

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

BUREAU OF MINES

R. R. Sayers, Director

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War Minerals Report 7

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STATE DEPT' OF GEOLOGY &  
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MOLLALA CLAY  
CLACKAMAS COUNTY, OREG.

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STATE OFFICE BLDG., PORTLAND, OREG.

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Aluminum

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WASHINGTON: 1942

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WAR MINERALS REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

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W.M.R. 7 - Aluminum

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SUMMARY

The Molalla clay deposits are situated near the town of Molalla, Clackamas County, northwestern Oregon. A preliminary investigation of the area has been made by the Bureau of Mines, the results of which indicate the possibility of deposits of high-alumina clays. Estimates based on preliminary drilling show that 5 million tons of high-alumina clay could be obtained from each 100 acres of minable ground.

A Bureau of Mines project will be established to outline the extent and character of the deposits, which will furnish data from which to estimate the tonnages and grades available. As soon as these have been determined, the next step will be to work out a plan for mining and treating the material. This plan will be discussed in a subsequent report. The cost of this exploratory work is estimated at \$29,385.

## INTRODUCTION

The Bureau of Mines has done some preliminary exploring on the Molalla clay deposits.<sup>1</sup> This work, consisting of drilling, trenching, and test pitting, demonstrated that the deposits are worthy of further investigation.

## HISTORY

Small-scale clay-mining was carried on in the Molalla district for some years. The clay was shipped to local manufacturers of ceramic ware and refractory brick. Owing to inability to compete with outside shippers, the industry has been stagnant in recent years.

## PHYSICAL FEATURES

The deposits lie in an area of gently rolling to relatively rough topography. The altitude ranges from about 500 to 1,500 feet.

The climate is similar to that of the Portland area. Temperature during the winter months seldom falls as low as zero. Summer months are ideal. Rainfall is heavy during winter and spring and moderate during summer and fall. Light snow might fall in January and February, but it seldom remains on the ground for more than a day.

Parts of the area are covered with a dense growth of evergreen and deciduous trees and small shrubs. Timber suitable for mining and rough construction work is available on many of the properties. Farming is the principal industry.

Enough water for operations of any extent is available from the Molalla River on the eastern edge of the area or from Tiesel Creek on the southern edge. Both are perennial streams.

## TRANSPORTATION

Molalla is on a branch line of the Southern Pacific Railway from Canby. Portland is 30 miles due north by highway. Hard-surfaced roads

<sup>1</sup> C. C. Popoff, mining engineer.

connect Molalla with all the larger towns and cities of the Northwest. Most of the favorable clay areas are within 6 miles of Molalla and are reached on graveled or improved county roads.

Ordinary commodities are available in Molalla. Mining equipment and supplies can be purchased in Portland or in the larger towns of this area. A post office and telegraph station are at Molalla.

#### DESCRIPTION OF DEPOSITS

Most of the area is covered by Tertiary sediments and lavas. The clay beds are in the Molalla formation of the lower Miocene age. The southwest and central portions of the district are overlain by sandstone and basalt. The northern part is covered by Pleistocene gravels and recent alluvium. The Molalla formation is a stratified deposit dipping to west and northwest.

The blue and blue-gray clay is high in alumina and iron. The clays of other colors probably are of different age and contain more iron and less alumina. Analyses of samples in the preliminary investigation are shown in attached table 1.

Most of the overburden is a hard-packed sedimentary. This ranges in thickness from 3 to 40 feet, with an average of about 10 feet. The clay strata, where tested, show a thickness of 20 to 30 feet. The number of beds has not been determined.

Isolated outcrops of clay along the Molalla River are exposed by a number of shallow open-cut pits and some short tunnels. About 250 hand-auger holes were drilled by the Bureau of Mines. Only a few of these prospect holes reached the clay, as the overburden was too thick and hard to be penetrated. A record of this preliminary drilling is shown in table 1.

