URANIUM

IN ARIZONA

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Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona

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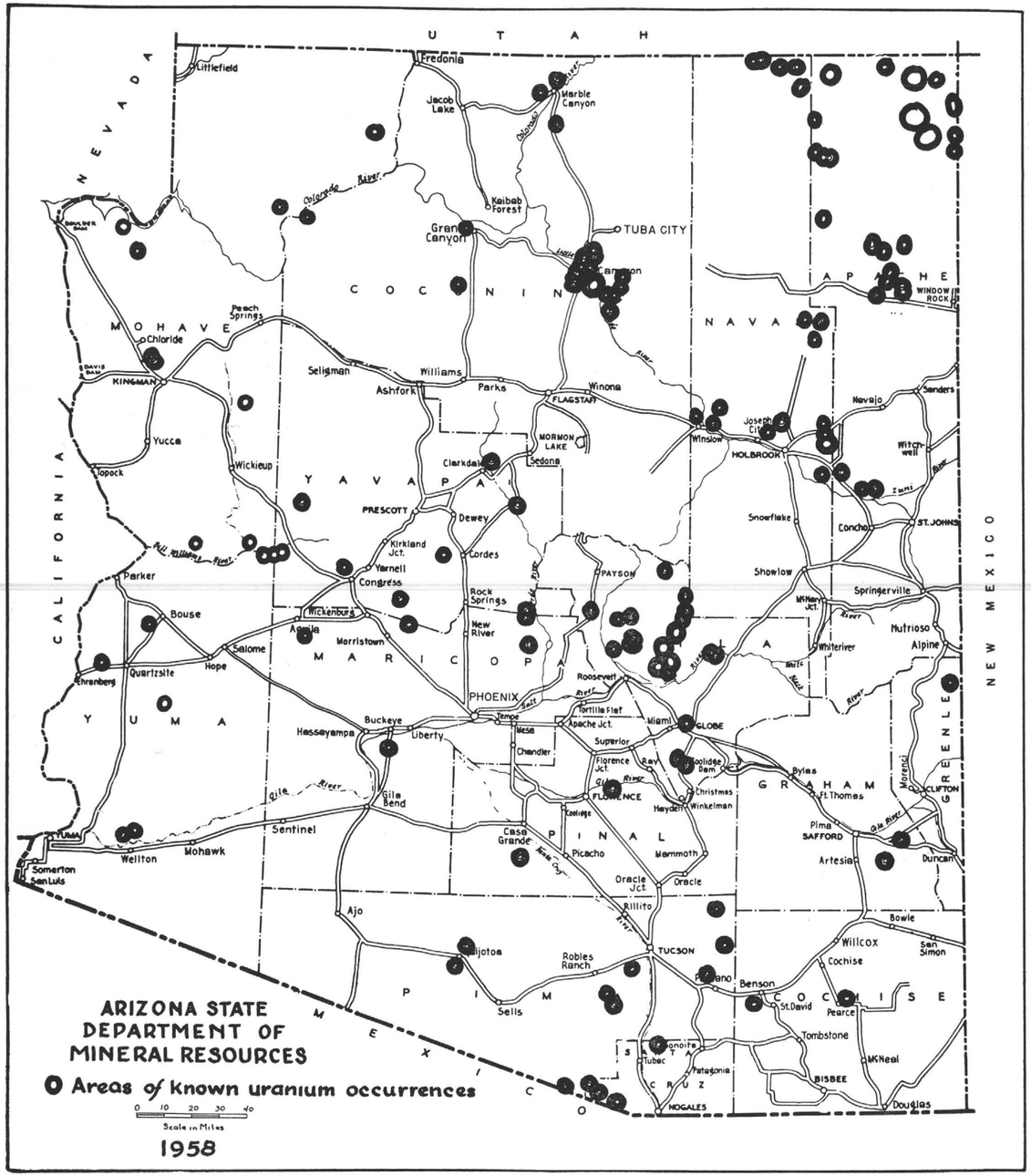

§ 27-203 Completing lode location; recording discovery notice; monumenting; discovery shaft; abandonment of claim

A. The locator of a lode claim shall have ninety days from the time of the location in which to:

1. Cause to be recorded in the office of the county recorder a copy of the location notice.

2. Sink a discovery shaft on the claim to a depth of at least eight feet from the lowest part of the rim of the shaft at the surface or deeper, if necessary, to a depth where mineral in place is disclosed in the shaft.

