



## **Environmental and Public Safety During In-Situ Uranium Recovery**

### **What regulatory agencies oversee in-situ recovery (ISR) operations in Colorado?**

The U.S. Nuclear Regulatory Commission (NRC) oversees and regulates the process of in-situ uranium recovery. However, Colorado is an 'Agreement State,' meaning that the Colorado Department of Public Health and Environment (CDPHE) has entered into an agreement with NRC to oversee all uranium licensing and permitting on NRC's behalf. Source Material & By-Product Licenses are issued by the CDPHE's Radiation Program of the Hazardous Materials and Waste Management Division. However, the other Divisions of CDPHE and the Department of Natural Resources Mined Land Reclamation Board as well as local county agencies will have active rolls in the review of an application for license. Colorado agencies have a strong record of reviewing radiation matters and licensing uranium mills—the effect of this responsibility is that the local state personnel are going to be the regulators, rather than a distant federal agency out of Washington. EPA, Region 8, located in Denver, will also have an active roll as they will be the agency issuing the Underground Injection Control (UIC) Permit and aquifer exemption.

### **Can residents and livestock remain living next to the recovery site during ISR?**

Yes, absolutely. The areas surrounding the permit areas will remain safe for all activities and residents, just as they are today. The suspension of any activities by the landowner is only within the operating area, where the drilling rigs, vehicles, wells, monitoring equipment and backhoes are treated as industrial equipment and restricted to qualified personnel only for the safety reasons just like any industrial site. ISR production also consists of a well field, which contains numerous water wells usually spaced at approximately 100 feet apart or closer. These wells are constructed from polyvinyl chloride (PVC) and livestock can damage the well head that is exposed above the surface. The Colorado Department of Public Health and Environment will attest to the fact that areas adjacent to the operating permit areas will be safe for all activity, just as it is today.

### **Is the uranium processed into "yellowcake" at the recovery site?**

No. The uranium we extract is not yellowcake, nor will it ever be processed at the Centennial Project site into yellowcake. Resin beads loaded with uranium will be transported from the Centennial Project to a central processing plant, most likely located in eastern Wyoming. There, the uranium is stripped from the loaded resin, precipitated and dried, yielding a uranium oxide product (U<sub>3</sub>O<sub>8</sub>) with a rich yellow color, called "yellowcake." The resin beads are returned to the ISR site and reused in the recovery process.

### **What level of radiation exposure, if any, can be expected for residents near the recovery project?**

The Nuclear Regulatory Commission limits radiation exposure for any member of the public from a uranium extraction facility at 25 millirems per year, with a condition that exposure be as low as reasonably possible. While any exposure to radiation can seem frightening, consider this limit in perspective. It is one-sixteenth of the average amount of radiation (400 millirems) that a Colorado citizen receives each year from natural sources alone. Further, Powertech intends to maintain exposures well below this limit and will follow other requirements issued by regulatory agencies.

### **Can the radiation exposure from ISR cause cancer?**

No. Epidemiological studies have shown that ISR operations do not increase the risk of cancer. (Boice, Mumma, Schweitzer, Blot: "Cancer mortality in a Texas county with prior uranium mining and milling activities, 1950-2001"; Journal of Radiological Protection, 2003.) There is no need or requirement for annual cancer screenings as a result of this type of mining operation. What route will the trucks or rail take to reach the milling plant? Powertech will be coordinating its plans with the U.S. and Colorado Departments of Transportation to determine the optimum route and method for transporting loaded resin or ore, as the case may be. More will be determined in the permitting processes.

### **Would spills of uranium during transport pose any danger to human health?**

No. Spills of ore or resin beads with uranium from the Centennial Project are very unlikely, but in the case of a spill, still pose no danger to human health or environment. The radioactivity of uranium in one gram of Weld County ore (assume 200 ppm) is 134 pCi (picoCurie) and that of pure natural uranium is 670,000 pCi (picoCurie). The latter is close to the radiation emitted by a self-luminous watch dial (up to 500,000 pCi). During transport from in-situ well fields, natural uranium will be tightly bound by ion-exchange bonds to resin beads similar to plastic, presenting no danger to human health. Nevertheless, any and all such spills would be tested and the soil would be excavated, placed in 55 gallon drums and stored until closure or sent to a licensed mill tailings site.

