# Memorandum

MWH
MONTGOMERY WATSON HARZA

**To:** Dan McDonald

**From:** Dave Thompson

**CC:** Bob Montgomery

**Date:** February 21, 2003 **File #:** 1520618/1003551

**Re:** Lake Wenatchee Water Storage Feasibility Study
Technical Feasibility; Scope Task 2.2.A Field Reconnaissance

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On December 13, 2002 Kim de Rubertis and I visited Lake Wentachee for the purpose of walking the outlet to select a suitable potential location for a low-level impoundment structure. The structure would have a moveable crest that would allow impoundment of water in Lake Wenatchee during the summer and early autumn when the lake level typically falls to its lowest annual levels. Choosing a suitable location for an impoundment structure is one aspect in determining the technical feasibility of seasonally raising the water surface in the lake.

The weather during the day of our trip was foggy to clear and sunny. The ground was covered with approximately 6 inches of snow. We decided to perform the site visit in spite of the snow because we feared that later in the winter the snow depth would only get deeper and make access and inspection more difficult. In addition, we drove the north and south shore roads to see the development adjacent to the lake.

We parked our vehicles at the State Highway 207 Bridge over the Wenatchee River, immediately downstream of the lake, and walked upstream along the north bank of the river toward the lake (Photograph 1). We noted the new stream gaging station located on the north bank of the river upstream and adjacent to the bridge. This gage was installed by the Department of Ecology through the watershed planning process.

*Photograph 1 Wenatchee River, looking upstream (westward), immediately downstream of*

*Lake Wenatchee, upstream of the State Highway 207 Bridge.*

The location selected for the impoundment structure is located approximately 1600 ft downstream of the lake at a point where the river is about 200 ft wide. This is a location where there had previously existed a bridge crossing of the river and where four concrete piers, two on each bank, still exist (Photograph 2). This is a location where the river is the narrowest and, therefore, the structure length would be minimized. In addition, there are access roads to each bank from the north and the south, which would aid in construction and minimize ground disturbing activities away from the river. For the sake of the site visit, it is assumed that the lake/river level would be raised not more than 5 ft. The overbanks adjacent to the preferred structure location slope steeply up and away, approximately 1.5 or 2 horizontal to 1 vertical on both sides of the river (Photographs 3 and 4).


*Photograph 2 Potential location of impoundment structure on Wenatchee River, looking upstream.*

*Photograph 3 North shore overbank.*

*Photograph 4 South shore overbank.*

The river depth is estimated at 4 to 5 ft at the potential location of the impoundment structure. Assuming that the foundation of the structure would be at the same elevation as the streambed so that lake levels would not be raised during high flow events, then a 9 to 10 ft high rubber bladder, or other lowering device, would be

required to impound water to a depth of 4 to 5 ft, assuming that lake outflows were at or near normal low levels during our site visit.

Bedrock was not detected in the area and would not likely to be found during excavations for the structure foundation. The area of the structure is alluvium, which is likely from glacial outwash (See Kim de Rubertis memo attached).

The north and south shores of the lake are lined with homes with beaches and docks. Further investigations will be required to determine the impact of keeping the lake level high during the summer and early autumn. Lake Wenatchee State Park is located at the outlet of the lake on both the north and south shores. The road that accesses the north shore of the impoundment structure site is through the park. The road that accesses the south shore leads to the park's south side access road. These roads will need to be further investigated as potential construction would be during the summer and early autumn, when river flows are low, but recreation around the park is at its peak.

I also visited with Rick Smith, Superintendent of the Wenatchee Reclamation District. He gave me a background for the storage project and provided me with materials, including newspaper clippings, location of a previously planned dam on the outlet of Lake Wenatchee, application for a permit to construct a reservoir at Lake Wenatchee, and other materials. In addition, he had in his possession vintage (circa 1931) survey drawings perhaps made by the District's Engineer C.C. Williams. I received photocopies of portions of the drawings that provide mapping of the outlet channel between the lake and to downstream of the proposed impoundment structure location.

During the trip, we also visited Dryden Dam on the Wenatchee River, about 2.5 river miles downstream of Peshastin, WA (Photograph 5). Within the last 12 years, Dryden Dam has been retrofitted with an inflatable rubber bladder to aid in diverting water into Wenatchee Reclamation District's Dryden Canal. The dam body was deflated at the time of the visit, but apparently has been operating successfully since installation. A similar rubber bladder should be considered for installation at Lake Wenatchee.

*Photograph 5 Dryden Dam, Wenatchee River, with rubber bladder in deflated position.*

Attachment: Kim de Rubertis memorandum dated 1/17/03.

January 17, 2003

# Kim de Rubertis

## Consulting Engineer

**TO:** **Dave Thompson**
**AT:** **MWH/Bellevue**
**SUBJECT:** **Lake Wenatchee**

On December 13, 2002, together we inspected the outlet of the lake above the SR 207 bridge. The purpose of our inspection was to evaluate the feasibility of constructing a low dam across the outlet. The purpose of a low dam would be to raise the ordinary water elevation in the lake to the normal high water elevation. To achieve the increased water elevation, a low dam (less than approximately 7 ft above the existing river bottom) across the outlet channel would be required. An inflatable rubber dam could be used to meet this requirement.

