

US Uranium Mining and Exploration

US Nuclear Fuel Cycle Appendix 1

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Uranium mining in the USA today is undertaken by few companies on a relatively small scale. Uranium exploration is undertaken by many companies, often going over areas that were mined in the 1950s-80s.

Uranium production from one mill (White Mesa, Utah) and five in-situ leach (ISL) operations totalled 1,583 tU (1,866 t U₃O₈) in 2006, 1,748 tU (2,061 t U₃O₈) in 2007, and 1,503 tU (1,774 t U₃O₈) in 2008.¹ In 2008, Rosita became a sixth ISL production site before being shut down. In 2009, production was 1445 tU (1704 t U₃O₈) with only the White Mesa mill and three ISL operations (Crow Butte, Smith Ranch-Highland, Alta Mesa) producing at year end and into 2010.

Cameco's US subsidiary Power Resources Inc operates the Smith Ranch-Highland mine in Wyoming's Powder River basin and the Crow Butte mine in Nebraska, both of them ISL operations, and producing nearly 1200 tonnes U between them in 2009 from total reserves of 12,000 tU (15,000 t U₃O₈). The US company is now known as Cameco Resources and is aiming to increase production from these mines and adjacent properties including Reynolds Ranch to 1,770 tU/y by 2011.

Uranium Resources Inc (URI) commenced production from its Vasquez ISL mine in 2004 at about 50 tU/y and from Kingsville Dome in 2006, both in south Texas. Vasquez peaked in 2006 and is now depleted (30 tU in 2007, 9 tU in 2008). Rosita started production in 2008 with oxygen injection but was then closed as uneconomic after 3 tU was recovered.

Kingsville Dome produced 67 tU in 2008 and 19 tU in 2009. It was closed in June 2009 due to low uranium prices, and is being remediated along with Vasquez and Rosita.

Mestena Uranium's Alta Mesa ISL plant in southern Texas is also operational.

Conventional (non-ISL) uranium mining is resuming in the USA after some years (though Cotter Corporation produced 38 tonnes U through its 400 t/day Cañon City mill, Colorado in 2005).

Cotter Corporation, a General Atomics subsidiary, is planning a \$200 million rebuild of its Cañon City mill by 2014, when it expects to treat ore from the Mount Taylor mine in New Mexico. (Mount Taylor, which has been on standby since 1989, is owned by another General Atomics subsidiary, Rio Grande Resources Corporation.)

Denison Mines produced 165 tU in the first half of 2009 through its 2000 t/day White Mesa mill in southeastern Utah, from its own and purchased ore (the company is advertising its ore-buying program), as well as doing some toll milling. Production cost for this was \$197 per kgU. The mill has a vanadium co-product recovery circuit.

Denison is opening the first of its Uravan Mineral Belt mines on the Colorado Plateau (straddling the Utah-Colorado border) containing 2100 tU in placer deposits plus vanadium co-product (Uravan = uranium + vanadium). Its mines are mainly in the La Sal, Sunday and East Canyon/Rim zones, about 100 km northeast of its White Mesa mill. In 2007, Denison operated four of these mines: Topaz, West Sunday and Sunday/St. Jude in the Sunday group, and Pandora in the La Sal group. Most are mature operating mines with extensive underground workings, while the Topaz mine is relatively new. Two more of these mines reopened in 2008: Rim and Beaver (La Sal group), which required significant refurbishing to produce some 30 tU/y. There are no plans to bring the other mine there, Van 4, into production. In August 2009, the Pandora, West Sunday and Beaver mines were operating, while the Topaz, Rim and Sunday mines were closed pending market improvement.

Denison's Henry Mountains deposits in Utah including Tony M, Southwest and Bullfrog have 4900 tU as indicated resources at over 0.2% and inferred resources of 3100 tU, both NI 43-101 compliant. All these are some 120 km west of the White Mesa mill. Denison began production from the Tony M mine in 2007, but late in 2008 put it on care and maintenance. The company was intending to spend \$35 million on the adjacent new Bullfrog mine, but it was put on hold in 2008.