3. Monument the claim on the ground so that its boundaries can be readily traced.

B. Failure to do all the things in the time and place specified in subsection A. shall be an abandonment of the claim, and all right and claim of the discoverer and locator shall be forfeited.

§ 27-204 Monumenting lode claims

The boundaries of a lode claim shall be monumented by six substantial posts projecting at least four feet above the surface of the ground, or by substantial stone monuments at least three feet high, one at each corner of the claim and one at the center of each end line. When the point of a monument is at the same point and coincides with a monument of the survey of the United States, the monument of the government survey shall be deemed a mining claim monument.

§ 27-205 Location work as discovery work

Any open cut, adit or tunnel, made as part of the location of a lode mining claim, equal in amount of work to a shaft eight feet deep and four feet wide by six feet long, which cuts a lode or mineral in place at a depth of ten feet from the surface is equivalent, as discovery work, to a shaft sunk from the surface.

§ 27-206 Relocation

The location of an abandoned or forfeited claim shall be made in the same manner as other locations except that the relocator may perform the location work by sinking the original location shaft eight feet deeper than it was originally, or if the original location work consisted of a tunnel or open cut, the locator may perform the location work by extending the tunnel or open cut by removing therefrom two hundred and forty cubic feet of rock or vein material.

Titles to land in Arizona are diversified. Some of the land is open to unrestricted prospecting; some of it to limited prospecting and some of it closed. Since the status changes frequently, it is advisable to make local inquiry as to ownership and then check with the United States Bureau of Land Management, 1305 N. Central Avenue, Phoenix, Arizona, after first ascertaining insofar as possible the exact location (if possible, section, township and range) of the area in which you are interested.

The surface of much of the public domain has already been leased to ranchers and others even though mineral rights are reserved for prospecting and mining, and every care should be exercised to respect the rights of surface lease holders. Avoid unnecessary damage to fences, water holes and other improvements. Keep travel to established roads or trails wherever possible. Make every effort to cooperate with the owner of the surface rights.

Prospecting on Indian lands is not permitted except with tribal council approval. Inasmuch as regulations governing prospecting on the various reservations vary, it is necessary to make arrangements at the headquarters of the local reservation.

In many instances the mineral rights on privately owned land belong to the owners of those lands and it should be considered necessary always to contact the owners of private or railroad lands before attempting to enter them.

One should search for evidence of previous locations, such as monuments and location work, and make sure that the land is not already legally claimed by others.

The State of Arizona owns several million acres of land, including the mineral thereon, which are subject to lease. Instructions and forms pertaining to location of mineral claims and application for mineral leases may be obtained from the State Land Department, State Office Building, Phoenix.

Uranium prospecting and mining carries no priority over other types of mining and the same laws apply.

For more detailed information the Department of Mineral Resources has available a booklet "Laws and Regulations Governing Mineral Rights in Arizona" for which out-of-state residents are charged thirty cents.

FOR MORE PROFIT—KEEP THE GRADE UP[1]

Intelligent mining and shipping of ore can often make the difference between a profit and a loss for marginal production. But in order to appraise this aspect, it is best to review the prices and incentives that the AEC has offered to stimulate Plateau production. Incentive payments for acceptable ores from domestic mines are: (1) a guaranteed base price of $3.50 per lb. of ore assaying 0.20% U_3O_8 and more; (2) premiums based on grades above 0.20%; (3) a development allowance of 50c per lb. of U_3O_8 contained in ores assaying over 0.10% U_3O_8; (4) an ore haulage allowance of 6c a ton mile for maximum of 100 mi.; and (5) an initial production bonus which may amount to as much as $35,000 in addition to all other payments. Items (1) to (4) inclusive are effective through March 31, 1962 under Circular 5 Revised; and item (5) is effective until Feb. 28, 1957[2] under Circular 6.

The foregoing table shows how to compute the value of ores as specified in Circular 5 Revised, and Circular 6. Haulage allowance, vanadium payments, and lime penalties will be variable and hence are not included.

The following example shows how items (1), (2), (3) and (5) are applied on an ore with assay value at 0.55% U_3O_8:

(1)	Base price $3.50 x 11 lb.	$38.50
(2)	Premium above 4 lb. at 75c (7 x .75)	5.25
(2)	Premium above 10 lb. at 25c (1 x .25)	.25
(3)	Develop. allow. at 50c (11 x .50)	5.50
	Base price	$49.50
(5)	Production bonus (after certification)	38.50
	Total	$88.00

[1]From "Engineering and Mining Journal"—September, 1954.

