GEOLOGICAL SURVEY CIRCULAR 158

INDUSTRIAL CLAYS, OTHER THAN POTENTIAL SOURCES OF ALUMINA OF THE COLUMBIA BASIN

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UNITED STATES DEPARTMENT OF THE INTERIOR
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U.S. GEOLOGICAL SURVEY
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CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

During World War II, the Columbia Basin in Idaho, Oregon, Washington, and the western portion of Montana developed into an important industrial area because of the abundance of hydroelectric power and industrial raw materials. The industries that were established led to a substantial increase in population, and additional industrial and population expansion is indicated at the present time. This inventory of known industrial clay deposits in the Columbia Basin area is prepared as an aid in the development of the area.

A comprehensive survey was made of the literature pertaining to all the clay deposits of the Columbia Basin area. This report, however, deals only with those clays of relatively low-aluminum content and not with the better grades of kaolinitic clays that are used as fire clays, or other clays that may be potential sources of alumina. These high-alumina clays are discussed by Sohn. 1/

Reports by State and Federal agencies, publications in trade journals, and unpublished reports, memoranda and field notes in the files of the U. S. Geological Survey were used in this compilation. Because of the numerous sources consulted, the data included herein have various degrees of accuracy, and only obvious errors, mostly in locations of deposits, that could be determined by comparing several sources recording the same deposit were corrected.

Deposits of bentonite, brick and tile, pottery and slip clay are listed in the tables alphabetically by county for each state. For each county they are numbered on the accompanying map from upper right to lower left, and the numbers are given in the second column of the tables. The deposits are located by the General Land Office Survey net; those deposits for which Land Office data are not available are located by distance and direction from the nearest town; and those deposits for which precise location is not available are located approximately within the county. The precision of location and the kind of clay according to use are shown by appropriate symbols on the map. Names are recorded for those deposits that have a name in the literature; new names are not proposed here. Tabulated data on quality and quantity are summarized from published reports, except for the bentonite deposit in Yakima County, Wash., for which original data are given. Under "Use of clay" the symbol "a" means that clay from the deposit is used or has been used commercially; "p" means that no commercial use has been made except possibly for testing purposes.

[1] Sohn, I. G., 1952, Geologic environment map of alumina resources of the Columbia Basin: U. S. Geol. Survey Min. Inv., Resource appraisals MR-1.

CLASSIFICATION OF INDUSTRIAL CLAYS

Industrial clays are classified largely on the basis of use. Nomenclature of clays and clay products, chemical composition, and geologic origin are discussed by Ries 2/; bentonites are discussed by Davis, Vacher, and Conley. 3/ For convenience of tabulation, the following terminology is used:

Brick and tile clay. --Dark-firing, nonrefractory to semirefractory clays and shales that fuse below Seger cone 27 (1600 C) are used for brick and tile. Common brick and tile can be made from any sandy plastic clay that fires hard at temperatures below Seger cone 10 (1300 C). Vitrified brick, hollow block, sewer pipe, and paving brick are made from better grades of clay and shale. The alumina (Al_2O_3) content of these clays varies from 17 percent to 25 percent. Iron oxide (Fe_2O_3) content as much as 10 percent is not detrimental.

Pottery clay. --As used in this report pottery clay includes stoneware clay and terra-cotta clay. They are light-firing, semirefractory clays (below Seger cone 27, 1600 C) that are smooth, tough, and plastic.

Slip clay. --Clay is called slip clay when it contains a high percentage of fluxing impurities and has such texture that at a low temperature (Seger cone 6, 1230 C) it melts to a glass, thus forming a natural glaze. Such material should possess good adhesive properties, should not shrink too much, or crack in drying or in the early firing periods.

Bentonite. --Clay of the montmorillonite group that has the physical property of swelling by absorbing water is used in drilling muds, bond in foundry sand, inert filler water proofing, and for various other purposes.

SUMMARY

Within local areas clays of similar geologic origin generally have similar properties. Pottery clays most commonly occur in areas underlain by weathered portions of the granitic rocks in the Idaho and related batholiths, in areas underlain by argillaceous sediments, and in areas underlain by glacial deposits; slip-clay deposits are confined mostly to areas underlain by glacial clays in the northwestern portion of the Columbia Basin. So many varieties of clays can be used for brick and tile manufacture that suitable deposits can be found in most of the geologic environments listed. The geologic history of bentonite deposits in the area is not adequately known at the present time.

Development of the known industrial clay deposits, and discovery of additional deposits depend entirely upon local demand. Numerous widely distributed clay-bearing areas are known in the Columbia Basin, and the possibility of new discoveries in the neighborhood of known deposits is very promising.

[2]Ries, Heinrich, 1927, Clays, their occurrence, properties and uses. John Wiley and Sons, Inc., 3d ed.

[3]Davis, C. W., Vacher, H. C., and Conley, J. E., 1940, Bentonite, its properties, mining, preparation and utilization: U. S. Bur. Mines Tech. Paper 609.

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TABLE 1.--BRICK AND TILE CLAY

[Column 2; figures refer to map locations of deposits; deposits without figures are not located on map. Column 6: symbol "a," clay from deposit is or has been used commercially; symbol "p," no commercial use recorded except possibly for testing purposes. Column 7: underscored figures refer to numerical list of references in the text immediately preceding table 1]

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
Idaho						
Ada	1		Sec. 34, T. 4 N., R. 2 E.	Payette formation	a Finishing brick and vitrified paving brick.	7 pp. 14-15; 8 p. 28; 10 p. 17; 27 pp. 6-7.
Adams	1		Meadows		a Brick	32 p. 116.
Bannock	1		Near Pocatello	Salt Lake formation	p Terra cotta	9 p. 48.
Bear Lake	1		Paris		a Brick	32 p. 116.
Benewah	1		SE¼, sec. 23, T. 46 N., R. 2 W., railroad cut.	Latah formation	p Brick and tile	34 pp. 24-25.
Boise	1		Sec. 1, T. 5 N., R. 1 E. (Most of the town is in Ada County.)	Idaho formation	p Not known	28 p. 11.
Bonner	1		Sandpoint		a Brick	32 p. 116.
			Albeni Falls		a Brick	32 p. 116.
Bonneville	1		Idaho Falls		a Brick	32 p. 116.
Canyon	1		Caldwell		a Brick	32 p. 116.
Cassia	1		East edge of the town of Burley	Flood-plain deposits from the banks of the Snake River.	a Brick	2 p. 360; 6 p. 160; 38.
	2		N½ sec. 31, T. 10 S., R. 25 E.	Clay, 20-foot bed, above a limestone of Carboniferous age.	p Brick and tile	34 p. 29.
	3		Oakley		a Brick	32 p. 116.
Elmore	1		Sec. 15, T. 5 S., R. 9 E.	Sandy clay, 25 ft interbedded with diatomite.	p Not known	28 p. 13.
	2		Sec. 34, T. 4 S., R. 11 E.	Clay, 20 ft, overlain by diatomite and basalt.	p Not known	28 p. 13.
	3		4 miles south of King Hill	Sandy clay, interbedded with diatomite.	p Not known	28 pp. 14-15.
Franklin	1		Preston		a Brick	32 p. 116.
Fremont	1		Saint Anthony		a Brick	32 p. 116.
Gem	1		Emmett		a Brick	32 p. 116.
Idaho	1		Keuterville		a Brick	32 p. 116.
	2		Sec. 16, T. 30 N., R. 3 E.	Sandy clay	a Brick	32 p. 116; 41.
Kootenai	1		Sec. 5, T. 48 N., R. 1 E.	White clay, 10 ft and 8 ft of light-yellow clay.	p Brick and tile	34 pp. 62-65.
	2		T. 47 N., R. 3 W.	Clay, 5-foot exposure	p Brick and tile	34 pp. 36-37.
Latah	1		Sec. 1, T. 41 N., R. 5 W.	Palouse(?) formation	a Brick and tile	34 pp. 56-57.
	2	Yale deposit	Railroad cut 300 ft west of Yale station.	Residual clay, produced by weathering of granite.	p Brick	31 pp. 47-49.
	3		Railroad cut 600 ft northwest of Ayer station.	Residual clay, produced by weathering of granite.	p Brick	31 p. 20; 34 p. 57; 40 p. 481.
	4		Sec. 28, T. 40 N., R. 5 W.	Residual clay, produced by weathering of granite.	p Brick	31 pp. 20-21.
	5		Railroad cut ½ mile east of Deary.	Residual clay, produced by weathering of granite.	p Face brick, crude pottery	31 pp. 67-68; 34 pp. 41-42.
	6		Kendrick		a Brick	32 p. 116.
	7		Genesee	Latah formation	a Brick	32 p. 116.

