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THIRTY YEARS OF MERCURY IN OREGON

By
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Oregon's quicksilver industry remained largely undeveloped until 1927, despite the fact that two of its largest producing mines were discovered prior to 1900. Although records of pre-1927 production are meager, Schuette** estimated the total to be about 3,000 flasks. During the past thirty years, Oregon mines have produced slightly more than 92,000 flasks or approximately 15 percent of the domestic quicksilver supply.

Cinnabar was recognized, possibly for the first time in Oregon, by placer miners working the alluvial-gold deposits of Jackson County in the early 1860's. In the following years, some quicksilver was recovered with crude retorts and sold locally to the miners. The Bonanza, Nonpareil, and Elkhead deposits of Douglas County were discovered before 1870, and by 1879 reduction plants were established on both the Bonanza and Nonpareil properties. However, the mines were abandoned after slight production, and the Bonanza, which was to become Oregon's greatest contributor, produced little until 1937.

Development of the Black Butte mine in Lane County, another of Oregon's larger producers, began in the early 1890's. In 1898, the late W. B. Dennis, a prominent Oregon engineer, acquired the property, and, under his management, some 15,000 feet of development work was done. To treat the ore, Dennis designed a furnace plant that is said to have been far in advance of its time. Because of low mercury prices and the bank panic, the mine was closed in 1908 and remained idle until 1916.

The demands of World War I so stimulated production that the Black Butte was reopened, and the War Eagle mine in the Meadows district of Jackson County came into production. From 1916 through 1919, these and several smaller mines and prospects contributed to a total of 1,860 flasks (1,271 of which came from the Black Butte) at an average price of \$113.36 per flask.

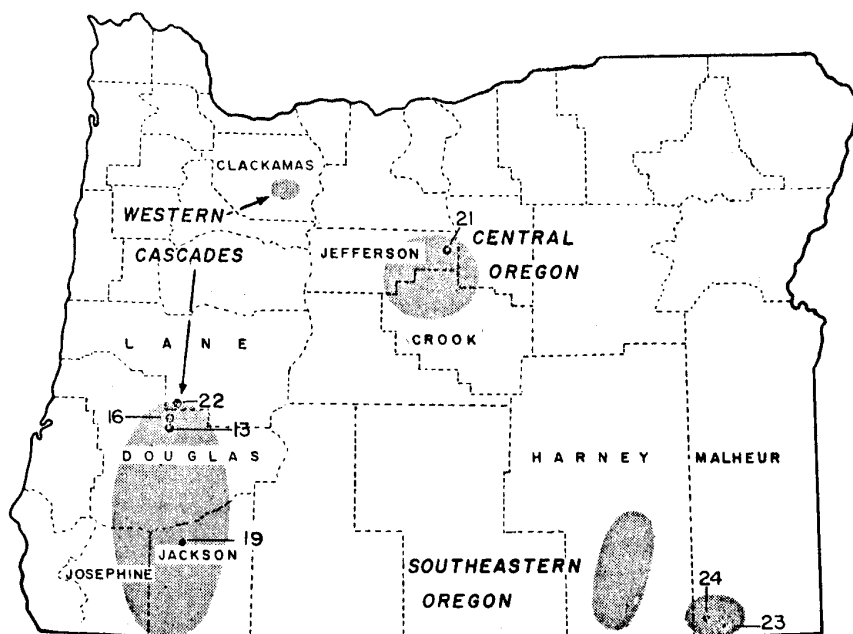
By 1921, mercury prices had declined to an average of only \$46.07, and Oregon's production again became almost nil, remaining so until 1927. The total United States production dropped to 6,339 flasks in 1921 from a 1917 wartime high of 36,159 flasks. In 1926, the total output was only 7,642 flasks, although the average price doubled that of 1921. Thus is reflected the industry's fear of the mercury market, the instability of which

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**See references following report.

was so drastically emphasized in the 1921 collapse. However, mercury values rose to an average of \$118.16 in 1927 and, largely because of the influence of the European cartel (Mercurio Europeo, established in 1928), prices remained in excess of \$100 per flask until 1931. The cartel was formed by Spanish and Italian producers who controlled 80 percent of the world production at the time. Aims of the organization were distribution of sales, control of production, and stabilization of prices. As a result of continuing high prices, plus the general feeling of prosperity prevalent in the late 1920's, mines began reopening and new prospects were developed. In 1931, the United States produced enough quicksilver for its own needs for the first time since 1918.

