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THE BUREAU OF LAND MANAGEMENT AND URANIUM

JOSEPH E. C. CONRACE*

President Wallace

Distinguished Guests

Members of the Judiciary

Members of the Wyoming State Bar

Ladies and Gentlemen:

It is a distinct privilege and a real pleasure to be given the opportunity of appearing before the Wyoming State Bar. I am here as a representative of the newly-organized office of the State Supervisor of the Bureau of Land Management for Wyoming.

Because many of you at one time or another will have contact with matters involving public lands and their resources, it may be of advantage to you to know of the recent reorganization of the Bureau so far as it concerns the State of Wyoming. This reorganization has already been commented upon in general terms by Mr. Mock, who preceded me.

Nevertheless, there may be some here who are not aware that the Bureau of Land Management resulted from the consolidation in 1946 of the General Land Office (which had been in existence since 1812) with the Grazing Service.

It is not difficult to visualize the function of the Bureau — it is precisely what the name implies —

THE MANAGEMENT OF PUBLIC LANDS.

Management of the public domain in Wyoming involves not only administration of the use and disposition of the surface — such as grazing, homesteading, land sales, etc. — but also the use and disposition of the resources on and under the surface. These resources include timber; leaseable minerals such as oil and gas, coal, phosphate, sulphur, etc.; minerals subject to appropriation under the U. S. mining laws, which include all minerals except those specified in the Mineral Leasing Act.

To avoid any premature assumption that the task of the Bureau is relatively simple, insofar as administration is concerned, let me point out that there are over 16½ million acres of vacant public lands in Wyoming, and that it has been estimated that there are over 5,000 different laws applicable to the public domain. More of these laws are being added constantly, such, for instance, as the recently-enacted Public Law 585 of August 13, 1954, known as the multiple use law concerning minerals and about which Mr. Senior has just commented to you.

* Lands and Minerals Officer, Bureau of Land Management, Cheyenne, Wyoming. Address delivered at the annual meeting of the Wyoming State Bar, September 16, 1954, Rock Springs, Wyoming.

In the implementation of Public Law 585, regulations thereunder are now in course of preparation by Bureau personnel and will be promulgated after Secretarial approval.

Getting back to the reorganization of the Bureau, let me state that in order to provide for a closer and more direct contact with the public, there has been established at Cheyenne, Wyoming, since June 1, 1954, the office of the State Supervisor, Bureau of Land Management, located in the Federal Office Building.

The State Supervisor's Office — and here I ask that you bear in mind this office has no connection with any office of the State of Wyoming — is divided into three departments or operational segments:

Lands and Minerals

With jurisdiction over the classification and disposition of lands and mineral resources; review of appeals from decisions rendered by the manager of the land office; supervision over land office functions concerning the adjudication of applications and claims for rights to public lands and mineral resources; etc.

Range and Forestry

With jurisdiction over management of range and forestry matters. This includes administration of grazing privileges, sales of timber resources, etc.

Land Office

Maintains accurate and complete records showing the status of all public lands of the United States within the State of Wyoming.

It is the portal through which must first enter all applications and claims for the acquisition of rights to public lands and their resources within the State of Wyoming.

Processes applications and claims under the public land laws under two general categories:

- (1) Disposition of land or surface resource, such as by homesteading, public sale, desert land entry, small tracts, sale of materials, etc.
- (2) Disposition of mineral resources under the U. S. Mining Laws of 1872 or under the Mineral Leasing Act of February 25, 1920, as amended and supplemented.

Mineral leasing procedure is covered in Title 43, Code of Federal Regulations, Parts 191, 192, and 200.

Information concerning mining law procedure is contained in our Circular 1278, which is a general digest; in Circular 1785, which contains the lode and placer mining regulations; and in a pamphlet entitled "How

TO APPLY FOR A PATENT TO A MINING CLAIM." Copies of these documents may be obtained without cost by writing to the State Supervisor, Bureau of Land Management, 305 Federal Office Bldg., Cheyenne, Wyoming.

In this respect, it is interesting to note that, since 1872, the United States Mining Laws have remained unchanged in any important respect until the passage of Public Law 250 on August 12, 1953, and Public Law 585 on August 13, 1954.

