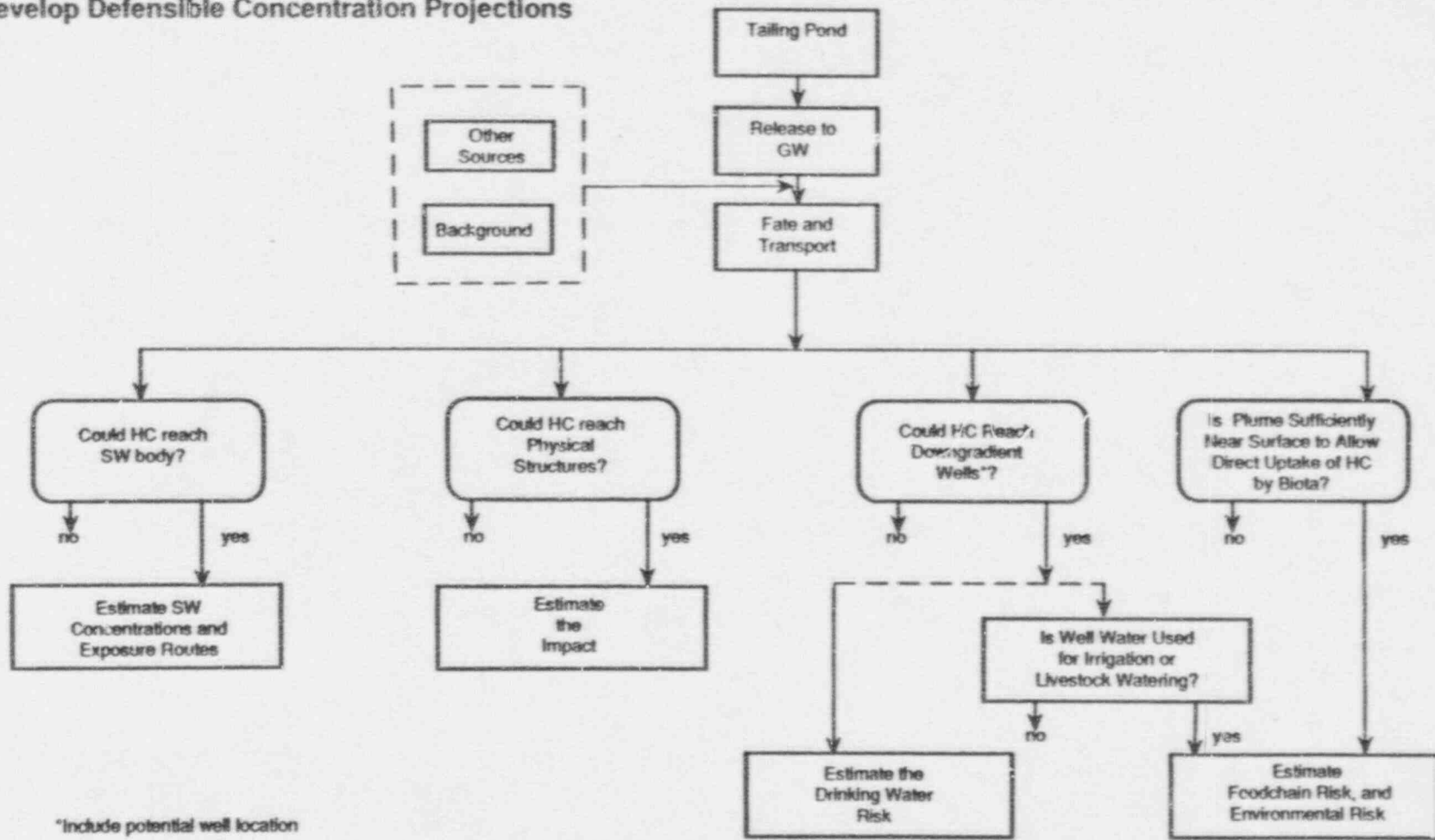


Hazards Assessment and 19 ACL Factors



Hazards Assessment

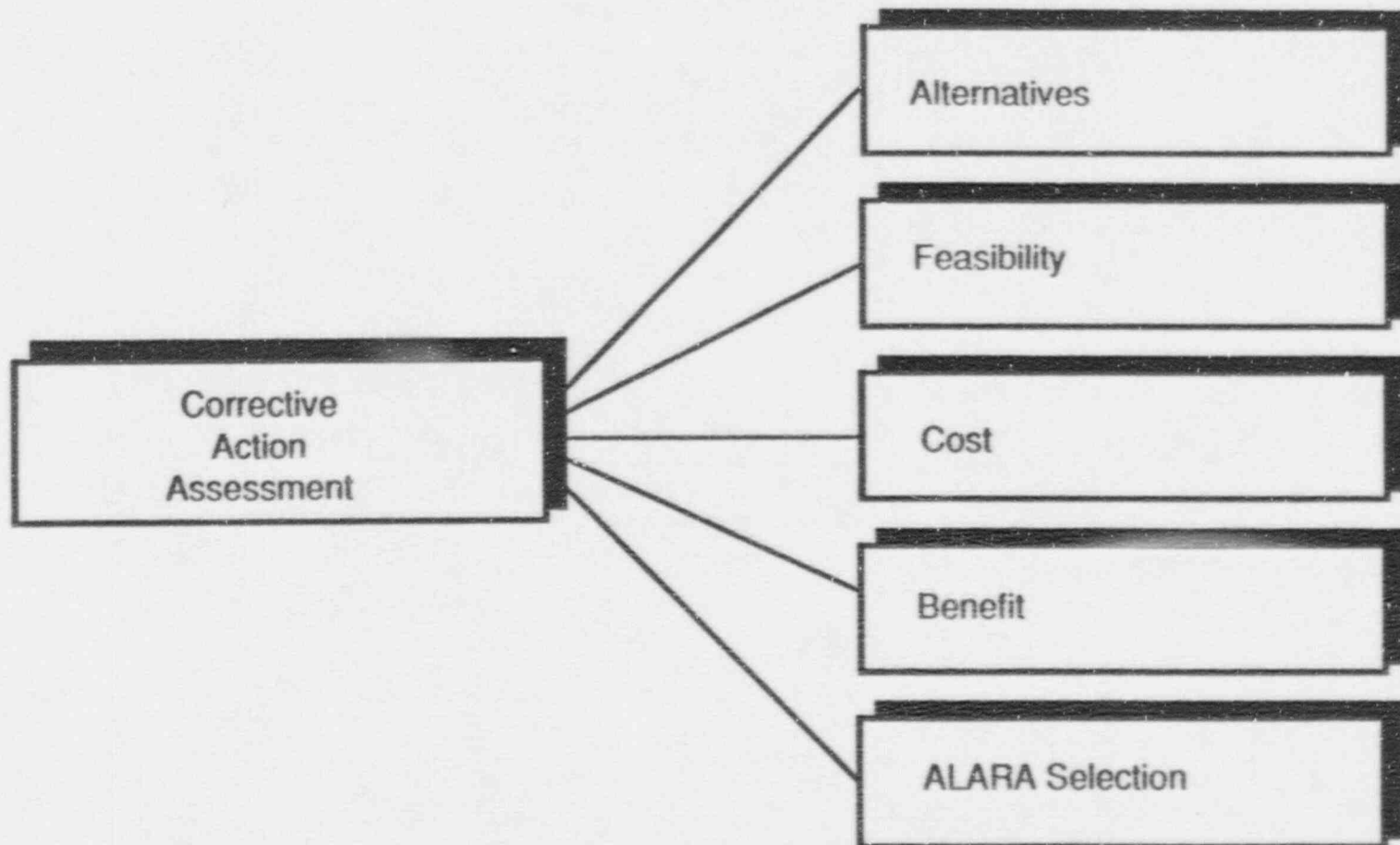
Develop Defensible Concentration Projections



Hazards Assessment (Concluded)

- Focus on ACL Constituents
- Eliminate insignificant exposure pathways

Corrective Action Assessment



Alternative Corrective Actions

- **Disposal actions**

- Clay covers
- Unit configurations
- Chemical stabilization
- Thermal stabilization
- Liners
- Others

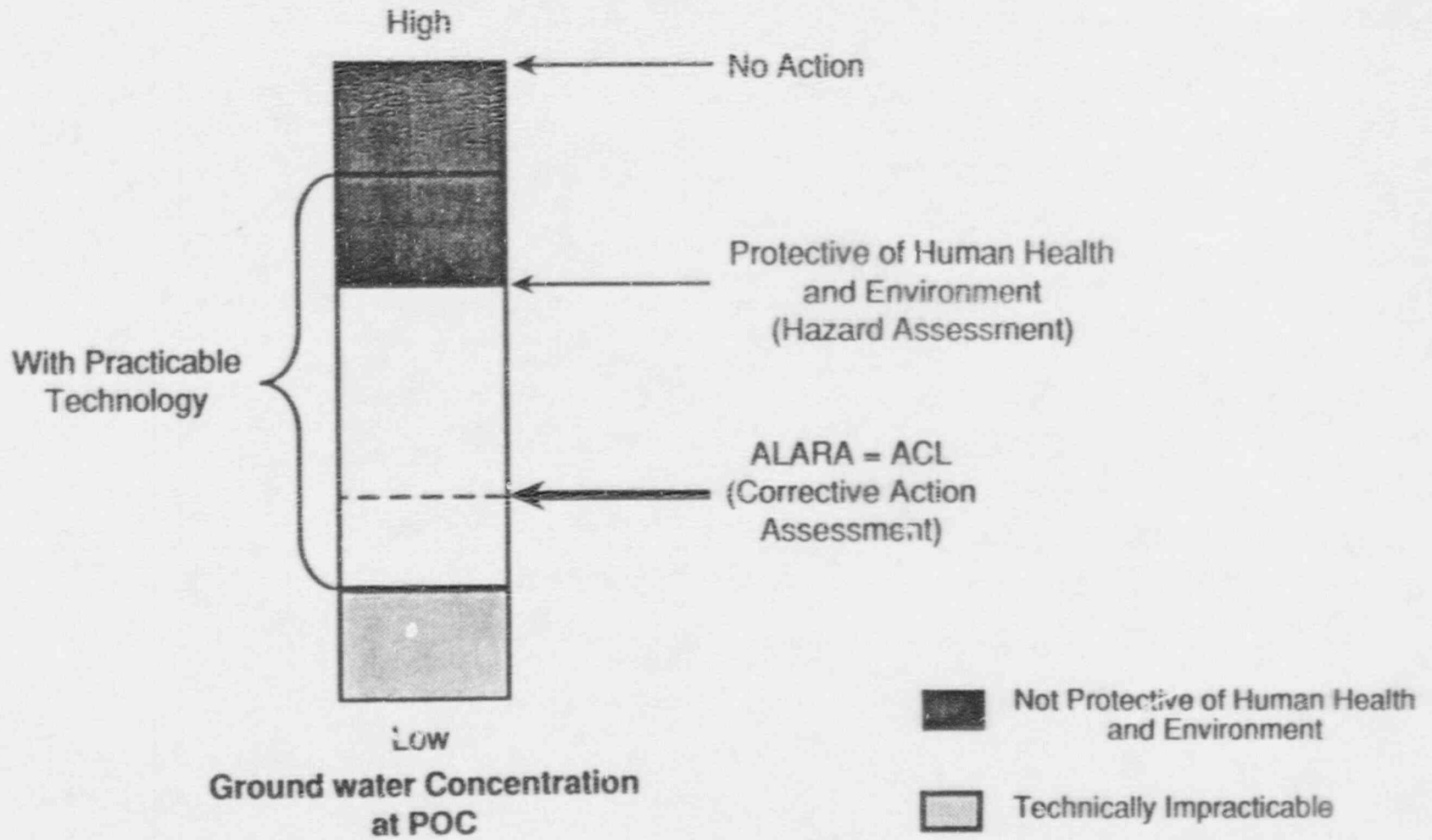
- **Cleanup actions**

- Pump and treat
- In-situ treatment
- Exhumation
- Slurry walls
- Others

Formulations of ACLs

- ALARA limit must be less than or equal to the limit from hazard assessment
- ACL is the ALARA concentration at POC

Summary



**Substantive Considerations in Applying
for an ACL at a Title I Site**

William D. Rowe

December 12, 1990

MITRE

Outline

- Historical background of ACLS
- Status of ACLS at Title II Sites
- Differences between Title I and Title II Sites
- Proposed approach to ACLS at Title I Sites
- Substantive considerations in applying for an ACL at a Title I Site

When to Apply for ACLs?

- When not proposing *background or drinking water standards*
- After Hazards Assessment and Corrective Action Assessment
- Before Disposal and Cleanup actions
- If indicated by Performance Assessments

When *not* to Apply for ACLs?

- When proposing to meet *background* or *drinking water standards*
- When **Supplementary Standards** apply
- When **passive restoration** is invoked under Cleanup

ACLs for Proposed *Disposal* Site

- Step 1 - Characterize Proposed Disposal Site
- Step 2 - Optimize Disposal Design
- Step 3 - Project Concentrations of Hazardous Constituents (HC)
- Step 4 - Determine Concentration Limits for each HC at POC

Characterize Proposed Disposal Site

- Geology
- Groundwater and surface water hydrology
- Rainfall
- Water uses
- Background levels
- Potentially exposed populations
- POC and POE locations

Optimize Disposal Design

- **Justification in Corrective Action Assessment**
- **Estimation of release rates for each HC**

Project HC Concentrations Around Disposal

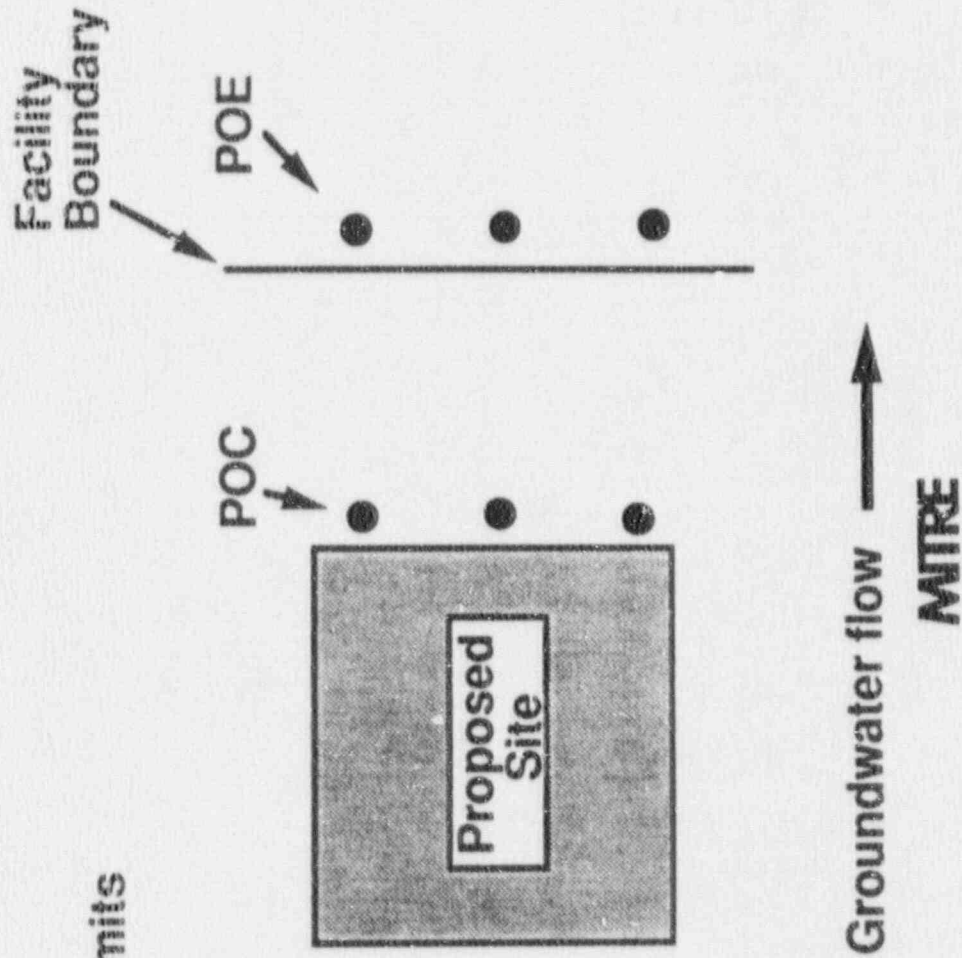
- Combine release rates and site hydrogeology for each HC
- Evaluate concentrations of each HC at POC and POE locations over time

Determine Concentration Limits at POC
for Disposal

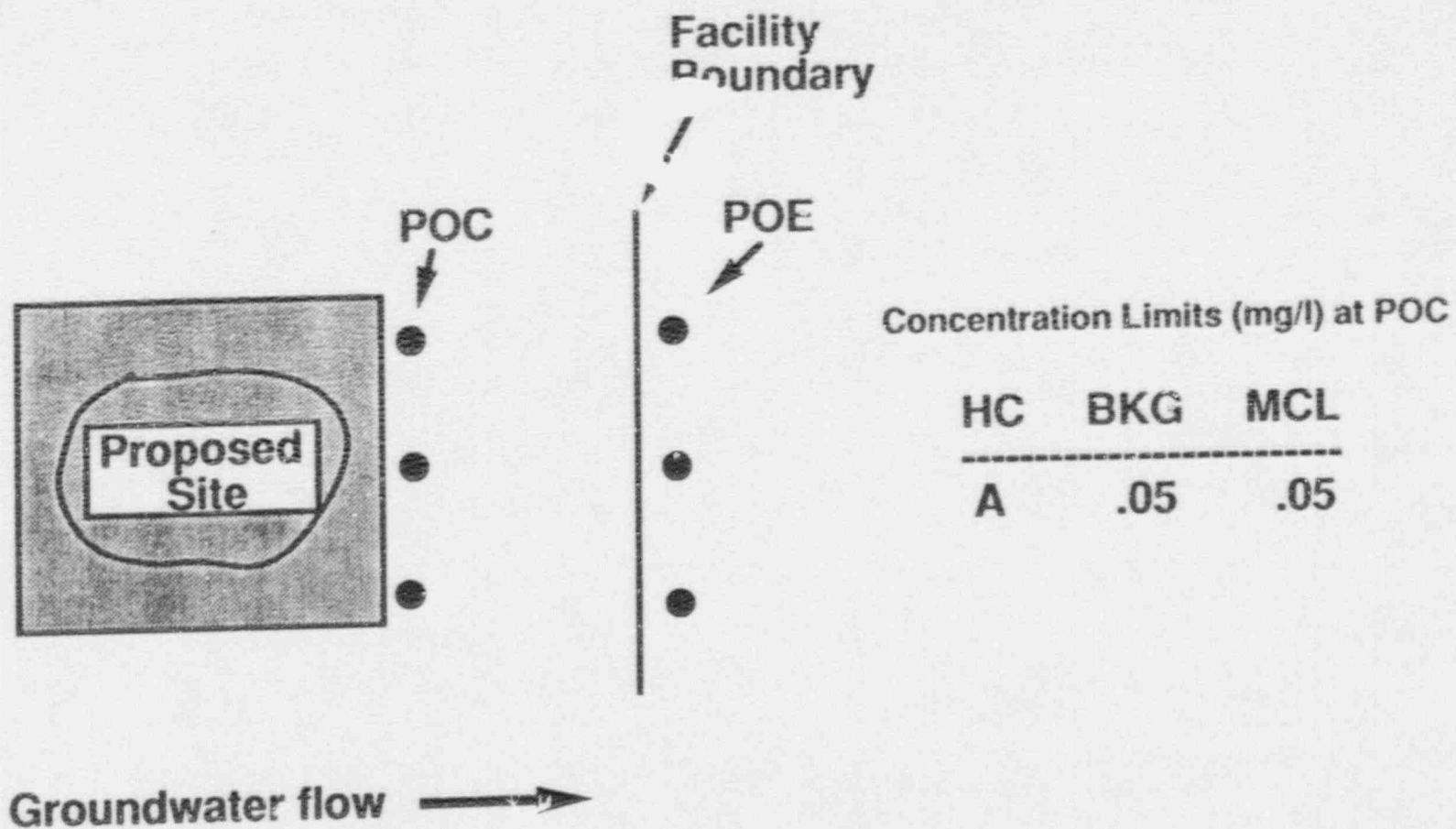
Simulate movement of each Hazardous Constituent