TABLE 1.-Analyses of samples from Molalla high-alumina clay deposit

(In Al<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub> columns, first figure is from "fusion" analysis, second from "available" analysis)

Auger hole	Altitude, feet	Sample No.	Depth interval	Formation <sup>1</sup>	Analysis,					Remarks, location, property
					SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	IgL	
13	1,500	CAS-5	4.0-14.0	Light-brown.	47.3	25.0/21.8	10.4/8.0	1.4	15.2	Sec.13,T.6 S.,Zmuda
13	1,500	CAS-6	14.0-19.0	Light-tan.	47.1	26.9/25.2	8.4/6.8	1.5	15.4	Do.
24B	740	CAS-38	9.0-13.0	Blue.	29.8	31.3/29.4	15.9/2.35		19.4	Sec.35,T.5 S.,U.S.
25	720	CAS-7	0.0- 7.0	do.	46.2	31.7/30.9	6.0/4.5	1.6	14.3	Do.
26	810	CAS-9	12.0-21.0	Blue, white.		16.1	4.3			Do.
28	1,140	CAS-8	6.8-18.0	Blue, yellow, brown.		22.7	4.8			Sec.1,T.6 S.,Zahar
33	750	CAS-15	2.0-11.0	White.	49.4	26.4/17.0	4.2/2.4	1.9	16.3	Sec.35,T.5 S.,U.S.
33	750	CAS-16	12.6-21.0	Light-brown.	45.8	25.3/19.8	10.4/7.0	1.3	15.9	Do.
35	680	CAS-11	10.5-16.5	Pink, tan, white, blue.		20.0	3.8			Do.
35	680	CAS-12	16.5-26.0	Gray, tan.		17.0	1.9			Do.
52	780	CAS-13	16.0-25.0	Blue altered volcanic rock.		8.0	3.5			Do.
64B	1,140	CAS-17	3.0-10.0	Blue.	47.4	26.6/21.2	7.3/4.2	0.8	15.5	Sec.1,T.6 S.,Zahar
64B	1,140	CAS-18	18.0-28.0	Gray.	52.3	24.1/17.3	5.7/2.9	1.0	13.9	Do.
67C	500	CAS-10	12.8-17.8	Yellow, blue.		27.5	8.3			Sec.22,T.5 S.,Muller
67C	500	CAS-14	17.8-29.0	Blue.		28.3	4.7			Do.
111	500	CAS-25	2.0- 9.0	Blue, gray.		11.6	2.1			Sec.35,T.5 S., Schoenborn
1	800	CAS-22	5.0-13.0	Blue.	55.1	22.2/17.0	7.0/3.9	1.3	10.8	Sec.34,T.5 S.,Neal
124	470	CAS-19	2.0-17.0	Tan.	51.4	27.5/24.4	4.8/2.9	1.4	13.7	Sec.22,T.5 S., Co. road
124	470	CAS-20	17.0-30.0	Blue, pink.	47.0	33.3/31.7	2.3/1.6	1.6	14.8	Do.
126	420	CAS-26	14.0-25.0	Blue.		23.4	4.8			Sec.16,T.5 S., Co. road
134B	510	CAS-23	0.0- 7.0	do.	50.1	28.2/25.1	4.9/3.4	1.3	14.2	Sec.21,T.5 S., Co. road
144	370	CAS-27	13.5-27.0	Tan.		16.4	5.6			Sec.20,T.5 S., Co. road
147	480	CAS-29	2.5- 7.0	do.		24.6	5.7			Sec.22,T.5 S.,Kyllo
147	480	CAS-28	7.0-16.0	Blue, tan, brown.		17.3	4.8			Do.

<sup>1</sup> Clay, unless otherwise designated.

Auger hole	Altitude, feet	Sample No.	Depth interval	Formation <sup>1</sup>	Analysis,					Remarks, location, property
					SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	IgL	
1550	495	CAS-30	16.5-27.0	Blue, pink, gray.		29.7	2.2			Sec.22,T.5 S.,Kyllo
161	400	CAS-21	8.0-14.0	Gray.	52.1	22.4/16.8	7.4/5.1	1.6	12.0	Sec.20,T.5 S., Co. road
166	530	CAS-24	3.5-15.5	Blue and white.		31.2	4.3			Sec.28,T.5 S., Co. road
166	530	CAS-31	16.0-24.0	Yellow, blue.		30.3	7.7			Do.
180	430	CAS-39	16.0-28.0	Blue, blue-green.	42.4	24.6/18.6	14.6/2.4		13.9	Sec.15,T.5 S., Co. road
181B	515	CAS-40	6.0-16.0	Blue, yellow.	42.6	38.7/32.7	3.9/0.6		15.2	Sec.28,T.5 S., E. Sawtell
Bowman	740	CAS-33	Pit	Blue.		35.8	1/6.9			Sec.35,T.5 S.,U.S.
Zahar	640	CAS-34	Pit	Pink.		6.3	2.4			Do.
Ellis	560	CAS-35	10.0-20.0	Blue.						Sec.27,T.5 S., L. L. Ellis
Kyllo	465	CAS-41	Pit	Varicolored.						Sec.22,T.5 S.,Kyllo
Ellis	560	CAS-32	Channel	Blue (1)	33.8	36.8/35.2	7.29/5.3	1.75	18.1	Tunnel,Sec.27,T.5 S. Analysis by Salt Lake City
Ellis	560	CAS-32	Channel	(2)		36.3	3.8		15.7	Same place. Analysis by Seattle, Wash.
Ellis	560	CAS-32	do.	(3)		31.5	3.3			Same place. Analysis by Reno.

