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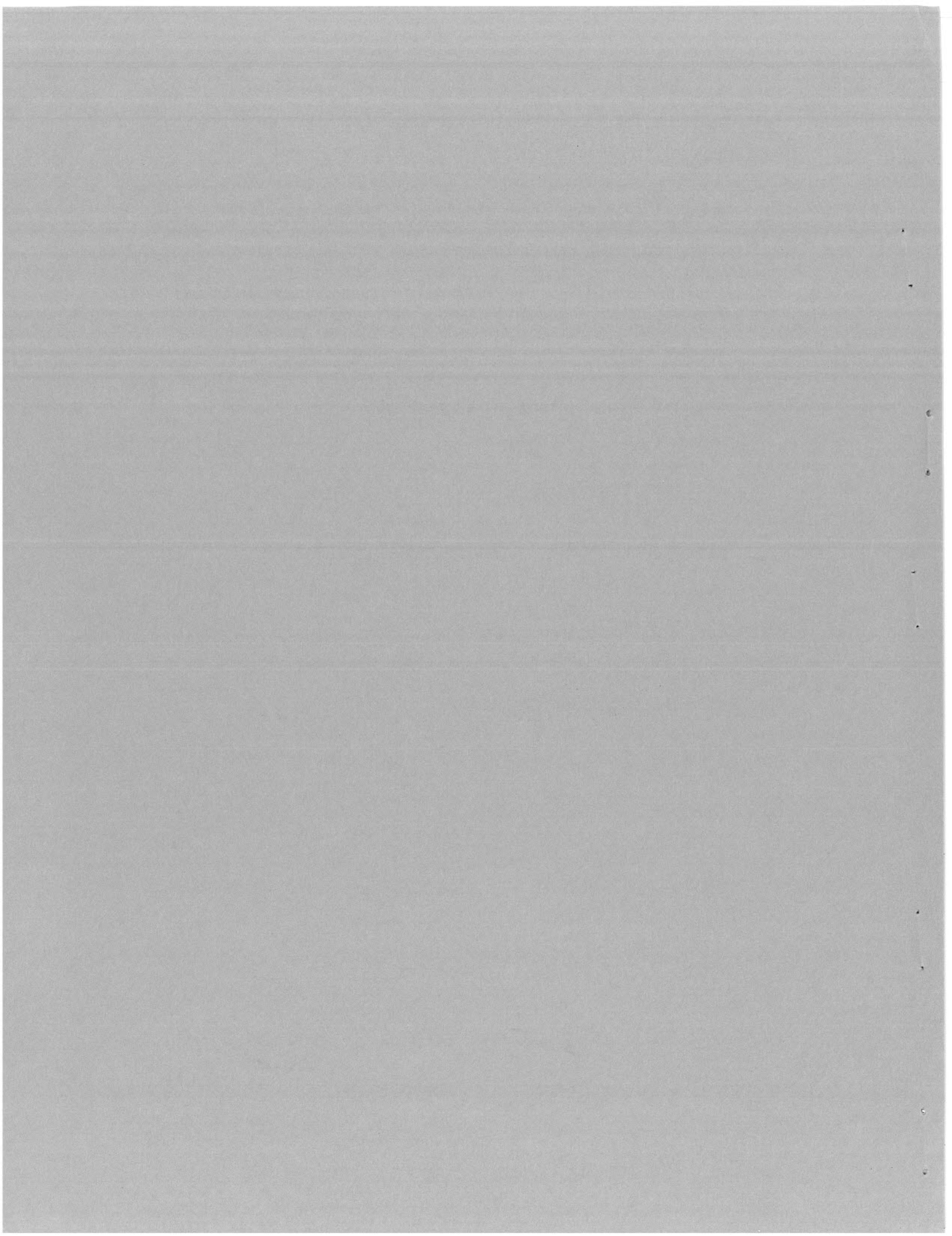
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URANIUM IN ARKANSAS

Arkansas Geological And Conservation Commission

1958



INTRODUCTION

This paper has been prepared primarily as a guide to the average prospector in his search for uranium in Arkansas. The intensive search for uranium in the United States since early 1948 has been influenced by the Federal Government guaranteed price schedules and discovery bonuses, which will continue through 1962, as well as the fact that the radio-active properties of uranium makes it possible for the layman to prospect with the use of relatively inexpensive radio-active recording instruments.