COMPLY WITH

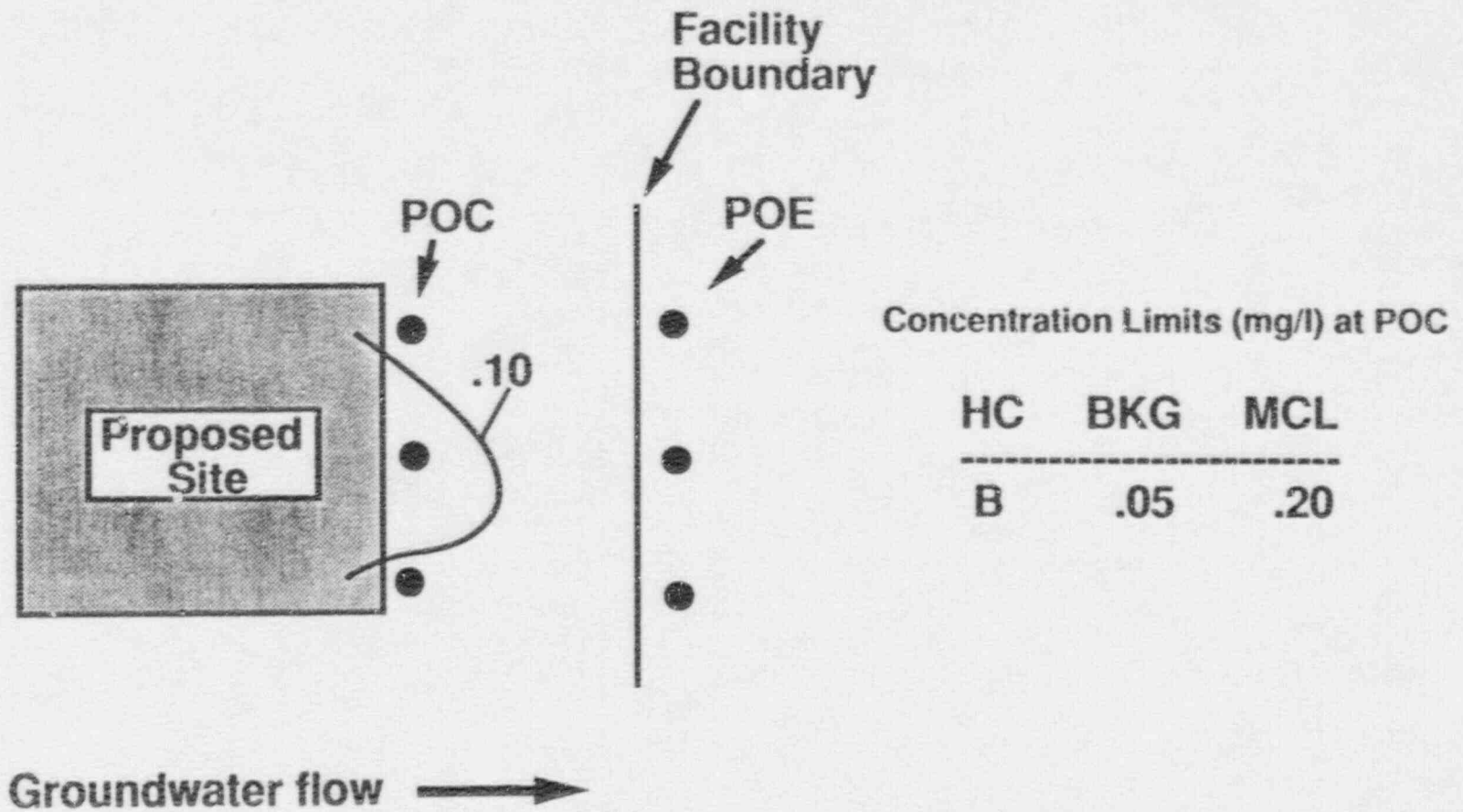
- background
- drinking water limits
- ACLs



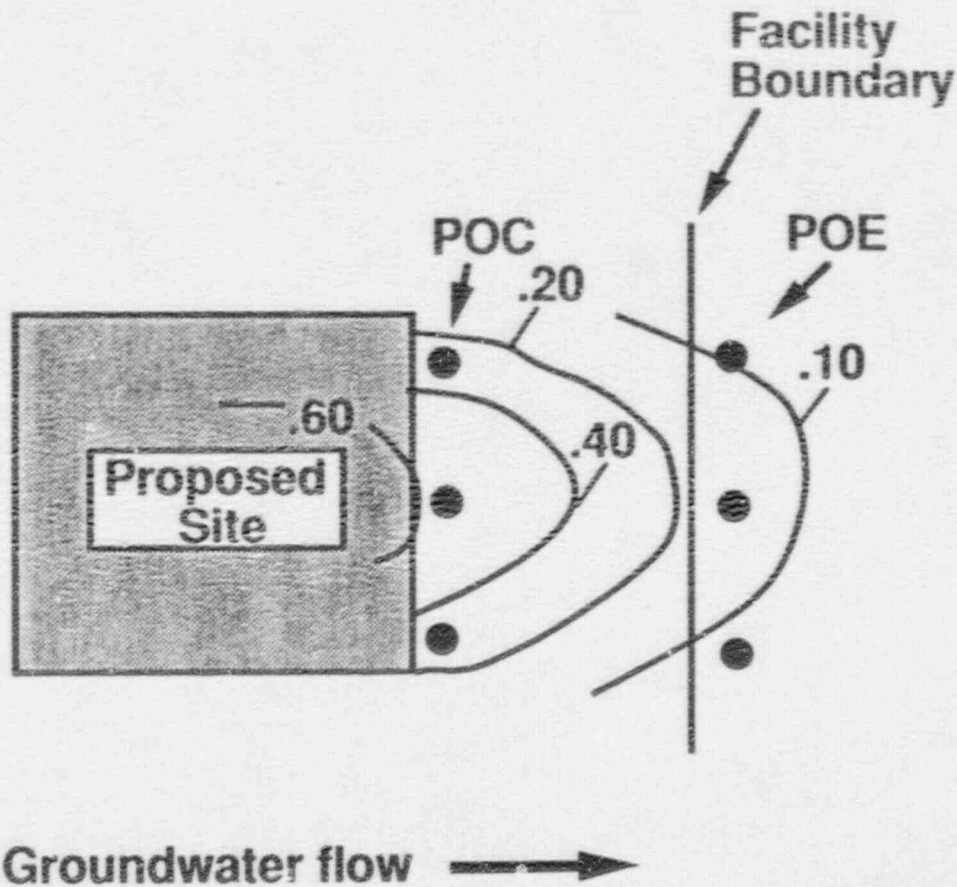
Concentration Limits for Disposal



Concentration Limits for Disposal (Continued)



Concentration Limits for Disposal (Continued)



What is HEL?

Maximum Projected concentration at POE?

Comparison

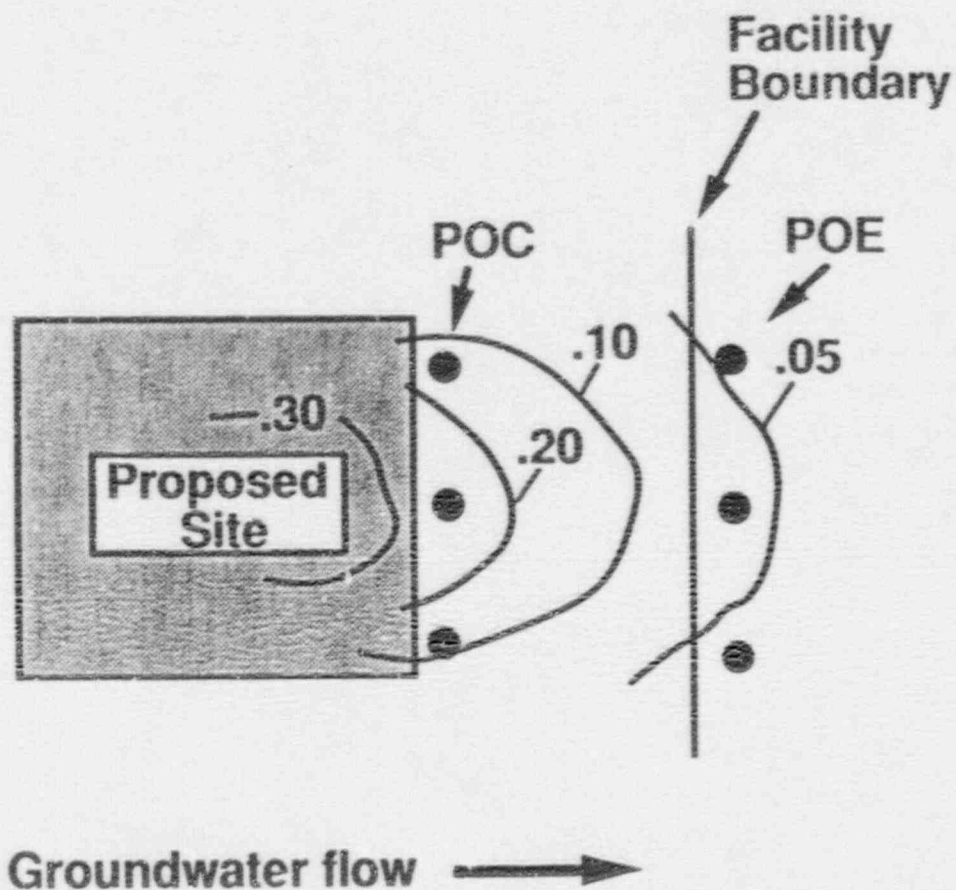
Concentration Limits (mg/l) at POC

HC	BKG	MCL
C	.10	.20

USE : Drinking Water
HEL = MCL = .20

ACL for C = .50

Concentration Limits for Disposal (Concluded)



What is HEL?

Maximum Projected concentration at POE?

Comparison

Concentration Limits (mg/l) at POC

HC	BKG	MCL
D	.05	N/A

HEL = .10 for POE
(based on RfD)

ACL = .25

Concentration from Reference Dose (RfD)

- Available from EPA databases

e.g., Integrated Risk Information System [53 FR 20162, June 2, 1988]

- Concentration in Water =
$$\frac{\text{RfD} \times \text{Body Weight}}{\text{Ingestion Rate}}$$

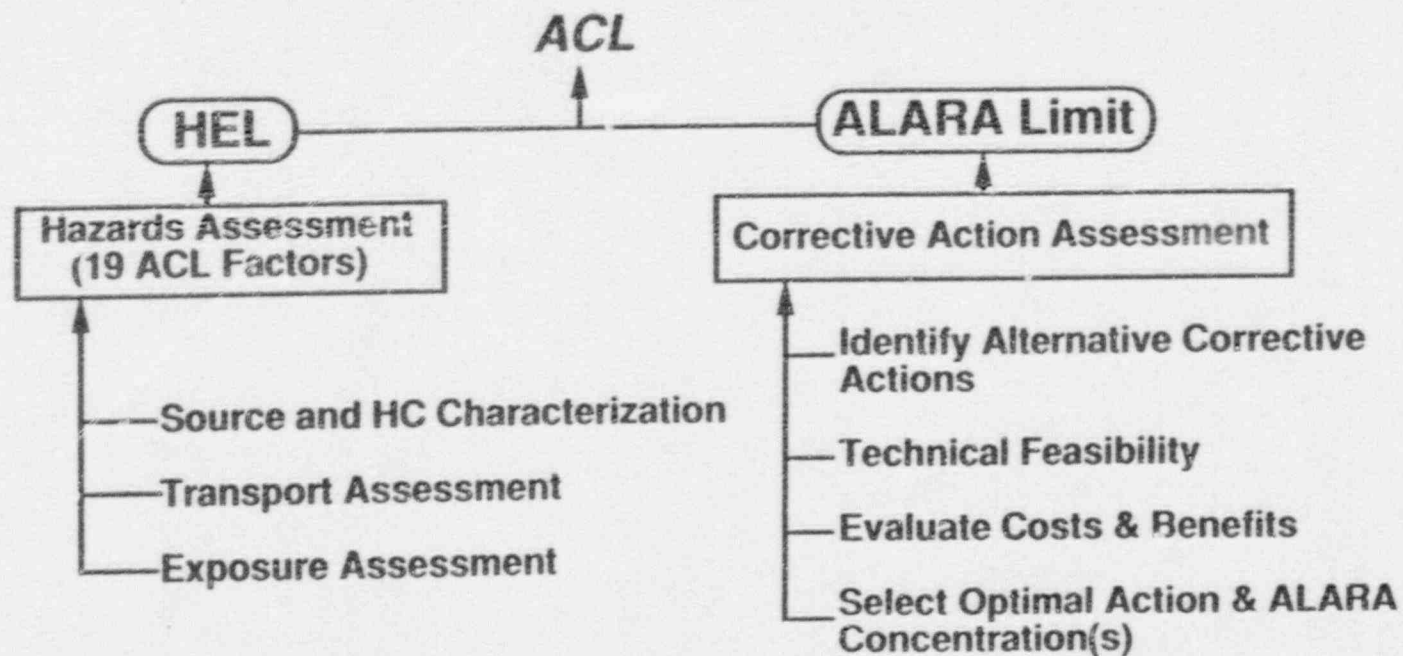
$$C \text{ (mg/l)} = \frac{\text{RfD (mg/kg-day)} \times 70 \text{ kg}}{2 \text{ liters/day}}$$

Summary of Concentration Limits for Disposal

<u>HC</u>	<u>Concentration Limit (mg/l) at POC</u>			<u>HEL at POE</u>
	<u>Background</u>	<u>MCL</u>	<u>ACL</u>	
A	.05	.05	N/A	.05
B	.05	.20	N/A	.20
C	.10	.20	.50	.20
D	.05	N/A	.25	.10

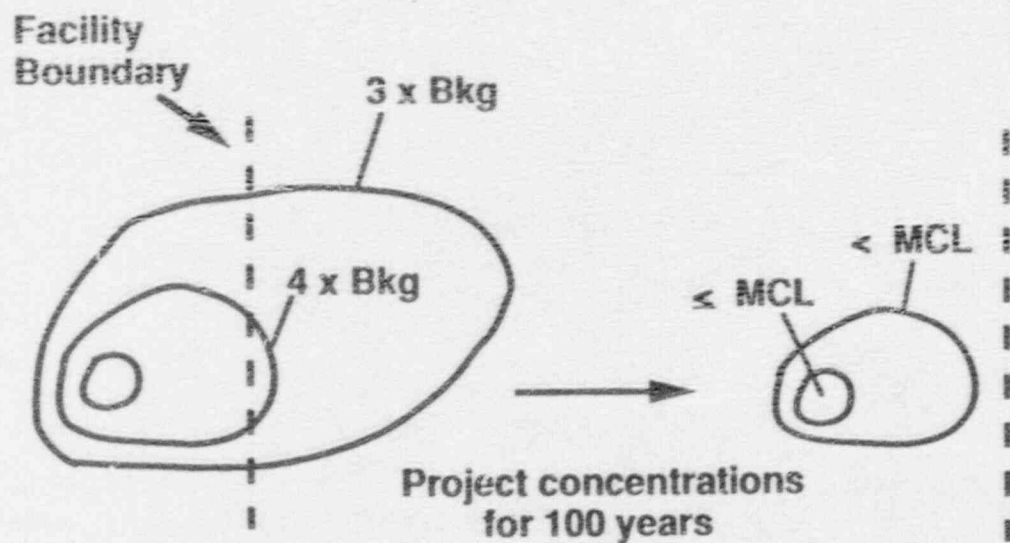
Considerations in Applying for an ACL

- ACLs are proposed for Hazardous Constituents C and D
- Information must be provided demonstrating proposed ACLs are ALARA and protective of Human Health and Environment



Concentration Limits for Cleanup

HC	BKG	MCL
E	.05	.10

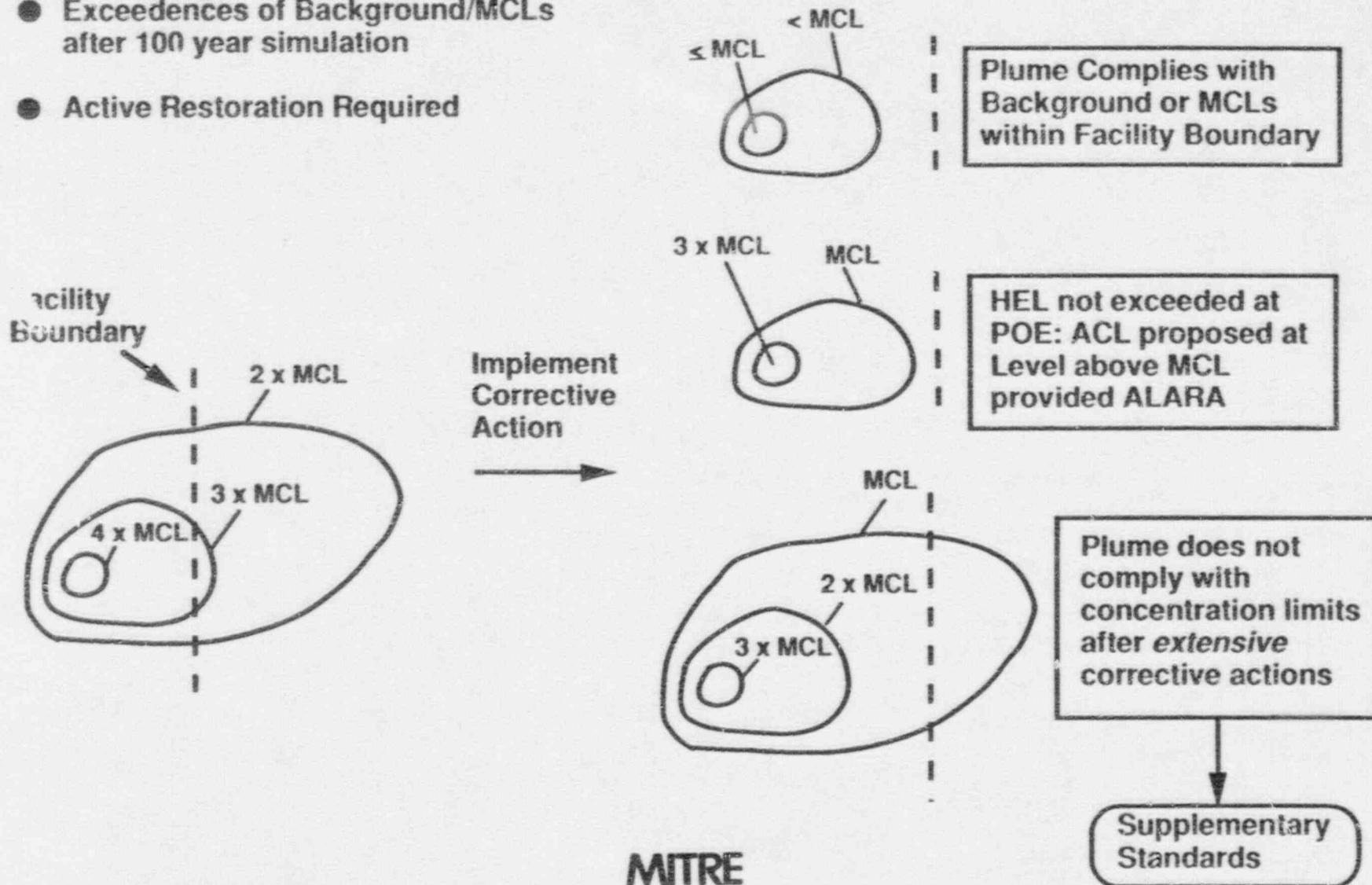


- Background or MCLs met within 100 years
- Not a Public Water Supply
- Institutional Controls on water uses during restoration

PASSIVE RESTORATION

Concentration Limits for Cleanup (Concluded)

- Exceedences of Background/MCLs after 100 year simulation
- Active Restoration Required



ENCLOSURE 4

LIST OF ACRONYMS AND DEFINITIONS

LIST OF ACRONYMS

ACL	Alternate Concentration Limit
ALARA	As Low As Reasonably Achievable
GWPS	Groundwater Protection Standard
HC	Hazardous Constituent
HCC	Hazardous Constituent Concentration
HEL	Health and Environmental Limit
MCL	Maximum Contaminant Level
POC	Point of Compliance
POE	Point of Exposure
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RSD	Risk-specific Dose
UMTRCA	Uranium Mill Tailings Radiation Control Act

LIST OF DEFINITIONS

AQUIFER

A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs. The uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically connected with this aquifer within the boundaries of the site.

Saturation Zone

Groundwater zone created by uranium recovery operations at designated processing sites. Such a zone should not be considered an aquifer unless it is or potentially is: (1) hydraulically interconnected to a natural aquifer; capable of discharge to surface water; or (2) reasonably accessible because of migration beyond the vertical projection to the land transferred for long-term government ownership and care.

DISPOSAL PERIOD

Period of time beginning March 7, 1983 and ending with the completion of all Subpart A requirements specified under a plan for remedial action except those specified in Section 192.02(b) and (c). UMTRCA requires this period to end no later than September 30, 1994.

HEALTH AND ENVIRONMENTAL LIMIT (HEL)

Concentration of substance in water that is protective of human health and the environment. Typically based on reference dose or risk-specific dose. Must be met at point of exposure.

GROUNDWATER

Water below the ground surface in a zone of saturation.

LIST OF DEFINITIONS (concluded)

POINT OF COMPLIANCE

Title I

Disposal: Vertical surface at hydraulically downgradient limit of the disposal site that extends down into the uppermost aquifer underlying the site.

Cleanup: Any point where contamination is found in groundwater.

Title II

Site-specific location in the uppermost aquifer where the groundwater protection standard must be met.

POINT OF EXPOSURE

Locations where humans, wildlife or other environmental species could reasonably be exposed to hazardous constituents from the groundwater in the uppermost aquifer.

POST-DISPOSAL PERIOD

Period of time beginning immediately after the completion of the requirements of Subpart A and ending at the completion of of the monitoring requirements established under Section 192.02(b).

REFERENCE DOSE (RfD)

Amount (in mg/kg) of noncarcinogenic substance to which humans can be exposed on a daily basis without suffering any adverse health effect.

RISK-SPECIFIC DOSE

Amount of a particular carcinogenic substance to which humans can be exposed without increasing their risk of contracting cancer above a specified risk level.