The real development of Oregon's quicksilver industry began with the production of 2,080 flasks in 1927 - nearly as much as the estimated total previous production. Several mines became so well established during the boom period, 1927-1931, that they were able to weather the depression, although production decreased from 5,011 flasks in 1931 to 1,342 in 1933. By the end of 1937, all of Oregon's major producers of the past 30 years were in operation.



PRINCIPAL QUICKSILVER DISTRICTS

Principal Quicksilver Producers

Mine	County	Mine	County
1. Kiggins	Clackamas	13. Bonanza	Douglas
2. Nisbet	"	14. Elkhead	"
3. Blue Ridge	Crook	15. Mother Lode	"
4. Byram and Oscar	"	16. Nonpareil	"
5. Champion	"	17. Cinnabar Mountain, Jackson	"
6. Johnson Creek	"	18. Mountain King	"
7. Maury Mountain	"	19. War Eagle	"
8. Mother Lode	"	20. Axe Handle	Jefferson
9. Number One	"	21. Horse Heaven	"
10. Staley	"	22. Black Butte	Lane
11. Taylor Ranch	"	23. Bretz	Malheur
12. Towner	"	24. Opalite	"

The major contributors in the early period from 1927 to 1933 were the Black Butte mine, reopened in 1927 by the Quicksilver Syndicate, and the Opalite and Bretz mines in Malheur County, put in operation by the Bradley Mining Company in 1927 and 1931, respectively. The Horse Heaven mine in Jefferson County came into production in 1934, and was acquired by the Horse Heaven mine, Inc., division of the Sun Oil Company in 1936. The Bonanza, discovered several decades before, began active and continuous production in 1937, operated by Bonanza Mines, Inc. Although there are a large number of small producers and undeveloped prospects in Oregon, more than 80 percent of Oregon's past mercury production is accounted for by these five mines. By 1944, each had produced more than 10,000 flasks, and the Bonanza in eight years had contributed 24,471 flasks to account for more than a quarter of Oregon's total output.

The yearly average of Oregon production from 1927 through 1945 is about 4,265 flasks. The greatest production was made in 1940-1941 when more than 20 mines contributed over 9,000 flasks each year for an average of \$180.95 per flask. In 1940, the Bonanza led all mercury mines in the United States in annual production with a contribution of 5,733 flasks. However, during each succeeding war year after 1941, a sharp decrease in production was realized until in 1945, Oregon's total output was only 2,500 flasks. In 1943 and 1944, large amounts of foreign mercury were purchased by the government despite the fact that domestic mines were adequately supplying the wartime needs of the United States and some of the Allied Nations. A surplus was quickly obtained. As a result, the government price support was removed and prices declined rapidly. The United States production decreased from an all-time record of 51,929 flasks from 146 mines in 1943 to 30,763 flasks from 68 mines in 1945.

By 1944, the Bretz, Opalite, and Black Butte mines were closed as reserves minable under existing conditions were depleted. In 1944, the surface plant at the Horse Heaven mine was destroyed by fire, and known reserves did not warrant the expenditure required to rebuild even of war-directed labor and materials had been available. Consequently it too closed, leaving the Bonanza as Oregon's only major producer still in operation.

