

# The Story Of Uranium: Part Of County Progress

Lake County Examiner

As The Examiner dedicates this entire special edition to Progress in Lake county and Oregon, it is fitting that an account of uranium be included because the coming of the new uranium industry brings full circle the area's progress from ox yoke to U 308, from the past to the future.

When Oregon was born and when Lake county was established, uranium was known only as a coloring agent for ceramic ware and as a substance to fix the dyes used in textiles and leather. The mineral's new uses in nuclear fission, recognized as the foremost fuel for power generation and for the Space Age, make it far too expensive to be used as a mordant or a coloring agent.

## NAMESAKE

Uranium was discovered in 1789 by the German scientist, Martin Heinrich Klaproth and was named by him in honor of the 1781 discovery of the planet Uranus by Sir William Herschel. But only the oxide was first known, and it was not until 1841 that the metal was produced. The property of radioactivity, later found in many other elements, was first discovered in uranium in 1896. The atom-splitting experiments of the 1920's and 1930's led to the first sustained chain reaction during the World War II days. Since that time, uranium has been successfully used in producing power and its radioactive isotopes have put seven league boots on scientific and medical research.

Early arrivals in Oregon and Lake county, intent as they were on gold or silver, would not have recognized the uranium ores nor would they have paid them any attention. Most likely they didn't even know the name, Uranium.

Today, Lake county's uranium deposits are producing the ore, and Lakeview Mining Company's reduction plant is producing the oxide to be turned into uranium metal for the nation's stockpile of peace power. And certainly the hope of all is that this uranium will be used entirely for the greater benefit of mankind.

## DISCOVERY

Uranium in Lake county was discovered in the spring of 1955 by Don and Irma Tracy. Joining forces Leehmann Sr. and Jr., the with John and Wayland Roush and with Walter partnership leased their White King properties to Thornburg Brothers, of Grand Junction, Colo., and associates. Dr. Garth Thornburg and his brother, Vance, together with the Richardson-Bass partnership of Fort Worth, Tex., and the Murchison Trusts, of Dallas, Tex., formed the Lakeview Mining Company to explore and develop the White King and other leased properties here. One of these was the Lucky Lass, discovered shortly after the White King by Don Lindsey, Bob Adams Jr., Choc Shelton and Clair Smith. The Lakeview Mining Company owners also own the Gunnison Mining Company, at Gunnison, Colo., which has a uranium reduction

plant there.

A contract for sale of uranium oxide from the Lake county deposits was signed with the Atomic Energy Commission on November 18, 1957, and this was the green light for construction of a \$3,000,000 reduction plant here. Acting as its own contractor, with plans and designs prepared by the Galigher Company, of Salt Lake City, the Lakeview Mining Company built the mill during the summer and fall of 1958, the first White King ore entering the plant on November 29 and the first yellowcake emerging on December 15. At the close of 1958, this mill was one of 23 uranium reduction plants in the United States.

## GEOLOGY

The general geology of the White King area was described in the December, 1958, issue of The Ore-Bin, monthly publication of the Oregon Department of Geology and Mineral Industries. The article, written by Norman V. Peterson, of Grants Pass, geologist for the department who has undertaken an intensive geological study of the Lakeview uranium area, stated.

"All rocks exposed in the general area are Tertiary age and consist of a great variety of volcanics. The oldest rocks in the mine area consist of a series of acid to intermediate tuffs, tuff breccias, crystal tuffs and welded tuffs which are prominently exposed in northwest-trending with steep north-east-facing fault scarps. A fossil phinoceros tooth found in this sequence in the summer of 1958 has been identified as being of early Miocene age. These tuffs are overlain by less indurated agglomerates, clayey tuffs and a thick section of tuffaceous lake beds. The younger, less indurated tuffs are in turn usually covered by thin to thick olivine basalt flows. The tuffs and basalt have been intruded by glassy flow-banded rhyolite.

"Except for a small amount of commercial-grade material containing secondary minerals in the oxidized zone near the surface, all of the ore is found in a roughly rectangular area about 400 feet wide and 1200 feet long. Ore bodies are roughly tabular and extend downward and eastward from the original discovery point.