As taxpayers, I am sure you will be interested to know that 37½% of all revenue derived by the U. S. Government from mineral activities in Wyoming public lands administered by the Bureau of Land Management is distributed to the State of Wyoming.

For the first six months of 1954, the revenue to be distributed to the State of Wyoming will be just short of FOUR MILLION DOLLARS.

Returning to the subject of uranium in Wyoming, it has been said that history repeats itself. The legendary "Gold Rush" days of California, of the Yukon and the Klondike are rapidly being overshadowed in history by the currently feverish search for a new metal — one that is more precious and infinitely more vital than gold. It is URANIUM, the source of atomic energy — the means by which our modern scientists have succeeded in creating near-miracles and accomplishments undreamed of not too long ago. It has been said that a piece of radioactive URANIUM no more than three ounces in weight — if properly utilized — could run an automobile one full year; eleven pounds could operate an atomic locomotive one year; our own Navy's atomic submarine "NAUTILIUS" derives its motivating force entirely from the uranium atom; the recent development of the atomic battery has been looked upon as significant as the invention of the electric light bulb which has illuminated the world.

Now, the quest for URANIUM has spread to Wyoming areas — successfully.

In a recent report by the Natural Resources Research Institute, University of Wyoming, it is stated that the earliest uranium discovery was in 1916 at Silver Cliff mine at Lusk, Wyoming. Uranium mineralization of the carnotite type was recently discovered in the Lakota sandstone of Lower Cretaceous age in Crook County. In October, 1951, uranium was discovered in the Wasatch formation, of early Eocene age, on the south side of Pumpkin Butte in the Powder River Basin (102 square miles of which have since been withdrawn from public disposition for investigation by the Atomic Energy Commission). A discovery of uranium resulted from airborne radioactive surveys in the Miller Hill area, Carbon County, in 1952.

Several other uranium occurrences have been reported in Wyoming—carnotite in the Casper Mountain area, Natrona County, and on the dump

of the South Copper Belt mine in Gohen County; uranium has been found in the Sundance formation (Upper Jurassic) southwest of the abandoned post office at Mayoworth, Johnson County; uranium is present in the Cherty manganese limestone of the Casper formation (Pennsylvanian) which was once overlain by the White River formation (Oligocene).

Late in the summer of 1953, uranium was discovered in the Gas Hills area of Fremont County. The uranium is present in several forms, one of which is a strong greenish-yellow fluorescent mineral tentatively identified as uranospinite. In October, 1953, uranium-bearing sandstone, in which the principal uranium mineral is uranophane, was discovered about seven miles west of Baggs and also near Saratoga, Carbon County; in the McComb area north of Shoshoni; and also in the vicinity of Crooks Gap in Fremont County.

These discoveries in Wyoming have resulted in a rush of locations under the United States mining laws, with notices thereof filed with the recorder of the county in which the claim is located. A report of several months past indicated approximately 1400 such location notices covering lands in Fremont County alone. In one day, April 22, 1954, there were 111 notices of locations filed with the recorder of Natrona County. Ninety-five of these locations were staked out in a small sandstone rock area six miles north of Casper. Additional locations covered areas about eight miles south of the Johnson County line.

Because of the intense interest in uranium and the eagerness of uranium prospectors to record their location notices, many of these hastily-recorded locations may prove to be invalid under the laws in existence at the time of location.

Unless a mining location is made in full accordance with the applicable mining laws and regulations, the mining locations may be an utter nullity and will not operate to vest in the mining locator the rights and privileges which would ordinarily flow from the location of a valid mining claim.

For instance, a mining location would be void ab initio if made at a time when the area covered by the location was included in a withdrawal which operated to preclude location, entry, and purchase under the U. S. mining laws. A withdrawal of this type would be a first form reclamation withdrawal. Before such withdrawn lands can be made subject to location, entry and purchase under the mining laws, they must be restored from the existing withdrawal and returned to their original status as vacant, un-withdrawn, unappropriated public lands. Application for such restoration under the provisions of the Act of April 23, 1932 (47 Stat. 136; 43 U.S.C. 154) may be filed with the manager of the particular federal land office having jurisdiction over the lands involved.