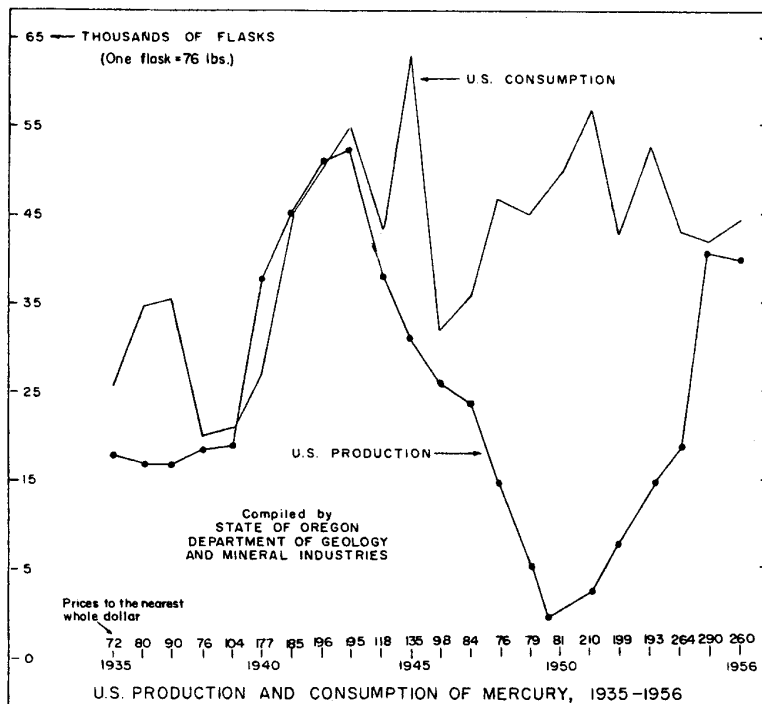
When World War II ended in 1945, mercury played its familiar role of reacting rapidly to changed economic conditions and became a drug on the market even before the consumption of other metals diminished. New supplies, foreign and domestic, exceeded consumption by 55 percent in 1946, and some United States producers are believed to have operated at a loss. Oregon's contribution was 1,326 flasks, the lowest output since 1926. Due to the excessive purchases of foreign mercury by the United States government, the domestic market became saturated and prices were forced ever lower while production costs rose. In 1950, all but 16 mercury mines in the United States were closed, including Oregon's all-time great, the Bonanza. Oregon produced 5 flasks of mercury in 1950. The total United States production that year was 4,535 flasks for an average price of \$81.26 per flask. These 4,535 flasks, the smallest annual output in at least 100 years, constituted only 7 percent of the total United States supply. The other 93 percent was imported.

The United States normally produces only a fraction of its consumption requirements because the lower grade of domestic ores and the higher production costs place domestic producers at a disadvantage in competing with major sources. The 1952 Minerals Yearbook reports that the annual averages of mercury ore produced from 1927 through 1952 varied between 6.0 and 12.5 pounds per ton, and the 1943 record production was extracted from ore averaging 6.3 pounds of recoverable mercury per ton. Italian ores about double this

latter figure, and the grade of ore at the Almaden mine in Spain, the world's largest producer, is 3 to 5 times that in Italy. In spite of this fact, United States producers did supply the war-time needs of the Allied Nations when foreign sources were cut off and mercury prices were

forced to abnormal heights. The accompanying graph illustrates the reaction of domestic production to economic conditions of the mercury market.

With the phenomenal rise in average price to \$210.13 per flask in 1951, domestic production increased to only 7,283 flasks. Oregon's contribution of 1,177 flasks came almost entirely from the reactivated Bonanza mine. During the war years, production had been at tremendous rates and, due to the shortage of men and materials, the upkeep of many of the mines and the development of future reserves were neglected. Consequently, the reopening of inactive mines required outlays of considerable capital, and producers were slow in expanding



production without some assurance of market stability. Also, when compared with pre-inflation mercury values and production costs, the 1951 average price is considerably reduced. The following table is taken from Minerals Yearbook 1951. Prices were adjusted by the Bureau of Labor Statistics wholesale price indexes (1947-1949 = 100).