ENCLOSURE 5

TITLE I REGULATIONS, 40 CFR 192, SUBPARTS A-C

Thursday
September 24, 1987



Part III

**Environmental
Protection Agency**

40 CFR Part 192

Standards for Remedial Actions at
Inactive Uranium Processing Sites;
Proposed Rule

**ENVIRONMENTAL PROTECTION
AGENCY**
40 CFR Part 192
(FR 3227-6)
**Standards for Remedial Actions at
Inactive Uranium Processing Sites**
AGENCY: U.S. Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency is proposing health and environmental regulations to correct and prevent contamination of ground water beneath and in the vicinity of inactive uranium processing sites by uranium tailings. EPA issued regulations (40 CFR Part 192 Subparts A, B, and C) for cleanup and disposal of tailings from these sites on January 5, 1983. These new regulations would replace existing provisions at 40 CFR 192.20(a) (2) and (3) that were remanded by the Tenth Circuit Court of Appeals on September 3, 1985. They are proposed pursuant to section 275 of the Atomic Energy Act (42 U.S.C. 2022), as amended by Section 206 of the Uranium Mill Tailings Radiation Control Act of 1978 (Pub. L. 95-604) (UMTRCA).

The regulations would apply to tailings at the 24 locations that qualify for remedial action under Title I of Pub. L. 95-604. They provide that tailings must be stabilized and controlled in a manner that permanently eliminates or minimizes contamination of ground water beneath stabilized tailings, so as to protect human health and the environment. They also provide for cleanup of contamination that existed before the tailings are stabilized.

DATES: *Comments.* Comments on this Notice of Proposed Rulemaking will be accepted until October 28, 1987.

Hearing. A Public Hearing will be held on October 29, 1987 at 9:00 a.m. (see below).

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Central Docket Section (LE-130), U.S. Environmental Protection Agency, Attention: Docket Number R-87-01, Washington, DC 20460. The Docket is available for public inspection between 8:00 a.m. and 3:00 p.m., Monday through Friday, at EPA's Central Docket Section (LE-130), West Tower Lobby, 401 M Street SW., Washington, DC. A reasonable fee may be charged for copying.

Hearing. A Public Hearing will be held at the Strater Hotel, 999 Main Ave., Durango, Colorado 81301. Requests to participate should be made in writing to Floyd L. Galpin, Acting Director, Criteria

and Standards Division (ANR-460), U.S. Environmental Protection Agency, Washington, DC 20460. All requests should include an outline of the topics to be addressed and names of the participants. Oral presentations should be limited to a maximum of 30 minutes. Presentations may also be made without prior notice, but may be subjected to time constraints at the discretion of the hearing officer. Written comments made during or in conjunction with the oral presentations will be accepted after the hearing for a period of time to be announced at the hearing.

FOR FURTHER INFORMATION CONTACT: Kurt L. Feldmann, Guides and Criteria Branch (ANR-460), Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, DC 20460; telephone number (202) 475-9620.

SUPPLEMENTARY INFORMATION:
I. Supporting Document

A report ("Draft Background Information Document—Proposed Standard for the Control of Contamination in Ground Water in the Vicinity of Inactive Uranium Mill Sites," EPA 520/1-87-014) has been prepared to support these proposed regulations. Single copies may be obtained from the Program Management Office (ANR-453), Office of Radiation Programs, Environmental Protection Agency, Washington, DC 20460; (202) 475-8386.

The report contains a brief history of the Title I sites, a summary of the types and quantities of ground-water contamination present at sites for which such data are available, where and over what period of time the contamination is projected to disperse in the absence of control, and a description of alternate ground-water contamination control and cleanup technologies and their associated costs. An analysis of information supporting the decisions reflected in this proposed standard completes the report.

II. Scope of this Proposed Rulemaking

On November 8, 1978, Congress enacted the Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. 95-604 (henceforth called "UMTRCA"). In UMTRCA, Congress enunciated its finding that uranium mill tailings "... may pose a potential and significant radiation health hazard to the public, and ... that every reasonable effort should be made to provide for stabilization, disposal, and control in a safe and environmentally sound manner of such tailings in order to prevent minimize radon diffusion into the environment and to prevent or minimize

other environmental hazards from such tailings." The Act directs the Administrator of the Environmental Protection Agency (EPA) to set "... standards of general application for the protection of the public health, safety, and the environment ..." to govern this process of stabilization, disposal, and control.

UMTRCA directs the Department of Energy (DOE) to conduct such remedial actions at the inactive uranium processing sites as will insure compliance with the standards established by EPA. This remedial action is to be selected and performed with the concurrence of the Nuclear Regulatory Commission (NRC).

Standards are required for two types of remedial action: disposal and cleanup. Here disposal is used to mean the operation which places tailings in a permanent condition that will minimize risk to people and harm to the environment. Cleanup is the operation which eliminates or reduces to acceptable levels the potential health and environmental consequences of tailings or their constituents that have been dispersed from tailings piles by natural forces or people prior to disposal.

On January 5, 1983, EPA promulgated final standards for the disposal and cleanup of the inactive mill tailings sites under UMTRCA (48 FR 590). These standards were challenged in the Tenth Circuit Court of Appeals by several parties (Case Nos. 83-1014, 83-1041, 83-1206, and 83-1300). On September 3, 1985, the court dismissed all challenges except one: it set aside the ground-water provisions of the regulations at 40 CFR 192.20(a)(2)-(3) and remanded them to EPA "... to treat these toxic chemicals that pose a ground-water risk as it did in the active mill site regulations." With this notice, EPA is proposing new regulations to replace those set aside.

III. Summary of Background Information

Beginning in the 1940's, the U.S. Government purchased large quantities of uranium for defense purposes. As a result, large piles of tailings were created by the uranium milling industry. Tailings piles pose a hazard to public health and the environment because they contain radioactive and toxic constituents which emanate radon to the atmosphere and may leach into ground water. Tailings are a sand-like material, and have also been removed from tailings piles in the past for use in construction and for soil conditioning. These uses are inappropriate, because the radioactive and toxic constituents of tailings may elevate indoor radon levels.

expose people to gamma radiation, and leach into ground and surface waters.

Most of these mills are now inactive and many are abandoned. Congress designated 22 specific inactive sites in Title I of UMTRCA, and the DOE subsequently added 2 more. Most other uranium tailings sites are regulated by the NRC or States under Title II of UMTRCA (DOE owns one inactive site at Monticello, Utah, that is not included under UMTRCA). The Title I sites are all located in the West, predominantly in arid areas, except for a single site at Canonsburg, Pennsylvania. Tailings piles at the inactive sites range in area from 5 to 150 acres and in height from only a few feet to as much as 230 feet. The amount at each site ranges from residual contamination to 2.7 million tons of tailings. The 24 designated Title I sites combined contain about 26 million tons of tailings covering a total of about 1000 acres.

The disposal of tailings at these sites is currently being carried out by DOE under the provisions of Title I of UMTRCA. In addition, tailings that were dispersed from the piles by natural forces, or that have been removed for use in or around buildings, or on land, are being retrieved and replaced on the tailings piles prior to their disposal.

UMTRCA requires that DOE complete all these remedial actions within 7 years of the effective date of EPA's standards; that is by March 5, 1990. Remedial actions have been completed at the Canonsburg, Pennsylvania, pile, the only site in an area of high precipitation, and at Shiprock, New Mexico. Remedial actions are currently well advanced at two other sites: Salt Lake City, Utah and Lakeview, Oregon. Work is expected to begin at approximately six others during 1987-1988. In view of the rate of progress with remedial work, the DOE is requesting a legislative extension of the completion date until September 1993.

The most important hazardous constituent of uranium mill tailings is radium, which is radioactive. Other potentially hazardous substances in tailings piles include arsenic, molybdenum, selenium, uranium, and usually in lesser amounts, a variety of other toxic substances. The concentrations of these materials vary from pile to pile, ranging from 2 to more than 100 times applicable standards. Although a variety of organics are known to have been used at these sites, none has thus far been detected in tailings.

Exposure to radioactive and toxic substances may cause cancer and other diseases, as well as genetic damage and teratogenic effects. Tailings pose a risk to health because: (1) Radium in tailings

decays into radon, a gaseous radioactive element which is easily transported in air, and whose radioactive decay products may lodge in the lungs; (2) individuals may be directly exposed to gamma radiation from the radioactivity in tailings; and (3) radioactive and toxic substances from tailings may leach into water and then be ingested with food or water. It is the last of these hazards that is primarily addressed here. (Although radon from radium in ground water is unlikely to pose a hazard in these locations, these proposed standards would also address that potential hazard.) The other hazards are covered by existing provisions of 40 CFR Part 192.

We have based our analysis on detailed reports for 12 of the 24 inactive uranium mill tailings sites that have been developed to date for the Department of Energy by its contractors. Preliminary data for the balance of the sites have also been examined. These data show that the volume of contaminated water in the underlying aquifers at the 24 sites ranges from 25 million gallons to 4 billion gallons. In a few instances, mill effluent was apparently the sole source of this ground water. Each of the 12 sites examined in detail have ground-water contamination beneath and/or beyond the site. In some cases, the ground water up gradient of the pile already exceeded EPA drinking water standards for one or more contaminants, thus making it unsuitable for use as drinking water and, in some extreme cases, for any other purpose before it was contaminated by effluent from the mill. Some contaminants from the tailing piles are moving offsite quickly and others are moving slowly. The time for natural flushing of the contaminated portions of these aquifers is estimated to vary from several years to many hundreds of years.

Contaminants that have been identified in the ground water downgradient from a majority of the sites include uranium, sulfate, iron, manganese, nitrate, chloride, molybdenum, selenium, and total dissolved solids. Radium, cobalt, arsenic, fluoride, chromium, cadmium, ammonium, boron, vanadium, lead, thorium, zinc, silver, copper, and magnesium, have also been found in the ground water at one or more sites.

UMTRCA requires that the standards established under Title I provide protection that is consistent, to the maximum extent practicable, with the requirements of the Resource Conservation and Recovery Act (RCRA). In this regard, regulations established by EPA for hazardous waste disposal sites under RCRA provide for

the specification of ground-water protection limits for the specific hazardous constituents relevant to each regulated unit in permits. These regulations contain general numerical limits for some constituents in ground water; limits for other constituents are set at their background level in ground water at the regulated unit. Together with a provision for the point of compliance, these limits become the facility's ground-water protection standard, unless alternate concentration limits (ACLs) are approved. ACLs may be requested based upon data which would support a determination that, if the ACL is satisfied, the constituent would not present a current or potential threat to human health or the environment.

IV. The Proposed Standards

The proposed standards consist of two parts: a first part governing the control of any future ground-water contamination that may occur from tailings piles after disposal, and a second part that applies to the cleanup of contamination that occurred before disposal of the tailings piles.

A. The Ground-Water Standard for Disposal

The proposed standard (Subpart A) for control of potential contaminant releases to ground water after disposal is divided into two parts that separately address actions to be carried out during period of time designated as the remedial and post-disposal periods. The remedial and post-disposal periods are defined in a manner analogous to the closure and post-closure periods, respectively, in RCRA regulations. However, there are some differences regarding their duration and the timing of any corrective actions that may become necessary due to failure of disposal to perform as designed. (Because there are no mineral processing activities currently at these inactive sites, standards are not needed for an operational period.) The remedial period, for the purpose of this regulation, is defined as that period of time beginning on the effective date of the original Part 192 (Title I) standard (March 7, 1983) and ending with completion of remedial actions by DOE. The post-disposal period begins with completion of remedial actions and ends after an appropriate period for the monitoring of ground water to confirm the adequacy of the disposal, as determined by NRC for each site. The proposed ground-water standard for the disposal to be carried out during the remedial period adopts relevant

paragraphs from Subpart F of Part 264 of this Chapter (§§ 264.92-264.95). The proposed standard for the post-disposal period adopts § 264.111 (a) and (b) of this Chapter, and also incorporates provisions for monitoring and a corrective action program. These provisions are essentially the same as those governing the licensed (Title II) uranium mill tailings sites (40 CFR 192, Subparts D and E; see also the Federal Register notices for these standards published on April 29, 1983 and on October 7, 1983). However, additional constituents are here proposed to be regulated (in addition to the general RCRA list of hazardous constituents and table of applicable limits) that are applicable to these sites only.

These proposed regulations would require installation of monitoring systems upgradient of the point of compliance (i.e., in the uppermost aquifer upgradient of the edge of the tailings disposal site) to determine background levels of any listed constituents that occur naturally at the site. The disposal would then be designed to control, to the extent reasonably achievable for 1000 years and, in any case, for at least 200 years, all listed constituents identified in the tailings at the site to levels for each constituent derived in accordance with § 264.94. Accordingly, the elements of the ground-water protection standard to be specified for each disposal site would include a list of relevant constituents, the concentration limits for each such constituent, and the compliance point.

To obtain an ACL for any constituent, the DOE would have to provide data to support a finding that the presence of the constituent at the proposed ACL in ground water at the site would not pose a substantial present or potential hazard to human health or the environment. ACLs could be granted provided that, after considering practicable corrective actions, a determination can be made that it satisfies the lower of the values given by the standard for setting ACLs in § 264.94(b), and the corrective action that is as low as reasonably achievable (ALARA).

The standards of Title II sites require use of a liner under new tailings piles or lateral extensions of existing piles. These standards for remedial action at the inactive Title I sites do not contain a similar provision. We assume that the inactive piles will not need to be enlarged. Several, however, will be relocated. However, unlike tailings at the Title II sites, which generally may contain large amounts of process water, the inactive tailings contain little or no free water. Such tailings, if properly

located and stabilized with an adequate cover, are not likely to require a liner in order to protect ground water.

However, a liner may be required to satisfy the proposed ground-water standards in situations where tailings now, or may in the future, contain water above the level of specific retention. For example, tailings to which water is added to facilitate their removal to a new site (i.e., through slurring) or piles in areas of high precipitation or within the zone of water table fluctuation could discharge contaminants to ground water. Under § 192.20(a)(2) of these proposed standards, it would be necessary for the DOE, with the concurrence of the NRC, to propose and carry out a disposal design in such circumstances which uses a liner or equivalent to assure that ground water would not be contaminated and, at the same time, satisfy the existing requirements of these standards for control of radon emissions. In such circumstances, this may be accomplished by installing a liner beneath the tailings whose permeability is greater than that of the cover material. If the tailings form an acid solution when mixed with water, a neutralizing material mixed with the tailings or added to the liner are additional methods that may need to be considered to fix listed constituents in the immediate vicinity of a pile. In addition, a capillary break may be necessary to prevent migration of water into a pile from below. Currently, however, DOE plans do not include slurring any tailings to move them to new locations. Further, for all but one site that has already been closed (Canonsburg), the tailings are located in arid areas where annual precipitation is low.

Disposal designs which prevent migration of listed constituents in the ground water for a short period of time would not provide appropriate protection. Such approaches simply defer adverse ground-water effects. Therefore, measures which only modify the gradient in an aquifer or create barriers (e.g., slurry walls) would not of themselves provide an adequate disposal. Where feasible, it may be appropriate to protect ground water by preventing generation of leachate containing listed constituents. A method that appears promising is fixing the constituents *in situ* (in place) so they cannot be leached out. *In situ* treatment of constituents may be considered analogous to removal when it provides long-term protection of human health or the environment. While the Agency recognizes that *in situ* treatment is an

emerging technology, applied in only limited circumstances to date, it should be considered where it can provide an effective ground-water protection strategy.

At the end of the remedial period (i.e., when disposal and any cleanup required under Subpart B has been completed), ground waters would be required to be in compliance with the standards established pursuant to these regulations. During the post-disposal period, the regulations would further require that methods used for disposal provide a reasonable expectation that the provisions of § 264.111 (a) and (b) will be met. Paragraph 264.111(a) requires that a site be closed in a manner that minimizes further maintenance. Paragraph 264.111(b) requires control, minimization, or elimination of post-disposal escape of listed constituents to ground or surface water to the extent necessary to prevent threats to human health and the environment. In the context of these regulations, this would mean control pursuant to the standards established under §§ 264.92-264.95. Depending on the properties of the sites, candidate disposal systems, and the effects of natural processes over time, measures required to satisfy the proposed standards would vary from site to site. Actual site data, computational models, and prevalent expert judgment would be used in deciding that proposed measures will satisfy the standards. Under the provisions of section 108(a) of UMTRCA, the adequacy of these judgments would be determined by the NRC.

During the post-disposal period, monitoring of the disposal would be required for a period sufficient to verify the adequacy of the disposal to achieve its design objectives for containment of listed constituents. This period is intended to be comparable to the time period required under § 264.117 for waste sites regulated under RCRA (i.e., a few decades). It is not intended that monitoring be carried out for the 200- to 1000-year period over which the disposal is designed to be effective.

If listed constituents from a disposal site appeared during the post-disposal period in excess of the ground-water standards for disposal, the proposed regulations would require a corrective action program designed to bring the disposal and the ground water back into compliance. Such a corrective action would have to last as long as is necessary to achieve conformance with the ground-water protection standard, and include a modification of the monitoring program sufficient to

demonstrate that the corrective measures will be permanently successful.

Additional Regulated Constituents

For the purpose of this regulation only, the Agency proposes to regulate, in addition to the hazardous constituents referenced by § 264.93: molybdenum, nitrate, combined radium-226 and radium-228, and combined uranium-234 and uranium-238. Molybdenum, radium, and uranium were addressed by the Title II standards because these radioactive and/or toxic constituents are found in high concentrations at many mill tailings sites. Nitrate is proposed for addition because it has been identified in concentrations far in excess of drinking water standards in ground water at a number of the inactive sites.

The proposed concentration limit for molybdenum in ground water from uranium tailings is 0.10 milligram per liter. This is the value of the provisional adjusted acceptable daily intake (AADI) for drinking water developed by EPA under the Safe Drinking Water Act (50 FR 46958). The Agency has proposed neither a maximum concentration limit goal (MCLG) nor a maximum concentration limit (MCL) for molybdenum because it occurs only infrequently in water. According to the most recent report of the National Academy of Sciences (*Drinking Water and Health*, 1980, Vol. III), molybdenum from drinking water, except for highly contaminated sources (e.g., molybdenum mining wastewater) is not likely to constitute a significant portion of the total human intake of this element. However, since uranium tailings can be a highly concentrated source of molybdenum, it is appropriate to include a standard for molybdenum in this proposed rule. In addition to the hazard to humans, our analysis of toxic substances in tailings in the Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (EPA 520/4-82-013-1) found that, for ruminants, molybdenum in concentrations greater than 0.5 ppm in drinking water would lead to chronic toxicity.

The proposed limit for combined uranium-234 and uranium-238 due to contamination from uranium tailings is 30 pCi per liter. At this concentration, the estimated lifetime radiation risk of fatal cancer would be the same as that for the existing ground water standard for combined radium-226 and radium-228 (5 pCi per liter) (51 FR 34836), based on dose assessments for ingestion as determined by the International Commission on Radiological Protection.

This proposed limit would apply to remedial actions for uranium tailings under these regulations only; the Agency has not made a proposal for a general standard for isotopes of uranium in water. However, this limit is within the range of values currently under consideration for drinking water.

The proposed concentration limit for nitrate (as nitrogen) is 10 mg per liter. This is the value of the interim drinking water standard for nitrate.

B. The Cleanup Standard

With the exception of the point of compliance provision, the proposed standard (Subpart B) for cleanup of contaminated ground water contains identical basic provisions (§§ 264.92-.94) as the standard for disposal in Subpart A. In addition, it provides for the establishment of supplemental standards under certain conditions and for use of institutional control to permit passive restoration through natural flushing when no community drinking water source is involved.

The standards do not specify a single point of compliance for the cleanup of ground water that has been contaminated by residual radioactive materials from uranium milling before final disposal. Instead, the "point of compliance" is any point where contamination is found in the ground water. The standard requires DOE to establish a monitoring program to determine the extent of contamination (§ 192.12(c)(1)) in ground water around a processing site (§ 192.11(b)). The possible presence of any of the inorganic or organic hazardous constituents identified in tailings or used in the processing operation should be assessed. The remedial action plan referenced under § 192.20(b)(4) would document the extent of contamination, the rate and direction of movement of contaminants, and consider future movement of the plume.

The proposed cleanup standards would normally require restoration of all contaminated ground water to the levels provided for under § 264.94. These levels are either background concentrations, the levels specified in Tables 1 and A, or ACLs. In cases where the ground water is not classified as Class III, any ACL should be determined under the assumption that the ground water may be used for drinking purposes.

In certain circumstances, however, supplemental standards set at levels that assure, at a minimum, protection of human health and the environment, and come as close to meeting the otherwise applicable standards as is reasonably achievable by remedial actions could be granted if:

- The ground water at the site is Class III (See definitions, § 192.11(e)) in the absence of contamination from tailings; or
- Complete restoration would cause more environmental harm than it would prevent; or
- Complete restoration is technically impracticable from an engineering perspective.

The use of supplemental standards for Class III ground water would apply the ground water classification system established in EPA's 1984 Ground Water Protection Strategy. Procedures for classifying ground water are presented in "Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy" released in final draft in December 1986 and due to be finalized during late 1987. Under these draft guidelines, Class I ground waters encompass highly vulnerable resources of particularly high value, e.g., an irreplaceable source of drinking water or ecologically vital ground water. Class II ground water include all non-Class I ground water that is currently used or is potentially adequate for drinking water. Class III encompasses ground waters that are not a current or potential source of drinking water due to widespread, ambient contamination caused by natural or human-induced conditions, or cannot provide enough water to meet the needs of an average household. Human-induced conditions would not include the contribution from the uranium mill tailings. At sites with Class III ground water, the proposed supplemental standards would require only such management of contamination due to tailings as would be required to prevent additional adverse impacts on human health and the environment from that contamination. For example, if the additional contamination from the tailings would cause an adverse effect on Class II ground water that has a significant interconnection with the Class III ground water over which the tailings reside, then the additional contamination from the tailings would have to be abated.