Lewis -------	1	----------	Kippen ----------	----------	a	Brick ----------	32 p. 116.
	2	C.W. Booth pit	Western edge of town of Nezperce	Latah formation ----------	a	Brick ----------	34 p. 59; 41.
		----------	Ilo ----------	----------	a	Brick ----------	32 p. 116.
Nez Perce ---	1	----------	Lewiston ----------	----------	a	Brick ----------	32 p. 116.
Payette -----	1	----------	Town of Payette ----------	----------	a	Brick ----------	12 p. 121; 38.
Power -------	1	----------	Sec. 15, T. 8 S., R. 30 E., south side of Snake River.	Purple clay, 12 ft exposed	a	Brick ----------	34 p. 61.
	2	----------	Sec. 8, T. 9 S., R. 30 E.------	Lake deposit, 15 ft -------	p	Not known ----------	37 pp. 31, 47.
Twin Falls --	1	----------	Secs. 29, 31, T. 8 S., R. 14 E.	Idaho formation ----------	p	Not known ----------	28 p. 22; 37 p. 40.
Valley ------		Sunnyside mine (gold).	T. 19 N., R. 11 E., Marble Creek, Thunder Mountain district.	Potash clay, occurs as gangue.	p	Not known ----------	29 pp. 591, 594-595; 45 p. 109.
Washington --	1	----------	Dry Creek, T. 11 N., R. 7 W.	Clay, 6-foot bed in Payette formation.	p	Brick and tile, crude pottery and stoneware.	34 pp. 66-71.
	2	----------	1 mile north of Weiser, sec. 19, T. 11 N., R. 5 W.	Clay, 20-foot bed--------	p	Not good for brick; small amount could be used in a mixture for common structural wares.	34 p. 66.
Montana							
Flathead ----	1	----------	Whitefish ----------	Quaternary alluvium -------	a p	Pressed brick ---------- Pottery	24; 30 pp. 61-62; 41.
	2	----------	Kalispell ----------	Quaternary alluvium -------	a p	Pressed brick ---------- Pottery	24; 30 p. 62; 41; 43 p. 10.
Missoula ----	1	----------	Missoula ----------	Bozeman "lake beds," (Tertiary).	a	Brick and tile ----------	24; 41; 43 p. 10.
Ravalli -----	1	----------	Hamilton ----------	Quaternary alluvium -------	a	Brick ----------	24; 30 p. 62; 41.
Sanders -----	1	----------	Thompson Falls ----------	Quaternary alluvium -------	a	Brick and pottery -------	30 p. 61; 41.
Silver Bow --	1	----------	Butte ----------	Quaternary alluvium -------	a	Brick ----------	24; 30 pp. 57-59; 41.
Oregon							
Baker -------	1	----------	Near Carson ----------	----------	a	Tile ----------	36 p. 9.
	2	----------	Baker ----------	----------	a	Brick ----------	17 pp. 656-675.
	3	----------	Near Whitney ----------	----------	a	Brick and tile ----------	36 p. 10.
Benton ------	1	----------	Near Corvallis, NE¼ sec. 11, T. 12 S., R. 5 W.	Recent alluvium ----------	a	Brick and drain tile ----	2 p. 24; 5 p. 3; 17 p. 654.
	2	----------	Monroe, E½ sec. 28, T. 14 S., R. 5 W.	Clay, plastic, burns to a good color; valley alluvium.	a	Brick and tile ----------	2 p. 24; 5 p. 5; 17 p. 654; 35 p. 47.
Clackamas ---	1	----------	Milwaukie ----------	----------	a	Brick and tile ----------	36 p. 9.
	2	----------	Railroad cut near Cook --------	Clay, plastic, red-burning.	p	Face brick ----------	17 p. 652.
	3	----------	New Era ----------	"Surface clay" ----------	a	Brick and tile ----------	17 p. 653.
	4	----------	Estacada ----------	"Excellent clays" ---------	a	Dry press brick ---------	17 p. 652.
	5	----------	Canby ----------	----------	a	Brick and tile ---------	17 p. 653.
	6	Needy Brick & Tile Co.	NE¼ SW¼ sec. 6, T. 5 S., R. 1 E.	Willamette silty clay loam	a	Brick and tile ---------	5 p. 8.
	7	----------	Near Molalla, NE¼ SW¼ sec. 32, T. 4 S., R. 2 E.	Willamette silty clay loam	a	Building and drain tile -	2 p. 24; 5 p. 7.
		Hubbard Clay Works.	About 3 miles east of Hubbard on the south side of Hubbard to Molalla road and on west bank of Rock Creek.	Willamette silty clay loam	a	Tile ----------	5 p. 24.
Clatsop -----	1	Fort Clatsop clay.	Sec. 35, T. 8 N., R. 10 W. ----	Alluvial terrace deposit --	a p	Sewer pipe and drain pipe Brick	21 pp. 844-845, 848.
Columbia ----	1	----------	Warren ----------	----------	a	Brick and tile ----------	36 p. 10.
Coos --------	1	----------	Coos Bay (Marshfield)----------	----------	a	Brick ----------	17 p. 655; 36 p. 9.