There have been several radio-active prospects reported throughout the state, a number of which have been visited by representatives from this office. However, there has been no commercial production of uranium from the state to date.

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TYPES OF URANIUM DEPOSITS

Vein Deposits. Uranium occurs in commercial quantities in both igneous and sedimentary rocks. Major deposits occur in igneous rocks in the Belgian Congo, Canada, and Czechoslovakia where the uranium occurs as pitchblende in hydrothermal fissure veins and is usually associated with other important minerals such as silver, cobalt, nickel and copper. As a rule the vein deposits are much higher grade but yield smaller tonnages than the sedimentary deposits.

Deposits in Sedimentary Rocks. The most important deposits in the United States are in the Colorado Plateau, where the uranium minerals occur in sedimentary rocks, mostly sandstones. The chief uranium mineral is carnotite, which is associated with the vanadium minerals roscoelite and vanadinite. Deposits of lesser importance occur in limestones, phosphates, shales, lignites and other formations containing an abundance of organic materials.

The individual ore deposits in the Colorado Plateau are fairly well-defined lenses but are irregular in size and distribution throughout the formations.

The occurrence of uranium in limestones is not uncommon but concentrations in commercial quantities are few. The only deposit of major importance occurs in the Jurassic Todilto limestone a few miles west of Grants, New Mexico, where the uranium occurs associated with fluorite along fractures in the limestone. The origin of the uranium in the Todilto limestone is assumed to be replacement of limestone by hydrothermal solutions because of its

association with replacement deposits of fluorite.

When uranium is present in shales and phosphate rocks, it usually occurs in very small amounts uniformly throughout the entire formation in contrast to the concentrated occurrences in sandstones and limestones. The most important uraniferous phosphates are those in the Pliocene Bone Valley formation in Florida and the Permian Phosphoria formation in the Western States. Through intensive research sponsored by the Atomic Energy Commission the Florida phosphates have been producing uranium as a by-product in the manufacture of phosphate fertilizer.

The black shale formations of the United States remain as future potential sources of commercial uranium with the most important discovery to date being the Chattanooga shale of Devonian age. Radioactivity occurs more or less uniformly throughout the Chattanooga shale; however, where small concentrations of uranium are present they are associated with the more carbonaceous zones of the formation.

Uranium has a definite affinity for carbonaceous materials which make the lignite and coal formations of the United States favorable environment for uranium concentrations providing the carbonaceous matter was deposited before the introduction of uranium solutions. Commercial concentrations of uranium have been found in some of the lignites in the Dakotas.

Uranium is a very common element and is likely to occur in most any type of rock; however, because of the easy solubility of uranium salts it is not likely for secondary uranium concentrations to occur in placers or unconsolidated formations in tropical or sub-tropical regions.

URANIUM MINERALS

General. There are more than 100 uranium bearing minerals but only a very few of them occur in sufficient quantities to be considered ore bodies; however, the fact should not be overlooked that where any one of the uranium minerals does occur there is a possibility that other uranium minerals of major importance may exist nearby. Uranium minerals are usually broken down into two major classifications: hypogene (primary) and supergene (secondary). The primary minerals are those that were formed by hydrothermal solutions and the secondary minerals were formed as a result of solution of the primary minerals. Both primary and secondary uranium minerals form important ore bodies, the latter being the most extensive and consequently the more important type of deposit in the United States.

Primary Minerals. The primary uranium minerals are formed as a result of igneous activity; however, they may occur in sedimentary formations as a result of mechanical separation during the erosion of igneous bodies and their redeposition as clastic sediments.

The two most important primary uranium minerals are pitchblende and uraninite respectively and are generally described as follows:

Pitchblende (uranium oxide) occurs chiefly in hydrothermal fissure veins and is very commonly associated with one or more of the copper minerals. Pitchblende has a hardness of 5-6, specific gravity of 6-9, conchoidal fracture, black to greenish color and most commonly occurs in rounded, irregular masses. This mineral

contains 50-80% U_3O_8 .

Uraninite (uranium oxide) is sometimes associated with pitchblende but is most commonly found in pegmatites and granites. Uraninite has the same general properties as pitchblende except it usually occurs in massive crystalline form with the individual crystals being small cubes. This mineral contains 65-85% U_3O_8 .

