



URANIUM MINING AND MILLING REGULATION IN COLORADO

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The Colorado General Assembly has granted to the Division of Reclamation, Mining and Safety ("DRMS") (previously known as the Division of Minerals and Geology) within the Colorado Department of Natural Resources the exclusive jurisdiction over reclamation of mining sites in Colorado. *See* Colorado Mined Land Reclamation Act, C.R.S. § 34-32-101, *et seq* (the "MLR Act"). At the same time, the Colorado Radiation Control Act, C.R.S. § 25-11-101, *et seq*, as well as an agreement between Colorado's governor and the United States Nuclear Regulatory Commission, dictates that the Colorado Department of Public Health and Environment ("CDPHE") is the sole regulator of radioactive material in Colorado through its Radiation Management Unit ("RAM"). C.R.S. § 25-11-102. Because in-situ uranium operators extract a mineral and extract, concentrate, or produce radioactive material, such operations trigger regulation by both DRMS and RAM.

This overview examines the relevant Colorado statutes and rules, and sets forth how DRMS and CDPHE coordinate the regulation of uranium mining in Colorado. Specifically, this paper examines the in-situ uranium mining project proposed by Powertech Uranium Corporation ("Powertech"), as well as future Colorado in-situ and conventional uranium operations, Notice of Intents to Prospect ("NOI's"), and uranium milling operations.

BACKGROUND

1) *Uranium Mining*

Historically, the majority of uranium ore has been mined in open pit or underground mines. The ore extracted from these mines is transported to a mill where it is crushed and then leached with a leaching agent, usually sulfuric acid or an alkaline leaching product. Ideally, the mill is located near the mine to reduce transportation costs. The final product is referred to as "yellow cake," which consists of U_3O_8 and impurities. Open pit and underground mining are generally more expensive than in-situ leach mining ("ISL") (also known as "ISR" – in-situ recovery mining), and accordingly, their use decreased as uranium prices decreased in the 1980's and 1990's.

2) *In-situ Uranium Mining Technology*

ISL differs from conventional mining in that:

[c]onventional mining involves removing rock from the ground, breaking it up and treating it to remove the minerals being sought. In-situ leaching . . . involves leaching the ore where it is in the ground, and using liquids which are pumped through it to recover the minerals out of the ore by leaching.

<<http://www.uic.com.au/nip40.htm>¹>. In ISL, wells inject the leaching liquid into the orebody, and then the uranium-bearing product is pumped out of other wells. <<http://www.wise-uranium.org/uisl.html>>.

3) *Uranium Milling*

A simple definition of uranium milling is the process or activity that extracts or concentrates uranium from ore for its source material, and its resulting waste is termed byproduct. See *Nuclear Regulatory Commission Director Decision, December 13, 2000*. The federal government defines “source material” as:

(1) Uranium or thorium, or any combination thereof, in any physical or chemical form; or (2) ores which contain by weight one-twentieth of one percent (0.05%); or more of (i) Uranium, (ii) thorium or (iii) any combination thereof.

10 C.F.R. 40.4. The Code of Federal Regulations defines uranium milling as “any activity that results in the production of byproduct as defined in this part.” *Id.* “Byproduct” material is:

the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by such solution extraction operations do not constitute ‘byproduct material’ within this definition.

*Id.*²

¹ All citations to websites in this paper were accurate as of the date the websites were visited, which was June 21, 2007.

² There is no definition of “milling” or “source material milling” in Colorado statutes. However, the Colorado Code of Regulations defines “source material milling” as “any activity that results in the production of byproduct material as defined by definition (2) of byproduct material.” 6 CCR 1007-1, § 1.2.2. The C.C.R. further defines “byproduct” as:

(2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium or thorium solution extraction processes (underground ore bodies depleted by these solution extraction operations do not constitute “byproduct material” within this definition). *Id.*

4) *Powertech's In-situ Uranium Site*

In 2006 Powertech purchased 5,760 acres of uranium mineral rights in Weld County, Colorado from Anadarko Land Corporation, which had previously purchased the mineral rights from Rocky Mountain Energy Company ("RME"). RME had conducted an evaluation and concluded that there were several uranium deposits containing 9,581,000 pounds of uranium located at the site. See www.powertech.com. Powertech indicated that it plans to conduct an in-situ uranium mining operation at this site, which it named the "Centennial Project." The site is located in west-central Weld County, 13 miles south of the Colorado-Wyoming border, and three to five miles east of Interstate 25. See *Canadian National Instrument, Form 43-101, page 6*. As of August 2007, Powertech has not filed a permit application with DRMS or with CDPHE for operation of the Centennial Project.

