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 Planning & Oversight
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Lander County Yucca Mountain Repository
 Planning and Oversight Program

Fall 2006

Yucca Mountain News

Mina Route is Now Under Intensive Study by DOE

In July the Department of Energy announced their intention to study the Mina Branch line as a possible transportation option for Yucca Mountain. The Mina Branch line extends south from the Union Pacific mainline at Hazen in western Churchill County. The line then extends through Lyon County south through the Walker River Paiute Reservation before terminating near Hawthorne. This change is important to Lander County because waste shipments will pass through the Battle Mountain area enroute to the Mina Branch line.

The Mina route is now under intensive study by DOE to determine its possible inclusion as a potential rail route to Yucca Mountain. Two important factors have led to DOE reconsideration of the Mina Route. First, the Walker River Tribe Paiute is

now willing to consider rail shipments through the reservation to potentially avoid Highway shipments. The Tribe currently owns the underlying land for the portion of the Mina Branch line which passes through the reservation. As a result, the Tribe controls use of the Mina Branch south of the reservation. Currently, the Tribe maintains a user agreement with the Hawthorne Army Ammunition Depot, the only users on the line south of the reservation. Second, the Mina Branch line alternative to Yucca Mountain potentially provides substantial cost savings over the construction of the Caliente route.

In response to potential nuclear waste shipments, the Lander County Board of County Commissioners have authorized three recent studies using nuclear waste funds provided by the federal government for independent

oversight of the Yucca Mountain project. Radiological Waste Management Associates is performing a risk assessment on the Union Pacific line through the Battle Mountain area. The risk assessment will analyze the potential for accidents in the corridor and the accident consequences that may arise in the event of a derailment or collision. Parsons Brinckerhoff, a rail engineering firm, is conducting two rail studies to identify potential problems and conflicts in the rail corridor that might be associated with shipments of nuclear waste. They will also identify potential mitigation actions required to improve safety throughout the rail corridor in Lander County. For more information on the County's oversight program and studies being conducted, contact Ms. Deborah Teske at 775-635-2860.

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- DOE asked the inspector general to audit its corrections program, which were put in place after it was found that earlier systems for fixing deficiencies were not working. (page 3)
- Idaho has played a vital role in developing nuclear power and will continue to do so. (page 4)
- "A nuclear renaissance is happening worldwide," said Ron Hochstein, president of International Uranium Corp., which owns the White Mesa uranium mill in Blanding, Utah, and several mines in the Uravan Mineral Belt of the Colorado Plateau. (page 5)

Meetings to Address Yucca Issues

The U.S. Nuclear Waste Technical Review Board will host a workshop Sept. 25-26 in Las Vegas and will then meet Sept. 27 in Amargosa Valley to address various issues concerning Yucca Mountain.

The workshop will focus on the potential for localized corrosion of Alloy-22, a proposed material for waste packages in which radioactive waste will be disposed, under aqueous conditions that might exist in the proposed repository. The results of recent and ongoing testing related to the evolution of aqueous environments in the repository and the potential initiation, propagation, cessation and consequences of Alloy-22 localized corrosion will be addressed during the workshop.

The workshop is open to the public and will be held at the Las Vegas Marriott Suites, 325 Convention Center Drive; telephone 702-650-2000, fax 702-650-9466.

The workshop agenda will be available on the board's Web site (www.nwtrb.gov) about one week before the date of the workshop.

A final meeting agenda for the board's Sept. 27 meeting in Amargosa Valley will also be available about one week before the meeting date at www.nwtrb.gov and available by telephone.

The meeting will be held at 8 a.m. Sept. 27 at the Longstreet Inn and Casino, Stateline and Highway 373, in Amargosa Valley.

The meeting will be public and opportunities for comment will be provided.

The board will review the Department of Energy's efforts to develop and articulate a safety case for a proposed geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain at this meeting.

The board was charged with conducting an independent review of the technical and scientific validity of DOE activities related to implementing the Nuclear Waste Policy Act.

