WASHINGTON COUNTY

Geography

Washington County comprises an area of 716 square miles located west of Multnomah and Clackamas counties. Hillsboro, situated approximately in the center of the Tualatin River Valley, is the county seat.

The most prominent physiographic features are the broad valley of the Tualatin River, the Chehalem Mountains on the south, the Portland hills on the north, and a rugged mountainous area of the Coast Range on the west. Elevations range approximately from 100 feet in the Tualatin Valley to more than 3,000 feet in the Coast Range along the western edge of the county. Drainage is largely eastward into the Willamette River by the Tualatin River and its tributaries, such as Dairy, McKay, and Gales creeks. However, a small part of the northwest corner is drained by the Nehalem River; and the headwaters of the Salmonberry, Wilson, and Trask rivers, which flow westward to the Pacific Ocean, are partly in western Washington County.

Washington County is noted for its dairy products, grain, fruits, nuts, and vegetables. The main industries are canning and lumbering. The mineral resources consist of ferruginous bauxite which occurs on the gently sloping hills north and south of the Tualatin Valley, sand, gravel, crushed rock, silt and clay from which brick and tile are made, and shale which is expanded to form a lightweight aggregate.

Geology

The Tillamook volcanic series (Eocene) consisting of basaltic lavas with interbedded tuffs and breccia is exposed in western Washington County from the Salmonberry River southward. Unconformably overlying these lavas are conglomerates, shales, and sandstones of the Cowlitz formation (upper Eocene) that are exposed along the eastern border of the exposure of these older lavas. Overlying the Cowlitz is the Keasey formation (upper Eocene to lower Oligocene) which consists of shales and sandstones lithologically similar to those of the Cowlitz formation. These sediments are exposed at Sunset Tunnel on the Wolf Creek Highway and along Gales Creek northwest of Forest Grove.

Tuffaceous and micaceous sandstones, siltstones, and shales make up the Gries Ranch, Pittsburg Bluff, and Scappoose formations of Oligocene age. They unconformably underlie the Columbia River basalts (middle Miocene) in northern and southern Washington County. These sediments are best exposed in the upper reaches of the East Fork and West Fork of Dairy Creek.

Thick flows of Columbia River basalt cap the Portland hills, the Chehalem Mountains, and Cooper and Bull mountains. Lateritic weathering of the Columbia River basalts has formed the ferruginous bauxite deposits of this county. The silts overlying the laterite deposits have been assigned to the Troutdale (Pliocene) formation (Libbey, Lowry, and Mason, 1945:10).

Boring lava (Pliocene) covers a portion of the west slope of the Portland hills east and northeast of Beaverton. These lavas are generally lighter in color than the characteristically dense, black flows of Columbia River basalts.

The valley fill of the Tualatin River consists of Pleistocene and Recent alluvial deposits, sands, gravels, and clays.

Mining Properties of Washington County

CLEAR CREEK DEPOSIT (Limestone)

Owner: Not known.

Location: Near the section corner common to secs. 10, 11, 14, and 15, T. 1 N., R. 5 W., on the north fork of Clear Creek, 200 yards west of forks at at an elevation about 900 feet. The deposit is about 4 miles southwest of Gales Creek; it is reached by a dead-end road to the saddle north of Clear Creek, a distance of 3.1 miles, thence 1.5 miles up the creek to the forks. The deposit has had no work done on it (1946).

Geology: According to Warren, Norbisrath, and Grivetti (1945), the area lies within the Tillamook volcanic series of probable middle Eocene age. The deposit consists of coarse-grained fossiliferous tuff and fine conglomerate, cemented and possibly replaced in part by lime. It outcrops in the bed of the creek, underlying and forming the basal 10 to 25 feet of a bed of basaltic conglomerate, also cemented by lime, which stands up in cliffs at least 30 feet high.

The strike is about N. 25° W. and the dip about 20°-25° E., but the structure is very obscure, even in the good outcrops afforded by the walls of the creek. The limestone overlies basaltic breccia which consists of both angular and rounded basaltic grains averaging about half a centimeter in diameter. The total section of overlying basaltic conglomerate is at least 500 feet thick, having an outcrop width of at least half a mile. East of this band of conglomerate, and either intruding or overlying it, is a dense, fine-grained, blocky basalt.

It is reported that low-grade limestone also appears along the strike on the south fork of Clear Creek, but it has not been traced farther in either direction. Sample No. P-4541 from the bed on the north side of the creek; sample No. P-4542 from the limy portion of the overlying conglomerate; sample No. P-4543 from the limy bed on the south side of the creek as analyzed in the Department's laboratory contained 57.08, 55.14, and 42.11 percent $CaCO_3$, respectively.

