



Alternate Concentration Limits

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June 2002

ALTERNATE CONCENTRATION LIMITS

REGULATORY FRAMEWORK:

10 CFR Part 40, Appendix A, Criterion 5B6

Regs state that the licensee can submit ACLs that present no significant hazard. The Licensee must provide the basis for any proposed limits including consideration of practicable corrective actions, that limits are as low as reasonably achievable, and information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and 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.

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ALTERNATE CONCENTRATION LIMITS

REGULATORY FRAMEWORK (Contd.):

Criterion 5B5 states that at the point of compliance, the concentration of a hazardous constituent must not exceed-

1. Commission approved background concentrations in groundwater
2. Values given in Table 5C(Maximum Concentration Limits)
3. Alternate Concentration Limits

NRC Guidance:

NUREG-1620 Section 4.3 and appendix K (4.4.3. for models)

Point of Compliance: A location at which the groundwater is monitored to determine compliance with groundwater protection standards. Objective is to provide the earliest possible warning of a release into the environment from the impoundment. The POC is defined as the intersection of a vertical plane with the uppermost aquifer at the hydraulically downgradient limit of the waste management area.

NRC Guidance (Contd.):

Point of Exposure: Location where people, wildlife, or aquatic species could reasonably be exposed to hazardous constituents from groundwater contamination from mill activities. The point of exposure does not have to be a point but can be a stream or property boundary.

Hazard Assessment

- Site adequately characterized
- Source term adequately characterized
- Identify constituents of concern
- Potential health effects - radiological dose, chemical dose
- Potential environmental effects - acute and chronic risk, state water quality criteria
- Environmental impacts
 - degradation to groundwater resources
- Staff must complete an Environmental Assessment (NUREG-1748) ✓

Licenses give NRC information to help staff

Exposure Assessment

Evaluate the potential harm to human health and the environment from the hazards identified in the hazard assessment

- Exposure pathways - ingestion of drinking water, agriculture, recreational, cattle
 - Pathway evaluation - Multi-pathway analysis (i.e. drinking water, cattle, milk, grass, gardening..)
 - Human exposure - ingestion of water, ingestion of food
 - Inhalation, dermal contact if necessary
 - Estimate future use and potential exposure
 - Must not exceed an excess lifetime risk of fatal cancer on the order of 10^{-4}

Exposure Assessment (Contd)

- Exposure to non-human populations - aquatic, wildlife, endangered species
 - Impacts to water resources
- Points of exposure identified
- Likelihood of exposure to human and non-human populations
- Exposure impacts assessed through time (1000 years)

Exposure Assessment (Contd)

- **Groundwater Flow, Fate and Transport Modeling**
 - NUREG1620 Section 4.4.3.
 - Staff needs modeling data on CD to review
 - American Standards for Testing and Materials (ASTM)
 - D5447, D5490, D5609, D5611, D5718, D5880, D5981
 - License has multiple options
 - Example : MODFLOW, MT3D & PHREEQC
 - Must model for 1,000 years
 - Validate with existing data if available (Truth Test)

Corrective Action Assessment

- **Range of realistic remedial alternatives**
- **Cost benefit analysis**
- **As Low As Reasonably Achievable (ALARA)**

ACL Applications

Approved:

- Arco Bluewater
- Exxon
- Bear Creek
- Petrotomics
- L-Bar
- Umetco

ACL Applications

Under NRC Review:

- PMC - Lucky Mc
- PMC - Shirley Basin
- Quivira
- WNI Split Rock

Emerging Issues with ACLs

Off-site groundwater contamination (NUREG-1620)

- Licensee must first attempt to make every reasonable effort to keep POE at long-term care boundary that will be owned by long-term care custodian. If that can not be achieved, a good-faith effort must be made to acquire the land between the license area boundary and the POE. If land can not be acquired through a good faith effort, then institutional controls other than ownership may be initiated.