Average Annual Prices (range)		
	Actual	Adjusted
1935-1939	\$ 71.99 to \$103.94	\$ 90 to \$135
1940-1943	176.87 to 196.35	225 to 199
1950	81.26	50
1951	210.13	116

In 1951, the Defense Minerals Procurement Agency considered it unnecessary to allow government aid in the expansion of domestic mercury production. World supply was then adequate for world demand. However, since the United States was then producing only a small part of its consumption requirements, dependence on foreign sources led to the establishment of a strategic stockpile of mercury. Mercury was also included with minerals eligible for exploration aid through the Defense Minerals Exploration Administration. The loans are granted to those eligible on a matching-fund principle, the DMEA meeting 75 percent and the operator 25 percent of exploration costs. Substantial reserves have been developed in Oregon and other states as a result of this assistance.

In July 1954, without consulting the mercury industry, the General Services Administration announced a mercury procurement program calling for the purchase of 125,000 flasks of

domestic and 75,000 flasks of Mexican mercury at a price of \$225 per flask. The program is to remain in effect until such procurement is completed or until December 31, 1957, whichever occurs first. Because the market prices for mercury have greatly exceeded \$225 per flask since the establishment of the program, no Government stockpile purchases of domestic metal have been made. Nevertheless, the purchase program has been of value in that it established a "floor" price for quicksilver and assured domestic producers a minimum price. This has deterred price manipulations by the cartel.

The 1956 total of 1,875 flasks for an average of \$260 per flask became Oregon's highest contribution since 1945. The major contributions were made by the Bonanza mine and the Horse Heaven mine, the latter of which began producing again in May 1955 from broken ore and pillars left in the mine since the fire in 1944.

Two other large past producers, the Bretz and the Black Butte, closed since 1944, came into production again late in 1956. Substantial reserves of high-grade ore are reported to have been developed at the Bretz in 1955. To treat the ore, a 150-ton flotation plant was completed in December 1956 and is now operating 24 hours a day. The process of concentrating cinnabar by flotation on such large scale is almost, if not wholly, unique. The management reports that results have been very favorable. Development work at the Black Butte mine has succeeded in blocking out new ore, and by the end of 1956, the mine was turning out about 100 flasks of quicksilver per month.

Several of Oregon's smaller past producers have also been reactivated, and expensive exploration work has been done in attempting to develop new mines.

The comparative stability and high level of prices in recent years have encouraged the revitalization of Oregon's quicksilver industry. If present conditions continue, the industry will undoubtedly expand. However, what the future holds is difficult to determine for, as demonstrated by past events, the domestic market is most erratic, and mercury values depend largely upon international conditions and price manipulations. With the ending of the purchase program at the end of 1957 the domestic quicksilver industry will once more be at the mercy of the cartel controlling the European mines.

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Williams, Howell, and Compton, R. R., (1953), Quicksilver deposits of Steens Mountain and Pueblo Mountains, southeast Oregon: U.S. Geol. Survey Bull. 995-B.

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MERCURY FLOOR PLAN EXTENDED

The Department was notified March 21 by Congresswoman Edith Green that the \$225-per-flask purchase program for quicksilver had been extended for one year. Mrs. Green's telegram follows:

HOLLIS M. DOLE, DIRECTOR

ODM TODAY AUTHORIZED GSA TO EXTEND MERCURY PURCHASE PROGRAM THROUGH 1958. THIRTY THOUSAND FLASKS DOMESTIC TWENTY THOUSAND MEXICAN AUTHORIZED TO BE PURCHASED SAME PRICE

EDITH GREEN MC

WHITE KING URANIUM CONTINUES PRODUCTIVE

The Lake County Examiner reports that 10 carloads of uranium ore were shipped from the White King property, near Lakeview, in late January and early February. Four carloads were surface ore and six carloads were underground ore taken from the shaft. The exploratory shaft is down to 90 feet and drilling continues. A level has been established at 70 feet and the next level will be at 155 feet. The company has several geologists exploring and studying the area.

U.S. GEOLOGICAL SURVEY ANNOUNCES NEW MAP PRICES

The U.S. Geological Survey announces the following changes in the prices of its topographic maps effective May 1, 1957:

List Price: The list price of topographic quadrangle maps at scales 1:24,000; 1:31,680; 1:62,500; 1:125,000; and 1:250,000 (1° x 1° reconnaissance series) is 30 cents each. The list price of topographic maps at scale 1:250,000 (new 1° x 2° series) is 50 cents each.