"The mineralization appears to be directly related to the intrusive rhyolite, and localization of the mineralization is the result of faulting. The mineralization is found in a host of younger tuffs and agglomerate surrounded on all sides by down-faulted basalt flows. A variety of minerals indicates the possibility of at least two periods of mineralization. The earlier mineralization period contains low temperature minerals such as cinnabar, realgar, stibnite and opal. A suite of medium-temperature minerals including sooty pitchblende, coffinite, galena, pyrite and jordsite is believed to have originated at some later time."

## EXPLORATION

Signing of the White King, Lucky Lass and other leases  
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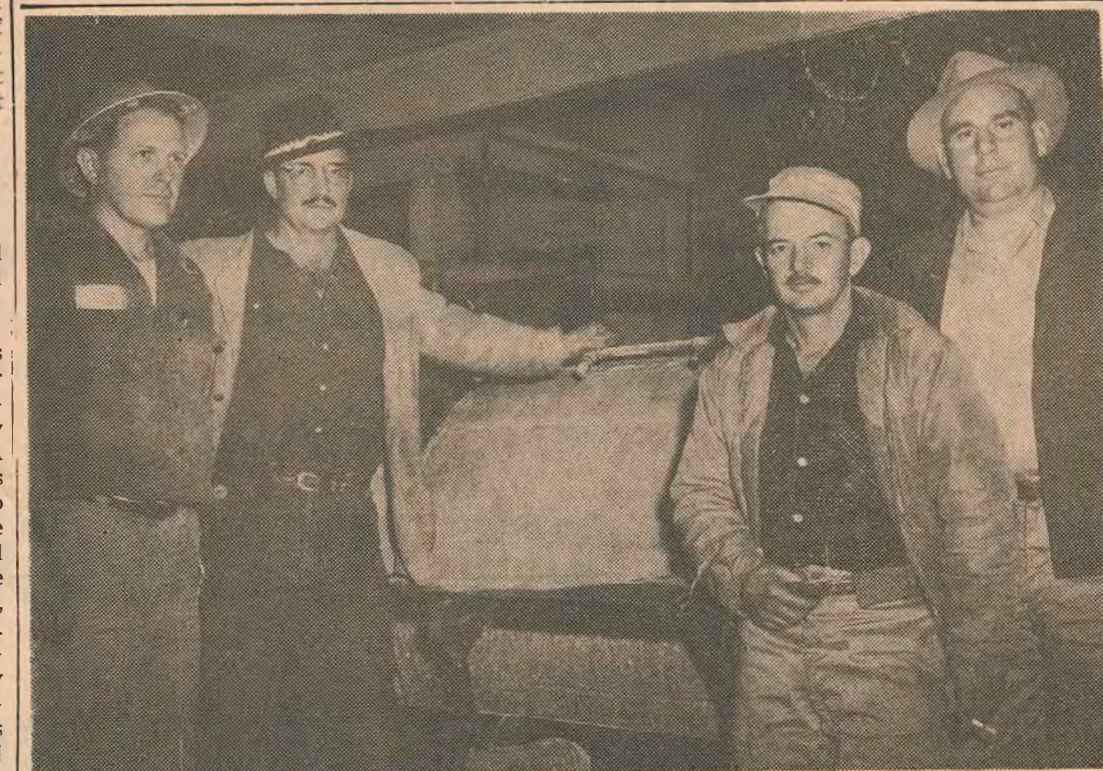
Most White King ore for the uranium reduction plant has, until recently, come from underground. This group of miners is shown checking a carload of ore, at the 6130 station, for radioactivity to check its content of uranium oxide. A recent change

in Lakeview Mining Company's ore production program discontinued the underground mining in favor of an open pit operation. Left to right are W. E. Carnell, mine shift boss; Leroy Breshears, trammer; J. L. Shelton, miner; W. A. Ferguson, shift boss.



