UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

EVALUATION OF POTENTIAL WATER SUPPLIES AT WHITE RIVER HEADQUARTERS SITE AND TAHOMA CREEK CAMPGROUND, MOUNT RAINIER NATIONAL PARK, WASHINGTON

Suitable water supplies have been found at the two sites. At the proposed White River Headquarters site, two ground-water aquifers might yield a sufficient volume of water to a drilled well, and a spring with adequate flow is located 0.87 mile south of the park boundary. For Tahoma Creek Campground, a spring with sufficient discharge is located about half a mile north of the campground.

Prepared in cooperation with the
U.S. National Park Service

Tacoma, Washington
April 1965

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Water Resources Division
1305 Tacoma Avenue South
Tacoma, Washington 98402

April 14, 1965

Mr. James M. Siler
Regional Chief of Lands
National Park Service
Western Regional Office
180 New Montgomery Street
San Francisco, California 94105

Dear Mr. Siler:

By letter request of January 8, 1964, the National Park Service authorized the U.S. Geological Survey, Water Resources Division, to determine water-supply capabilities at two sites in Mount Rainier National Park: White River Headquarters site and Tahoma Creek campground. Both water-supply studies have been completed by H. W. Anderson, Jr., a geologist with the Tacoma District Office.

At the White River Headquarters site (fig. 1), three possible sources of supply were considered. These are (1) the White River, (2) springs along the east valley wall, and (3) ground water developed from permeable zones underlying the headquarters site. Although the flow of the White River is more than adequate to meet the expected demand, its use would be costly and troublesome. Development of one or more springs near the headquarters site appears feasible. The closest spring of adequate size is 0.87 mile south of the park boundary along U.S. Highway 410. The flow of this spring was measured at 94 gallons per minute (gpm) on September 3, 1964. Drilling a well at the site might permit development of one or both of two water-yielding zones; the first might be encountered somewhere between 25 and 75 feet, and the second between 275 and 425 feet below land surface near the center of the valley. Thus, either the springs or a drilled well should provide a satisfactory water supply for the White River Headquarters site.

At the Tahoma Creek campground (fig. 2), three possible sources of supply were considered. These are (1) permeable zones that might underlie the campground, (2) the small stream flowing through the campground, and (3) springs located along the northwest valley wall. Drilling a well to develop a ground-water supply is not desirable for two reasons. The possibility of a water-bearing permeable zone underlying the campground is not great, and there is no power source to operate a pump. Water could be supplied from the small stream flowing through the campground from above the highest point where Tahoma Creek trail crosses it; however, even above the trail the stream is susceptible to contamination. Two springs were located about 300 yards northwest of the Tahoma Creek trail, half a mile north of the campground, as indicated on the enclosed sketch of Tahoma Creek campground (fig. 2). These springs are relatively safe from contamination, and the flow from each of them, estimated at 45 gpm, is adequate for the stated requirements of the campground.

A detailed discussion of the possible sources of water supply for the White River headquarters site and Tahoma Creek campground follows:

White River Headquarters Site

According to Sherman Knight, landscape architect for the National Park Service, 50,000 gallons per day (gpd), or 35 gallons per minute (gpm), is required to meet the needs of the White River headquarters, which are planned to include six permanent residences and 24 summer apartments.

White River

The flow of White River is so great that a volume of water adequate for the needs of the proposed headquarters can be diverted during the entire year. Despite its adequacy, the use of surface water from the White River would not be practical for two reasons. First, the water would require settling and filtration; and second, it would require chemical treatment. The sediment load is excessive, especially in summer, and the sediment is so fine that it remains in suspension for a long period--a sample of White River water collected October 2, 1964, remained turbid for 3 days. The purity of the water cannot be assured because upstream from the headquarters site the river flows through the White River campground and then parallels the highway for 9 miles; therefore, chlorination or some other form of purification would be required.

Springs

The flow of ten springs on the east valley wall was either measured or estimated. They are located between three-quarters of a mile and 1¼ miles south of the park boundary. The location of each spring is shown in figure 1, and their flows are tabulated in table 1.