The primary uranium deposits are of a richer grade than the secondary deposits but are generally of lesser importance commercially because of their size.

Secondary Uranium Minerals. The most extensive and consequent~~ly~~ the most important uranium ore bodies in the United States are of secondary origin with the chief secondary uranium minerals being carnotite, tyuyamunite, autunite, tobernite, all of which are weathered products of the primary minerals. A general description of the above secondary minerals is given below in the order of their importance:

Carnotite (potassium uranium vanadate) is bright canary yellow with a hardness of 2-3, a specific gravity of 4. and occurs as irregular lenses in sandstone and as a minor cementing agent in sandstones. This mineral contains 50-55% U_3O_8 .

Tyuyamunite (calcium uranium vanadate) has a bright greenish yellow color, a hardness of 2-3, a specific gravity of 3-4, and occurs as crystalline coatings usually associated with calcite minerals. This mineral contains 48-55% U_3O_8 .

Autunite (calcium uranium phosphate) ranges in color from bright lemon-yellow to apple green, has a hardness of 2-3, a specific gravity of 3. and occurs in small, flat transparent crystals.

Autunite is the only important uranium mineral that will always fluoresce under an ultraviolet light. The fluorescence is brilliant yellow or apple green. This mineral contains 60% U_3O_8 .

Torbernite (copper uranium phosphate) is bright green, with a hardness of 2-3, specific gravity of 3-4, and occurs as flat, square, transparent crystals, and will occasionally fluoresce to a bright green. This mineral contains 60% U_3O_8 .

PHYSIOGRAPHIC PROVINCES OF ARKANSAS AND THEIR
RELATION TO PROSPECTING

General. Physiography is defined as a study of land forms and the forces that were responsible for their present features. In this respect Arkansas is divided into four major physiographic provinces which are in turn subdivided into smaller units. The four major provinces are the Ozark Plateau, Arkansas Valley, Ouachita Mountains and Gulf Coastal Plain (Figure 1). The two divisions of greatest relief are the Ouachita Mountain and Ozark Plateau provinces; consequently, there are more formations exposed in those regions, thus providing a greater variety of formations and rock types that can be traversed by the prospector. The sedimentary rocks of the Ozark Plateau, Arkansas Valley and Ouachita Mountain Provinces are all of Paleozoic age while those of the Gulf Coastal Plain are younger and more unconsolidated ranging in age from Lower Cretaceous to Recent.

Ozark Plateau. The rocks that make up the Ozark Plateau range in age from Lower Ordovician to Pennsylvanian and consist of limestone, dolomite, sandstone, shale, chert and conglomerate formations. Except for local structures the formations are relatively flat lying with a very low regional dip increasing southward toward the Arkansas Valley Province. The physiography of the Ozark Plateau is similar to that of the Colorado Plateau but the formations are older and are composed principally of limestones and dolomites in contrast to the massive sandstones and marls of the Colorado Plateau.

A prospector should not overlook the possibility of uranium occurring in any of the formations exposed in the Ozark Plateau; however, certain rock types have been proven to be better host rocks for the deposition of uranium than others. Limestones and dolomites are generally considered poor host rocks for the deposition of uranium except in those cases where mineralization has been effected by the action of hydrothermal solutions. In this respect one might consider prospecting those limestones in the vicinity of the lead and zinc deposits of north-central Arkansas. The sandstone deposits of the plateau region are generally hard and impermeable except some of the younger sandstones along the southern escarpment which occur above the limestone section. These younger and more permeable sandstones would be better host rocks for the deposition of uranium and are, therefore, the better sandstones to prospect. Because of the association of uranium with phosphate rocks and black bituminous shales one might consider those areas in the Plateau favorable for prospecting; however, it should be remembered that those rock types seldom, if ever, contain commercial concentrations of uranium.

Generally speaking the rock types represented in the Ozark Plateau are not favorable for the deposition of uranium in commercial concentrations. The uranium content of the phosphate rocks may be of commercial value providing the uranium could be extracted as a by-product in the manufacture of phosphate products.

