A GEOLOGIC TRIP ALONG SNOQUALMIE, SWAUK, AND STEVENS PASS HIGHWAYS

By

University of Washington Geology Department Staff

Revised by

Vaughn E. Livingston, Jr.

Cover: Snoqualmie Pass Highway in 1910 and 1963. Photographs courtesy Joseph Stenstrom (1910) and Jerry Gray (1963).

STATE OF WASHINGTON

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INTRODUCTION

This guide book has been published primarily to help acquaint the traveler with the wonderful variety of geologic features that can be seen along the Snoqualmie, Swauk, and Stevens Pass Highways. The professional geologist who is interested in the central and northern Cascade Mountains should find it a useful guide also.

The Blewett Pass highway was relocated in 1957 and now crosses the Wenatchee Mountains through Swauk Pass, 3½ miles to the east of Blewett Pass. Because the old name had become so well established, the new Swauk Pass highway is commonly, but erroneously, referred to as the Blewett Pass highway.

The route of the log crosses two distinctly different lithologic provinces. The Seattle-Peshastin Creek segment passes through a section of predominantly Tertiary sedimentary and volcanic rocks, showing some rocks that are the same age on both sides of the Cascades. The Peshastin Creek-Stevens Pass-Sultan section of the log passes through a predominantly pre-Tertiary metamorphic and intrusive series that is typical of the northern Cascade Mountains.

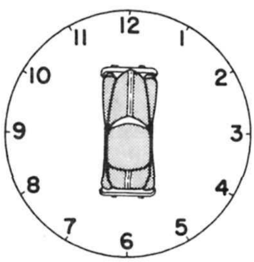
This log is a revision of a road log prepared by the Geology Department staff of the University of Washington for the regional meeting of the Geological Society of America that was held in Seattle in 1954. The reviser has added the illustrations, list of references, road changes, items of historical interest, and new geologic information. Neverthless, the original arrangement, and, wherever possible, the original wording has been retained. This is especially true of the discussions of the Roslyn syncline and of the metamorphic complex along the Stevens Pass highway. The latter discussion was prepared by Professor Peter Misch of the University of Washington from unpublished field notes.

The reviser wishes to thank Paul Hammond, a graduate student at the University of Washington, for geologic information he supplied on the Seattle-Snoqualmie Pass section; Mr. Robert Hitchman, of Seattle, for definitions and information on origins of various geographic names along the route; Mrs. Kate M. Bailey, of Cashmere, for help in locating photographs; Mr. John P. Thomson, of Spokane, for supplying information about the dredging operation on Swauk Creek; W. A. G. Bennett, a Divison of Mines and Geology staff geologist, for the photograph of the dredge on Swauk Creek; Mr. Joseph Strenstrom, of Seattle, for the photographs of the old Snoqualmie Pass Highway; and Mr. Robert E. Eddy, of the Chelan County Historical Society, for the photo of the old town of Blewett.

Thanks are also due Hazel Mills of the Washington State Library, Wanda Brockman of the Seattle Public Library, and L. G. Reichert of the Great Northern Railway Company for help in searching out some of the historical information. Members of the geology staff of the University of Washington edited the manuscript after its revision and are thanked for their efforts.

This is the first of a series of guide books the Division of Mines and Geology tentatively plans to publish. It is hoped that these books will help the reader to realize that "old mother earth" is not just a chaotic pile of rocks, but that there is system and organization in the way the rocks occur. This book can be a useful source of information to science teachers who live along the route, inasmuch as they can take their students into the field, using the log as a guide, and show the students many different kinds of rocks as they occur in nature, and also the ways in which the geologic processes have affected the topography. The log route passes through, or close to, at least 11 communities, not counting Greater Seattle, and the teachers in each of these towns have, with the aid of this log, a natural geology laboratory in which to work.

The road log indicates distances between points and gives a cumulative total of mileage covered, starting at Seattle and ending at Sultan. Because of differences in car odometers, the cumulative total probably will not always agree. Because of this, many check points are included in this log. Check points used are creek crossings and road junctions. In order to locate points of interest away from the highway the "o'clock" system is used; the front of the car is 12 o'clock, the rear of the car is 6 o'clock (see diagram below).



The geology of the area traversed by this log is known through the reconnaissance and detailed geologic mapping done by the workers indicated on the index map on page 46. Part of this work has been published (see Selected References on page 48), but much of this is in unpublished theses by students at the University of Washington and other universities. These theses also are listed in the Selected References.

ROAD LOG

Leave Seattle on U.S. Highway 10, traveling east. Seattle was platted on May 23, 1853 by A. A. Denny, C. D. Boren, and Dr. D. S. Maynard, 3 years after the first settlers landed on Alki Point. The new town was named after an Indian chief who was friendly to the settlers. Apparently, though, the chief had not always been cordial to the white men. Entries in the Hudson's Bay Company's daily journal list him as being somewhat of a villain. The entry for September 30, 1835 says:

> This afternoon a quarrel took place between Ovrie and an Indian of the Soquamish tribe by the name of Seealt or by us called LaGros. It is said that he threatened Ovrie with his gun. This is the second time. I of course brought him to account and told him that if he ever did it again I should not pass over the business so quietly. At best this fellow is a scamp like Challacom (Steilacoom) and a black heart ready to pick a quarrel (Meany, 1923, p. 261).

Another entry on December 6, 1837 says:

> The Chief Seeyat has murdered an Indian doctor, much talk about the affair amongst the Soquamish tribe. I wish they would determine to shoot the villain (Meany, 1923, p. 261).

From some reason, between 1837 and 1851 Chief Seattle's feelings toward the white man mellowed. This change in attitude may have been brought about by his conversion to Christianity or by the fact that Chief Patkanim of the Snoqualmie tribe, after being defeated in a battle, became a friend of the whites. At any rate, Seattle remained a friend to the settlers throughout the remainder of his life, even during the Indian uprising of 1855-56. Early settlers estimated that the Chief was about 80 years old when he died in 1866. He was a large man and an impressive leader and, according to reports, an outstanding orator.

Begin mileage at the east end of the Lake Washington floating bridge where concrete railing ends.

As you cross the floating bridge, note the streamlined longitudinal profile of Mercer Island ahead. The island was shaped by the Vashon glacier of Wisconsin age as it moved southward through the Puget Sound lowland. The island consists of a core of flat-lying pre-Vashon Pleistocene glacial drift[1/] covered by a thin veneer of Vashon till[2/]. The Vashon glacier was the last great ice sheet that moved down through the Puget Sound lowland.

Mileage cumulative	Mileage point to point	
0.0		East end of floating bridge (at end of concrete railing).
	0.2	
0.2		Overpass.
	0.4	

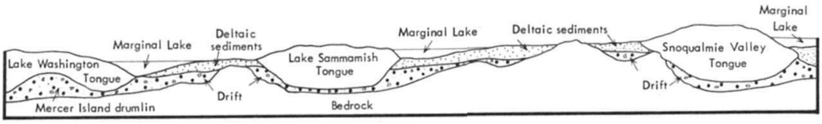
1/ Drift is a general term that includes all rock material, such as boulders, gravel, sand or clay, that has been deposited by either a glacier or water derived from the melting of a glacier.

2/ Till is a heterogeneous unsorted mixture of clay, sand, and various sized rocks.

Mileage cumulative	Mileage point to point	
0.6		Overpass. Gray till under overpass on both sides of the road and for next 0.2 mile on the right.
	0.3	
0.9		Underpass.
	0.4	
1.3		Underpass.
	0.2	
1.5		Essentially flat-lying pre-Vashon outwash[1] sand and silt at right.
	0.4	
1.9		Vashon till on right.
	0.9	
2.8		West end of East Channel bridge between Mercer Island and the mainland. On the right between 2 and 3 o'clock is a flat delta built into Lake Washington by Coal Creek. The delta is built largely of waste from coal mines that was transported down the creek during a flood years ago. Low hill in distance at 2 o'clock is underlain by marine sedimentary rocks of probable Oligocene age.
	0.9	
3.7		Highway crosses the Mercer Slough peat bog. This was a long narrow arm of Lake Washington that has been filled in with vegetal material and minor rock debris. This is the largest peat bog in King County and one of the largest in the State. It has been used to some extent for truck gardening, but has never been fully developed.
	0.3	
4.0		Overpass.
	0.2	
4.2		Overpass.
	0.8	
5.0		Outwash sand and gravel exposed in gravel pit on the right. For the next 1.5 miles the highway crosses a delta. Exposures in gravel pits on both sides of the highway show delta structure with foreset beds generally dipping westward. The delta top is pitted with kettles along its western (toward Lake Washington) margin, which, along with the absence of contemporaneous offshore sediments on Mercer Island and other low drumloidal hills to the west, indicate that the delta was formed in an ice marginal lake at a time when the Lake Washington trough was occupied by a tongue of the Vashon Glacier. The broad channel that the highway follows ends abruptly to the east in a sharp slope descending into the Lake Sammamish trough, forming a hanging head similar to the outlet of a lake. As it would be impossible for the rock debris that makes up the delta to be carried across an open lake by currents, this indicates that the Lake Sammamish trough was filled with ice at the time the delta was built. The stream that carried the deltaic material either flowed directly off the ice lobe,
	0.9	

[1] Outwash is stratified sediments that have been deposited by meltwater streams beyond the end of the glacier.

across the ice lobe from the highlands between Issaquah and North Bend, or around the southern margin of the ice lobe (see diagramatic cross-section below).



Diagramatic cross-section from Mercer Island to North Bend looking north.

Mileage cumulative	point to point	
5.9		Overpass.
	0.1	
6.0	0.5	Hills at 3 o'clock are underlain by tuff, siltstone, and conglomerate beds of Oligocene age. Fossil shells found in the rocks indicate that they were originally deposited in the sea.
6.5	1.2	To the right is a large gravel pit that shows delta structure very well.
7.7		Intermittent exposures of Oligocene tuff, tuffaceous siltstone, and volcanic rocks. They contain an assemblage of poorly preserved shallow-water marine fossils that includes clams, oysters, snails, and Dentalium (tusk shells). The beds strike N. 85° E. and dip about 45° NW, and are on the north limb of the Newcastle anticline. They overlie the coal-bearing strata to the south.

The highway from Mercer Island to about 3 miles east of Preston passes along the north border of the King County coal field. The field extends southward almost to Enumclaw and covers about 336 square miles. The area has a gently rolling topography and is mantled with a layer of glacial debris. The coal occurs in the Puget Group, a thick Eocene series of sandstone, siltstone, shale, and carbonaceous beds with occasional intercalated lava flows.

In 1853 Dr. M. Bigelow found coal on Black River near the present town of Renton. A mine was opened and was operated until the outbreak of the Indian Wars of 1855 and 1856. At that time, two of Bigelow's partners who were working at the mine were killed by Indians, and as a result the mine was abandoned.

In 1863, coal was discovered near the present town of Issaquah and on Coal Creek near the town of Newcastle. Daniel Bagley, G. F. Whitworth, John Ross, and others began active development of the Coal Creek seams and were soon shipping coal to Seattle. The coal was hauled to Lake Washington by

0.1 wagons, carried across the lake in barges, and then reloaded

Mileage
cumulative point to point

into wagons and hauled into Seattle. In 1867 the Lake Washington Coal Company was organized with the avowed purpose of developing the mine on a larger scale. A new portal was made at the mine and the method of transportation was changed. The coal was moved down the east side of Lake Washington into Black River, then down the Duwamish River to Elliot Bay and Seattle's waterfront. In 1870 the mine was sold to the Seattle Coal Company, who built a tram line from the mine to Lake Washington. Here the coal was loaded into barges and taken across the lake, where it was conveyed by another tram to Lake Union. From Lake Union it was distributed throughout the city.

New mines were opened in rapid succession after this and production went up accordingly. The peak production year was 1907, when 1,446,966 tons of coal was marketed from the King County fields. Ever since that time, production has fallen off gradually, until in 1960 there was only 62,068 tons of coal mined in the County by 5 mining companies. Total production from the fields as of the end of 1960 was approximately 46 million tons.

Some of the State's most important clay deposits occur in the King County coal fields. They are mostly Tertiary in age, and many of them are directly associated with coal seams as an underclay. This is a clay or shale bed that immediately underlies a coal seam. Most of the clay deposits in the coal fields are actually shale, which is just an indurated clay that has fissility (capable of being split into thin slabs).

7.8 Redmond-Lake Sammamish exit on right. Issaquah Mountain ahead on skyline, probably underlain by andesitic flows and
1.1 tuffs of the Tukwila Formation.