Table 1.--Springs south of proposed site of White River headquarters

(Discharge measurements and estimates made Sept. 3, 1964)

Spring number	Distance, south of park boundary (miles)	Springflow		Elevation above mean sea level (feet)
		gpm	cfs	
1 (Fountain spring)	1.25	300	0.66	3,250
2	1.30	e 22	e .05	--
3	1.11	140	.30	--
4	1.08	150	.33	--
5	1.05	72	.16	--
6	.99	67	.15	--
7	.93	27	.06	--
8	.90	e 9	e .02	--
9	.87	94	.21	3,060
10	.75	27	.06	2,990
Total discharge		908	2.00	

"e" denotes estimated value

The flow of these springs was measured on September 3, 1964. The precipitation reported during the preceding year at Longmire was about 9 percent above normal, suggesting that the measured springflow may also have been higher than normal. Spring no. 9 (table 1) is the closest one to the headquarters site that is adequate to meet the needs of the proposed development. The spring, 200 feet above Highway 410, was flowing at 94 gpm on September 3. Even if the flow were to decrease by 50 percent during a dry year, it still would exceed the

35 gpm needed. The road crew that maintains the culverts carrying flow from these springs say they have never known these springs to go dry during the past 10 years.

If additional water were required, other springs could be added to the system. Two such springs (nos. 7 and 10, table 1) are within only a few hundred feet of the previously described spring.

Drilled well

To evaluate the possibility of developing a water supply from a drilled well, geologic data are presented to show the presumed general nature of deposits underlying the White River valley floor near the headquarters site. This valley is glacially altered and stream cut; it has been partially filled by debris flows and stream deposits. The nature of the materials is known in a general way from the log furnished by the U.S. Forest Service for a well at the Silver Creek Work Center, and from information supplied by D. R. Crandell and others of the U.S. Geological Survey. The data are presented graphically in figure 3. The mudflow at the surface is impervious. Its thickness is expected to range from 15 to 25 feet. The White River deposits underlying this mudflow may be as thick as 50 feet. They yield 85 gpm to the well at Silver Creek Work Center. The impermeable Osceola mudflow underlying the White River sediments may be as thick as 200 to 350 feet. Below the Osceola, water-bearing stream deposits exist at certain localities, and probably underlie the headquarters site as well. At Federation Forest State Park, a well reportedly was drilled into this material at a depth of 208 feet below land surface. The yield of that well is not known. These estimates of thickness and depth to aquifers are made for the central part of the valley; the chance of obtaining water from a drilled well decreases as the site is moved toward the valley wall.

The likelihood of a well in bedrock yielding an adequate supply is not great. Bedrock underlying the debris flows and stream deposits in this area is the Ohanapecosh Formation, composed of volcanic breccia, sandstone, and siltstone. It has been folded and intruded by sills and dikes, leaving the rock fractured. This formation has generally low permeability except locally, as evidenced by springs issuing

from a fractured zone in the valley wall more than 100 feet above the level of the White River. The depth to bedrock at the headquarters site is not known, but it probably exceeds 300 feet.

Conclusions

Development of a water supply from the White River would be costly and troublesome because of sediment and possible contamination. Examination of springs along the east valley wall indicates that an adequate volume of water could be obtained from spring number 9 (fig. 1), with neighboring springs available for an additional supply.

Geologic reconnaissance suggests the feasibility of developing a water supply from a drilled well at either of two depths. The water-bearing stream deposits probably would be encountered somewhere between 25 and 75 feet, and between 275 and 425 feet below the land surface. Water withdrawn from the shallow stream deposits (those between the Osceola mudflow and the more recent debris flow) is underflow from the White River. This water is the most likely source of reliable supply to a well--it provides about 85 gpm at the Silver Creek Work Center well. Below these stream deposits a well would have to penetrate the entire Osceola mudflow to reach pre-Osceola stream deposits or bedrock (fig. 3).