Arkansas Valley Region. The Arkansas Valley is composed principally of sandstones and shales of Pennsylvanian age with very few calcareous rocks or fossils represented. The formations are steeply

folded and eroded to the extent that several thousand feet of Pennsylvanian rocks are exposed on the surface. The sedimentary formations have been intruded by igneous dikes and sills at some places in the central part of the province. Some of the formations of the Valley contain coal beds with the most extensive coal deposits being in the central and western part of the province.

Radio-activity has been reported at a number of places in the Valley province, three of which have been examined by representatives from this office. Two of the prospects were in the igneous rocks in Perry County and one prospect was in a black shale formation in Sebastian County. Samples were taken from all three prospects and were analyzed in the Commission laboratory with negative results.

The character of the rocks and the attitude of the beds in the Valley province makes it an unfavorable region to prospect; however, any prospecting done in the Valley should be concentrated around the areas of igneous activity and the sandstones adjacent to the coal beds.

Ouachita Mountain Region. The Ouachita Mountain Province is characterized by ridge-and-valley type of topography with most of the ridges being the very hard, resistant Arkansas novaculite, while the valleys are essentially shale. Rocks of the Ouachita province range in age from Cambrian to Carboniferous being intruded in places by Cretaceous igneous rocks.

Most of the radio-activity in the Ouachita Province occurs in the Magnet Cove and Wilson Springs areas; however, several prospects

have been reported outside these areas, many of which have been visited by representatives from this office.

Most of the formations exposed in the Ouachita Province are impervious and are not good host rocks for the deposition of uranium. Prospecting in the Ouachita Province should be restricted to fracture zones in the formations where the possibility of hydrothermal replacement deposits might exist especially around mineralized areas of the province.

Gulf Coastal Plain Province. The Gulf Coastal Plain sediments cover approximately one half of the total area of the state and consists of loosely consolidated sandstones, gravels, clays, lignites, and chalk formations with the latter being the least significant from an areal standpoint. Two large syenite intrusives occur in Pulaski and Saline Counties in the bauxite districts. Because of the easy solubility of uranium salts and the nature of the rocks comprising the Coastal Plain sediments as well as our climatic conditions the Coastal Plain is not considered a favorable region in which to prospect. A possible exception might be the lignites because of the very common association of uranium with carbonaceous materials.

Summary. Generally speaking the Ozark and Ouachita Provinces are the best regions in which to prospect with the least favorable being the Gulf Coastal Plain.

FEDERAL, STATE AND PRIVATE LANDS

General. The only lands in Arkansas that are available for claim-staking are the federal lands of the National Forests. There are three types of forest lands all of which must be treated separately with respect to mineral development. The lands are classified according to the nature in which they were obtained: First, forest lands created from the public domain by presidential proclamation; second, Weeks Law lands; and third, lands acquired by the Forest Service in exchange for National Forest lands.

Public Domain Forest lands are those that have been created from the public domain by presidential proclamation and are subject to claim staking.

Weeks Law lands are those that were purchased from private owners for forest purposes and are not subject to ordinary claim-staking. Preliminary prospecting may be carried on without a permit, but a permit is necessary for the making of extensive excavations, for the erection of structures, and for the acquisition of exclusive rights. A written application for a prospecting permit should be made to the forest officer in charge before any extensive exploration work is commenced. The forest officer may issue a permit, for which a fee of \$5 is required, allowing the applicant to prospect 100 acres of forest lands for a period of one year. Prospecting permits are not transferable and do not allow the removal of minerals in merchantable quantities. Upon discovery of a valuable mineral deposit a mining permit may be applied for through the forester in charge.

Exchange lands are those lands that have been acquired by the Forest Service in exchange for forest lands and may be leased under a special use permit for which a charge of from 25¢ to 50¢ an acre is usually made. Each applicant is given individual treatment, there being no general regulations on these lands. Information regarding prospecting and mineral development may be obtained from the forester in charge.

The accompanying map (Figure 2) showing the location of National Forest lands does not show the individual boundaries of the three types of forest lands described above because that information is not readily available; however, this information is available in the county clerk's office in those counties where National Forest lands are located. The local headquarters of the National Forests are as follows: Headquarters Ouachita National Forest, U. S. Forest Service, Hot Springs, Arkansas; Headquarters Ozark National Forest, U. S. Forest Service, Russellville, Arkansas.

