STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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RECONNAISSANCE GEOLOGY ALONG U.S. HIGHWAY 20 BETWEEN VALE AND BUCHANAN MALHEUR AND HARNEY COUNTIES, OREGON

By
H. M. Dole* and R. E. Corcoran*

During the early part of April 1954 the authors spent four days traversing US Highway 20 between Vale and Buchanan, Malheur and Harney counties, Oregon, a road distance of 83 miles. The geologic cross sections and plan which follow this text record the information obtained. It is estimated that a total of about 15,000 feet of beds is represented by the sections.

GENERAL GEOLOGY

The mapping indicated a normal sequence of beds, from younger to older, between Vale and the east slope of Stinkingwater Mountain. On Stinkingwater Mountain a blanket of fairly recent lava hides the relationship between what is thought to be older tuffaceous beds to the east and younger volcanics to the west.

In general the structure is one of low easterly dips to Drinkwater Pass; moderate westerly dips from Drinkwater Pass to the highway bridge across the Malheur River just south of Drewsey; and low easterly dips to the summit of Stinkingwater Mountain. The structure on the west slope of Stinkingwater Mountain was not clear but according to Piper's (1939)** map the general trend is one of low westerly dips into the Harney Basin.

Major fault zones are inferred south and east of Harper, about midway between Juntura and Harper, and north of Juntura. Most of the evidence bearing on the fault zones is based on what appears to be an anomalous sequence of beds in the valley walls. Faulting is especially noticeable in the Owyhee basalt because of the presence of a cliff-forming welded tuff that makes a good marker bed. Many minor offsets occur in the sedimentary sections. It is not known, however, how important these are for they may reflect local slumping or perhaps folding at depth.

AGE AND THICKNESS OF THE UNITS

Younger lavas: This unit occurs as a capping of variable thickness throughout most of the western part of the traverse (see sections 12 and 16), and because it is younger than all other formations in this area a Plio-Pleistocene (?) age has been assigned to it. Thickness of the unit is probably less than 200 feet.

Idaho formation: This traverse overlaps the work of Pritchett (1953) in the Mitchell Butte quadrangle. Pritchett assigned a lower to middle Pliocene age to the Idaho formation. Because the beds he mapped were found to continue westward his age assignment has been adopted for this report.

The top of the Idaho formation lies to the east of the area traversed. The base of the formation was determined to be near mile post 220 (see section 5). The beds mapped as part of the Payette formation by Moore (1937) just south of the highway near Harper were included in the Idaho formation because Pliocene (?) vertebrate remains have been obtained from them and structural relations indicate a continuity with the beds farther east. The thickness as determined from the cross section is about 3,100 feet.

Owyhee basalt: A lower Pliocene - upper Miocene age is given to the Owyhee basalt. This follows the work of Corcoran (1953) in the Mitchell Butte quadrangle where similar stratigraphic relations were encountered.

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*Geologists, Oregon Department of Geology and Mineral Industries.

**See bibliography following sections (page 39).

The thickness of this section has been estimated to be approximately 5,000 feet, the bulk of which consists of basalt flows. Only the top of these lavas was seen; the base of the section was not determined due to faulting. It is thought, however, that the thickness given here is fairly close to the total thickness of the Owyhee basalt in this area.