We selected a site for a dam near the old bridge piers. This location is about 1,000 ft upstream of the SR 207 bridge. We selected it because, all other factors being equal, it offers the shortest crest length.

The figure to the right (Kahler Glen Golf Course and Condominiums, Water Resources Technical Report, Kim de Rubertis, August, 1993) illustrates the general geology of the area.

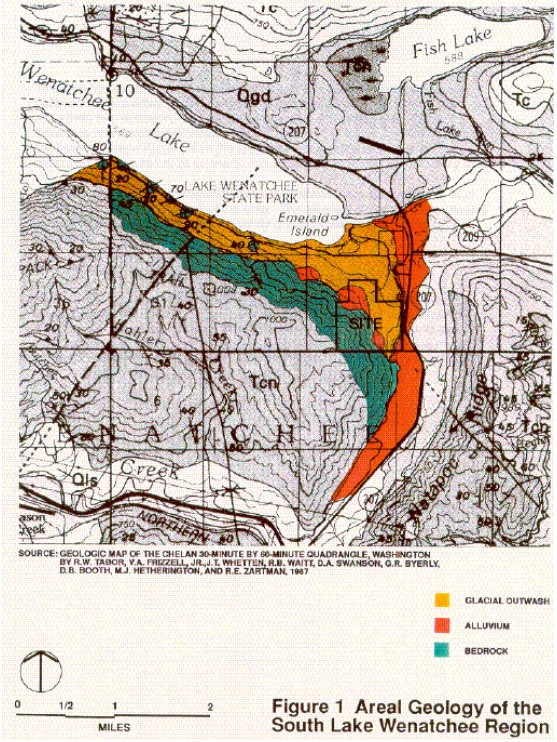

Figure 1 Areal Geology of the South Lake Wenatchee Region

I believe that the entire reach that we inspected is formed in alluvium, most if not all of which, is reworked glacial outwash. This means that the soils underlying the outlet are a fairly well graded mixture of silt, sand, gravel, cobbles, and boulders. These soils are strong enough to support a dam of the proportions contemplated.

The depth to bedrock is not known. I believe that bedrock will be the

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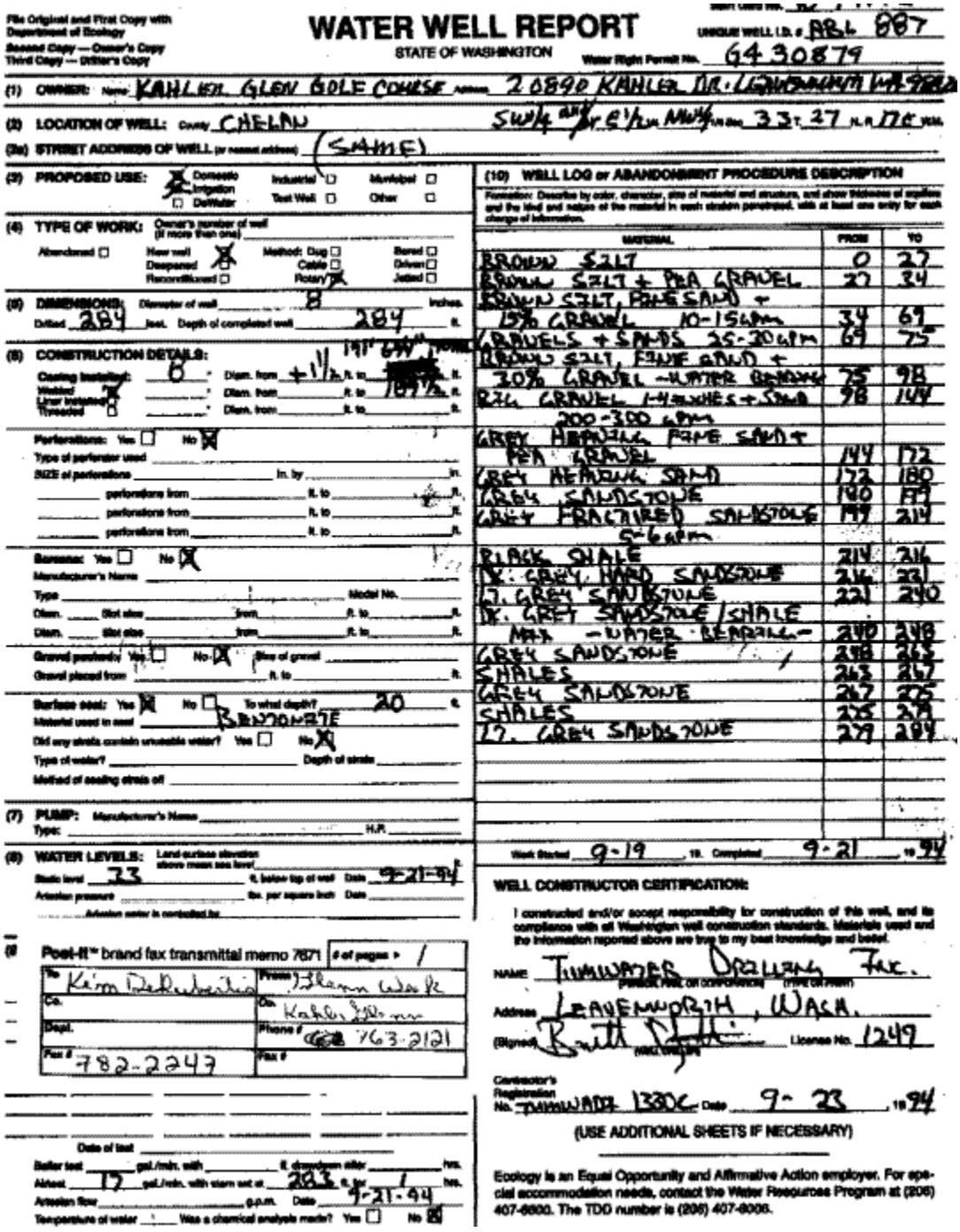
Chumstick sandstone to be found at a depth of at least 200 ft. Following is the log of a well (DOE ABL887) drilled nearby on the west bank of Nason Creek. Chumstick sandstone was found at 180 ft. I believe that the stratigraphy of the alluvium at a dam sited in the outlet channel will be similar to the alluvium described in the well log.