Denison also has four old mines in the Arizona Strip of north central Arizona, along with some new deposits there, though all these are some 500 km south from White Mesa mill and some may be impacted by the Bureau of Land Management decision to stall developments there. It has been working to bring the Arizona 1 underground mine into production.

Toronto-based Uranium One in 2007 bought US Energy's 1,000 t/day Shootaring Canyon mill in southeast Utah and associated properties in four contiguous states for \$50 million plus royalties. US Energy had been planning to bring the mill back into production at a cost of \$31 million. (Uranium One had also secured the right to buy Rio Tinto's 3,000 t/day Sweetwater uranium mill and associated uranium properties in south-central Wyoming for \$110 million, but in January 2007 Rio Tinto cancelled the deal.)

In Wyoming, Uranium One has plans for production from the Irigaray-Christensen Ranch ISL mine in the Powder River Basin from 2011. It acquired 500 tU/yr capacity through the Irigaray central processing plant when it bought those assets for \$35 million from Areva in mid-2009, and plans to expand this plant to its licensed 960 tU/yr. (In 2007, it announced a 'toll milling' arrangement with Cameco's Power Resources Inc for recovery of up to 540 tU per year at PRI's Smith Ranch-Highland mill, but that appears to be superseded.) Production from its three small mines (Moore Ranch, Peterson Ranch, Nine Mile) will be from loaded resin trucked to Irigaray starting 2012, initially Moore Ranch. The NRC issued a licence for Moore Ranch in October 2010. Uranium One has some 4,000 tU as measured resources (2,235 t at Moore Ranch) and 23,000 tU as indicated resources in the state. It also had plans for production from Antelope and JAB in the Great Divide Basin, but these were deferred due to endangered species concerns.

In 2009, Titan Uranium Inc bought Uranium One's 50% interest in Sheep Mountain so that it now holds that whole deposit with 6200 tU indicated resource at 0.1%U and an existing mine permit. Underground development took place in the 1970s. Titan has undertaken a prefeasibility study on mining by open pit and underground, with heap leaching recovery, to produce 580 tU/yr from 5500 tU probable reserves.

Uranerz is in the process of permitting its Nichols Ranch ISL operation in the Powder River Basin of Wyoming. This will have a number of satellite operations, starting with Hank, with loaded resin

being trucked to Nichols Ranch, which is being licensed for 770 tU/yr. Production is envisaged from 2011. The company has NI 43-101 compliant resources of 6060 tU at about 0.1 %U in seven deposits, including measured & indicated resources of 1,137 tU for Nichols Ranch itself, 860 tU for Hank, 1100 tU for West North-Butte and 1655 tU measured and indicated resources at about half the grades of these - 0.048 %U, at Reno Creek, 30 km east of Nichols Ranch.

Australian-based Peninsula Minerals reports JORC-compliant resources of 9700 tU at about 0.05% for its Lance ISL project in Wyoming's Powder River Basin, including 3550 tU as measured and indicated resources. It is undertaking a feasibility study with a view to bringing this into production.

Energy Fuels Resources Corporation (EFRC, a subsidiary of Energy Fuels Inc of Toronto) has applied to reopen former uranium-vanadium mines in the Uravan Mineral Belt in western Colorado. Whirlwind (including Packrat, Bonanza and La Sal) is a near-term project following Bureau of Land Management approval, but late in 2008 was put on standby. Tenderfoot Mesa is adjacent. It has applied for a licence to build the new Piñon Ridge mill, with construction start possible in 2011. EFRC's nearby Energy Queen mine in Utah was refurbished for 2008 reopening. In August 2008 EFRC announced NI 43-101 compliant indicated resources of 1480 tU and inferred resources of 1,370 tU for its Colorado and Utah properties.

