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URANIUM PROSPECTING IN OREGON, 1956

By
Max Schafer*

Introduction

The search for uranium deposits in Oregon in 1956 was typified in two ways. First, there were no discoveries large or rich enough to show such immediate promise as the White King claims in Lake County. Second, the total number of prospectors decreased but the type of work done was better than before. Quantity decreased but quality was up.

The lack of any new deposits that showed as much immediate promise as the White King claims is disappointing and unexpected. It was felt that the White King claims would be a major "break-through" and once some of the important geological facts were learned concerning this deposit, other similar deposits would quickly be discovered. This view was perhaps overly optimistic. The belief is strong, however, that additional economic deposits of uranium will be discovered in the future. It is thought that more knowledge of the geology of uranium and of refined prospecting techniques will assist in uncovering deposits of major importance. One difficulty that has been and will continue to be encountered by the prospector is the problem of deep cover or overburden.

The weekend prospector equipped with a small Geiger counter and large hopes was not so much in evidence this past year. The principal amount of prospecting in 1956 was done by men or groups of men, some of whom were sponsored by businessmen. The prospectors were equipped with good detection instruments and generally had a bulldozer available for trenching. Many had small drills with which they could test "hot spots" to a depth of 50 to 100 feet and some used the new hand-held prospecting drills. In addition, more flying was done in 1956 by mining companies and private persons than before. It has become evident to the prospector that covering the claim with a detection counter is only the first step in exploring a claim, and that after a radioactivity anomaly is found, the source and distribution of the radioactivity must be determined by means of deeper exploration.

Uranium occurrences investigated by the Department during 1956 are given below. These occurrences do not include all of the known radioactive areas in Oregon, but represent the outstanding developments during the year.

Lakeview area

A preliminary report on the occurrences of uranium in the Lakeview area was published in the December 1955 Ore.-Bin. The following brief notes summarize the information learned during the 1956 field investigations.

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The immediate area of the White King and Lucky Lass claims is underlain by Tertiary andesite and basalt flows, acid to intermediate tuffs, and bedded to massive tuffaceous, lacustrine deposits. The bedded lake deposits, which are the least extensive of the rock types, dip 15 to 45 degrees to the southwest and are conformable with the flows and tuffs.

Since the leasing of the White King property by the Lakeview Mining Company, extensive exploration has been carried out in the prospect area immediately east, northeast, and southeast of the discovery pit. The work has consisted largely of drilling with noncoring diamond bits and probing the holes with a detection counter. Little coring has been done because of difficulty in obtaining good core recovery. Cuttings from the drilling are studied by the mine geologist.

Drilling has penetrated recent stream alluvium, volcanic tuffs, and tuffaceous sediments. Some of the tuffs and sediments have been altered to opal or to clay. Uranium ore is found in a zone about 100 feet in thickness and is in sediments and tuffaceous sediments. The ore is confined principally to a tuffaceous agglomerate or breccia which is overlain by a clayey sediment. The mineralization within the agglomerate is associated with opalite cementing agglomerate fragments and is present to some extent in areas where a clayey cement predominates.

Correlation of rock types and surface study has brought out the presence of many small vertical faults which were not previously recognized. These faults, which have displacements of as much as 200 feet, are probably the main structural control in the location of the ore solutions which deposited the uranium in this particular area.

Pike Creek area

An occurrence of secondary uranium mineralization is located in Harney County in secs. 17 and 20, T. 34 S., R. 34 E., on the east face of Steens Mountain. The mineralization occurs in the Pike Creek volcanic series which is considered to be early Pliocene in age. This formation is made up of acid flows and tuffs exceeding 1500 feet in thickness. The uranium occurrence is at a contact between a rhyolitic intrusion breccia and a bedded acid tuff deposit. The hard, nonporous breccia also shows radioactivity along fractures and where iron and manganese oxides stain the rock. Visible autunite-like secondary uranium minerals are present along bedding and joint surfaces in the tuff and at the contact. Mineralization was not discovered beyond about $1\frac{1}{2}$ feet from the contact between the tuff and the intrusion breccia.