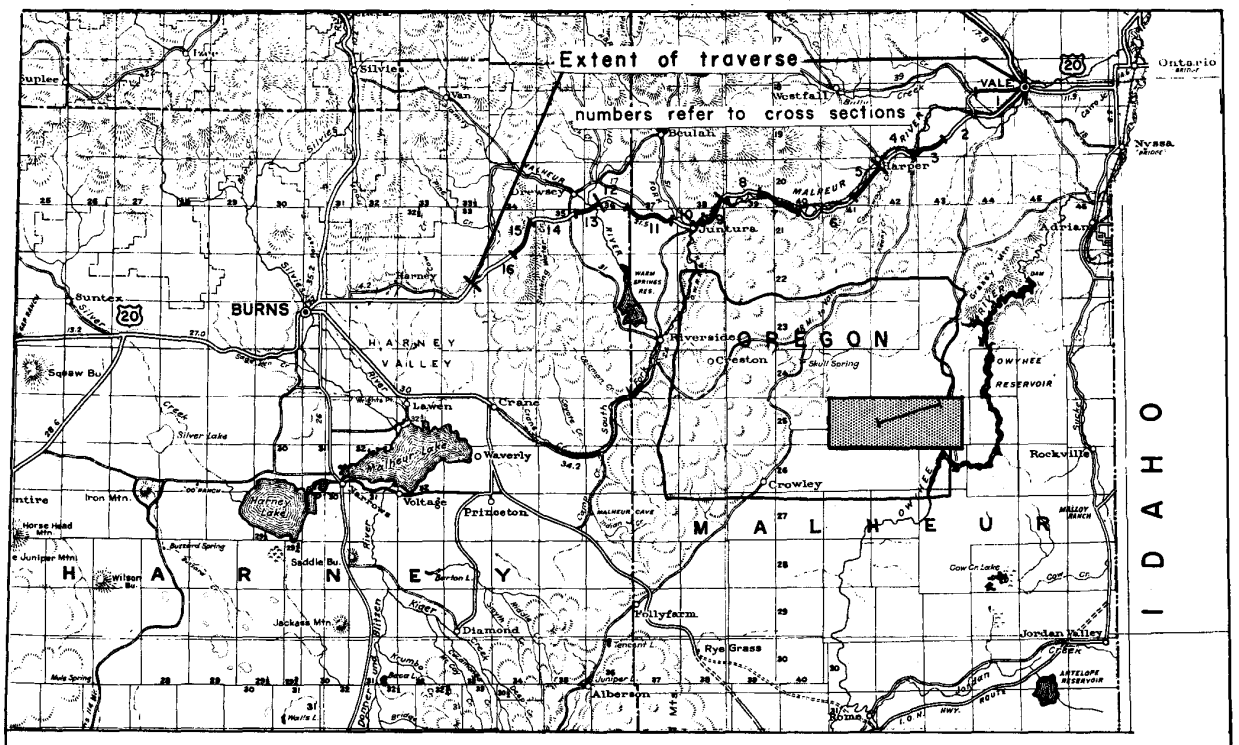
Steens basalt: The age of the Steens basalt has been given by Fuller (1931) as late Miocene or early Pliocene. This was based on its stratigraphic position above the Alvord Creek beds of middle Miocene age. The minimum thickness of this unit as represented on section 16 has been estimated to be about 1,200 feet.

Siliceous extrusives: The western margin of the traverse is in siliceous extrusives as named by Piper who assigned a Miocene(?) age to them. It is thought that these volcanics may be equivalent to Fuller's Pike Creek beds which would place them below the Steens basalt and above the Alvord Creek beds. A thickness could not be estimated for this unit.

Payette formation: Just a few miles north of the highway (see sections 12, 13, and 14) in the Otis Basin, Moore recognized the Payette formation and assigned it a Miocene age. The section which this traverse crossed is undoubtedly a continuation of the beds mapped by Moore. Sharf (1935), in the Rockville area of eastern Malheur County, considered the Payette formation an equivalent of the Mascall formation and assigned a middle Miocene age. Buwalda (1924) considered the Payette formation to be upper Miocene. In this report the Payette is designated as middle to upper Miocene in age.

Neither the top nor the base of the Payette formation was definitely delineated. The top may be represented on section 7, but faulting has so complicated this area that little reliance can be placed on the continuance of the section. Even so, about 5,600 feet of Payette beds are thought to be present.

Columbia River lava(?): The badly altered and fractured lavas and pyroclastics occurring unconformably below the Payette formation, as shown on section 11, were designated Columbia River lava(?) only because of their stratigraphic position. Any thickness given can be only an estimate. From measurements on the cross section a thickness of about 300 to 500 feet was obtained.



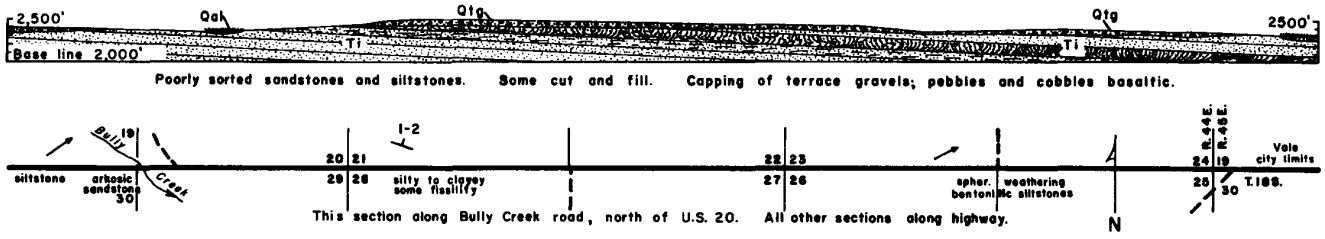
Locality map & index map of Oregon

GEOLOGIC CROSS SECTION & PLAN ALONG U.S. HIGHWAY 20

VALE TO BUCHANAN

Malheur & Harney Counties, Oregon

Section 1



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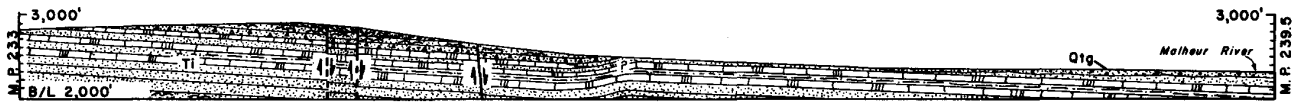

