

Map Projection: Wyoming Lambert Conformal Conic False Easting: 500000, False Northing: 200000 Central Meridian: -107.5 degrees West Standard Parallel 1: 41 degrees North Standard Parallel 2: 45 degrees North Latitude of Origin: 41 degrees North Linear Unit: Meter Horizontal Datum: North American Datum of 1983 (NAD 83) Ellipsoid: Geodetic Reference System 80 Base hillshade derived from USDA/NRCS-National Cartography & Geospatial Center 10-meter Digital Elevation Model (DEM), 2000; azimuth 345°, sun angle 40°, vertical exaggeration 1.3

A digital version of this map is also available on CD-ROM

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110°W

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Magnetic Declination 10° 12' 21" E

at center of map (April 25, 2014)

Scale 1:500,000 1 inch equals approximately 8 miles (13 kilometers) 1 centimeter equals approximately 5 kilometers (3 miles) 30 MILES

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C O L O R A D O

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	Φ

Roads Cities State capital —————— Interstate highway City or town U.S. highway <u>— 59</u> State highway Landforms 59 County or Landform other road Mountain peak Railroad Geographic center of Wyoming (calculated centroid)

105°W

Water / Perennial river Perennial stream Ephemeral or / intermittent stream Canal

BASE MAP EXPLANATION

Boundaries Continental Divide Township boundary County boundary Indian reservation boundary Lake or reservoir National park boundar State boundary