Those who wish to speak are encouraged to sign the "public comment register" at the check-in table. A time limit may have to be set on individual remarks, but written comments of any length may be submitted for the record.

Transcripts for the workshop and the meeting will be available no later than Oct. 19 and Oct. 23, respectively, on the board's Web site, www.nwtrb.gov, by email, on computer disk and on a library-loan basis in paper format from Davonya Barnes of the board's staff.

For more information, contact Karyn Severson, NWTRB external affairs, 2300 Clarendon Blvd., Suite 1300, Arlington, VA 22201-3367; telephone 703-235-4473, fax 703-235-4495.

Developing Yucca Mountain's Engineering Barrier System

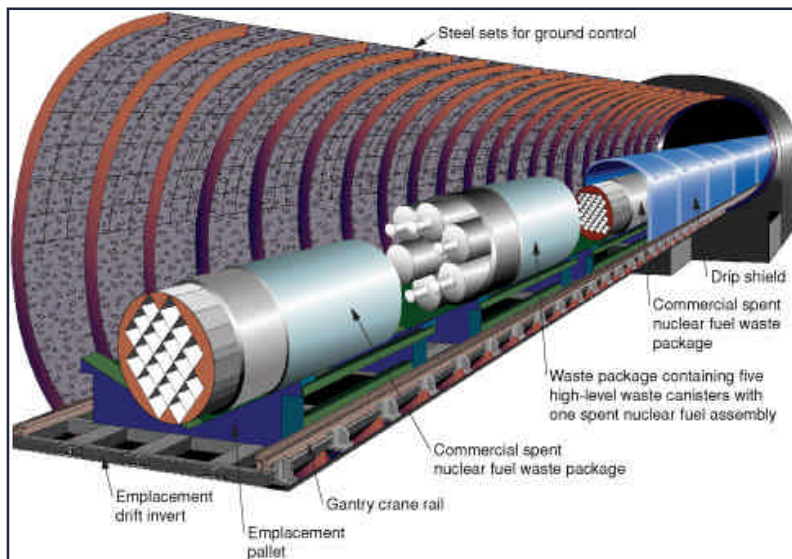
Scientists at Lawrence Livermore have been working on designing a waste package system to keep high-level radioactive waste packages essentially intact for at least 10,000 years. A team of Livermore researchers—engineers, metallurgists, chemists, microbiologists, and computer scientists—are testing and refining the design and materials for what will eventually be 12,000 waste packages. These efforts are an integral part of a national program to design, license, and build an underground nuclear waste repository in Yucca Mountain, Nevada.

Livermore's largest effort is developing Yucca Mountain's engineered barrier system, which consists of a waste package, drip shield, and supporting structures. The engineered barrier system is designed to work with the natural barriers of Yucca Mountain to contain the repository's radioactive wastes and prevent them from seeping into the water table which lies about 300 meters below the planned repository.

"We need to show that our design will substantially contain the waste

inside the canisters for at least 10,000 years under extreme and varying conditions of temperature, radiation, and corrosion," says Dan McCright, Livermore metallurgist and Yucca Mountain Program senior scientist. According to

McCright extensive analyses have shown that even if waste were to eventually leak from the canisters, additional barriers, both natural and engineered, are expected to keep the waste far from the water table and humans.



Livermore is developing Yucca Mountain's engineered barrier system, which consists of a waste package, drip shield, and supporting structures. This artist's concept shows how the canisters will be placed in tunnels about 300 meters underground. The waste packages will rest on a strong corrosion-resistant pallet and supporting steel frame.

No direct information exists about how modern materials will behave over thousands of years under a range of conditions. The Livermore research is based on accelerated aging tests of materials that are proposed to make up the engineered barrier system and on computer models that simulate how a repository built at Yucca Mountain would perform over thousands of years.