Supplemental standards may also be appropriate in certain other cases similar to those addressed in section 121(d)(4) of the Superfund Amendments and Reauthorization Act of 1980 (SARA). SARA recognizes that cleanup of contamination could sometimes cause environmental harm disproportionate to the health effects it would alleviate. For example, if fragile ecosystems would be impaired by any reasonable restoration process (or by carrying a restoration process to extreme lengths to remove small amounts of residual

contamination), then it might be prudent to protect them in lieu of completely restoring ground-water quality. Decisions regarding tradeoffs of environmental damage can only be based on characteristics peculiar to the location. We do not know whether there are such situations in the UMTRCA program, but we believe that DOE should be permitted to propose supplemental standards in such situations, after thorough investigation and consideration of all reasonable restoration alternatives, for concurrence by the NRC.

Based on currently available information, we are not aware that at least substantial restoration of ground-water quality is technically impracticable from an engineering perspective at any of the designated sites. However, our information may be incomplete. We believe DOE should not be required to institute active measures that would completely restore ground water at these sites if such restoration is technically impracticable from an engineering perspective, and if, at a minimum, protection of human health and the environment is assured. Consistent with the provisions of SARA for remediation of waste sites generally, the proposed standards would therefore permit DOE to propose supplemental standards in such situations at levels achievable by site-specific alternate remedial actions that are technically practicable. The concurrence role of the NRC would also apply to such proposals. A finding of technical impracticability from an engineering perspective would require careful and extensive documentation, including an analysis of the degree to which remediation is practicable. It should be noted that the word "practicable" is not identical in meaning to the word "practical." As used here, the former means "able to be put into practice" and the latter means "cost-effective." In addition to documentation of technical matters related to cleanup technology, DOE would also have to include a detailed assessment of such site-specific matters as transmissivity of the geologic formation, contaminant properties (e.g., withdrawal and treatability potential), and the extent of contamination.

Finally, for aquifers where passive restoration can be projected to occur naturally within a period less than 100 years, and where the ground water is not now and is not now projected to be used for a community water supply within this period, we propose to allow extension of the remedial period to that time, provided satisfactory institutional control of public use of ground water

and an adequate monitoring program is established and maintained throughout this extended remedial period.

The proposal to allow extension of the remedial period to permit reliance on passive restoration through natural flushing is based on the judgment that no active cleanup is warranted to restore ground-water quality where ground-water concentration limits will be met within a period no greater than 100 years through natural processes and no substantial use of the water exists or is projected, if institutional control is established that will effectively protect public health in the interim. This mechanism may also be a useful supplement for situations where active cleansing to completely achieve the standards is impracticable, environmentally damaging, or excessively costly, if the partially cleansed ground water can achieve the levels required by the standards through natural flushing within an acceptable extended remedial period. Alternate standards would not be required where final cleanup is to be accomplished through natural flushing, since those established under § 264.94 would be met at the end of the remedial period.

The proposed regulations would establish a time limit on such extension of the remedial period to limit reliance on extended use of institutional controls to control public access to contaminated ground water. Following the precedent established by our final rule for high-level radioactive wastes (40 CFR 191.14(a)), it is proposed that use of institutional controls be permitted for this purpose only when they will be needed for periods of less than 100 years. Otherwise, active restoration rather than passive restoration through reliance on natural flushing would be required.

Institutional controls must be effective over the entire period of time that they would be in use. Examples of acceptable measures include legal use restrictions enforceable by permanent government entities, or measures with a high degree of permanence, such as Federal or State ownership of the land containing the contaminated water. In some instances, a combination of institutional controls may have to be used at the same time to provide adequate protection, such as providing an alternate source of drinking water and placing a deed restriction on the property to prevent use of contaminated ground water. Institutional controls that would not be adequate are measures such as health advisories, signs, postcards, admonitions, or any other measure that requires the voluntary cooperation of private parties.

In all cases in which DOE proposes to use institutional controls, the measures must have a high probability of protecting the human health and the environment and must receive the concurrence of the NRC.

Restoration methods for ground water include removal methods, wherein the contaminated water is removed from the aquifer, treated, and either disposed of, used, or reinjected into the aquifer, and *in situ* methods, such as the addition of chemical or biological agents to fix the contamination in place. Appropriate restoration methods will depend on characteristics of specific sites and may involve use of a combination of methods. Water can be removed from an aquifer by pumping it out through wells or by collecting the water from intercept trenches. Slurry walls can sometimes be put in place to contain contamination and prevent further migration of contaminants, so that the volume of contaminated water that must be treated is reduced. The background information document contains a more extensive discussion of candidate restoration methods.

We have reviewed preliminary information on all 24 sites and detailed information on 12 of the 24 to make a preliminary assessment of the extent of potential applicability of the proposed supplemental standards and use of passive remediation under institutional control. Based on these analyses, none of the pre-existing ground water beneath uranium mill tailings piles falls into Class I. Approximately two-thirds of the sites appear to be over Class II and the balance over Class III ground waters. The rate at which natural flushing is occurring at three or four of the 24 sites would permit consideration of passive remediation under institutional control as the sole remedial method. We are not able to predict the applicability of provisions regarding technical impracticability or excess environmental harm, since this requires detailed analysis of specific sites, but we anticipate that wide application would be unlikely. It is emphasized that the above assessments are not based on final results for the vast majority of these sites, and is, therefore, subject to change.

RCRA regulations provide that, for disposal units regulated by EPA under RCRA, the constituents to be included in the ground water protection standard (§ 264.93) and acceptable concentrations of each (§ 264.94) are decided by the Regional Administrator of EPA. The regulations also provide for ACLs to be issued by the Regional Administrator. The criteria to be considered when

issuing ACLs are listed in § 264.94(b). EPA's regulations under Title II of UMTRCA provide that the NRC, which regulates active sites, replace the EPA Regional Administrator for the above functions when any contamination permitted by an ACL will remain on the licensed site. Because section 108(a) of UMTRCA requires the Commission's concurrence with DOE's selection and performance of remedial actions to conform to EPA's standards, we propose that the Nuclear Regulatory Commission administer all such functions for Title I, including concurrence on supplemental standards.

C. Request for Comments

The Agency solicits comment on this entire proposed rule. In addition, we are particularly interested in receiving comments and recommendations on the following issues:

1. Should a liner requirement always be imposed on tailings piles that are moved to a new location? Should a liner be required only if the DOE or the NRC conclude that it is needed to satisfy the ground-water standards for disposal?
2. For designated processing sites from which tailings have been removed, is a specific requirement that DOE clean up the ground water before releasing the land to State or private owners needed to assure that such cleanup will occur?
3. Should institutional controls be relied upon, for a limited time, to prevent access of the public to ground water in order to permit use of natural flushing of contaminants, as proposed? If so, what types of institutional controls should be allowed? Should these be specified in the rule? Is the proposed time period appropriate?
4. Should the option to make use of natural flushing for cleansing of contaminants be limited to cases where some restoration of the ground water has already been carried out? Should the use of an alternate concentration limit (ACL) be permitted, as proposed, in the case of clean up to be achieved (in whole or part) by natural flushing?
5. Are the proposed bases for supplemental standards for cleanup reasonable and adequate for the protection of public health? Should other bases be provided and, if so, what are they? Should the provisions for natural flushing and supplemental standards for cleanup apply only to existing contamination or should they also apply, as proposed, to "new" contamination due to failure of the disposal design to perform as intended?
6. Under these proposed standards, alternate concentration limits would be concurred in by the NRC. Should EPA establish generic criteria and/or

guidance governing the application of the provisions of § 264.94(b) of this Part to these judgments for these standards?

7. Should EPA publish, as part of this standard, a restricted list of just those radioactive and toxic constituents that are present at these sites, or continue to rely on the entire list (supplemented as proposed) of constituents encompassed by RCRA regulations? Should the proposed list of additional listed constituents be changed?

8. EPA could consider publishing a restricted list of just those radioactive and toxic constituents that are principal contaminants at these sites and specifying a limit for each of these, under the assumption that any minor contaminants would be taken care of in the cleanup of these principal contaminants. With such a restricted set of constituents and corresponding complete set of limits, EPA could then consider dropping the provisions for ACLs and relying solely on the remaining provisions for exceptional cases. Should EPA adopt this approach?

9. Should EPA specify a minimum or the entire period for post-disposal ground-water monitoring in Subpart A, or leave it to the DOE and NRC to determine this period on a site-specific basis, as proposed? If EPA should specify a period, what length would be appropriate to demonstrate conformance to the disposal design standard, and on what basis should this value be chosen?

10. For tailings regulated by NRC under Title II of the Act, section 84(a)(3) requires the NRC to develop regulations to conform to general requirements applicable to the possession, transfer, and disposal of hazardous materials regulated by the Administrator. Should the standards proposed here incorporate such requirements for tailings regulated under Title I?

11. Is it appropriate to base the uranium contaminant limit on radioactivity alone or should the chemical toxicity of uranium result in a more restrictive value?

12. Should the Agency consider revising the Title II regulations to incorporate those portions of the Title I regulations that are different from the Title II regulations, e.g., the additional contaminant limits in Table A?

13. Are the estimated costs of implementing these proposed standards accurate and based on reasonable assumptions?

14. What criteria should be used to judge "technically impracticable from an engineering perspective?" Can and should these criteria be specified in the rule or should they be left to the judgment of the Department of Energy

and the Nuclear Regulatory Commission?

15. The criteria proposed here to specify ground water as Class III, and therefore qualified for supplemental standards, are based on draft proposals still under consideration by the Agency. Are these criteria appropriate for this application, or would others be more appropriate for use at these sites?

V. Implementation

UMTRCA requires the Secretary of Energy to select and perform the remedial actions needed to implement these standards, with the full participation of any State that shares the cost. The NRC must concur with these actions and, when appropriate, the Secretary of Energy must also consult with affected Indian tribes and the Secretary of the Interior.

The cost of remedial actions will be borne by the Federal Government and the States as prescribed by UMTRCA. The clean-up of ground water is a large-scale undertaking for which there is relatively little experience. Ground-water conditions at the inactive processing sites vary greatly, and, as noted above, engineering experience with some of the required remedial actions is limited. Although preliminary engineering assessments have been performed, specific engineering requirements and costs to meet the ground-water standards at each site have yet to be determined. We believe that costs averaging about 12 million (1986) dollars for each tailings site at which extensive cleanup is required are most likely.

The benefits from the cleanup of this ground water are difficult to quantify. We expect that, in a few instances, ground water that was unusable due to contamination from tailings piles and needed for use will be restored. In the areas where the tailings were processed, ground water is relatively scarce due to the arid condition of the land. However, most of the contamination at these sites occurs in shallow alluvial aquifers, which have limited current use in these locations because of their generally poor quality and the availability of better water from deeper aquifers.

Implementation of the disposal standard for protection of ground water will require a judgment that the method chosen provides a reasonable expectation that the provisions of the standard will be met, to the extent reasonably achievable, for up to 1000 years and, in any case, for at least 200 years. This judgment will necessarily be based on site-specific analyses of the properties of the sites, candidate

disposal systems, and the potential effects of natural processes over time. Therefore, the measures required to satisfy the standard will vary from site to site. We expect that actual site data, computational models, and expert judgment will be the major tools in deciding that a proposed disposal system will satisfy the standard.

The purpose of the proposed ground-water cleanup standard is to provide the maximum reasonable protection of public health and the environment. Costs incurred by remedial action should be directed toward this purpose. We intend the standards to be implemented using verification procedures whose cost and technical requirements are reasonable. Procedures that provide a reasonable assurance of compliance with the standards will be adequate. Measurements to assess existing contamination and to determine compliance with the cleanup standards should be performed with reasonable survey and sampling procedures designed to minimize the cost of verification.

The explanatory discussions regarding implementation of these regulations in § 192.20 (a)(2) and (a)(3) are revised to remove those provisions that the Court remanded and to reflect these new proposals.

These standards are not expected to affect the disposal work DOE has already performed on tailings. We expect, in general, that a pile that has been properly designed to comply with the disposal standards now in effect for long term stabilization and control of radon emanation from a pile will also comply with these disposal standards for the control of ground-water contamination. DOE will have to determine, with the concurrence of the NRC, if any additional work may be needed to comply with the ground-water cleanup requirements. However, any such cleanup work should not adversely affect the control systems for tailings piles that have already been or are currently being installed.

VI. Regulatory Impact Analysis/Regulatory Flexibility

Under Executive Order 12291, EPA must judge whether a regulation is "Major" and therefore subject to the requirement of a Regulatory Impact Analysis. That order requires such an analysis if the regulations would result in (1) an annual effect on the economy of \$100 million or more; (2) a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies or geographic regions; or (3)

significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

This proposed regulation is not Major, because we expect the costs of the remedial action program for ground water in any calendar year to be less than \$100 million; States bear only 10% of these costs and there are no anticipated major effects on costs or prices for others; and we anticipate no significant adverse effects on domestic or foreign competition, employment, investment, productivity, or innovation. Estimated costs under these proposed regulations are discussed in the Background Information Document.

This proposed regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291.

This rule does not contain any information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980 U.S.C. 3501, et seq.

This proposed regulation will not have a significant effect on a substantial number of small entities, as specified under section 605 of the Regulatory Flexibility Act, because there are no small entities subject to this regulation.

Dated: September 10, 1987.

Lee M. Thomas,
Administrator.

List of Subjects in 40 CFR Part 192

Environmental protection, Radiation protection, Uranium.

For reasons set forth in the preamble, 40 CFR Chapter I, Part 192, Subparts A, B and C are proposed to be amended as follows:

PART 192—HEALTH AND ENVIRONMENTAL PROTECTION STANDARDS FOR URANIUM MILL TAILINGS

1. The authority citation for Part 192 continues to read as follows:

Authority: Section 275 of the Atomic Energy Act of 1954, 42 U.S.C. 2022, as added by the Uranium Mill Tailings Radiation Control Act of 1975 as amended, Pub. L. 95-604.

Subpart A—Standards for the Control of Residual Radioactive Materials From Inactive Uranium Processing Sites

2. Section 192.01 is amended by revising paragraph (a) and adding

paragraphs (g), (h), (i), and (j) to read as follows:

§ 192.01 Definitions.

(a) Unless otherwise indicated in this subpart, all terms have the same meaning as in Title I of the Act. Reference to Part 264 of the Code of Federal Regulations is to that Part as codified on January 1, 1983. [These references will be replaced by the complete text in the final rule.]

(g) *Remedial period* means the period of time beginning March 7, 1983 and ending with the completion of requirements specified under a remedial action plan.

(h) *Remedial Action Plan* means a written plan for a specific site that incorporates the results of site characterization studies, environmental assessments or impact statements, and engineering assessments into a plan for disposal and cleanup which satisfies the requirements of Subparts A and B.

(i) *Post disposal period* means the period of time beginning immediately after the completion of the requirements of Subpart A and ending at completion of the monitoring requirements established under § 192.02(b).

(j) *Ground water* is subsurface water within a zone in which substantially all the voids are filled with water under pressure equal to or greater than that of the atmosphere.

3. Section 192.02 is amended by redesignating and revising the introductory text as paragraph (a); paragraph (a) is redesignated as paragraph (a)(1); paragraph (b) introductory text is redesignated as paragraph (a)(2); paragraph (b)(1) is redesignated as paragraph (a)(2)(i); paragraph (b)(2) is redesignated as paragraph (a)(2)(ii); and paragraphs (a)(3), (a)(4), (b) and (c) are added to read as follows:

§ 192.02 Standards.

(a) Control of residual radioactive materials and their listed constituents shall be designed to:

(3) Conform to the ground-water protection provisions of §§ 264.92–264.95 of Part 264 of this chapter, except that, for the purposes of this subpart:

(i) To the list of constituents referenced in § 264.93 of this chapter are added molybdenum, radium, uranium, and nitrate.

¹ Because the standard applies to design, monitoring after disposal is not required to demonstrate compliance. This footnote applies only to § 192.02(a)(1) and (2).

(ii) To the concentration limits provided in Table 1 of § 264.94 of this chapter are added the constituent limits in Table A of this subpart.

TABLE A.

Constituent	Limit
Combined radium-226 and radon-226	5 pCi/liter.
Combined uranium-234 and uranium-238	30 pCi/liter.
Gross alpha-particle activity (excluding radon and uranium)	15 pCi/liter.
Nitrate ion (N)	10 mg/liter.
Molybdenum	0.1 mg/liter.

(iii) The Secretary shall determine what listed constituents are present in the tailings at a disposal site.

(iv) A monitoring program shall be established upgradient of the disposal site adequate to determine background levels of listed constituents.

(v) The Secretary may propose and, with the Commission's concurrence, apply alternate concentration limits, provided that, after considering practicable corrective actions, the Commission determines that these are as low as reasonably achievable, and that, in any case, § 264.94(b) is satisfied, and

(vi) The functions and responsibilities designated in referenced paragraphs of Part 264 of this chapter as those of the "Regional Administrator" with respect to "facility permits" shall be carried out by the Commission.

(4) Comply with the performance standard in § 264.111 (a) and (b) of this chapter.

(b) The Secretary shall propose and, following concurrence by the Commission, implement a monitoring plan, to be carried out over a period of time which shall constitute the post-disposal period, which is adequate to demonstrate that initial performance of the disposal is in accordance with the design requirements of § 192.02(a).

(c) If the ground-water standards established under provisions of § 192.02(a) are found or projected to be exceeded, as a result of the monitoring program established for the post-disposal period under § 192.02(b), a corrective action program to restore the disposal to the design requirements of § 192.02(a) and, as necessary, to clean up ground water in conformance with Subpart B shall be put into operation as soon as is practicable, and in no event later than eighteen (18) months after a finding of exceedance.

Subpart B—Standards for Cleanup of Land and Buildings Contaminated With Residual Radioactive Materials From Inactive Uranium Processing Sites

4. Section 192.11 is amended by revising paragraph (b) and adding paragraph (e) to read as follows:

§ 192.11 Definitions.

(b) *Land* means (1) any surface or subsurface land that is not part of a disposal site and is not covered by an occupiable building, and (2) subsurface land that contains ground water contaminated by listed constituents from residual radioactive material from the processing site.

(e) *Class III ground water* means ground water that is not a current or potential source of drinking water because (1) the concentration of total dissolved solids is in excess of 10,000 mg/l, (2) widespread, ambient contamination not due to activities involving residual radioactive materials from a designated processing site exists that cannot be cleaned up using treatment methods reasonably employed in public water-supply systems, or (3) the quantity of water available is less than 150 gallons per day.

5. In § 192.12, the introductory text is republished and paragraph (c) is added to read as follows:

§ 192.12 Standards.

Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:

(c) The concentration of any listed constituent in ground water as a result of releases from residual radioactive material at any designated processing site shall not exceed the provisions of §§ 264.92-264.94 of this chapter as modified by § 192.02(a)(3) (i) and (ii), except that for the purposes of this subpart:

(1) The Secretary shall carry out a monitoring program adequate to define the extent of ground-water contamination by listed constituents

Class III ground waters are further defined in *Ground-Water Protection Strategy*, Office of Ground-Water Protection, USEPA, Washington, DC 20460, Aug. 1984, and its Final Draft of *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy*, Office of Ground-Water Protection, USEPA, Washington, DC 20460, December 1986.

from residual radioactive materials and to monitor compliance with this Subpart.

(2) The Secretary may propose and, with the Commission's concurrence, apply alternate concentration limits, provided that, after considering practicable corrective actions, the Commission determines that these are as low as reasonably achievable, and § 264.94(b) is satisfied.

(3) The functions and responsibilities designated in referenced paragraphs of Part 264 of this chapter as those of the "Regional Administrator" with respect to "facility permits" shall be carried out by the Commission.

(4) The remedial period established under Subpart A may be extended by an amount not to exceed 100 years if:

(i) The concentration limits established under this Subpart are not projected to be exceeded at the end of this extended remedial period.

(ii) Institutional control, which will effectively protect public health and satisfy beneficial uses of ground water during the extended remedial period, is instituted, as part of the remedial action, at the processing site and wherever contamination by listed constituents from residual radioactive materials is found in ground water, or is projected to be found.

(iii) The ground water is not currently and is not now projected to become a source of supply for public drinking water subject to provisions of the Safe Drinking Water Act during the extended remedial period, and

(iv) The requirements of Subpart A are satisfied within the time frame established under section 112(a) of the Act, or as extended by Act of Congress.

Subpart C—Implementation

6. In § 192.20, paragraphs (a)(2), and (a)(3) and (b)(1) are revised and paragraph (b)(4) is added to read as follows:

§ 192.20 Guidance for Implementation.

(2) Protection of water should be considered on a case-specific basis, drawing on hydrological and geochemical surveys and all other relevant data. The hydrologic and geologic assessment to be conducted at each site shall include a monitoring program sufficient to establish background ground water quality through one or more upgradient wells. New disposal sites for tailings that still contain water at greater than the level of "specific retention" or tailings that are slurried to the new location shall use

a liner or equivalent to prevent contamination of ground water.

(3) The remedial action plan, following approval by the Commission, will specify how applicable requirements of Subpart A are to be satisfied. The plan shall include the schedule and steps necessary to complete disposal operations at the site. It shall include an estimate of the inventory of wastes to be disposed of in the pile and their listed constituents and address (i) any need to eliminate free liquids; (ii) stabilization of the wastes to a bearing capacity sufficient to support the final cover; and (iii) the design and construction of a cover to manage the migration of liquids through the stabilized pile, function with minimum maintenance, promote drainage and minimize erosion or abrasion of the cover, and accommodate settling and subsidence so that the cover's integrity is maintained.