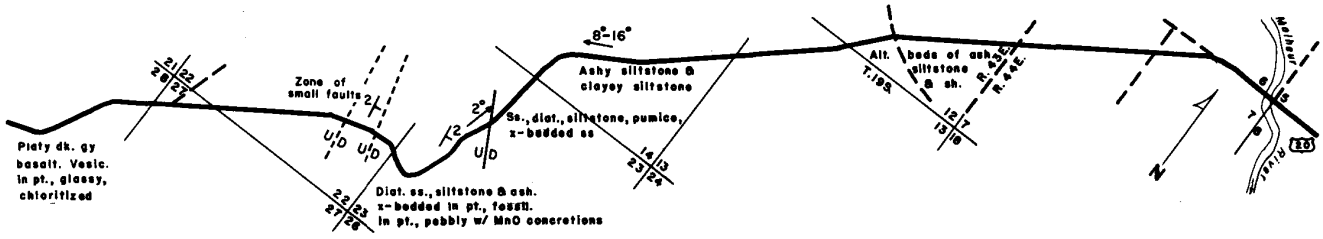

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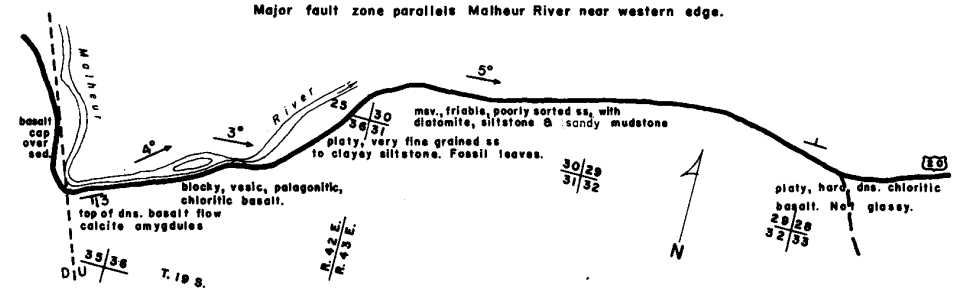

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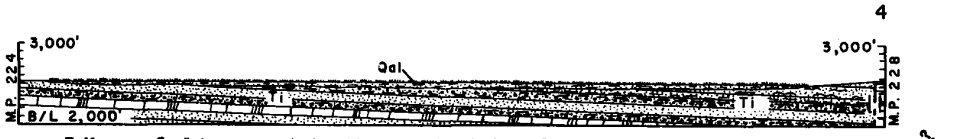
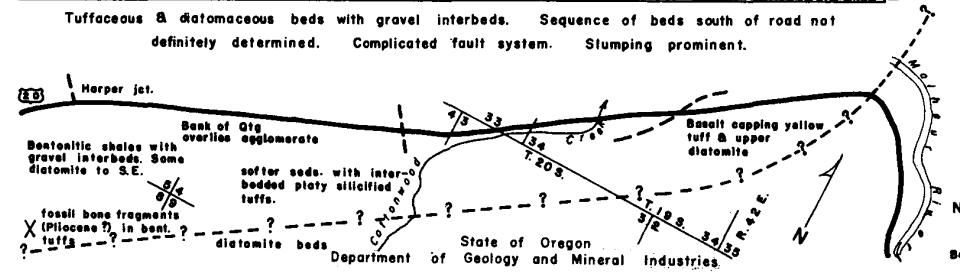
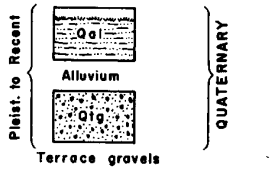




EXPLANATION



Strike & dip of beds

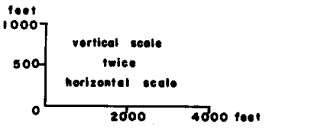
Direction of prevailing dip

Fault

U, upthrown side; D, downthrown side

Dashed where approximately located

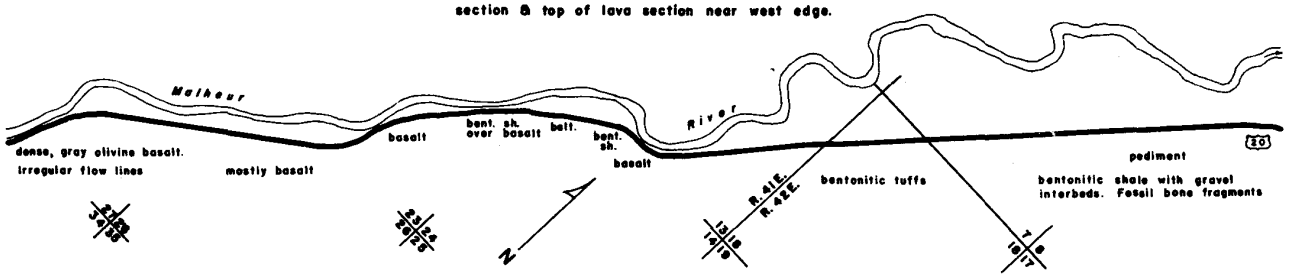
Cross section elevations from aneroid readings