Emerging Issues with ACLs

Institutional Controls

- Not in regulatory framework for UMTRCA Title II (10 CFR Part 40)
- Site specific evaluation
- Alternatives provision of 10 CFR Part 40, Appendix A
- DOE must agree to conditions
- State consultation

Emerging Issues with ACLs

Institutional Controls (Contd.)

- Controls must be enforceable, durable, legally defensible
- Staff currently evaluating use of Institutional Controls at Western Nuclear, Inc. (WNI) site
- Staff working to present WNI issue to Commission
- Institutional Controls hot topic in other groundwater remedial programs and with decommissioning sites

Institutional Controls and Uranium Recovery

Background:

- 1978: Congress enacted the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA)... which addresses the disposal of tailings and soil cleanup at milling sites.
- 1979: NRC promulgated implementing regulations in 10 CFR Part 40 (Part 40).
- 1980: NRC amended Part 40, adding 12 criteria in a new Appendix A, to provide the flexibility needed "to allow achieving an optimum tailings disposal program on a site-specific basis."
- 1983: Congress amended section 84(c) of the AEA to provide that licensees "may propose alternatives to specific requirements adopted and enforced by the Commission under this Act..."
- 1983 amendment spoke directly to the Commission's authority to approve alternatives which meet the standard set out in 84(c).

Institutional Controls and Uranium Recovery

Background:

- 1985: NRC amended Introduction to Appendix A to incorporate the standard Congress provided for Commission approval in section 84(c):
 - the Commission may treat such alternatives as satisfying Commission requirements if the Commission determines that such alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with such sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose...
- The presence of long-lived radionuclides creates a special set of concerns when considering the effectiveness of institutional controls

Institutional Controls and Uranium Recovery

Background:

- The consequences of failure of institutional controls could be that future inhabitants are unknowingly exposed to the hazards associated with milling, e.g., groundwater ingestion, as well as potential for degradation of groundwater resources, and harmful impacts on aquatic life, wildlife (including endangered species), agriculture, etc.
- Statement of Considerations for Proposed 1997 License Termination Rule provided reason for not including uranium mill tailings in the rule plan, commenting that the stabilization of this material requires “some type of durable institutional control, such as placing the site under the custody of a State or Federal agency,” as well as the importance for undertaking extensive site-specific safety and environmental analysis, in order to determine “the best course of action and to ensure the long-term effectiveness of institutional controls.”

Institutional Controls and Uranium Recovery

Engineered Barriers, Physical Controls And Institutional Controls:

- The Commission has not yet addressed the use of institutional controls for uranium recovery sites; therefore, currently there is no guidance directly addressing the use of institutional controls for uranium recovery sites as there is, for example, for restricted release under the License Termination Rule (LTR) in 10 CFR Part 20, Subpart E.
- UMTRCA established the most durable and enforceable institutional control, implemented at Part 40, Appendix A, criterion 11 - transfer of title to the byproduct material licensed under Part 40 and land, including any interests therein (other than land already owned by the United States or by a State), which is used for the disposal of the byproduct material, to the United States or the State in which the land is located, unless the Commission determines that this is not necessary .

Institutional Controls and Uranium Recovery

Engineered Barriers, Physical Controls And Institutional Controls:

- Section 83 (b)(4) (section 202 (b)(4) of UMTRCA) provides that for sites licensed prior to enactment of UMTRCA, the Commission may take into consideration the fact that a licensee in this situation may not be able to transfer title and custody of the land and materials to DOE, before license termination. If a site cannot be transferred, the Commission would have to consider the use of alternatives to the requirements in Part 40, Appendix A. This may equate, in some instances, to the use of institutional controls, if the site could not be released for unrestricted use otherwise.
- The term institutional control is used in discussing the decommissioning of uranium recovery sites, e.g., to address the approaches for meeting offsite release limits. Criterion 8, of Part 40, Appendix A, points out that "institutional controls" such as extending the site boundary or exclusion area, may be employed to ensure that off site exposure limits are met. In this example, "institutional controls" would refer to the purchase of lands, erection of fences, and postings.