Clearly, it is highly important to every prospector to make certain beforehand that, in the event he is successful in his efforts, he can legally

claim the uranium or other mineral deposits which he has discovered. Otherwise, as it has so often happened in the past, a prospector's time and effort will have been utterly lost and he will derive no benefit upon having made a mineral discovery in lands which were not at the time of location and discovery subject to location, entry, and purchase under the provisions of the U. S. mining laws.

Therefore, the prospector must first check the ownership of the land he desires to prospect, and he must make certain that such lands are in fact open to him for prospecting purposes. His initial step is to examine the status records of the federal land office having jurisdiction over the area in which he is interested. These records are open to inspection by the public. They show the current status of every acre of the present public domain. Land office personnel are available to assist the prospector in ascertaining which of the public lands are vacant, unwithdrawn and unappropriated. The availability of lands which show existing commitments under any of the mineral or public land laws should in all doubtful cases be resolved with the assistance of land office personnel. In instances where the solution to a particular question or complicated situation is not readily available, the matter is referred to the Lands and Minerals section of the State Supervisor's office for consideration and determination.

Even if the examination of land office records shows the lands to be free of any conflicts, there is yet another search to be made before it can be certain that the lands are subject to location and entry under the mining laws. This additional step is to examine the records of the county recorder to see if any mining locations have been recorded by others with respect to the particular area in which the prospector is interested. Mining locations are not required to be recorded in the federal land offices; the mining law requirements in this respect contemplates recordation only with the county recorder. The first formal notice of a mining location which any federal land office receives occurs upon the filing of an application for patent to a mining claim. Prior to such application for patent, a valid mining claim may be held and worked under the mining law doctrine of right of possession — *pedis possessio*. The only recorded notice of the existence of a mining claim held by possessory right is in the office of the recorder of the county in which the mining claim is situated. For that reason, it is incumbent upon every prospector to check the county recorder's records to make certain that there is no prior mining location upon the land involved.

If no prior adverse interests or other conflicts are disclosed after examination of the records of the land office and of the county recorder, the public lands involved are properly subject to location and entry under the U. S. mining laws and the prospector is entitled to go upon the land to prospect for uranium or other mineral deposits and to reap the benefit of discovery, in event discovery is made. A location under the mining laws

is made by staking the corners of the claim, posting notice of location on the claim, and otherwise complying with state laws concerning recordation of the location in the county recorder's office, discovery work, etc. The mining laws of the State of Wyoming are available in mimeograph form from the Wyoming Natural Resource Board, State Capitol Bldg., Cheyenne.

So much for the "mechanics" of the processes of locating a mining claim and of the many pitfalls to be avoided.

Our main subject, however, is uranium. I am going to take the liberty of passing on to you some items in this respect which have been compiled by the Natural Resources Research Institute of the University of Wyoming. Although what I am going to say is not of a legal nature, I believe it may be informative as well as interesting to you.

First, let me point out that the demand for uranium ores is due to the Atomic Energy Commission's ore purchasing program which guarantees markets for uranium ores at certain minimum prices through March 31, 1962, with bonus payments guaranteed on ore from new domestic mines through February 28, 1957.

Uranium through "fission" releases the energy of the "Atom Bomb" and also has applications for the release of energy for power generating purposes. One pound of U-235, about the size of a walnut, on fission instantaneously liberates with explosive violence as much heat (energy) as the burning of 1,500 tons of coal. Only one part of uranium in 140 parts of naturally occurring uranium is present in the fissionable U-235 form, and therefore large quantities of uranium must be processed to produce the needed amount of U-235.

Thorium, potassium and rubidium as well as a few of the lanthanons (rare earths) also are radioactive. However, the natural radioactivity encountered from these elements other than thorium is usually slight.

All radioactive materials give off radiation (alpha, beta or gamma rays) which can be detected by instruments such as Geiger-Mueller counters and scintillation counters, or by the blackening effect of the rays on photographic film. Field radiation counters will not, ordinarily, differentiate between thorium or uranium. Most such instruments depend mainly upon gamma radiation which is the most penetrating form. Chemical tests will, however, differentiate uranium and thorium and the percentage of either or both can be determined by chemical analysis.

Since allanite, a radioactive thorium mineral occurs in a number of Wyoming localities and other thorium and rare earth occurrences are known in the State, the prospector should recognize that radioactivity encountered may be due to thorium.