Tahoma Creek Campground

The volume of water needed for the Tahoma Creek campground (fig. 2) has been stated as 27,000 gallons per day (gpd), or 19 gallons per minute (gpm). The campground does not have electricity, so a gravity system would be necessary. This would make the development of a well difficult and the use of a stream or spring desirable.

Drilled well

At the campground, a debris flow covers the surface. Farther up the valley, this flow is underlain by an ash layer and at least two other debris flows. The debris flows have a small permeability and will not yield appreciable water to a well. Stream deposits may exist between or below these debris flows, but the number of these flows seen at the surface, and their recent nature, discourage the likelihood of a successful well at the campground.

Stream

The small stream that flows through the campground into Tahoma Creek is now used as a temporary water supply; however, it seems undesirable as a permanent source of drinking water because of possible upstream contamination, even above the highest trail crossing.

Springs

In addition to the other supplies considered, a spring already developed for the Tahoma Vista area near Tahoma Creek campground was investigated. The records at Longmire indicate that the system will supply only 2,000 gpd, an inadequate supply for the campground.

Two springs, which form the main source of the stream flowing through the campground, issue about half a mile north of the campground. They provide the most desirable water supply because: they are not readily susceptible to contamination, they yield an adequate volume and they are suitable for a gravity-distribution system. A catchment basin could be built immediately below the northernmost of the two springs more easily than below the southern spring, which has a less clearly defined orifice. The estimated flow of the north spring on October 6, 1964 was 45 gpm. However, 1964 was a wetter-than-average year, so a perennial springflow of adequate volume cannot be assured, based on the meager records.

Conclusions

A well is an unlikely source of water for the campground, and the stream supply is not considered entirely suitable. Instead, the best drinking-water source is a spring that surfaces about half a mile up the small tributary stream flowing through the campground. However, the perennial reliability of the flow from this spring during periods of drought is uncertain. During such intervals, the supply may require augmentation from the adjacent spring.