(b)(1) Compliance with § 192.12 (a) and (b) of Subpart B, to the extent practical, should be demonstrated through radiation surveys. Such surveys may, if appropriate, be restricted to locations likely to contain residual radioactive materials. These surveys should be designed to provide for compliance averaged over limited areas rather than point-by-point compliance with the standards. In most cases, measurement of gamma radiation exposure rates above and below the land surface can be used to show compliance with § 192.12(a). Protocols for making such measurements should be based on assuming realistic radium distributions near the surface rather than extremes rarely encountered.

(4) The remedial action plan, following approval by the Commission, will specify how applicable

requirements of Subpart B would be satisfied. The plan should include the schedule and steps necessary to complete the cleanup of ground water at the site. It should document the extent of contamination due to releases prior to final disposal, including the identification and location of listed constituents and the rate and direction of movement of contaminated ground water. In addition, the assessment should consider future plume movement, including an evaluation of such processes as attenuation and dilution. In cases where § 192.12(c)(4) is invoked, the plan should include a monitoring program to verify projections of plume movement and attenuation throughout the remedial period. Finally, the plan should specify details of the method to be used for cleanup of ground water.

7. In § 192.21, the introductory text and paragraph (b) are revised, paragraph (f) is redesignated as paragraph (h), and new paragraphs (f) and (g) are added to read as follows:

§ 192.21 Criteria for applying supplemental standards.

Unless otherwise indicated in this subpart, all terms shall have the same meaning as defined in Title I of the Act or in Subparts A and B. The implementing agencies may (and in the case of subsection (h) shall) apply standards under § 192.22 in lieu of the standards of Subparts A or B if they determine that any of the following circumstances exists:

(b) Remedial actions to satisfy the cleanup standards for land, § 192.12 (a) and (c), or the acquisition of minimum materials required for control to satisfy § 192.02(a) (2) and (3), would, notwithstanding reasonable measures to limit damage, directly produce

environmental harm that is clearly excessive compared to the health benefits to persons living on or near the site, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

(f) The restoration of ground water quality at any designated processing site under § 192.12(c) is technically impracticable from an engineering perspective.

(g) The ground water is Class III.

8. In § 192.22, paragraphs (a) and (b) are revised and paragraph (d) is added to read as follows:

§ 192.22 Supplemental standards.

(a) When one or more of the criteria of § 192.21 (a) through (g) applies, the implementing agencies shall select and perform remedial actions that come as close to meeting the otherwise applicable standard as is reasonable under the circumstances.

(b) When § 192.21(h) applies, remedial actions shall, in addition to satisfying the standards of Subparts A and B, reduce other residual radioactivity to levels that are as low as is reasonably achievable.

(d) When § 192.21 (f) or (g) applies, implementing agencies must apply any remedial actions for the restoration of contaminated ground water that is required to assure, at a minimum, protection of human health and the environment.

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ENCLOSURE 6

FEDERAL REGISTER NOTICE ON CUSTODY AND LONG-TERM
CARE OF URANIUM AND THORIUM MILL TAILINGS DISPOSAL
SITES

Rules and Regulations

Federal Register

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This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510.

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 40

RIN 3150-AC56

Custody and Long-Term Care of Uranium and Thorium Mill Tailings Disposal Sites

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is amending its regulations by issuing general licenses that will permit NRC to license the custody and long-term care of reclaimed or closed uranium or thorium mill tailings sites after remedial action or closure under the Uranium Mill Tailings Radiation Control Act has been completed. The intended effect of this action is to provide a surveillance procedure to ensure continued protection of the public health and safety and the environment. This action is necessary to meet the requirements of Titles I and II of the Uranium Mill Tailings Radiation Control Act.

EFFECTIVE DATE: November 29, 1990.

FOR FURTHER INFORMATION CONTACT: Mark Haisfield, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Mail Stop NLS-200. Telephone (301) 492-3877.

SUPPLEMENTARY INFORMATION:

- I. Background
- II. Summary of Final Rule
- III. Uranium Mill Tailings Remedial Action Amendments Act of 1988
- IV. The Stabilization and Long-Term Care Program (Title I and Title II)
- V. The Long-Term Surveillance Plan (Title I and Title II)
- VI. Future Uses of the Disposal Site
- VII. Comments of the Proposed Rulemaking

VIII. EPA Clean Air Act Activities

IX. Finding of No Significant Environmental Impact: Availability

X. Paperwork Reduction Act Statement

XI. Regulatory Analysis

XII. Regulatory Flexibility

Certification Statement

XIII. Backfit Analysis

XIV. List of Subjects in 30 CFR Part 40

I. Background

In the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), the Congress recognized that uranium mill tailings may pose a potentially significant radiation health hazard to the public. One of the measures enacted by Congress to control this hazard is to place the long-term care of the uranium or thorium mill tailings disposal site, after completion of all remedial actions or closure, in the hands of State or Federal government.

Title I of UMTRCA defines the statutory authority and roles of the Department of Energy (DOE) and the NRC with regard to the remedial action program for inactive uranium mill tailings sites. Title I requires that, upon completion of the remedial action program by DOE, the permanent disposal sites be cared for by the DOE or other Federal agency designated by the President, under a license issued by the Commission. Title II of UMTRCA contains similar requirements for NRC licensing of presently active uranium or thorium mill tailings sites following their closure and license termination. These disposal sites would be licensed by the Commission upon their transfer to the Federal Government or the State in which they are located, at the option of the State. These regulations will complement other UMTRCA required regulations which have been completed and cover activities through closure.

An Advance Notice of Proposed Rulemaking was issued on August 25, 1988 (53 FR 32396). The proposed rule was issued on February 6, 1990 (55 FR 3970).

II. Summary of Final Rule

The regulatory additions to 30 CFR part 40 will provide for two new general licenses. The general licenses in § 40.27 and § 40.28 will correspond to Title I and Title II of UMTRCA, respectively. The provisions in § 40.27 would apply to inactive sites and the provisions in § 40.28 would apply to active sites.

Although the requirements in § 40.27 and § 40.28 will differ somewhat due to the differences in Title I and Title II of the Act, the goals to be achieved by the long-term care licenses are the same.

These regulations deal only with uranium or thorium mill tailings sites after remedial actions (for Title I) or closure activities (for Title II) have been completed to meet applicable closure standards. UMTRCA stipulates the Federal government (normally DOE) as the long-term care licensee, and thereby the owner, except in the case of a Title II disposal site where the State may elect to be the long-term care licensee. In lieu of any such State election, the Federal government will become the long-term care licensee. The NRC will receive a detailed Long-Term Surveillance Plan (LTSP) from DOE or an appropriate State which will discuss ownership (whether Federal or State), disposal site conditions, the surveillance program, required clean-up inspections, and how and when emergency repairs and, if necessary planned maintenance, will be accomplished. Unless the Commission is formally notified by the appropriate State, the DOE will submit the LTSP and will be the long-term care licensee. (See the section entitled "The Long-Term Surveillance Plan.") The general license will become effective for each individual Title I or Title II disposal site upon NRC receipt of an LTSP that meets the requirements of the general license and either NRC concurrence in completion of remedial actions (Title I site) or termination of the Title II site license.

For disposal sites governed by the provisions of § 40.27 (Title I sites), the general license applies only to the DOE or another Federal agency designated by the President. For disposal sites governed under the provisions of § 40.28 (Title II sites), DOE, or another Federal agency, will prepare and submit the LTSP, unless the State, at its option, decides to take custody of the site and be included in the general license. In the latter case the State would prepare and submit the LTSP. The authority to grant a long-term care license is reserved to the NRC. States may be the long-term care agency, but are not authorized to grant this type of license. (See section 83 b(1)(A) of the Atomic Energy Act of 1954, as amended, and 10 CFR 150.15a(b)(5)).

The general licensees for long-term care are exempted from 10 CFR parts 19, 20, and 21. These parts cover notices, instructions, notifications to workers, and inspection in part 19, standards for protection against radiation in part 20, and reporting of defects and noncompliance in part 21. These parts deal with operational activities. A general license for long-term care covers activities after the operation and clean-up of the site has been completed. Under normal circumstances the long-term care licensee will spend a day or two at each disposal site each year to confirm that the site's conditions are as expected. The disposal site will comply with 40 CFR part 192, subparts A, B, and C (for Title I sites) and 10 CFR part 40 Appendix A criteria (for Title II sites), which essentially eliminate direct radiation and air particulates and control radon releases within specified limits. Disposal site closure will, therefore, eliminate the need for specific radiation controls as specified in parts 19, 20, and 21 under normal conditions.

If damage to the disposal site requires significant repairs, then the long-term care licensee must notify NRC and describe the necessary repairs. Since worker radiation protection and occupational exposure reporting may be necessary during such repair efforts, the long-term care licensee will identify the appropriate requirements of 10 CFR parts 19, 20, and 21 to be applied. NRC may then impose appropriate portions of the above parts or regulations by order on a site specific basis depending upon the damage and the type of repairs necessary.

A minor administrative change is being made to 10 CFR part 40 appendix A Criterion 12 to allow for a more efficient reporting program. Criterion 12 states that inspection results must be reported to the Commission within 60 days following each inspection. Because each long-term care licensee, primarily the Department of Energy, will most likely have multiple disposal sites, this rule will allow annual reports that cover all of these sites under their jurisdiction. Any disposal site where unusual damage or disruption is discovered during the inspection, however, will require a preliminary inspection report to be submitted within 60 days. The timing for submittal of the annual report will be based on when the long-term care licensee will be doing the inspections and will be submitted within 90 days of the date of the annual inspection of the last site inspected.

Criterion 12 currently deals with Title II licensees. It is being amended to include Title I licensees. Provisions in

§ 40.27 (Title I disposal sites) will reference Criterion 12 so that the same reporting requirements for Title II licensees will apply for Title I licensees.

There are some differences in requirements for mill tailings located on Indian lands. Where the disposal site is on Indian tribal lands, the tribes retain ownership. An exception is provided in Section 105(b) of UMTRCA, which states that in those cases where the residual radioactive material from processing sites on Indian land is relocated to a permanent disposal area not on Indian land, the DOE shall acquire title to the residual radioactive material and the disposal site. The NRC and DOE have generally agreed that disposal sites on Indian lands should be handled in the same manner as other Title I disposal sites, including conduct of surveillance under proposed § 40.27. We also understand that DOE and the appropriate Indian tribes have agreed that DOE would provide for long-term care. Four of the 24 Title I processing sites are on Indian lands. Three of these sites will also serve as disposal sites (the residual radioactive material from two of these locations will be consolidated at one disposal site).

For Title II disposal sites on Indian lands it is not clear who will be responsible for monitoring, maintenance, and emergency measures at the site. Currently, the Western Nuclear Sherwood Uranium Mill located in the State of Washington is the only site that falls into this category. UMTRCA provides that long-term surveillance will be done by the Federal government and that the licensee will be required to enter into arrangements with the Commission to ensure this surveillance. However, UMTRCA was not explicit as to which Federal agency is responsible for the disposal site, and should this site ever require emergency measures, additional authorizations may be required. The basic obligations for this site have already been codified in 10 CFR part 40, Appendix A, Criterion 11F, and are not part of this rulemaking. NRC is providing flexibility in this area and will work out long-term care arrangements for these disposal sites on a case-by-case basis.

Both § 40.27 and § 40.28 allow for potential future uses of the disposal sites. As provided in UMTRCA, any future use would require a separate Commission license to assure that the site remains or is restored to a safe and environmentally sound condition. See the "Future Uses of the Disposal Site" section.

The rulemaking provides for a general license to governmental bodies for

custody and long-term care of uranium or thorium mill tailings sites after closure, pursuant to statute. Therefore, this rulemaking has no significant impact upon the private sector. However, the staff recognizes that there may be cases where communication and sharing of information between the current licensee and the future long-term care licensee may be appropriate. This communication will allow the long-term care licensee to better prepare the Long-Term Surveillance Plan by having more knowledge of how site closure was accomplished.

III. Uranium Mill Tailings Remedial Action Amendments Act of 1988 (Amendments Act)

The Amendments Act was signed by the President on November 5, 1988, and provides among other things an extension of the UMTRCA Title I program. It allows the Department of Energy until September 30, 1994 (previously 1990) to perform remedial actions at designated uranium mill tailings sites and vicinity properties. There is one major exception to the 1994 deadline. The authority to perform ground water restoration activities is extended without limitation. However, to meet the current proposed Environmental Protection Agency (EPA) ground water standard, compliance with the ground water protection provisions at the disposal site would still need to be accomplished by the 1994 date.

The reason for the extension to 1994 is to allow DOE enough time to complete remedial actions at all designated processing sites. The ground water restoration extension was provided due to the potential that it may take DOE decades to comply with EPA ground water standards for some processing sites. EPA is currently issuing new ground water standards in response to a September 3, 1985 decision by the 10th Circuit Court of Appeals in which the ground water provisions of the EPA uranium mill tailings standards (40 CFR 192.20(a)(2-3)) for Title I processing sites were set aside and remanded to EPA. Based on the proposed EPA standards (52 FR 36000; September 24, 1987), the DOE believes that ground water restoration activities will take significantly more time than originally planned. The new standards have not yet been made final. Until final ground water standards are promulgated, UMTRCA requires that implementing agencies use the available proposed standards.

As a result of the Amendments Act, the NRC is planning to allow licensing of Title I disposal sites, where the tailings

are not being moved, to occur in two steps, if needed. The first step would allow DOE, if necessary, to do all remedial actions, which include complying with the ground water protection standards addressing the design and performance at the disposal site for closure and licensing. The Amendments Act requires this to be completed prior to September 1994. The second step, which can go on for many more years, would deal with existing ground water restoration. When ground water restoration is completed, the Long-Term Surveillance Plan would be appropriately amended. Until the EPA standards are finalized, and DOE and NRC evaluate the sites based on these standards, we will not know how many sites would likely be involved in this two step licensing process.

The Amendments Act itself did not address the potential delay of licensing Title I disposal sites due to the ground water provisions in EPA's proposed standards requiring monitoring after NRC has concurred in completion of remedial action. NRC's options ranged from a case-by-case use of EPA's supplemental standards provisions to exempt such disposal sites entirely from performance monitoring to the inflexible consequence of delaying all such licensing until completion of the ground water performance monitoring program. Such a delay could extend for up to 30 years or more. Based on interaction with other Federal agencies and the Congressional legislative history, the NRC has selected the two step approach discussed above to optimize flexibility.

NRC comments to EPA on their proposed standards suggested ways to remedy the situation. The final EPA standards may resolve this issue, but could also introduce new uncertainties. Because the proposed EPA standards are legally binding until final rules are issued, this rule is designed to have flexibility to address various situations.

IV. The Stabilization and Long-Term Care Program (Title I and Title II)

Although the end result for long-term care licensing for Title I or Title II disposal sites is similar, the processes leading up to closure of Title I or Title II sites are different. The following provides background on these processes, as well as some of the differences between Title I and Title II licensing.

Title I (24 sites)

UMTRCA charged the EPA with the responsibility for promulgating remedial action standards for inactive uranium mill sites. The purpose of these standards is to protect the public health

and safety and the environment from radiological and non-radiological hazards associated with radioactive materials at the sites. The final standards were promulgated with an effective date of March 7, 1983 (46 FR 802; January 8, 1983). See 40 CFR part 162-Health and Environmental Protection for Uranium Mill Tailings, Subparts A, B, and C.

The Department of Energy will select and execute a plan of remedial action that will satisfy the EPA standards and other applicable laws and regulations. All remedial actions must be selected and performed with the concurrence of the NRC. The required NRC concurrence with the selection and performance of proposed remedial actions and the licensing of long-term care of disposal sites will be for the purpose of ensuring compliance with UMTRCA.

The portion of the EPA standards dealing with ground water requirements has been remanded by court action, and is currently being finalized by EPA (see the previous section for more details). DOE continues to perform remedial action at the inactive processing sites in accordance with NRC's concurrence with the remedial action approach. Delaying implementation of the remedial action program would be inconsistent with Congress' intent of timely completion of the program.

Modifications of disposal sites after completion of the remedial action to comply with EPA's final ground water protection standards may be unnecessarily complicated and expensive and may not yield commensurate benefits in terms of human and environmental protection. Therefore, the Commission believes that sites where remedial action has been essentially completed prior to EPA's promulgation of final ground water standards will not be impacted by the final ground water standards. Although additional effort may be appropriate to assess and cleanup contaminated ground water at these sites, the existing designs of the disposal sites should be considered sufficient to provide long-term protection against future ground water contamination. NRC does not view UMTRCA as requiring the reopening of those sites that have been substantially completed when NRC concurred with the selection of remedial action in accordance with applicable EPA standards, proposed or otherwise in place at the time such NRC concurrence was given.

The stabilization and long-term care program for each site has four distinct phases. In the first phase DOE selects a disposal site and design. This phase includes preparation of an

Environmental Assessment or an Environmental Impact Statement, and a Remedial Action Plan. The Remedial Action Plan is structured to provide a comprehensive understanding of the remedial actions proposed at that site and contains specific design and construction requirements. NRC and State/Indian tribe concur in the Remedial Action Plan to complete the first phase.

The second phase is the performance phase. In this phase the actual remedial action (which includes decontamination, decommissioning, and reclamation) at the site is done in accordance with the Remedial Action Plan. The NRC and the State/Indian tribe, as applicable, must concur in any changes to this plan. At the completion of reclamation activities at the site, NRC concurs in DOE's determination that the activities at the site have been completed in accordance with the approved plan. Prior to licensing, the next phase, title to the disposed tailings and contaminated materials must be transferred to the United States and the land upon which they are disposed of must be in Federal custody to provide for long-term Federal control, at Federal expense. Disposal sites on Indian land will remain in the beneficial ownership of the Indian tribe.

NRC concurrence in the DOE determination that remedial action at the processing site has been accomplished in accordance with the approved plan may be accomplished in two steps, where residual radioactive material is not being moved from the processing site to a different disposal site. The Uranium Mill Tailings Remedial Action Amendments Act of 1986 allows for a two step approach for Title I disposal sites. The Amendments Act will allow DOE to do all remedial actions, other than ground water restoration, for the first step of closure and licensing. The second step, which can go on for many years, will deal with existing ground water restoration. When ground water restoration is completed, the LTSP will be appropriately amended. For sites that are being moved, licensing will occur in one step. There is no ground water restoration at the disposal site and the processing site will not be licensed after completion of remedial action. See the earlier discussion on this law for more details.

The third phase is the licensing phase. The general license is effective following (1) NRC concurrence in the DOE determination that the disposal site has been properly reclaimed and (2) the formal receipt by NRC of an acceptable Long-Term Surveillance Plan. NRC concurrence with DOE's performance of

the remediation indicates that DOE has demonstrated that the remedial action complies with the provisions of the EPA standards in 40 CFR part 192, Subparts A, B, and C. This NRC concurrence may be completed in two steps as discussed above. There is no termination date for the general license.

Public involvement has been and will continue to be provided through DOE's overall remedial action program for Title I sites and NRC's licensing program for Title II sites. The local public will have an opportunity to comment on the remedial action or closure plans proposed and implemented by DOE or the Title II licensee and to raise concerns regarding final stabilization and the degree of protection achieved. NRC fully endorses State and public input in all stages of the program, especially in the planning stages of remedial action when such input can be most effective in identifying and resolving issues affecting long-term care. At the time the LTSP is submitted, the NRC will consider the need for a public meeting in response to requests and public concerns. Therefore, NRC encourages State and public participation early in the remedial action and closure process and will provide additional opportunities, as needed, later in the process.

The final phase of the program is surveillance and monitoring and begins after NRC accepts the LTSP. In this phase, DOE and NRC periodically inspect the disposal site to ensure its integrity. The Long-Term Surveillance Plan will require the DOE to make repairs, if needed.

One of the requirements in the EPA standards is that control of the tailings should be designed to be effective for up to 1000 years without active maintenance. Although the design of the stabilized pile is such that reliance on active maintenance should be minimized or eliminated, the NRC license will require emergency repairs as necessary. In the event that significant repairs are necessary, a determination will be made on a site specific basis regarding the need for additional National Environmental Policy Act (NEPA) actions, and health and safety considerations from parts 19, 20, and 21.

Title II

UMTRCA also charged EPA with the responsibility for promulgating standards for active uranium or thorium mill tailings sites. EPA completed this in Subparts D and E of 40 CFR part 192 on October 7, 1983 (48 FR 45946).

Title II processing sites have active NRC or Agreement State licenses. Each

licensee is responsible for having a closure plan that is approved by the NRC or an Agreement State. This plan describes how the licensee will close the site to meet all applicable standards after completion of operations.