The Lakeview Logging Company, under contract, hauls the ore from the mine to the reduction plant, using this specially built all-steel ore bed which averages 55 tons per load. It has brought in 60 tons in one load, and the overall weight of truck

and ore runs up to 80 and 85 tons. The haul is made over roads built and owned by the logging company. Shown with the truck, here parked on the 100-ton scales at the plant, is Lew Holland, driver.

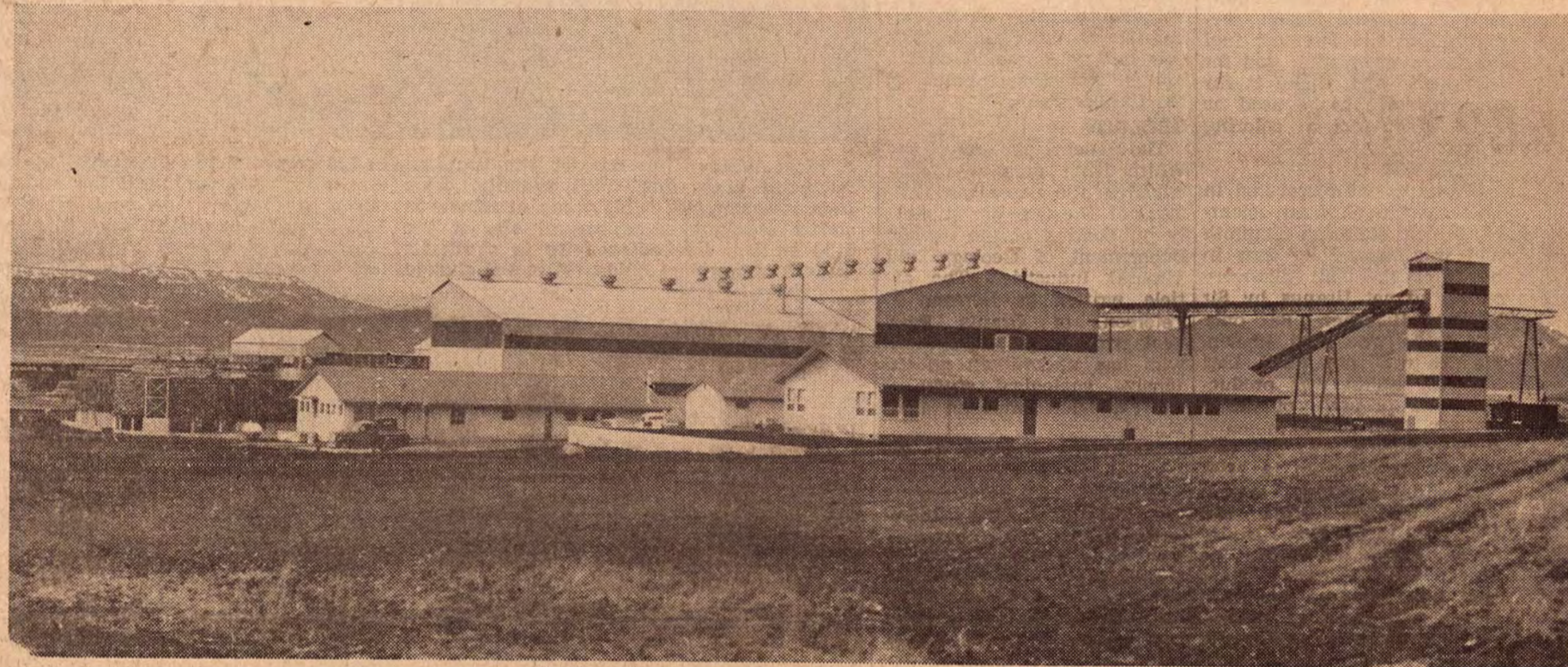


THE REDUCTION process had completed the circuits in Mid-December when this picture was taken at the yellow cake filter. Left to right are C. Oliver Hower, plant superintendent;

Dr. Garth Thornburg, president; Burr Johnson, construction superintendent; and James F. Poulos, general manager. (Bennett Photo)



# URANIUM NEWEST OF LAKE COUNTY'S INDUSTRIES CONGRATULATES LAKE COUNTY ON EIGHTY YEARS OF PROGRESS **LAKEVIEW MINING COMPANY**



LAKEVIEW MINING COMPANY URANIUM MILL

## **PAYROLL:**

Since 1955, the payrolls of Lakeview Mining Company have added materially to the business climate of this area, supporting existing businesses and aiding in the expansion of many. Payrolls are the keynote of prosperity which accompanies progress.