ISSUES

- 1) Which agency or agencies regulate which aspects of in-situ uranium operations in Colorado?
- 2) Which agency or agencies regulate conventional uranium operations in Colorado (surface and underground)?
- 3) Which agency or agencies regulate Notice of Intent to prospect ("NOI's") for uranium in Colorado?
- 4) Which agency or agencies regulate uranium milling operations in Colorado?

SHORT ANSWERS

- 1) Both CDPHE and DRMS regulate in-situ uranium operations in Colorado. CDPHE regulates those portions of the in-situ uranium operations that involve radioactive materials; and the Water Quality Control Division ("WQCD"), the Air Quality Control Division ("AQCD"), and other divisions or programs will also provide regulatory oversight and permitting as appropriate. WQCD will permit any discharges to surface water. Under C.R.S. § 25-8-202(7)(b)(I) "[t]he division [WQCD] shall be solely responsible for the issuance and enforcement of permits authorizing point source discharges to surface waters of the state affected by such discharges." However, the WQCD will not issue groundwater permits for these operations due to the fact that DRMS is an implementing agency pursuant to S.B. 181. C.R.S. § 25-8-202(7). DRMS will be responsible for protecting and implementing the state's groundwater quality standards in accordance with § 25-8-202(7). DRMS will regulate the extraction of a mineral from its natural occurrence.

- 2) DRMS will regulate and issue reclamation permits for conventional uranium mining projects (surface and underground mining) in Colorado. CDPHE may also be involved with these operations through the WQCD, the AQCD, and other divisions or programs as appropriate.
- 3) DRMS will regulate and issue Notice of Intents to conduct uranium prospecting in Colorado. CDPHE will not play a role in regulating NOI's since no extraction or concentration of radioactive materials takes place under an NOI.
- 4) CDPHE will be the primary regulatory agency responsible for licensing and monitoring uranium milling operations. However, DRMS will play an extensive consulting role in reviewing an application for the operation's reclamation, revegetation, hydrologic balance and financial assurance aspects.³

DISCUSSION

Colorado statutes and rules and federal rules provide the analytical framework for setting forth the jurisdictional and regulatory authority of DRMS and CDPHE in regulating uranium mining and milling in Colorado.

1) *Statutory Authority*

A) DRMS Statutory Authority

By statute, DRMS, in conjunction with the Mined Land Reclamation Board ("Board" or "board"), has exclusive jurisdiction over issuing reclamation permits, which are necessary before any mining operation can begin in Colorado. See C.R.S. § 34-32-109(2) (explaining "any operator proposing to engage in a new mining operation must first obtain from the board or office a reclamation permit as specified in this article"). C.R.S. § 34-32-109(6) mandates that:

[n]o governmental office of the state, other than the board, nor any political subdivision of the state shall have the authority to issue a reclamation permit pursuant to this article, [or] to require reclamation standards different from those established in this article.⁴

³ There are circumstances in which DRMS has a regulatory role in milling operations; e.g., when the mill is attached to a mine and thus is within the "affected land" of the operation. Such circumstances are evaluated on a case-by-case basis.

⁴ See also C.R.S. § 34-32-105(4), which grants the Board "jurisdiction and authority over all persons and property, public and private, necessary to enforce the provisions of this article."

Moreover, DRMS's jurisdiction over in-situ uranium operations flows from definitions contained in the Mined Land Reclamation Act. The following definitions help illustrate DRMS's jurisdiction over in-situ uranium 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 lands. C.R.S. §34-32-103(13).