The current repository design calls for waste to be stored in a package consisting of a set of two nested

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Developing Yucca Mountain's Engineering Barrier System (continued)

(Continued from page 2)

canisters—an outer canister made of a highly corrosion-resistant metal (Alloy 22) and an inner canister made of a tough, nuclear-grade stainless steel (316NG). An overhanging drip shield made of titanium will provide additional protection to the waste package from dripping water and any falling rocks from the repository ceiling. "Because the waste package and the drip shield are made of different corrosion-resistant materials, they form corrosion defense in depth," says McCright.

Storing the waste packages horizontally and commingling the different kinds of waste packages will create a relatively uniform temperature in each underground drift, or tunnel, carved inside the mountain. The waste packages have a common diameter (1.8 meters), but their lengths vary according to the type of waste—from about 3.6 meters for the defense waste to 5.7 meters for the spent nuclear fuel.

The most critical element of the engineered barrier system is the 20-millimeter-thick outer canister made of Alloy 22, which consists of about 60 percent nickel, 22 percent chromium, 13 percent molybdenum, and 3 percent tungsten. Alloy 22 is highly resistant to fractures and is easier to weld than alternative materials such as titanium. It is also extremely corrosion resistant under the conditions of high temperature and low humidity expected to prevail for hundreds to thousands of years in a repository. In addition, it is resistant under conditions of either low or high humidity at the lower temperatures expected in the repository when radiation levels decrease. Hence, the selection of Alloy 22 would provide containment over a range of environmental conditions. "It's the best engineered material available for the job," says McCright.

Nuclear-grade stainless steel (316NG) was chosen for the 50-millimeter-thick inner canister to add strength and bulk to the waste package. It is corrosion resistant, more compatible with Alloy 22 than carbon steel, and more economical than more complex steel alloys.

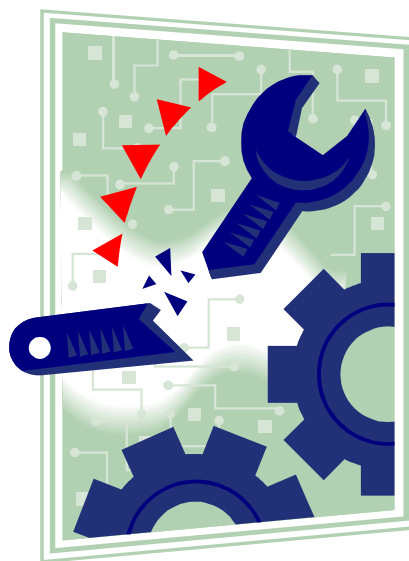
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Report Says DOE Not Correcting Mistakes

The Department of Energy is still failing to do a good job correcting mistakes in its nuclear waste program, a problem that could affect safety and delay the proposed Yucca Mountain repository even more if it is not fixed, investigators said.

Since DOE put a new corrections program in place in October 2003, workers have reported more than 5,600 potential problems with data, software and computer models for repository designs.

But auditors found more than half of the most significant potential problems were not addressed in a timely manner, and mistakes continued to be repeated. More



than 100 possible problems that should have been handled through formal corrective action were not managed properly, they added.

The 20-page report released by the Energy Department's inspector general underscored DOE's continuing struggle to manage details of the complex undertaking.

DOE had asked the inspector general to audit its corrections program, which was put in place after it was found that earlier systems for fixing deficiencies were not working.

DOE accepted the latest audit, and "initiated an aggressive plan of action to improve the program," according to the report.

"This review shows the commitment that this department has toward improving

the management and oversight of the Yucca Mountain Project," DOE spokesman Craig Stevens said in a statement. "This comprehensive report will help us make certain that our processes and procedures are sound as we move forward."

Bob Loux, a repository critic and director of the Nevada Agency for Nuclear Projects, said the latest audit spotlighted the same DOE problems as before with quality assurance.

"We have been seeing and hearing about these kinds of things for some time," Loux said. "If anything, the IG is understating the effect these problems have. In other nuclear facilities these things have resulted in cancellations."

PROBLEMS COULD CAUSE GREATER YUCCA DELAYS

The Energy Department has set a June 2008 goal to send the Nuclear Regulatory Commission a comprehensive application to license a repository where 77,000 tons of highly radioactive spent fuel

would be handled and stored within Yucca Mountain, 100 miles northwest of Las Vegas.