TABLE 1.--BRICK AND TILE CLAY--Continued

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
	2	----------	Bandon ----------	----------	a Brick----------	17 p. 655.
	3	----------	Myrtle Point ----------	----------	a Brick and tile ----------	36 p. 10.
Crook -------	1	----------	Prineville ----------	----------	a Brick ----------	17 p. 656; 36 p. 10.
Curry -------	1	----------	Langlois ----------	----------	a Brick and tile ----------	36 p. 9.
Deschutes ---	1	----------	Bend ----------	----------	a Brick ----------	17 p. 656.
Douglas -----	1	----------	Oakland ----------	----------	a Brick and tile ----------	36 p. 10.
	2	----------	About ½ mile north of Sutherlin, near the highway leading to Oakland.	----------	a Brick and tile ----------	17 p. 655; 21 p. 893.
	3	----------	Roseburg ----------	----------	a Brick ----------	17 p. 655; 36 p. 10.
	4	----------	Riddle ----------	----------	a Brick and tile ----------	36 p. 10.
Gilliam -----	1	----------	Condon ----------	----------	a Brick and tile ----------	36 p. 9.
Grant -------	1	----------	Prairie City ----------	----------	a Brick and tile ----------	36 p. 10.
Jackson -----	1	Gaines property.	SW¼ sec. 20, T. 33 S., R. 1 W.	Altered tuff or rhyolite --	p Face brick ----------	47 pp. 80, 84, 92.
	2	----------	Gold Hill ----------	----------	a Brick and tile ----------	36 p. 9.
	3	----------	One mile east of Tolo along the Rogue River.	Alluvial clay ----------	a Brick and drain tile ----	17 p. 655; 48 pp. 159-160.
	4	----------	About a mile west of Jacksonville	Clay, red, containing small particles of quartz.	a Brick and tile ----------	17 p. 655; 48 pp. 141-142.
	5	----------	Medford ----------	----------	a Brick and tile ----------	36 p. 9.
	6	----------	NE¼ sec. 25, T. 37 S., R. 1 W.	Residual soil ----------	p Brick(?) ----------	47 pp. 81, 93.
	7	----------	Ashland ----------	----------	a Brick and tile ----------	36 p. 9.
Josephine ---	1	----------	Near Grants Pass, E½ SE¼ SW¼ sec. 24, T. 37 S., R. 8 W.	Slate of the Galice(?) formation, deeply weathered.	a Brick and tile ----------	3 pp. 23, 102; 5 p. 9; 36 p. 9.
			The head of Waters Creek, T. 36 S., R. 7 W.	Altered tuff or rhyolite --	p Brick ----------	47 pp. 81, 93.
Klamath -----	1	----------	Klamath Falls, SW¼ sec. 19, T. 38 S., R. 9 E.	Clays, associated with tuffs and diatomite.	a Brick and tile ----------	3 p. 24; 5 pp. 9, 10; 17 p. 655; 38.
	2	----------	Merrill ----------	----------	a Brick and tile ----------	36 p. 9.
Lake --------	1	----------	Lakeview ----------	----------	a Brick and tile ----------	36 p. 9.
Lane --------	1	Junction City clay deposit	SW¼ NW¼ sec. 31, T. 15 S., R. 5 W.	Clay gravel conglomerate, highly weathered, 5 ft below which is 2 ft fine-textured clay becoming more sandy with depth.	a Brick and tile ----------	21 pp. 885, 887; 47 pp. 64-65.
	2	----------	Greenleaf ----------	----------	a Brick and tile ----------	36 p. 8.
	3	----------	Railroad cut at Elmira --------	Clay at least 27 ft thick-	a Brick, tile, pottery ----	17 p. 655; 35 p. 47.
	4	----------	SE¼ NW¼ SW¼ NE¼ sec. 34, T. 17 S., R. 4 W.	Clay, kaolinitic, sandy, micaceous, 38 acres, reported 90 ft thick.	a Mixed for red structural brick, moulding sand.	21 pp. 870-871; 35 p. 47.
	5	Eugene Fire Clay Products Co.	NW¼ sec. 36, T. 17 S., R. 4 W.	----------	a Brick ----------	17 pp. 654-655; 21 pp. 867-869, 887; 47 pp. 65-66, 84, 91.
	6	----------	Florence ----------	----------	a Brick and tile ----------	36 p. 9.
	7	----------	Near Cottage Grove ----------	----------	a Brick and tile ----------	36 p. 9.
Lincoln -----	1	----------	Toledo ----------	----------	a Brick and tile ----------	36 p. 10.
Linn --------	1	----------	East Albany, SE¼ sec. 5, T. 11 S., R. 3 W.	Alluvial clays ----------	a Brick and tile ----------	3 p. 24; 5 pp. 10, 11; 17 p. 654.

Malheur	1		Ontario		a	Brick and tile	36 p. 10.
	2		Sec. 21, T. 18 S., R. 45 E.	Payette formation	a	Brick	5 p. 11.
Marion	1		Aurora, also Needy Brick and Tile Co. located at Needy, near Aurora.		a	Brick and tile	3 p. 102; 36 p. 9.
	2		Donald, E½ SW¼ sec. 17, T. 4 S., R. 1 W.	Alluvial terrace	a	Brick and tile	5 p. 12; 17 p. 653.
	3		Hubbard		a	Brick and tile	36 p. 9.
	4		Woodburn	"Surface clay"	a	Brick and tile	17 p. 653; 36 p. 10.
	5		Gervais		a	Brick	36 p. 9.
	6		Mount Angel		a	Brick	36 p. 8.
	7		Near Chemawa		a	Brick	36 p. 9.
	8		Salem	"Surface clay"	a	Brick and tile	17 p. 654.
	9		NE¼ SE¼ sec. 36, T. 7 S., R. 1W.	Residual clay	p	Brick	21 p. 865; 47 pp. 60, 91.
Multnomah	1		SE¼ sec. 6, T. 1 N., R. 1 E.	River-terrace deposit	a	Brick	14 p. 18.
	2		NE¼ sec. 6, T. 1 S., R. 1 E.	Sandy clay, from base of loess.	a	Brick, hollow ware, drain tile.	5 pp. 14-15; 14 p. 18; 17 p. 651.
			Barnes Road, also Linnton road, and also West Portland.	Sandy clay, from base of loess.	a	Brick and tile	17 p. 651.
			Near Central	Alluvial clay	a	Brick	36 p. 9.
	3		Hogan, SW¼ sec. 14, T. 1 S., R. 3 E.	Alluvial clay	a	Brick, hollow ware, and drain tile.	5 p. 13; 17 p. 652.
	4		Anderson	Alluvial clay	a	Brick	17 p. 653.
			Terry	Alluvial clay	a	Brick and tile	36 p. 10.
Polk	1		Dallas		a	Brick	17 p. 654; 36 p. 9.
	2		Falls City		a	Brick	17 p. 654.
	3		Monmouth, SW¼ sec. 24, T. 8 S., R. 5 W.	Willamette silty clay loam	a	Brick and tile	5 p. 16; 17 p. 654; 36 p. 9.
	4		Independence		a	Brick and tile	36 p. 9.
	5		Airlie		a	Brick	17 p. 654.
Sherman	1		Wasco		a	Brick and tile(?)	36 p. 10.
	2		Moro		a	Brick and tile	36 p. 10.
	3		Grass Valley		a	Brick and tile	36 p. 9.
Tillamook	1		Bay City		a	Brick	36 p. 9.
	2	Tillamook clay deposit.	Sec. 5, T. 2 S., R. 10 W.		p	Brick and tile	21 pp. 841-843.
	3	Tillamook Clay Works.	SW¼ sec. 10, T. 2 S., R. 9 W.		a	Brick and tile	5 p. 17; 22 pp. 4, 9.
Umatilla	1		Weston	Volcanic ash, decomposed	a	Brick	17 p. 656; 36 p. 10.
	2		Meacham	Alluvial	a	Brick and tile	36 p. 9.
Union	1		Elgin	Alluvial	a	Brick and tile	36 p. 9.
	2		La Grande, sec. 36, T. 2 S., R. 37 E.	Lacustrine deposit	a	Brick and tile	5 pp. 17, 18; 17 p. 656; 36 p. 9.
Washington	1		Banks		a	Brick	36 p. 9.
	2		North Plains	"Surface clays"	a	Brick and tile	17 p. 651.