QC, p C q 🖕 Quartz-pebble conglomerate DE, Top **A** Other sedimentary—See SYMBOLS USED FOR CLASSIFICATION OF DEPOSIT OR OCCURRENCE MH, pEq Igneous—See SYMBOLS USED FOR CLASSIFICATION OF DEPOSIT OR OCCURRENCE MV, p C gn I Metamorphic—See SYMBOLS USED FOR CLASSIFICATION OF DEPOSIT OR OCCURRENC X Radioactive mineral occurrence of unknown classification—Host formation not specified 43 ppm 🗄 Hydrogeochemical uranium anomaly—Concentration in parts per million (ppm) given where 75 ppb 9 Stream sediment uranium anomaly—Concentration in parts per billion (ppb) given where known ◆ △ Uranium occurrence at depth—Depth (in feet) to top of occurrence given where known; circle indicates redox (reduction-oxidation) occurrence, triangle indicates non-redox occurrence **Large area containing uranium- or thorium-related occurrences**—Details shown on map OTHER URANIUM-RELATED FEATURES Uranium district boundary—Name of district and approximate extent of production and/or • • • • occurrences Uranium project, proposed Uranium mill or processing facility, active Uranium mill or processing facility; Inactive or HR= historical/reclaimed OTHER SYMBOLS AND DESIGNATIONS Yellowstone volcanic area (Quaternary)—Adapted from Love and Christiansen (1985) Absaroka volcanic area (Eocene)—Adapted from Love and Christiansen (1985) **Other intrusive and extrusive volcanic rocks**—Adapted from Love and Christiansen (1985) Precambrian rocks—Colored areas are exposed outcrops; areas covered by younger sedimentary rocks or surficial deposits that obscure the Precambrian bedrock are not colored; lithologies not differentiated; boundaries from Love and Christiansen (1985) SYMBOLS USED FOR CLASSIFICATION OF **DEPOSIT OR OCCURRENCE** 🔺 Sedimentary CM Contact metamorphic AU Authogenic MM Metamorphic, unclassified BP Beach placer BS Black shale MV Metamorphic vein Co-precipitate Desert evaporite DE Igneous FP Fluvial placer AN Anatectic Hydroallogenic AP Allogenic Hydroauthigenic AT Autometasomatic LP Land-pebble phosphate IM Initial magmatic LS Allogenic limestone MH Magmatic hydrothermal MP Marine phosphorite OR Orthomagmatic OS Organic sediments PK Paleokarst RP Replacement • RX Redox (roll front and peneconcordant) QC Quartz-pebble conglomerate UC Nonconformity-related FORMATION SYMBOLS AND AGES FOR ROCKS HOSTING URANIUM DEPOSITS OR OCCURRENCES Quaternary rocks and sediments Mesozoic sedimentary rocks Qal Alluvium KI Lance Formation (Upper Cretaceous) Qhs Hot spring deposits Kfh Fox Hills Formation (Upper Cretaceous) Kle Lewis Shale Qr Rhyolite Kmv Mesaverde Formation or Group Quaternary and Tertiary sedimentary rocks Ke Ericson Sandstone of Mesaverde Group Tb Bug Formation (Pleistocene-Pliocene) Ks Steele Shale Kn Niobrara Formation Tertiary sedimentary rocks Frontier Formation Tu Tertiary rocks, undifferentiated Kik Inyan Kara Group Tms Moonstone Formation (Pliocene) Kfr Fall River Sandstone of Inyan Kara Group Tnp North Park Formation (now upper Browns Klk Lakota Sandstone of Inyan Kara Group Park Formation) (lower Pliocene and upper Kcv Cloverly Formation Miocene) Kg Gannett Group Tmu Miocene rocks, undifferentiated Jm Morrison Formation Tbp Browns Park Formation (Miocene) Js Sundance Formation To Ogallala Formation (Miocene) Jc Canyon Springs Member of Sundance Twr White River Formation (upper Eocene and Oligocene) **Rc** Chugwater Formation or Group Tsr Split Rock Formation (Miocene) Ttm Tatman Mountain Formation (early and Paleozoic