Before the NRC, or an Agreement State, terminates a license the site must be closed in a manner which meets applicable standards. These include the requirements contained within 10 CFR part 40 — Domestic Licensing of Source Material, or similar Agreement State requirements. In addition, 10 CFR 150.15a requires that prior to the termination of any Agreement State license for byproduct material, the Commission shall have made a determination that all applicable standards and requirements have been met. Once the future long-term care licensee has submitted a suitable LTSP, the general license takes effect when either NRC terminates the current specific license or when NRC concurs with an Agreement State's termination of the current specific license. This rulemaking provides the Commission with two options to maintain control over disposal sites in the unexpected situation when: (1) an acceptable LTSP has not been submitted; (2) the current specific license is ready to be terminated; (3) NRC had determined that the disposal site has been closed in accordance with applicable standards; and (4) disposal site custody has been transferred to the long-term care licensee. The Commission could delay termination of the specific license until an acceptable LTSP is submitted or issue an order requiring surveillance by the custodian of the disposal site, who will become the long-term care licensee under the general license. The Commission considers either of these actions to be sufficient to ensure that the disposal site will be under surveillance and control during the transition period from the specific to the general license. The Commission will not unnecessarily delay the termination of the specific license solely on the basis that an acceptable LTSP has not been received. In such cases, the prime option would be to issue appropriate orders. The Commission, however, does not want to preclude the option of not terminating the specific license if this were appropriate for a relatively short period.

The general license approach for Title II sites is similar to the process used for Title I sites. The most significant differences are:

1. A State, at its option, may take over long-term care of a Title II disposal site instead of the DOE.

2. In some rare cases, such as may occur with deep burial where no ongoing site surveillance will be required, surface land ownership transfer requirements may be waived for a Title II disposal site.

3. Potential future uses of a Title I disposal site are limited to subsurface rights, whereas, a Title II disposal site could also potentially allow the usage of surface rights. (See the section entitled "Future Uses of the Disposal Site".)

4. Title II licensees are required to pay a minimum charge of \$250,000 (1978 dollars) to cover the costs of long-term surveillance. This charge must be paid to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium or thorium mill license. The minimum charge may be adjusted based on site specific requirements in excess of those specified in Criterion 12 of appendix A. (See the section entitled "The Long-Term Surveillance Plan", Title II, for additional details).

5. The determination that remedial action at Title I sites has been completed may be done in two steps, whereas the determination of acceptable closure for Title II sites will be done only once before license termination.

6. There is an additional Title II requirement when a license in an Agreement State is terminated and the disposal site transferred to the United States for long-term care. All funds collected by the State for long-term surveillance will be transferred to the United States. This requirement has already been codified in part 150 and is not part of this rulemaking.

7. Title I covers designated inactive uranium mill tailings sites. Title II covers sites licensed as of January 1, 1978 and new uranium and thorium mill tailings sites.

Twenty-seven of the 29 conventional mills licensed by NRC or Agreement States are not currently operating. Most of these have no plans to restart operations, and closure activities have either been started or are in planning.

V. The Long-Term Surveillance Plan (Title I and Title II)

DOE, or the appropriate State, will submit a disposal site Long-Term Surveillance Plan to the NRC to coincide with completion of remedial actions (Title I) or license termination (Title II). DOE, or the appropriate State, will be responsible for preparing the LTSP since this document will clearly define their responsibilities under the general license. As discussed previously, the LTSP for Title I disposal sites will allow a two step approach as provided in the

Uranium Mill Tailings Remedial Action Amendments Act of 1986. The Amendments Act will allow DOE to do all remedial actions, other than ground water restoration, for the first step of closure and licensing. The first step includes any performance or design features necessary to satisfy ground water protection standards, except for ground water restoration. The second step which can go on for many years, will deal with existing ground water restoration. When ground water restoration is completed, the LTSP will be appropriately modified.

Title I

The DOE has developed a "Guidance for UMTRA Project Surveillance and Maintenance" document issued in January 1986. Copies of this document are available from the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, P.O. Box 5400, Albuquerque, New Mexico, 87115. This document, which was developed with NRC staff coordination, provides detailed generic guidance for what information should be considered in designing an LTSP for Title I disposal sites.

The DOE guidance document addresses five primary activities. These activities, which are discussed in the following paragraphs, are:

1. Definition and characterization of final disposal site conditions.
2. Disposal site inspection.
3. Ground water monitoring, if necessary.
4. Aerial photography.
5. Contingency (or emergency) repair, and planned maintenance if necessary.

DOE indicated that final disposal site conditions should be defined and characterized prior to the completion of remedial actions at a site. As-built drawings should be compiled, a final topographic survey should be performed, a vicinity map should be prepared, and ground and aerial photographs should be taken. Survey monuments, site markers, and signs should be established. If the disposal site LTSP specifies that ground water monitoring is required, then a network of monitoring wells should be identified and new wells established if needed.

DOE describes three types of disposal site inspections: Phase I, Phase II and contingency inspections. Annually scheduled 1 to 2-day phase I inspections would be conducted by a small team to identify any changes in conditions that may affect design integrity. Phase II inspections would be unscheduled and dependent upon potential problems identified during a Phase I inspection. Team members of a Phase II inspection

should be specialists in the potential problem areas (e.g., geotechnical engineer for settlement). Contingency inspections would also be unscheduled and occur when information has been received that indicates that site integrity has been, or may be, threatened by natural events (e.g., severe earthquake) or other means.

The need to monitor ground water conditions should be determined on a site specific basis. If it is determined that ground water monitoring is required for the long-term care at the disposal site, then it should be conducted in two phases, screening monitoring and evaluative monitoring. Screening monitoring will be designed to detect changes in ground water quality attributable to the tailings. If a significant change is apparent, evaluative monitoring should be initiated. Evaluative monitoring will be more extensive and will quantify the rate and magnitude of the change of conditions. When EPA finalizes the ground water protection standards, modifications may be necessary. See the discussion on the Uranium Mill Tailings Remedial Action Amendments Act of 1986 for more details.

Aerial photographs of the Title I disposal sites should be taken immediately upon completion of the construction and after the permanent surveillance features have been installed. The photographs will be used to prepare the final topographic map and as-built drawings and will be kept in the permanent site file for future reference, should a problem develop at the site. In the unlikely event that a problem (such as erosion) should occur, the photographs provide baseline information about site conditions. New aerial photographs would be taken if it becomes necessary to monitor a problem over a long period of time.

The LTSP should also describe the procedures the long-term licensee would follow if contingency or emergency repairs were needed at the disposal site due to extreme natural events or purposeful intrusion.

The conduct of custodial activities such as grass mowing or fence repair are not precluded. If the long-term care licensee desires to conduct this type of custodial activity (termed "planned maintenance" in the DOE guidance document), the activities should be described in the LTSP. However, it should be noted that planned maintenance of this type cannot be relied upon to ensure compliance with the EPA standards.

Title II

Much of the guidance described for Title I disposal sites can be applied to the Title II disposal sites. However, the DOE guidance document includes additional information and recommendations for which the applicability must be evaluated on a site specific basis for Title II disposal sites. Specific requirements for Title II sites are addressed in Appendix A of 10 CFR part 40. For Title II sites, criterion 10 of Appendix A requires the existing licensee to pay a minimum charge of \$250,000 (1976 dollars) to cover the costs of long-term surveillance. The minimum charge was based on an annual inspection by the governmental agency retaining custody of the site to confirm the integrity of the stabilized tailings and to determine the need, if any, for maintenance and/or monitoring. The actual amount of this charge will be set based on a site specific evaluation, which should be included as part of the existing licensee's reclamation plan for the site. This charge is not intended to cover the cost of contingency (emergency) repairs. Because the tailings and wastes should be disposed of without the need for any active maintenance, the annual inspection should be completed in 1 to 2 days per site. Post-closure maintenance activities that are relied upon to comply with Appendix A closure standards can only be authorized by considerations of alternatives under Section 64(c) of the Atomic Energy Act of 1954, as amended. In such cases, the minimum charge for long-term surveillance to the existing licensee will be increased accordingly to provide for this maintenance. The basis for the minimum charge and the annual inspection is discussed in detail in the Final Generic Environmental Impact Statement on uranium milling (NUREG-0706).

The custodial agency will prepare an LTSP for each disposal site using input from the existing licensee's reclamation plan, including the evaluation of long-term surveillance needs. Thus, important site information will be transferred from the existing licensee to the custodial agency. The existing licensee, however, will not be required to prepare the LTSP. In addition the LTSP will not affect the

*Copies of NUREG-0706 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20512-7082. Copies are also available from the National Technical Information Service, 5200 Port Royal Road, Springfield, VA 22161. A copy is also available for public inspection and/or copying at the NRC Public Document Room, 2120 L Street NW, (Lower Level) of the Colman Building, Washington, DC.

long-term surveillance charge paid by the existing licensee (the LTSP may also reflect additional site-specific activities which are not to be reflected in the long-term care charge, but are voluntarily committed to by the custodial agency).

VI. Future Uses of the Disposal Site

UMTRCA provides for potential future uses of the disposal site. For a Title I disposal site, it provides that the Secretary of the Interior, with the concurrence of both the Secretary of Energy and the NRC, may dispose of any subsurface mineral rights. If this occurs, the NRC will issue a specific license to the Secretary of the Interior to assure that the tailings are not disturbed, or if disturbed are restored to a safe and environmentally sound condition. At a Title I processing site, when tailings are moved, once the surface remedial actions are completed, surface rights will be available as long as the use does not impede future ground water restoration activities.

For a Title II disposal site, the same provisions as above apply with the following two differences. First, surface as well as subsurface estates may be available for use. Second, although the request to use these rights may be received from any person, if permission is granted, the person who transferred the land to the Federal or State Government shall receive the right of first refusal with respect to this use of the land.

Environmental impacts will be evaluated prior to any action granting the use of surface or subsurface estates.

VII. Comments on the Proposed Rulemaking

The Commission received six (6) letters commenting on the proposed rule. Copies of these letters and an analysis of the comments are available for public inspection and copying for a fee at the NRC Public Document Room at 2120 L Street, NW, (Lower Level), Washington, DC. Comments were received from two States, a company having uranium interests, and three Federal Agencies (the Department of Energy, the Environmental Protection Agency, and the Department of the Interior). The most significant comments are summarized below.

There was concern that a current licensee may be placed in a position of having to delay final closure and turnover of its disposal site to the Federal government if an acceptable Long-Term Surveillance Plan has not been submitted. This could cause increased costs to the licensee and thereby have a significant impact on the private sector.

The proposed rule package discussed two options available to the Commission to maintain regulatory control of the disposal site in the above situation. The NRC could delay termination of the license or could issue specific orders to the intended custodial agency. We agree with the commenter that an indefinite delay in terminating the license could increase the impacts to an existing licensee. Therefore, we have clarified the rule to acknowledge that if significant financial impacts are anticipated due to lack of action on the custodial agency's part, issuing an order would be our prime option. However, the Commission wants to retain the option of not terminating the existing license, if this might be appropriate for a relatively short period.

A State commenter was concerned that the rule does not provide for explicit State concurrence in an LTSP prepared by the Federal government.

The proposed rule did not provide for specific State concurrence in the NRC licensing actions, because the State has no regulatory authority under the Atomic Energy Act during the long-term care period. The State, as a member of the general public, may comment on any action to be taken by the NRC. We would like to note that, for the Title II sites, the State, at its option, can be the custodial governmental agent and, therefore, become the responsible party to prepare and implement the LTSP under the general license issued by the NRC.

If significant environmental consequences occur at either Title I or Title II disposal sites in the future, the failure will not likely be as a result of the LTSP, but will most likely be as a result of inadequate design or construction. The States have been and will continue to be integrally involved in the design and construction phase of remedial action or closure. The commenter appears to over estimate the purpose of the LTSP which is the surveillance of the reclaimed or closed site, not the performance of significant maintenance work. The performance of significant work at licensed disposal sites under this regulation requires specific authorization from the NRC.

The Department of Energy indicated that the proposed rule was not clear regarding how the two step licensing process (Title I only) works in relationship to processing sites that are stabilized in place versus those that are relocated.

There will be a difference in how the two-step licensing approach will be used depending upon whether the residual radioactive material has been stabilized in place or moved. The two-step

approach, as it will apply for this LTSP and licensing, will only be used for materials stabilized in place. For materials that are moved to a separate disposal site there will be no ground water restoration at the new site under normal, expected conditions and the old site will not have an LTSP or license associated with it. When DOE moves a site, the original processing site will be cleaned-up to meet EPA standards for unrestricted use. NRC will not license these processing sites.

For residual radioactive materials stabilized in place and requiring additional ground water restoration, the LTSP will cover all the elements identified in the rule, except for detailed ground water restoration actions. The LTSP may still require ground water monitoring to ensure that actions taken for ground water restoration are not affecting the integrity of the stabilized pile. For example, if ground water restoration activities are impacting leaching through the pile, monitoring under the LTSP should be able to identify this and trigger any necessary corrective actions.

In summary, regardless of whether residual radioactive material is relocated or not, the custodial agency will be an NRC general licensee at the disposal site only. If ground water restoration at the processing site is necessary when the material is relocated, this will have no impact on the general license for the disposal site. If ground water restoration is necessary for a site stabilized in place, then licensing will be done in two steps.

DOE requested that reporting requirements for Title I sites be comparable to those for Title II sites - 10 CFR part 40 Appendix A, Criterion 12. The wording in the proposed rule provided DOE with flexibility in developing reporting requirements for Title I sites. However, since DOE requested this change and it would provide for reports at least as frequently as under the proposed rule, it has been added to the final rule.

In the Advance Notice of Proposed Rulemaking, the Commission indicated that before the general license could become effective at a disposal site the NRC must "receive" an LTSP. In the proposed rule, the wording was changed to show that the Commission must "accept" the LTSP. DOE did not support this change. NRC has made this change to provide a better level of control over the licensing process. If the NRC receives an acceptable LTSP, the long-term care licensee would not be impacted in any way. If an unacceptable LTSP is received, this provision provides

the NRC an opportunity to work with the long-term care licensee to correct the deficiencies prior to licensing.

NRC adopted a number of DOE recommendations that provide additional clarity in the notice and rule. These changes included, for example, clarifying when the word "site" specifically refers to a disposal or processing site, providing additional information for Title I sites on Indian lands, using the term "remedial action" for Title I sites, noting in the rule that there is no termination date to the general licenses, clarifying the use of aerial photographs, and other wording changes that provided more specific information.

VIII. EPA Clean Air Act Activities

EPA has published new air effluent regulations for radon and other radioactive effluents from uranium mill tailings as part of the voluntary remand of standards developed under section 112 of the Clean Air Act (CAA) (54 FR 51654, December 15, 1989). The EPA regulations include a radon emission standard that would apply to both Title I and Title II disposal sites after closure that must be confirmed by measurement. Other NRC and EPA regulations are design standards. Once measurements confirm that the site meets CAA standards and long-term stabilization has been completed, the tailings are no longer subject to EPA regulations under the CAA. Prior to closure, it is entirely possible that the CAA standards could result in EPA ordered modifications to sites that already meet current design standards. The potential for conflicting EPA and NRC/Agreement State regulatory programs prior to the long-term care period will require close coordination between the two agencies and with States, depending on CAA delegations.

IX. Finding of No Significant Environmental Impact: Availability

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR part 51, that this rule is not a major Federal action significantly affecting the quality of the human environment and therefore an environmental impact statement is not required. The rule establishes general licenses for long-term care of uranium or thorium mill tailings disposal sites by another Federal agency or State. The licensing action will be done after remedial action or site closure is completed, and would ensure that disposal sites remain in good condition. If unexpected repairs are ever required,

the long-term care licensee will be responsible to make the necessary repairs. The Commission will evaluate at the time such action is deemed necessary whether there is a need to prepare a separate environmental assessment.

The environmental assessment and finding of no significant impact on which this determination is based are available for inspection at the NRC Public Document Room, 2120 L Street NW, (Lower Level), Washington, DC. Single copies of the environmental assessment and finding of no significant impact are available from Mark Haisfield, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Mail Stop NLS-260. Telephone (301) 492-3877.

X. Paperwork Reduction Act Statement

This proposed rule does not contain a new or amended information collection requirement subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*). Existing requirements were approved by the Office of Management and Budget approval number 3150-0020.

XI. Regulatory Analysis

The Commission has prepared a regulatory analysis for this regulation. The analysis examines the costs and benefits of the alternatives considered by the Commission. The analysis is available for inspection in the NRC Public Document Room, 2120 L Street NW, (Lower Level), Washington, DC. Single copies of the analysis may be obtained from Mark Haisfield, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Mail Stop NLS-260.

XII. Regulatory Flexibility Certification Statement

As required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule does not have a significant economic impact upon a substantial number of small entities. This rule will apply only to a Federal agency or an appropriate State. Although small entities may be requested to consult with government agencies in developing LTSPs, effort associated with such consultation is required under the criteria in Appendix A to 10 CFR part 40, which were previously promulgated by the Commission. Therefore, a Regulatory Flexibility Analysis is not required and has not been prepared.

XIII. Backfit Analysis

The NRC has determined that the backfit rule, 10 CFR 50.109, does not apply to this final rule, and therefore, a backfit analysis is not required for this final rule because these amendments do not involve any provisions which would impose backfits as defined in 10 CFR 50.109(a)(1).

List of Subjects in 10 CFR Part 40

Criminal penalty, government contracts, Hazardous materials-transportation, Nuclear materials, Reporting and recordkeeping requirements, Source material, and Uranium.

Under the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, 5 U.S.C. 552 and 553, and the Uranium Mill Tailings Radiation Control Act of 1978, as amended, the NRC is adopting the following amendments to 10 CFR part 40.

PART 40 - DOMESTIC LICENSING OF SOURCE MATERIAL

1. The authority citation for part 40 continues to read as follows:

Authority: Secs. 82, 83, 84, (S, E1, 101, 182, 183, 186, 88 Stat. 932, 933, 935, 946, 953, 954, 955, as amended, sec. 11e(2), 83, 84, Pub. L. 95-604, 92 Stat. 3033, as amended, 3039, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2014(e)(2), 2092, 2093, 2094, 2095, 2111, 2113, 2114, 2201, 2232, 2233, 2236, 2282); secs. 274, Pub. L. 86-373, 73 Stat. 688 (42 U.S.C. 2021); secs. 201, as amended, 202, 206, 80 Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846). Sec. 275, 82 Stat. 3021, as amended by Pub. L. 97-415, 98 Stat. 2067 (42 U.S.C. 2022). Section 40.7 also issued under, Pub. L. 95-601, sec. 10, 82 Stat. 2951 (42 U.S.C. 1851). Section 40.31(g) also issued under sec. 122, 66 Stat. 936 (42 U.S.C. 2132). Section 40.66 also issued under sec. 184, 66 Stat. 954, as amended (42 U.S.C. 2234). Section 40.71 also issued under sec. 167, 66 Stat. 955 (42 U.S.C. 2237).

For the purposes of sec. 223, 66 Stat. 956, as amended (42 U.S.C. 2273); §§ 40.3, 40.25(d)(1)-(3), 40.35(e)-(d), 40.41(b) and (c), 40.46, 40.51(a) and (c), and 40.63 are issued under sec. 161b, 66 Stat. 946, as amended, (42 U.S.C. 2201(b)), and §§ 40.5, 40.8, 40.25(c) and (d)(3) and (4), 40.26(c)(2), 40.35(e), 40.42, 40.61, 40.62, 40.64, and 40.85 are issued under sec. 161c, 66 Stat. 950, as amended (42 U.S.C. 2201(o)).

2. Section 40.1 is revised to read as follows:

§ 40.1 Purpose.

(a) The regulations in this part establish procedures and criteria for the issuance of licenses to receive title to, receive, possess, use, transfer, or deliver source and byproduct materials, as defined in this part, and establish and

provide for the terms and conditions upon which the Commission will issue these licenses. These regulations also provide for the disposal of byproduct material and for the long-term care and custody of byproduct material and residual radioactive material. The regulations in this part also establish certain requirements for the physical protection of import, export, and transfer shipments of natural uranium. (Additional requirements applicable to the import and export of natural uranium are set forth in part 110 of this chapter.)

(b) The regulations contained in this part are issued under the Atomic Energy Act of 1954, as amended (68 Stat. 819), Title II of the Energy Reorganization Act of 1974, as amended (88 Stat. 1242), and Titles I and II of the Uranium Mill Tailings Radiation Control Act of 1978, as amended (42 U.S.C. 7901).

3. In § 40.2a, paragraph (a) is revised to read as follows:

§ 40.2a Coverage of inactive tailings sites.

(a) Prior to the completion of the remedial action, the Commission will not require a license pursuant to 10 CFR Chapter I for possession of residual radioactive materials as defined in this part that are located at a site where milling operations are no longer active, if the site is covered by the remedial action program of Title I of the Uranium Mill Tailings Radiation Control Act of 1978, as amended. The Commission will exert its regulatory role in remedial actions primarily through concurrence and consultation in the execution of the remedial action pursuant to Title I of the Uranium Mill Tailings Radiation Control Act of 1978, as amended. After remedial actions are completed, the Commission will license the long-term care of sites, where residual radioactive materials are disposed, under the requirements set out in § 40.27.

4. Section 40.3 is revised to read as follows:

§ 40.3 License requirements.

A person subject to the regulations in this part may not receive title to, own, receive, possess, use, transfer, provide for long-term care, deliver or dispose of byproduct material or residual radioactive material as defined in this part or any source material after removal from its place of deposit in nature, unless authorized in a specific or general license issued by the Commission under the regulations in this part.

5. In § 40.4, the definition *Residual radioactive material* is added in alphabetical order to read as follows:

§ 40.4 Definitions.

Residual radioactive material means: (1) Waste (which the Secretary of Energy determines to be radioactive) in the form of tailings resulting from the processing of ores for the extraction of uranium and other valuable constituents of the ores; and (2) other waste (which the Secretary of Energy determines to be radioactive) at a processing site which relates to such processing, including any residual stock of unprocessed ores or low-grade materials. This term is used only with respect to materials at sites subject to remediation under Title I of the Uranium Mill Tailings Radiation Control Act of 1978, as amended.