TABLE 1.--BRICK AND TILE CLAY--Continued

State and County	No.	Name of Deposit	Location	Description		Use of clay	Reference
	3	Forest Grove clay deposit	SE¼ NE¼ sec. 1, T. 1 S., R. 4 W.	Alluvial and (or) terrace deposit.	a	Brick and tile	5 pp. 18, 19; 17 p. 651.
	4	----------	Hillsboro	Surface clays	a	Brick and tile	17 p. 651; 36 p. 9.
	5	Beaverton clay deposit.	Sec. 15, T. 1 S., R. 1 W.	----------	a	Brick	17 p. 652.
	6	----------	NE¼ sec. 23, T. 2 S., R. 1 W.	Surface clay, intermixed with gravel. (A deposit of better-grade clay about a mile south has been opened and worked.)	a	Brick and tile	17 p. 652; 32 p. 250.
	7	----------	Scholls, NW¼ sec. 10, T. 2 S., R. 2 W.	Pleistocene terrace deposit	a	Brick, tile, hollow building blocks.	3 p. 24; 5 pp. 20, 21; 36 p. 10.
	8	----------	Sherwood	Pleistocene terrace deposit	a	Brick and tile	3 p. 102; 5 pp. 19-20; 17 p. 653.
			Railroad cuts between Buxton and Timber, T. 3 N., R. 4 and 5 W.	----------	p	Brick and tile	17 p. 651.
Yamhill	1	----------	Newberg	Clay, overlain by 20 ft of overburden.	a	Face and common brick	17 p. 653; 36 p. 10.
	2	----------	McMinnville, NW¼ sec. 28, T. 4 S., R. 4 W.	Willamette silty clay loam	a	Brick and tile	3 p. 24; 5 pp. 21-22; 17 p. 653; 36 p. 9.
	3	----------	Whiteson	----------	a	Brick and tile	36 p. 10.
	4	Willamina clay deposit.	0.8 miles north of town of Willamina, SE¼ sec. 36, T. 5 S., R. 7 W.	Residual clay, derived by weathering of basalt; 6 to 12 ft thick; underlies 126 acres.	a	Brick and tile, face brick	5 pp. 22-24; 21 pp. 818-837; 46 pp. 204-205, 207; 47 pp. 34-38, 84, 88.
			Some distance west of North Yamhill.	----------	a	Sewer pipe, hollow ware, and face brick.	17 pp. 652-653; 36 p. 10.
Washington							
Adams	--	----------	Southwest part of county	Recent alluvial, buff-colored clay silts, and silty sandstones.	p	Brick and tile	19 pp. 59, 336.
Asotin	1	----------	4 miles up river from Asotin	Compact, yellow-gray clay--	p	Brick	19 pp. 60, 342-343.
Benton	1	----------	Pit north of Hanford, sec. 25, T. 13 N., R. 27 E.	Alluvial clay, sandy on bank of Columbia River.	a	Brick	19 p. 61; 26 p. 31; 42 p. 22.
	2	----------	Prosser	Alluvial clay, silty.	a	Brick	19 pp. 60, 342-343; 33 pp. 230-231, 318-319; 42 p. 22.
	3	----------	Kennewick	Alluvial clay, silty	a	Brick	19 p. 60; 26 p. 31; 33 p. 231; 42 p. 22.
Chelan	1	----------	NW¼ NW¼ sec. 1, T. 27 N., R. 22 E.	Surface loam and colluvial clay.	a	Brick	19 pp. 64-65, 358; 42 p. 22.
	2	----------	Chelan	Glacial clay, 40 ft covers considerable area.	a	Brick	19 pp. 64-65, 342-343; 33 pp. 235-236, 318-319; 42 p. 22.
	3	----------	Leavenworth	Alluvial clay	a	Brick	26 p. 31.
	4	----------	Wenatchee, 9th and Columbia Sts., and 9th St. and Walla Walla Ave.	Alluvial	a	Brick, rough-textured face brick and hollow block.	19 pp. 63-64, 343-344, facing p. 358; 33 pp. 234-235; 42 p. 22.
	5	Squaw Saddle deposit.	SE¼ SE¼ sec. 16, T. 22 N., R. 20 E.	Weathered rhyolite	p	Low-grade siliceous refractory, as a portion of light-colored structural wares.	19 p. 65; 21 p. 691; 46 p. 122-125.
Clallam	1	----------	Railroad cut east of Twin, NW¼ sec. 25, T. 31 N., R. 10 W.	Tertiary shale	p	Brick	19 pp. 66-67, 336.
	2	----------	Fort Angeles, south side of street one block east of Port Angeles post office.	Glacial clay, about 30 ft thick.	a	Brick and tile	19 pp. 68-69, 336; 42 p. 21; 46 pp. 157, 160-161.

Clark	1	SE¼ sec. 17, T. 4 N., R. 1 E.	Alluvial clay, reddish-buff, sandy; at least 52 ft thick.	a	Face brick and tile	19 pp. 72-73, facing p. 358, 42 p. 22.
	2	North part of town of Vancouver, 2611 Kauffman St.	Clay, yellowish sandy, alluvial.	a	Brick and tile	19 pp. 71-72, 336; 26 p. 31; 42 p. 22.
	3	Russell Landing, east of Vancouver, SW¼ SW¼ sec. 33, T. 2 N., R. 2 E.	Terrace, about 100 ft above river level, 20 ft of gray brick loam overlies 6 ft purer blue clay.	a	Brick and terra cotta	14 p. 18; 19 pp. 69-70, 336, facing p. 358; 33 pp. 299-300; 42 p. 22.
	4	NE¼ sec. 10, T. 1 N, R. 4 E.	Alluvial	p	Brick and tile	19 pp. 70-71, 336.
Columbia	1	Near Dayton	Palouse formation	a p	Brick Drain tile	19 pp. 73, 336, 342-343; 33 pp. 227-229, 318-319; 42 p. 22.
Cowlitz	1	A. E. Bingham prospects.	Secs. 8, 17, T. 9 N., R. 2 W.	Clay, and shalelike clay above coal bed.	p	Brown and buff structural wares.
	2	SE¼ sec. 32, T. 9 N., R. 3 W.	Eocene(?) sediments	p	Buff-colored facing brick and high-quality structural ware.	18 p. 23.
	3	Temple property.	Highway cut about 2 miles south of Kelso.	Weathered volcanic ash	p	Brick and tile
Douglas	1	Bridgeport	Glacial(?) clay	p	Brick	19 pp. 342-343; 33 pp. 318-319.
	2	Waterville	Sandy clay, Pleistocene loess.	a	Brick	19 p. 85; 26 p. 31.
Ferry	1	3 miles west of Republic	Glacial clay, yellowish-gray	a	Brick	19 p. 87; 33 pp. 318-319; 42 p. 22.
Franklin	1	Sec. 33, T. 13 N., R. 28 E.	Clay, light-buff, containing some ash and fine sandy clay of Ringold formation.	p	Brick and tile by addition of nonplastic material to reduce shrinkage.	19 pp. 90-94, 336.
Garfield	1	Near Pomeroy	Clay, gray, silty, alluvial	a	Brick	19 p. 94; 33 p. 230.
Grant	1	Railroad cut along Great Northern Railway near Trinidad.	Clay, 15 to 40 ft thick, 1200 ft wide.	p	Brick and terra cotta	15 p. 7.
Grays Harbor	1	Southwest corner sec. 9, T. 20 N., R. 10 W.	Oligocene shale, unweathered	p	Brick and tile	19 pp. 98-99, 337; 46 pp. 140, 149-150.
	2	NW¼ sec. 27, T. 18 N., R. 10 W.	Clay, light-colored, weathered Willapa Pleistocene.	p	Brick and tile	19 pp. 104-105, 337.
	3	SW¼ sec. 28, T. 18 N., R. 9 W.	Tertiary shale	p	Brick and tile, shrinkage need reduction.	19 pp. 100, 337.
	4	Secs. 33, 34, T. 18 N., R. 8 W.	Tertiary shale, 12 ft overburden.	p	Brick and tile, shrinkage need reduction.	19 pp. 101, 337.
	5	N½ sec. 32, T. 17 N., R. 10 W.	Willapa, 12 ft bluish-gray, soft, silty clay (Pleistocene).	p	Brick and tile	19 pp. 101-103, 337.
	6	Railroad cut northwest corner sec. 19, T. 16 N., R. 10 W.	Tertiary shale	p	Brick and tile	46 pp. 142, 149-150.
Jefferson	1	3 miles north of Quilcene	Tertiary shale	p	Brick and tile	19 pp. 107, 337.
	2	South end of Balton Peninsula	Tertiary shale	p	Brick and tile	19 pp. 107-108, 337; 46 pp. 141, 149-150.
King	1	Woodinville near north end of Lake Washington, sec. 9, T. 26 N., R. 5 E.	Glacial clay, blue	a	Brick, tile and "haydite" (burned clay and shale aggregates).	19 p. 158; 26 p. 31; 42 p. 21.
	2	Grotto, sec. 17, T. 26 N., R. 11 E.	Glacial clay	a p	Portland cement Brick and tile	15 p. 7; 42 p. 21.
	3	About 2 miles north of Seattle on the western shore of Lake Washington.	Glacial clay	a	Brick	26 p. 31, 33 pp. 248-249, 318-319; 42 p. 21.
	4	Seattle	Glacial clay, used by 10 brickyards.	a	Brick and tile	19 pp. 152-154, 156-157; 33 pp. 240-248, 318-319; 42 p. 21; 46 pp. 158-161.
	5	NE¼ NW¼ SW¼ sec. 27, T. 24 N., R. 5 E.	Shale of Puget group	a	Brick, tile, and all red ware.	42 p. 21; 46 pp. 112, 119-120.

