GEOLOGICAL SURVEY OF WYOMING

URANIUM MINES AND URANIUM AND THORIUM OCCURRENCES IN WYOMING

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INTRODUCTION

The uranium industry in Wyoming has had many ups and downs. Uranium minerals were first identified in Wyoming at the Silver Cliff Mine near Lusk, from which several shipments of uranium were made. These were processed for their radium (radium is a radioactive decay product of uranium), which was reportedly sent to France for use by Marie Curie in her experiments with radioactivity.

Uranium remained mostly a curiosity until the atomic bomb was developed. Following World War II, the U.S. Atomic Energy Commission established buying stations for uranium near uranium mining areas. One was located in Riverton, Wyoming.

The location of this buying station followed a significant uranium discovery made in Wyoming in 1952 by J.D. Love of the U.S. Geological Survey. He found uranium minerals in Tertiary sandstones in the Powder River Basin and suggested these sediments may contain large deposits. Following this discovery, Wyoming was combed by prospectors. Many small mines were developed and the mining districts shown on Plate 1 were delimited. At the same time, a few uranium mining companies grew from small operations to large producers.

Uranium production reached 1,545,455 tons of ore in 1961 and then declined slightly, leveling off at a little over one million tons per year (Table 1). Annual production increases had lasted until the early-1960's when the U.S. Atomic Energy Commission closed its buying stations due to the skrinking demand for uranium for use in newly developed fusion thermonuclear weapons, which use uranium only in the detonators.

Table 1. Annual Wyoming uranium production.

Year	Uranium ore (short tons)	Year	Uranium ore (short tons)	Year	Uranium ore (short tons)	Year	Uranium Ore (short tons)
1953	639	1960	1,189,904	1968	1,841,311	1976	3,302,422
1954	9,405	1961	1,545,455	1969	1,631,581	1977	3,986,025
1955	6,190	1962	1,394,704	1970	2,042,074	1978	5,517,070
1956	59,378	1963	1,289,595	1971	2,044,943	1979	5,512,345
1957	234,574	1964	1,126,827	1972	3,390,100	1980	5,352,337
1958	599,093	1965	1,222,821	1973	2,679,175	1981	4,360,677
1959	810,514	1966	916,415	1974	2,287,787	1982	2,100,162
		1967	1,242,188	1975	2,734,633	1983	3,022,650

In the late 1960's, uranium began to boom again - this time for use as a fuel for the nuclear power industry. The exploration for new deposits during this boom was conducted at first by large uranium mining companies, later joined by oil companies. The large uranium mines shown on Plate 1 were developed during this period. Production rose from a low of 916,415 tons of uranium ore in 1966 to a high of 5,517,070 tons of ore in 1978 (Table 1).

In 1979, after the Three Mile Island Nuclear Power Plant suffered a partial meltdown, public pressure coupled with high interest rates and high construction costs caused the nuclear power industry to cancel or postpone new nuclear plants as well as orders for new supplies of uranium. Since most utilities had ordered enough uranium to fuel even the unbuilt plants, the supply of uranium greatly exceeded the demand. Because uranium was not being bought, the price fell from $40.00 per pound in 1979 to $15.25 per pound on January 1, 1985. This current price is far below mining costs. Since 1980, the production of uranium in Wyoming has fallen to 3,022,650 tons of ore in 1983 (Table 1). Continued lower production rates are predicted for 1984 and 1985.

Currently there are five active uranium mines in Wyoming, and four mills which produce uranium oxide (yellowcake). The yellowcake from these mills is sold

under preexisting contracts to utilities. In a few years, demand for uranium may increase as the present oversupply and stockpiles are depleted by the operating nuclear power plants. This could, once again, lead to new or expanded uranium operations in the State.

The map (Plate 1) accompanying this report shows all known uranium mines and uranium and thorium occurrences in Wyoming as of January 1, 1985. It also shows the type or classification of each deposit and its host rock by formation name or lithology. An explanation of the symbols and abbreviations on Plate 1 as well as a list of selected references from which the map was compiled are included below.

EXPLANATION OF SYMBOLS AND ABBREVIATIONS ON PLATE 1

Uranium Mines and Uranium and Thorium Occurrences


Redox uranium deposit[1], cumulative production greater than 500,000 tons of ore (NAMES OF ACTIVE MINES ARE IN BOLD TYPE)


Redox uranium deposit[1], cumulative production less than 500,000 tons of ore


Redox uranium occurrence[1]


Redox uranium occurrence[1] with mine development postponed or terminated without production.