6. In § 40.7, paragraph (f) is revised to read as follows:

§ 40.7 Employee protection.

(f) The general licenses provided in §§ 40.21, 40.22, 40.23, 40.27, and 40.28 are exempt from paragraph (e) of this section.

7. Section 40.20 is revised to read as follows:

§ 40.20 Types of licenses.

(a) Licenses for source material and byproduct material are of two types: general and specific. Licenses for long-term care and custody of residual radioactive material at disposal sites are general licenses. The general licenses provided in this part are effective without the filing of applications with the Commission or the issuance of licensing documents to particular persons. Specific licenses are issued to named persons upon applications filed pursuant to the regulations in this part.

(b) Section 40.27 contains a general license applicable for custody and long-term care of residual radioactive material at uranium mill tailings disposal sites remediated under Title I of the Uranium Mill Tailings Radiation Control Act of 1978, as amended.

(c) Section 40.28 contains a general license applicable for custody and long-term care of byproduct material at uranium or thorium mill tailings disposal sites under Title II of the Uranium Mill Tailings Radiation Control Act of 1978, as amended.

8. New §§ 40.27 and 40.28 are added to read as follows:

§ 40.27 General license for custody and long-term care of residual radioactive material disposal sites.

(a) A general license is issued for the custody of and long-term care, including monitoring, maintenance, and emergency measures necessary to protect public health and safety and

other actions necessary to comply with the standards promulgated under section 275(a) of the Atomic Energy Act of 1954, as amended, for disposal sites under Title I of the Uranium Mill Tailings Radiation Control Act of 1978, as amended. The license is available only to the Department of Energy, or another Federal agency designated by the President to provide long-term care. The purpose of this general license is to ensure that uranium mill tailings disposal sites will be cared for in such a manner as to protect the public health, safety, and the environment after remedial action has been completed.

(b) The general license in paragraph (a) of this section becomes effective when the Commission accepts a site Long-Term Surveillance Plan (LTSP) that meets the requirements of this section, and when the Commission concurs with the Department of Energy's determination of completion of remedial action at each disposal site. There is no termination of this general license. The LTSP may incorporate by reference information contained in documents previously submitted to the Commission if the references to the individual incorporated documents are clear and specific. Each LTSP must include—

(1) A legal description of the disposal site to be licensed, including documentation on whether land and interests are owned by the United States or an Indian tribe. If the site is on Indian land, then, as specified in the Uranium Mill Tailings Radiation Control Act of 1978, as amended, the Indian tribe and any person holding any interest in the land shall execute a waiver releasing the United States of any liability or claim by the Tribe or person concerning or arising from the remedial action and holding the United States harmless against any claim arising out of the performance of the remedial action;

(2) A detailed description, which can be in the form of a reference, of the final disposal site conditions, including existing ground water characterization and any necessary ground water protection activities or strategies. This description must be detailed enough so that future inspectors will have a baseline to determine changes to the site and when these changes are serious enough to require maintenance or repairs. If the disposal site has continuing aquifer restoration requirements, then the licensing process will be completed in two steps. The first step includes all items other than ground water restoration. Ground water monitoring, which would be addressed in the LTSP, may still be required in this first step to assess performance of the

tailings disposal units. When the Commission concurs with the completion of ground water restoration, the licensee shall assess the need to modify the LTSP and report results to the Commission. If the proposed modifications meet the requirements of this section, the LTSP will be considered suitable to accommodate the second step.

(3) A description of the long-term surveillance program, including proposed inspection frequency and reporting to the Commission (as specified in Appendix A, criterion 12 of this part), frequency and extent of ground water monitoring if required, appropriate constituent concentration limits for ground water, inspection personnel qualifications, inspection procedures, recordkeeping and quality assurance procedures;

(4) The criteria for follow-up inspections in response to observations from routine inspections or extreme natural events; and

(5) The criteria for instituting maintenance or emergency measures.

(c) The long-term care agency under the general license established by paragraph (a) of this section shall --

(1) Implement the LTSP as described in paragraph (b) of this section;

(2) Care for the disposal site in accordance with the provisions of the LTSP;

(3) Notify the Commission of any changes to the LTSP; the changes may not conflict with the requirements of this section;

(4) Guarantee permanent right-of-entry to Commission representatives for the purpose of periodic site inspections; and

(5) Notify the Commission prior to undertaking any significant construction, actions, or repairs related to the disposal site, even if the action is required by a State or another Federal agency.

(d) As specified in the Uranium Mill Tailings Radiation Control Act of 1978, as amended, the Secretary of the Interior, with the concurrence of the Secretary of Energy and the Commission, may sell or lease any subsurface mineral rights associated with land on which residual radioactive materials are disposed. In such cases, the Commission shall grant a license permitting use of the land if it finds that the use will not disturb the residual radioactive materials or that the residual radioactive materials will be restored to a safe and environmentally sound condition if they are disturbed by the use.

(e) The general license in paragraph (a) of this section is exempt from parts

19, 20, and 21 of this chapter, unless significant construction, actions, or repairs are required. If these types of actions are to be undertaken, the licensee shall explain to the Commission which requirements from these parts apply for the actions and comply with the appropriate requirements.

§ 40.28 General license for custody and long-term care of uranium or thorium byproduct materials disposal sites.

(a) A general license is issued for the custody of and long-term care, including monitoring, maintenance, and emergency measures necessary to protect the public health and safety and other actions necessary to comply with the standards in this part for uranium or thorium mill tailings sites closed under Title II of the Uranium Mill Tailings Radiation Control Act of 1978, as amended. The licensee will be the Department of Energy, another Federal agency designated by the President, or a State where the disposal site is located. The purpose of this general license is to ensure that uranium and thorium mill tailings disposal sites will be cared for in such a manner as to protect the public health, safety, and the environment after closure.

(b) The general license in paragraph (a) of this section becomes effective when the Commission terminates, or concurs in an Agreement State's termination of, the current specific license and a site Long-Term Surveillance Plan (LTSP) meeting the requirements of this section has been accepted by the Commission. There is no termination of this general license. If the LTSP has not been formally received by the NRC prior to termination of the current specific license, the Commission may issue a specific order to the intended custodial agency to ensure continued control and surveillance of the disposal site to protect the public health, safety, and the environment. The Commission will not unnecessarily delay the termination of the specific license solely on the basis that an acceptable LTSP has not been received. The LTSP may incorporate by reference information contained in documents previously submitted to the Commission if the references to the individual incorporated documents are clear and specific. Each LTSP must include--

(1) A legal description of the disposal site to be transferred (unless transfer is exempted under provisions of the Atomic Energy Act, § 83(b)(1)(A)) and licensed;

(2) A detailed description, which can be in the form of a reference of the final disposal site conditions, including existing ground water characterization.

This description must be detailed enough so that future inspectors will have a baseline to determine changes to the site and when these changes are serious enough to require maintenance or repairs;

(3) A description of the long-term surveillance program, including proposed inspection frequency and reporting to the Commission (as specified in appendix A, Criterion 12 of this part), frequency and extent of ground water monitoring if required, appropriate constituent concentration limits for ground water, inspection personnel qualifications, inspection procedures, recordkeeping and quality assurance procedures;

(4) The criteria for follow-up inspections in response to observations from routine inspections or extreme natural events; and

(5) The criteria for instituting maintenance or emergency measures.

(c) The long-term care agency who has a general license established by paragraph (a) of this section shall --

(1) Implement the LTSP as described in paragraph (b) of this section;

(2) Care for the disposal site in accordance with the provisions of the LTSP;

(3) Notify the Commission of any changes to the LTSP; the changes may not conflict with the requirements of this section;

(4) Guarantee permanent right-of-entry to Commission representatives for the purpose of periodic site inspections; and

(5) Notify the Commission prior to undertaking any significant construction, actions, or repairs related to the disposal site, even if the action is required by a State or another Federal agency.

(d) Upon application, the Commission may issue a specific license, as specified in the Uranium Mill Tailings Radiation Control Act of 1978, as amended, permitting the use of surface and/or subsurface estates transferred to the United States or a State. Although an application may be received from any person, if permission is granted, the person who transferred the land to DOE or the State shall receive the right of first refusal with respect to this use of the land. The application must demonstrate that--

(1) The proposed action does not endanger the public health, safety, welfare, or the environment;

(2) Whether the proposed action is of a temporary or permanent nature, the site would be maintained and/or restored to meet requirements in

Appendix A of this part for closed sites; and

(3) Adequate financial arrangements are in place to ensure that the byproduct materials will not be disturbed, or if disturbed that the applicant is able to restore the site to a safe and environmentally sound condition.

(e) The general license in paragraph (a) of this section is exempt from parts 19, 20, and 21 of this Chapter, unless significant construction, actions, or repairs are required. If these types of actions are to be undertaken, the licensee shall explain to the Commission which requirements from these parts apply for the actions and comply with the appropriate requirements.

(f) In cases where the Commission determines that transfer of title of land used for disposal of any byproduct materials to the United States or any appropriate State is not necessary to protect the public health, safety or welfare or to minimize or eliminate danger to life or property (Atomic Energy Act, § 53(b)(1)(A)), the Commission will consider specific modifications of the custodial agency's LTSP provisions on a case-by-case basis.

9. Appendix A, Criterion 12 is revised to read as follows:

Appendix A to part 40 - Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content

Criterion 12—The final disposition of tailings, residual radioactive material, or wastes at milling sites should be such that ongoing active maintenance is not necessary to preserve isolation. As a minimum, annual site inspections must be conducted by the government agency responsible for long-term care of the disposal site to confirm its integrity and to determine the need, if any, for maintenance and/or monitoring. Results of the inspections for all the sites under the licensee's jurisdiction will be reported to the Commission annually within 90 days of the last site inspection in that calendar year. Any site where unusual damage or disruption is discovered during the inspection, however, will require a preliminary site inspection report to be submitted within 90 days. On the basis of a site specific evaluation, the Commission may require more frequent site inspections if necessary due to the features of a particular disposal site. In this case, a preliminary inspection report is required to be submitted within 90 days following each inspection.

Dated at Rockville, Maryland this 24th day of October, 1990

For the Nuclear Regulatory Commission,
Samuel J. Chilk,
Secretary of the Commission.
(FR Doc. 90-25612 Filed 10-29-90; 8:45 am)
BILLING CODE 7890-01-0

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

(Docket No. 90-NM-83-AD; Amdt. 39-6786)

Airworthiness Directives; British Aerospace Model BAe/DH/BH/HS 125 Series Airplanes, Post-Modification 255640

AGENCY: Federal Aviation Administration (FAA), DOT.
ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD), applicable to certain British Aerospace Model BAe/DH/BH/HS 125 series airplanes, which requires replacement of all main landing gear (MLG) door aluminum forward hinge fittings every 6,000 landings. This amendment is prompted by reports of in-service failures of the hinge fitting door jack attachment lugs. This condition, if not corrected, could result in the main landing gear (MLG) door failing to close when retracting the landing gear and subsequently exceeding the landing gear door design loads.

EFFECTIVE DATE: December 4, 1990.

ADDRESSES: The applicable service information may be obtained from British Aerospace, PLC, Librarian for Service Bulletins, P.O. Box 37414, Dulles International Airport, Washington, DC 20041-0414. This information may be examined at the FAA, Northwest Mountain Region, Transport Airplane Directorate, 1801 Lind Avenue SW., Renton, Washington.

FOR FURTHER INFORMATION CONTACT: Mr. William Schroeder, Standardization Branch, ANM-118; telephone (206) 227-2146. Mailing address: FAA, Northwest Mountain Region, Transport Airplane Directorate, 1801 Lind Avenue SW., Renton, Washington 98055-4056.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations to include a new airworthiness directive, applicable to certain British Aerospace Model BAe/DH/BH/HS 125 series airplanes, which requires replacement of all main landing gear (MLG) aluminum forward hinge fittings every 6,000 landings, was published in the Federal Register on June 1, 1990 (55 FR 22355).

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the single comment received.

The commenter supported the rule, but stated that the proposed 400-landing compliance time for replacement of aluminum forward hinge fittings that have exceeded 6,000 landings is not consistent with the compliance time specified in British Aerospace Service Bulletin 32-218, dated July 28, 1988. The FAA partially concurs. The service bulletin recommends that hinge fittings be replaced upon the accumulation of 6,000 landings, or within approximately one year for those that have exceeded 6,000 landings; and that repetitive visual inspections for cracks be conducted at 300-landing intervals until parts are available for replacement. British Aerospace had previously advised the FAA that the highest time Model BAe-125 in the United States has accumulated approximately 3,200 landings, and that these airplanes average approximately 400 landings per year. Therefore, the compliance time of 400 landings in this AD action was selected in order to be equivalent to the one-year compliance time recommended in the service bulletin for replacement of the hinge fittings that had exceeded 6,000 landings. The FAA determined that repetitive inspections to allow operation until parts are available need not be included in this AD, since U.S. operators will replace the fittings prior to accumulating 6,000 landings and there is no evidence at this time that there will be a parts availability problem. Should a parts availability problem arise in the future, the individual operator always has the option to request an alternate means of compliance in accordance with paragraph C. of this AD.

Paragraph C. of the final rule has been revised to specify the current procedure for submitting requests for approval of an alternate means of compliance.

After careful review of the available data, the FAA has determined that air safety and the public interest require the adoption of the rule with the change noted above. The FAA has determined that this change will neither increase the economic burden on any operator, nor increase the scope of the rule.

It is estimated that 420 airplanes of U.S. registry will be affected by this AD, that it will take approximately 32 manhours per airplane to accomplish the required actions, and that the average labor cost will be \$40 per manhour. The estimated cost for required parts is \$7,260. Based on these figures, the total

ENCLOSURE 7

RISK INFORMATION: INTEGRATED RISK INFORMATION
SYSTEM (IRIS) - MEMO AND EXAMPLE



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D C 20460

JUN 1 1988

OFFICE OF
THE ADMINISTRATOR

SUBJECT: Integrated Risk Information System (IRIS)

FROM: A. James Barnes
Deputy Administrator (A-101)

TO: Assistant Administrators
Associate Administrators
Regional Administrators
Office Directors
Division Directors

I am pleased to announce that the Integrated Risk Information System (IRIS) was made available to the public on April 15, 1988. IRIS is an on-line database of the Agency's risk assessment and regulatory information on chemical substances. It is designed for those with a fundamental knowledge of risk assessment who must deal with risk issues on a regular basis.

There are currently 260 chemicals on IRIS. The risk information on these chemicals has been arrived at after review and agreement by scientists from across the Agency using all available studies on a substance. New chemicals will be regularly added to the system and existing chemicals revised as warranted by new scientific findings. Additional risk information will be included on each of the chemicals to meet the needs of EPA users.

IRIS was made available within the Agency last summer. Since then there has been significant demand for the risk information in IRIS, particularly from state environmental officials. Based on pilot use of IRIS within the Agency, the development of the database has been completed. IRIS will be made available through various on-line networks such as DIALCOM, Inc., the Public Health Network (PHN), and the National Library of Medicine's TOXNET.

The primary purpose of IRIS is to serve EPA staff and contractor needs for chemical-based risk information. Since it represents regularly updated and consistent EPA interpretation of the data and possible risk, I hope that it also will contribute to sound risk-based decision-making across the country.

IRIS Questions & Answers

1) HOW CAN I GET ACCESS TO IRIS?

IRIS is available on every EPA electronic mailbox. Once the EPA electronic mail system has been accessed, simply type in 'IRIS' and hit the return key. The IRIS menu will appear on the screen. To obtain a copy of the IRIS User's Guide, call IRIS User Support at FTS 684-7254 or print out the identical on-line version provided in menu option 4.

2) HOW CAN THOSE OUTSIDE THE AGENCY GET ACCESS TO IRIS?

Those outside EPA can obtain an IRIS account by calling Mike McLaughlin of DIALCOM, Inc. at (202) 488-0550 or write to:

Mike McLaughlin
DIALCOM, Inc.
Federal Systems Division
600 Maryland Avenue SW
Washington DC 20024

IRIS is also available through the Public Health Network (PHN) of the Public Health Foundation. Call Paul Johnson at (202) 898-5600 for more information. PHN is only available to local, state, and federal public health officials.

IRIS will be made available on the NIH National Library of Medicine's TOXNET system sometime during the late summer or fall of 1988. At that time, call (301) 496-6531 for details.

3) HOW MUCH DOES IRIS COST?

There is no charge to EPA users and the 47 states which have EPA-paid-for electronic mail accounts.

Those outside EPA who access IRIS through DIALCOM, Inc. must pay only for the cost of accessing IRIS. The user will be billed by DIALCOM, Inc. There is a \$25.00 monthly minimum which is applied against a usage fee of \$25.00 per hour. In addition to the usage fee, there is a \$.05 charge per computer screen accessed. There is no EPA charge for using IRIS.

Those eligible to access IRIS via the Public Health Network will be charged under a different set of fees. Contact the Public Health Foundation at (202) 898-5600 for more information.

V Chicago David Dolan
(312) 886-6195
FTS 886-6195

VI Dallas Fred Reitman
(214) 655-2235
FTS 255-2235

Jill Lyons
(214) 655-7208
FTS 255-7208

VII Kansas City Bob Fenemore
(913) 236-2970
FTS 757-2970

VIII Denver Jim Baker
(303) 293-1524
FTS 564-1524

IX San Francisco Arnold Den
(415) 944-0906
FTS 444-0906

X Seattle Dave Tetta
(206) 442-2138
FTS 399-2138

Dana Davoli
(206) 442-2135
FTS 399-2135

10) WHEN WILL (CHEMICAL NAME) BE INCLUDED IN IRIS?

WHEN WILL THE REFERENCE DOSE FOR (CHEMICAL NAME) BE ADDED TO IRIS?

WHEN WILL THE CARCINOGEN ASSESSMENT FOR (CHEMICAL NAME) BE ADDED TO IRIS?

Cal. IRIS User Support at (513) 569-7254 or FTS 684-7254.

Chemicals on the Integrated Risk Information System
(April 15, 1988)

Sections Available:

RfD = Chronic noncarcinogenic assessment (Reference Dose)
CAR = Chronic carcinogenicity assessment
HA = Drinking Water Health Advisories

Acetone; 67-64-1RfD
Acetonitrile; 75-05-8RfD
Acrylic Acid; 79-10-7RfD
Acrylonitrile; 107-13-1CAR
Alachlor; 15972-60-8RfD, HA
Aldicarb; 116-06-3RfD, HA
Aldrin; 309-00-2RfD, CAR
Allyl Alcohol; 107-18-6RfD
Aluminum Phosphide; 20859-73-8RfD
Amdro; 67485-29-4RfD
Ametryn; 834-12-8RfD
Ammonium Sulfamate; 7773-06-0RfD
Antimony; 7440-36-0RfD
Apollo; 74115-24-5RfD
Arsenic, inorganic; 7440-38-2CAR
Atrazine; 1912-24-9RfD

Barium; 7440-39-3RfD
Barium Cyanide; 542-62-1RfD
Baygon; 114-26-1RfD
Bayleton; 43121-43-3RfD
Baythroid; 68359-37-5RfD
Benefin; 1861-40-1RfD
Benomyl; 17804-35-2RfD
Bentazon; 25057-89-0RfD
Benzene; 71-43-2CAR, HA
Benzidine; 92-87-5CAR
Benzo[a]pyrene (BaP); 50-32-8CAR
Beryllium; 7440-41-7RfD
Bidrin; 142-66-2RfD
1,1-Biphenyl; 92-52-4RfD
Bis(2-ethylhexyl)phthalate (BEHP); 117-81-7RfD
Bis(chloroethyl)ether (BCEE); 111-44-4CAR
Bromodichloromethane; 75-27-4RfD
Bromoform; 75-25-2RfD
Bromomethane; 74-83-9RfD
Bromoxynil Octanoate; 1689-99-2RfD
1,3-Butadiene; 106-99-0CAR
n-Butanol; 71-36-3RfD
Butylate; 2008-41-5RfD
Butylphthalyl Butylglycolate (BPEG); 85-70-1RfD

Cadmium; 7440-43-9CAR
Calcium Cyanide; 592-01-8RfD

tafol; 2425-06-1RfD
tan; 133-06-2RfD
baryl; 63-25-2RfD
bofuran; 1563-66-2RfD, HA
bon Disulfide; 75-15-0RfD
bon Tetrachloride; 56-23-5RfD, CAR, HA
bosulfan; 552-14-8RfD
boxin; 5234-1-1RfD
loramben; 133-1-1RfD
lordane; 57-74-9RfD, CAR, HA
lorine Cyanide; 506-77-4RfD
loroform; 67-66-3RfD
loromethyl Methyl Ether (CMME); 107-30-2CAR
lorothalonil; 1897-45-6RfD
lorpyrifos; 2921-88-2RfD
lorsulfuron; 64902-72-3RfD
lromium(III); 16065-83-1RfD, HA
lromium(VI); 7440-47-3RfD, CAR, HA
opper Cyanide; 544-92-3RfD
yanazine; 21725-46-2RfD
yanide, free; 57-12-5RfD, HA
yanogen; 460-19-5RfD
Cyclohexanone; 108-94-1RfD
Cyromazine; 66215-27-8RfD