Bayswater Uranium Corporation of Canada has received a pre-feasibility study on mining its newly-acquired Reno Creek and Southwest Reno Creek deposits in Wyoming. These have a NI 43-101 measured and indicated resource of 4220 tU @ 0.066% suitable for ISL, plus inferred and historical resources. The project would have five wellfields and a central processing plant producing about 750 tU/yr. It is 30 km southeast of Christiansen Ranch and 50 km north of Cameco's Smith Ranch, and Bayswater plans to bring it into production about 2014.

In October 2009, Uranium Energy Corporation (UEC) bought the small but recently-refurbished Hobson mill in southern Texas from Uranium One (it had been shut since 1991). UEC plans to make Hobson the basis of its Texas uranium projects. Hobson will have 380 t/yr capacity, and already recovers uranium from loaded resin trucked there from the La Palangana ISL mine, to which will be added loaded resin from satellite plants at Goliard and Nichols. In November 2010, UEC reported that production had commenced at Palangana – the first US ISL operation to start in five years. UEC has been granted preliminary approval to mine its Goliard ISL project in south Texas from 2011. Goliard has 2100 tU and Palangana 410 tU measured and indicated resources which are NI 43-101 compliant, at about 140 m depth. Nichols has 500 tU inferred. Another potential ISL satellite is Salvo, with 580 tU 'historic' resource.

UEC in 2007 bought the New River Uranium Project in Arizona with a historic resource estimate of 5,000 tU in shallow low-grade ore. In 2009, it formed a joint venture with Australia's Uran Ltd to develop the Grants Ridge project in New Mexico, including nine historic mines which operated from 1970-80s, with average grade 0.20%.

Ur-Energy has approval for ISL mining at its Lost Creek, Wyoming deposit with 4200 tU indicated and inferred resources at 0.05%U. The company claims potential for some 10,000 tU in the immediate area. Mining is planned, and the site is close to Kennecot's Sweetwater mill.

Uranium Resources Inc (URI) in 2007 sought to buy Rio Algom Mining, with uranium properties and a licensed mill site at Ambrosia Lake in New Mexico, where it planned to construct a new mill to serve the Grants mineral belt. However, the deal was aborted in mid-2008. URI subsidiary Hydro

Resources Inc was licensed in 1994 to mine the Crownpoint and Church Rock ISL deposits in New Mexico, and after years of opposition the licence was validated by the Nuclear Regulatory Commission in 2006. URI's future potential is in its Grants district properties in New Mexico which hold 39,000 tU, and from which it hopes to produce 2000-3000 tU/yr from ISL. URI plans to produce 385 tU/yr from Churchrock from mid-2013.

Also in New Mexico, Uranium International Corp (UIC) has announced 1,180 tU measured and indicated resource at Dalton Pass, with ISL potential. It also announced a 1,160 tU measured and indicated resource at Nose Rock, deep in hard rock. Both are NI 43-101 compliant, in the Grants mineral belt and owned by Strathmore Minerals. UIC has the option of earning a 65% share of each.

Neutron Energy Inc has taken full ownership of the Cebolleta Land Grant in New Mexico which has 8000 tU resources after mining took place 1975-81, producing 460 tU.

Yellowcake Mining Corp reports 5,000 tU reserves at its planned Beck mine in the Uravan area of Colorado and agreed in May 2008 to sell a 50% stake in it to Korea Electric Power Corp (KEPCO). However, in February 2009, KEPCO withdrew, leaving the project bereft of funds. The company had joint ventures with Strathmore Minerals for Juniper Ridge and a Gas Hills prospect in Wyoming, but these were terminated in 2008.

Strathmore Minerals is working towards bringing its Gas Hills properties in Wyoming into production, though it has only historical resource figures for most of these.

In New Mexico, Strathmore submitted a mining permit application in October 2009 for Roca Honda (60% owned, with Sumitomo 40%) in the Grants mineral district which has measured & indicated resource of 6,745 tU at 0.195% U and slightly less inferred resources. The company also has other projects in the Grants mineral district, including: another Church Rock prospect with 4570 tU as measured & indicated resource, Marquez with 3500 tU as indicated resource, Dalton Pass with ISL potential and 1000 tU measured & indicated resource, and Nose Rock, deep in hard rock with 1160 tU measured & indicated resource. All the above are NI 43-101 compliant.