National Park and other special topographic maps are individually priced. A price list is available upon request.

Discounts: A discount of 20 percent is allowed on all orders which amount to \$10 or more at the list price. A discount of 40 percent is allowed on all orders which amount to \$60 or more at the list price. The discounts apply to all topographic, geologic, and special maps distributed by the Geological Survey.

SHELDON GLOVER RETIRES

Sheldon L. Glover retired as Supervisor of the Washington Division of Mines and Geology on March 1, 1957, after serving on the staff of the Division for 23 years, the last 16 of which as Supervisor.

Mr. Glover graduated from the University of Washington with a Bachelor of Science degree and received his Master of Science degree from the University in 1921. After 7 years of consulting work with the firm of Landes and Glover, consulting geologists of Seattle, he went into private professional work in British Columbia in charge of exploration and development for the Shenandoah Mining Company. In 1934 he joined the staff of the Washington Division of Geology as Assistant Supervisor, with headquarters at Pullman. He was transferred to Olympia in 1941 as Supervisor of the Division of Mines and Mining, and in 1945, when the two divisions were consolidated to form the Division of Mines and Geology, he became supervisor with headquarters in Olympia.

Sheldon Glover served in the U.S. Army Coast Artillery as First Lieutenant from 1917 to 1919. He is the author of numerous technical articles and bulletins on Washington geology.

The names of Glover and the Washington Division of Mines and Geology became synonymous over the years and no geologist in the Northwest was better known, more greatly respected and liked than Shelly Glover. The State of Washington owes him a debt of gratitude for long and faithful service.

Marshall Huntting, formerly Assistant Supervisor, has succeeded Mr. Glover as Supervisor.

DREDGING LEGISLATION INTRODUCED

A bill, H. B. No. 655, was introduced in the Oregon House of Representatives March 5 that, if passed, would require any placer or dredge mining operation conducted in Oregon to:

- (1) Secure a license from the State Land Board, the application fee for which would be \$50 for each 50 acres of land or fraction thereof.
- (2) Post a bond with the State Land Board of \$300 for each acre of land to be mined.
- (3) Replace topsoil and restore area to its natural condition.
- (4) Replace water course on original meander line.
- (5) Construct settling ponds to clarify water.

The Land Board may revoke a license if violations of the conditions are found and the Board may make rules and regulations to carry out provisions of the act if necessary. The bill also states that violation of the provisions would be a misdemeanor.

H. B. 655 has been referred to the House Committee on State and Federal Affairs, Representative Norman Howard, Chairman. As yet no time has been set for a hearing.

AIME REGIONAL CONFERENCE TO MEET

The tenth annual AIME Pacific Northwest Regional Conference will be held in Portland at the Multnomah Hotel on April 11, 12, and 13. The Conference which originated in Portland in 1948 has grown from a strictly Industrial Minerals meeting to a full-fledged conference which embraces nearly all of the various fields of mining and geology. Included in the three-day program will be two field trips, one to the Owens-Illinois glass plant in Portland, another to Albany where titanium and zirconium plants operated by Oregon Metallurgical and Wah Chang will be visited. The U.S. Bureau of Mines station at Albany will hold open house also. Luncheon and banquet speakers will include Dr. A. B. Kinzel, president, Union Carbide & Carbon Research Laboratories; George Beard, assistant vice president and project development engineer, Pacific Power and Light; Dr. William J. Kroll, metallurgist; and R. R. McNaughton, Manager, Metallurgical Division, Consolidated Mining & Smelting Company of Canada.

The Industrial Minerals Section will hold two sessions. On Friday afternoon the following papers will be given: "Euxenite Dredging, Concentration and Chemical Processing" by Warren Wagner, "Increasing Military Demands on Alaska Coals" by H. F. Yancey and M. R. Geer, "Development of the Lone Clay Property" by Richard P. Brooks, "New Applications of Carbon in Mining and Metallurgy" by S. W. Martin and L. Kiefer, and "The Conversion of Gilsonite to Coke, a Process Seventy-two Miles Long" by Park L. Morse. On Saturday morning there will be a lightweight aggregate symposium with Frank Spangler, S. Carl Smithwick, Lloyd A. Williamson, and William E. Miller participating.