8.9 Eastbound traffic entrance to Lake Sammamish State Park.
0.1

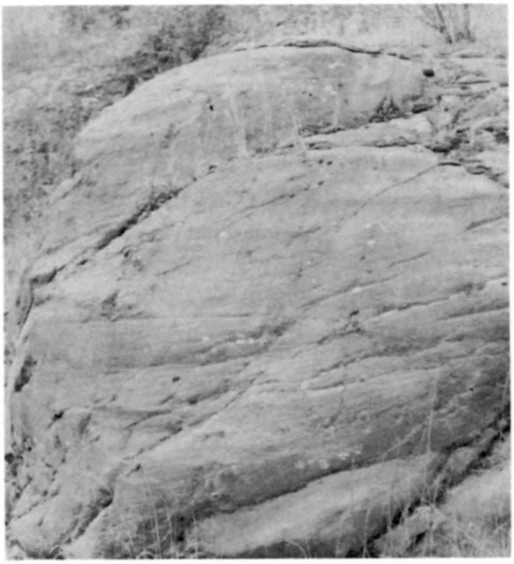
9.0 Underpass. Excellent exposures of flat-lying outwash gravel on
0.3 right.

9.3 Lake Sammamish on left. There is a very nice State Park at the east end of the Lake. The park has good swimming and picnic facilities, but is not equipped for overnight camping.

Looking ahead, a flat terrace can be seen on the east side of the valley. Exposures in the face of the terrace indicate that it is a delta. The same reasoning that was outlined for the delta in the Lake Washington trough applies to this delta. Its relatively low altitude indicates that it was built in a lake that was marginal
0.6 to a lobe of Vashon ice occupying the Sammamish trough. East of the Sammamish trough the highway to Preston follows the channel of the stream that built the delta. From Preston the channel descends rapidly northeastward into the Snoqualmie River valley, the easternmost trough of the Puget Sound lowland. The old U.S. 10 highway goes down this channel to Fall City; the new highway, however, crosses the glaciated upland and joins

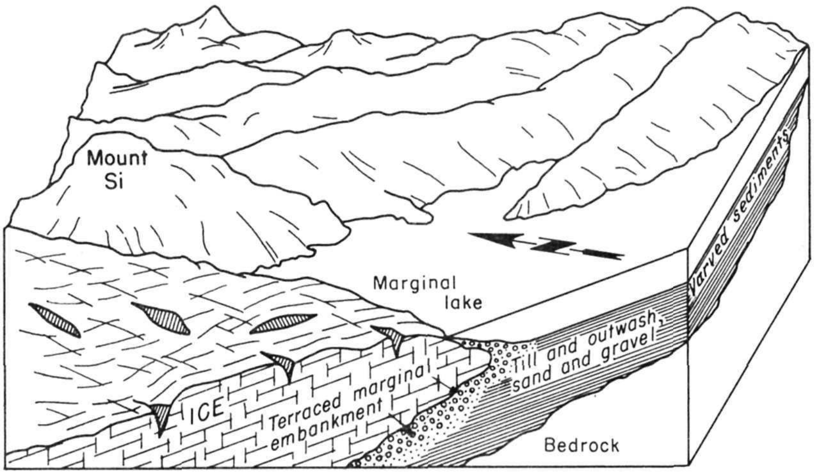
Mileage cumulative	Mileage point to point	
		the old highway at North Bend (see diagramatic cross-section on page 5).
9.9		Westbound traffic entrance to Lake Sammamish State Park on left.
	0.8	
10.7		Outwash gravels are well exposed on terrace face at 10 o'clock.
	0.5	
11.2		Bridge over Issaquah Creek.
	0.5	
11.7		Issaquah junction. Continue on U.S. 10.
	0.8	
12.5		Northern Pacific Railway trestle. Enter valley of East Fork of Issaquah Creek. Abandoned coal mines are located along the valley wall on left. The coal is interbedded mostly with sandstone of the Renton Formation of Eocene age.
	0.1	
12.6		Bridge over East Fork of Issaquah Creek.
	0.1	
12.7		Bridge over East Fork of Issaquah Creek.
	0.2	
12.9		Bridge over East Fork of Issaquah Creek.
	0.5	
13.4		Bridge over East Fork of Issaquah Creek. Bonneville Power line crossing.
	0.2	
13.6		Bridge over East Fork of Issaquah Creek.
	1.4	
15.0		Bridge over East Fork of Issaquah Creek. Outcrops along left side of road are Tertiary volcanic and sedimentary rocks probably of the Tukwila Formation. They are andesite porphyry, tuff, conglomerate, and tuffaceous sandstone and shale. They strike N. 10° E. and dip 15° NW. At the east end of the outcrops (15.2) there is a cast of a fossil tree that was buried by ash. The base appears to be rooted in a tuffaceous carbonaceous shale.
	0.2	
15.2		Cast of fossil tree on left.
	0.3	
15.5		Bridge over East Fork of Issaquah Creek.
	0.6	
16.1		Bridge over East Fork of Issaquah Creek.
	1.2	
17.3		Late Eocene arkosic sandstone of the Tiger Formation overlain by glacial drift on right. The Tiger Formation underlies the Tukwila Formation in this area.
	0.2	
17.5		Road junction. Glacial drift on both sides of the road.
	0.1	
17.6		Overpass.
	0.3	
17.9		Glacial outwash silt, sand, and gravel on right.
	0.2	

Mileage cumulative	Mileage point to point	
18.1		Bridge over Raging River.
	0.1	
18.2		Gray-colored Vashon till on left.
	0.2	
18.4		Eocene andesite porphyry covered by glacial debris on left.
	2.0	
20.4		Auburn cutoff junction.
	0.7	
21.1		Roadcut in Eocene tuffaceous sedimentary rocks, probably part
	0.1	of the Tukwila Formation, overlain by glacial drift.
21.2		Echo Lake on right.
	0.2	
21.4		Eocene sandstone on both sides of the road. Mount Si on skyline
	1.3	at 12 o'clock.
22.7		Varved clay and silt beds exposed in road cut on right.
	0.7	
23.4		Eocene sedimentary and volcanic rocks on right. At west end of the roadcut the outcrops have been polished and striated by the continental glacier that came down from the north. The grooves indicate the direction the glacier was moving; in this case
	0.4	the bedrock acted as a buttress deflecting the ice to the southwest. The striations and grooves were made when rocks frozen in the bottom of the glacier were dragged across the outcrops. The rockshod mass of ice in effect acted as a huge piece of sandpaper.

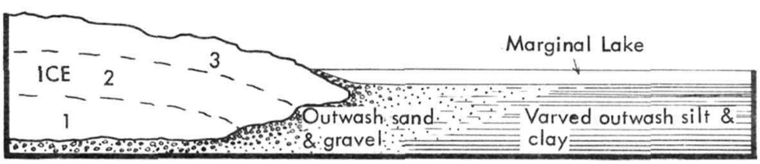


Grooved and striated surface of glaciated bedrock
at the east end of road cut at mile 23.4.

Mileage cumulative	Mileage point to point	
23.8		Bridge. Enter alluvial floor of Snoqualmie Valley.
	0.6	
24.4		Railroad crossing.
	1.0	
25.4	0.7	Enter North Bend. At 10 o'clock is Mount Si. Mount Si is made up of massive volcanic breccia, argillite, and graywacke of Mesozoic (?) age. The front of the mountain is a high-angle fault that is still active, according to seismic evidence. The mountain was named after Josiah Merrit (Meany, 1923, p. 179), an early settler in the area. North Bend gets its name from its position on the South Fork of the Snoqualmie River; the river turns north at this point. The town, formerly called Snoqualmie, was platted by W. H. Taylor (Meany, 1923, p. 191), who settled here in 1872.
26.1		Railroad crossing. Leave North Bend.
	0.5	
26.6	1.7	Mount Si at 9 o'clock. The small block mountain standing at the foot of Mount Si is Little Si. It may be a fault sliver, a landslide block, or a stranded meltwater channel (Kremer, 1959). Outcrops at 10 o'clock on Mount Si appear to be less rugged and jagged than those farther up the hill, which indicates that only the lower slopes of the mountain were glaciated. Rugged peaks ahead on the skyline are composed mostly of granodiorite. Mountains seen from here that border the South Fork of the Snoqualmie Valley are Grouse Ridge at 11 o'clock, Bandera Mountain beyond at 11:30, McClellan Butte at about 12 o'clock, just beyond Mount Washington which is at 1 o'clock. The low hills at the valley mouths of the Middle Fork (Grouse Ridge) and South Fork of the Snoqualmie River, and of the Cedar River are terminal moraines deposited by the Vashon glacier. The rivers have since breeched the moraines, and the highway goes through one of these gaps.
28.3		Underpass.
	0.3	
28.6	2.8	Highway is ascending the ice contact front of the terraced morainal embankment. The Vashon glacier dammed off the valley during the early part of its advance. The ensuing lake that was impounded up-valley acted as a depositional basin for the debris being washed off the glacier, gravel and sand being deposited close to the ice, and silt and clay farther up the valley. As the glacier advanced and spread out laterally, it overrode earlier deposits, and the streams discharging off the ice built new gravel terraces at the higher elevation. The varved sediments that occur farther up the valley represent the fine-grained lacustrine phase of the outwash (see sketch on page 10).
31.4		Glacial sand and gravel at 9 o'clock in roadcut of westbound lane.
	0.1	



Block diagram showing theoretical relationship of terraced morainal embankment, varved sediments, and outwash gravels to glacier and Snoqualmie Valley during Pleistocene time.



Diagramatic cross-section showing relationship of different ice advances to terraced moraine and outwash.

1.-First stage of advance, ice stagnant long enough for ice contact terrace to form.

2.-Second stage of advance, first terrace has been over-ridden, ice again stagnant long enough for second ice contact terrace to form.

3.-Third stage of advance, second terrace has been over-ridden, third terrace forming.

Mileage cumulative	point to point	
31.5		Twin Falls State Park. Picnic facilities only.
	0.3	
31.8	1.7	Bridge over the South Fork of Snoqualmie River. At west end of bridge are outcrops of siliceous argillite and banded chert that are pre-Tertiary in age. About 0.1 mile beyond the east end of the bridge, altered Keechelus Andesite flow rocks of probable Oligocene age are exposed in the road cuts.
33.5		Bridge over Change Creek.
	0.2	
33.7	0.5	Bridge over Hall Creek. Contact between andesite flow rocks and granodiorite intrusive is approximately here.
34.2		Few scattered outcrops on right for next 0.2 mile are granodiorite.
	0.9	
35.1	0.3	Bridge over South Fork of Snoqualmie River. Massive, well jointed, fine-grained dioritic rock is well exposed in quarry on left at east end of bridge. McClellan Butte on right, Bandera Mountain at 12 o'clock.
35.4	0.2	Highway was washed out from here to 36.0 by a flash flood during the winter of 1959-60. The original grade was built on structurally weak glacial clay and silt, which the river was able to erode very easily. An excellent section of varved glacial sediments was exposed as a result of the flood and washout.
35.6	0.8	Varved clay and silt to the right across the river, and on the left in roadcuts. Varved sediments will be seen intermittently for the next several miles in roadcuts. The clay and silt were deposited in a lake that was formed when the Vashon glacier dammed off the valley. Most of the material was probably washed into the ice marginal lake from the glacier. The different varves represent seasonal accumulations. The clay was deposited during the fall and winter, and the silt during the spring and summer. By counting the varves, geologists are able to estimate the number of years it took the sediments to accumulate (see photograph on page 12).
36.4	0.5	Enter Snoqualmie National Forest. Mount Catherine at 1 o'clock on skyline at head of valley.
36.9	0.8	Keechelus Andesite crops out high on the mountain to the right. Mountain to the left is composed of Keechelus Andesite down low and of Snoqualmie Granodiorite up high. The Snoqualmie Granodiorite has been estimated to be 17 million years old (Lysson and others, 1961) by the potassium-argon method of dating. Beyond here mountains on left are granodiorite.
37.7	3.3	Varved silt and clay on left. At east end of cut, silt is underlain by granodiorite.
41.0		Bandera Mountain at 9 o'clock. Mount Kent at 3 o'clock.
	1.2	

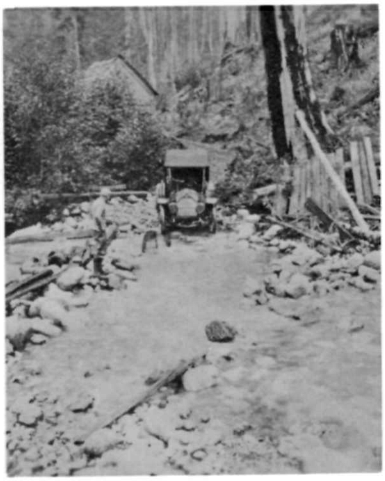
Varved glacial clay and silt at mile 35.6.

