EVALUATION OF THE FEASIBILITY OF OBTAINING A SUPPLY OF GROUNDWATER FOR THE LOVELL COVE LOGGING CAMP ON TAKLA LAKE

Prepared for

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Prepared by

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MAY 21, 1991

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May 21, 1991

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8555 Pacific Street
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Attention: Mr. William Blaney,
Manager - Forestry Operations North Zone

Subject: **Evaluation of the Feasibility of Obtaining a Supply of Groundwater for the Lovell Cove Logging Camp on Takla Lake**

Dear Sirs:

This letter is further to discussions on May 7 in Prince George and at the Lovell Cove Camp between Bill Blaney and Ed Livingston, and to several telephone discussions between Blaney and Livingston and Blaney and Badry. It is also further to your (Blaney) letter of April 30, 1990 which forwarded maps and aerial photographs of the subject area.

1.0 INTRODUCTION

From the aforemented discussions, we understand that the situation concerning water supply for the Camp is as follows:

1. When the Camp was first established, two or three test wells were drilled. One of these, at the present camp site, obtained water at a depth about 25.9 m (85 ft) but the water was salty. Another well was drilled - probably on the west side of the camp area - to a depth of 67.1(?) m (220? ft) but it did not encounter any water. There are no logs or other information on these wells.

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2. The existing water supply at the Camp is from a sump constructed with a length of large diameter corrugated culvert pipe surrounded by broken rock; the facility is located on the bank of the creek which, on its course from the south end of Cheztainya Lake to Takla Lake, runs through the Camp. This facility is essentially an intake from the creek.

3. The quality of the water from the present source is unsatisfactory because it contains suspended silt and dissolved iron and is brown in colour.

4. There is an area near the Camp where railway ties were treated with creosote; there may be creosote in the ground at that location.

In addition to the maps and aerial photos provided by Mr. Bill Blaney, the following published documents have been used in the preparation of this letter:

1. N.T.S. Map 93M/9, **Bulkley House**, of scale 1:50,000.

2. Geological Survey of Canada Memoir 252, **Fort St. James Map-Area, Cassiar and Coast Districts, British Columbia**, by J.E. Armstrong, 1949.

3. Geological Survey of Canada Map 1505A, **Tectonic Assemblage Map of the Canadian Cordillera and Adjacent Parts of the United States**, by Tipper, Woodsworth and Gabrielse, 1981, of scale 1:2,000,000.

4. British Columbia Department of Mines and Petroleum Resources Bulletin No. 48, **Landforms of British Columbia - A Physiographic Outline**, by Stuart S. Holland, 1964, 138 pp.

Figure 1 in the attachments is an area location map; Figure 2 shows the approximate (unsurveyed) locations and depths of test pits which were dug during Ed Livingston's site visit.

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2.0 GEOLOGY

As shown on Figure 1 attached, the subject area is located within the transition zone of the Nechako Plateau and the Omineca Mountains to the north. The geologic map (Geological Survey of Canada Map 1505A) shows the area of the Lovell Cove Camp to be underlain by Cretaceous age rocks which are probably part of the Skeena Formation. They are described as "sandstone, conglomerate, argillite, marine and non-marine". The marine fossils, which are plentiful in the quarry northeast of the Camp, show that the argillite is marine. The sandstone and pebble conglomerate which underlie the camp area look more like non-marine sediments; although no fossils were seen, it is uncertain whether the sediments are marine or non-marine. The sandstone, which dips gently to the northeast, outcrops in the form of northwest-southeast trending ridges that were probably formed by glacial erosion of hard and soft rocks, with the more resistant beds forming the ridges.

The bedrock is overlain by an intermittent cover of glacial and recent sediments. Most of the glacial material is a dark grey, very compact stony, sandy, silty-clay till which rests directly on bedrock in most places. In the valley between two rock ridges, at the southeast end of Cheztainya Lake, there is at least 9 m (30 ft) of silt, sand and gravel which is probably fine-grained glacial outwash. These sediments are overlain by less than one metre of organic swamp deposits. Other than the minor deposits of sand and gravel between rock ridges, there seems to be very little sand and gravel in the area. This is supported by the fact that one of the sandstone ridges near the Camp was stripped down to rock to obtain the small amount of sand and gravel at surface; the origin of this sand and gravel is likely weathering of the sandstone. Along Takla Lake, near the airstrip, there is a low beach terrace composed of sand and fine gravel. The thickness of the granular sediments is unknown but, all things considered, they are likely to be rather thin.