sedimentary rocks middle Eocene) Pu Permian rocks undifferentiated Ta Aveross Formation (middle and upper Phosphoria Formation Eocene) PPm Minnelusa Formation Tt Tepee Trail Formation (upper Eocene) PPh Hartville Formation Twa Washakie Formation (early and middle PPt Tensleep Formation Eocene) **PPc** Casper Formation Tb Bridger Formation (early and middle **₽f** Fountain Formation Eocene) Tbs Battle Spring Formation (early Eocene) Mm Madison Limestone Twb Wagon Bed Formation (early and middle Eu Cambrian rocks undifferentiated Ed Deadwood Formation Eocene) Tw Wasatch Formation (early Eocene) Ef Flathead Sandstone Twc Cathedral Bluffs Tongue of Wasatch Precambrian crystalline rocks Formation p€u Precambrian rocks undifferentiated Twdr Wind River Formation (early Eocene) p€cq Quartz-pebble conglomerate Tgr Green River Formation (early Eocene) gl Laney Member of Green River Formation p€g Granite pEgd Granodiorite Tgw Wilkins Peak Member of Green River p€gn Gneiss Tfu Fort Union Formation (Paleocene) p€m Mafic igneous rocks p**E**q Quartzite Tertiary igneous rocks (Black Hills area) pEqm Quartz monzonite Tia Alkaline rocks pEsc Schist Tic Carbonatite Tim Mafic rocks ROCKS AND FORMATIONS HOSTING URANIUM MINERALIZATION Cretaceous, Tertiary, and Quaternary volcanic rocks (undifferentiated)-Alkalic, calcalkalic, and potassic igneous intrusive and extrusive rocks ranging in age from Cretaceous through early Quaternary including: a Cretaceous(?) monzonite porphyry intrusive in the Beartooth Mountains, northwestern Wyoming; middle to late Eocene phonolite, trachyte, latite and rhyolite in the Rattlesnake Hills, central Wyoming; Paleocene and Eocene trachyte, phonolite, syenite, lamprophyre, pseudoleucite, and breccias in the western Black Hills area, northeastern Wyoming; Eocene andesite, dacite, potassic mafic lavas, and rhyolitic ash-flow tuffs in the Absaroka Range, northwestern Wyoming; late Tertiary and early Quaternary lamproite (orendite, wyomingite, madupite) extrusives in the Leucite Hills, southwestern Wyoming; and late Tertiary and Quaternary rhyolitic ash-flow tuffs and rhyolitic lava flows in the Yellowstone region. Miocene rocks—These include the Browns Park and North Park Formations in central southern Wyoming, unnamed Miocene(?) rocks in the southern Rock Springs uplift, the Moonstone Formation in the central Granite Mountains, the South Pass and Split Rock Formations at the southern end of the Wind River Mountains, and the Split Rock Formation in the Granite Mountains and Rawlins uplift. The North Park is now considered upper Browns Park. Equivalent rocks in eastern Wyoming, the Arikaree and Ogallala Formations, are not shown on the map because they contain only three isolated uranium occurrences. Browns Park Formation—White to pale-green, soft, massive tuffaceous sandstone, silty sandstone, and claystone; conglomeratic at base. Lower unit is light-brown conglomerate consisting of pebble (average 2 inches in diameter)- to boulder-sized material, including Precambrian and Paleozoic fragments up to 4 feet in diameter in the Miller Hill area (Love, 1953) and quartz; matrix is arkosic sandstone and mudstone with scattered, discontinuous shale beds. Upper unit is fine- to medium-grained, well-sorted, friable, weakly (calcite) cemented sandstone with parallel to trough cross-bedding and scattered limonite staining; thin, persistent limestones are interbedded with sandstone. Uranium occurs in cross-bedded