Mileage cumulative	Mileage point to point	
42.2		Mount Gardner at 12 o'clock.
	1.4	
43.6		Bridge over the South Fork of Snoqualmie River. Granite
	0.2	Mountain at 9 o'clock.
43.8		Asahel Curtis Forest Camp on left.
	0.2	
44.0		Rocks in the roadcuts for the next 0.5 mile are part of the Snoqualmie Granodiorite intrusive body. Note the excellent,
	0.4	almost cubic, jointing pattern in places.
44.4		Bridge over Olallie Creek.
	0.5	

Mileage cumulative	Mileage point to point	
44.9	0.2	Exposures of well-cemented Naches Formation sandstone showing blocky jointing similar to that in the granodiorite. Scattered through the sandstone are irregular masses of granodiorite.
45.1	0.5	Rockdale Creek culvert. West portal of Milwaukee Railroad tunnel is above the road here. Denny Mountain at 10 o'clock.
45.6	0.4	Denny Mountain at 11 o'clock and The Tooth just to the left and beyond at 10:30 o'clock.
46.0	0.3	Lookout point. Roadcuts are in contact metamorphosed sedimentary and basic volcanic rocks of the Naches Formation, which is probably Eocene in age. The rocks contain introduced diopside-garnet veinlets, the calcium of which was probably derived from associated limestone beds. These veinlets have been described by Professors Goodspeed and Coombs (1932) of the University of Washington.
46.3	0.6	Slickensides exposed in the roadcut on right reveal the presence of a fault that strikes northeast and dips northwest. When the roadway was being widened in 1953, rocks on the hanging wall of the fault gave way, causing a landslide that covered the road and carried two trucks over the side.
46.9	0.5	West end of snow shed. Contact metamorphosed basic volcanic rocks are exposed at east end of shed. About 0.5 mile beyond the snowshed, Guye Peak can be seen at 11 o'clock. It is the type locality of the Guye Formation. Mountains farther north are composed of Snoqualmie Granodiorite and older volcanic and sedimentary rocks. Kendall Peak is at 12 o'clock.
47.4	1.0	Rock outcrops along the road from here to beyond the summit are siliceous sandstone and conglomerate of the Guye Formation.
48.4		Summit of Snoqualmie Pass, elevation 3,010 feet. Ski lift, which operates in summer as well as winter, affords an excellent view of the mountains in this area. Snoqualmie Pass was named after an Indian tribe. The name refers to a legend that told how the people of the tribe came from the moon (Meany, 1923, p. 280). Snoqualmie Pass was one of the main routes used by the Indians to cross the Cascade Mountains. Apparently the Hudson's Bay people were familiar with the pass and had used it also. In 1848 several settlers from King County entered the west end of the pass and began to improve the trail. Shortly thereafter, Governor Stevens had the pass explored as a possible route for the proposed railroad across the mountains. This survey reported that it was at least 1,000 feet lower in elevation than any other known pass. The Governor's report caught the interest of the people of King County, and from 1855 until the completion of the highway across the pass, they, with help and encouragement

Mileage
cumulative point to point

from the people of Kittitas County, pushed the idea of a Snoqualmie Pass road. During the early days of this project, the people
1.8 themselves donated funds for the construction of a wagon road. They petitioned the State and Federal governments, held lotteries, and had special tax levies to raise funds for the road. Unfortunately, the lawmakers turned a deaf ear on their appeals, the lotteries ended in lawsuits because they didn't raise enough funds to pay off the winners, and the special tax levies didn't raise enough money to maintain the road. Finally, in 1909 a transcontinental automobile race was proposed in connection with the Alaska-Yukon-Pacific Exposition in Seattle. The race was to start in New York and end in Seattle. King and Kittitas Counties appropriated funds and quickly made the road passable for cars. About 100 cars went over the pass that summer. This was all the stimulus needed to get the Government interested in the pass. Plenty of money was made available, and on July 1, 1915, Governor Ernest Lister formally dedicated the new Snoqualmie Pass Highway (Bagley, 1929). Road cuts from the summit to Coal Creek are in glacial sediments deposited by valley glaciers. In places the contact between glacial debris and the Guye Formation is exposed.



Snoqualmie Pass highway in 1910 (Car is a Chalmers "30"). Photographs courtesy of Joseph Stenstrom.

50.2 Bridge over Hyak Creek. Roadcuts on both sides of the road for
0.9 the last mile have been in till.

51.1 Bridge over Coal Creek. Roadcut on left is in Mount Catherine
0.3 Rhyolite.

Mileage
cumulative point to point

51.4 Bridge over Gold Creek. On the left, looking up Gold Creek, is
an excellent view of the mountains northeast of Snoqualmie Pass.
High peak at the head of the valley is Alaska Mountain, ridge on
right side of valley is Rampart Ridge, to the left is Kendall Peak.
To the right is the upper end of Lake Keechelus. The lake is of
glacial origin, having formed behind a terminal moraine that
blocked the valley. The size of the lake has been increased by
building a dam on the top of the moraihe.
There are two published meanings for the word Keechelus,
both being of Indian origin. One is "less fish" or "fewer fish,"
the other meaning is "bad lake." An Indian legend tells about a
man on a tall horse appearing in the center of the lake. A horse
1.3 from a passing band of Indians swam out to the tall horse and
they both disappeared. From that time it was to the Indians a
bad lake (Meany, 1923, p. 127).
Bedrock exposures along road for approximately the next
2 miles are in the Naches Formation as mapped by Foster (1960).
Beyond that for approximately another 2 miles, the road is in
Keechelus Andesite. It is made up of andesite, breccia, and tuff
that have been subjected to various kinds of alteration. Originally, the Keechelus Andesite was considered to be Miocene in
age, but more recent evidence indicates that it is older, probably
Eocene-Oligocene.

52.7 Bridge over Rocky Run Creek.
0.3
53.0 Rock Bar Forest Camp entrance.
1.0
54.0 Excellent exposures of andesite breccia on left. The breccia
is exposed for only a few yards, so it is necessary to watch
0.2 carefully in order to see it.

54.2 West end of snow shed.
0.8
55.0 Landslide scar on left. When the new road was being widened in
1956, the whole face of the cut fell out into the road, killing
three people and knocking several pieces of equipment off the
0.4 grade. The slide resulted when the bank was over-steepened,
and the rocks failed along a vertical joint system that is parallel
to the dip of the beds.

55.4 Large quarry on left is in a dacite breccia that was described by
0.1 Goodspeed and Coombs (1937) as a replacement breccia.

55.5 Glacially polished rock surfaces on right.
1.4
56.9 Lower end of Keechelus Lake, dam spillway at right. Bedrock
exposures in roadcuts for approximately the next 9 miles are
mostly altered sedimentary and volcanic rocks of the Naches
Formation, capped locally by glacial deposits. The formation
2.1 varies considerably from place to place; generally speaking,

Mileage
cumulative point to point

however, it is made up of about 5,000 feet of interbedded basalt, sedimentary, and rhyolytic rocks. The sedimentary rocks are mostly arkosic sandstone that grade locally into carbonaceous shales and conglomeratic beds.

59.0 Stampede Pass road exit on right. The Northern Pacific Railway tunnels under Stampede Pass, which acquired its name in a rather unusual way. According to reports, as the railroad was being built into the Cascade Mountains in March of 1881, word came out from headquarters to speed up the work. When the labor
0.3 gang was notified of the order they all quit. The foreman told them "no work, no eat," and as a result, according to one witness, the men all stampeded out of the pass for the valley. The company officers wanted to name the pass after its discoverer, Virgil G. Bogue, by Mr. Bogue asked that it be called Stampede (Meany, 1923, p. 286).

59.3 Overpass.

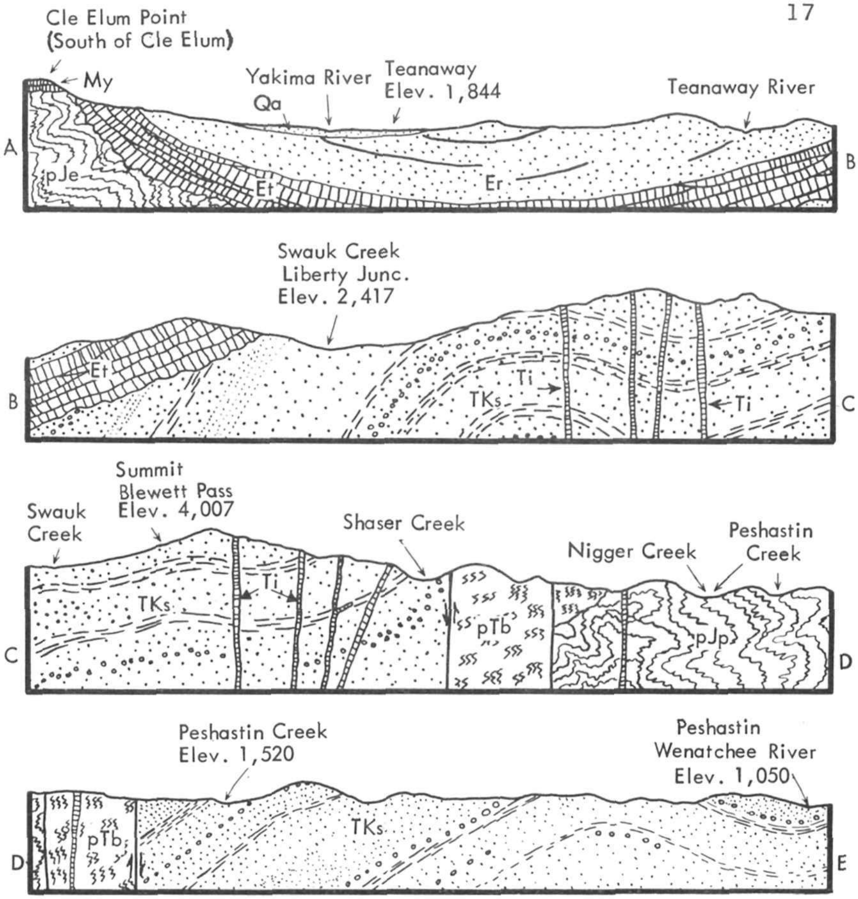
1.1

60.4 Overpass.

3.6

64.0 Kachess Ridge can be seen at 11 o'clock on skyline. Several thousand feet of Teanaway Basalt is exposed on the mountain front, dipping northeast into the Roslyn syncline.

The mountains seen to the north and east are made up predominantly of Paleocene and Eocene rocks that have been folded into a broad syncline, the axis of which trends northwest-southeast between Kachess Lake and Cle Elum Lake, then bends around the southern end of Cle Elum Lake and trends east-west through the Cle Elum area. The highway generally parallels the southern limb of the syncline to the town of Cle Elum. The three major units of the syncline structure are the Swauk Formation, the Teanaway Basalt, and the Roslyn Formation. The oldest of
2.0 the group is the Swauk, which is Paleocene in age. It is made up of more than 12,000 feet of sandstone and shale with a few conglomerate beds. Unconformably overlying the Swauk is approximately 5,000 feet of Teanaway Basalt, which is Eocene in age. The Teanaway is composed predominantly of basalt flows with pyroclastic and sedimentary interbeds. Resting concordantly on top of the Teanaway Basalt is the Roslyn Formation. It is Eocene in age and is made up of more than 4,000 feet of arkosic sandstone and shale with interbedded coal seams. The basement complex beneath the syncline is the pre-Jurassic Easton Schist composed mainly of amphibolite, greenschist, and phyllite. The long southeast-trending ridge that parallels the highway southeast of Easton for about 10 miles is made up of this formation (see diagramatic cross-sections on page 17).



Diagramatic cross-section from Cle Elum Point northeast to Liberty Junction, then north to Peshastin, crossing the Roslyn syncline and the south flank of the Mount Stuart uplift. Vertical exaggeration about three times. Qa-valley fill; My-Yakima Basalt; Er-Roslyn Formation; Et-Teanaway Basalt; Ti-Teanaway basalt swarm dikes; TKs-Swauk Formation; pTb-pre-Tertiary basic rocks; pJe-Easton Schist; and pJp-Peshastin Formation.