Non-redox sedimentary uranium deposit, cumulative production less than 500,000 tons of ore


Non-redox sedimentary uranium or thorium occurrence


Nonconformity-related uranium deposit, cumulative production less than 500,000 tons or ore


Nonconformity-related uranium occurrence


Quartz pebble-conglomerate uranium and thorium occurrence


Uranium deposit hosted in igneous rock, cumulative production less than 500,000 tons or ore


Uranium or thorium occurrence hosted in igneous rock


Uranium deposit hosted in metamorphic rock, cumulative production less than 500,000 tons of ore


Uranium or thorium occurrence hosted in metamorphic rock


Radioactive mineral occurrence of unknown classification


Hydrogeochemical uranium anomaly, concentration given where known


Stream sediment uranium anomaly, concentration given where known


Uranium occurrence at depth, depth to top of occurrence given where known


Large area containing related uranium or thorium occurrences

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[1] Includes roll-front and peneconcordant types.

Miscellaneous Symbols

 Uranium mill, active January 1, 1985 (NAMES OF ACTIVE MILLS ARE IN BOLD TYPE)

 Inactive uranium mill

 Inactive *in situ* leach uranium mill

 Uranium mining district

Classification of Deposit or Occurrence

AN	Anatectic	LS	Allogenic limestone
AP	Allogenic	MH	Magmatic hydrothermal
AT	Autometasomatic	MM	Metamorphic, unclassified
AU	Authigenic	MP	Marine Phosphate
BP	Beach placer	MV	Metamorphic vein
BS	Black shale	OR	Orthomagmatic
CM	Contact metamorphic	OS	Organic sediments
CO	Co-precipitate	PG	Pegmatitic
DE	Desert evaporite	PK	Paleokarst
FP	Fluvial placer	QC	Quartz-pebble conglomerate
HA	Hydroallogenic	RP	Replacement
HY	Hydroauthigenic	RX	Redox
IM	Initial magmatic	UC	Nonconformity-related
LP	Land pebble phosphate		

Formation Names or Rock Types

QUATERNARY
- Qal Alluvium
- Qhs Hot spring deposits
- Qr Rhyolite

QUATERNARY AND TERTIARY
- QTb Bug Formation

TERTIARY
- Tu Tertiary rocks, undivided
- Tms Moonstone Formation
- Tnp North Park Formation
- Tmu Miocene rocks, undivided
- Tbp Browns Park Formation
- To Ogalalla Formation
- Twr White River Formation
- Tsr Split Rock Formation
- Ttm Tatman Mountain Formation
- Ta Aycross Formation
- Tt Tepee Trail Formation
- Tb Bridger Formation
- Tbs Battle Spring Formation
- Tw Wasatch Formation
- Twc Cathedral Bluffs Tongue, Wasatch Formation
- Twdr Wind River Formation
- Tg Green River Formation
- Tgl Laney Member, Green River Formation
- Tgw Wilkins Peak Member, Green River Formation
- Tfu Fort Union Formation

TERTIARY IGNEOUS ROCKS (BLACK HILLS AREA)
- Tia Alkaline rocks
- Tic Carbonatite
- Tim Mafic rocks

MESOZOIC
- Kl Lance Formation
- Kfh Fox Hills Sandstone
- Kle Lewis Shale
- Kmv Mesaverde Formation
- Ke Ericson Sandstone
- Ks Steele Shale
- Kn Niobrara Formation
- Kf Frontier Formation
- Kik Inyan Kara Group
- Kfr Fall River Sandstone
- Klk Lakota Sandstone
- Kcv Cloverly Formation
- Jm Morrison Formation
- Js Sundance Formation
- Jscs Canyon Springs Member, Sundance Formation
- Rc Chugwater Formation

PALEOZOIC
- Pu Permian rocks, undivided
- Pp Phosphoria Formation
- PPm Minnelusa Formation
- PPh Hartville Formation

PPt Tensleep Sandstone
PPc Casper Formation
Pf Fountain Formation
Mm Madison Limestone
Cu Cambrian rocks, undivided
Cd Deadwood Formation
Cf Flathead Formation

PRECAMBRIAN

pCu Precambrian rocks, undivided
pCcq Quartz pebble conglomerate
pCg Granite
pCgd Granodiorite
pCgn Gneiss
pCm Mafic igneous rocks
pCq Quartzite
pCqm Quartz monzonite
pCsc Schist

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