Following an eight-month audit, inspectors said they were told by Yucca managers that some corrections "proved to be more complicated than anticipated." In some cases, corrections were delayed for budget reasons.

"As a result, potential conditions that could affect the ongoing design and analysis work may go unresolved," auditors said. Problems could delay NRC licensing to begin repository construction, they said.

DOE missed its original 1998 deadline to open a Yucca repository, and also abandoned a 2010 startup date. Its new target for repository operations is March 2017. *Source: Associated Press—Steve Tetreault*

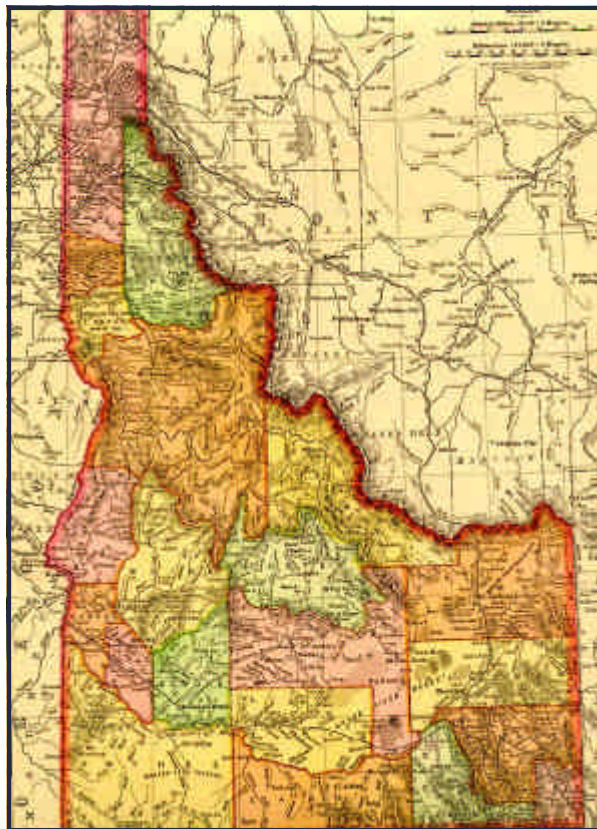
Last year Congress passed the first comprehensive energy bill in 13 years: the Energy Policy Act (EPACT), which begins to rectify U.S. energy policies. The world is already phasing out hydrocarbons (gasoline, coal, oil, natural gas), a process that will take more than half a century, and EPACT moves us more rapidly in this direction. Notably, it contains incentives to restart nuclear power in this country that have already produced plans for 27 new reactors. The economic, energy-security, and environmental benefits from new nuclear energy may be the most lasting legacy of EPACT.

Idaho's electricity comes from hydroelectric, natural gas, and more recently, wind. Yet as a state we are a net energy importer, meaning we use electricity generated elsewhere. Most plans for new U.S. nuclear power plants propose building them at existing commercial reactor sites, so a commercial nuclear plant may not be in Idaho's immediate future.

However, Idaho has played a vital role in developing nuclear power and will continue to do so. The Idaho National Laboratory (INL) has developed and tested more than 50 prototypes of nuclear reactors over the past half century. With the planned construction of the Next Generation Nuclear Plant (NGNP) as early as 2016, Idaho will help assure our nation's future energy security.

The first new reactors will be advanced versions of the technology that currently produces emission-free electricity in more than 30 states, but the NGNP incorporates an inherently safe design and advanced technology that will dramatically increase the efficiency of nuclear power. It will produce not only emission-free electricity, but also hydrogen for use as a transportation fuel that does not emit carbon dioxide. The NGNP will

Senator Larry Craig, Idaho: talking about nuclear energy; "It is a vitally important and growing component in America's energy mix"



provide high-temperature, process heat for our domestic chemical industry, helping to replace natural gas with an affordable, emission-free source.