EXPLANATION

MAP SYMBOLS

URANIUM DEPOSITS—Defined where ore production has been reported from surface mine(s) or *in-situ*

PRODUCTION, below).

212 (RX, Jm) • Redox (reduction-oxidation)

213 (UC, Ef) 🕂 Nonconformity related

△□◊ҧ☆ or ● 1 to 26,000 short tons

UC, Ef, pEf 🔶 Nonconformity related

• 26,001 to 100,000 short tons

100,001 to 400,000 short tons

750,001 to 1,500,000 short tons

1,500,001 to 5,000,000 short tons

• • • • 5,000,001 to 10,200,000 (or more) short tons

URANIUM DEPOSITS OR OCCURRENCES).

RX, Tbs • Redox (reduction-oxidation)—Includes roll front and peneconcordant types

→ or ● 400,001 to 750,000 short tons

 $_{137 (Ls, PPc)} \triangle$ Other sedimentary

144 (MH, p€g) Igneous

162 (MV, pEg) 👌 Metamorphic

recovery. Number is keyed to mine name and production table (see KEY TO NUMBERED

URANIUM MINES AND URANIUM ORE PRODUCTION, at right). Symbol indicates

classification of deposit; color in symbol refers to production category (see URANIUM

For mines outside the boundaries of named production districts, the first two letters in parentheses indicate specific classification (see SYMBOLS USED FOR CLASSIFICATION OF DEPOSIT OR

OCCURRENCE); the last letters indicate host formation(s) (see FORMATION SYMBOLS AND

URANIUM PRODUCTION—Uranium ore (not yellowcake) production; 1 short ton equals 2,000

URANIUM AND THORIUM OCCURRENCES—No ore production has been reported or recorded.

Named occurrences are given where known; two capital letters indicate classification of occurrence

(see SYMBOLS USED FOR CLASSIFICATION OF DEPOSIT OR OCCURRENCE); last letters

indicate host formation (see FORMATION SYMBOLS AND AGES FOR ROCKS HOSTING

tons of ore (or equivalent pounds of U_3O_8 from ISR).

pounds. Hatchured symbols indicate primary production from *in-situ* mining operations. Symbol

indicates classification of deposit (see URANIUM DEPOSITS, above); color and size of symbol

indicates tonnage category; hatchured symbols indicate ISR (in-situ recovery) production in pounds

of U_3O_8 (yellowcake). Mine name included for those mines that produced greater than 400,001 short

AGES FOR ROCKS HOSTING URANIUM DEPOSITS OR OCCURRENCES).