Bear Creek area

The discovery of the Bear Creek uranium occurrence near Bend in Crook County, Oregon, caused a flurry of excitement in the summer of 1955. Since that time about 500 feet of trenches have been dug and five drill holes totaling about 200 feet have been put down on an occurrence in sec. 13, T. 18 S., R. 16 E., 1.5 miles west of Bear Creek.

The mineralization at this prospect is in volcanic tuff of Clarno (Eocene) age. The Clarno formation in this area is composed of basalt flows, rhyolitic flows and tuffs, and tuffaceous sediments. The uranium is located in a small shear zone in silicified and porous tuff on the crest of a small ridge. The silicification is probably responsible for the existence of the ridge.

Trenching by bulldozer has cut the ridge in several places. Only one trench exposes visible uranium mineralization. On the east side of this trench a yellow-green fluorescent secondary uranium mineral coats fractures in silicified tuff. On the opposite side of the trench a green fluorescent secondary uranium mineral is disseminated in a loose porous gray tuff. Both of these zones are less than 3 feet wide and nearly vertical. High radioactivity extends for several feet on each side of the visible mineralization. The difference in the color of the minerals in the hard brittle rock and the porous rock is a relationship which has been noted also at the White King deposit in Lake County. According to Forrest Kennaday,* Glide, Oregon, a shaft will be sunk to explore a 4-foot radioactive zone at a depth of 37 feet which was encountered in the drilling.

Powell Butte area

The radioactive material discovered in 1955 on the west side of Powell Butte in sec. 13, T. 16 S., R. 14 E., Crook County, was explored in 1956 by hand-mining methods. Prospecting has failed to uncover any sizeable concentration of uranium mineralization.

Powell Butte is an old rhyolitic highland of Clarno (Eocene) age. It is made up of acid and intermediate volcanic rocks with glassy welded tuffs and rhyolites predominating. The rocks of the Butte give an unusually high background reading and joints are particularly "hot." The anomalous radioactivity is associated with iron oxide-hydroxide staining or filling along the joints and with hyaline opal that fluoresces greenish-yellow.

Salem area

An occurrence of secondary uranium mineralization was found on land owned by Sam F. Speerstra of Salem in sec. 6, T. 8 S., R. 3 W., Marion County, in 1955 and is reported here for the first time. The occurrence is on the south slope of Illahe Hill about 4 miles south of Salem.

The uranium mineralization occurs in the Eugene formation of upper Oligocene age. The rock is a tuffaceous marine sandstone. Exploration work consisting mainly of pitting and some drilling has uncovered disseminated uranium minerals and small concentrations over a wide area. The minerals have tentatively been identified as tyuyamunite and autunite-zippeite.

Origin of the deposits

The occurrences noted above illustrate at least two types of uranium mineralization. It is believed that the deposits at the White King and the Bear Creek claims owe their mineralization to ascending hydrothermal solutions. The White King deposit is especially typical of a hydrothermal mineral deposit. At this property both pre- and post-mineral faulting have probably occurred. The first period of faulting provided channelways for the ascending mineralizing solutions and the second period of faulting broke up the ore bodies. There is a strong possibility that repeated movement has occurred along the same zones of weakness. Physical characteristics of the rock, such as porosity, have governed localization of the ore-bearing solutions. The richer ore occurs in layers of porous tuff which afforded easy access to mineralizing solutions rising along faults. The nonporous clayey tuff acted as a cap rock to contain the solutions. The assemblage of sulphides (realgar, orpiment, cinnabar, pyrite, and stibnite) is typical of a low-temperature, low-pressure mineral deposit. Galena was recently discovered in a drill hole associated with a black, sooty uranium mineral disseminated in opalite. This discovery sheds a little different light on the origin of the mineralization as lead sulphide is generally thought to form at a higher temperature than the other sulphides present. It is possible that more than one stage of mineralization took place and this could account for the mixed assemblage.

The uranium occurrence near Bear Creek in Crook County also appears to be hydrothermal in origin. This deposit, like the Lucky Lass claim, which is near the White King mine in Lake County, has no other visible mineralization besides the uranium, although samples from these two prospects contain traces of mercury. At the Bear Creek occurrence there is some evidence of silicification and alteration caused by hydrothermal activity.

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* Personal communication.