Idaho will also build on its tradition of supplying highly skilled workers to meet the growing needs of INL. The newly formed Center for Advanced Energy Studies in Idaho Falls will provide nuclear and energy related degrees to students at Idaho State University, Boise State University, and the University of Idaho, enabling them to be part of the exciting renaissance of nuclear power.

Nuclear power is the largest source of emission-free energy in the world. America's 103 operat-

ing nuclear power plants generate nearly 20 percent of our electricity, while hydroelectric contributes less than 9 percent, and other renewables about 2 percent. The bulk of our country's power comes from fossil fuels: coal (50 percent), natural gas, and oil — all of which produce greenhouse gases.

I would submit that there is no realistic way to minimize greenhouse-gas emissions without increasing the current level of nuclear power generation. Serious policymakers understand that nuclear power should be part of a solution to the climate-change issue and deserves careful consideration.

Challenging the future development of nuclear power is the issue of waste disposal. The president has launched an important recycling initiative enabling fuel to be reused several times, reducing waste by as much as 90 percent, and allowing developing countries to safely use the fuel we exchange with them, so none of it will end up in unfriendly hands. Until this program is available, fuel can be safely stored at reactor sites. Still, our country wants a safe permanent geologic repository, and I will do everything within my power to make this happen.

On the eve of World War I, Winston Churchill said the key to energy security was "variety and variety alone." We would do well to heed that observation. While nuclear power may never become our only energy source, it is a vitally important and growing component in America's energy mix.

Sen. Larry Craig represents Idaho in Congress. *Source: The Idaho Statesman*

6 Uranium Mines Scheduled to Open in Colorado, Utah

A call heard 'round the world for uranium soon could have the Burros back in business, to say nothing of the Pandora, Sunday, St. Jude, JD5, October, Blue Streak and perhaps hundreds more.

Those mines and their monikers are getting new attention as the long-dormant uranium industry in western Colorado and elsewhere shimmers back to life.

"A nuclear renaissance is happening worldwide," said Ron Hochstein, president of International Uranium Corp., which owns the White Mesa uranium mill in Blanding, Utah, and several mines in the Uravan Mineral Belt of the Colorado Plateau.

International Uranium plans to have six mines in Colorado and Utah operating by the first quarter of 2007.

Its White Mesa Mill— one of two operating mills in the United States — is expected to begin processing late in 2007 or early 2008, initially pumping out about 3.4 million pounds of uranium oxide and 5.9 million pounds of vanadium from new and stockpiled feedstock. It's expected to average between 1.5 and 2 million pounds of both per year thereafter.

That means employment at the mill likely will triple from the current 50, and Hochstein said he believed the company would eventually employ about 400 people in western Colorado and Utah's San Juan County.

International Uranium is far from the only company to hear the worldwide rumble of demand for uranium.

Miners hoping to catch the glow of the next boom have staked thousands of 20-acre claims in Mesa, Montrose and San Miguel counties in just the last two years, as uranium prices have mushroomed to \$48 a pound, up from a low of about \$7 a pound.

Prices are rising as stockpiles disappear and demand increases among the 104 reactors that supply 20 percent of the United States' electricity.

In Mesa, Montrose and San Miguel counties, demand for uranium around the world has miners staking claims again, and lots of them.

In 2001 and 2002, fewer than five mineral claims were registered in any of those counties.

By 2005, San Miguel County had 719 mineral claims recorded, Montrose had 784, and Mesa saw 155 mineral claims.

Through July 2006, BLM officials have logged 1,262 claims in San Miguel County, 472 in Montrose County and 145 in Mesa County.

In Utah in 2005, more than 6,000 uranium claims were filed, according to the Utah Geological Survey, and in Arizona about 700 claims have been filed on federal lands not far from the Grand Canyon.

The U.S. Department of Energy, meanwhile, is studying how to manage 38 tracts of land it has previously offered for lease for uranium mining. The department's preferred option is to renew 13 of those leases for 10 years and put the remaining 25 up for bid.

The affected area includes 27,000 surface acres, about 750 of which would be disturbed under the preferred alternative.