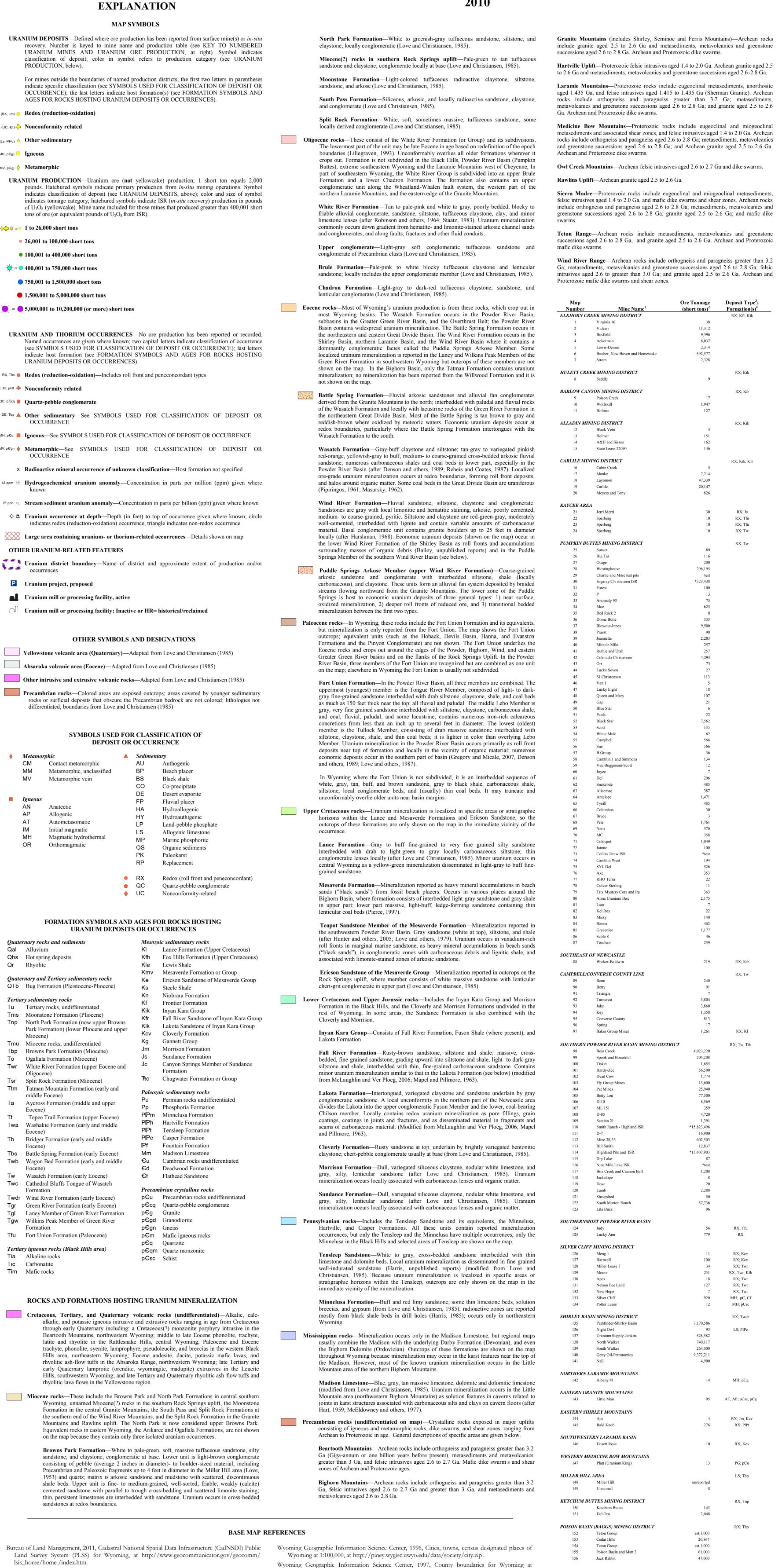
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sandstones at redox boundaries.

Remote Sensing, v. 68, no. 1, at http://ned.usgs.gov.

URANIUM MAP OF WYOMING

Robert W. Gregory, Richard W. Jones, and Kyle D. Cottingham



1:100,000, at http://piney.wygisc.uwyo.edu/data/boundary/county.zip.

Management, 2014, Wind River Indian Reservation Boundary, at

Wyoming Geographic Information Science Center, 1997, State boundary of Wyoming at 1:100,000, at

Wyoming Geographic Information Science Center, 1997, Wyoming roads at 1:100,000, at

Wyoming Geographic Information Science Center, 2002, Continental Divide of the United States

http://159.238.113.121/arcgis/rest/services/ets/Wind_River_Indian_Reservation/MapServer.

at 1:2,000,000 (modified), at http://piney.wygisc.uwyo.edu/data/geology/continentaldivide.zip.