Powertech Uranium Corp is proposing to develop two ISL mines: Centennial in northern Colorado, and Dewey-Burdock in South Dakota – in each case very close to the Wyoming border. Centennial has 4,430 tU in 0.08% ore and Dewey-Burdock 2570 tU indicated resources averaging 0.18%U and 1880 tU inferred resources averaging 0.13%, both NI 43-101 compliant. The company has applied to develop Dewey-Burdock.

Bluerock Energy Corporation has shipped the first ore from development of the J-Bird mine in Colorado to Denison's White Mesa mill in Utah.

White Canyon Uranium based in Perth, Australia, commenced production from its Daneros deposit in southeastern Utah in December 2009. Ore is trucked 100 km to Denison's White Mesa mill for treatment and recovery of U₃O₈ product. Ore produced during the development phase was sold to Denison, and from there a 3-year toll treatment agreement came into effect, from January 2010, for up to 55,000 tonnes of ore per year. JORC-compliant resource figures of 447 tU in 0.22%U ore were quoted in August 2010, and production is planned to be 227 tU/yr.

US uranium mines and other production facilities

	ISL mine	Hard rock mine	Mill	Status	Annual capacity
Uranium One	Christiansen Ranch, WY		Irigaray, WY	Being refurbished and expanded	960 tU
	Antelope, WY			Under construction	900 tU
Uranerz	Nichols Ranch, Hank, Jane Dough, WY		Nichols Ranch, WY	Permitting	770 tU
Power Resources Inc (Cameco)	Smith Ranch - Highland, WY		Smith Ranch - Highland, WY	Operating	2100 tU
Cameco Corporation	Crow Butte, NE			Operating	385 tU
Uranium Resources Inc	Vasquez, TX			Operating in 2008, but now closed	0
	Rosita, TX			Operating in 2008, but closed mid-2009	0
Mestena Uranium	Alta Mesa, TX			Operating	385 tU
Uranium Energy Corp	La Palangana, Goliard, TX		Hobson, TX	Palangana operating, Goliard licensed, Hobson mill licensed	Mill: 380 tU
Hydro Resources Inc (URI subsidiary)	Church Rock, NM			Under construction*	385 tU
	Crownpoint, NM			Under construction*	385 tU
White Canyon Uranium		Daneros, UT	White Mesa, UT (toll)	Operating	227 tU
Cotter Corp			Canon City, CO	Standby, refurbish plan for 2014 start	
Denison		Uravan, CO-UT, Tony M, UT, Arizona 1, AZ	White Mesa, UT	Some operating	
Kennecott			Sweetwater, WY	Standby	
Uranium One			Shootaring Canyon, UT	Operational in 2008?	
Energy Fuels Resource Corp		Uravan mines	Pinon Ridge, CO	Developing, maybe operate 2011	

* *Partially permitted and licensed*

There was a considerable legacy of pollution from abandoned uranium mines and treatment plants, most dating from the 1940s and 1950s, and which was addressed in the 1980s. For instance, the Uravan mill site on the San Miguel River in Colorado was designated a Superfund site and was cleaned up between 1987 and 2007 at a cost of over \$120 million. Historic mining and milling at Uravan included the production of radium, vanadium and uranium, leaving radioactive residues from the early 1900s through to the mid-1980s. From the time Uravan mill began operating in the 1920s until it was shut down, it processed over ten million tonnes of uranium-vanadium ore, giving rise to a similar amount of uncontained tailings, and 1,440 megalitres of liquid wastes were treated in the site rehabilitation program.

Further Information

[Related information pages](#)

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[References](#)

1. [U.S. Uranium Mine Production and Number of Mines and Sources, US Energy Information](#)

Administration, Domestic Uranium Production Report (21 May 2009) [[Back](#)]

General sources

[US Energy Information Administration \(www.eia.doe.gov\)](http://www.eia.doe.gov)

Company reports