The association of the uranium anomaly on Pike Creek in Harney County with the rhyolite intrusion breccia might indicate that this occurrence is also of hydrothermal origin. There is a possibility, however, that the source of the uranium in the tuffs is not hydrothermal but the result of release of uranium to ground water from the breakdown or uranium-rich volcanic rocks.

The high radioactive background associated with Powell Butte and the concentration of "hot spots" along fractures suggests that the uranium mineralization at this locality may be due to descending ground water or to ascending vapors derived from a cooling magma. If due to descending ground water, the source of the uranium would be the volcanic rock which is slightly enriched with uranium as an original constituent. Possibly this uranium could be transported by ground water circulating through fractures in the rock upon decomposition of the volcanic rock. If due to ascending vapors, the source of the uranium would be residual uranium from the magma which was the source of the volcanics that formed Powell Butte. This late-stage magmatic material would ascend the ancient vent through joints and fractures formed from contraction due to cooling. In either case, the uranium has probably been concentrated and possibly transported through colloidal action. This is borne out by the association of the "hot spots" with iron oxide-hydroxides and hyaline opal (water-clear, globular silica).

The origin of the uranium mineralization found in the marine sandstones of the Eugene formation on Illahe Hill south of Salem is difficult to explain. A source for the uranium other than from a magma is indicated, as no hydrothermal mineral deposits are known in the Eugene formation. A possible explanation for a uranium source is the volcanic ash that is found in the sandstones and shales of the formation. Chemical breakdown of the ash and tuff and its conversion to clay might make available any uranium present to circulating ground water. Concentration of the uranium thus available could be due to organic material or to gels of silica, iron, or others. Or possibly the mineralization could be attributed to a concentration of heavy minerals, some of which contained uranium, along an ancient beach or strand at the time sediments were accumulating to form the Eugene formation.

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NEW URANIUM HANDBOOK AVAILABLE

The U.S. Bureau of Mines has just published an illustrated, 130-page booklet entitled "Facts Concerning Uranium Exploration and Production," that promises to be a handy reference book for the uranium prospector and miner. The authors are John E. Crawford and James Paone.

The handbook answers many common questions regarding uranium exploration and development. It briefly and concisely reviews such subjects as the geology and mineralogy of uranium ores, methods of prospecting, favorable areas, sample testing, available maps, radioactivity instruments, staking claims, exploratory drilling, mining, milling, and refining. A section of the handbook is devoted to brief descriptions of uranium-bearing areas in the United States and Alaska; Oregon is included. Accompanying each subject treated in the handbook is a list of selected references for persons desiring more detailed information. Listed also are companies which supply equipment, offices which dispense information, assay laboratories, mills, and other services.

The handbook is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price is 70 cents.

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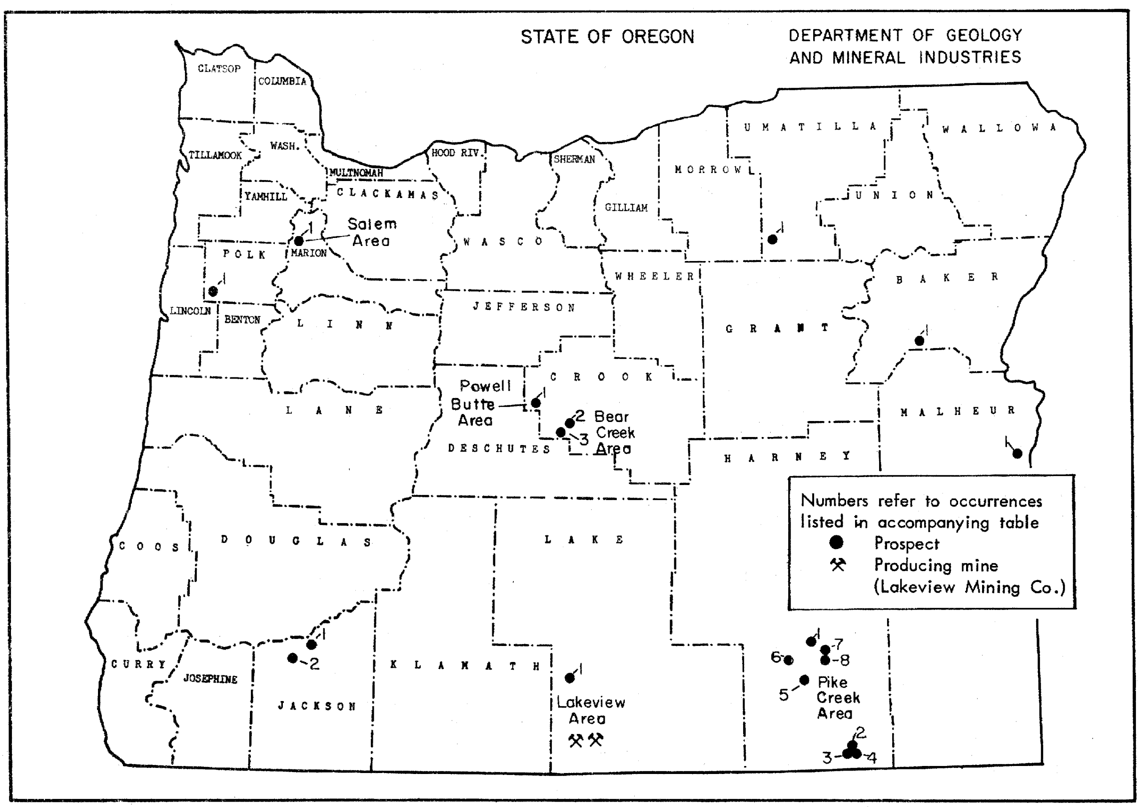
RADIOACTIVE OCCURRENCES IN OREGON, 1956