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3.0 FIELD INVESTIGATION

The possibility of locating a granular aquifer under the glacial till near the Camp was investigated by digging test pits with an excavator, either to bedrock or to the maximum reach of the excavator which was about 9 m (30 ft). Three pits were dug along the unused power line which leads from the Camp to the Airstrip. The two pits (1 and 2) on the slope toward the Lake reached fresh, dark grey sandstone at the depths noted on the map included in the attachments as Figure 2. The pit (3) at the top of the slope near camp elevation did not reach bedrock within its total depth of 9 m but, at that depth, it had reached a red-green mottled till which was close to rock in the other two pits; therefore, the bottom of this pit was also probably close to rock.

A test pit (4) was dug along the road approximately in the middle of the valley southeast of Cheztainya Lake. The valley is occupied by a swamp with a dense growth of willows and other phreatophytes. The road has been constructed of gravel placed over a bed of logs. The excavator remained on and operated from the road. The pit was dug through about ½ metre of organic swamp deposits into grey silty sand, interbedded sand and small gravel, with bouldery gravel at the bottom of the pit at a depth about 8 m (26 ft). Because of caving and a flow of groundwater, it was difficult to clearly observe the subsurface conditions. When the pit was at maximum depth, it was bailed by the excavator at a rate of about two buckets per minute. The bucket held at least 50 imperial gallons, indicating an inflow of 100 igpm or more. The bailing could only be continued for a few minutes because of caving so it is not a reliable capacity test; however, it indicates that a well of moderate capacity could be constructed at this site. The conductivity of the water was fairly low (200 microsiemens) and the taste (in spite of sediment) was good so the water quality is probably good. Brown colour would not be expected in water from a well constructed at this site.

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3.0 WATER SUPPLY ALTERNATIVES

From the results of the test pit digging and general observations, it is our opinion that the valley southeast of Cheztainya Lake is the only place near the Camp where it is possible to construct a well to obtain good quality groundwater. It may also be possible to obtain groundwater from the beach terraces along Takla Lake but this depends on their thickness, which must be sufficient to allow for the decline in Lake level in late fall. The beach of Takla Lake is a substantial distance from the Camp, particularly since it would probably not be permissible to run a buried water pipe across the airstrip.

At the site southeast of Cheztainya Lake, a well could be constructed by drilling or by digging with an excavator and placing contrete or steel casing in the hole. A drilled well is preferred under conditions at that site. It would be quite easy to construct a screened dug well with 200 mm or 250 mm (8" or 10") diameter casing, using a small cable-tool drilling rig. Access to the drill site would have to be prepared by placing gravel. A well at this site would require a fairly long water main and power line under less than ideal conditions for pipe burial.

Two other surface water sites were considered: Takla Lake and Cheztainya Lake. Takla Lake has good quality water but a long pipe and power line are required and the pumping lift to the camp is large. Cheztainya Lake is at the same elevation as the camp and is quite close. The lake bottom slopes quite steeply from shore at an accessible site so only a short intake is required to draw deep water. The water is brown but otherwise seems to be of good quality. This is probably the best source of water for present requirements.

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The report of poor quality water from drilled wells in the sandstone bedrock at the Camp certainly discourages exploration in the rock. Without more specific information on the chemical content of the water, it is difficult to speculate about the reason for the poor quality water; however, the most likely explanation is that it represents water which has travelled slowly a long distance through the rock, from the recharge area on the mountain slopes to the discharge end in the valley bottom, during which time the water has become highly mineralized. In a long groundwater flow system, the extremes in the natural change in groundwater quality from the recharge area to the discharge area are represented by a calcium/bicarbonate type water, which is low in dissolved mineralization, to a sodium/chloride water which is high in dissolved mineralization. The degree of mineralization is also controlled by the solubility of the sediments and bedrock in the path of flow.

4.0 SUMMARY AND CONCLUSIONS

1. The Lovell Cove Camp is underlain by Cretaceous sedimentary rocks with an intermittent cover of glacial sediments, largely compact till.

2. Previous drilling at the Camp indicates that water from fractured bedrock is highly mineralized and salty.

3. The possible presence of shallow gravel aquifer under the till was investigated in the camp area by digging three test pits with an excavator; no aquifer was encountered.

4. A test pit dug along the road southeast of Cheztainya Lake encountered a shallow sand and gravel aquifer containing water which is probably of good quality. A well with sufficient capacity for the Camp could probably be constructed at that site.