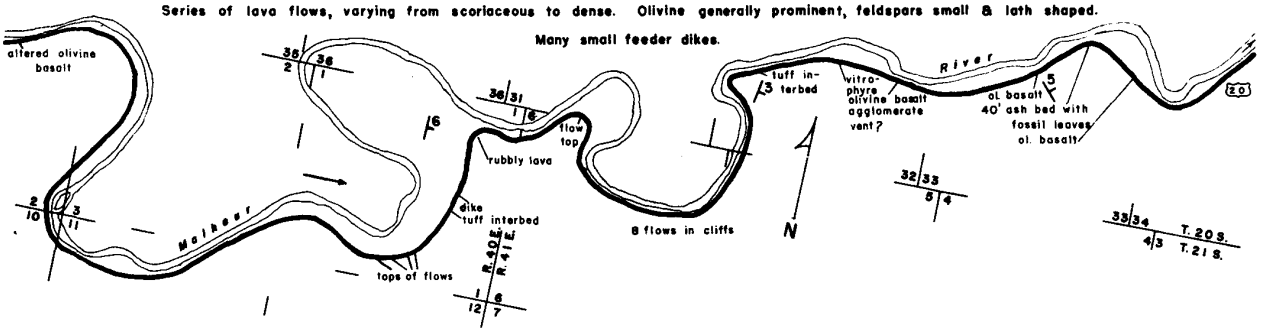
Note: Read cross sections from east to west

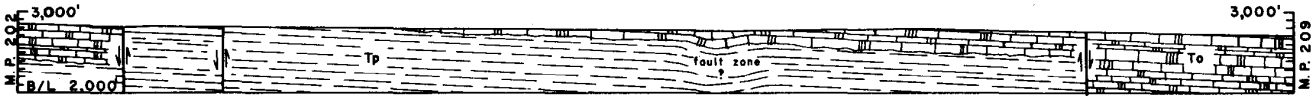
Base map furnished by State Highway Department.

Diatomaceous & bentonitic shales with gravel interbeds & intercalated lava flows. Base of dominantly sedimentary section & top of lava section near west edge.

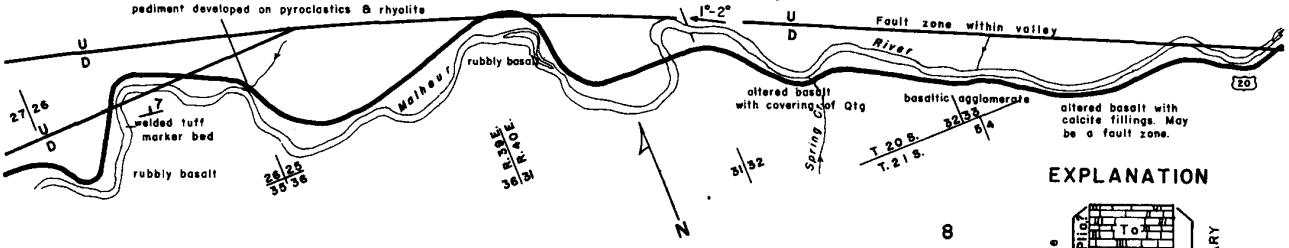


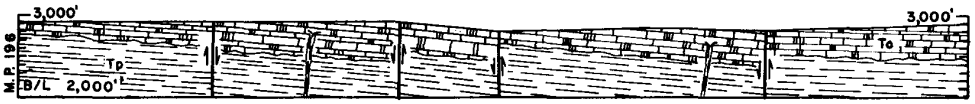
Series of lava flows, varying from scoriaceous to dense. Olivine generally prominent, feldspars small & lath shaped. Many small feeder dikes.