By

T. C. Matthews*

Tom Matthews

Pertinent facts on radioactive discoveries in Oregon during 1956 are presented in Table 1 (see Ore.-Bin, December 1955, for 1954-1955 summary). Information was based on samples submitted to the offices of the Department or collected in the field by members of the staff. Additional information was furnished by the Atomic Energy Commission, Salt Lake Area Office, and by persons reporting uranium occurrences. The index map shows the distribution of the occurrences. The numbers on the map correspond with those in the table. The name given refers to either the owner or operator of the claim or the person submitting the sample or information to the Department. Unless otherwise indicated, the tests for U_3O_8 equivalent were made by members of the Department staff and chemical analyses for U_3O_8 were made by L. L. Hoagland, Assayer-Chemist with the Department. All available samples were tested with the short-wave ultraviolet lamp, and the color of the fluorescence given. Since the presence of mercury may have bearing on the origin of the uranium mineralization, its presence or absence is noted.



* Spectroscopist, State of Oregon Department of Geology and Mineral Industries.

Table 1.

Radioactive Occurrences In Oregon, 1956

Map. No.	Name	Location Claim Name	Uranium Minerals	Host Rock and Associated Minerals	U_3O_8 Equiv.	U_3O_8 Chem.	Fluorescence	Mercury
BAKER COUNTY:								
1*	Unnamed	Dooley Mountain	Autunite	Silicified rhyolite tuff, limonite stained	.025	.036	Bright green crystals	Trace
CROOK COUNTY:								
1*	Harley Dosser Redmond, Oregon	Powell Butte T. 16 S., R. 14 E.	Meta-autunite (?)	Porphyritic rhyolite	.05 .16	.064 .148	None	Present
1	(same)	(same)			# .09			
2*	Bennie J. Schultz Eugene, Oregon	Sec. 21, T. 16 S., R. 17 E. Game Guides Group	Autunite	Tuff	.11	.25	Strong yellow-green	None
3*	Sage Hollow Mining Inc. F. J. Kennaday, Sec. Glide, Oregon	Bear Butte T. 18 S., R. 16 E. and R. 17 E.	Uranophane	Brecciated rhyolite	# .09			
3	(same)	(same)			# 1.41 # .77	1.83 1.23		
HARNEY COUNTY:								
1	Lester Rhoads Burns, Oregon	Steens Mountain Sec. 8, T. 34 S., R. 34 E.	Unknown	Semi-schistose greenstone	.11	.13	None	Trace
2	Douglas Shepardson Andrews, Oregon	Pueblo Mountains T. 40 S., R. 35 E.	Unknown	Quartz vein material with copper sulphides	.075	.07	None	Present
3	Roy M. Johnson La Center, Washington	Pueblo Mountains T. 40 S., R. 35 E.	Unknown	Quartz vein material with copper sulphides	.3	.53	None	Trace
4	Ronald C. Begg John Day, Oregon	Pueblo Mountains Sec. 8, T. 40 S., R. 35 E.	Unknown	Quartz vein material with copper sulphides	.36	.30	None	Trace
5	Preston C. Marshall Portland, Oregon	T. 36 S., R. 33 E.	Unknown	Coarse pumiceous sandstone	.02		Scattered yellow-green	None
6*	Dewey Quier Burns, Oregon Lee Kronberg Harold Davis	T. 34 S., R. 33 E. Lobo #3	Unknown	Porphyritic andesite breccia	.11	.07	Dull yellow-green on fractures	Trace