TABLE 1.--BRICK AND TILE CLAY--Continued

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
	6	----------	Foot of Beacon Hill, ½ mile north of Black River Junction.	Shale, in coal mine -------	p Brick and tile ----------	19 pp. 117-119, 337, 344-345.
	7	----------	½ mile east of Renton on south side of Cedar River.	Shale of Puget group ------	a High-grade paving brick, vitrified building brick.	19 pp. 113-114, 337, 344-345; 33 pp. 249-254, 318-319; 42 p. 21.
	8	----------	Secs. 29, 30, T. 23 N., R. 6 E.	Eocene clay ----------	p Brick and tile ----------	19 pp. 121-122, 337.
	9	Durham coal mine.	NW¼ sec. 2, T. 21 N., R. 7 E.	Shales of the Puget group, interbedded with coal.	a Brick ----------	19 p. 134; 42 p. 21.
	10	----------	NW¼ sec. 14, T. 21 N., R. 7 E.	Tertiary shale; plant for paving brick at Bayne failed.	p Brick and tile ----------	46 pp. 132, 146-148.
	11	----------	8 miles east of Enumclaw on Highway No. 410.	Residual clay, derived by weathering of basalt.	p Brown structural ware ---	19 pp. 108-110, 337, 344-345.
	12	----------	NE¼ NW¼ sec. 1, T. 19 N., R. 8 E.	Residual clay, derived by weathering of basalt.	p Gray and brown structural wares.	19 pp. 111, 337, 344-345; 21 p. 799.
Kitsap ------	1	----------	Sec. 34, T. 24 N., R. 1 E.	Glacial clay, blue --------	a Brick ----------	33 pp. 292-293; 42 p. 21.
	2	----------	Sec. 2, T. 23 N., R. 2 E. ¼ mile SW of Harper.	Glacial clay, 60 ft thick -	a Brick and tile ----------	19 pp. 162-163, 338; 26 p. 31; 33 pp. 291-300; 42 p. 21; 46 pp. 157-158, 160-161.
Kittitas ----	1	----------	Cle Elum on Yakima River ------	Alluvial clay, silty -----	a Brick ----------	26 p. 31; 33 p. 233; 41; 42 p. 22.
	2	----------	East edge of Ellensburg -------	Alluvial clay, silty of limited magnitude.	a Brick ----------	19 p. 166; 33 p. 233; 42 p. 22.
Klickitat ---	1	----------	Goldendale in the valley of the Klickitat Creek.	Alluvial clay ----------	a Brick ----------	19 p. 167; 26 p. 31; 42 p. 22.
	2	----------	Near Lyle ----------	----------	p Brick and tile ----------	15 p. 7.
Lewis -------	1	----------	In Centralia ----------	Alluvial clay on the bank of the Chehalis River.	a Brick and tile ----------	26 p. 31; 33 pp. 298-299, 318-319; 42 p. 21.
	2	----------	S½ NE¼ sec. 12, T. 14 N., R. 2 W.	Willapa clay (Pleistocene)	p Brick and tile ----------	19 p. 186.
	3	----------	Near Mendota, T. 14 N., R. 1 W.	Eocene shale ----------	p Brick and tile ----------	19 pp. 176-177, 185, 338; 46 pp. 138-139, 149-150.
	4	----------	Sec. 24, T. 14 N., R. 3 W. ----	Alluvial clay, sandy, bluish-gray, soft, fine-textured.	p Brick and tile ----------	19 pp. 188, 338.
	5	----------	In northern part of Chehalis --	Willapa clay (Pleistocene) and underlying Eocene sediments.	a Brick, hollow block, and drain tile.	19 pp. 186-187, 338, 344-345; 33 pp. 296-297, 318-319; 42 pp. 21-22.
	6	----------	4 miles southeast of Pe Ell, road cut on the Boistfort road.	Tertiary shale ----------	p Brick and tile ----------	19 pp. 176, 338.
	7	----------	Railroad cut 2½ miles northeast of Napavine.	Willapa clay (Pleistocene)	p Brick and tile ----------	19 pp. 182-183, 338.
	8	----------	Highway 1 mile north of Napavine.	Alluvial clay, sandy, bluish-gray to yellowish-gray.	p Brick and tile ----------	19 pp. 188, 388.
	9	----------	½ mile southwest of Napavine --	Willapa clay (Pleistocene)	p Brick and tile ----------	19 pp. 180-181, 338.
	10	----------	SE¼ sec. 13, T. 12 N., R. 1 E.	Tertiary shale ----------	p Brick ----------	19 p. 178.
	11	----------	Sec. 25, T. 13 N., R. 3 E. ----	Tertiary shale ----------	p Brick and tile ----------	46 pp. 122-125, 138, 146-149.
	12	----------	Sec. 25, T. 13 N., R. 4 E. ----	Eocene shale and in 3½ sec. 25, recent alluvial material.	p Brick and tile ----------	19 pp. 178-179, 189, 338.
	13	----------	Sec. 5, T. 11 N., R. 2 W. -----	Tertiary shale in bed of Olequa Creek, south of Winlock.	p Brick and tile ----------	19 pp. 174-175, 338; 46 pp. 137-138, 146, 149-150.
	14	----------	½ mile east of Vader, sec. 33, T. 11 N., R. 2 W.	Willapa clay (Pleistocene)	a Brick and tile, dry press brick.	19 p. 184; 33 pp. 294-296; 46 p. 22.
Lincoln -----	1	----------	Sec. 30, T. 27 N., R. 39 E. ---	Glacial clay ----------	p Face Brick ----------	19 pp. 189-190.
	2	----------	Along railroad at Mondovi -----	Residual clay, derived by weathering of basalt.	p Brick ----------	33 pp. 219-220, 318-319.

Mason	1	Sund Creek near Hoodsport	Tertiary shale	p	Brick and tile	19 pp. 190-191, 338.
	2	SE¼ sec. 32, T. 19 N., R. 3 W.	Willapa clay (Pleistocene)	p	Brick and tile	19 pp. 191-192, 338; 46 pp. 122-125.
Okanogan	1	Secs. 21, 22, T. 40 N., R. 27 E.	Alluvial silt and clay	a	Brick	19 pp. 193-194, 339, 346-347; 42 p. 22.
	2	1 mile east of Brewster on Highway No. 97.	Alluvial silt and clay	p	Brick and tile	19 pp. 194-195, 339, 346-347.
Pacific	1	1½ miles west of business center of Raymond.	Tertiary shale	p	Brick and tile	19 pp. 198, 339; 46 pp. 140, 149-150.
	2	2 miles southeast of Raymond, cut in State Route 12.	Tertiary shale	p	Brick and tile	19 pp. 197, 339.
	3	South Bend	Willapa clay (Pleistocene)	a	Brick and hollow block	19 p. 199; 42 p. 21.
	4	Near Bay Center	Pleistocene clay, sandy, gray.	p	Brick and tile	19 pp. 199-200, 339.
	5	½ mile west of Lebanon	Tertiary shale	p	Brick and tile	19 pp. 196, 339.
	6	SE¼ SW¼ sec.6, T. 12 N., R. 6 W.	Tertiary shale	p	Brick and tile	19 pp. 195-196, 339.
Pend Oreille	1	Upper end of Box Canyon on Pend Oreille River, T. 35 N., R. 43 E.	Alluvial clay	p	Brick and portland cement	25 p. 382; 33 pp. 214-215, 320-321.
	2	South and east of Newport T. 31 N., R. 45 E.	Clay, white, sandy, having very little plasticity, and yellow clay having a good degree of plasticity.	p	Probably brick	33 pp. 212-213, 320-321.
Pierce	1	Gig Harbor	Glacial clay	p	Brick and tile	16 pp. 763-764.
	2	Jovita	Glacial clay	a	Brick	26 p. 31.
	3	West side of Fox Island near north end.	Glacial clay, 40-foot bed	a	Brick	33 pp. 273-274; 42 p. 21.
	4	Southeastern part of city of Tacoma.	Glacial clays	a	Brick	26 p. 31; 33 pp. 272-273; 42 p. 21.
	5	Canyon 100 ft west of old No. 6 tunnel of Carbon Hill Coal Co. at Carbonado.	Tertiary shale	p	Brick and tile	19 pp. 215-216, 339, 348-349; 46 pp. 133, 146-148.
	6	Clay City, sec. 36, T. 17 N., R. 4 E.	Residual clay, derived by weathering of andesite.	a	Various clay structural products.	19 pp. 208-213; 42 p. 21.
San Juan	1	Orcas Island, sec. 21, T. 37 N., R. 1 W.	Glacial clays, blue	a p	Brick Cement	25 p. 378; 33 pp. 289, 318-319; 42 p. 21.
	2	San Juan Island at Roche Harbor	Glacial clays, 40 ft thick	a	Brick	25 p. 378; 33 pp. 289, 318-319.
	3	Lopez Island along beach 3½ miles from town of Lopez.	Glacial clays	p	Building brick and drain tile.	19 pp. 217, 339, 348-349; 33 p. 290.
Skagit	1	Alger, sec. 7, T. 36 N., R. 4 E.	Recent lacustrine clay, from the valley bottom.	a	Brick	19 p. 223; 33 pp. 281-282, 320-321; 42 p. 21.
	2	Railroad cut ½ mile south of Prairie.	Recent lacustrine clay	p	Brick and tile	19 pp. 224, 339, 348-349.
	3	Railroad(?) cut just south of Hoogdal.	Glacial clay	p	Brick and tile	19 pp. 220-221, 339, 348-349.
	4	Concrete on both sides of Baker River and (or) in sec. 2, T. 35 N., R. 8 E.	Recent alluvial clay, and (or) glacial clay.	a	Brick, portland cement	19 pp. 219-220, 339; 25 pp. 379-380; 33 pp. 282-283, 320-321; 42 p. 21.
	5	Sec. 8, T. 35 N., R. 9 E.	Glacial clay	p	Brick and tile	19 pp. 220, 348-349; 33 pp. 320-321.
	6	Anacortes	Glacial clay	a	Brick	19 p. 223; 42 p. 21.
	7	Near Bay View on Padilla Bay	Glacial clay	a	Brick, drain tile, hollow block.	19 p. 223; 26 p. 31; 42 p. 21.