### **Does in-situ mining create any radioactive tailings?**

No. One of the key advantages of ISR mining is that tailings are not generated.

### **Will Powertech also be undertaking open pit mining?**

Powertech is evaluating the feasibility of mining all of the deposits with the ISR method. However, open pit mining for a couple of the deposits is a last-resort possibility. We have suggested that we are looking at the possibility of a gravel quarry on the southern properties, where the ore bodies are much shallower. Where the ore is shallow, there may not be any water present surrounding the ore. We are looking at several methods of recovery for this shallow ore and we are considering removing the valuable gravel deposits over the ore and then removing the natural uranium ore to transport it to a mill facility. We have also identified another method wherein we can use slurry walls surrounding the ore to isolate the uranium, and through purchase of water rights, increase the water level for In-Situ Recovery (ISR) production. It will take more extensive testing before we make an application for either of these methods.

There will be no tailings at the Centennial site even if there were to be an open pit. Powertech will extract and transport the ore to a central processing facility and quarry the gravel for sale as a commercial rock product.

Economics and regulatory approval will dictate the mining method. Permit applications will be submitted in the latter part of 2008.

### **How will Powertech ensure safe air quality surrounding the site?**

At the Centennial Project, eight stationary air-monitoring stations will be set up at the boundary of the permit area to measure levels of radon and other parameters as specified by the Colorado Department of Public Health and Environment, and to assure the public that safe levels of air quality are maintained. Two will monitor only particles less than 10 microns in diameter, and the remaining six will test all particle sizes.

### **How will Powertech remediate the site after the ore has been depleted?**

Powertech will totally reclaim the site in a manner approved by the State of Colorado, such that it can be returned to its former uses. The groundwater quality will be restored to prior use, wells plugged, pipelines removed, surface re-vegetated, and any leased land returned to the landowner.

## **What type of bonding has Powertech secured to ensure that site restoration is completed at the end of the project?**

For the two Notices of Intent (NOI) approved by the DNR's Division of Reclamation, Mining and Safety (DRMS) for drilling monitor wells and core holes, Powertech has provided reclamation performance bonds in excess of \$350,000.

For the ISR operation, Powertech will secure surety bonds as required by the State of Colorado (CDPHE and DNR) and the U.S. EPA, so that any costs of restoration and plugging of wells and removal of surface facilities are guaranteed. This money is held in an Escrow account, which is managed and controlled by either the State or Federal Government for the duration of the operation. The bonds will stay in place until the restoration work is completed and approved. This type of "insurance" will guarantee the healthy future of the site for generations.

## **Is there a risk that the uranium extracted from the Centennial Project will be sold to a foreign country for nuclear weapons?**

No. Due to high demand, a deficit of domestic uranium supplies, and concerns about the security of foreign supplies, the uranium mined in the United States will stay in the United States for nuclear power generation.

U.S. utilities have the largest demand for uranium in the world. Our nation obtains 20-percent of its electricity from 104 nuclear power plants and consumes approximately 55 million pounds of uranium annually. Only 3 million pounds are produced from domestic uranium reserves, with the other 50+ million pounds coming from foreign markets such as Kazakhstan, Australia and Canada. Nuclear power generators simply prefer to buy uranium produced in the U.S., and we can provide them an adequate and secure supply.

To expand further, we would note that many environmentalists concerned with global warming have asserted their support for nuclear power, as the leading method of reasonably-priced energy production without carbon dioxide emissions. Uranium is the one element that can help meet growing energy demands while not contributing to carbon loading in the atmosphere, as fossil fuels do.

## **Could the uranium recovered at the Centennial Project be a target for terrorists?**

Naturally occurring uranium in its ore state poses little danger to the public, and ore would be incredibly difficult to use to create a national security issue. Uranium is found in small quantities everywhere, and in perspective, poses less danger to the public than a standard gasoline filling station or surface-exposed propane tank for a terrorist attack. Powertech knows of no U.S. Department of Homeland Security rules that apply to its operation, and any other security measures required by the regulatory authorities will be addressed accordingly in our permit applications.