<sup>1</sup> Clay, unless otherwise designated.

## RESERVES

The area proposed for prospecting covers about 3-1/2 square miles. Spot-drilling elimination of barren ground will determine the areas available for mining, which should amount to several hundred acres. In selected areas an average overburden of less than 10 feet with average thickness of 20 feet for the clay bed is indicated by preliminary drilling. On this basis, 5 million tons of clay could be produced from each 100 acres of minable ground. Extensive prospecting is required to prove the amount and grades of the clays in the district.

## OWNERSHIP OF PROPERTIES

All the deposits upon which prospecting is contemplated at this time are on privately owned lands. Originally, the lands probably were patented for agricultural purposes. The name of owner and description of property in the area under immediate consideration follows. All owners are listed as residing in Molalla, Oreg., and all plots are included in T. 5 S., R. 2 E. The number of acres individually owned are not shown:

<u>Names</u>	<u>Sections</u>	<u>Names</u>	<u>Sections</u>
E. L. Palfrey	16,17,20,21	T. Kylo	26
Oscar Kayler	21	Otis Engle	22
A. R. Sawtell	21	A. Shaver	22
H. Russell	21	S. E. Lay	22
L. Tubbs	21	S. W. Lay	22
H. Tubbs	21	F. E. Lay	22
Dixon	21	F. Mueller	22
A. Shaver	20,21	O. K. Bell	28,29
Steiniger	16	Miller Bros.	27,28
Stutz	16	Dougherty	27
Gross	15,16	L. L. Ellis	27
Robins	15		
C. W. Shaver	20	E. Sawtell	28

## PROPOSED EXPLORATION BY BUREAU OF MINES

The proposed exploration will be done mostly by churn drilling. Ordinary 6-inch and 4-inch tools will be used on the overburden and 4- and 3-inch split and solid barrels for dry pipe sampling in the clay.

Areas appearing to be most favorable will be selected. Spot drilling of occasional holes will determine depth and type of material at such places. The results of this spot drilling will determine locations of other holes for more detailed exploration. This, in turn, will permit more intensive drilling as selected areas are further delimited. One hole to about 5 acres is allowed in this plan. It is estimated that 100 to 120 holes of 40- to 50-foot average depth will enable an approximate estimate to be made of probable and possible tonnage and grades. This would amount to about 5,000 feet of drilling.

In addition to the power churn drilling outlined above, hand drilling is proposed for the shallower depths. East of the Molalla River and southwest and west of the areas selected for churn drilling the depths should not average more than 15 feet. About 250 to 300 holes should supplement the churn-drilling program.

Assuming that 3 churn-drill rigs are used, each working 2 shifts a day, about 4 months will be required to do this work. This assumes 15 to 20 feet of drilling per rig per day. On this basis, costs are estimated as follows:

Churn drilling, 5,000 ft. @ \$2.50 . . . . .	\$12,500
Hand drilling, 4,000 ft. @ \$0.75 . . . . .	3,000
Labor and supervision. . . . .	11,435
Miscellaneous. . . . .	<u>2,450</u>
	29,385

#### CONCLUSIONS

Geological conditions indicate high-alumina clay concealed by overburden. It is necessary to drill through this mantle of overburden to determine the extent and grade of the clays.

Drilling will be done by the Bureau of Mines in cooperation with the Federal Geological Survey. The minimum cost is estimated at \$29,385. A further report will be issued upon the completion of the drilling.