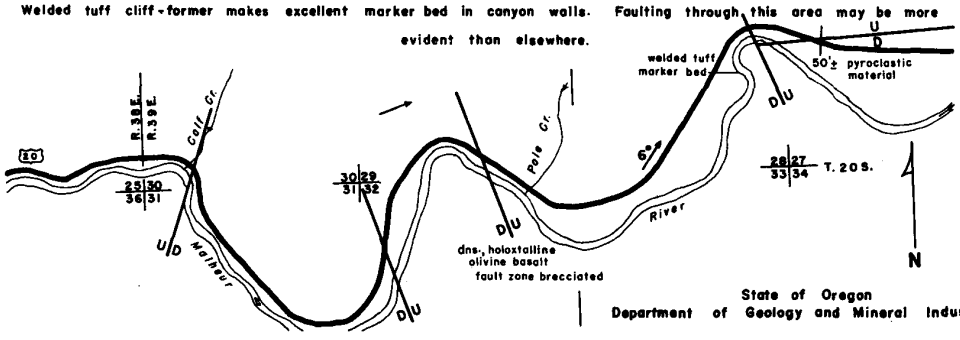


Cross section diagrammatic to illustrate underlying pyroclastics & repetition due to faulting. Fault zone with considerable displacement parallels valley floor.

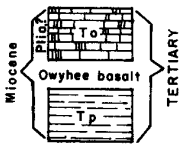




Welded tuff cliff-former makes excellent marker bed in canyon walls. Faulting through this area may be more evident than elsewhere.



EXPLANATION



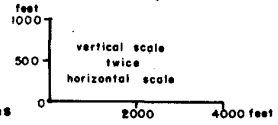
Payette formation

Strike & dip of beds

Direction of prevailing dip

U
D
fault

Cross section elevations from aneroid readings



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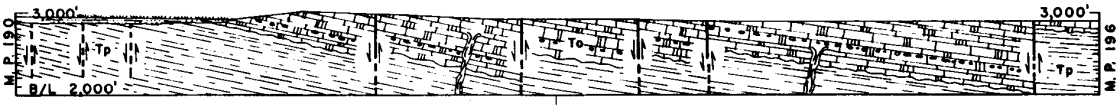
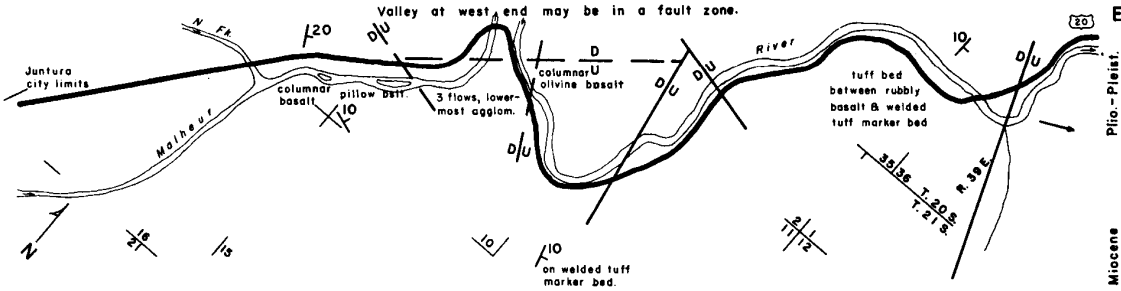
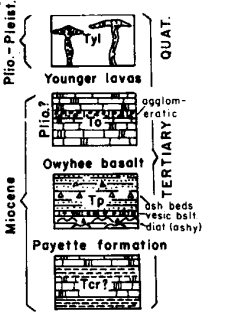


Lava flows prominent in canyon walls with few thin tuff beds. Agglomeratic near base.

Valley at west end may be in a fault zone.