6	(same)	(same)			# .09			
7	Harold Davis Milwaukie, Oregon	T. 34 S., R. 34 E. No. 6, Mary D	Unknown	Chert with disseminated pyrite; veinlets of secondary quartz		# .188		
8*+	Fred Ladd Denio, Nevada Harry Alexander Miller Mining Co.	Steens Mountain Sec. 20, T. 34 S., R. 34 E.	Torbernite and uranophane (?)	Rhyolitic flows and tuffs	# .97	# .938		
JACKSON COUNTY:								
1+	Canyon Creek Mining Co. Arleigh Anderson, Sec. Trail, Oregon	Sec. 31, T. 33 S., R. 1 W.	Unknown	Rhyolitic flows and tuffs		# .15 # .24		
2+	D. C. Maple Central Point, Oregon	T. 34 S., R. 2 W.	Autunite	Rhyolitic flows and tuffs	.04			
2	(same)	(same)			.2	.2		
LAKE COUNTY:								
1	Lewis A. Kaehn Gilchrist, Oregon	Sec. 1, T. 36 S., R. 17 E.	Unknown	Fine volcanic ash and opalite	.10	.098	None	Trace

* Property examined by State of Oregon Department of Geology and Mineral Industries.
\+ Property examined by Atomic Energy Commission, Salt Lake Area Office.
\# Information furnished by claim holder.

Note: All analyses by State of Oregon Department of Geology and Mineral Industries unless otherwise indicated.

Table 1 (cont.)

Map No.	Name	Location Claim Name	Uranium Minerals	Host Rock and Associated Minerals	U_3O_8 Equiv.	U_3O_8 Chem.	Fluorescence	Mercury
MALHEUR COUNTY:								
1+	R. D. & S. B. Rasmussen La Grande, Oregon	T. 21 S., R. 44 E.	Unknown	Siltstone	# .06			
MARION COUNTY:								
1*	Sam F. Speerstra Salem, Oregon	Sec. 6, T. 8 S., R. 3 W.	Tyuyamunite, autunite-zippeite (?)	Tuffaceous sandstone	.24	.23	None	None
1	(same)	(same)	(same)	Pulverized sandstone core	.28	.39	None	None
1	(same)	(same)	(same)	Sandstone with feldspar, chlorite, and amphibole	# .08			
1+	(same)	(same)	(same)		# .84			
1	(same)	(same)	(same)		# .41 # .17	# .54 # .198		
POLK COUNTY:								
1	L. R. Johnson Salem, Oregon	Sec. 15, T. 9 S., R. 7 W.	#Carnotite (?)	Sandstone	# .57 # .43			
UMATILLA COUNTY:								
1	Warren Wright Pendleton, Oregon	Sec. 3, T. 4 S., R. 32 E.	Allanite	Pegmatite	.07	.008	None	None

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NEW BASE MAP OF OREGON PUBLISHED BY U.S.G.S.

A new map of Oregon has been published recently in two editions by the U.S. Geological Survey. One edition, known as a "base" map, is published in three colors and shows principal drainage features, public land subdivisions, county boundaries, and railroads. The other edition, known as a "general use" map, is in eight colors. It includes all the information shown on the "base" map and in addition shows highways, towns, national parks, national forests, and Indian reservations. Both maps are at a scale of 1:500,000 (1 inch equals approximately 8 miles). Copies are available from the Geological Survey, Denver Federal Center, Denver, Colorado. Price for the "base" map is $1.00, and for the "general use" map is $2.00.