Don Coram holds three uranium leases from the Energy Department, all on standby.

"That's about to change," Coram said, as he is gearing up to start production.

While the nuclear renaissance has garnered plenty of attention from big producers, Coram said he anticipates there will be many other opportunities.

"They're going to need the small mines, the family operations," he said.

Coram not only wants to work his own mines, he has a process he said will allow him to reclaim on site miniscule bits of uranium from the overburden dragged out of other mines.

"It's a process that we can take all over the world, and that's what we plan on doing," he said.

The Energy Department's preferred alternative to encourage uranium mining has stirred fears in Gunnison County and Crested Butte, where officials fear spills of radioactive materials on their way to the mills.

Environmental or other objections, however, aren't the most immediate problems that uranium companies face.

A generation of uranium miners has come and gone over the time that the mines have been idled by low prices and skepticism about nuclear power, said John Reams of Tomcat Mining Corp. in Naturita, which does contract mining for International Uranium.

It won't be long before mining companies go outside the area to recruit the miners needed to keep up with demand, said Jim Fisher, general mine superintendent for International Uranium.

The effort, though, will prove worthwhile, said Fisher, who has spent more than 35 years in the uranium business. He figures this play is good for 20 to 25 years.

Even if Australia, which has large, proven, high-grade reserves, decides to jump into the burgeoning global uranium market, the Colorado Plateau mines still could run for about 10 years, Fisher said.

The mining end isn't the only one with difficulties.

"We're facing issues at the mill" getting needed reagents to Blanding, Hochstein said.

In many respects, the North American industry needs to retool, he said.

"We need investment," Hochstein said. "You can only flip hamburgers for so long."

Getting the nuclear industry moving toward critical mass, though, could have payoffs some might not anticipate, he said.

Uranium mining leaves the surface undisturbed, and nuclear power can reduce demand for natural gas, which is expensive and has other, better applications, such as plastics and a range of technical, scientific and medical products.

Using natural gas to generate electricity, Hochstein said, "is a waste of a natural resource. *Source: The Daily Sentinel*

Developing Yucca Mountain's Engineering Barrier System (continued)

(Continued from page 3)

The titanium drip shield, which McCright compares to a sturdy awning, would be fabricated from grade 7 titanium. This material contains a small amount of palladium to provide greater corrosion resistance. The drip shield, however, is not considered essential to containing the wastes. Earlier projections of Alloy 22's corrosion performance assumed that there would be no drip shields and that drips from the repository walls would fall directly on the canisters. *Source: Science & Technology*



Livermore scientists are testing the design of the waste packages to be used in the Yucca Mountain repository. The waste packages will have a common diameter (1.8 meters), but their lengths will vary according to the type of waste—from about 3.6 meters for defense waste to 5.7 meters for spent nuclear fuel. The scientists work on prototypes like the one shown here that have the full-scale diameter but shortened lengths.

Lander County Repository Planning and Oversight Program

This newsletter is a publication of the Lander County Repository Planning and Oversight Program. Lander County is one of ten affected units of local government involved in the proposed Yucca Mountain Repository. Funding provided to Lander County is paid by users of electricity generated by nuclear power plants. Under a general contract with nuclear generating utilities, the federal government collects a fee of one mill (one-tenth of a cent) per kilowatt-hour from utility companies for nuclear generated electricity. The money goes into the Nuclear Waste Fund which is used to fund all program related activities.

For more information on Lander County's program contact Deborah Teske at the Community Development Department (775) 635-2860 or Joy Brandt at (775) 964-2447 in Austin, NV. Additional information can be obtained from the U.S. Department of Energy, Yucca Mountain, Site Characterization Project Office at (702) 794-1444 or contact them at www.ymp.gov. The Nevada Agency for Nuclear Project, Nuclear Waste Project Office, Capital Complex, Carson City, NV. 89570, (775) 687-3744 or at their web site <http://www.state.nv.us/nucwaste>. Lander County's Nuclear Waster Oversight website is at <http://www.landercountynwop.com>.

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