

April 9, 1997

L54(2380)
ORCA/General

Memorandum

To: Superintendent, Oregon Caves National Monument

Through: William L. Jackson, Chief, Water Operations Branch

From: Larry Martin, Hydrogeologist, Water Operations Branch

Subject: Trip Report for Travel to Oregon Caves National Monument on March 31 to April 3, 1997.

PURPOSE: The purpose of this trip was to assist the park in evaluating alternative sources of drinking water supplies and to determine if sufficient water is available for planned development at the maintenance area.

SUMMARY: Hydrogeologic conditions in the area are unfavorable for construction of water supply wells. We would not construct a well near the cave system because we would not want to affect the groundwater flow system interchange with the cave. The remainder of the area is underlain by metamorphic volcanic and sedimentary rocks which are nearly impermeable. Previous investigators have shown that Lake Creek is the only stream in the immediate vicinity having reliable flows throughout the year to meet the demand of the chalet, chateau, and related facilities. The water collection system at the spring supplying the maintenance area can easily be expanded to supply ample water for the proposed developments in that area.

DISCUSSION: Oregon Caves National Monument is underlain by metamorphosed sedimentary and volcanic rocks and granitic intrusive rock formations. All bedrock formations in the area, with the exception of the caves in the marble, are nearly impermeable. The metavolcanic rocks may be permeable where they have been fractured during folding, but many of the fractures were subsequently filled by secondary deposits of silica and calcium carbonate, resulting in generally impermeable bedrock formations. None of the metasedimentary rocks are productive aquifers, because compaction and recrystallization have reduced pore spaces (Young, 1961). Groundwater supplies could be obtained from the marble, but would result in adverse impacts to the flow system through the cave and cave resources dependent on the interconnection with the groundwater flow system.

I checked with a local well drilling company (Coleman's Drilling) in Grants Pass regarding the potential for constructing water supply wells at the Monument. They have constructed wells for Forest Service campgrounds near the Monument. Jim Sublette confirmed that constructing a well capable of producing more than a few gallons per minute is very unlikely at Oregon Caves and that even a small yield well would not be reliable, being subject to decreased yield during dry periods.

Horizontal well drilling was attempted at several sites in and near the Monument in 1967 (Barrett,

1967). Yield from horizontal borings was generally in the range of 1-2 gallons per minute. The project was abandoned after spending \$17,000 on test drilling. Barrett concluded that the potential was low for intersecting water bearing fractures in the bedrock.

The USGS evaluated potential water supply sources in 1967 (Oster and Hampton, 1967) and determined that Lake Creek and Cave Creek could provide dependable sources of drinking water. Diversion of water from Cave Creek would need to be from downstream of the cave system and thus would require pumping water up several hundred feet in elevation. Diversion from Cave Creek would also be susceptible to contamination from visitor facilities at chalet/chateau area, e.g., parking lot runoff, septic leach field effluent, etc. Diversion from Lake Creek could be accomplished with a gravity flow system. Water quality in the Lake Creek watershed is affected only by timber harvesting and cattle grazing on Forest Service land.

Winter storms (1996-97) destroyed the intake structure on Lake Creek for the water supply system serving the chalet and chateau areas. A temporary diversion and intake has been constructed on Panther Creek at the pipeline crossing. Panther Creek is known to cease flowing in early summer. Thus, it will be necessary to rebuild the intake on Lake Creek or find an alternative source for water within the next few months.

Since there are no other reliable sources (as discussed above), it will be necessary to rebuild the intake structure on Lake Creek. John Cavin and I inspected the damaged intake structure and agreed that the new intake should be constructed to eliminate taking water from a backwater eddy, as has been the case in the past. This arrangement was resulted in debris getting trapped in the eddy and sucked into the intake. Instead, the concrete dam should be extended across the channel to form a pool and a screened intake will be placed in the bottom of the pool. Gravel trapped in the pool will provide filtering to prevent debris from entering the intake. I have forwarded information about screened intake structures from Johnson Well Screen Co. to park staff for their consideration.

There has been some concern about the potential for cryptosporidium and giardia to enter the water system. This concern has been increased by cattle grazing on Forest Service land in the upper part of the Lake Creek watershed. Since there are no effective methods for treating cryptosporidium contaminated waters, prevention is very important. Cryptosporidium is prevented from entering the water system by; protecting the watershed, optimizing filtration, and insuring the integrity of the distribution system. The Monument is working with the Forest Service to expand the park boundary to include all of the Lake Creek watershed upstream from the Monument, thus protecting the water supply from contamination. This becomes especially important since this is the only reliable water source for visitor facilities at the Monument.

Currently water use in the maintenance area is limited to 1 house and the shop facilities. Water is collected at a spring box several hundred feet up the hill to the north of the maintenance area. This seep has proven to be a reliable supply of at least a few gallons per minute, probably in the range of 2-3 gpm even in dry periods.

Additional development is being planned for the area in the vicinity of the maintenance shop. Development would include; 1 house, 4 apartments, a collections storage and administration building, and a maintenance shop. Estimated maximum daily use at the site would be about 2000

gallons per day. A source of 2 gallons per minute would provide almost 3000 gallons per day. Thus, the present collection system may be adequate to meet the needs of the proposed development. If additional water is needed, a second spring box could be constructed to the east of the existing spring box to collect additional water which presently bypasses the collection system. Total yield from an expanded collection system should be about 5 gallons per minute.

Additional water supplies could be obtained by constructing an intake on Lake Creek, east of the maintenance area. This option would yield a larger supply, but would require additional construction costs to extend a pipeline about ½ mile upstream and be susceptible to damage from flooding on Lake Creek.

Water conservation will reduce the demand for water at both sites in the park. Low-flow toilets and showerheads would significantly reduce the amount of water diverted from the natural environment, reduce treatment costs, and reduce the quantity of wastewater that would need to be treated.

RECOMMENDATIONS: Rebuild the intake structure on Lake Creek to supply the chateau and chalet areas. Lake Creek is the only dependable source of water for the chateau/chalet area that does not require pumping water uphill. Expand the collection system providing water to the maintenance area by constructing another collection box in the seep area east of the current collection box. Institute water conservation measures to reduce the demand for water and associated costs of treating water and wastewater.

References

Barrett, Don, 1977, Trip report dated November 16, 1977.

Robison, J.H., 1973, Availability of Ground Water in the Grants Pass Area, Josephine County, Oregon, USGS Hydrologic Investigations Atlas HA-480, 2 sheets.

Sublette, Jim, 1997, Representative of Coleman's Well Drilling, Grants Pass, OR, personal communication.

Oster, E.A., and Hampton, E.R., 1967, Water Supply for Oregon Caves National Monument, Southwestern Oregon, USGS Open File Report, 14 pp.

Ramp, Len and Peterson, Norman, 1979, Geology and Mineral Resources of Josephine County, Oregon, Oregon Department of Geology and Mineral Industries Bulletin 100, 45 pp.

Young, Richard A., 1959, Ground-water Resources of the Rogue River Basin, Oregon, USGS unpublished administrative report, 158 pp.

Young, Richard A., 1961, Hydrogeologic Evaluation of the Streamflow Records in the Rogue River Basin, Oregon, USGS Open File Report 61-176, 110 pp.