Wyoming State Engineer's Office, Board of Control Division - Technical U.S. Bureau of Land

include granite aged 2.5 to 2.6 Ga and metasediments, metavolcanics and greenstone successions aged 2.6 to 2.8 Ga. Archean and Proterozoic dike swarms. Hartville Uplift—Proterozoic felsic intrusives aged 1.4 to 2.0 Ga. Archean granite aged 2.5 to 2.6 Ga and metasediments, metavolcanics and greenstone successions aged 2.6-2.8 Ga. Laramie Mountains—Proterozoic rocks include eugeoclinal metasediments, anorthosite aged 1.435 Ga, and felsic intrusives aged 1.415 to 1.435 Ga (Sherman Granite). Archean metavolcanics and greenstone successions aged 2.6 to 2.8 Ga; and granite aged 2.5 to 2.6 Ga. Archean and Proterozoic dike swarms. Medicine Bow Mountains—Proterozoic rocks include eugeoclinal and miogeoclinal metasediments and associated shear zones, and felsic intrusives aged 1.4 to 2.0 Ga. Archean rocks include orthogneiss and paragneiss aged 2.6 to 2.8 Ga; metasediments, metavolcanics and greenstone successions aged 2.6 to 2.8 Ga; and Archean granite aged 2.5 to 2.6 Ga. Archean and Proterozoic dike swarms. **Owl Creek Mountains**—Archean felsic intrusives aged 2.6 to 2.7 Ga and dike swarms.

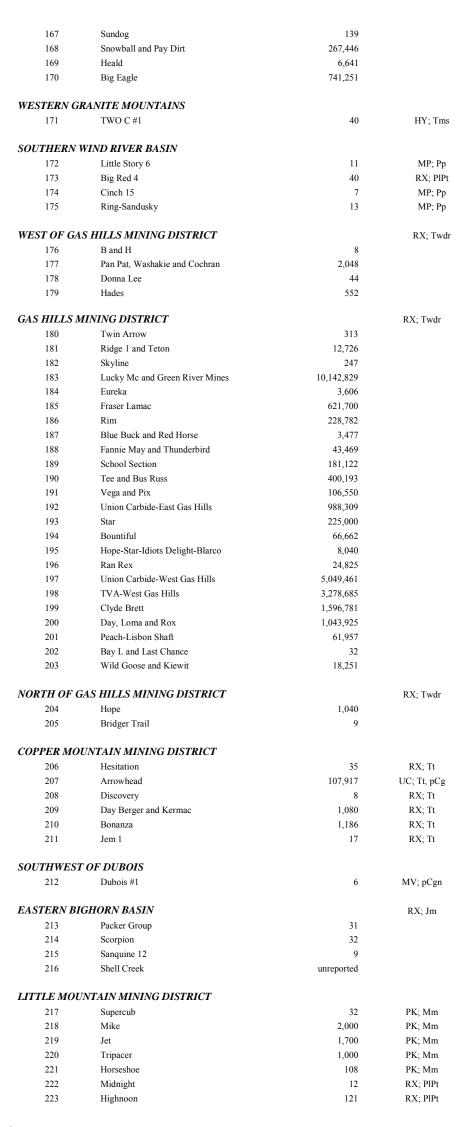
Rawlins Uplift—Archean granite aged 2.5 to 2.6 Ga. Sierra Madre-Proterozoic rocks include eugeoclinal and miogeoclinal metasediments, felsic intrusives aged 1.4 to 2.0 Ga, and mafic dike swarms and shear zones. Archean rocks include orthogneiss and paragneiss aged 2.6 to 2.8 Ga; metasediments, metavolcanics and greenstone successions aged 2.6 to 2.8 Ga; granite aged 2.5 to 2.6 Ga; and mafic dike swarms

Teton Range—Archean rocks include metasediments, metavolcanics and greenstone successions aged 2.6 to 2.8 Ga, and granite aged 2.5 to 2.6 Ga. Archean and Proterozoic mafic dike swarms. Wind River Range—Archean rocks include orthogneiss and paragneiss greater than 3.2

Ga; metasediments, metavolcanics and greenstone successions aged 2.6 to 2.8 Ga; felsic intrusives aged 2.6 to greater than 3.0 Ga; and granite aged 2.5 to 2.6 Ga. Archean and Proterozoic mafic dike swarms and shear zones.