The Geology Section has scheduled the following papers for Friday morning: "Uranium Deposits of Northwestern Washington" by Hubert W. Norman, "Nature and Origin of Southwestern Oregon Chromite Deposits" by Len Ramp, "The Challenge of Moran" by Harry V. Warren, and "Riddle Nickel Deposit" by Walter A. Foster.

The Metals Branch will have a full session of papers and there will also be a Minerals Beneficiation session. Since many wives attend the Regional Conferences a full program of activities has been provided for them.

LAND DETERMINATIONS PUBLISHED

The U.S. Forest Service has notified the Department of the publication in local newspapers of several notices to mining claimants (see opposite page). The notice is part of the procedure established by Public Law 167, the Multiple-Use Mining Law, that would allow the U.S. Forest Service and U.S. Bureau of Land Management to take over management of the surface resources of mining claims. Holders of valid mining claims which are included in the notice must file a "Verified Statement" (a statement under oath) in response to the publication if they wish to keep the status of their claims the same as before passage of Public Law 167. Failure to file a "Verified Statement" within 150 days from the time of first publication in the newspapers will be considered as conclusive evidence that the mining claim owner:

- (1) Waives and relinquishes any right, title, or interest under such mining claim as regards the surface rights.
- (2) Constitutes a consent by the mining claimant that the mining claim shall be subject to the limitations and restrictions of Public Law 167.

- (3) Precludes thereafter any assertion of such mining claimant of any right or title or interest in the mining claim contrary to or in conflict with Public Law 167.

The "Verified Statement" should be filed with the Land Office of the Bureau of Land Management, P.O. Box 3861, Portland 8, Oregon. Attention is called to the necessity of having the statement sworn to before a notary public or other officer authorized by law to administer oaths. Persons desiring a "Verified Statement" form can obtain it at no charge by writing to offices of the Department.

FOREST SERVICE PUBLICATION NOTICES					
National Forest	Name of area	Acres Nat'l. Forest Land	Date of First Publication	Name of Newspaper	City of Publication
Siskiyou	Fuller	8,200	Feb. 21, 1957 Feb. 27, 1957	Curry County Reporter Coos Bay Times	Gold Beach Coos Bay
Siskiyou	Wildhorse	53,000	Feb. 21, 1957	Curry County Reporter	Gold Beach
Willamette	Little N. Fork	22,600	Feb. 27, 1957	Oregon Statesman	Salem
Deschutes	Chemult	45,500	Feb. 27, 1957	Herald and News	Klamath Falls
Fremont	Chemult	8,500	Feb. 27, 1957	Herald and News	Klamath Falls
Whitman	Woodley	35,250	Feb. 27, 1957	Observer	La Grande
Whitman	Dooley Mt. Buffalo	44,000	Feb. 21, 1957 Feb. 27, 1957	Blue Mt. Eagle Democrat Herald	John Day Baker

An explanation of Public Law 167 was given in the August 1955 issue of The Ore.-Bin. The procedures under which the U. S. Forest Service is conducting land determinations and the rights of claim holders were discussed in the April 1956 Ore.-Bin. Maps showing location of the land determination areas listed on this page were printed in the October 1956 Ore.-Bin. Persons desiring

copies of these Ore.-Bins may obtain them at no charge by writing to the Department of Geology and Mineral Industries, 1069 State Office Building, Portland 1, Oregon.

FRESH WATER AVAILABLE IN COOS BAY SAND DUNES

Studies made by U.S. Geological Survey

An investigation made in 1954-56 by the U.S. Geological Survey in cooperation with the State Engineer has shown that a considerable amount of fresh ground water of generally good quality is present in the sand-dune area north of Coos Bay. The results of the investigation are incorporated in a 32-page open-file report entitled, "Ground-water resources of the sand-dune area north of Coos Bay, Oregon." Authors are S. G. Brown and R. C. Newcomb, geologists with the U.S. Geological Survey. The report is not for sale, but copies are on file at offices of the State Engineer and at the principal libraries in the Coos Bay area. The report may be consulted at the offices of the U.S. Geological Survey and the Oregon Department of Geology and Mineral Industries in Portland.