## **INDUSTRY:**

Development of the mining property and construction of the new uranium reduction plant add a major new industry in growth of the community. Industry is the primary force in moving ahead; it takes the forefront line in area's advance into the future.

## **ECONOMY:**

The operation of Lakeview Mining Company mean many new jobs, and these in turn mean a sounder economy for all of the county. Jobs mean homes, support of public and civic enterprises, prosperity in the stores and offices, growth for churches and schools.



WHITE KING MINE

## **DEVELOPMENT OF NATURAL RESOURCES:**

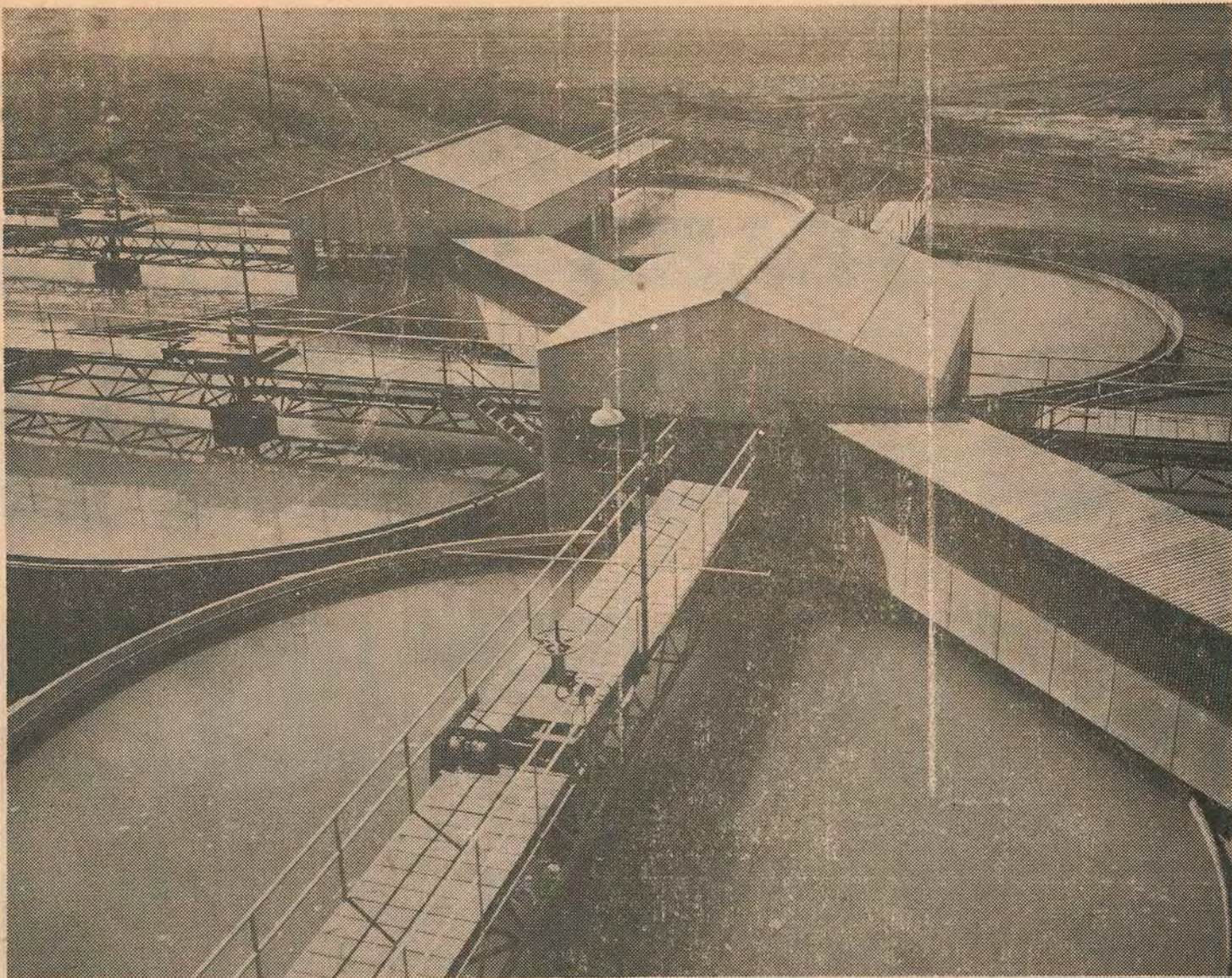
Natural resources, such as uranium ore, lie buried for millions of years until the needs of man, together with man's ingenuity, recover and develop them for useful purposes. This has been true throughout the Ages, and now ... The Atomic Age.

