

## Summary Regulation of In Situ Uranium Recovery in Colorado

In situ uranium recovery is regulated through the Colorado Department of Public Health and Environment (CDPHE), Colorado Department of Natural Resources (DNR) and the U.S. Environmental Protection Agency (USEPA).

Within the CDPHE, several different authorizations must be obtained:

- a Radioactive Materials License from the Radiation Management Unit of the Hazardous Materials and Waste Management Division is required for possession of radioactive materials and uranium recovery operations
- a permit from the Water Quality Control Division is required for discharge to surface water or for surface runoff from disturbed areas
- a permit from the Air Pollution Control Division is required to control dust from construction activities

The DNR administers permits for prospecting and mining reclamation through the Division of Reclamation, Mining and Safety (DRMS):

- a Notice of Intent to conduct prospecting activities is required for exploration to define ore bodies, characterize ground water and determine possible mining and refining methods.
- a Reclamation Permit is required for any mining activity (including open pit or in situ mining)

The USEPA requires an Underground Injection Control Permit for injection wells, which requires an aquifer-exemption determination. The aquifer exemption is given if the applicant can demonstrate that the injection zone is not a drinking water aquifer and cannot serve as a drinking water source.

The Radioactive Materials License and the Underground Injection Control Permit both have extensive public involvement requirements.

Local government also may have land use or other regulations applicable to the project.

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**Colorado Department of Public Health and Environment**  
**Radiation Management Unit**  
**Regulatory Process for In Situ Uranium Mining**

The Colorado Radiation Control Act provides for the regulation of radioactive materials by the Colorado Department of Public Health and Environment (CDPHE) in CRS 25-11-101, et seq. Through the Act and an agreement between the Governor and the U.S. Nuclear Regulatory Commission, the CDPHE is empowered to be the sole regulator of radioactive material in the state. The Rules and Regulations Pertaining to Radiation Control (6 CCR 1007-1) provides the details of how radioactive materials are regulated.

The CDPHE does not regulate unmined minerals containing radioactive materials [CRS 25-11-108(3)], nor does it regulate uranium ore prior to receipt at a processing facility. Thus, traditional underground or open-pit uranium mining is not regulated by the CDPHE Radiation Management Unit (RAM). However, in situ mining is the underground processing of uranium ore, an activity subject to licensing requirements for Type II byproduct material (per Regulation 1.2, Definitions) including Parts 1, 3, 4, 10, 17 and 18 of the regulations, among others. These requirements include decommissioning, environmental assessment, financial assurance, operations, residuals management, and worker and public safety.

The process for licensing uranium-recovery facilities is specifically addressed in the Act (CRS 25-11-203). The process is summarized below:

- The application, including the Environmental Report, is submitted to CDPHE RAM.
- CDPHE must determine completeness within 30 days.
- If the application is determined to be complete, the applicant must hold a public meeting within 45 days.
- The applicant must hold a second public meeting within 30 days of the first public meeting. (Transcripts of both meetings must be submitted to CDPHE RAM.)
- County Commissioners' comments on the Environmental Report (submitted with the application) must be received by CDPHE RAM within 90 days of first public meeting. (County Commissioners may request up to \$50,000 from the applicant for the review.)
- If the County Commissioners respond, CDPHE RAM has 270 days to determine whether a license is rejected, issued as requested or issued with conditions.
- If the County Commissioners do not respond, CDPHE RAM has 360 days after the second public meeting to determine whether a license is rejected, issued as requested or issued with conditions.

CDPHE will consult with other regulatory agencies as part of the review. As described in Part 18 of the Regulations, CDPHE RAM will prepare a written analysis of the project, a justification of the decision and, if applicable, a draft license for public review. A hearing will be held, if requested, and a final decision will be reached in accordance with Part 18 of the regulations and the Administrative Procedures Act, CRS 24-4-104 and 24-4-105. The regulations also provide for site restoration and decommissioning.

Details regarding this process and the requirements can be located on the CDPHE RAM web site <http://www.cdphe.state.co.us/hm/rad/index.htm>, or by contacting Steve Tarlton, CDPHE RAM, at (303) 692-3423, 1 (888) 569-1831, ext. 3423 (toll free).

**Division of Reclamation, Mining and Safety Briefing Paper**  
**In-Situ Uranium Operations, August 2007**

This briefing paper provides information regarding the administrative permitting process concerning mining operations and information on some of the issues surrounding *in-situ* uranium mining operations.