Sincerely yours,

L. B. Laird

L. B. Laird
District Chief

Enclosures: 3 figures

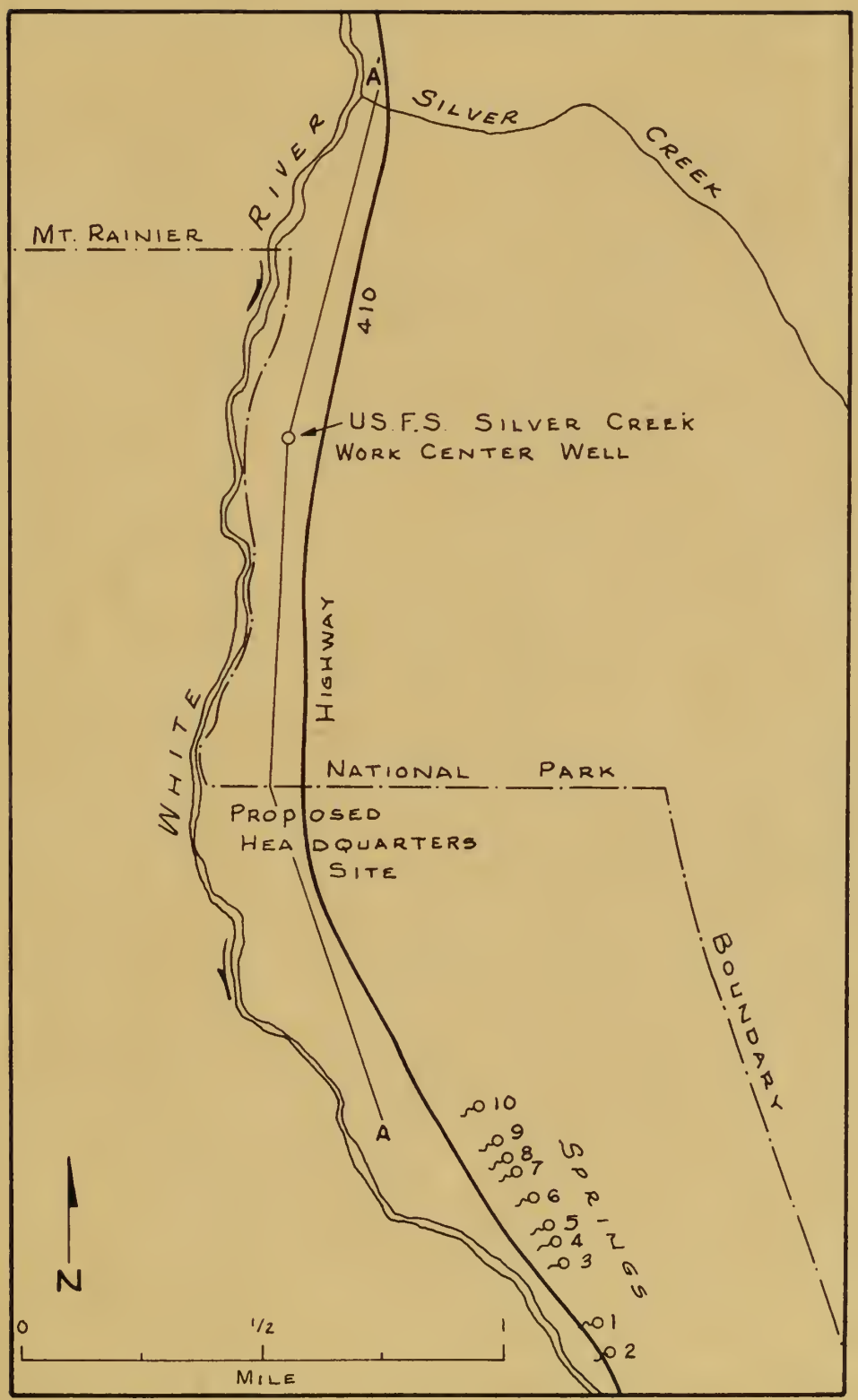

Figure 1.--Proposed White River Headquarters site, showing the location of cross section A-A' (fig. 3).