TABLE 1.--BRICK AND TILE CLAY--Continued

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
	8	----------	S½ sec. 30, T. 35 N., R. 6 E.--	Recent lacustrine deposit of powdery talc mixed with clay.	p Brick and tile ----------	19 pp. 223-224, 339, 348-349.
	9	----------	Tiloh, NE¼ sec. 23, T. 34 N., R. 4 E.	Recent lacustrine clay, about 40 ft thick.	a Brick and tile ----------	19 pp. 222, 339, 348-349, facing p. 358; 26 p. 31; 42 p. 21.
	10	----------	North part of town of McMurray	Tertiary shale ----------	p Brick and tile ----------	19 pp. 219, 339, 348-349; 46 pp. 134, 146-148.
Snohomish ---	1	----------	Granite Falls ----------	Glacial clay ----------	p Brick and tile ----------	19 pp. 348-349; 33 pp. 320-321.
	2	----------	Everett, northern part, two brick yards.	Glacial clay ----------	a Brick ----------	19 pp. 225-227, 339, 348-349; 33 pp. 278-279; 42 p. 21.
	3	----------	Everett, southeast part -------	Glacial clay, about 40 ft thick.	a Brick ----------	19 pp. 225-227, 339, 348-349, facing p. 358; 33 pp. 277-278; 42 p. 21.
	4	----------	Northwest part of town of Snohomish.	Glacial and Recent alluvial clay.	a Brick and tile ----------	19 p. 227; 42 p. 21; 46 pp. 159-161.
	5	----------	State Reformatory at Monroe ---	Glacial clay ----------	a Brick used for the buildings.	19 p. 227; 42 p. 21.
	6	----------	Near Sultan ----------	----------	p Brick ----------	15 p. 8.
Spokane -----	1	----------	Road cut NW¼ sec. 27, T. 29 N., R. 43 E.	Latah formation ----------	p Brick and tile ----------	19 pp. 225, 276, 340; 46 pp. 116, 123-125.
	2	----------	Along Bear Creek E½ sec. 10, T. 28 N., R. 43 E.	Latah formation ----------	p Brick and tile ----------	19 pp. 274, 340.
	3	----------	Road cut 2½ miles south of Milan, center north line, sec. 13, T. 28 N., R. 43 E.	Latah formation ----------	p Brick and tile ----------	19 pp. 274-275, 340; 46 pp. 130-131, 146-148.
	4	----------	NW¼ sec. 16, T. 27 N., R. 43 E.	Latah formation ----------	p Brick and tile ----------	19 pp. 273-274, 340.
	5	----------	1 mile north of Mead, sec. 2, T. 26 N., R. 43 E.	Glacial clay ----------	a Brick ----------	19 pp. 279-280, 340, 350, 351; 33 pp. 174, 175; 42 p. 22.
	6	----------	Mead, along north bank of Peone Creek.	Latah formation ----------	a Red repress brick -------	33 pp. 174-176, 320, 321.
	7	----------	Spokane, W. 2120 - 26th Ave. Similar undeveloped deposits in southwest corner sec. 24, T. 25 N., R. 42 E. and on Peterson's farm near the Spokane Country Club.	Latah formation ----------	a Brick ----------	19 pp. 267-270, 340, 350, 351; 33 pp. 169-172, 320, 321; 42 p. 22; 46 pp. 115, 123-125, 145.
	8	----------	Center sec. 19, T. 25 N., R.44 E.	Residual clay, derived by weathering of gneiss.	p Brick and tile ----------	46 pp. 129, 146-148.
	9	----------	Sec. 19, T. 25 N., R. 45 E. ---	Latah formation ----------	p Brick and tile ----------	19 pp. 271, 340.
	10	----------	Cheney ----------	Palouse formation ---------	a Brick ----------	33 pp. 194-196, 320, 321; 42 p. 22.
					p Repress brick and drain tile.	
	11	----------	Railroad cut just west of Hager station, sec. 36, T. 24 N., R. 45 E., sec. 1, T. 23 N., R. 45 E.	Clay, gray, poorly sorted and quartzose sand, at least 40 ft thick.	p Brick and tile ----------	19 p. 239.
	12	----------	Road cut 2½ miles southeast of Fairfield NW¼ SW¼ sec. 29, T. 22 N., R. 45 E.	Semirefractory clay -------	p Brick and tile, hollow block.	19 pp. 237, 239; 42 p. 24; 46 pp. 129, 146-148.
	13	----------	N½ sec. 25, T. 21 N., R. 45 E.	Latah formation ----------	p Brick and tile, hollow block.	19 pp. 234, 235, 339.
			6 miles north of Spokane on the farm of W. G. Lake.	Latah formation ----------	p Brick and tile ----------	33 pp. 172-174, 320, 321.