[2]Extended to March 31, 1960.

The closing of the sampling plant at Cutter, Arizona, left only one buyer of uranium ores within Arizona—the Rare Metals Corporation of America, which has a processing plant near Tuba City. Uranium shipments to out-of-state plants have high transportation costs to deal with. Furthermore, ores might not be amenable to the process used by the nearest mill. In such cases it is necessary to look for higher grade deposits to offset the higher costs.

The Atomic Energy Commission has a field office in the Professional Building, Flagstaff, Arizona, to which questions may be referred.

LOCATION OF MINING CLAIMS IN ARIZONA

Uranium claims are staked in the same manner as other mining claims.

The Arizona Revised Statutes, Title 27, Minerals, Oil and Gas, read in part as follows:
§ 27-202 Method of locating lode claim[3]; monument; location notice; amendments

A. Location of a mining claim shall be made by erecting at or contiguous to the point of discovery a conspicuous monument of stones not less than three feet in height, or an upright post securely fixed and projecting at least four feet above the ground, in or on which there shall be posted a location notice, signed by the name of the locator. The location notice shall contain:

1. The name of the claim located.
2. The name of the locator.
3. The date of the location.
4. The length and width of the claim in feet, and the distance in feet from the point of discovery to each end of the claim.
5. The general course of the claim.
6. The locality of the claim with reference to some natural object or permanent monument whereby the claim can be identified.

B. Until the requirements of subsection A are complied with, no right of location is acquired.

C. The notice may be amended at any time and the monument changed to correspond with the amended location, but no change shall be made which will interfere with the rights of others.

[3]On the public domain of the United States.

URANIUM IN ARIZONA

Large numbers of uranium prospectors from all sections of the country have been attracted to the West, and Arizona in particular, because of widespread publicity given to a few spectacular discoveries. Many of these were inexperienced people, completely ignorant of the problems incidental to prospecting and mining; their main thought being to find uranium ore and get rich quick. Many came with limited capital, imbued with the idea that they could get rich within a few weeks. Some people have been fortunate enough to cash in on that idea; but, with few exceptions, the price of success has been much time, labor and study, backed by adequate capital. Much of the available area has been gone over and it is becoming increasingly evident that it is going to be necessary to spend considerable time and money to properly explore further. A slight reading on a geiger counter does not necessarily mean a profitable deposit.

Discoveries of uranium bearing minerals have been made in all fourteen counties of Arizona. With few exceptions, operating mines are located in the Colorado Plateau in the northeast section of the State. By far the greater number of deposits are in the Mesozoic sedimentary formations. Properties in the Globe area are inactive and those in Yavapai and Yuma Counties near the Bill Williams River are producing only small amounts. Ores in the Globe area are refractory and from both regions transportation is costly.

Much has been published regarding prospecting for uranium. The Atomic Energy Commission and the U.S. Geological Survey have released booklets of instructions, as have many geological and engineering consulting firms and individuals. These releases can be had from various sources at a nominal price. They contain information regarding types of uranium ores, instruments that can be used in the field to detect radiation, equipment for evaluating the ore when found, the procedure for having it analyzed, how and where to contact the A.E.C. personnel for information and assistance, areas in which uranium has been found, and in some publications maps are included that show the locations of discoveries and areas that are considered favorable for new finds. Pamphlets particularly recommended are:

Prospecting for Uranium, by AEC and USGS, 1957 Revision (75c)

Prospecting with a Counter, by AEC (30c)

These two pamphlets are available from the Superintendent of Documents, U.S. Printing Office, Washington 25, D.C., as well as local book stores dealing in technical publications. A comprehensive treatise on uranium and thorium minerals is the A.E.C. Release RMO 563 entitled "Mineralogy of Uranium and Thorium Bearing Minerals."

Most of these information circulars and booklets are reliable and can be of tremendous help to the prospector, be he a novice or experienced, so there is little excuse for the searcher of this valuable metal to go into the field uniformed. Maps of the State and of the Counties of the State are available to the prospector. The staffs of the Arizona Bureau of Mines at the University in Tucson, and the Department of Mineral Resources, Mineral Building, Fairgrounds, Phoenix, with a field office at Tucson, are ready and willing to render aid and assistance in the search for, and development of, uranium deposits in the State.