EXPLANATION

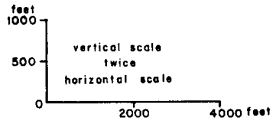


Strike & dip of beds

Direction of prevailing dip

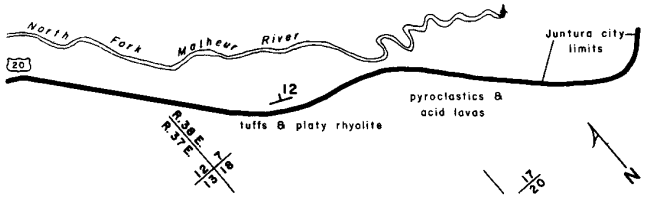
U
D
fault

Cross section elevations from aneroid readings

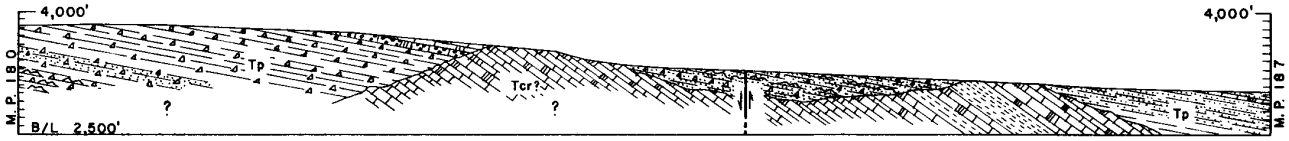


10

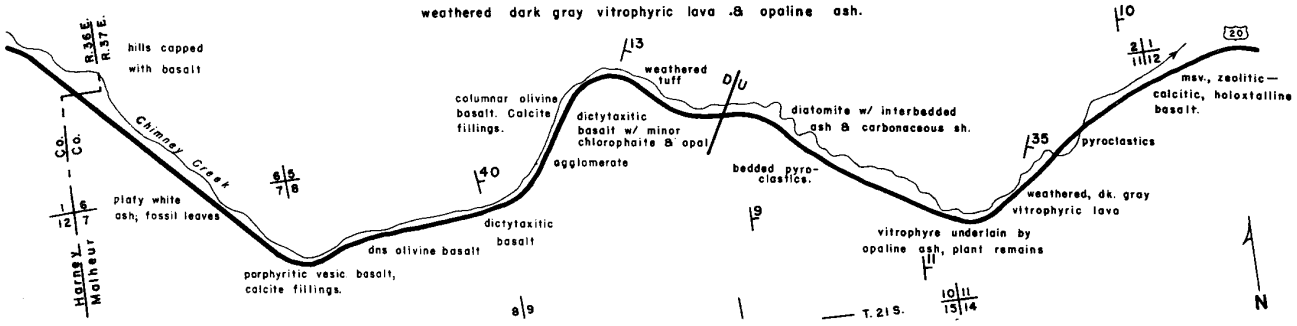
Fairly non-resistant tuffs with platy rhyolite along southwest side of valley



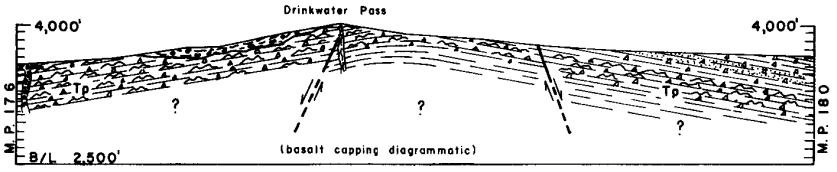
11



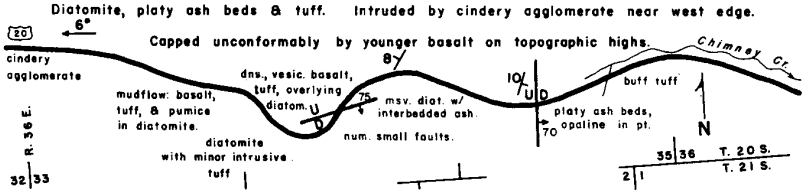
Alternate beds of diatomite, ash & carbonaceous shales with intercalated basalt. Unconformably underlain by weathered dark gray vitrophyric lava & opaline ash.



12



Diatomite, platy ash beds & tuff. Intruded by cindery agglomerate near west edge. Capped unconformably by younger basalt on topographic highs.



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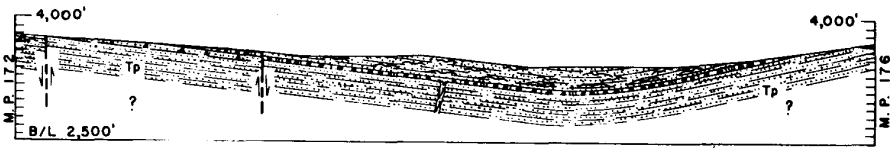
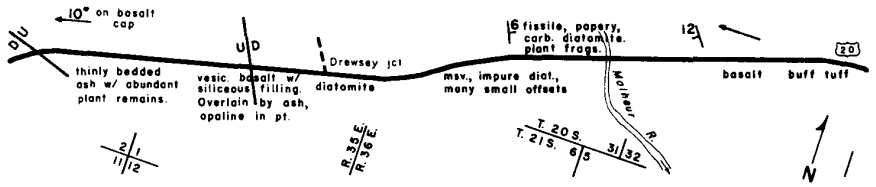
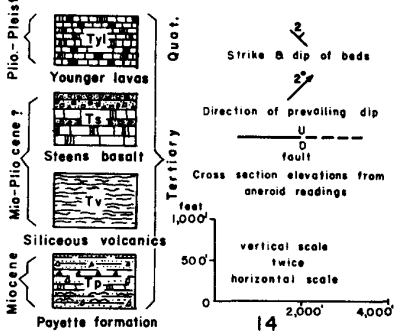
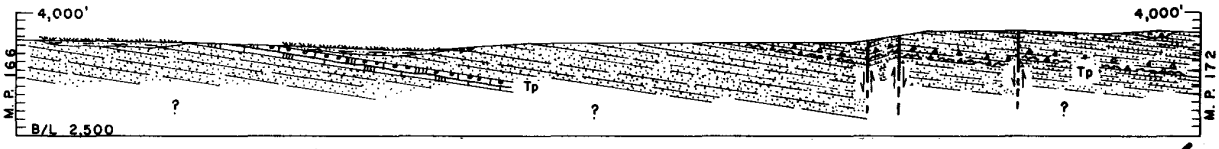


Impure diatomite & pyroclastics with interbedded basic flows. Lava capping hills has westerly dip.