State-owned lands that are available for mineral leasing and development are restricted mostly to section 16 (school land) and beds of navigable streams.

Most the the section 16 lands have been sold; however, anyone wishing to purchase section 16 land is required to make application to the county court, and deposit with the county clerk a sufficient sum to cover the costs of surveying, appraisalment, and sale -- plus a written commitment to bid at least \$2.50 per acre if it is acreage property and the full appraised value if it is lots.

Mineral leases of beds of navigable streams may be obtained through the Arkansas Commissioner of Revenues at Little Rock. Not

more than 1000 acres of such stream beds may be leased to any one person, association, or corporation.

The prospector should not consider those lands that have been forfeited to the state for non-payment of taxes for two practical reasons. First, a tax title can usually be set aside at the insistence of the original owner, as there are many technical defects which may invalidate a tax sale. Second, an act adopted in 1939 requires that in the sale of tax-forfeited lands all minerals, including oil and gas, be retained by the state. Leases may be obtained on tax-forfeited land at the discretion of the Land Use Committee of the State Planning Board through application to the State Land Commissioner.

A prospector has no legal right to trespass upon private property without first having received permission from the property owner or other authorized persons acting in the owner's behalf; however, most people have no objection to prospecting on their property and should welcome the prospector as long as he respects property improvements. If a mineral deposit is found on privately-owned property the prospector must deal with the owner regarding a mineral lease. There is no particular form to be followed in preparing a mining lease; however, if both parties are not familiar with leasing activities it is very important to obtain a competent attorney's assistance.

Claim Staking. Any person who is a citizen of the United States or has declared his intention to become a citizen may locate mineral claims in certain of the National Forest lands discussed above. A person may locate either a "lode" or a "placer" claim depending on the nature of the deposit. A lode claim should be located to cover

a vein, or other mineralized zone that is situated between, or within layers of surrounding country rock. A placer claim should be located to cover a sedimentary deposit of valuable material that occurs as a result of erosion and redeposition of former lode deposits.

A lode claim: The word "lode" as used here will refer to the outcrop of a vein or mineralized zone on the surface and not necessarily to the true strike of the vein or mineralized zone. A lode claim is in the shape of a rectangle or a parallelogram with the maximum length being 1500 feet horizontally along the lode and 600 feet wide with the center of the lode being approximately 300 feet from each side line or roughly splitting the center of the claim lengthwise. Special care should be exercised in locating the end lines of the claim making sure that they are both the same length and are parallel to each other. The end lines must be oriented so as to be perpendicular to the true strike of the vein which is not necessarily the strike of the lode as it is expressed on the surface.

There is no limit to the number of lode claims that a person may locate; however, certain acts are necessary in order to constitute a valid location. A claim is not valid unless a discovery of valuable mineral has been made in each claim and the discovery must be of mineral in place, not of float rock. The boundaries of each claim must be sufficiently marked so that any person can readily trace them on the ground. Ordinary stakes or monuments at the corners of the claim are sufficient, though it is advisable to attach a notice at each corner indicating the position of the others. The law does not require a prospector to record notice of the location; however, it is advisable to do so because it provides a

permanent record of the boundaries of the claim. Where notice of location is filed for record it should contain all pertinent information concerning the claim such as the name of the claim, the names of the locators, the date of location, and the location of the claim or claims with reference to some natural object or permanent monument. This information should be filed with the county recorder of the county in which the claim or claims are located.

In order for a claim to remain valid at least \$100 worth of assessment work must be conducted during each year. The first one-year period begins at noon on July 1 following the date of location.

Placer claims: The dimensions of a placer claim are not restricted to any specified lengths or widths but should conform as nearly as practicable to legal subdivisions and cannot exceed twenty acres in a single individual claim. There is no limit to the number of claims that a person or association may make as long as there is a discovery of valuable material within each claim. The boundaries of the claims must be marked in the same manner as lode claims. The recording of a placer claim is optional, as with the lode claim, but the annual assessment work is required in order for the claim to remain valid.

PROSPECTING METHODS

General. Prospecting for uranium should be conducted in the same general manner as one would employ in searching for other valuable minerals; however, the uranium prospector has the added advantage of geiger and scintillation counters that can detect radio-active bodies.