Informant: Fred Chain, 20 Park Street, Forest Grove, Oregon

Report by: J.E.A., 1946

FERRUGINOUS BAUXITE DEPOSITS

Location: T. 1 N., R. 2 W., and Tps. 2 and 3 N., Rs. 2 and 3 W. A part of the area in the E½, T. 2 N., R. 2 W., is situated in Multnomah County. This area is approximately twenty-five to thirty-five miles northwest of Portland and from six to fifteen miles north of Hillsboro, Oregon. Skyline Boulevard, which extends along the crest of the Portland hills northwestward from Portland, lies along the eastern edge of the laterite deposits.

History: In April 1944 the Department began investigation of deposits of ferruginous bauxite which occur in northern Washington County. A preliminary report by Libbey, Lowry, and Mason (1944) and the bulletin by Libbey, Lowry, and Mason (1945:28-47) list numerous float localities, outcrops, and deposits of ferruginous bauxite in this area.

Topography: A gently sloping upland surface, having an elevation of more than 1,600 feet, drops gradually southward in a distance of 7 miles to an elevation of about 400 feet where it approaches the Tualatin Plain. The crest of the surface forms the drainage divide between northern Washington County and southern Columbia County. The surface is dissected by many gulches and canyons with steep slopes, which separate numerous flat-topped hills and spurs.

Development and exploration: In 1944 and 1945 the Department explored a number of the deposits. An area totaling slightly more than 500 acres was mapped topographically. During the investigation 69 auger holes, totaling 1,614 feet, were drilled. More than 5,000,000 tons of ferruginous bauxite was indicated in two localities (see figure 3 opposite page 7). The Hendrickson, Zimmerman, Nelson, Hutchison, and Nixon properties contain the bulk of the reserves indicated by this exploration. Deposits were indicated at other properties, but considerably more exploration would be necessary to make accurate tonnage estimates.

Alcoa Mining Company explored the laterite deposits of Washington County from early in 1945 to late in 1947. The quantity of reserves developed by this company has not been made public. In 1946 the company made several shipments of ore from properties on Dixie Mountain to East St. Louis for testing purposes.

Geology: The ferruginous bauxite deposits of Washington County, like those of Columbia County, were formed by the laterization of Columbia River basalt of Miocene age following extrusion and before the deposition of the overlying silts. Probably the laterization occurred before the gentle folding and uplift of the region took place sometime in the Pliocene.

The Miocene basalts are underlain by shales and sandstones of Oligocene age. Exposures of these sediments occur along the northwestern border of the basalts in the bauxite locality of Washington County. Some of the exposures of these sediments are steptoes in the bauxite localities of Washington and Columbia counties representing ridge areas, which stood above the generally mature surface over which the basalts were extruded.

Basalt exposed in McKay Creek west of the Hendrickson laterite deposit strikes N. 65° W. and dips several degrees to the south. The attitude of this basalt is very similar to that of the laterite deposits on the Hendrickson and Hutchison-Nixon properties.

The basalt in the area of the ferruginous bauxite deposits in Washington County is thought to form the southwest limb of an anticline which trends northwestward, and the crest of which approximately coincides with the drainage divide in northern Washington County. This basalt dips to the south and apparently extends southward under the fill of the Tualatin Valley to reappear in the Chehalem Mountains.

The arithmetical average analysis of the ore on properties drilled by the Department in Washington County is 34.68 percent alumina, 23.12 percent iron, 9.48 percent silica, and 4.85 percent titania. The character of the ore in Washington County, which is similar to that in Columbia County, is further discussed in the description of the properties on which reserves of ores were estimated as a result of the Department's exploration program.

Hendrickson Property

The Hendrickson farm is located on Dixie Mountain Road in the N½ sec. 6, T. 2 N., R. 2 W., at an elevation of about 1,300 feet. Several outcrops and cuts were channel sampled. Twenty-nine holes were drilled on the property. The arithmetical average analysis of samples of ore from these drill holes is:

Alumina	(Al_2O_3)	31.85 %
Iron	(Fe)	25.95
Silica	(SiO_2)	8.95
Phosphorus	(P)	0.140
Titania	(TiO_2)	4.5
Ignition loss		18.0
Moisture		19.0

Approximately 64 acres are underlain by ore on this farm. The volume-weight factor for the ore is 17 cubic feet per long ton. Using this volume-weight factor and an average thickness of ore of 11 feet, 1,760,000 long tons of ore is indicated by the drilling.

A typical section (in descending order) of ore on the Hendrickson property consists of red to reddish-brown oölitic or pisolitic, reddish-brown nodular, firm red fine-grained, and brown to yellow brown, soft, fine-grained varieties of ferruginous bauxite. The overburden consists of top soil and buff to brown to red silt. Red clayey silt or clay, some of which contains oölites, immediately overlies the ore.