"Mining operation" means:

the development or extraction of a mineral from its natural occurrences on affected land. The term includes, but is not limited to, open mining and surface operations and the disposal of refuse from underground and in situ mining. The term includes the following operations on affected lands: transportation; concentrating; milling; evaporation; and other processing. The term does not include...smelting, refining, cleaning, preparation, transportation, and other off-site operations not conducted on affected land. C.R.S. § 34-32-103(8).

"Mineral" is:

An inanimate constituent of the earth in a solid, liquid, or gaseous state which, when extracted from the earth, is useable in its natural form or is capable of conversion into a useable form as a metal, a metallic compound, a chemical, an energy source, or a raw material for manufacturing or construction material. For the purposes of this article, this definition does not include coal, surface or subsurface water, geothermal resources, or natural oil and gas together with other chemicals recovered therewith, but does include oil shale.

"Affected land" is defined as:

the surface of an area within the state where a mining operation is being or will be conducted, which surface is disturbed as a result of such operation. Affected lands include but shall not be limited to private ways, roads except those roads excluded pursuant to this subsection (1.5), and railroad lines appurtenant to any such area; land excavations; prospecting sites; drill sites or workings; refuse banks or spoil piles; evaporation or settling ponds; leaching dumps; placer areas; tailing ponds or dumps; work, parking, storage, or waste discharge areas; and areas in which structures, facilities, equipment, machines, tools, or other materials or property which result from or are used in such operations are situated. C.R.S. § 34-32-103(1.5). (Emphasis added).

Finally, the following reclamation requirements that operators must meet are pertinent:

Every operator to whom a permit is issued pursuant to the provisions of this article shall perform such reclamation as is prescribed by the reclamation plan adopted pursuant to this section . . . (7) [r]eclamation plans and the implementation thereof shall conform to the following general requirements . . . (g) [d]isturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quality and quantity of water in surface and ground water systems both during and after the mining operation and during reclamation shall be minimized. Nothing in this paragraph (g) shall be construed to allow the operator to avoid compliance with other statutory provisions governing well permits and augmentation requirements and replacement plans when applicable. C.R.S. § 34-32-116.

Reading these definitions as a whole, a mining operation is defined as the extraction of a mineral. Uranium falls within the definition of a “mineral.” The proposed in-situ operation involves extracting this mineral from its natural occurrence. Consequently, Powertech’s proposed operation constitutes a mining operation. Accordingly, Powertech must obtain a reclamation permit from DRMS.⁵

B) CDPHE Statutory Authority

The CDPHE’s Radiation Management Unit has sole jurisdiction to regulate radioactive materials in Colorado:

(1) The department [the CDPHE] is designated as the radiation control agency of this state. (2) Pursuant to rules and regulations adopted as provided in section 25-11-104, the department shall issue licenses pertaining to radioactive materials, prescribe and collect fees for such license, and require registration of other sources

⁵ Other statutes that pertain to DRMS’s regulatory role in uranium mining operations include the definitions of designated mining operations (“DMO’s”) and of prospecting. DMOs are operations where:

“[t]oxic or acidic chemicals used in extractive metallurgical processing are present on-site; or [a]cid- or toxic-forming materials will be exposed or disturbed as a result of mining operations.” C.R.S. § 34-32-103(3.5).

“Prospecting” is “the act of searching for or investigating a mineral deposit.” C.R.S. § 34-32-103(12). The Act requires that any person conducting prospecting must first file a Notice of Intent with DRMS. C.R.S. § 34-32-113(1).

DRMS’s responsibility as an implementing agency in relation to groundwater under C.R.S. § 25-8-202 will be discussed later in this paper.

of ionizing radiation. No other agency or branch of this state shall have such power or authority.⁶

C.R.S. § 25-11-103. Any person who uses radioactive material must apply for and receive a license from CDPHE:

(1) No person shall acquire, own, possess, or use any radioactive material occurring naturally or produced artificially without having been granted a license therefore from the department; nor shall he transfer to another or dispose of such material without first having been granted approval of the department therefore.