Radiation Detection Instruments. Uranium as well as several other associated elements of little economic value emits radiation. This radiation can be detected in the field by geiger and scintillation counters.

The geiger counter works on a very simple principle. Briefly, when the geiger counter is struck by radio-active emissions these emissions are amplified and shown on the indicator which may be a blinking light, a dial or may be audible by use of ear phones. Geiger counters may be purchased for as little as \$25 or as much as \$300.

The scintillation counter has a higher sensitivity to radiation but is more expensive. The geiger counter is adequate for prospecting but the scintillation counter's higher sensitivity makes it better adapted for making radioactive surveys and measuring low levels of radio-activity.

In using the radiation detection instruments in the field three major effects must be taken into account before the readings shown by the instrument can be properly interpreted. These effects, all of which cause a rise in the readings, are: (1) background effect, (2) the "mass effect", and (3) effect of radio-active elements other

than uranium.

The background effect is caused by radiation which is constantly present from various outside sources and will cause the instrument to give a small reading at all times. To take the background effect the flashes per minute of the bulb or the average location of the dial must be noted. The counter should be checked from day to day and from location to location. After the background effect has been established any readings over this count should be noted.

The mass effect is the rise in the readings attributable to a large mass of weakly radio-active rocks none of which may be high enough grade to be ore but the sum total of which may give a high reading. An example of this is the radio-activity encountered in large outcrops of many of the black shales.

The effect of radioactive elements other than uranium may give a false impression as to the amount of uranium present. For example uranium and thorium register on most counters in the same way and the only way to determine the element present is through chemical analysis.

Assaying Uranium Samples. Field radiation detection instruments should not be depended upon to give more than a rough assay. A radiometric assay, that is, using carefully calibrated laboratory counters, is useful in determining the total radio-active constituents of a sample but in order to determine the exact radio-active elements present and their percentages a chemical analysis should be run on the sample.

Samples may be sent to either a government agency or commercial assayers. The government agencies now receiving such samples are the

Arkansas Geological and Conservation Commission and the Bureau of Mines.

Arkansas Geological and Conservation Commission. The Geological and Conservation Commission at the State Capitol in Little Rock will examine any type of sample that is submitted either by mail or in person and will forward those that are sufficiently radio-active to the Commission laboratory for a chemical analysis. Upon completion of the examination a report will be mailed to the party that submitted the sample. Only a limited number of samples will be chemically analyzed from any given prospect. It is sometimes helpful to know the approximate location of the sample in order to associate the sample material with other geological information in the area, thus, expediting a proper examination and making possible a more detailed report on the material. However, it is not required that the sample location be given as long as the material occurs in the state. If a sample shows sufficient merit, arrangements may be made with a geologist from this office to make a preliminary investigation of the prospect and advise the property owner, or lessor, accordingly. There is no charge for services rendered by the Geological and Conservation Commission. It should also be remembered that the services outlined above are not restricted to uranium and may, therefore, be applied to any type of mineralization or commercial rock in the state.

U. S. Bureau of Mines. The Bureau of Mines will identify minerals by inspection. Samples sent to the Bureau of Mines should be addressed:

Bureau of Mines
P. O. Box 136
Rolla, Missouri

Samples submitted to any of the above government agencies should weigh at least one pound and be clearly labeled with the sender's return address. All samples submitted should be as representative as possible; that is, they should represent the rocks of the entire ore deposit from which they were taken. If several samples are taken from an ore body they should be labeled as to how much of the ore body they represent. Other information which should be included if possible is the exact location of the deposit, estimated amount of the material, and any other relevant information including a short description of the deposit.

Numerous commercial analytical laboratories will assay uranium samples for an average cost of between \$4.50 and \$10. Information on the size of the samples to be submitted and cost of the analysis may be obtained from any of the below listed laboratories.