66.0 Bridge. Easton Lake on the right. There is a small outcrop of Easton Schist at east end of the bridge. About 0.5 mile west of the westbound bridge, good exposures of Naches Formation crop out in the roadcut on the left.

1.4

67.4 Easton junction

0.5

67.9 Bridge over Yakima River. Long ridge on the right is part of the type area of the Easton Schist, which includes phyllite, mica schist, greenschist, glaucophane schist, and amphibole schist.

0.3

Mileage cumulative	Mileage point to point	
68.2		Overpass.
	0.7	
68.9	3.3	Easton Ridge on the left is composed of the youngest part of the Teanaway Basalt.
72.2		Bridge over Big Creek.
	1.3	
73.5		Bridge over Little Creek.
	1.7	
75.2	0.6	Railroad and road cuts through a ridge composed of glacial lake beds, outwash, and morainal material. Local folding and faulting in this material are thought to have been caused by compressional forces exerted by a glacier overriding the ridge as it moved down the Yakima River valley.
75.8		Bridge over Yakima River.
	2.1	
77.9	1.3	Bridge over Cle Elum River. The prominent mass of rock, Peoh Point, on the south side of the Yakima River valley at 2 o'clock, is composed of Taneum Andesite, a lower Miocene volcanic unit consisting of andesite porphyry and volcanic conglomerate and breccia. It is overlain by the Yakima Basalt of Miocene age.
79.2		Roadside park on left and right.
	0.9	
80.1		Enter Cle Elum. This town was named from the Indian word Kleallum or Kleattum, meaning "swift waters" (Meany, 1923, p. 50).

Coal mining is Cle Elum's major industry. The mines supplied coal for steam locomotives of the Northern Pacific Railway for many years. Since the line's switchover to diesel locomotives, coal production has steadily dwindled. A new use that is being considered for coal from this area is to produce steam for generation of electricity.

There is no authenic report on the earliest discovery of coal in the Cle Elum district. However, Isaiah Buchanan is reported to have known that coal was to be found in the area when he homesteaded on Manastash Creek in 1871 or 1872 (Saunders, 1914, p. 17). He worked several seams on his property for a number of years in a fruitless attempt to interest eastern concerns in the field.

In May 1886, the Northern Pacific Railway Company sent a field party into the area to prospect for and develop any promising coal discoveries. They made significant finds in the Roslyn area, and by December of the same year made the first shipment of coal by rail from the mines. At the present time only two companies are actively mining coal in the Cle Elum district. Total production from the time the mines first opened to December 31, 1960 has been 60,759,965 tons.

The Northern Pacific Railway Company began testing a new hydraulic method of mining coal in 1961. Instead of using

Coal miner in one of the Roslyn mines using high pressure water jet to cut coal from face of seam.

Mileage	
cumulative	point to point

a pick and shovel or mechanical diggers, a small jet of water under very high pressure is directed against the face of the coal
0.9 seam. The water actually cuts the coal away from the face of the seam.

The coal occurs in the Roslyn Formation of Eocene age. The Roslyn Formation in the Cle Elum area is about 3,500 feet thick and contains at least 20 coal seams. The formation is made up of arkosic sandstone, shale, and, locally, conglomerate.

There are several low-grade iron-nickel deposits in the Cle Elum-Blewett area (Broughton, 1943, 1944; Lupher, 1944; Zapffe, 1944). None of them have yielded commercial ore as yet, but they are rich enough to generate continuing interest among different mining groups. The deposits are lateritic in nature and occur in two distinct types, fine-grained beds and conglomerate beds. The fine-grained beds range in thickness from several inches to over 30 feet. The conglomerate beds, for the most part, represent transported material and have a maximum thickness of about 500 feet. Occasionally the two types are found interbedded, but usually they occur separately.

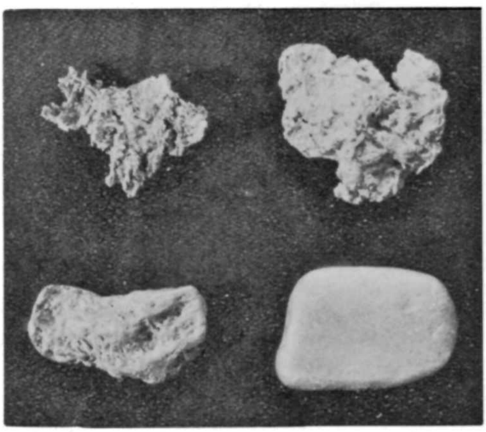
The fine-grained beds can best be described as metamorphosed mudstone that contains appreciable amounts of iron, nickel, chromium, and aluminum. The material is composed mostly of very fine grained limonite, hematite, magnetite, and aluminum oxide,

Mileage cumulative	point to point	
		in varying amounts. Some of the magnetite is present in the form of oolites and pisolites up to half an inch in diameter. Occasionally, small grains and pebbles of serpentine are found in the fine-grained beds. The conglomerate beds are composed of a fine matrix that resembles the fine-grained beds, with well-rounded pebbles, cobbles, and boulders of serpentine, peridotite, diabase, and slate. Some of the boulders are as much as 10 feet in diameter.
81.0		Railroad crossing.
	0.3	
81.3		Junction with Highway 2E. Continue on U.S. 10.
	0.9	
82.2		Old coal mine dumps to the left behind homes. The low hills to the left are underlain by white arkosic sandstone of the Roslyn Formation.
	2.9	Looking ahead, the gently south-sloping hill on the skyline, Lookout Mountain, is composed of Yakima Basalt, which dips gently to the southeast and unconformably truncates the Teanaway Basalt and Roslyn Formation.
85.1		White-weathering Roslyn sandstone crops out on the left. To the
	0.6	right, the Yakima Basalt caps the ridge across the valley.
85.7		Teanaway junction. Turn left on U.S. 97. Roadside park. From here the highway trends northeastward across the northern limb of the Roslyn syncline, passing successively through the Roslyn, Teanaway, and Swauk Formations.
		North of the Roslyn syncline lies the Mount Stuart uplift of pre-Tertiary rocks. They include schist, phyllite, metagabbro, peridotite, and serpentine (see diagramatic cross-section on page 17). The core of the uplift is made up of quartz diorite and granodiorite of the Mount Stuart batholith. Some of these pre-Tertiary rocks will be seen along the highway in the upper Peshastin Creek area and again in Tumwater Canyon northwest of Leavenworth.
	1.1	The Mount Stuart rocks are unconformably overlain on the west and south by folded rocks of the Swauk Formation. To the east they are in fault contact with the Swauk. Northward, the Mount Stuart uplift is continuous with the northern Cascade uplift. The fault along the eastern margin of the uplift has a large displacement and serves as the western border fault of the Chiwaukum graben. Willis (1953), who named it the Leavenworth fault, was able to trace it for about 36 miles. The highway crosses the fault four times, first near the mouth of Ingalls Creek on the Swauk Pass highway, again at the west outskirts of Leavenworth, again at the north end of Tumwater Canyon, and finally just west of the intersection of U.S. 2 and State 15C.
86.8		Lookout Mountain, at 2 o'clock, is capped by Yakima Basalt. Because the basalt rests on structurally incompetent Roslyn

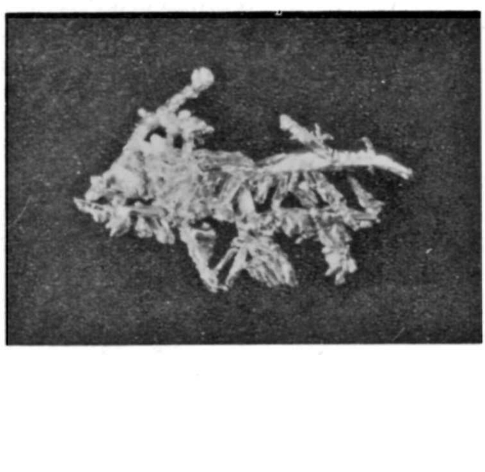
Mileage cumulative	Mileage point to point	
	2.9	sandstone, there has been considerable landsliding, and the steep western front of the mountain represents a landslide scarp.
89.7		Bridge over Teanaway River.
	0.4	
90.1		Snow-capped Mount Stuart on the skyline at 9 o'clock. It is composed of granodiorite of Mesozoic age.
		Mount Stuart was named by Captain George B. McClellan on September 20, 1853. McClellan's diary says ". . . a handsome snow-peak smaller than Mount Baker; as it is not found on any previous map that I know of, and had no name, I
	0.2	called it Mount Stuart." (Meany, 1923, p. 179). Apparently it was named in honor of Jimmie Stuart, about whom McClellan had said in an earlier entry in his diary, "On the 18th June, 1851, at five in the afternoon died Jimmie Stuart, my best and oldest friend. He was mortally wounded the day before by an arrow, whilest gallantly leading a charge against a party of hostile Indians." (Meany, 1923, p. 179).
90.3		Junction of U.S. 97 and Teanaway River road. The topography
	1.5	on the south side of the alluvial plain is controlled by landsliding.
91.8		Yakima Basalt caps long south-sloping ridge at 2 o'clock. Approximate axis of the Roslyn syncline. Reddish-brown weathering
	1.9	rocks that underlie skyline ridge on left are Teanaway Basalt flows.
93.7		Junction of U.S. 97 and State 21. Continue on U.S. 97. State 21 continues south up Horse Canyon and then down Dry Creek to Ellensburg. These valleys are the collecting areas for one of the State's unique gem stones; in fact, some clain that it is found nowhere else in the world. This is the beautiful <u>Ellensburg blue agate</u>. It is thought to have originally formed in the vugs and fissures of the Teanaway Basalt. As the basalt was weathered
	0.1	and eroded, the agates were freed from the basalt and washed away to collect in the gravels of the Ellensburg Formation. How the agates were formed and the places to collect them are described in the pamphlet, "Ellensburg Blue" by J. P. Thomson (1961). Mr. Thomson was a long-time resident of the area and spent considerable time collecting the unusual blue agates. His father, a pioneer Ellensburg jeweler, helped popularize the stone.
93.8		Old dredge tailing piles on Swauk Creek at right. The name Swauk is apparently of Indian origin and might mean "deep" (Robert Hitchman, written communication, 1961). It was first mentioned in the report of J. K. Duncan, topographer with Captain George B. McClellan, in 1854. The name was then spelled Schwock (Meany, 1923, p. 298).
		Gold was discovered on Swauk Creek in 1874, (Glover, 1954, p. 13, says 1868) by Ben Goodwin (Bethune, 1891, p. 8). Old Ben had been a miner and prospector in California and Oregon before working his way north to Washington. Tradition

has it that he was lost and decided to do a little looking around while he got his bearings. As a result of his looking, he found the placer deposits on Swauk Creek. Once Ben got back to civilization, it didn't take long for the news of his good luck to spread to other gold camps in the northwest, and miners started to flock to the fabulous "diggin's" on Swauk Creek.

The Pleistocene gravels along Swauk Creek and several of its tributaries were gold bearing. Fine gold was distributed discontinuously through the gravel deposits; however, most of the gold occurred close to bedrock along the valley floor. The Swauk gold is reported to have been coarse; pieces weighing several ounces were common. Many nuggets weighing between 20 and 50 ounces were found. These larger nuggets were usually well rounded; the smaller nuggets, especially those found along the smaller tributaries, were in the form of wire, or crystalline, gold.



Gold nuggets from Swauk Mining district showing progressive rounding from wire gold nugget at upper left to solid nugget at lower right. Original size.



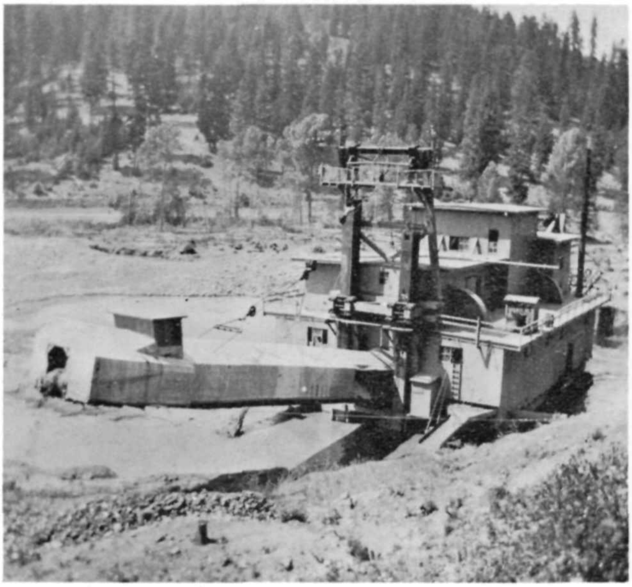
Wire gold nugget from Swauk Mining district. Four times original size.