Institutional Controls and Uranium Recovery

Engineered Barriers, Physical Controls And Institutional Controls:

- The LTR and its accompanying Decommissioning Standard Review Plan (SRP), NUREG-1727, discuss the uses of institutional controls. "Institutional control" is not defined but is used to indicate control by an organization, e.g., governmental organizations or administrative mechanisms such as land restrictions, which are enforceable through governmental organizations such as courts.
- "Engineered Barrier" is defined in 10 CFR Part 61 as a man-made structure or device that is intended to improve the land disposal facility's ability to meet specified performance objectives, is also and used in the proposed guidance for the LTR to describe one of a broad range of barriers with varying degrees of durability, robustness, and isolation capability. However, the final SRP used the term "physical controls" instead, to describe barriers that rely on human involvement to maintain their effectiveness.

Institutional Controls and Uranium Recovery

Engineered Barriers, Physical Controls And Institutional Controls:

- "Physical controls" are appropriately included in the term "institutional controls," while "engineered barriers, to the extent that they do not rely on maintenance, inspection, monitoring, repair, or other human actions, do not seem to fit the concept of "institutional control."
- Illustrating the interaction of these controls, the SRP states:
 - Institutional controls include measures to control access to the site and minimize disturbances to engineered measures established by the licensee to control the residual radioactivity ... Generally engineered measures should be designed to last, without the need for replacement and with minimum maintenance, over the time period established for the institutional controls." Some type of governmental involvement or administrative mechanism is required to guarantee the enforcement of the engineered barrier or control.

Institutional Controls and Uranium Recovery

Legally Defensible, Durable and Enforceable Mechanisms:

- Institutional controls must be capable of achieving a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from radiological and nonradiological hazards associated with such sites, which is equivalent to, to the extent practicable, or more stringent than the level which would be achieved by standards and requirements adopted and enforced by the Commission for the same purpose...
- Several factors in LTR guidance that are relevant to uranium recovery licensee sites include whether restrictions are: (1) enforceable against any owner of the affected property and any person who subsequently acquires the property or acquires any rights to use the property; (2) are enforceable by parties, other than the landowner, who have the legal authority to enforce the restrictions; (3) are based on considerations of how durable the controls need to be; (4) remain in place for the duration of the time needed; (5) have appropriate funds set aside if funds are necessary; and (6) are appropriately recorded, including the deed and land records, as appropriate.

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Examples of Various Institutional Controls and Their Relative Attributes:

Institutional Control	Attributes	Description
Transfer, in fee, to DOE	Most effective IC, i.e., defensible, durable, enforceable. DOE owns the site and materials.	Provided for in the Uranium Mill Tailings Radiation Control Act of 1978 and Appendix A of 10 CFR Part 40. Transfers land and materials at processing site to DOE. DOE, as the owner of the site, can restrict entry on the property, as well as the use of the surface and subsurface property, and can enter onto the property in order to maintain and enforce restrictions on the land.
Subsurface Estates, transferred, in fee, to DOE	Legally defensible, durable, and enforceable	Establishes a dominant and a servient estate. If DOE owned, for example, the subsurface estate, DOE could prevent the owner of the servient estate access to groundwater.
Easements	Legally defensible, durable, and enforceable - more durable if it runs with the land as in this case	Traditional tool of property law. Typically gives the owner of one parcel the right to cross the adjacent property, i.e., a "right of way". It would allow DOE to enter onto the land to enforce restrictions.
Restrictive Covenants/Negative Easements	Legally defensible, durable and enforceable- but can be problematic	Typically prevents future purchasers or successors from using the land in a certain manner, e.g., drilling new wells. It allows DOE to enter onto the land to enforce restrictions.
Deed Notations	Not durable or enforceable	Serve an informational purpose only. If information is located in deed, it can be lost within a short time for a variety of reasons. DOE cannot use it to enforce restrictions.

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