(2) No person shall knowingly use, manufacture, produce, transport, transfer, receive, send, acquire, own, or possess any source of ionizing radiation unless such person is licensed by or registered with the department. (Emphasis added).

C.R.S. § 25-11-107. Moreover, uranium mills must be licensed by CDPHE. C.R.S. § 25-11-201(1.6).⁷

CDPHE may also be involved through the WQCD if surface discharge permits are required by the operation:

[t]he division [WQCD] shall be solely responsible for the issuance and enforcement of permits authorizing point source discharges to surface waters of the state affected by such discharges. C.R.S. § 25-8-202(7)(b)(I).

⁶ CDPHE does not interpret this statute to include regulation of open pit uranium mining, due to the fact that CDPHE does not regulate unmined minerals containing radioactive materials. It also does not regulate uranium ore prior to receipt at a processing facility. C.R.S. § 25-11-108(3). Thus, DRMS is the sole regulatory authority for open pit uranium mining.

⁷ The Colorado Code of Regulations (“CCR”) and the Code of Federal Regulations (“CFR”) provide additional regulation of in-situ uranium mining operations in Colorado. For example, the Underground Injection Control Program (UIC) requires “Class I” and “Class III” well operators to receive permits in order to protect underground sources of drinking water. Class I wells include wells that inject hazardous waste into the ground near an underground source of drinking water, while Class III wells include wells used for the “in situ production of uranium or other metals.” 40 C.F.R. § 144.6. The Environmental Protection Agency, Region 8, regulates Class I and Class III wells. 40 CFR § 147.301. Thus, if Powertech’s Centennial Project uses Class I and Class III wells, it may be required to receive separate permits from the EPA.

Also, CDPHE RAM’s “Licensing Requirements for Uranium and Thorium Processing,” 6 C.C.R. 1007-1, Part 18, sets forth extensive rules regulating uranium processing facilities and disposition of the resulting byproduct material. These rules require, among other things, a specific CDPHE license for source material milling. *Id.* at RH 18.3.

Finally, the following statutes are pertinent to the WQCD's role in permitting uranium operations. Note that these statutes pertain to groundwater permits, and not to surface water discharge permits:

The commission and the division shall recognize water quality responsibilities of the following state agencies, referred to in this subsection (7) as the 'implementing agencies': The office of mined land reclamation.

C.R.S. § 25-8-202(7).

Neither the commission nor the division shall require permits for, or otherwise regulate, other activities subject to the jurisdiction of the implementing agencies, unless the commission finds, after notice and public hearing, that . . . [s]uch regulation is necessary to assure compliance with the federal act.

C.R.S. § 25-8-202(7)(b)(II). As will be further discussed below, because DRMS is an implementing agency, it will regulate and monitor impacts to groundwater quality from uranium operations.

3) *Applying the Above-listed Guidelines to Uranium Mining in Colorado*

A) Regulation of In-situ Uranium Mining Operations in Colorado

Based on the above statutes and rules, DRMS and CDPHE must both be involved in the regulation and licensing of in-situ uranium operations in Colorado. A CDPHE license is required because in-situ uranium operations involve the manufacturing, production, use, possession, and possible transfer and/or transportation of radioactive materials – in this case, uranium. Thus, Powertech, as well as any future in-situ mining operator, must apply for and obtain the appropriate licenses from CDPHE's RAM before beginning an in-situ uranium operation. C.R.S. § 25-11-103; 107.

Operators will not be required to obtain groundwater discharge permits from CDPHE's WQCD because C.R.S. § 25-8-202(7) (also known as "S.B. 181" for the senate bill that changed the statute) explains that the WQCD will not permit activities subject to the jurisdiction of implementing agencies. In-situ operations are subject to the jurisdiction of an implementing agency -- the DRMS. DRMS will thus be responsible for protecting and implementing the state's groundwater quality standards.⁸

⁸ It is important to note that S.B. 181 pertains only to groundwater regulation. Therefore, operators may still be required to obtain surface water discharge permits from the WQCD if the operation will cause a discharge to surface water. The nature of the operation will determine the role of any other CDPHE divisions and programs, and DRMS may ask the RAM unit, the Water Quality Control Division, and other appropriate CDPHE divisions or programs to provide comments during the reclamation permit review process.