Mileage
cumulative point to point

The country rock of most of the district is sandstone and and shale of the Swauk Formation. The rocks have been folded up at an angle, so that the shale beds with their fissility and jointing form natural riffles. The richest gold deposits were found in the cracks and crevices of the shale. The sandstone
0.3 beds usually were worn down smooth by the stream so that they commonly were barren of any gold.

As the readily accessible diggings were worked out and profits began to drop, the crude methods of mining, such as panning and sluicing, began to fade out of the picture. About 1922 the first dredging operation was started along Swauk Creek.

The dredge was built by the Swauk Mining and Dredging Company at the confluence of Swauk and Williams Creeks. It operated only 1 year and then was forced to close down because of its inability to handle large boulders. In 1925, a larger dredge was hauled into the district from Oregon by the Kittitas Mining Company. It began operations about half a mile below Deer Gulch on Swauk Creek during February 1926. In the summer of 1929 the company moved the dredge into Deer Gulch, where after a few weeks of digging it became stranded. This ended the large-scale dredging operations on Swauk Creek (J. P. Thomson, written communication, 1961). Apparently only relatively small-mesh screens were used on the dredges, because many large nuggets have been found in the tailings.



Dredge working on Swauk Creek during 1926. Note tailings spilling off stacker at left. Photograph courtesy of W. A. G. Bennett.

In 1881, lode gold was found in the Swauk Creek district. It usually occurs in "pods" or "pockets," and continuous veins are the exception rather than the rule. It has been found associated with quartz and calcite and usually occurs along shear zones. Even though the area has been thoroughly prospected, good strikes are still being made here. In 1956, two prospectors found 45 pounds of gold in a "pocket" that was only about 7 feet long, 4 feet wide, and 2 feet high. The largest nugget weighed about 5 pounds.

Overshot water wheel and arrastre at Liberty in 1927. Note bevel gears just right of center that transferred power from the water wheel on left to arrastre. Grinding surface is hidden by side boards, but cross arms to which grinding stones were attached are plainly visible above side boards.

Mileage cumulative	Mileage point to point	
		This is one area in the State where the "gold fever" continues. It is not uncommon to see people trying their hand at panning along the creek today. Just the magic of the word gold still pulls people into the area to do a little "weekend prospecting."
94.1	0.2	Bridge over Swauk Creek. Teanaway Basalt crops out on the left just before the bridge. It consists of flows and interbedded tuff.
94.3	0.8	Bridge. Rocks to the right of the road beyond the bridge can be seen to strike about east-west and dip about 45° to the south. Note the old dredge tailings along the valley floor.
95.1	0.1	Enter the Wenatchee National Forest. Wenatchee is a Yakima Indian word that means "river issuing from a canyon" (Robert Hitchman, written communication, 1961).
95.2	1.7	Large Teanaway swarm-dike cutting Swauk sedimentary rocks.
96.9	0.1	Bridge over Swauk Creek.
97.0	1.0	Liberty Junction. Continue on U.S. 97. Vertical basalt dike of the Teanaway dike swarm cutting through gently north-dipping Swauk Formation. The Teanaway dike swarm is one of the most interesting features of the area. It extends westward from Wenatchee for about 45 miles, but is best developed on the southern flanks of the Mount Stuart uplift. At certain places the dikes make up as much as 90 percent of the surface area (Lupher, 1944); in general, however, the average is much less. Petrographically, the dikes are indistinguishable from the Teanaway Basalt and might possibly have been feeders for the flows. Most of the dikes are seen intruding Swauk, but they are found cutting the older formations of the area also. According to Foster (1960), the dikes are perpendicular to the fold axis and the swarm is best developed where folding is the tightest. They range in thickness from a fraction of a foot to over 150 feet, and many can be traced for miles. They have a characteristic brown color on the weathered surface. The road passes through the Swauk Formation from here to Peshastin Creek on the north side of the pass.
98.0	0.4	Bridge over Swauk Creek. Small quarry in Swauk sandstone on left.
98.4	0.2	Campground on left. Bridge over Swauk Creek.
98.6	1.0	Old gold mine portal on left.

Mileage cumulative	Mileage point to point	
99.6		Bridge over Swauk Creek.
	0.9	
100.5	0.2	Mineral Springs Forest Camp on left. To the west of here about 3 miles is Redtop Mountain, one of the good collecting areas for geodes and agates.
100.7		Bridge over Swauk Creek.
	0.1	
100.8		Bridge over Blue Creek.
	1.4	
102.2	0.8	Swauk sandstone and carbonaceous shale on left. Beds strike north and dip about 30° to 40° west. Middle part of roadcut is in a Teanaway swarm-dike, north end is in Swauk again.
103.0	0.4	Road to left is old highway over Blewett Pass. It is very crooked, and because it is not maintained is dangerous to travel.
103.4	1.0	Contact relationship between the Swauk and brown-weathering Teanaway dike is exceptionally well exposed in roadcut to left along old highway.
104.4		Swauk Forest Camp on right.
	1.1	
105.5		Teanaway Basalt till exposed in roadcut on left.
	0.4	
105.9	0.7	Quarry on left. A Teanaway dike was quarried for bituminous aggregate. Irregular contact with Swauk is well exposed.
106.6	0.7	Yakima Basalt dipping gently to the southeast caps the hill at 1 o'clock on the skyline.
107.3	0.8	Teanaway dikes on left. Notice the well-exposed faults with small displacement that are indicated by the weathered slickensides.
108.1	0.6	Excellent Swauk outcrops on the left contain plant fossils and coaly beds. Palmetto leaves found here indicate that at the time these sediments were laid down the climate was tropical to subtropical. Interesting sedimentary structures also can be seen here. Close observation will disclose micro-crossbedding, ripple marks, and flow casts. Beds strike N. 50° to 60° W. and dip 35° to 40° NE. √
108.7	1.1	Summit of Swauk Pass, elevation 4,103 feet. Thin-bedded sandstone and shale in roadcut. At 12 o'clock on the skyline, rocks of the Swauk Formation can be seen dipping to the north. The road follows Tronsen Creek for about the next 9 miles.
109.8		Tronsen Forest Camp on left.
	1.6	
111.4	1.4	Massive white arkosic sandstone on right. Steeply dipping Swauk sandstone forms cockscomb ridge on skyline at 11 o'clock.

Mileage
cumulative point to point

112.8 Swauk conglomerate cliffs behind the trees on left. The pebbles
0.6 consist of volcanic, intrusive, and metamorphic rocks in an arkose matrix.

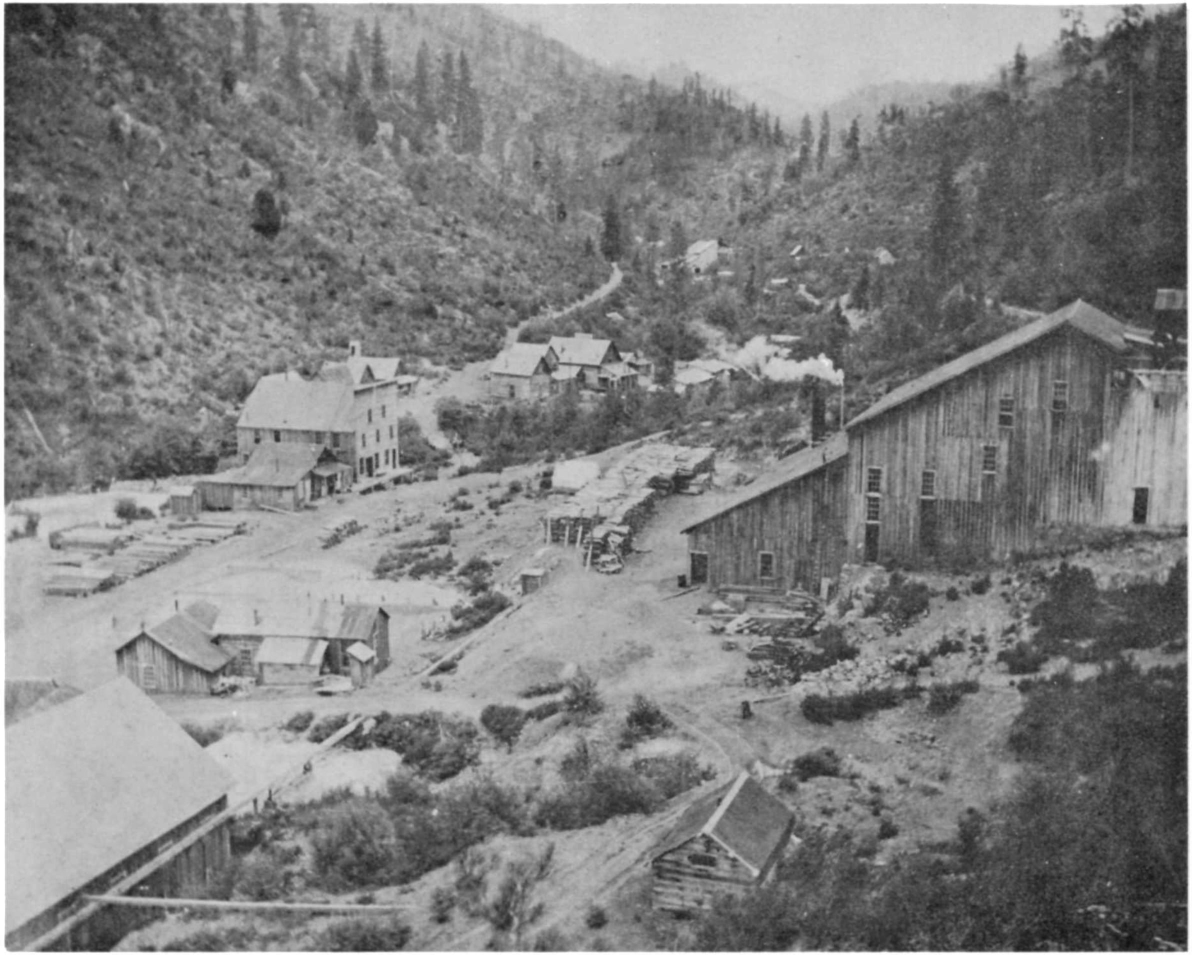
113.4 At 12 o'clock on the skyline is Icicle Ridge. The ridge is made
0.6 up of crystalline rocks of the Mount Stuart uplift.

114.0 Bonanza Forest Camp on left.
3.0

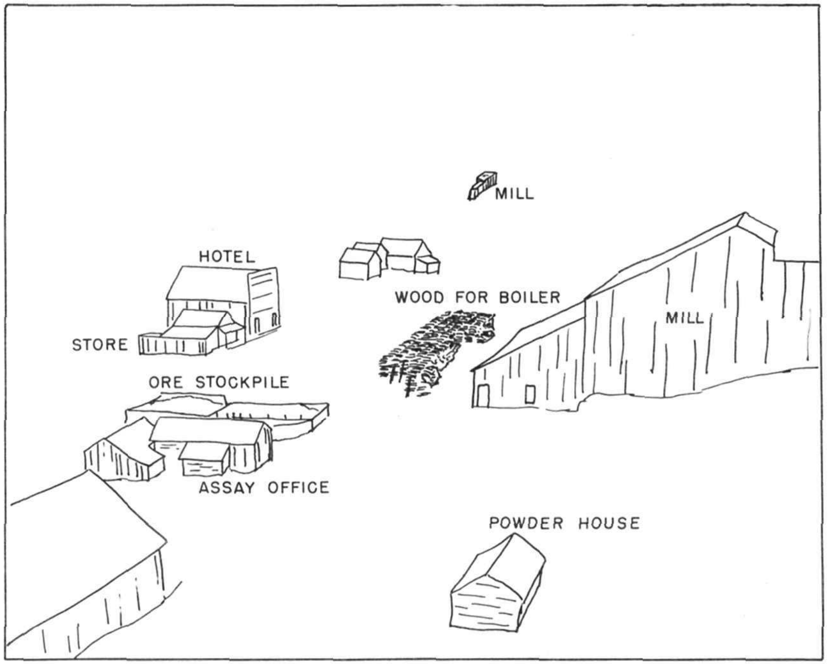
117.0 Swauk conglomerate exposed in roadcut on the right. Pebbles and boulders were derived from intrusive, volcanic, and metamorphic rocks. A small fault with a basalt dike intruded along
0.2 its plane can be seen. The displacement, which is about 4 feet, is well shown by the white sandstone bed that has been truncated by the fault. Shearing has broken some of the conglomerate pebbles along the fault plane.