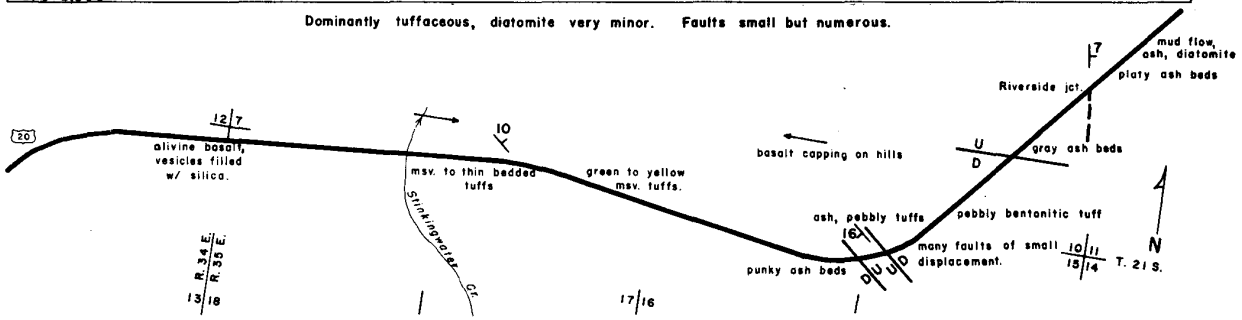


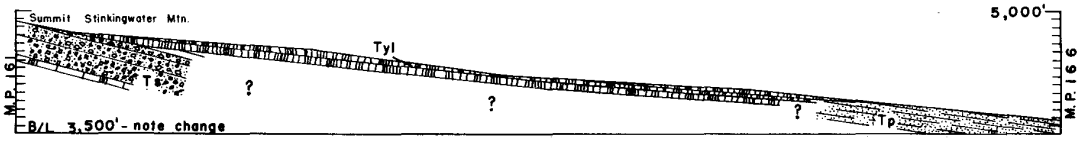
EXPLANATION



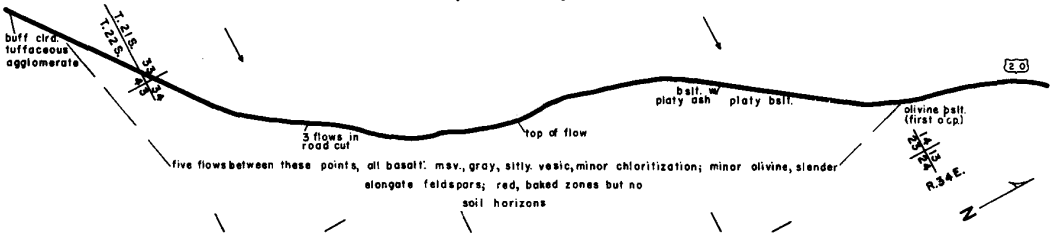


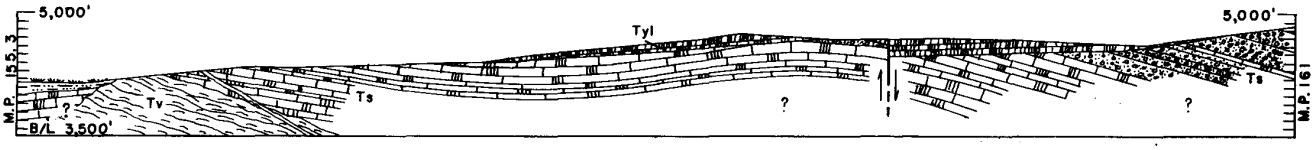
Dominantly tuffaceous, diatomite very minor. Faults small but numerous.



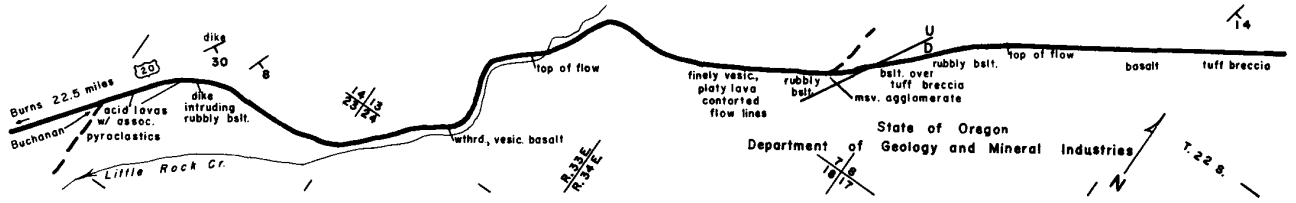


Younger lavas conceal the relationship between the section of lavas & pyroclastics to the west & the dominantly sedimentary section to the east.