Specifically, Rules 3.1.6 and 3.1.7 of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal and Designated Mining Operations (“Rules”) (2 CCR 407-1) set forth water quality requirements during mining and reclamation. The Rules require, among other things, compliance with Colorado and federal water quality laws and regulations; compliance with statewide standards for pollutants; groundwater monitoring; establishment of permit conditions, including numeric protection levels protective of unclassified groundwater uses; and minimization of disturbances to the prevailing hydrologic balance of the affected land and the surrounding area. See 2 CCR 407-1.

In addition, the reclamation permit includes mining and reclamation plans, and in the case of hard rock mines that have the potential to cause acid rock drainage and/or use toxic chemicals in metallurgical processing, the permit includes an Environmental Protection Plan (“EPP”).⁹ C.R.S. § 34-32-103(3.5). EPPs will likely be required for in-situ uranium operations in Colorado. The permit and EPP requirements are enforceable by the Board, which has the authority to issue violations, levy civil penalties, and order mine operators to cease and desist if they fail to comply with the terms of the permit, the EPP, the Mined Land Reclamation Act, or the Rules. In order to evaluate compliance with the required terms, DRMS regularly inspects mining operations, and on a case-by-case basis may require monitoring of environmental parameters, including ground water monitoring.

In conclusion, given that Powertech’s proposed operation constitutes a mining operation and involves radioactive material, such operation will require separate permits from CDPHE and DRMS. CDPHE and DRMS will have dual jurisdiction and regulatory authority over Powertech’s in-situ uranium operation, as well as over any future in-situ uranium mining operations in Colorado. The two departments will coordinate as practicable and appropriate the permit process to provide comprehensive regulatory oversight and requirements.

B) Regulation of Conventional Uranium Mining in Colorado

DRMS will be the primary agency responsible for permitting and regulating conventional uranium mining operations. As stated previously, conventional mining “involves removing rock from the ground, breaking it up and treating it to remove the minerals being sought.” <http://www.uic.com.au/nip40.htm> CDPHE will not be involved unless a uranium milling operation is associated with the conventional operation. CDPHE explained that:

CDPHE does not regulate unmined minerals containing radioactive materials . . . nor does it regulate uranium ore prior to receipt at a processing facility. Thus traditional underground or open pit mining is not regulated by the CDPHE RAM.

CDPHE RAM Regulatory Process for In Situ Uranium Mining memorandum, (“Memorandum”), at 1. While DRMS has regulatory authority over conventional uranium operations in Colorado, the Water Quality Control Division or other CDPHE divisions and programs may also have regulatory oversight over specific aspects of the operations.

⁹ Mining operations that involve the use, exposure or disturbance of acidic or toxic materials are called “Designated Mining Operations” or “DMO’s” for short. C.R.S. § 34-32-103(3.5).

C) Regulation of Notice of Intents (“NOI’s”) for Uranium Prospecting in Colorado

DRMS will have sole regulatory authority over uranium prospecting through issuance of NOI’s. C.R.S. § 34-32-113(1). CDPHE does not regulate “unmined minerals containing radioactive materials” – nor does it regulate uranium “prior to receipt at a processing facility.” Id. In prospecting activities no minerals are extracted, and no minerals end up at a processing facility. Therefore, no CDPHE involvement is implicated in uranium prospecting. Any operator who wishes to prospect for possible uranium must first file an NOI with the Board.

D) Regulation of Uranium Milling Operations in Colorado

Pursuant to statutes and rules, uranium milling operations must be licensed by CDPHE. C.R.S. § 25-11-201(1.6); 6 CCR 1007-1, Part 18. CDPHE will be the primary agency responsible for regulating uranium milling operations, with input from DRMS. DRMS will play a regulatory role in milling operations when the mill is attached to a mine and thus is within the “affected land” of the operation.