The strike of the ore body is approximately N. 75° W. and the dip 1°-2° S. The attitude was determined from the elevations of the bottom contact of the hard ore.

Geo. B. Zimmerman Estate

This property is northwest of the Hendrickson deposit and is separated from it by a narrow saddle. A drill hole penetrated 13 feet of oölitic ore which analyzed as follows:

Al_2O_3	36.60%
Fe	23.49
SiO_2	6.94

Insufficient exploration makes a tonnage estimate difficult. There are possibly 50 acres underlain by ore.

Nelson Property

The Nelson farm is located in the SW¼ sec. 32, T. 3 N., R. 2 W., a quarter of a mile northeast of the Hendrickson property. Average analysis of ore from three of the six drill holes on the Nelson property is:

Al_2O_3	32.52%
Fe	21.66
SiO_2	12.97

An estimated 175,000 long tons of reserves, based on a 10-foot average thickness of ore, lies between the holes drilled in ore.

Hutchison-Nixon Properties

The Hutchison and Nixon properties are 14 miles north of Hillsboro, and 8 miles north of North Plains by way of Pumpkin Ridge Road. Elevation in the area ranges from 1,100 to 1,300 feet. The legal description is secs. 1 and 2, T. 2 N., R. 3 W., and secs. 34, 35, and 36, T. 3 N., R. 3 W.

More than 230 samples were taken from 23 drill holes totaling 692 feet. The over-all weighted average analysis of the ore indicated is:

Al_2O_3	34.33%
Fe	24.46
SiO_2	8.64

The weighted average thickness of the ore was 13 feet. A total reserve of 3,600,000 long tons of ore is indicated.

The thickness of overburden ranges from 2 to 30 feet and averages 18 feet. The stripping ratio of the overburden to ore is 1.4 to 1.

The ore body is similar in thickness, attitude, and composition to that at the Hendrickson farm 1½ miles to the east. The ore is oölitic and pisolitic for the most part, with the lower portion of the bed somewhat less gritty and of a porous granular texture. The ore body strikes about N. 85° W. and dips approximately 10°-3° S.

References: Libbey, Lowry, and Mason, 1944
Libbey, Lowry, and Mason, 1945

YAMHILL COUNTY

Geography

The Willamette River forms most of the eastern boundary of Yamhill County which lies south of Washington County and north of Polk County.

The county comprises an area of 709 square miles. McMinnville, the county seat, is located near the junction of the North and South Yamhill rivers.

The most important physiographic features of Yamhill County are the broad plain of the Willamette Valley on the east, the Chehalem Mountains in the northeastern corner, and the Coast Range on the west. The Dundee, Amity, and Eola hills are minor structural features which stand above the low level plain of the Willamette Valley. Elevations in the county range from a low of about 75 feet along the Willamette River to slightly above 3,000 feet in the Coast Range. The drainage is principally southeastward along the North Yamhill River and northeastward along the South Yamhill River into the Willamette River. The Willamette River flows northward along the eastern edge of the county as far as Newberg where it turns abruptly eastward. Some of the area along the westward edge drains westward to the Pacific Ocean.

Agriculture is the main source of income. Fruits and nuts are the principal crops. Sand, gravel, crushed rock, and clay constitute the known mineral resources.

Geology

Published geological data pertaining to Yamhill County are rather limited. Reconnaissance and preliminary geology of parts of the county have been described by Washburne (1914), Piper (1942), Snavely and Vokes (1949), and Warren, Norbisrath, and Grivetti (1945). The geological map of a part of northwestern Oregon prepared by the last authors mentioned above covers more than the northern one-third of the county.

In general, the oldest rocks are exposed to the west in the Coast Range, and consist mainly of Eocene lavas and sediments (sandstone, siltstone, and shales). Intrusive igneous rocks of probable upper Oligocene age cut these Eocene formations. In the Willamette Valley, Oligocene sediments which overlie the Eocene sediments and underlie Miocene lava flows crop out at the base of Chehalem Mountains and the Dundee, Amity, and Eola hills. Pleistocene and Recent terrace and alluvial deposits form the fill of the Willamette Valley, and these deposits extend up the valleys of the North and South Yamhill rivers.

According to the map by Warren, Norbisrath, and Grivetti (1945), the Tillamook volcanic series (Eocene) occurs in the Coast Range in northwestern Yamhill County. East of this series north of Yamhill, middle Eocene shales are mapped as a separate unit. The authors state, however, that the lavas and shales interfinger. Farther east in the valley of Chehalem Creek, middle Tertiary sediments, mainly sandstones and shales, are exposed. These sediments as mapped include the upper Eocene Cowlitz formation and Oligocene formations. In the Chehalem Mountains and the Dundee Hills, flows of Columbia River basalt (middle Miocene) overlie the Oligocene sediments.