H. D. Brown Laboratory
Route 3
Grand Junction, Colorado

Bruce Williams Laboratories
Box 557, 618-624 Joplin Street
Joplin, Missouri

Cross Laboratories, Inc.
700 Baltimore Avenue
Kansas City, Missouri

Chapman and Wood
536 Jefferson Street Northeast
Albuquerque, New Mexico

MARKETING OF URANIUM ORE

Sale of Uranium Ore. If Uranium is found of commercial quality and quantity (as determined by the Atomic Energy Commission) it may be sold to any person or company in the United States provided both the buyer and seller are licensed by the Atomic Energy Commission. The seller of uranium ore may deal directly with the AEC uranium mill and buying station at Monticello, Utah or with any of the licensed commercial uranium mills. A few of the licensed commercial uranium mills closest to Arkansas are listed below:

Anaconda Company
Bluewater (Grants), New Mexico

Climax Uranium Company
Grand Junction, Colorado

Gunnison Mining Company
Gunnison, Colorado

Homestake-New Mexico Partners
Grants, New Mexico

Kerr-McGee Oil Industries, Inc.
Shiprock, New Mexico

Vanadium Corporation of America
Durango, Colorado

Prior to any shipment of uranium ores to a mill arrangements should be made with the Atomic Energy Commission, Grand Junction, Colorado concerning bonuses and allowances.

Uranium Prices. The Atomic Energy Commission guarantees a fixed price on uranium ores through 1962 (see Table 1). The minimum grade of ore purchased is 0.10% U_3O_8 ; however, in view of the limitations of the haulage allowance (which is 6¢ per ton-mile up to a maximum of 100 miles) it would seem that a grade of at least 0.2% U_3O_8 would be necessary in an outlying district such as Arkansas.

TABLE 1

SCHEDULE OF PRICES FOR URANIUM ORE

(As Specified in Circ. 5 Revised, and Circ. 6)

Grade of Ore Percent U ₃ O ₈	Pounds of U ₃ O ₈ Per Ton of Ore	Base Price Pound U ₃ O ₈ of Ore	Price \$ 3.00	Grade Premium		Mine Develop. Allowance .50/Lb.	Price Before Initial Prod. Bonus & Haul- Age Allowance	Price Per Ton of Ore Initial Prod. Bonus on 10,000 Lb.	Price Before Haulage Allowance
				\$.75 a Lb. Over 4-Lb.	\$.25 a Lb. Over 10-Lb.				
0.10	2.00	\$1.50	\$ 3.00	-	-	\$ 1.00	\$ 4.00	\$ 3.00	\$ 7.00
0.20	4.00	3.50	14.00	-	-	2.00	16.00	14.00	30.00
0.30	6.00	3.50	21.00	1.50	-	3.00	25.50	21.00	46.50
0.40	8.00	3.50	28.00	3.00	-	4.00	35.00	28.00	63.00
0.50	10.00	3.50	35.00	4.50	-	5.00	44.50	35.00	79.50
0.60	12.00	Do	42.00	6.00	0.50	6.00	54.50	42.00	96.50
0.70	14.00	Do	49.00	7.50	1.00	7.00	64.50	49.00	113.50
0.80	16.00	Do	56.00	9.00	1.50	8.00	74.50	56.00	130.50
0.90	18.00	Do	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
5.00	100.00	Do	350.00	72.00	22.50	50.00	494.50	350.00	844.50
10.00	200.00	Do	700.00	147.00	47.50	100.00	994.50	700.00	1,694.50

URANIUM PROSPECTS IN ARKANSAS

Uranium of commercial grade (i.e. 0.1% + U_3O_8) has been found in Arkansas; however, no uranium in commercial amounts has yet been found in the state. Numerous prospects containing some uranium and other radio-active materials have been visited by a representative of the Arkansas Geological and Conservation Commission. Listed below is a brief description of some of the prospects visited which have yielded samples containing uranium. Many other reported occurrences have been examined and found to contain no appreciable uranium. All assays mentioned below are chemical assays.

Grigger Prospect. Located in Montgomery County approximately 0.2 miles north of Mt. Ida, Arkansas in section 1, T 2S, R 25W. The radio-activity in this prospect comes from a soft, yellowish-white crust that is formed in solution channels in the Stanley shale (Mississippian). Several samples of the shale were analyzed with negative results. The only material carrying more than a trace of uranium is the white crust material from which one sample was obtained and found to contain .02% U_3O_8 . At the time of examination the only development work being done was the trenching of the deposit with a bulldozer.