Fault in Swauk conglomerate, with basalt dike intruded along fault plane. Mile 117.0.

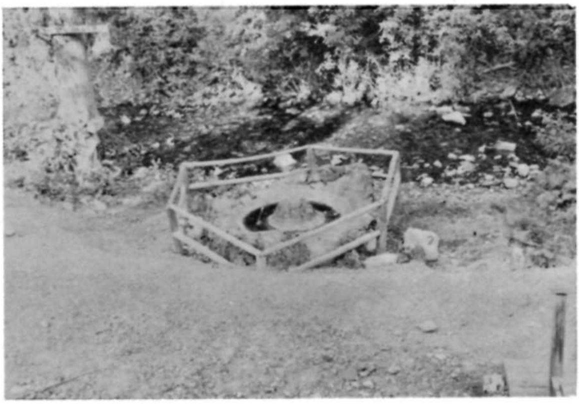
117.2 Serpentine exposed in rock quarry on left. Swauk Formation in roadcut on right. Fault contact between the two units crosses the road at this point. About 400 feet south of here, 50 feet above Peshastin Creek (Tronsen Creek enters Peshastin Creek
0.3 here) on the east side of the creek is one of the iron ore deposits previously described. The deposit can be recognized by the old adit in the valley wall. Drive up the old Blewett Pass highway for about 0.4 mile and the adit can be seen across the creek to the left. The deposit is a highly ferruginous slab of mudstone in a serpentine conglomerate.



Town of Blewett in 1900, looking south toward Blewett Pass. See Sketch for identification of buildings. Photograph courtesy Chelan County Historical Society, identifications by Mrs. Kate M. Bailey of Cashmere.



Mileage cumulative	Mileage point to point	
117.5	0.1	Junction of old Blewett Pass highway on left. Continue on U.S. 97.
117.6	1.5	Small patch of granodiorite on right intrudes serpentine. From here to about half a mile below the old Blewett townsite the road passes through serpentine with a few intrusive bodies.
119.1		Old Blewett townsite (page 28). To the left, just over the bank, is an old arrastre cut into a solid block of stone. According to a sign in the parking area on the right, this is "one of the few remnants of water-powered ore-grinding machines numerous in the west from the 1840's through the 1880's. Chunks of gold-bearing ore were ground into powder on this stone base by heavy drag stones geared to a water wheel. Gold was recovered by amalgamation with mercury. The Blewett arrastre was built in 1861 when some 260 miners were working here and was active until 1880. An arrastre near Liberty, about 10 miles south, was active until 1932."



Blewett arrastre at mile 119.1. Note drag stone with ring in it on ground at right of arrastre.

The town was named after the Blewett mine which bore the name of Edward Blewett, who was a Seattle mining engineer (Robert Hitchman, written communication, 1961). Placer gold was first discovered on Peshastin Creek in 1860 (Glover, 1954, p. 12). The district was soon populated with miners from the Frazer River fields of Canada and from the Similkameen camps of the Okanogan country. The gravel deposits along Peshastin Creek were not nearly as extensive as those along Swauk Creek. The gold, however, was uniformly distributed throughout the gravel, and apparently all of the gravel was gold-bearing. Like Swauk Creek, the largest nuggets found along Peshastin Creek occurred on or

Mileage
cumulative point to point

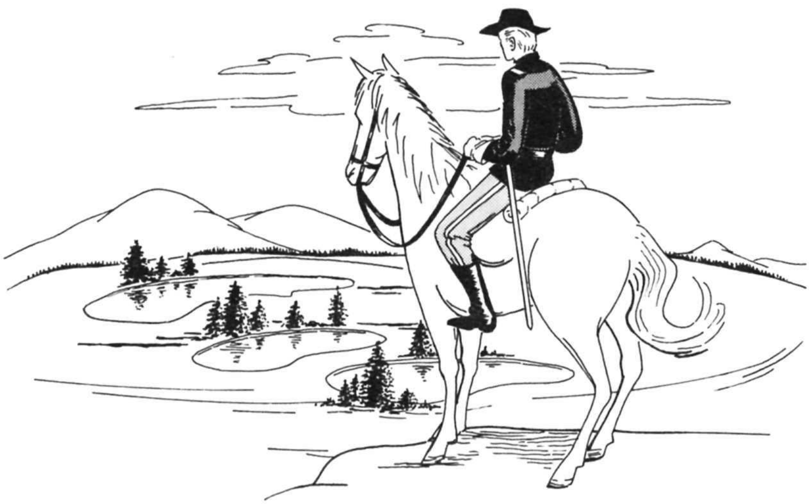
near the irregular bedrock surface. The largest Peshastin Creek nuggets were less than an ounce in weight, but the gold was fairly coarse and easily recovered.

With regard to the gold found on Peshastin Creek, it is more valuable than that found on Swauk Creek. Usually gold has a certain amount of silver mixed with it in a natural alloy, and the Swauk gold has a higher silver content than does the Peshastin Creek gold.

In 1874 (Glover, 1954, p. 14), mining along Peshastin Creek was given a "shot in the arm" when gold-bearing quartz veins were discovered at the head of Culver Gulch by John Shafer. The veins are along shear zones in serpentine and peridotite, some being as wide as 8 feet.

Every mining district seems to have its fabulously rich "lost" mine, and the Blewett district is no exception. Like most legends of lost treasure, there is a misplaced map and the discoverer
0.1 died before he could get back to his strike.

In 1872 the United States Army sent a detachment of cavalry into the region around Mount Stuart to reconnoiter the area. One of the officers, Captain Ingalls, became separated from the party and, with night approaching, found himself on a high ridge overlooking a deep valley. Below, he could see a row of three small lakes; two of them were round and the third one, which was the middle lake, was crescent shaped. The lakes were surrounded by sheer cliffs except in the curve of the middle lake, where the cliffs gave way to a gentle slope that led down to the water.



Mileage cumulative	point to point	
		Faced with the prospect of spending a night in the open, Captain Ingalls descended to the lakes below. He found that they were about 200 to 300 yards apart and were connected by a small stream. He had noticed that the color of the water in the lakes was different; the two round lakes were dark, whereas the crescent-shaped lake was green. This, he found, was due to the underlying rock. The two outer lakes were underlain by a dark, nearly black serpentine, and the middle lake was underlain by a light-green talcose rock.
		On the beach of the middle lake, Captain Ingalls found a crumbling "rotten" quartz vein that contained abundant native gold. Ingalls remained in the vicinity of the lakes for a couple of days so that he could map the area. Then he made his way down the outlet stream, which now bears his name, extending his mapping while he traveled. He took with him several small pieces of gold-bearing quartz as proof of his find. As he was making his way down stream, the area was shaken by an earthquake. (This is the same quake that spilled a great mass of granite into the Columbia River to form Ribbon Cliff just north of Entiat.) Captain Ingalls later wrote a friend, John Hansell, telling him of the gold vein and suggesting that they make a trip back into the area. Ingalls mentioned in his letter that the map was hidden near the mouth of the creek and that they would have to find it, because he was sure the earthquake had changed the topography of the area. Unfortunately, Ingalls was killed by Indians before he and Hansell could get together.
		After Ingalls' death, Hansell began to search for the lost mine. He built up a small homestead near the mouth of Ingalls Creek so he could be close to the area, and he devoted most of his time looking for the three lakes. Apparently the earthquake caused a landslide that buried the lakes, because they have not been found to this day.[1/]
119.2	0.5	Old stamp mill off the road to the left was used to crush and concentrate the gold ore that was mined in the area. The gulch running back into the hills behind the mill is Culver Gulch, where the first lode gold claim was staked.
		From about 0.5 mile below here to Ingalls Creek the road is in slate and phyllite of the Peshastin Formation. The Peshastin Creek canyon serves as the formation's type locality.
119.7	1.0	Roadcuts are in Peshastin Formation phyllite, argillite, and slate.

[1/] This story is an abridgement of an article written by Kate M. Bailey for the Aug. 10, 1951 edition of the Wenatchee Daily World.

Remains of stamp mill seen in Blewett townsite picture on page 28.

Mileage cumulative	Mileage point to point	
120.7	0.5	Nigger Creek empties into Peshastin Creek on left. Originally called Negro Creek, it was named for a negro who worked a placer claim at its confluence with Peshastin Creek.
121.2	1.2	*Landslide across creek to left.*
122.4	1.4	Ingalls Creek empties into Peshastin Creek on left. The creek was named after Captain Ingalls of the United States Army.
123.8	0.5	Leave Wenatchee National Forest. Roadcuts just beyond the forest boundary sign (123.9 and 124.1) are in an intrusive rock made up of coarse-grained light-colored granodiorite fragments in a finer grained darker colored diorite matrix. The granodiorite is a plutonic facies that had crystallized, then was fragmented and engulfed in a more basic hypabyssal facies, the diorite, of possibly the same intrusive body. The bold outcrops on the valley walls at 9 o'clock are basalt conglomerate beds of the Swauk Formation and are made up almost entirely of serpentine boulders.
124.3	0.1	Approximate location of the Leavenworth fault, the western border fault of the Chiwaukum graben described by Willis (1953).

Mileage cumulative	Mileage point to point	
124.4	0.9	Roadcut in pebble conglomerate and sandstone of the Swauk Formation indicates that the Leavenworth fault has been crossed and the road is in the graben here. Notice carbonaceous material and one small coal seam in roadcut. Beds are near vertical. Slickensides are common on many of the plane surfaces. Looking north across Peshastin Creek, a dark serpentine conglomerate can be seen. It is a conglomerate of the Swauk Formation and lies west of the Leavenworth fault (Willis, 1953). On the same slopes are outcrops of white-weathering arkosic sandstone that dips westward toward the fault plane. Near the fault plane the beds have been pulled up in a drag fold and dip to the east. In the area there are local coarse conglomerate beds that may have been deposits during the early phases of the Mount Stuart uplift. The pebbles and boulders are mainly quartz diorite and granodiorite that appear identical with the lithologies found in the Mount Stuart Granodiorite.
125.3	1.1	Dip slope of Swauk Formation on right. Beds strike about N. 45° W. and dip about 35° SW.
126.4	4.0	Bridge over Peshastin Creek. The name Peshastin comes from the Indian name Pish Pish Astin which has been translated as "broad bottom canyon," which describes the Peshastin Valley below the mouth of Ingalls Creek (Robert Hitchman, written communication, 1961).
130.4	1.1	Junction of U.S. 97 and U.S. 2. Turn left on U.S. 2 toward Seattle.
131.5	0.1	Peshastin junction. Continue on U.S. 2.
131.6	1.1	On left, roadcut is in deeply weathered, probably pre-Wisconsin age Peshastin Till (Page, 1939). From here to Leavenworth, the road is in Swauk Formation sedimentary rocks within the Chiwaukum graben.
132.7	0.9	On left, massive exposures of steeply dipping, thick-bedded Swauk arkose, pebbly in part.
133.6	0.6	Across river at 3 o'clock, flat core of open syncline in the Swauk Formation.
134.2	0.6	On left, massive outcrops of steeply dipping Swauk arkose with silty interbeds. Part of the sandstone is conglomeratic. Pebbles are small and well rounded, consisting mainly of vein quartz, quartzite, and greenstone, and have obviously traveled a great distance. There are no granitic pebbles present.
134.8	1.3	Bridge over Wenatchee River. Note the deep channel the river has cut in the glacial moraine on right. Enter Leavenworth. The town was named for C. F. Leavenworth, an early settler who

Mileage cumulative	point to point	
		platted the town in the early eighties (Robert Hitchman, written communication, 1961).
136.1		Leave Leavenworth.
	0.1	
136.2		Stop; walk to small rock quarry immediately north of road just before entering Tumwater Canyon. Generally, west of here the rocks are crystallines of the Mount Stuart uplift. To the east are folded rocks of the Swauk Formation lying within the Chiwaukum graben. The trace of the Leavenworth fault is visible on the south skyline as a sharp topographic break. To the north the fault can be seen truncating the bedding planes of the Swauk. Here at the quarry, the fault lies just at the east side of the small hill on which the quarry is located. The rocks exposed in the quarry are para-amphibolite and biotite schist. That they were derived from sedimentary rocks is indicated by the thin bands and lenses of lime-silicate granulite (diopside, grossularite, etc.), which originally was carbonate
	0.3	rock, and thin bands of biotite schist that originally was argillite. Most of the amphibolite was derived from a dolomitic shale. Locally, there are patches and veinlets of dioritic rock that has been formed by either injection or recrystallization of the amphibolite. Boudinage ("sausage-like") structure can be seen in the schist. The easternmost edge of the amphibolite has suffered cataclastic mylonitic shearing.[1] The shear planes dip east and are immediately adjacent to the east-dipping Leavenworth fault. The road in the lower part of Tumwater Canyon is in a diorite border facies of the Mount Stuart batholith. The rocks here are mostly patchy and heterogeneous with abundant inclusions of unassimilated amphibolitic material, but at other places they are homogeneous.
136.5		Roadcut in patchy heterogeneous diorite that contains abundant incompletely assimilated inclusions of amphibolitic material. Enter Wenatchee National Forest and Tumwater Canyon.
	0.7	Tumwater is a Chinook jargon word that means "waterfall," "cascade," or "rough water," (Robert Hitchman, written communication, 1961).
137.2		Rockslide scar across valley to left.
	0.8	
138.0		Old power house on left was built in 1909 to furnish power for
	1.7	the Great Northern Railway Company's electric locomotives which were used to pull trains across the Cascades.
139.7		Entering Tumwater Botanical Area. Don't pick the flowers!
	0.7	

1/ Southwick (1962, p. 34) was unable to locate this mylonite.