**WE AT LAKEVIEW MINING COMPANY ARE PROUD TO BE A PART  
OF THE GROWING ECONOMY OF LAKEVIEW AND LAKE COUNTY**



## Thickener Tanks

One of the many processes to which the ore is subjected in extracting its uranium oxide, takes place in the six huge thickener tanks, located outside the reduction plant. Before reaching this stage, the uranium has been taken into solution by sulphuric acid, and in these tanks the liquid with its load of uranium is separated from the remaining solids. The loaded liquor goes back into the plant where a kerosene-amine solution extracts the uranium from the sulphuric, a sodium carbonate solution strips the uranium from the kerosene, caustic soda and more sulphuric precipitate the oxide from the carbonate. The resulting yellowcake is then dried, ground to powder, and packaged for shipment to the AEC. The whole process, from the time ore enters the plant until the yellowcake emerges, takes about three days.



## Uranium

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by the Lakeview Mining Company. Thornburg Bros. start of extensive exploration in the area signaled the drill rigs and drillers were brought from their Colorado and Arizona fields to begin the business of looking underground, and core drilling went forward throughout the winter of 1955 and the following year. The truck-mounted Sullivan rotary drills explored the findings of geologists, and in 1956 the company went to Texas and bought a large Mayhew 2000 rig to sink 14-inch holes as deep as 1700 feet. All drill holes, totaling upwards of 125,000 feet, were probed for mineral presence, and cores were systematically checked with Geiger counters.

The first White King shaft was started in 1956, a two-compartment shaft with stations at the 70, 160 and 260 foot levels. Drifts, rises and other exploratory underground works have totaled more than 4000 feet, and in addition to the exploration feature of the No. 1 shaft and its companion works, all White King ore production until recently has come from there.

### DEVELOPMENT

The No. 1 shaft was sunk for two main purposes, exploration to prove the results of the core drilling and to secure ore for amenability tests to determine what type of reduction plant would be built. Ore recovered during this work was stockpiled against the day a reduction plant would be in operation; but the company knew that once the plant was working, production from the small shaft would have to be supplemented by ore from another shaft or source.

So in June, 1958, with the plant construction well under way, work was started in sinking a 7 by 18 foot, three-compartment shaft. With a 96-foot, all-steel headframe and double-drum electric hoist, this shaft was intended for a depth of 700 feet with five working stations.

Underground mining problems made slow work of the No. 2 shaft, and production from the No. 1 fell far short of supplying the 300-tons per day needed at the plant. So in March of this year an open pit operation was started to augment production from the small shaft, and

early this month the decision was made to abandon all underground mining, turning the entire White King operation to open pit. On April 12 a contract for stripping and open pit mining was signed with Isbell Construction Company, of Reno, and on April 13 underground ore production was ceased, starting the salvage of equipment and machines used in the underground works.