Rankin Prospect. Located in a stream bed in SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Section 25, T 8S, R 26W, Pike County. The radio-activity in this prospect is restricted to the fragments of carbonized wood that lie in the silt at the contact with the underlying clay in the lower part of the Trinity formation (Lower Cretaceous). The carbonized wood fragments vary considerably in size and radio-activity. In general

the smaller fragments show the highest radio-activity. Two samples were collected for chemical analysis. Sample #2 was from the fragment showing the highest radio-activity and sample #1 was taken from a four foot log.

Sample #1 -- Trace U_3O_8

Sample #2 -- 0.2 % U_3O_8

At the time of examination no development work was being undertaken.

Milligan Phosphate Property. Located in Independence County approximately 12 miles northeast of Batesville, Arkansas in the N $\frac{1}{2}$ of the NW $\frac{1}{4}$ of Section 6, T 14N, R 5W. The radio-activity in this property is contained within a phosphate deposit in the Cason shale (Ordovician). Shafts were dug on this property to determine the amount and grade of the phosphate. The samples taken for assay came from these shafts. The results were:

<u>Shaft</u>	<u>Depth</u>	<u>% U_3O_8</u>
1	14-15'	0.0007
2	15-17'	0.00034
3	17-19'	0.0009

All development work on this property has taken place in search of phosphate rock.

Peyton Creek Phosphate Deposit. Located partly in Van Buren County (Sec. 12, T 13N, R 15W) and partly in Searcy County (Sec. 1, T 13N, R 15W). It is approximately 3 miles south of Leslie, Arkansas. The radio-activity in this deposit is confined to the phosphate rock of Mississippian age. Chemical analysis of a representative sample of the phosphate rock showed a uranium content of 0.014% U_3O_8 . All development work on this deposit has occurred

primarily as a result of the search for phosphate rock.

Chandler Prospect. Located in Garland County in Section 16, T 2S, R 18W. The uraniferous material on this prospect occurs as a thin crust on the surface and in small fractures in the Arkansas novaculite (Devonian). One sample of this crust was taken and found to contain 0.35% U_3O_8 . At the time of examination development work was limited to uncovering this material with a bulldozer.

Bear Hill Prospect. Located in Marion County in the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 11, T 19N, R 17W. The radioactive material on this prospect is a bitumen sparsely scattered in an outcrop of black shale. Two representative samples of the black shale were taken and found to contain 0.005% U_3O_8 and 0.006% U_3O_8 . Two small, carefully selected samples of the bitumen were taken and found to contain 0.55% U_3O_8 and 2.0% U_3O_8 . No known development work has taken place on this property.

Ubergang Prospect. Located in Saline County in Section 3 and 4, T 1N, R 15W. The radio-activity on this prospect is confined to a vuggy, coarse-grained quartz feldspar rock. This rock is scattered over the property and nowhere was it found in place. A selected sample taken of this rock was found to contain 0.019% U_3O_8 and 1.5% Th^{232} (Thorium).

Runyan Prospect. Located in Hot Spring County in the NW $\frac{1}{4}$ of Section 8, T 3S, R 17W. The radio-active material on this property occurs in veins in the Arkansas novaculite (Devonian). A number of samples taken from this prospect have been checked and one of the more radio-active specimens tested was found to contain 0.14% U_3O_8 . At the time of the examination development work was confined to uncovering these veins with a bulldozer.

Wilson Springs Prospect. This prospect is located about five miles east of Hot Springs in Sections 17 and 19, T. 3S, R. 18W, Garland County, Arkansas.

Uranium mineralization occurs at the contact of a nepheline syenite intrusive with adjacent folded Paleozoic novaculite and shale formations.

Geochemical and X-ray determinations by the U. S. Geological Survey indicated that there was a significant concentration of niobium and vanadium along with the uranium and that one of the uranium minerals present was pyrochlore.

Isorad mapping and geochemical sampling of the deposit was accomplished by the AEC.

The early development work at the deposit consisted of a number of bulldozer cuts made by the property owner in the vicinity of the radio-active highs.

The Lisbon Uranium Corporation of Moab, Utah drilled eleven core holes at the deposit to test its depth. The maximum drill hole depth was 147 feet and the maximum depth below the surface of significant radio-activity was seven feet.

There has been no commercial production of uranium from this deposit although samples containing as high as .4% chemical uranium have been tested.

Additional information on this deposit has been published in reference #10 by Malan and Nash.

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