Stevens -----	1	Sec. 17, T. 39 N., R. 40 E. and also at Northport.	Glacial(?) clay, silty ----	a	Brick ----------	19 pp. 297-298; 33 pp. 216, 320-321; 42 p. 22.
	2	NE¼ sec. 17, T. 37 N., R. 38 E.	Glacial clay ----------	p	Brick and tile ----------	19 pp. 298, 340.
	3	Kettle Falls along the Columbia River.	Glacial clay ----------	a	Brick ----------	19 p. 296; 33 pp. 218-219; 42 p. 22.
	4	Colville ----------	Alluvial clay, silty ------	a	Brick ----------	19 p. 295; 33 pp. 210-211; 42 p. 22; 66 p. 342.
	5	Chewelah ----------	Glacial clay and recent silty alluvial clay.	a	Brick and tile ----------	19 pp. 294-295, 340, 350-351; 33 p. 211; 42 p. 22.
	6	NW¼ sec. 3, T. 31 N., R. 37 E.	Glacial clay, silty -------	p	Brick and tile ----------	19 pp. 295, 340.
	7	W½ sec. 28, T. 31 N., R. 40 E.	Latah formation ----------	p	Brick and tile ----------	19 p. 280.
Thurston ----	1	Olympia ----------	----------	a	Brick and tile ----------	26 p. 32.
	2	Northwest corner sec. 19, T. 16 N., R. 1 W.	Tertiary shale ----------	p	Brick and tile ----------	19 pp. 300-301, 340.
	3	Near Bucoda ----------	"Clay deposit" ----------	p	Not known ----------	15 p. 8.
		Near Olympia ----------	Clay, light-gray; cone of fusion 4 (1210° C).	p	Brick, vitrified paving brick.	33 pp. 275-276, 320-321.
Wahkiakum ---	1	E½ sec. 8, T. 9 N., R. 6 W. --	Tertiary shale ----------	p	Brick and tile ----------	19 pp. 302, 303, 340; 46 pp. 136, 146-149.
	2	Logging railroad cut ¾ mile north of Cathlamet, near T. M. Bowman farm, T. 8 N., R. 6 W.	Willapa clay (Pleistocene)	p	Brick and tile ----------	19 pp. 303-305, 340; 46 pp. 119, 123-125.
	3	Sec. 7, T. 8 N., R. 4 W. -----	Clay, derived by weathering of basalt.	p	Brick and tile ----------	19 pp. 302, 340.
Walla Walla--	1	Walla Walla ----------	Recent alluvial ----------	a	Brick and tile ----------	19 p. 306; 26 p. 32; 42 p. 22.
Whatcom -----	1	Kendall ----------	Glacial clay ----------	p	Brick and tile ----------	25 p. 379; 33 pp. 288, 320-321.
	2	Brennan in sec. 33, T. 39 N., R. 2 E.	Glacial clay ----------	a	Portland cement --------	42 p. 21.
	3	Bellingham ----------	Glacial clay; also shale in Bellingham coal mine.	a p	Brick ---------- Brick and tile ----------	19 pp. 306-307, 341; 33 pp. 284-286; 42 p. 21.
	4	Grand View station on Great Northern Railway.	Shale of the Chuckanut formation.	a	Brick and tile --------	19 pp. 307-308; 26 p. 32; 42 p. 21; 46 pp. 144, 149-150.
	5	Chuckanut ----------	----------	a	Brick and tile(?) ------	15 p. 8.
Whitman -----	1	Road cut NW¼ sec. 3, T. 19 N., R. 43 E.	Lake bed of pre-Palouse age	p	Brick and tile ----------	19 pp. 331-332, 341.
	2	Near Garfield ----------	Palouse formation ---------	a	Brick ----------	19 p. 329; 33 p. 226; 42 p. 22.
	3	Colfax ----------	Palouse formation ---------	a	Brick ----------	19 p. 329; 33 p. 225; 42 p. 22.
	4	About 2 miles southeast of Pullman.	Palouse formation and (or) clay derived by weathering of basalt.	a	Brick ----------	19 p. 329; 33 pp. 225-226; 42 p. 22.
	5	Road cut SE¼ SE¼ sec. 12, T. 13 N., R. 45 E.	Pre-Palouse formation -----	p	Brick and tile ----------	19 pp. 329-330, 341, 352-353.
	6	Road cut NW¼ sec. 26, T. 13 N., R. 45 E.	Pre-Palouse formation -----	p	Brick and tile ----------	19 pp. 330-331, 341.
	7	Uniontown ----------	Palouse formation ---------	a	Brick and tile ----------	19 p. 329; 42 p. 22.
Yakima ------	1	Yakima along Yakima River -----	Recent alluvial clay ------	a	Brick ----------	19 pp. 332, 352-353; 33 pp. 232, 320-321; 42 p. 22.
	2	NW¼ sec. 35, T. 12 N., R. 23 E.	Clay of the Rhingold formation.	a	Asphalt flooring -------	42 p. 22.
	3	Toppenish ----------	Recent alluvial clay ------	a	Brick and tile ----------	19 p. 332; 26 p. 32.
	4	Near center SE¼ sec. 34, T. 11 N., R. 21 E.	Clay, light and buff, probably Rhingold formation.	a	Filler in asphalt flooring.	42 p. 22.
	5	Granger SW¼ sec. 22, T. 10 N., R. 21 E.	Shales of the Ellensburg formation.	a	Brick and tile, rough-textured face brick, and hollow block.	19 pp. 333, 335, 341; 33 pp. 232-233; 42 p. 22.

TABLE 2.--POTTERY CLAY

[Column 2: figures refer to map locations of deposits; deposits without figures are not located on map. Column 6: symbol "a," clay from deposit is or has been used commercially; symbol "p," no commercial use recorded except possibly for testing purposes. Column 7: underscored figures refer to numerical list of references in the text immediately preceding table 1]

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
Montana						
Missoula	1		About 5 miles west of Missoula	Quaternary(?) alluvium	a Brick p Pottery	24; 30 p. 59; 41.
Ravalli	1		3 miles south of Grantsdale on the Bush place.	Quaternary(?) alluvium	p Pottery	24; 30 p. 62; 41.
Sanders	1		Whitepine	Quaternary alluvium	p Pottery	30 p. 61; 41.
	2		Thompson Falls	Quaternary alluvium	a Pottery	24; 30 p. 61; 41.
Oregon						
Clackamas	1	Oswego clay pit.	Foot of 5th and E. Sts. in Oswego, at the bottom of Tryon Creek.	Troutdale formation reworked.	a Pottery in local studios, patching furnace linings.	21 pp. 847-848; 39 (map).
			Along the west side of the hills near the mouth of the Clackamas River, along the right of way of the Southern Pacific Lines.	Clay, semiplastic under 6 to 8 ft of overburden.	a Stoneware	17 p. 652.
			Mouth of Pine Creek and Salmon River, foot of Elkhorn Range.	Kaolinite	No recorded use	36 p. 8.
Clatsop	1	Seaside clay deposit.	NW¼ NW¼ sec. 4, T. 5 N., R.10 W.		a Pottery	21 pp. 843-844, 848; 47 pp. 33, 84, 88.
		Oregon Pottery Co., Portland.	Smiths Landing		a Pottery	1 pp. 83-84.
Jackson			Road between Evans Creek and Trail Creek on Gardiner's farm.		a Pottery	48 p. 160.
Josephine	1	Marlin clay deposit.	NW¼ sec. 34, T. 35 S., R. 7 W.	Residual clay, derived by weathering of granite.	p Red pottery bodies and architectural ware.	21 pp. 889-892.
Lane	1		Railroad cut at Elmira	Clay, bluish white	p Pottery	32 p. 116; 35 p. 47.
	2		SW¼ SE¼ sec. 1, T. 18 S., R. 4W.	Tuff, probably altered	p Pottery(?)	21 pp. 872, 887.
Linn	1	Sweet Home clay deposit.	Sec. 11, T. 14 S., R. 1 W.	Shale, hard white	p Pottery	21 pp. 857-859.
Multnomah	1	Pacific Stoneware Co.	NW¼ sec. 9, T. 1 N., R. 1 E.	Loam from local basement excavations; clay shipped from Washington and from Willamina Clay Products Co.	a Flower pots	5 p. 15.
Washington	1		Northwest of Cherry Grove		p Pottery and light-colored structural ware.	47 pp. 34, 88.
Yamhill	1	Peavine Ridge clay deposit.	About 9 miles SW of McMinnville	Sedimentary formation, weathered portion.	a Stoneware	21 pp. 838, 848.
Washington						
King	1		Near Duvall		p Pottery(?)	15 p. 7.
	2		9th and Spokane Sts., also 9th and Lane Sts. in Seattle.	Glacial clay	a Pottery	20 pp. 24, 56.
	3		Road cut between Palmer Junction and Palmer on the south side of Green River, NW¼ sec. 14, T. 21 N., R. 7 E.		p Buff-colored pottery, terra cotta.	19 pp. 135, 337, 344-345; 46 pp. 122-125.