File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT
STATE OF WASHINGTON

UNIQUE WELL I.D. # ABL 887
Water Right Permit No. G4-30879

(1) OWNER: Name KAHLER, GLEN GOLF COURSE Address 20890 KAHLER DR. LEAVENWORTH WA 98826

(2) LOCATION OF WELL: County CHELAN SW¼ of SE¼ of NW¼ Sec. 33 T. 27 N.R. 17E WM.

(2a) STREET ADDRESS OF WELL (or nearest address) (SAME)

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐ Dewater ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches. Drilled 284 feet. Depth of completed well 284 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 6" Diam. from +1½ ft. to 191' 6" ft.
Welded ☒
Liner Installed ☐ Threaded ☐ Diam. from 191' 6" ft. to 189½ ft.
Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.
Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land surface elevation above mean sea level
Static level 73 ft. below top of well Date 9-21-94
Artesian pressure lbs. per square inch Date
Artesian water is controlled by

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| BROWN SILT | 0 | 27 |
| BROWN SILT + PEA GRAVEL | 27 | 34 |
| BROWN SILT, FINE SAND + 15% GRAVEL 10-15mm | 34 | 69 |
| GRAVELS + SANDS 25-30mm | 69 | 75 |
| BROWN SILT, FINE SAND + 30% GRAVEL - WATER BEARING | 75 | 98 |
| 80% GRAVEL 1-4 INCHES + SAND 200-300 GPM | 98 | 144 |
| GREY HARD SILT, FINE SAND + PEA GRAVEL | 144 | 172 |
| GREY MEDIUM SAND | 172 | 180 |
| GREY SANDSTONE | 180 | 199 |
| GREY FRACTURED SANDSTONE 5-6 GPM | 199 | 214 |
| BLACK SHALE | 214 | 216 |
| 16. GREY HARD SANDSTONE | 216 | 221 |
| 17. GREY SANDSTONE | 221 | 240 |
| 18. GREY SANDSTONE / SHALE MIX - WATER BEARING - | 240 | 248 |
| GREY SANDSTONE | 248 | 263 |
| SHALES | 263 | 267 |
| GREY SANDSTONE | 267 | 275 |
| SHALES | 275 | 279 |
| 17. GREY SANDSTONE | 279 | 284 |

Work Started 9-19 19 Completed 9-21 19 94

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME: TWINWOOD DRILLING Inc. (PERSON, FIRM OR CORPORATION) (TYPE OR PRINT)
Address LEAVENWORTH, WASH.
(Signed) [signature] (WELL CONSTRUCTOR) License No. 1249
Contractor's Registration No. TWINWDD 133DC Date 9-23 19 94

(USE ADDITIONAL SHEETS IF NECESSARY)

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| | |
|---|---|
| To Kim DeRubertis | From Glenn Wolfe |
| Co. | Co. Kahler Golf Course |
| Dept. | Phone # (509) 763-2121 |
| Fax # 782-2247 | Fax # |

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airlift 17 gal./min. with stem set at 283 ft. for 1 hrs.
Artesian flow g.p.m. Date 9-21-94
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

A site investigation, including drilling and sampling across the outlet along the selected dam axis, will be required before geotechnical design criteria can be

estimated with confidence. However, based on experience and judgment, the following factors are expected to influence dam design.

- The alluvium is strong enough to support a dam of the proportions contemplated without substantial improvement.
- The alluvium transmits water, and consideration should be given to lengthening the seepage path with some form of cutoff to reduce uplift and to prevent uncontrolled seepage through the abutments.
- The alluvium is susceptible to scour, and care must be exercised to protect the toe of the dam from undermining.
- The site is in seismic zone 3, and a peak horizontal ground acceleration of 0.3 g is proposed for the zone. The coarse granular nature of the alluvium suggests that it is not susceptible to liquefaction.

Access to the site for construction is excellent.