TUMWATER

Mileage cumulative	point to point	
140.4	1.8	Dam across Wenatchee River on left. Dam supplied the water that ran the generators in the power house at 138.0.
142.2	0.2	Bridge.
142.4	0.5	Leaving Tumwater Botanical Area.
142.9	0.3	North end of diorite outcrops. Roadside park on right.
143.2	0.4	Roadside park on left.
143.6	1.6	Serpentine exposed in roadcuts from here to 144.8. Associated with the serpentine are subordinate peculiar gabbroid rocks of heterogeneous character, a few thin bands of pure clinochlore schist, and some talc. The serpentine is mostly massive, but there are a few small stringers of the fibrous variety also.
145.2	0.2	Leave Tumwater Canyon and cross Wenatchee River. The Leavenworth fault, which south of the bridge is east of the canyon, crosses the valley a short distance north of the bridge. The hill directly south of the bridge is held up by dark-colored Chiwaukum Schist, and the hills just to the east are made up of light-colored Swauk Formation sedimentary rocks. By looking back to the south from farther up the highway, the approximate location of the fault can be seen by a sharp topographic break in the hill.

Mileage cumulative	Mileage point to point	
145.4		Tumwater Recreation Area, forest camp.
	0.5	
145.9	0.3	Chiwaukum Creek Bridge. Chiwaukum means "many little creeks running into big one" (Hitchman, written communication, 1961).
146.2		Chiwaukum Creek Forest Camp.
	1.7	
147.9	1.0	Road has crossed the Leavenworth fault and is within the Chiwaukum graben. Swauk Formation rocks crop out on both sides of the valley.
148.9	2.3	Great Northern Railway overpass. The valley that the highway follows was probably once occupied by either the Wenatchee River or Nason Creek. Ice damming at the lower end of Lake Wenatchee was probably responsible for the change in stream courses.
151.2	0.5	Junction of U.S. 2 and State 15C. Continue on U.S. 2. State 15C goes to Lake Wenatchee.
151.7	2.0	Highway cuts from here to first bridge over Nason Creek are in glacial drift.
153.7	0.7	Approximate location of the Leavenworth fault and western border of the Chiwaukum graben. At the east end of Nason Ridge at 3 o'clock the fault forms a topographic break. To the west and north is the crystalline complex of the northern Cascade Mountains.
154.4		Roadside park on right.
	0.4	
154.8	0.7	Bridge over Nason Creek. According to A. H. Sylvester as told to Robert Hitchman (written communication, 1961), Nason Creek was named as follows: "I don't know who assigned the name to it, sometime about 1890, but it was named for a Wenatchee Indian, Mow-mo-nash-et, known to the whites as Charley Nasen (sic), who as an old man had a rancharia on the banks of this stream. From the little I have heard of him I gather he was a disreputable old villain and bragged of having killed two white men during the Yakima Indian war of 1855 to 1858. The Indian name for the stream was Na-ta'-poc." Mr. Sylvester acknowledged that the Indian may have been a liar rather than a murderer.
155.5	1.1	Shallow road cut in migmatitic granodiorite on right. Banding is well exposed. A migmatite is a rock in which metamorphic rock such as schist or amphibolite is mixed with granitic material. Here, there are bands and pods of younger granitic rock in older schist.
156.6	1.1	Merritt Inn on left. High cliffs to the right at 3 o'clock are migmatitic granodiorite.
157.7	0.3	Ray Rock Spring. This gets its name from the white quartz that was mined near here. When two pieces of this quartz are struck together under water they are said to emit a bluish fluorescence. Also when rubbed together vigorously in the dark they show a reddish sparking.

Mileage cumulative	point to point	
158.0		White Pine Forest Camp on left.
	0.2	
158.2		Intermittent roadcuts for next 1.3 miles are in migmatite complex.
	1.6	
159.8		From here to 160.1, the roadcut affords excellent exposures showing some of the characteristics of the migmatite complex. To really see the features that will be discussed next, it is necessary to walk through the cut and examine the outcrops closely.

The migmatite complex includes remnants of biotite schist, especially in the western part of the cut. The schist is identical with that which will be seen farther west beyond the complex.

Some geologists consider the migmatite complex to be a phase in the conversion of a schist to a granitic rock by metasomatic replacement. The schist is converted to a medium-grained gneissose rock, the foliation of which is parallel to that of the parent rock. Through continued recrystallization and metasomatism under static conditions, the gneiss is gradually changed into a directionless massive granitic rock. The schist inclusions that are seen in the outcrop represent parent rock that has not been
0.6 completely altered to granite.

Many of the pegmatite dikes exposed in the cut are believed to have been formed by metasomatic replacement, and part of them to have been mobilized. This is indicated in some of the dikes by relict schistosity that parallels the foliation of the older enclosing rocks; some of the dikes die out into the older rocks with no sign of the older rocks being dilated; locally, some of the dikes are gradational with the older rocks. Where the metasomatic pegmatite dikes have sharp contacts with the country rock, it is thought that fractures have controlled the replacement. Some of the dikes seen in the cut are intrusive in origin, and their implacement has been controlled by fractures.

The composition of both dike types is identical. This leads to the idea that possibly the metasomatic dikes formed first and the material in some of them became mobile, moving along fractures as liquid intrusive masses. If this is so, the intrusive dikes would represent the latest phase of the migmatite complex.

160.4 Intermittent roadcuts for the next 2.5 miles are in biotite schist. Note the granitic dikes at 160.8. These dikes are related to the migmatite complex that was seen back to the east.

The schist is composed of biotite and quartz; in addition, at many places sodic plagioclase occurs in variable but small amounts. The presence of almandine, staurolite, and kyanite indicates that the staurolite-kyanite zone of regional metamorphism is represented in the schist. The major metamorphism was
2.3 synkinematic, but it extended into a post-movement phase of recrystallization that was probably contemporaneous with the partial migmatization that was seen farther east. More basic units that include hornblende-biotite schist and amphibolite are rare and are usually very thin. The age of the original sedimentary rock is pre-Jurassic; the metamorphism probably is late Paleozoic or early Mesozoic.

Outcrop at mile 162.7, showing ptygmatic folding and boudinage structure.

Mileage cumulative	Mileage point to point	
162.7		Roadcut in quartz-veined biotite schist, most of which contains garnet and some staurolite. The quartz is thought to have oozed out from the schist to form the veins. That the veins were formed by metamorphic differentiation is indicated by the concomitant decrease in the percentage of quartz within the schist. Most of the exudation quartz veins are synkinematic and are parallel with the foliation of the schist. Part of the exudation veins are post-kinematic and cut across the foliation. Some of the quartz veins display ptygmatic folding. In the western part of the cut boudinage structure can be seen.
	0.2	
162.9		Exposures on right are in a massive hornblendite that is cut by shear planes and small faults. The hornblendite was derived from a pyroxenite through recrystallization. In the eastern part of the roadcut the hornblendite is in fault contact with a biotite schist. Along the fault plane is a narrow band of mylonite.
	0.1	
163.0		Diorite on right.
	0.1	
163.1		Hornblendite on right.
	0.6	
163.7		Bridge over Nason Creek.
	0.7	

Mileage cumulative	Mileage point to point	
164.4		Granodiorite exposed in roadcuts on both sides. It contains scattered remnants of biotite schist and migmatized biotite schist. These rocks are the northern extension of the Mount Stuart batholith. There are intermittent exposures of granodiorite from here to Tunnel Creek on the west side of Stevens Pass.
	0.4	
164.8		Great Northern Railway overpass.
	0.8	
165.6		East portal of the Great Northern Railway's Cascade Tunnel on right. In the late 1880's, James J. Hill, the railroad magnate sent John F. Stevens out to locate a route over the Cascade Mountains that would open up new country. Stevens, who was a civil engineer, selected a route through the mountains that would have a 2.2-percent grade and 2.7-mile tunnel near the summit. Because the Great Northern Railway was not a land-grant railroad, it had to get into operation across the pass quickly to justify its expenditures. As a result, a switchback route with grades up to 4 percent was built across the top of the 4,061-foot pass to be used while the tunnel was being constructed. The switchback route was used from 1893 until 1900, when the tunnel was completed and put into use. The summit was placed at the east end of the tunnel at elevation 3,380 feet.
	3.6	

When the line was first built, there was little danger of snow slides because of the dense stand of timber that covered the hills. Forest fires soon destroyed the timber, however, and slides became a major winter problem. To alleviate the situation, it became necessary to build snowsheds over the tracks at several points along the line on the west side of the pass.

One of the worst railroad disasters in the history of the United States took place at the west end of the old tunnel in the winter of 1910. Two trains westbound out of Spokane became snowbound at the tunnel because of snowslides on the west side. The trains, which were parked on the Wellington siding (the siding's name was changed to Tye after the disaster) at the west portal of the tunnel, had been stalled for 10 days, when early in the morning of March 1, the snow on the mountain side above the siding came down in an avalanche, sweeping both trains from the tracks and killing 96 people.

The snow continued to give trouble each year, until finally in December of 1925 work began on the new Cascade tunnel. The new single-track tunnel is 41,152 feet long (7.79 miles), 18 feet wide, and 26 feet high, and is lined with concrete. The east end is 634 feet higher than the west end, making a 1.565 percent grade. It was dug from both ends toward the middle, and when the two crews met, they found that the alignments and elevations were less than one foot apart. A total of 839,700 cubic yards of rock was taken from the tunnel. This is almost enough material to build a dam as large as Bonneville across the Columbia River. On January 12, 1929 the tunnel was dedicated and opened to traffic.

The first locomotives used on the pass were the old coal-fired steam type. It did not take long for the smoke, soot, and

Mileage cumulative	point to point	
		steam to make the atmosphere in the tunnel thick enough to cut with a knife and most unbearable. Because of the poor ventilation a change to electric locomotives was made in 1909. The electricity was first supplied from the old powerhouse seen in Tumwater Canyon. In 1956 the electric locomotives were abandoned and deisel-electric locomotives took over.
169.2	1.1	Lichtenberg Mountain on right.
170.3	2.0	To the right on the opposite wall of the valley can be seen the old switchback grade of the Great Northern Railway's original route over the pass.
172.3	1.4	Summit of Stevens Pass, elevation 4,061 feet. The pass was named after John F. Stevens, the Great Northern Railway civil engineer who discovered it. Ski lifts on left.
173.7	3.1	To the right on the opposite side of the valley for the next 2 miles or so can be seen the switchbacks of the old Stevens Pass highway and the remains of the snowsheds built over the old railroad grade.
176.8	1.5	Bridge over Tunnel Creek.
178.3	0.2	Great Northern Railway underpass. West portal of Cascade tunnel to right.
178.5	0.5	Bridge over Tye River. The word "Tye" has two reported origins. One is that it was the name of a locating engineer of the Great Northern Railway. The other is that it comes from the Chinook jargon word "tyee," which means "chief, boss, manager, or superior" (Robert Hitchman, written communication, 1961).
179.0	0.2	Bridge over Tye River.
179.2	0.8	Roadcut is in a biotite schist. Folding and foliation are well developed, and gently dipping shear planes can be seen offsetting the foliation. To the west the schist is intruded by the Mount Stuart Granodiorite. Whereas on Stevens Pass and to the east it is thought that the granodiorite is migmatitic, here it was mobile and became a true intrusive rock.
180.0	0.6	Roadcut is in granodiorite.
180.6	1.5	Bridge over Deception Creek. Roadside park.
182.1	0.1	Bridge over Tye River.
182.2	0.4	Alpine Falls on left. Falls are held up by granodiorite.
182.6	0.4	Roadside park on left.