Principal Uranium Deposits and Uranium Minerals

At the present time the most important known world sources of

uranium are primary deposits which contain pitchblende or uraninite. Pitchblende, the most important uranium mineral, essentially uranium oxide, occurs in heavy steel-hard grayish black irregular masses having a conchoidal (glass-like) fracture. Powdered pitchblende is black, grayish black or greenish black. Pitchblende is usually but not always found in vein deposits. Uraninite has properties similar to pitchblende except that it crystallizes in the isometric system; crystals, however, are rare. Uraninite may be found associated with pitchblende, but is most likely to be found in pegmatites. Pitchblende when found in vein deposits is often associated with sulphide ores of metals such as nickel, cobalt, silver, bismuth and copper. Three well known areas have contributed most of the known production of primary uranium. These are the Erageberge area in Saxony and Bohemia, especially in the Joachimstal region which has been a mining center since the 12th century; the Eldorado mine, discovered in 1930, Great Bear Lake, Canada; and the Shinklobwe mine, discovered in 1913, in the Katanaga region of the Belgian Congo.

Primary uranium minerals have so far been of relatively little importance in the United States. Secondary uranium minerals, that is those formed by the alteration or leaching and redeposition of primary minerals are however, of importance in Colorado, Utah, New Mexico and Wyoming. The most important of the secondary uranium minerals is carnotite, a potassium uranyl vanadate. Carnotite occurs in sandstones of the Colorado Plateau region and in some cases the ore bodies can be recognized by this brightly colored canary yellow or greenish yellow secondary uranium mineral. For many years the carnotite deposits of the Colorado Plateau were worked for radium and vanadium. The present domestic production of uranium is derived mainly from the Colorado Plateau and from deposits near Marysvale and Moab, Utah and Grants, New Mexico.

Tests for Radioactivity

Prospecting for uranium is carried on with radiation detecting instruments almost exclusively. Air-borne surveys are made with scintillation counters or nuclimeters and more detailed investigations are conducted with these instruments or with Geiger counters on foot or by car-borne instruments.

The Geiger counter indicates radioactivity through the action of gamma or beta rays which enter the Geiger tube from a nearby radioactive source. These radiations ionize the gas in the tube, that is they cause it to conduct the high volt current applied to the tube. The current flow is indicated by clicks, neon lamp flashes or by a meter.

In using the Geiger counter the increase of meter reading or number of clicks per minute is proportional to the intensity of the radiation. While the high voltage is applied to the tube a small number of clicks (perhaps 5 to 50 per minute) is heard even though no radioactive substance is near

the tube. This is known as the background count and is due principally to cosmic radiations, everywhere present, passing into the tube. The background count is also affected by potassium minerals such as feldspars in granites or other rocks, if present near the instrument, and this effect can double or possibly triple the background count of the instrument.

Before using the counter on suspected radioactive materials or in prospecting, the background count should be taken and the activity of samples should be compared to this background count. An increase in count at least of three to four times the background count should be investigated. Increased count below this level may be suspected as being caused by something other than uranium or thorium, or by traces only of these elements.

In the scintillation type instrument the gamma rays strike a sensitive crystal (thallium activated sodium iodide) which gives flashes of light which are picked up on a photomultiplier tube and amplified. The electric current then is registered on a suitable meter. A Geiger counter with a single Geiger tube detects less than one per cent of the gamma rays which strike it, scintillation instruments pick up nearly all gamma rays which reach the instrument. The nucliometer is a Geiger counter the sensitivity of which is greatly increased by a multiplicity of tubes. The same precautions regarding compensation for background count should be taken with all radiation counters as with the ordinary Geiger counter.

Uranium and thorium minerals can usually be distinguished by fluorescence tests. Many secondary uranium minerals are brightly colored. This frequently enables them to be distinguished from darker radioactive thorium minerals that may appear quite similar. In such cases, tests are required to differentiate them. A simple and effective test for this purpose is the fluorescent bead test. This test is carried out by making a melted sodium fluoride or lithium fluoride bead on a small wire using a blow torch or other flame for heat, and after cooling examining the bead in ultra violet ("black") light. If uranium is present in the bead a bright yellow-green fluorescence becomes apparent. Other chemical tests are even more certain in differentiating uranium and thorium, but the fluorescence test with a Mineralite or other fluorescent light source is satisfactory as a field test.