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DRILLING PERMITS

Drilling Permit 23 was issued December 21, 1956, to Standard Oil Company of California for a deep stratigraphic hole in the NW$\frac{1}{4}$ sec. 6, T. 4 S., R. 21 E., near Condon, Gilliam County. Coordinates of the test are 4319 feet east and 2909 feet south of the NE corner of sec. 6. Elevation of drilling site is 2,747 feet. Lessors are Mr. and Mrs. H. L. Kirkpatrick, Condon, Oregon.

Revised location for Oroco Oil and Gas Company's McBride No. 1 test well which was issued Permit No. 19 September 27, 1956, is 1419 feet west of the east line and 1566 feet north of the south line of sec. 19, T. 16 S., R. 46 E., Malheur County, Oregon. Elevation at ground level is 2831 feet.

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DOMESTIC METAL PRICES

From E&MJ Metal and Mineral Markets, December 13, 1956

Quicksilver - $255-257 per 76-pound flask, New York.
Chromite - $ 59- 61 per long ton; Turkish, 48 percent Cr_2O_3, 3 to 1 chrome-iron ratio.
- $ 56- 58 per long ton; Turkish, 46 percent Cr_2O_3, 3 to 1 chrome-iron ratio.
Copper - 36.655 cents per pound, refinery (domestic average).

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CAR-LOT PURCHASE PROGRAM FOR CHROME

The following information on the car-lot buying of chrome ore for the Government stockpile is from the Federal Register of August 10, 1956, page 5989. Instructions on how to take advantage of this program have been requested from GSA, Seattle, but as yet they have not been received. It is suggested that anyone interested in obtaining further information write GSA at 120 Federal Office Building, 909 First Avenue, Seattle, Washington.

Any producer proposing to deliver chrome ore or concentrates, in one offering, consisting of one or more railroad carloads shall notify the Government of the intended delivery and request shipping instructions. Such notice shall state the approximate quantity proposed to be delivered, the approximate date of delivery, and the proposed shipping point (shipping point means the location at which the producer will make delivery f.o.b. railroad cars). Producers in the States of California, Nevada, and Arizona shall address such notice of delivery to the Regional Commissioner, General Services Administration, San Francisco 3, California. Producers in the States of Washington, Oregon, Idaho, Montana, and the Territory of Alaska shall address such notice of delivery to the Regional Commissioner, General Services Administration, Seattle 4, Washington.

Shipping instructions shall be issued to the producer by the Government. Offerings made shall be delivered, at the expense of the producer, f.o.b. railroad cars at the shipping point designated by the Government; type of railroad car to be designated by the Government. Fractional carloads will not be accepted. Charges incurred due to railway cars being loaded in excess of the maximum limit shall be for the account of the producer.

Sampling and screen size determination shall be made at the shipping point. Sampling, screen size determination, moisture content determination, and chemical analysis shall be performed, at the expense of the producer, by a commercial sampler-analyst firm approved by the Government. Sampling and screen size determination shall be made at the time of loading of the railroad car or cars and the certificate of the sampler-analyst shall so recite.

The weight of each offering shall be, at the Government's option, the gross railroad track scale weight of the car less the actual light weight of the car unloaded or the light weight stenciled on the car, less the moisture content as determined by the sampler-analyst. The weight certificate and the certificate of the sampler-analyst as to sampling, screen size, moisture content, and chemical analysis shall be final and conclusive. Demurrage charges incurred at the shipping point shall be for the account of the producer.

Title to and responsibility for the shipment shall remain vested in the producer until the producer is notified by the Government of the acceptability of the shipment. Upon receipt of the certificate of the sampler-analyst, the producer shall be notified with respect to the acceptability of the shipment. Upon notification of acceptance, the shipment shall move forward in accordance with the shipping instructions issued by the Government. Offerings failing to meet the specifications, terms, and conditions shall not be accepted. No offering shall be accepted on a weighted average basis. The producer shall be notified of a rejected shipment, and removal of the shipment shall be by and at the expense of the producer. The producer shall be held accountable for any expense incurred by the Government in connection with rejected shipments. Payment for accepted shipments shall be made in accordance with the established price provisions for the Government stockpile.

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