**General Information for all Mining Operations:**

In 1976, the Colorado General Assembly enacted the Mined Land Reclamation Act (Act), which sets forth specific and extensive performance standards for reclamation of mining operations (§ 34-32-101, et seq, C.R.S.) In the Act, the General Assembly created the Colorado Mined Land Reclamation Board (Board or MLRB) and Colorado Division of Reclamation, Mining and Safety (Division or DRMS) and delegated to them the authority to administer and enforce the provisions of the Act (§ 34-32-105, C.R.S.) The Colorado General Assembly gave the Board exclusive authority over issuance of reclamation permits, reclamation standards, and performance and financial warranties for mining operations throughout the State of Colorado (§ 34-32-109(6), C.R.S.).

The Board is a citizen board that, by statute, must have members with experience in the mining industry and in soil conservation or agriculture (§ 34-32-105(1), C.R.S.). In addition, the executive director of the Department of Natural Resources sits as a member of the Board. The Board holds monthly meetings with agendas that include consideration of permit applications and enforcement actions for possible violations of the Act and regulations promulgated thereunder.

The Division acts as staff to the Board on permit applications. To accomplish its extensive duties and responsibilities under the Act, the Division employs a broad range of experts in such fields as geotechnical engineering, geochemistry, geology, hydrology, soil science, wildlife, range science and civil engineering. The Division's experts scrutinize all facets of a proposed mining operation to ensure compliance with the requirements of the Act.

The Board and Division's authority is specific to reclamation of mining operations. "Reclamation" is defined as "the employment during and after a mining operation of procedures reasonably designed to minimize as much as practicable the disruption from the mining operation and to provide for the establishment of plant cover, stabilization of soil, the protection of water resources, or other measures appropriate to the subsequent beneficial use of such affected land." § 34-32-103(13), C.R.S.

There are several types of mining and reclamation permits. If a mine is to only affect less than two acres or less than 10 acres, such applications fall under section 34-32-110 of the Act (therefore called "110 permits"). If a mining operation will affect 10 acres or more, then the permit application falls under section 34-32-112 of the Act ("112 permits").

In addition, those mining operations that will have toxic or acidic chemicals present on site or will expose or disturb acid or toxic forming chemicals are called designated mining operations (DMOs). DMOs must not only comply with all 112 permit requirements, but also additional environmental protection requirements specific only to DMOs.

There are also Notices of Intent to conduct prospecting activities. Prospecting is defined as the act of searching for or investigating a mineral deposit. Prospecting includes such activities as drilling core or bore holes, digging pits, or other works to extract samples prior to commencement of development or extraction operations. By statute, the Board and Division are required to hold all information contained in Notices of Intent confidential. See 34-32-113, Colorado Revised Statutes.

Under the Mined Land Reclamation Act, mining operators must post a bond that is sufficient to complete all reclamation requirements should the State itself have to conduct reclamation. The bond is only to ensure that reclamation occurs and cannot be used for other purposes. The bond is calculated based on site specific information.

It is important to note that the permit application process is a public one. Permit applications are required to be filed in the clerk and recorder's office of the county in which the proposed mining operation will be located. In addition, permit applications must be noticed in a newspaper of general circulation in the locality of the proposed mining operation once a week for four consecutive weeks, commencing not more than 10 days after the application is deemed filed by the Division. The notice will have such information as the name of the applicant, the location of the proposed mining operation, the proposed date of commencement and completion of the operation, the proposed future use of the land, and the final date for filing objections to the application. It will also identify where additional information about the operation can be obtained.

Generally speaking, objections must be filed within 10 days from the last newspaper publication if the proposed mining operation is for a 110 permit and 20 days from the last newspaper publication if the proposed operation is for a 112 permit. Those who become and remain parties in the application process will have the opportunity to participate in public prehearing conferences (if held) and any formal public hearing before the Board. If objections to an application are filed, the Board must hold a public hearing on the permit application unless such objections are withdrawn prior to that hearing.

In addition to the Mined Land Reclamation Board and the Division of Reclamation, Mining and Safety, there are many other governmental agencies that regulate mining operations. These agencies may include: the Environmental Protection Agency Underground Injection Control Section; the Colorado Department of Public Health and Environment (specifically, Water Quality Control Division, Air Quality Control Division, Radiation Management Unit); the State Engineer's Office (water rights); and local governmental entities. Accordingly, the Board and Division do not have the sole authority to regulate every aspect of a mining operation. They only have the authority to regulate reclamation of a mine site as provided by statute.