Owing to the diverse modes of occurrence of uranium in the State at large, no simple rule of thumb will serve as a guide in locating new deposits. There is, however, a close relationship in some districts, between the occurrence of commercial grade deposits and the presence of characteristic mineral associations and structural controls that serve to indicate the more favorable ground for intensive pros-

pecting. Such guides must be used with caution because their mere presence in an area is not proof of the existence of mineable concentrations of uranium minerals, and their absence is not conclusive evidence of barren ground.

Consulting geologists and engineers perform an invaluable service in evaluating prospects and directing exploration programs. Money spent for this service is often saved many times over by having the work guided by experienced men.

A large part of Arizona is desert. Prospectors should avoid working these areas during the summer months, or at least take care not to over-exert themselves during the hot part of the day. Extra water and gasoline and snakebite kits should be carried when prospecting in remote sections.

URANIUM MINERALS

Uranium combines in nature to form a host of mineral compounds. Precise laboratory methods are required to identify many of them. Fortunately, most of the oxidized minerals likely to be found in an outcrop are characterized by conspicuous yellow, green, or orange colors. The primary oxides of uranium, such as uraninite and pitchblende and the uranium-bearing pegmatite minerals, are prevailingly black or brown, and the dark uranium-bearing minerals are relatively uncommon in outcrops, except in pegmatite.

Although these distinctive colors characterize many of the uranium minerals, it is unwise to hastily conclude that minerals of such color are necessarily uranium bearing. Preliminary testing with radiation counters will determine whether or not they are markedly radioactive, but wet assays will be required for determination of actual uranium content. Assays should, of course, be run only on representative samples, rather than on selected high-grade specimens.

Following is a list of the more important uranium minerals occurring in Arizona:

tyuyamunite and meta-tyuyamunite	kasolite	bassetite
pitchblende and uraninite	autunite	brannerite
uranophane and beta-uranophane	carnotite	allanite
torbernite and meta-torbernite	euxenite	swartzite
fergusonite	samarskite	andersonite

bayleyite, polycrase, etc.

TESTING FOR URANIUM

A standard test for uranium is by means of a borax or salt of phosphorous bead. This is satisfactory only when testing pure uranium minerals or material having a high uranium content. Other elements yield somewhat similar reactions, hence these bead tests are not conclusive.

A more satisfactory bead test can be made using sodium or lithium fluoride. After the bead has cooled it is examined under an ultra violet light. If uranium is present, the bead fluoresces yellow if sodium fluoride was used, or green if lithium fluoride was used. If tungsten is present the bead fluoresces bluish-white with lithium and does not fluoresce with sodium fluoride. Columbium in the sodium bead fluoresces bluish-white but does not show any fluorescence in the lithium bead. The fluorescence produced by either tungsten or columbium is a decided blue. There are no other elements with which the uranium can be confused in the sodium or lithium fluoride beads.

SCHEDULE OF PRICES FOR URANIUM ORE

(as specified in Circ. 5 rev. and Circ. 6)