A few of the brightly colored secondary uranium minerals are highly fluorescent. Schroeckerite, for example, exhibits a brilliant green fluorescence under the Mineralite. Since secondary uranium minerals which are fluorescent may be formed by the alteration of primary uranium minerals, the ultraviolet lamp is of value in prospecting for uranium, particularly in conjunction with the Geiger counter and the bead test described.

Methods of analysis for the quantitative determination of uranium

and thorium in ores and minerals are presented in detail in a pamphlet of the Atomic Energy Commission and also in a recently issued bulletin of the U. S. Geological Survey. The procedures are covered in sufficient detail so that they may be carried out in a well equipped laboratory by qualified analytical chemists.

Unfortunately, radiation detection instruments do not always give meter readings which are proportional to the uranium content of the sample tested. Accordingly, the count or uranium equivalent of the sample may be misleading and in error. For example, if the sample contains both thorium and uranium the counter will indicate the sum of the radioactivities of both. At times abnormally high gamma activity is obtained in a particular area and when samples of the "ore" are removed the activity decreases or entirely disappears. This may be due to radon gas, one of the short lived daughter products of the disintegration of uranium. Also an abnormally high count may be obtained on samples containing a higher than average radium to uranium ratio.

On the other hand samples which contain uranium minerals recently deposited, such as schoeckingerite emit principally beta radiation and this will not register on scintillators nor on other gamma ray counters, although radioactivity from the gamma radiation will be indicated.

Following test atomic explosions in Nevada, abnormally high radioactivity or excessive background count has been noted in many parts of the United States. During such periods of radioactive "fall out" readings obtained on radiation detection instruments should be discounted until they are proved to be permanent and due to radioactive mineral content of the samples.

In conclusion, let me leave with you a few items of miscellaneous data.

Uranium claims are staked on the public domain as lode claims, in compliance with the Federal and State statutes applying to the location of lode claims in the State in question.

The Atomic Energy Commission purchases uranium ores containing 0.10 per cent or more uranium, as U_3O_8 .

Ore from newly developed mines is eligible for a bonus equal to the base price paid on the uranium up to an initial production of 10,000 lbs. of contained uranium.

Not all types of uranium ore are at present acceptable to the Atomic Energy Commission, because of processing problems involved in extraction of the uranium.

At present it is necessary for Wyoming uranium producers to transport ores to Edgemont, South Dakota, which is the nearest AEC buying station. The Commission does make a transportation allowance which may offset

or help to meet the cost of transporting ores to the buying station.

Copies of the mining laws (Wyoming) may be obtained from the office of the state geologist in Geology Hall on the University campus at Laramie or from the Wyoming Natural Resources Board, State Capitol Bldg., Cheyenne.

The Natural Resources Research Institute, 1220 Lewis St., Laramie, makes Geiger counter tests for radioactivity on Wyoming samples without charge, providing the general area from which the samples are obtained is reported. The Institute will also determine whether radioactivity is due to uranium (fluorescent bead test) for \$1.00 and will analyze samples for uranium reporting percentage present for \$7.50.

The Atomic Energy Commission tests and analyzes samples for uranium if full descriptions as to location of the samples are given. A booklet "PROSPECTING FOR URANIUM" (Revised 1951) by the U. S. Atomic Energy Commission and the U. S. Geological Survey, can be purchased from the U. S. Government Printing Office, Washington, D.C., at a price of \$.55.

Questions regarding the sale of uranium ore and other matters relative to the development of uranium prospects may be referred to the Douglas, Wyoming, office of the AEC or to the Grand Junction, Colorado, office, P.O. Box 270.

The U. S. Atomic Energy Commission posts maps showing the locations of surface areas of high radioactivity on the 15th of the month at several places in Wyoming. These are at the following: Worland, Casper, Douglas, and Laramie. These maps also are posted in Denver and at many other places throughout the United States.

Finally, a word of warning. In certain areas in Wyoming the uranium mineralization may be associated with arsenic or selenium, both of which are extremely poisonous. Accordingly, care should be exercised to avoid excessive contact with dust from rocks containing uranium minerals unless they are known to be nontoxic.

Again, thank you very much for the privilege of appearing before you and for your patience in listening to me.