Dalapon; 75-99-0RfD
Danitol; 39515-41-8RfD
Decabromodiphenyl Ether (DBDPE); 1163-19-5RfD
Demeton; 8065-48-3RfD
1,4-Dibromobenzene; 106-37-6RfD
Dibromochloromethane; 124-48-1RfD
Dibutyl Phthalate; 84-74-2RfD
Dicamba; 1918-00-9RfD
Dichlorodifluoromethane; 75-71-8RfD
P,P'-Dichlorodiphenyltrichloroethane (DDT); 50-29-3RfD
1,2-Dichloroethane; 107-06-2CAR, HA
1,1-Dichloroethylene; 75-35-4RfD, CAR
Dichloromethane; 75-09-2RfD, CAR, HA
2,4-Dichlorophenol; 120-83-2RfD
4-(2,4-Dichlorophenoxy)butyric acid (2,4-DB); 94-82-6RfD
2,4-Dichlorophenoxyacetic acid (2,4-D); 94-75-7RfD
1,3-Dichloropropene (Telone II); 542-75-6RfD
Dichlorvos; 62-73-7RfD
Diethyl Phthalate; 84-66-2RfD
Diflubenzuron; 35367-38-5RfD
Dimethipin; 55290-64-7RfD
Dimethoate; 60-51-5RfD
Dimethyl Terephthalate (DMT); 120-61-6RfD
N-N-Dimethylaniline; 121-69-7RfD
2,4-Dinitrophenol; 51-28-5RfD
Dinoseb; 88-85-7RfD
Diphenamid; 957-51-7RfD
Diphenylamine; 122-39-4RfD
1,2-Diphenylhydrazine; 122-66-7CAR

Diquat; 85-00-7RfD
Disulfoton; 298-04-4RfD
Diuron; 330-54-1RfD
Dodine; 2439-10-3RfD

Endosulfan; 115-29-7RfD
Endothall; 145-73-3RfD
Epichlorohydrin; 106-89-8RfD, CAR, HA
Ethion; 563-12-2RfD
Ethyl Acetate; 141-78-6RfD
S-Ethyl dipropylthiocarbamate (EPTC); 759-94-4RfD
Ethyl p-nitrophenyl phenylphosphorothioate (EPN); 2104-64-5RfD
Ethylbenzene; 100-41-4RfD, HA
Ethylene Glycol; 107-21-1RfD
Ethylphthalyl Ethylglycolate (EPEG); 84-72-0RfD

Fenamiphos; 22224-92-6RfD
Fluometuron; 2164-17-2RfD
Flucrine (soluble fluoride); 7782-41-4RfD
Fluridone; 59756-60-4RfD
Folpet; 133-07-3RfD
Fonofos; 944-22-9RfD
Formic Acid; 64-18-6RfD
Fosetyl-al; 39148-24-8RfD
Furan; 110-00-9RfD

Glufosinate-ammonium; 77182-82-2RfD
Glyphosate; 1071-83-6RfD

Heptachlor; 76-44-8RfD, CAR, HA
Heptachlor Epoxide; 1024-57-3RfD, CAR, HA
Hexabromobenzene; 87-82-1RfD
Hexachlorobutadiene; 87-68-3RfD, CAR
alpha-Hexachlorocyclohexane (alpha-HCH); 319-84-6CAR
beta-Hexachlorocyclohexane (beta-HCH); 319-85-7CAR
delta-Hexachlorocyclohexane (delta-HCH); 319-86-8CAR
epsilon-Hexachlorocyclohexane (epsilon-HC); 6108-10-7CAR
gamma-Hexachlorocyclohexane (gamma-HCH); 58-89-9RfD, HA
technical Hexachlorocyclohexane (t-HCH); 00-01-0CAR
Hexachlorocyclopentadiene (HCCPD); 77-47-4RfD
Hexachlorodibenzo-p-dioxin, mixture (HxCDD); 19408-74-3CAR
Hexachloroethane; 67-72-1RfD, CAR
Hexazinone; 51235-04-2RfD
Hydrogen Cyanide; 74-90-8RfD, HA
Hydrogen Sulfide; 7783-06-4RfD

Imazalil; 35554-44-0RfD
Imazaquin; 81335-37-7RfD
Isobutyl Alcohol; 78-83-1RfD
Isophorone; 78-59-1RfD
Isopropalin; 33820-53-0RfD

Lead; 7439-92-1RfD
Linuron; 330-55-2RfD

Lendax; 83055-99-6RfD

Malathion; 121-75-5RfD
Maleic Hydrazide; 123-33-1RfD
Metalaxyl; 57837-19-1RfD
Methamidophos; 10265-92-6RfD
Methomyl; 16752-77-5RfD
Methyl Ethyl Ketone (MEK); 78-93-3RfD
Methyl Isobutyl Ketone (MIBK); 108-10-1RfD
Methyl Mercury; 22967-92-6RfD
Methyl Parathion; 298-00-0RfD
2-Methyl-4-chlorophenoxy acetic acid (MCPA); 94-74-6RfD
2-(2-Methyl-4-chlorophenoxy)propionic acid (MCPP); 93-65-2RfD
Metolachlor; 51218-45-2RfD
Metribuzin; 21087-64-9RfD
Mirex; 2385-85-5RfD

Naled; 300-76-5RfD
Nickel Carbonyl; 13463-39-3CAR
Nickel Refinery Dust; 00-02-0CAR
Nickel Sub sulfide; 12035-72-2CAR
Nickel, soluble salts; 7440-02-0RfD
Nitrapyrin; 1929-82-4RfD
Nitrate; 14797-55-8RfD, HA
Nitric Oxide; 10102-43-9RfD
Nitrite; 14797-65-0RfD, HA
Nitrobenzene; 98-95-3RfD
Nitrogen Dioxide; 10102-44-0RfD
N-Nitroso-di-n-butylamine; 924-16-3CAR
N-Nitroso-N-methylethylamine; 10595-95-6CAR
N-Nitrosodi-N-propylamine; 621-64-7CAR
N-Nitrosodiethanolamine; 1116-54-7CAR
N-Nitrosodiethylamine; 55-18-5CAR
N-Nitrosodimethylamine; 62-75-9CAR
N-Nitrosodiphenylamine; 86-30-6CAR
N-Nitrosopyrrolidine; 930-55-2CAR
Norflurazon; 27314-13-2RfD

Octabromodiphenyl ether; 32536-52-0RfD
Oryzalin; 19044-88-3RfD
Oxadiazon; 19666-30-9RfD
Oxamyl; 23135-22-0RfD, HA
Oxyfluorfen; 42874-03-3RfD

Paclobutrazol; 76738-62-0RfD
Paraquat; 1910-42-5RfD
Pentabromodiphenyl ether; 32534-81-9RfD
Pentachlorobenzene; 608-93-5RfD
Pentachloronitrobenzene (PCNB); 82-68-8RfD
Pentachlorophenol; 87-86-5RfD, HA
Permethrin; 52645-53-1RfD
Phenol; 108-95-2RfD
m-Phenylenediamine; 108-45-2RfD
Phenylmercuric Acetate; 62-38-4RfD

Phosmet; 732-11-6RfD
Phosphine; 7803-51-2RfD
Picloram; 1918-02-1RfD
Pirimiphos-methyl; 29232-93-7RfD
Potassium Cyanide; 151-50-8RfD, HA
Potassium Silver Cyanide; 506-61-6RfD
Prometon; 1610-18-0RfD
Prometryn; 7287-19-6RfD
Pronamide; 23950-58-5RfD
Propachlor; 1918-16-7RfD
Propanil; 709-98-8RfD
Propazine; 139-40-2RfD
Propham; 122-42-9RfD
Pydrin; 51630-58-1RfD
Pyridine; 110-86-1RfD

Quinalphos; 13593-03-8RfD

Radon 222; 14859-67-7CAR

Selenious Acid; 7783-00-8RfD
Selenourea; 630-10-4RfD
Sethoxydim; 74051-80-2RfD
Silver; 7440-22-4RfD
Silver Cyanide; 506-64-9RfD
Simazine; 122-34-9RfD
Sodium Acifluorfen; 62476-59-9RfD
Sodium Azide; 26628-22-8RfD
Sodium Cyanide; 143-33-9RfD, HA
Sodium Diethyldithiocarbamate (Dithiocarb); 148-18-5RfD
Strychnine; 57-24-9RfD
Styrene; 100-42-5RfD

Tebuthiuron; 34014-18-1RfD
Terbacil; 5902-51-2RfD
1,2,4,5-Tetrachlorobenzene; 95-94-3RfD
1,1,1,2-Tetrachloroethane; 630-20-6RfD
1,1,2,2-Tetrachloroethane; 79-34-5CAR
Tetrachloroethylene; 127-18-4RfD, HA
2,3,4,6-Tetrachlorophenol; 58-90-2RfD
Tetrachlorovinphos; 961-11-5RfD
Tetraethyl Lead; 78-00-2RfD
Thallic Oxide; 1314-32-5RfD
Thallium Acetate; 563-68-8RfD
Thallium Carbonate; 6533-73-9RfD
Thallium Chloride; 7791-12-0RfD
Thallium Nitrate; 10102-45-1RfD
Thallium Selenite; 12039-52-0RfD
Thallium(I) Sulfate; 7446-18-6RfD
Thiobencarb; 28249-77-6RfD
Thiophanate-methyl; 23564-05-8RfD
Thiram; 137-26-8RfD
Toluene; 108-88-3RfD
Triallate; 2303-17-5RfD

1,2,4-Tribromobenzene; 615-54-3RfD
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113); 76-13-1RfD
1,2,4-Trichlorobenzene; 120-82-1RfD
1,1,1-Trichloroethane; 71-55-6RfD
1,1,2-Trichloroethane; 79-00-5RfD, CAR
Trichloroethylene; 79-01-6CAR
Trichlorofluoromethane; 75-69-4RfD
2,4,5-Trichlorophenol; 95-95-4RfD
2,4,6-Trichlorophenol; 88-06-2CAR
1,2,3-Trichloropropane; 96-18-4RfD
Tridiphane; 58138-08-2RfD
Trifluralin; 1582-09-8RfD

Uranium, natural; 7440-61-1CAR

Vanadium Pentoxide; 1314-62-1RfD

Vernam; 1929-77-7RfD

Vinclozolin; 50471-44-8RfD

Warfarin; 81-81-2RfD

Xylenes; 1330-20-7RfD

Zinc Cyanide; 557-21-1RfD

Zinc Phosphide; 1314-84-7RfD

Zineb; 12122-67-7RfD

IRIS

INTRODUCTION

OVERVIEW OF IRIS

The Integrated Risk Information System (IRIS), prepared and maintained by the U.S. Environmental Protection Agency (EPA), is an electronic data base containing health risk and EPA regulatory information on specific chemicals. IRIS was developed for EPA staff in response to a growing demand for consistent risk information on chemical substances for use in decision-making and regulatory activities. Although IRIS is designed for EPA staff, it is also accessible to state and local environmental health agencies. IRIS is available to libraries, private citizens, and other organizations by means of Dialcom, Inc.'s Electronic Mail telecommunications system. The information in IRIS is intended for EPA staff without extensive training in toxicology, but with some knowledge of health sciences.

The heart of the IRIS system is its collection of computer files covering individual chemicals. These chemical files contain descriptive and quantitative information in the following categories:

- o Oral and inhalation reference doses (RfDs) for chronic noncarcinogenic health effects
- o Oral and inhalation slope factors and unit risks for chronic exposures to carcinogens
- o Drinking water health advisories from EPA's Office of Drinking Water
- o EPA regulatory action summaries
- o Supplementary data on acute health hazards and physical/chemical properties

To aid users in accessing and understanding the data in the IRIS chemical files, the following supportive documentation is provided:

- o Alphabetical list of the chemical files in IRIS and list of chemicals by CAS (Chemical Abstracts Service) number.
- o Background documents describing the rationales and methods used in arriving at the results shown in the chemical files.
- o A user's guide that represents step-by-step procedures for using IRIS to retrieve chemical information.
- o An example exercise in which the use of IRIS is demonstrated.
- o Glossaries in which definitions are provided for the acronyms, abbreviations, and specialized risk assessment terms used in the chemical files and in the background documents.

RISK ASSESSMENT AND RISK MANAGEMENT

The information in IRIS is intended for use in protecting public health through risk assessment and risk management. These two processes are briefly explained below.

Risk assessment has been defined as "the characterization of the potential adverse health effects of human exposures to environmental hazards (NRC, 1983, p. 18). In a risk assessment, the extent to which a group of people has been or may be exposed to a certain chemical is determined, and the extent of exposure is then considered in relation to the kind and degree of hazard posed by the chemical, thereby permitting an estimate to be made of the present or potential health risk to the group of people involved.

Risk assessment information is used in the risk management process in deciding how to protect public health. Examples of risk management actions include: deciding how much of a chemical a company may discharge into a river; determining which substances may be stored at a hazardous waste disposal facility; deciding to what extent a hazardous waste site must be cleaned up; setting permit levels for discharge, storage, or transport of hazardous waste; establishing levels for air emissions; and determining allowable levels of contamination in drinking water.

Essentially, risk assessment provides **information** on the health risk, and risk management is the **action** taken based on that information.

A complete risk assessment consists of the following four steps:

1. Hazard identification.
2. Dose-response assessment.
3. Exposure assessment, and
4. Risk characterization.

with risk characterization being the transitional step to risk management.

The following discussion of the four steps of risk assessment was excerpted from "Principles of Risk Assessment: A Nontechnical Review" (U.S. EPA, 1985).

Hazard identification involves gathering and evaluating data on the types of health injury or disease that may be produced by a chemical and on the conditions of exposure under which injury or disease is produced. It may also involve characterization of the behavior of a chemical within the body and the interactions it undergoes with organs, cells, or even part of cells. Data of the latter types may be of value in answering the ultimate question of whether the forms of toxicity known to be produced by a substance in one population group or in experimental settings are also likely to be produced in humans. Hazard identification is not risk assessment; we are simply determining whether it is scientifically correct to infer that toxic effects observed in one setting will occur in other settings (e.g., whether substances found to be carcinogenic or teratogenic in experimental animals are likely to have the same results in humans).

Dose-response assessment involves describing the quantitative relationship between the amount of exposure to a substance and the extent of toxic injury or disease. Data are derived from animal studies, or less frequently, from studies in exposed populations. There may be many different toxic effects under different conditions of exposure.

The risks of a substance cannot be ascertained with any degree of confidence unless dose-response relationships are quantified, even if the substance is known to be toxic.

Exposure assessment involves describing the nature and size of the population exposed to a substance and the magnitude and duration of their exposure. The evaluation could concern past or current exposures, or exposures anticipated in the future.

Risk characterization generally involves the integration of the

assessment process (hazard identification, dose-response assessment, and exposure assessment) to determine the likelihood that humans will experience any of the various forms of toxicity associated with a substance. (In cases where exposure data are not available, hypothetical risk can be characterized by the integration of hazard identification and dose-response assessment data alone.) A framework to define the significance of the risk is developed, and all of the assumptions, uncertainties, and scientific judgments of the preceding three steps are presented.

THE ROLE OF IRIS IN RISK ASSESSMENT/RISK MANAGEMENT

IRIS is a tool that provides hazard identification and dose-response assessment information, but does not provide situational information on instances of exposure. Combined with specific exposure information, the data in IRIS can be used for characterization of the public health risks of a given chemical in a given situation, which can then lead to a risk management decision designed to protect public health.

The information contained in Section I (Chronic Health Hazard Assessment for Noncarcinogenic Effects) and Section II (Carcinogenicity Assessment for Lifetime Exposure) of the IRIS chemical files **represents a consensus judgment** of EPA's Reference Dose (RfD) Work Group or Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Group, respectively. These two Agency-wide work groups include high-level scientists from EPA's program offices (hazardous waste, air, pesticides) and the Office of Research and Development. Individual EPA offices have conducted comprehensive scientific reviews of the literature available on the particular chemical, and have performed the first two steps of risk assessment: hazard evaluation and dose-response assessment. These assessments have been summarized for IRIS and reviewed and revised by the appropriate work group. As new information becomes available, these work groups will re-evaluate their work and revise IRIS files accordingly. For more information, contact IRIS User Support in EPA's Environmental Criteria and Assessment Office, Cincinnati, OH (513/569-7254 or FTS 684-7254).

REFERENCES

NRC (National Research Council). 1983. The Nature of Risk Assessment. In: Risk Assessment in the Federal Government: Managing the Process. National Academy Press, Washington, DC. p. 18.

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LIMITATIONS OF IRIS INFORMATION

The information in the Integrated Risk Information System (IRIS) is most useful if applied in the larger context of risk assessment as outlined by the National Academy of Sciences. IRIS supports the first two steps of the risk assessment process (as summarized in Service Code (menu option) 4); namely, the hazard identification and dose-response assessment steps. The primary qualitative and quantitative risk data in IRIS, the reference doses (RfDs) and carcinogen assessments, can serve as guides in evaluating potential health hazards and selecting a response to alleviate a potential risk to human health.

The **reference dose (RfD)** can be used to estimate a level of environmental exposure at or below which no adverse effect is expected to occur. The RfD is an **estimate** (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. RfDs are based on an assumption of lifetime exposure and may not be appropriately applied to less-than-lifetime exposure situations. RfDs are also derived for the noncarcinogenic effects of chemicals that are carcinogenic.

The **carcinogen assessments** in IRIS begin with a qualitative weight-of-evidence judgment in the form of a classification as to the likelihood that a chemical may be a carcinogen for humans. This judgment is made independent of consideration of the agent's potency. A quantitative assessment, including slope factor and unit risk, is then presented. The slope factor is an upper-bound **estimate** of the human cancer risk per mg of agent/kg body weight/day. The unit risk, which is calculated from the slope factor, is an **estimate** in terms of either risk per ug/L drinking water, or risk per ug/cu.m air concentration.

In general, risk values, such as those in IRIS, cannot be validly used to predict the incidence of human disease or the type of effects that chemical exposures may have on humans. This is due to the numerous **uncertainties** involved in risk assessment, including those associated with extrapolations from animal data to humans and from high experimental doses to lower environmental exposures. The organs affected and the type of adverse effect resulting from chemical exposure may differ between study animals and humans. In addition, many factors besides exposure to a chemical influence the occurrence and extent of human disease.

Any change to an RfD, slope factor or unit risk as they appear in IRIS (for example, the use of more or fewer uncertainty factors than were applied to arrive at an RfD) invalidates and distorts their application in estimating the potential health risk posed by chemical exposure.

Each reference dose and carcinogen assessment is derived by an interdisciplinary work group of EPA scientists using consistent chemical hazard identification and dose-response assessment methods. These methods are outlined in Background Documents 1 and 2 (Service Code 5). It is important to note that the risk information in IRIS will be revised by these work groups when additional health effects data become available and new developments in risk assessment methods arise.

Dose-response relationships for cancer risks are expressed as slope (potency) factors which are estimated as the 95th percentile confidence limits using the linearized multistage model. As such, they are conservative estimates of toxic hazard. Slope (potency) factors depend upon the route of exposure to an agent. When considering the potency of a known or potential carcinogen, it is also crucial to consider the weight-of-evidence class, indicating the strength of the evidence suggesting that the substance is a HUMAN carcinogen. There are six such classes:

- A - Known human carcinogen.
- B1 - Probable human carcinogen, limited human data.
- B2 - Probable human carcinogen, inadequate or no human data.
- C - Possible human carcinogen.
- D - Not classifiable as human carcinogen.
- E - Evidence that not carcinogenic in humans.

Estimates on non-cancer toxic hazards reflect the theoretical assumption that such toxic effects will only occur after exposure exceeds some threshold level. Reference Doses (RfDs) are estimates of exposure that are assumed not to be associated with significant risk of non-cancer toxic effects. The RfD for a chemical is obtained by dividing either the highest dose of the chemical that did not produce a toxic effect in experimental studies (No Observed Adverse Effect Level or NOAEL), or the lowest dose that did produce a toxic effect (Lowest Observed Adverse Effect Level or LOAEL), by the product of an Uncertainty Factor (UF) and a Modifying Factor (MF). The UF reflects the design of the study from which the LOAEL or NOAEL was obtained, while the MF reflects the EPA's confidence in the quality of the data for predicting human risk. In addition, EPA RfDs are accompanied by an overall statement of the agency's confidence in the RfD (High, Medium, or Low).

Where available, cancer potencies and reference doses were obtained from the Integrated Risk Information System (IRIS). All values in IRIS have been rigorously reviewed and officially accepted by EPA. For chemicals not included in IRIS, toxicity data were extracted from the Health Effects Assessment Summary Tables (HEAST), distributed quarterly by the Office of Emergency and Remedial Response. These values, and risk estimates derived from them, are marked by an asterisk (*).

CARCINOGENIC HAZARD DATA FOR SELECTED CHEMICALS

CAS #	CHEMICAL NAME	WT OF EVIDENCE CLASS	ORAL SLOPE(*) 1/(mg/kg/day)
7440-41-7	BERYLLIUM	B2	

NOTE: '*' indicates that the data source is HEAST.

CARCINOGENIC HAZARD DATA FOR SELECTED CHEMICALS

CAS #	CHEMICAL NAME	WT OF EVIDENCE CLASS	INHAL. SLOPE(*) 1/(mg/kg/day)
7440-41-7	BERYLLIUM	B2	

NOTE: '*' indicates that the data source is HEAST.

TOXIC HAZARD DATA FOR SELECTED CHEMICALS

CAS #	CHEMICAL NAME	RfD(mg/kg/d)(*)	UNC.FACT.	MOD.FAC.	CONF
7440-41-7	BERYLLIUM	5.00e-003	100	1	L

NOTE: '*' indicates that the data source is HEAST.