The report describes the ground-water body as a thin lens lying in an area of about 8 square miles of dune sand. The base of the lens is near sea level while the upper surface rises to 25 or 30 feet at the crest of the dune ridge. The lens is believed to be perched on a layer of clay that isolates it from the possible saline water below.

Annual rainfall in the area is about 61 inches. With 75 percent of it percolating into the ground-water body, an estimated 780 million gallons of water per year, or an average of about 2 million gallons per day, may be available for withdrawal from each square mile of sand-dune area.

Analyses of the water show that it is soft, has low salinity, is odorless, has a satisfactory taste, and normal temperature. The known features that are detrimental to its quality are a slight acidity, presence of iron in some places, and a light-brown organic color near marshy areas.

Studies continued by Pacific Power and Light Company

With completion of the preliminary investigations by the U.S. Geological Survey, as described above, the work was taken up and continued by the Pacific Power and Light Company to determine whether the fresh water in the dune area would be suitable in quantity and quality for pulp and paper manufacture. The Company reports that during the past 14 months it has made extensive field investigations in a 20 square-mile area. Pilot-plant pumping was done at Jordan Lake on the southern edge of the dune area and at Hauser on the eastern edge, and 170 piezometers and a number of rain gauges were installed throughout the dunes. A larger quantity of fresh water than could be accounted for by rainfall was indicated, and it was determined that there is an underground replenishment from older formations lying to the east where the annual rainfall averages higher than in the dune area. Drilling indicated that sand containing fresh water extends well below sea level. The Company's investigations reveal that the water supply potential is even more favorable than indicated by the U.S. Geological Survey's report.

NOTICES PUBLISHED BY BUREAU OF LAND MANAGEMENT

The U.S. Bureau of Land Management has published notices of land determinations on mining claims in Josephine and Douglas counties according to a release from the regional office. Date of first publication is given as March 20, 1957. Owners of valid mining claims who wish to maintain their claims the same as before passage of Public Law 167 must file a "Verified Statement" with the Land Office of the Bureau of Land Management, P.O. Box 3861, Portland 8, Oregon, within 150 days from March 20 (see p. 26, this issue of The Ore.-Bin). Mining claims involved in these are located as follows:

Josephine County - Sections 1, 3, 5, 7, 9, 11 to 13 incl., 15, 17 to 19 incl., 21, 23, 25, 27, 29, 31, 33, and 35, T. 38 S., R. 6 W., W.M.; Sections 1, 2, 6, 7, 9, 11 to 15 incl., 17, 19, 21, 22, 23, 25, 27 to 35 incl., T. 39 S., R. 5 W., W.M.; and Sections 1, 3, 11 to 15 incl., 23 to 26 incl., T. 39 S., R. 6 W., W.M.

Douglas County - Sections 1, 3, 5, 6, 7, 9, 11, 12, 14, 15, 17, 19, 21, 23, 28, 29, 31, 32, and 34, T. 30 S., R. 2 W., W.M.

BILL INTRODUCED IN U.S. SENATE

S. 1176 - National Wilderness Preservation System - Humphrey (Minn.), Neuberger (Ore.), Smith (Maine), Morse (Ore.), Douglas (Ill.), Mundt (S.D.), Murray (Mont.), Wiley (Wis.), Clark (Pa.), Lausche (Ohio), Jackson (Wash.), and Magnuson (Wash.). Committee on Interior and Insular Affairs. Similar to H.R. 361 by O'Hara (Ill.). Would establish a vast National Wilderness Preservation System which would include large areas within national forests; "mining or the removal of mineral deposits" would be prohibited in any part of the System.

(From Am. Mining Congress Bulletin Service, March 18, 1957.)