Underground mining at the White King was by stope development, with square sets and sand backfill. A new method of introducing sand into the stopes for backfilling was developed by the company, with eight-inch drill holes sunk from the surface to the filling area. The sand, from a nearby deposit, was fed into the holes by slushers, and in the mined-out stopes it was spread by slushers and air blast.

Investment in exploration and development has totaled some \$3,000,000.

The ore is hauled to the mill by the Lakeview Logging Company, under contract, a job for which the logging firm had a special body constructed for one of its huge Kenworth logging trucks. This outfit hauls about 55 tons at a time (a load has totaled 60 tons) and the gross weight of truck and ore is usually 75 to 80 tons.

### MILL CIRCUITS

The reduction plant uses the acid leach and solvent extraction processes. Ground finely in the rod mill and ball mill, the pulp goes first into the eight leach tanks where the uranium oxide is oxidized by sodium chlorate and leached from the ground ore by sulphuric acid. Next it goes to the six outdoor wooden thickener tanks where separation of the solids and aqueous liquor is achieved. The solids are pumped to tailing ponds, and the liquor returns inside the mill where it is first clarified in a filter then is circulated through a solution of kerosene and amine, the latter taking

away the uranium. The kerosene, or solvent organic, is then circulated through sodium carbonate which in turn takes the uranium into solution, leaving the organic to be re-circulated.

The final chemical step is the precipitation of the uranium from the carbonate which is done in two batch tanks by sulphuric acid and caustic soda. The resulting yellowcake is settled out in a conical-bottom thickener tank, from where it is pumped to a filter before dropping into a large dryer, for which heat is supplied by steam and batteries of heat lamps.

The dried yellowcake is ground in a hammermill, then drops into 55-gallon drums in which it is packaged for shipment to the AEC at Grand Junction, Colo. The reduction process, from the time the ore enters the mill until the yellowcake emerges, takes about three days.

At all stages throughout the milling process, tests are made in the company's complete laboratory at the plant site. Technicians work around the clock to make sure that all processes secure the correct results, plus carrying out extensive research to improve on the processes wherever possible.

With Dr. Thornburg as company president, officials of the Lakeview Mining Company are James F. Poulos, general manager; Howard Dutro, chief geologist and assistant general manager; Kenneth Kutz, mining superintendent; Carroll Flick, assistant mining superintendent; John Vecchies, assistant plant superintendent; Dale Cutting, chief chemist; Hugh Stapleton, office manager.

Of the more than \$6,000,000 so far invested by the company in plant construction and in mine exploration and development, most was furnished by a loan from the Chase Manhattan Bank, of New York City, in which the First National Bank of Oregon, with a branch at Lakeview, participated.



The final product at the reduction plant, U 308 or uranium oxide which is called yellowcake, is packaged in 55-gallon drums for shipment to the Atomic Energy Commission's field office at Grand Junction, Colo. Here two of the filled drums are moved to storage by D. E. McPherson, plant safety engineer and warehouseman.

## Geology Dept. Reports On Preliminary Study Of Area

A report on the 1958 field study of the Lakeview uranium area appears in the February, 1959, issue of the Ore-Bin, monthly publication of the Oregon Department of Geology and Mineral Industries.

The report was written by Norman V. Peterson, field geologist for the department stationed at Grants Pass, who made the study last summer. The account is accompanied by a geologic map of the area made by Peterson from his field notes and studies.

The report is part of the department's continuing uranium project intended both to enlighten and encourage the uranium prospector and to obtain basic stratigraphic information in areas of mineral significance that may lead to additional mineral

discoveries. The study area, starting with the White King and Lucky Lass properties, Oregon's only commercial uranium discoveries to date, covers about 140 square miles in Townships 37, 38 and 39 South, and Ranges 18, 19 and 20 East.

The maps detail the area's principal faults and geologic formations, the latter ranging from alluvium of the Pleistocene and Recent ages to the older tuffs of the Miocene.

The geologist adds: "After determining favorable geological locations, there are many geochemical prospecting methods such as soil sampling and testing of ground water or surface stream waters that may lead to the discovery of concealed deposits."