Mileage cumulative	point to point	
183.0		Bridge.
	0.4	
183.4		Bridge.
	0.7	
184.1		Black phyllite exposures on right. This phyllite correlates with similar rocks in the Easton Schist of the Easton-Cle Elum area. and forms part of the "Mount Shuksan belt" that extends all the way to the Canadian border.
	0.1	
184.2		Granodiorite outcrops on right.
	1.0	
185.2		Granodiorite outcrops on right.
	1.3	
186.5		Bridge over Tye River.
	1.4	
187.9		Bridge over South Fork of Skykomish River. Skykomish is an Indian word that has two meanings, "inland people" or "people of the upper river." The syllable "mish" means "people" (Robert Hitchman, written communication, 1961).
	0.3	
188.2		Hornfelsed Swauk Formation quartzite in roadcut on right. This is part of a narrow belt of Swauk sedimentary rocks that trends northwestward across the Cascades and crops out intermittently all the way to Bellingham, where it is called Chuckanut Formation.
	0.3	
188.5		Middle Tertiary granodiorite exposed on right.
	0.1	
188.6		Hornfelsed Swauk quartzite on right.
	0.3	
188.9		Skykomish junction. On right, roadcut is in hornfelsed Swauk sedimentary rocks. Town of Skykomish is across the river to the left. Continue on U.S. 2.
	0.6	
189.5		Roadcut in hydrothermally altered andesite. The andesite intrudes the Swauk and has in turn been intruded by granodiorite.
	0.2	
189.7		Bridge.
	0.2	
189.9		Bridge.
	0.2	
190.1		Roadcut in altered andesite.
	0.3	
190.4		Bridge. Roadcut on right is in granodiorite.
	0.5	
190.9		Bridge.
	0.3	
191.2		Bridge.
	0.2	
191.4		Bridge.
	0.2	

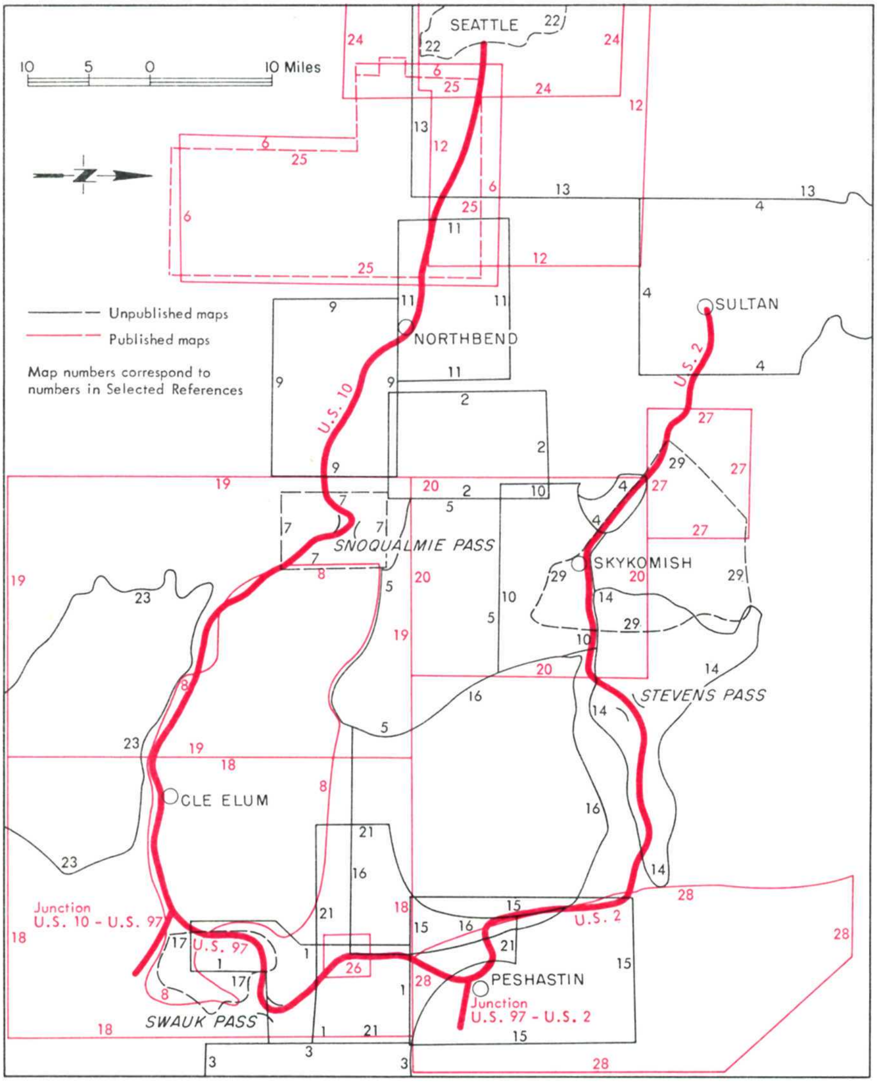
Mileage cumulative	Mileage point to point	
191.6		Rugged peak on skyline at 11 o'clock is Mount Index. It is made
	0.1	up of Index granodiorite.
191.7		Tunnel in granodiorite.
	0.1	
191.8		Money Creek Forest Camp on left.
	0.9	
192.7		Grotto. Ideal Cement Company's Grotto plant on left. The slopes across the river to the left contained a series of small Permian limestone bodies that were quarried to make cement. At present the limestone that is used here is quarried from the Soda Springs
	0.1	deposit near Lake Wenatchee in Chelan County and shipped by truck and rail to Grotto. The old abandoned quarries can be seen across the river on the lower slopes at 10 to 11 o'clock.
192.8		Mount Index visible at 11 o'clock.
	1.2	
194.0		Bridge.
	0.7	
194.7		Railroad underpass.
	1.8	
196.5		Bridge.
	0.3	
196.8		Baring.
	0.1	
196.9		Bridge.
	0.4	
197.3		King-Snohomish County line.
	0.7	
198.0		Bridge over Barclay Creek.
	0.3	
198.3		Quarry in massive Index granodiorite on right. The granodiorite,
	0.6	which is exposed in roadcuts for approximately the next 4 miles, is Tertiary in age.
198.9		River gorge cut in granodiorite on left. Mount Index on skyline across river. Bedded rocks that make up ridge to the right of Mount Index are Tertiary volcanics. Looking back up the Skykomish Valley, the asymmetrically shaped peak at 5 o'clock is Mount
	0.5	Baring and the peaks to its left are Gunn Peak and Merchant Peak. These three peaks are klippen of migmatitic amphibolite and quartz-diorite gneiss that have been thrust over ribbon chert and argillite of Permian age.
199.4		Railroad underpass.
	0.3	
199.7		Glacial polish and striations on exposure of Index granodiorite on
	0.2	left.
199.9		Bridal Veil Falls at 12 o'clock across valley. Roadside park on
	2.3	left.

Mileage cumulative	Mileage point to point	
202.2		Railroad overpass.
	0.3	
202.5		Junction of U.S. 2 and road to Index. Continue on U.S. 2.
	0.4	
202.9		Bridge over South Fork of Skykomish River.
	0.2	
203.1		Leave Snoqualmie National Forest.
	0.9	
204.0		Bridge over Anderson Creek.
	0.9	
204.9		Bridge over No Name Creek.
	1.5	
206.4	0.9	View of the glacial features of the lower Skykomish valley. During a time when the Vashon ice sheet filled the lower part of the Skykomish valley and the Skykomish valley glacier was some distance upstream, a glacial lake was formed in the valley, which acted as a depositional basin for the debris that was washed off the ice. When the ice withdrew, these sediments were left as terrace deposits. The steep western slope of the terrace is an ice contact slope.
207.3		Bridge over Proctor Creek.
	0.1	
207.4	0.6	On left is Miller's limestone crushing plant. Limestone in outcrops on the slope above the mill is intensely deformed and is associated with slightly altered clastic sedimentary rocks.
208.0		Bridge over Skykomish River.
	1.7	
209.7	1.3	Enter Gold Bar. The area was named Gold Bar by prospectors in 1869. Later, in 1900, the town was platted by the Gold Bar Improvement Association Company (Meany, 1923, p. 98).
211.0		Leave Gold Bar.
	1.0	
212.0		Bridge over Walker Creek.
	0.1	
212.1	0.2	Roadcut in indurated sandstone, grit, and flat shale pebble and conglomerate of unknown age.
212.3	0.7	Enter Startup. The town was originally named Wallace by William Wait in 1890. It was confused so often with Wallace, Idaho by the U.S. Postal Service that the name was changed in 1901 to Startup, honoring George Startup, a local merchant (Meany, 1923, p. 287).
213.0		Leave Startup.
	0.4	
213.4		Roadside park on left.
	2.2	
215.6		Bridge.
	0.2	

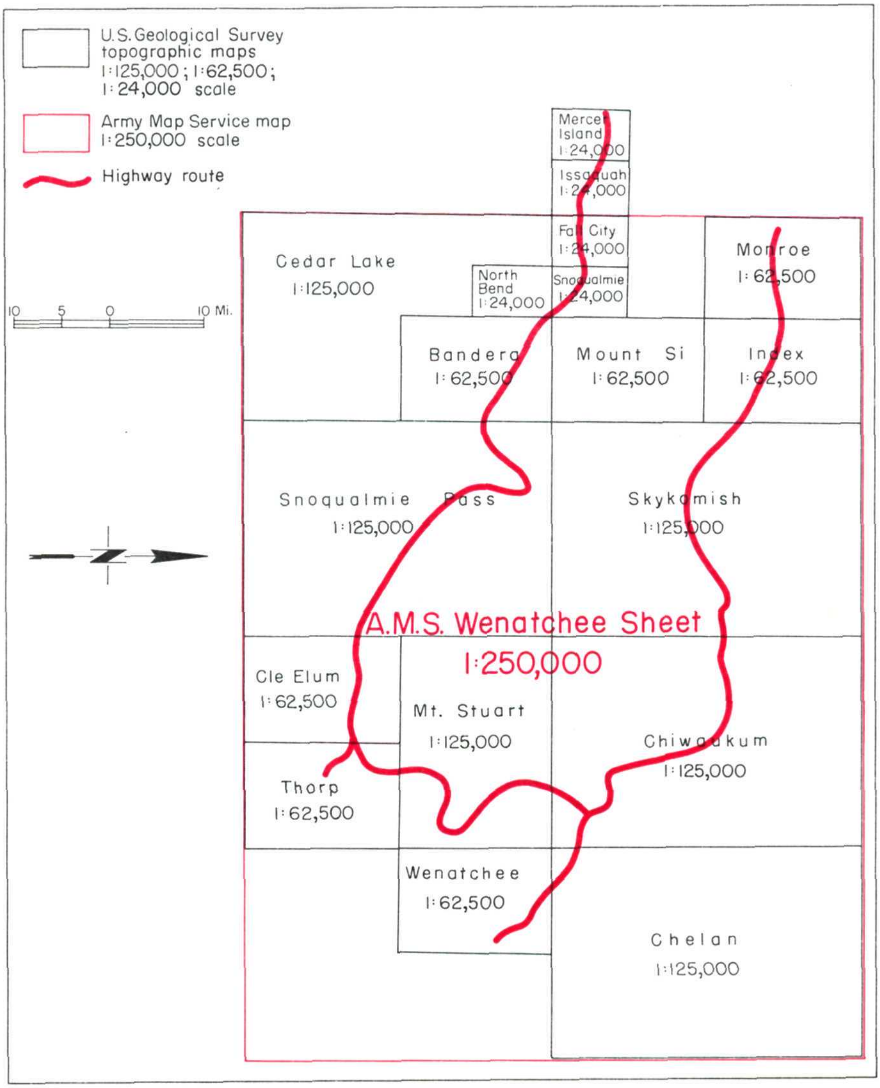
Mileage	
cumulative	point to point

215.8 Enter Sultan. The name Sultan is a corruption of Tseul-tud, the name of a local Indian chief. The first settler was John Nailor and his Indian wife, who took up a homestead in 1880. Discovery of gold in the area brought in more settlers, and Mr. Nailor became the first Postmaster (Meany, 1923, p. 295).

After leaving Sultan the road remains on glacial outwash of the Vashon glacier.



Index to geologic maps along route. Numbers correspond to those in list of selected references.



Index to topographic maps covering the road log route.

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