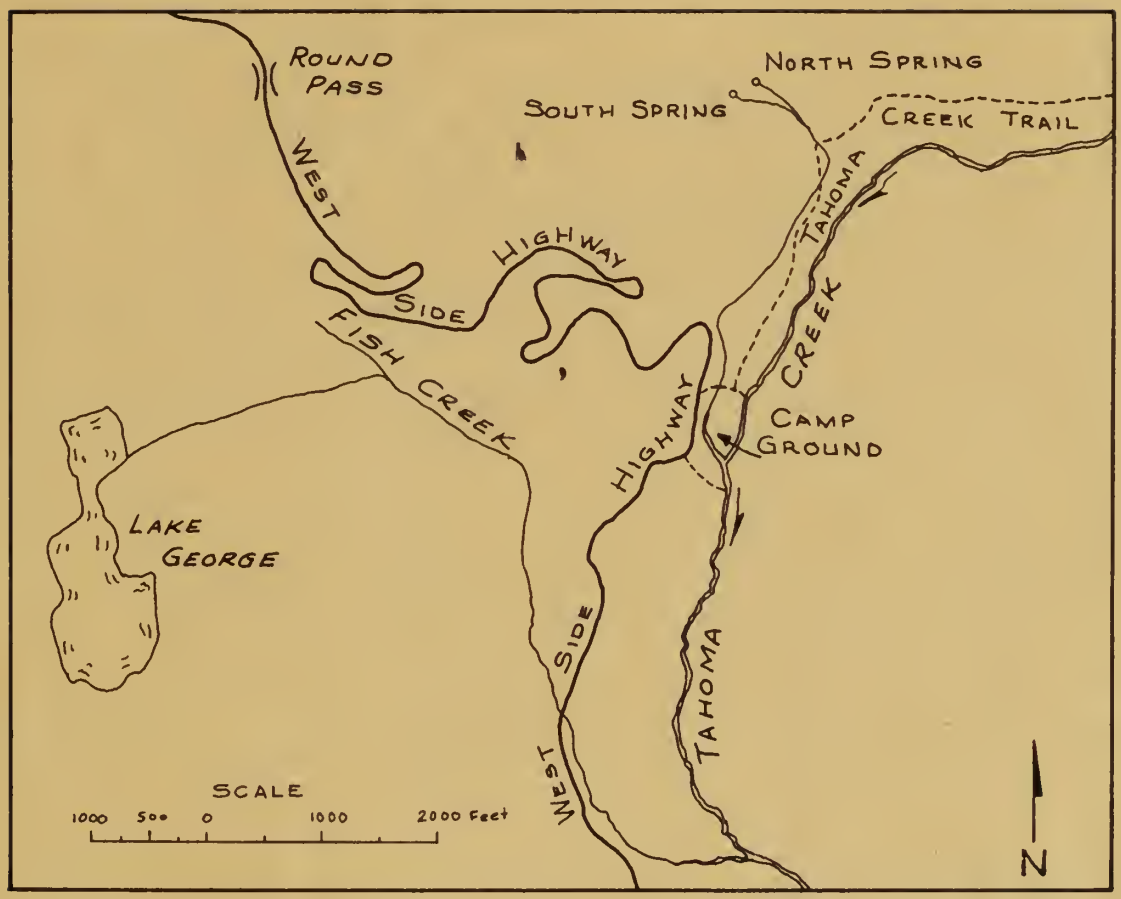

Figure 2.--Tahoma Creek campground and adjacent areas.

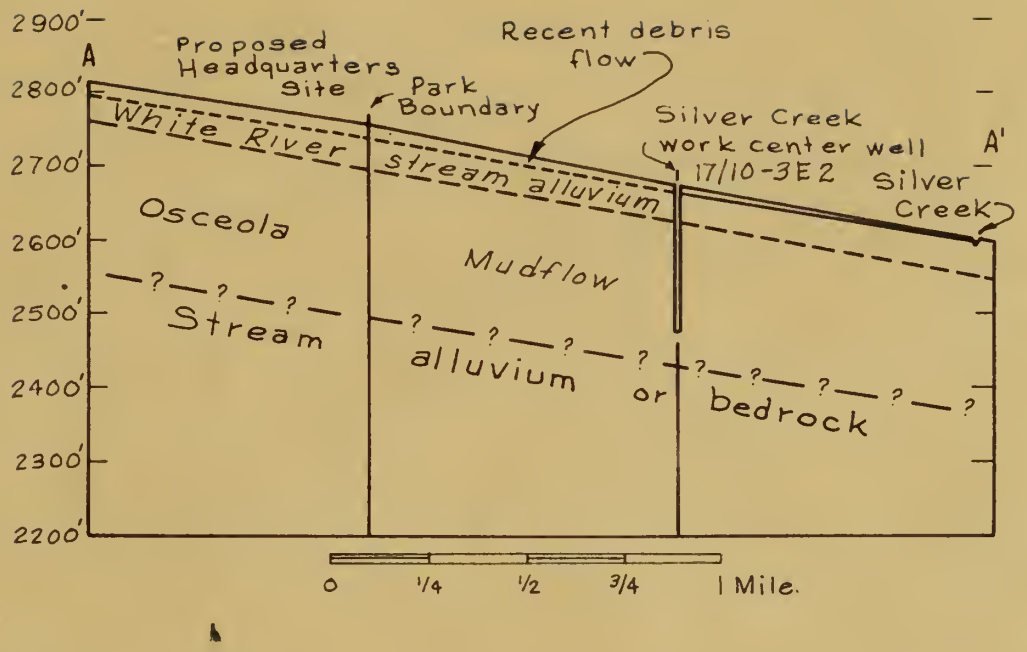

Figure 3.--Cross section A-A' along the White River valley.

(See fig. 1.)