Map Number ELKHORN CRE	Mine Name ¹	Ore Tonnage (short tons) ²	Deposit Type ³ ; Formation(s) ⁴ RX; Kfr, Kik
1	Virginia 16	38	
2	Vickers	11,312	
3	Busfield	9,396	
4	Ackerman	8,037	
5	Lewis-Dennis	2,314	
6	Hauber, New Haven and Homestake	592,577	
7	Strom KMINING DISTRICT	2,328	RX; Kik
8	Saddle	9	RX; Kfr
9	Poison Creek	17	ior, Ri
10	Wolfskill	1,947	
11 ALLADIN MINI		127	RX; Kik
12	Black Vein	5	
13	Helmer	151	
14	A&H and Sisson	162	
15 CARLILE MINI	State Lease 22090 NG DISTRICT	146	RX; Kik, Kfr
16	Cabin Creek	5	
17	Manke	2,214	
18	Layomon	47,339	
19	Carlile	20,147	
20	Meyers and Tony	826	
21	Jerri Merri	30	RX; Js
22	Sperberg	10	RX; Tfu
23	Sperberg	10	RX; Tfu
24	Sperberg	10	RX; Tw
25 26	TES MINING DISTRICT Sunset Big Tar	89 116	RX; Tw
27	Osage	200	
28	Westinghouse	296,195	
29	Charlie and Mike test pits	test	
30	Irigaray/Christensen ISR	*523,438	
31	Forest	100	
32	P	13	
33	Anomaly 93	75	
34	Moe	625	
35	Red Rock 2	8	
36	Dome Butte	335	
37	Blowout-Innes	9,500	
38	Praest	98	
39	Jeannette	2,283	
40	Miracle Mile	257	
41	Ruthie and Utah	257	
42	Colorado Christensen	4,293	
43	Orr	73	
44	Lucky Seven	27	
45	SJ Christensen	113	
46	Van 1	5	
47	Lucky Eight	18	
48	Queen and Mary	107	
49	Gap	21	
50	Blue Star	6	
50 51 52 53	Paula Black Star Scott	22 7,562 135	
54	White Mule	62	
55	Campbell	566	
56	Sue	566	
57	B Group	36	
58	Camblin 1 and Simmons	134	
59	Van Buggenem-Scott	12	
60	Joyce	7	
61	Del	206	
62	Snakebite	485	
63	Alicemae	387	
64	Antelope	1,471	
65	Tyeill	485	
66	Columbus	30	
67	Bruce	3	
68	Pete	1,761	
69	Nero	570	
70	MC	358	
71	Coldspot	1,049	
72	Jannie	100	
73	Collins Draw ISR	*test	
74	Camblin West	194	
75	SYL Del	526	
76	Axe	353	
77	RHO Terra	22	
78	Culver Sterling	11	
79	Trix Mystery Cora and Ira	363	
80	Alma Uranium Box	2,175	
81	Laur	7	
82	Kel Roy	22	
83	Missy	140	
84	Hanna	462	
85	Greeenlee	1,177	
86	Sable 8	46	
87	Teachair	259	
SOUTHEAST O	F NEWCASTLE Wicker-Baldwin	219	RX; Kfr
CAMPBELL/CO 89 90	NVERSE COUNTY LINE Reno Betty	240 91	RX; Tw
91	Triangle	7	
92	Turncrest	3,804	
93	Jake	3,860	
94	Key	1,358	
95	Converse County	813	
96	Spring	17	
97 SOUTHERN PO	Baker Group Mines WDER RIVER BASIN MINING DISTRICT	1,261	RX; Kl RX; Tw, Tfu
98	Bear Creek	4,023,220	
99	Spook and Bountiful	204,208	
100	Tisket	1,655	
101	Hardy-Zee	56,500	
102	Dead Cow	1,774	
103	Fly Group Mines	13,600	
104	Pat Mines	25,940	
105	Betty Lou	77,500	
106	D-10	8,569	
107	ML 151	359	
108	D-85	4,720	
109	Section 21	1,391	
110	Smith Ranch - Highland ISR	*15,823,496	
111	D-7	16,900	
112	Mine 28-33	602,503	
112 113 114 115	Bill Smith Highland Pits and ISR Dry Lake	12,837 *13,407,903 87	
116	Nine Mile Lake ISR	*test	
117	Box Creek and Cannon Ball	1,208	
118	Jackalope	8	
119	Dove	20	
120	Lamb	2,288	
121	Sheepshed	50	
122	South Morton Ranch	57,736	
123	Lila Buzz	96	
SOUTHERNMO 124 125	ST POWDER RIVER BASIN Judy Lucky Ann	56 779	RX; Tfu RX
	MINING DISTRICT Meng 1	11	RX; Kcv
127	Hartwell	100	RX; Kcv
128	Miller Lease 7	34	RX; Twr
129	Moore	251	RX; Twr, Kfh
129 130 131 132	Apex Nelson Fee Land New Hope	18 127 7	RX; Twr RX; Twr RX; Twr RX; Twr
132 133 134	Silver Cliff Potter Lease	920 12	MH; pC, Cf MH; pCsc
SHIRLEY BASI 135 136	N MINING DISTRICT Pathfinder-Shirley Basin Night Owl	7,170,586 93	RX; Twdr LS; PIPc
130 137 138 139	Uranium Supply-Jenkins North Walker South Walker	528,582 740,117 264,000	
140	Getty Oil-Petrotomics	9,372,211	
141	Nall	4,900	
NORTHERN LA 142	RAMIE MOUNTAINS Albany #1	14	MH; pCg
EASTERN GRA	NITE MOUNTAINS Little Man	95	AT, AP; pCsc, pCg
EASTERN SHII 144 145	R <i>LEY MOUNTAINS</i> Ajo Bald Knob	4 276	RX; Jm, Kcv RX; PlPt
	RN LARAMIE BASIN Desert Rose	10	RX; Kev
WESTERN MEI 147	DICINE BOW MOUNTAINS Platt (Uranium King)	13	PG; pCu
147 MILLER HILL 2 148		unreported	LS; Tbp
149	Unnamed	8	RX; Tnp
150	Ketchum Buttes	143	, .
151	Del Oro	2,048	
POISON BASIN 152 153	(BAGGS) MINING DISTRICT Teton Group Cedar Hills	est.1,000 20,867	RX; Tbp
153 154 155 156	Teton Group Poison Basin and Matt 3	20,867 est.1,000 61,000 47,000	
	Jack Rabbit E BASIN MINING DISTRICT Pard	47,000 426	D.V. T
157	Pard	426	RX; Tw
158	Ogle	68,400	RX; Tbs
159	Golden Arrow	5	DE; Tbs
160	Lone Wolf	23	RX: Tw
160	Lone Wolf	23	RX; Tw
161	Sweetwater	2,736,120	RX; Tbs
162	School Section	224	RX; Tbs
EASTERN ROC	K SPRINGS UPLIFT Lucky Turk	6	RX; Ke
CROOKS GAP-C 164 165	GREEN MTN. MINING DISTRICT Hazel and Beatrice Crooks Gap Mines	23 3,300,000	RX; Tbs
165	Green Mountain	523,438	





 1 ISR = Production from *in-situ* recovery methods ²Production from ISR methods noted by * and is reported in pounds of U₃O₈ (yellowcake); "test" indicates small amounts of unrecorded production ³Refer to list of SYMBOLS USED FOR CLASSIFICATION OF DEPOSITS OR OCCURRENCES

⁴Refer to list of FORMATION SYMBOLS AND AGES OF ROCKS HOSTING URANIUM DEPOSITS OR OCCURRENCES

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