### **Uranium Solution Mining in Colorado**

The Minerals Program of the Division of Reclamation, Mining and Safety regulates all mining activities (except for coal) in the State of Colorado, including *in-situ* mining operations, under the authorities of the Colorado Mined Land Reclamation Act and the Colorado Land Reclamation Act for the Extraction of Construction Materials. Uranium mining of any kind would be regulated under the authority of the Colorado Mined Land Reclamation Act (CRS 34-32-101 *et seq.*) and by other regulatory authorities.

Uranium can be mined by open pit, underground, and *in-situ* methods. *In-situ* or solution mining of uranium consists of using an oxidizing solution to leach uranium that is located in "roll front" deposits. The target zone usually consists of a porous sand or sandstone that is bounded by relatively non-porous shale or mudstone. Wells are drilled to define the deposit and for characterization of the ground water in the aquifer. Once the deposit is defined, injection wells and production wells are completed and the leaching solution is introduced on either side of the production well such that solution flows through the target zone and is pumped out the production well. Once the solution is on the surface, the uranium is concentrated using countercurrent resin ion exchange, yellowcake precipitation, and drying methods.

The Division issues several different types of Notices and Permits for mining activities. These range from a Notice of Intent to Conduct Prospecting for preliminary activities such as defining ore bodies, characterizing ground water, and determining possible mining and refining methods. Once the activities are determined to be development or mining, the operator is required to obtain a Mined Land Reclamation Board reclamation permit. Prospecting Notices are confidential pursuant to state law.

Some of the environmental issues surrounding uranium solution mining include ground water quality protection, handling and containment of radioactive fluids and solids, and surface reclamation following mining.

Additional information can be obtained by contacting David Berry, DNR Minerals Supervisor, at (303) 866-4938 or [david.berry@state.co.us](mailto:david.berry@state.co.us)

**Summary**  
**U.S. Environmental Protection Agency**  
**Underground Injection Control Program Regulations Applicable to In-Situ Uranium Mining**

The Underground Injection Control (UIC) Program is a preventative program designed to protect Underground Sources of Drinking Water (USDWs) by regulating injection wells. In Colorado, the EPA regulates Class I, III and V wells. In-situ uranium mining operations usually require two types of injection well permits: a Class III permit for the solution mining wells, and Class I permit for any industrial waste disposal well. The solution mining operations would be authorized under an EPA UIC Class III Area Permit, and any Class I well would require a separate UIC Class I Permit.

UIC Permits specify requirements for constructing, operating, and plugging and abandoning injection wells in order to assure that USDWs are protected. UIC Permits include operational requirements such as maximum injection volumes and/or pressures, monitoring and reporting requirements, mechanical integrity demonstration requirements, and injection well plugging and abandonment requirements. The permittee also must provide and maintain adequate financial responsibility and resources to close, plug, and abandon the permitted wells as required.

In addition to providing information about the proposed injection operation and the local groundwater and geology, EPA requires UIC permit applicants to identify the location of all wells within a project's area of review. For wells that are improperly sealed, completed or abandoned, the applicant must submit plans and undertake actions that prevent fluid movement into USDWs.

Before solution mining injection can occur, the permittee also must obtain an aquifer exemption from the EPA (see 40 CFR §146.4). The proposed solution mining zone must meet the following criteria before it can be exempted: (1) it does not currently serve as a source of drinking water; and (2) it cannot now and will not in the future serve as a source of drinking water because it is mineral, hydrocarbon or geothermal energy-producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that are expected to be commercially producible based on their quantity and location.

The UIC Permit application and issuing timeline is driven by regulations at 40 CFR §124. First, EPA must determine whether a UIC permit application is complete within 30 days of submittal. After reviewing the application, EPA will prepare and issue a draft permit decision with a statement of basis. Public notice of the draft decision is published in local newspapers, and a 30-day public comment period begins. During this time a public hearing may be requested; if requested it would be held at least 30 days after public notice of the hearing date. After the close of the comment period EPA will prepare and issue a final permit decision. If comments are received during the comment period, a responsiveness summary addressing all relevant public comments is prepared and issued with the final decision; this starts the 30 day opportunity for any commenter not satisfied with the final permit decision to submit their appeal to the Environmental Appeals Board before the permit becomes effective. (see 40 CFR §124.19)

Specific requirements for injection wells can be found in 40 CFR Part 146, *Underground Injection Control Program: Criteria and Standards*. Additional information, and links to EPA UIC regulations, may be found at: <http://www.epa.gov/region8/water/uic/>

For additional information, contact Dan Jackson, UIC Team Leader, U.S. EPA Region 8, 1595 Wynkoop St, Denver, CO 80202-1129, (303) 312-6155 or (800) 227-8917 ext 312-6155, or by email at [jackson.dan@epa.gov](mailto:jackson.dan@epa.gov) .