Entire section of volcanics. Unconformities between siliceous volcanic unit, lava-pyroclastic unit, & late basalt.



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1939 Geology and ground-water resources of the Harney Basin, Oregon: U.S. Geol. Water-Supply Paper 841, 1939.

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1935 A Miocene mammallian fauna from Sucker Creek, Oregon: Carnegie Inst. Wash. Pub. 453, 1935.

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PAPER ON PLACERS

The Department has just issued Miscellaneous Paper No. 5 entitled "Oregon's Gold Placers" to answer the many inquiries concerning location and characteristics of placers and equipment used in small-scale placer mining. Miscellaneous Paper No. 5 is a compilation by the Department staff and most of the material included was originally published in The Ore.-Bin. Contents of the paper are: History, Placer activities, Placer areas, Beach placers of the Oregon coast, River-terrace placers, Summary, Description of southwestern placer mining areas, Description of northeastern placer mining areas, "Is It Gold?", Prospecting with a gold pan, List of references, Graph showing 100 years of Oregon gold production, Illustration of small-scale placer mining apparatus, and Maps showing placer mining areas.

Miscellaneous Paper No. 5 may be obtained at the Portland office of the Department at 1069 State Office Building and from field offices in Baker and Grants Pass. The price is 25 cents.

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SATURDAY ANNE CHROME

A chrome deposit which occurs in a body of serpentine about 250 feet wide was found this spring by A. O. Craig, Selma, on the ridge between Soldier Creek and O'Connor Creek near Schoolhouse Flat in the Briggs Creek area of Josephine County. Float was found on both sides of the ridge and the outcrop of the chrome in place was about 3 feet wide by 5 feet long of schlieren banded ore. Other exposures have been found in excavations. A road was recently built from Schoolhouse Flat to the deposit by Roy Jackson and the ore is being concentrated at the Six Mile chromite mill owned by Roy Jackson and Jean Pressler.

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GEOLOGICAL SOCIETY HONORS THOMAS CONDON

TO

THOMAS CONDON
(1822-1907)

Pioneer Oregon geologist, teacher, author, clergyman; who came to Oregon around Cape Horn as a pioneer missionary in 1852; who provided a church home at The Dalles for all Christian faiths; who was the first investigator of the fossil beds of the John Day country; who at the founding of the University of Oregon in 1876 became its first professor of geology and continued as professor and teacher until 1907; whose geological classroom was the great outdoors and whose book, "The Two Islands," was the foundation for the study of the historical geology of Oregon; this plaque is dedicated by the Geological Society of the Oregon Country.

May 29, 1954

A bronze plaque with wording as reproduced above in honor of Thomas Condon, "Father of Oregon geology," was dedicated by the Geological Society of the Oregon Country at the new Thomas Condon State Park near Picture Gorge of the John Day River on May 29, 1954. More than 100 persons, including representatives of geological societies from Bend, Eugene, and John Day; the State Department of Geology and Mineral Industries; and the State Highway Department joined the Geological Society of the Oregon Country in paying tribute to the first investigator of the John Day fossil beds of central Oregon. Dedication speakers listed Dr. Condon's achievements which included his appointment by the Oregon Legislature as first State Geologist in 1872, selection as the first professor of geology at the newly created University of Oregon in 1876, and his discovery of the upper Oligocene horse in 1866, one of the most important contributions to American paleontology. In 1946 the State System of Higher Education established the Condon lectureship in his honor.

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WORK AT NICKEL MOUNTAIN

Mining of ore on Nickel Mountain has been started by the Hanna Coal and Ore Corporation even though the aerial tramway has not yet been put into operation. Heavy earth-moving equipment transports the ore to a coarse crusher from which it is now transported about 2 miles by road down to the smelter site. Transmission and substation facilities at the plant have been completed by Bonneville Power Administration and the California Oregon Power Company. Copco is supplying power to the Bonneville substation at the smelting plant and this Copco power is replaced by Bonneville with delivery over the new 230,000-volt Klamath Falls-Redmond line. The smelting plant will get 65,000 kilowatts of firm power under the contract with Bonneville. The drying and calcining equipment are already in use and electrodes are being baked in No. 1 furnace (June 11, 1954). It is expected that ore will be fed to this furnace and the tramway will be in operation by July 1.

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SAND AND GRAVEL PRODUCERS

A new list of sand and gravel producers in Oregon has been prepared and is now available at Department offices in Portland, Baker, and Grants Pass. Price is 5 cents.

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