Grade of ore Percent U_3O_8	Pounds U_3O_8 per ton of ore	Base Price: Pound U_3O_8	Base Price: Ton of Ore	Grade Premium: 75c a lb. over 4-lb.	Grade Premium: 25c a lb. over 10-lb.	Mine Develop. allow. .50 per lb.	Prices per Ton of Ore: Price before initial prod. bonus and haulage allowance	Prices per Ton of Ore: Initial Production bonus on 10,000 lb.	Prices per Ton of Ore: Price before haulage allowance
0.10	2.00	$1.50	$ 3.00	$ —	—	$ 1.00	$ 4.00	$ 3.00	$ 7.00
0.11	2.20	1.70	3.74	—	—	1.10	4.84	3.74	8.58
0.12	2.40	1.90	4.56	—	—	1.20	5.76	4.56	10.32
0.13	2.60	2.10	5.46	—	—	1.30	6.76	5.46	12.22
0.14	2.80	2.30	6.44	—	—	1.40	7.84	6.44	14.28
0.15	3.00	2.50	7.50	—	—	1.50	9.00	7.50	16.50
0.16	3.20	2.70	8.64	—	—	1.60	10.24	8.64	18.88
0.17	3.40	2.90	9.86	—	—	1.70	11.56	9.86	21.42
0.18	3.60	3.10	11.16	—	—	1.80	12.96	11.16	24.12
0.19	3.80	3.30	12.54	—	—	1.90	14.44	12.54	26.98
0.20	4.00	3.50	14.00	—	—	2.00	16.00	14.00	30.00
0.21	4.20	3.50	14.70	0.15	—	2.10	16.95	14.70	31.65
0.22	4.40	3.50	15.40	0.30	—	2.20	17.90	15.40	33.30
0.23	4.60	3.50	16.10	0.45	—	2.30	18.85	16.10	34.95
0.24	4.80	3.50	16.80	0.60	—	2.40	19.80	16.80	36.60
0.25	5.00	3.50	17.50	0.75	—	2.50	20.75	17.50	38.25
0.26	5.20	3.50	18.20	0.90	—	2.60	21.70	18.20	39.90
0.27	5.40	3.50	18.90	1.05	—	2.70	22.65	18.50	41.55
0.28	5.60	3.50	19.60	1.20	—	2.80	23.60	19.60	43.20
0.29	5.80	3.50	20.30	1.35	—	2.90	24.55	20.30	44.85
0.30	6.00	3.50	21.00	1.50	—	3.00	25.50	21.00	46.50
0.31	6.20	3.50	21.70	1.65	—	3.10	26.45	21.70	48.15
0.32	6.40	3.50	22.40	1.80	—	3.20	27.40	22.40	49.80
0.33	6.60	3.50	23.10	1.95	—	3.30	28.35	23.10	51.45
0.34	6.80	3.50	23.80	2.10	—	3.40	29.30	23.80	53.10
0.35	7.00	3.50	24.50	2.25	—	3.50	30.25	24.50	54.75
0.36	7.20	3.50	25.20	2.40	—	3.60	31.20	25.20	56.40
0.37	7.40	3.50	25.90	2.55	—	3.70	32.15	25.90	58.05
0.38	7.60	3.50	26.60	2.70	—	3.80	33.10	26.60	59.70
0.39	7.80	3.50	27.30	2.85	—	3.90	34.05	27.30	61.35
0.40	8.00	3.50	28.00	3.00	—	4.00	35.00	28.00	63.00
0.41	8.20	3.50	28.70	3.15	—	4.10	35.95	28.70	64.65
0.42	8.40	3.50	29.40	3.30	—	4.20	36.90	29.40	66.30
0.43	8.60	3.50	30.10	3.45	—	4.30	37.85	30.10	67.95
0.44	8.80	3.50	30.80	3.60	—	4.40	38.80	30.80	69.60
0.45	9.00	3.50	31.50	3.75	—	4.50	39.75	31.50	71.25
0.46	9.20	3.50	32.20	3.90	—	4.60	40.70	32.20	72.90
0.47	9.40	3.50	32.90	4.05	—	4.70	41.65	32.90	74.55
0.48	9.60	3.50	33.60	4.20	—	4.80	42.60	33.60	76.20
0.49	9.80	3.50	34.30	4.35	—	4.90	43.55	34.30	77.85
0.50	10.00	3.50	35.00	4.50	—	5.00	44.50	35.00	79.50
0.60	12.00	3.50	42.00	6.00	0.50	6.00	54.50	42.00	96.50
0.70	14.00	3.50	49.00	7.50	1.00	7.00	64.50	49.00	113.50
0.80	16.00	3.50	56.00	9.00	1.50	8.00	74.50	56.00	130.50
0.90	18.00	3.50	63.00	10.50	2.00	9.00	84.50	63.00	147.50
1.00	20.00	3.50	70.00	12.00	2.50	10.00	94.50	70.00	164.50
2.00	40.00	3.50	140.00	27.00	7.50	20.00	194.50	140.00	334.50
3.00	60.00	3.50	210.00	42.00	12.50	30.00	294.50	210.00	504.50
4.00	80.00	3.50	280.00	57.00	17.50	40.00	394.50	280.00	674.50
5.00	100.00	3.50	350.00	72.00	22.50	50.00	494.50	350.00	844.50
6.00	120.00	2.50	420.00	87.00	27.50	60.00	594.50	420.00	1,014.50
7.00	140.00	3.50	490.00	102.00	32.50	70.00	694.50	490.00	1,184.50
8.00	160.00	3.50	560.00	117.00	37.50	80.00	794.50	560.00	1,354.50
9.00	180.00	3.50	630.00	132.00	42.50	90.00	894.50	630.00	1,524.50
10.00	200.00	$3.50	$700.00	$147.00	47.50	$100.00	$994.50	$700.00	$1,694.50