	4	----------	Secs. 27, 28, T. 21 N., R. 6 E.	Hammer Bluff formation (post-Miocene-preglacial). Several lenticular-shaped deposits.	a	Pottery, stoneware, terra cotta, no. 2 siliceous refractory.	19 pp. 137-151, 337, 344-345; 21 p. 795; 26 p. 31; 33 pp. 269-271, 318-319; 46 pp. 85-87, 91, 96, 102-104, 106-109, 117-118, 123-129.
Pierce ------	1	----------	SE¼ sec. 22, T. 17 N., R. 2 E.	Recent, glacial clay, reworked.	a	Garden pottery and novelty ware.	19 pp. 216, facing p. 358.
Snohomish ---	1	----------	Northern part of Everett ------	Glacial clay ----------	a p	Flower pots, ---------- Repress brick and drain tile.	33 pp. 279-280.
	2	Meadowdale Pottery.	Sec. 32, T. 28 N., R. 4 E. ----	Glacial clay ----------	a	Flower pots ----------	19 pp. 227-228; 42 p. 21; 46 pp. 158, 160-161.
Spokane -----	1	Conner pit --	NE¼ NE¼ sec. 4, T. 29 N., R. 42 E.	Latah formation ----------	a	Terra cotta, pottery ----	19 pp. 264-265, 340, 350-351; 46 pp. 106, 109-110.
	2	----------	Road cut northeast of Chattaroy in the valley of Deep Creek, northwest corner sec. 28, T. 28 N., R. 44 E.	Latah(?) formation --------	p	Pottery, stoneware ------	19 pp. 261-262.
	3	----------	SW¼ sec. 21, T. 27 N., R. 44 E.	Residual clay, derived by weathering of granite; contains quartz and mica.	p	Pottery, if washed ------	19 pp. 260-261, 340, 350-351; 46 pp. 95, 102-104.
	4	----------	NE¼ SW¼ sec. 23, T. 26 N., R. 44 E.	Residual clay, recorded in well.	p	Pottery, fire clay ------	19 p. 258; 46 p. 114.
	5	----------	Trent ----------	----------	p	Stoneware ----------	33 pp. 197-198, 320-321.
	6	----------	Secs. 10, 15, T. 24 N., R. 43 E.	Latah formation ----------	a	Pottery ----------	19 pp. 252-253.
	7	----------	E½ NW¼ sec. 23, T. 23 N., R. 41 E.	Alluvial clay ----------	p	Pottery ----------	19 p. 253.
	8	----------	W½ sec. 33, T. 21 N., R. 45 E.	Latah formation ----------	a	Pottery ----------	19 pp. 236-237; 46 p. 113.
	9	----------	Ditch about 4 miles north of Tekoa, sec. 36, T. 21 N., R. 45 E.	Latah formation ----------	p	Pottery ----------	19 pp. 235-236, 339; 46 pp. 93, 102-104.
Stevens -----	1	Charles Rogers property.	E½ sec. 23, T. 39 N., R. 36 E.	Glacial clay ----------	a p	Pottery ---------- Slip clay ----------	19 pp. 299, 340.
	2	----------	NE¼ NE¼ sec. 30, T. 31 N., R. 41 E.	Latah formation ----------	p	Pottery, terra cotta ----	19 pp. 292-293, 340, 350-351.
	3	A. B. or "Abbott" pit	NW¼ sec. 32, T. 30 N., R. 42 E.	Latah formation ----------	a	Art pottery, stoneware --	19 pp. 85, 287-289, 340, 350-351 facing p. 358; 21 pp. 590-594, 605-606; 33 pp. 207-210, 320-321; 46 pp. 106, 109-110.
Whitman -----	1	----------	Road cut 2½ miles north of Tekoa	Latah formation ----------	p	Pottery, brick and tile--	34 p. 58.
	2	Cox pit(?) --	Sec. 7, T. 16 N., R. 46 E. ----	Latah formation ----------	a	Stoneware ----------	19 pp. 321-325, 341, 352-353; 33 pp. 222-225; 46 pp. 112-113.

TABLE 3.--SLIP CLAY

[Column 2: figures refer to map locations of deposits; deposits without figures are not located on map. Column 6: symbol "a," clay from deposit is or has been used commercially; symbol "p," no commercial use recorded except possibly for testing purposes. Column 7: underscored figures refer to numerical list of references in the text immediately preceding table 1]

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
Washington						
Ferry	1	----------	Laurier	Glacial clay	p Slip clay	33 pp. 318, 319.
	2	----------	Railroad cut just south of Rockcut.	Glacial clay	p Slip clay	19 pp. 88-89, 336, 342-343.
Skagit	1	----------	Near Sauk	Glacial clay	p Slip, brick and tile	19 pp. 218-219, 339, 348-349; 33 pp. 320-321; 46 pp. 134, 146-148.
			3 miles east of Van Horn road to Sauk along Skagit River.	Argillite, weathered	p Slip clay	46 pp. 134, 146-148.
Stevens	1	Charles Rogers property.	E½ sec. 23, T. 39 N., R. 36 E.	Glacial clay	a Pottery p Slip clay	19 pp. 299, 340.
	2	T. R. Fitzgerald property.	Along Columbia River 4 miles north of Bossburg.	Glacial clay	a Slip clay and temporary seals in furnace openings. p Brick and tile	19 p. 297; 21 pp. 709-711; 33 pp. 35, 216-218, 320-321.

TABLE 4.--BENTONITE

[Column 2: figures refer to map locations of deposits; deposits without figures are not located on map. Column 6: symbol "a," clay from deposit is or has been used commercially; symbol "p," no commercial use recorded except possibly for testing purposes. Column 7: underscored figures refer to numerical list of references in the text immediately preceding table 1]

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
Idaho						
Clark	1		About 15 miles from Dubois, T. 10 N., R. 33 E.	Bentonite, 15 ft, overlain by limestone.	p Not tested	23 p. 42.
Custer	--		Near the railroad south of Mackay.	Bentonite	p Not tested	23 p. 41.
Montana						
Dear Lodge	1		7 miles northeast of Warmsprings	"Veinlike" deposit, 2 to 3 ft thick.	a Small production, use not given.	24; 41.
	2		9 miles east of Warmsprings on Dry Cottonwood Creek.	"Altered dike in granite"	a Not given	11 p. 28; 24; 41.
Silver Bow	1	Kelly-Bolton deposit.	7 miles northwest of Ramsay, T. 4 N., R. 9 W.	"Alkaline earth bentonite"	a Shipped, use not stated	11 p. 28; 24; 41.
	2	Perry deposit	2 miles northeast of Ramsay, T. 3 N., R. 9 W.		a Use not stated	24; 41.
Oregon						
Baker	1					4.
Malheur	1					4.
	2					4.
Washington						
Kittitas	1		Yakima River, reportedly from the head of Yakima River.	Bentonite sample, contaminated somewhat by silt. Examined by Wash. Div. of Mines and Geology.		42 p. 24.
Pierce	1	Mineral Creek	Center sec. 14, T. 19 N., R. 8E.	Bentonite, interbedded with perlite; 4 beds total 4½ ft in a total thickness of 7 ft.	p Not tested, might be recovered as a byproduct of perlite recovery.	42 p. 24.
Yakima	1	Tientonite mine.	NE¼ sec. 7 and NW¼ sec. 8, T. 13 N., R. 14 E.	Bentonite, 15 ft. Two samples tested by the U.S. Geol. Survey have the following properties: X-ray pattern of montmorillonite, quartz, and a small quantity of unidentified material. Swelling (test made by the same procedure that is used in the Denver Laboratory of the Bureau of Reclamation) is 400 percent. Tests for use in drilling muds and in bonding foundry sands were performed in cooperation with the Illinois Geol. Survey. For use in drilling muds the samples have a wall-building capacity that compares favorably with that of the average of a number of samples from the bed that is mined most extensively in Crook Co., Wyo. However, the viscosity, yield, and gel strength are much lower, and the grit content is higher than in the Wyoming bentonite. For use in bonding foundry sand the samples have a dry compression strength better than the average for the Wyoming material, and a green compression strength a little below that average.	a Not known	41; 42 p. 24.

TABLE 4.--Bentonite--Continued

State and County	No.	Name of Deposit	Location	Description	Use of clay	Reference
	2	Moxee Valley district.	Near Yakima, T. 13 N., R. 21 E.	Bentonite reported --------	p Not known ----------	15 p. 5.
Wyoming						
Teton -------	1	----------	Blackrock Meadows, 3 miles southwest of Togwotee Pass.	Lower Eocene bentonite in 2 beds. "Large amount" reported.	p Not known ----------	13; 41.

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