5. Other possible water sources for the Camp are Cheztainya Lake and Takla Lake.

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Please call if you wish to further discuss any aspect of the contents of this letter.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

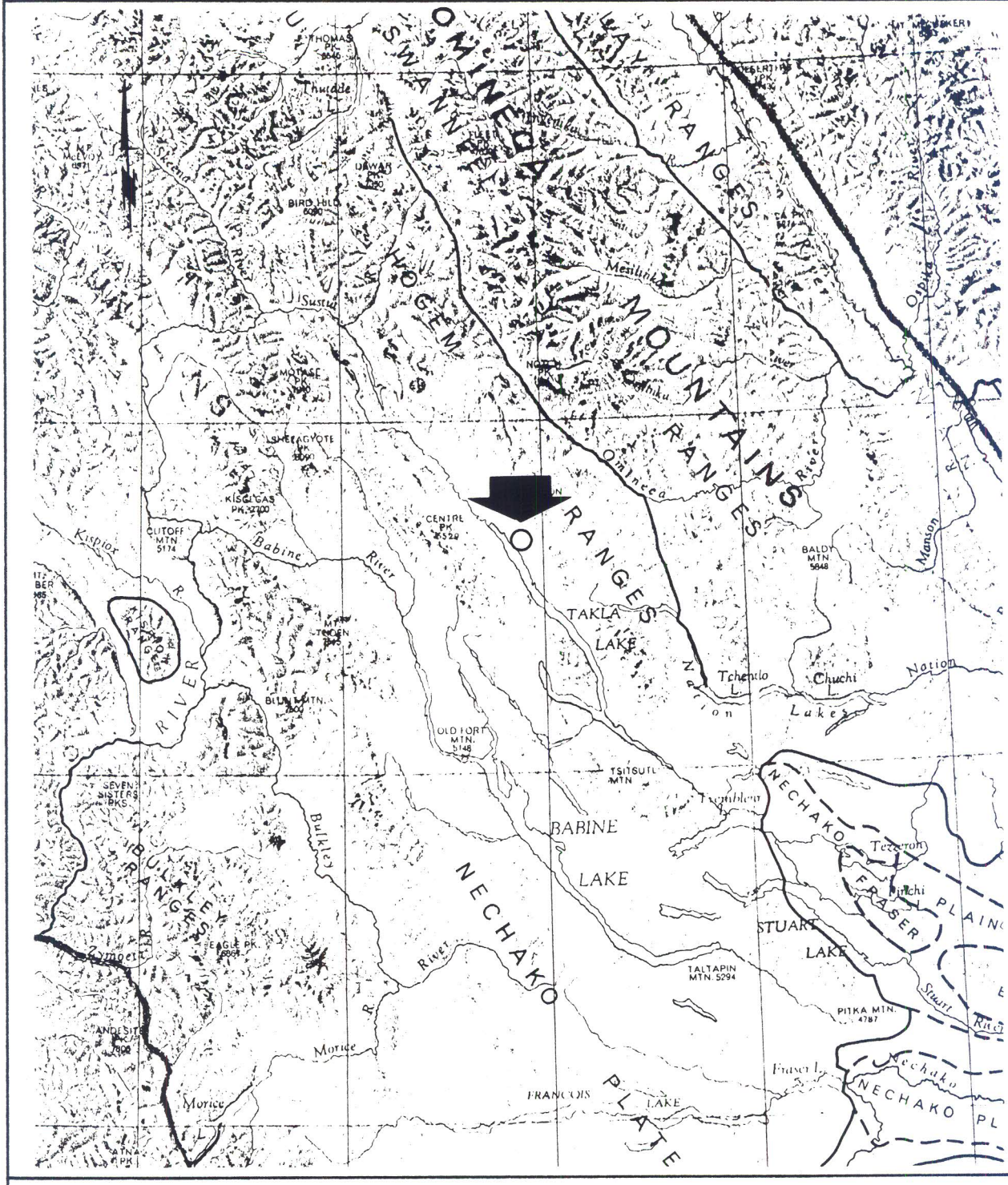
E. Livingston

E. Livingston, P. Eng.

Attachments

ATTACHMENTS

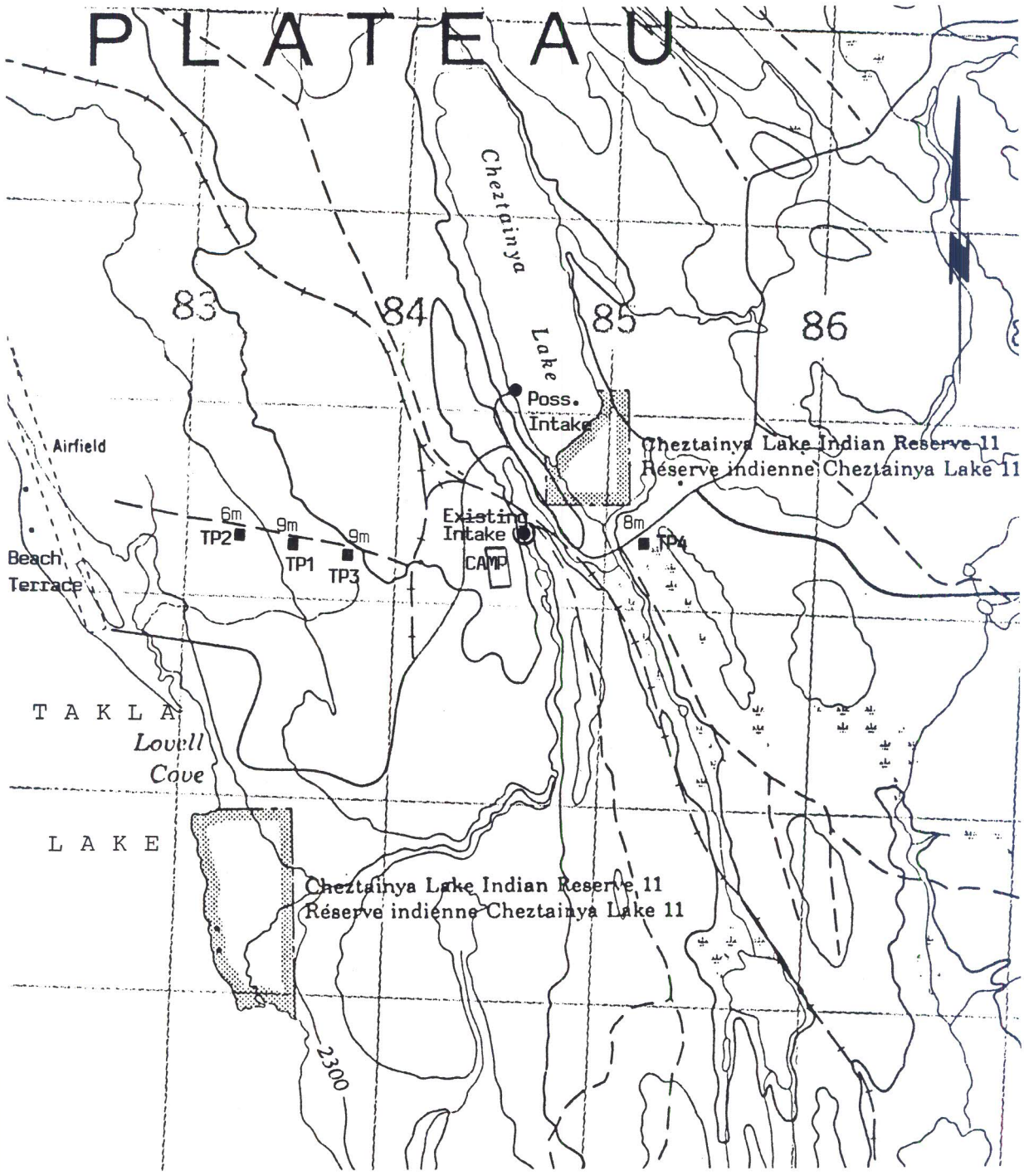
FIGURE 1	RUSTAD BROTHERS' LOVELL COVE LOGGING CAMP AREA LOCATION MAP



Notes:

1. The base map is that contained in B.C. Department of Mines and Petroleum Resources Bulletin No. 48, **Landforms of British Columbia - A Physiographic Outline,** by Stuart S. Holland, 1964.
2. ➧ ○ indicates the location of the Lovell Cove Logging Camp on the east side of the north arm of Takla Lake.

FIGURE 2	RUSTAD BROTHERS' LOVELL COVE LOGGING CAMP TEST PIT LOCATIONS AND DEPTHS



Notes:

1. The base map is 1:50,000 scale topographic map N.T.S. 93M/9, **Bulkley House,** enlarged to an approximate scale of 1:31,000; contour interval is 100 ft.
2. 9m ■ TP1 indicates the approximate (unsurveyed) location of a test pit and total depth of test pit.
3. ◉ ● indicates the existing and possible surface water intake sites.