B.C. Hydro & Power Authority

INTERIM PROGRESS REPORT

GEOTHERMAL INVESTIGATIONS IN B.C.

August 20, 1975.

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August 20, 1975.

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1.0. SUMMARY

1.1. Meager Creek

An electrical resistivity survey, the latest stage of detailed geothermal investigation at Meager Creek, near Pemberton, was completed in mid-August 1975. Results of this survey have further delineated a volume of low-resistivity rock, which is the downward extension of the reservoir of scalding water intersected in B.C. Hydro's research well 74-H-1. The resistivity anomaly has the classic configuration of wrapping around and descending under a young central volcano. It is 12,000 feet in length and at least 3000 feet in width, and it is open in two directions. It has a bottom 4000 feet beneath the surface, which could indicate an interface with an underlying steam-dominated reservoir. Geophysical properties measured to date remain consistent with the model of a geothermal system having a potential capacity in excess of 200 Mw.

This was the third resistivity survey. Prior surveys, a research well to a depth of 1140 feet, geological mapping traverses, geochemical studies of thermal waters, and other surveys have been completed to date.

The project is continuing at present with scheduling of two 300-foot drill holes for the purpose of temperature gradient and heat flow determinations. In addition to B.C. Hydro's commercially oriented program, the Federal Department of Energy, Mines and Resources is conducting a parallel program of basic geothermal research in the same region.

1.2./

1.2. Vancouver Island

An airborne infrared survey was carried out during December of 1974 over the areas of greatest geothermal interest on western Vancouver Island.

Configuration of the known thermal springs were established and several anomalous hot spots were detected. During the spring of 1975 ground follow-up was initiated. Most of the new anomalies have now been explained or discounted with no new hot springs being found to date. Field work and evaluation are continuing and should be completed during September 1975.

2.0. REVIEW OF THE GEOTHERMAL PROJECT, LOWER MAINLAND

B.C. Hydro's geothermal investigation on the Lower Mainland has proceeded in two phases, a reconnaissance geological investigation in 1973-4 and a detailed investigation of the Meager Creek area, near Pemberton, in 1974 to the present.

The detailed investigation has involved three principal steps to date: 25 line miles of reconnaissance electrical resistivity conducted in the fall of 1974; a subsequent drill hole, research well 74-H-1, completed at a depth of 1140 feet in March 1975; and about 25 line miles of deep-looking electrical resistivity completed August 12, 1975.

The recently completed resistivity survey by Deep Grid Analysis Ltd. was run on five intersecting lines on a 2000 foot grid to delineate the western part of the anomaly previously detected. Equipment and electrode spacings were chosen to give measurements of electrical properties at maximum depths ranging from 2500 feet to about 9000 feet.

Preliminary interpretation of the electrical data obtained in the recent survey is that the volume of low resistivity rock has a length of 12,000 feet and a width in excess of 3,000 feet. It extends downward to the north, like a ramp, under the central volcano at Meager Mountain, and it probably plunges in other directions as well, particularly to the west. The low resistivity values defining this volume have a mode of about 50 ohm-metres, against a background of ordinary diorite having values ranging from 200 to 3000 ohm-metres. The configuration of the volume of low resistivity rock suggests that it is a large geothermal reservoir which is the source of the channels of 50 to 70°C water of Meager Creek hot spring and well 74-H-1 at its eastern end. The low resistivity values cut off against intermediate values at a depth of 4000 feet. Electrical resistivity studies conducted by the U.S. Geological Survey over a known area in Yellowstone Park produced a similar cut off where the hot water reservoir is underlain by a steam-dominated reservoir of higher electrical resistivity.

3.0./

3.0. CURRENT WORK, MEAGER CREEK

The project is currently in progress. The key items planned for the immediate future are two or more shallow drill holes near the interpreted hotter area, and in rock as impermeable as it is possible to find. These holes are programmed for a depth of 300 feet and are being drilled to attempt the heat flow tests again. The other near-future objective is to continue with a detailed geologic map of the volcanic rocks on the south slope of Meager Mountain.

At the present time there is no road into the Meager Creek valley and all operations have to be supported by helicopter and by helicopter-supplied camp. The first large tent camp was located at the Meager Creek hot spring in October 1974. In July 1975 it was moved to its present location, approximately in the centre of the area of low resistivity.

In addition to the B.C. Hydro program, which has clearly commercial objectives, the Federal Department of Energy, Mines and Resources, has been conducting a program of basic research into geothermal resources under the leadership of Dr.Alan M. Jessop, Ottawa and Dr.J.G. Souther, Vancouver. Their current work includes a magnetotelluric monitoring survey, which measures electrical and magnetic properties to depths of 25 miles and can indicate whether major crustal fractures pass through this region or not; a network of seismic stations at the Meager Creek camp, Pemberton and Gold Bridge, measuring the incidence of microearthquakes and providing preliminary data on reservoir mapping by micro-seismic methods; a refraction seismic survey to gain information on depth to bedrock and groundwater movements; a program of measuring temperature gradient in the three existing drill holes in Meager Creek and mineral exploration drill holes in nearby areas, and measuring thermal conductivity of the cores from these holes; geologic mapping of the entire region and Meager Mountain in particular. Co-operation between the B.C. Hydro and E.M.R. programs has ensured the maximum efficiency.

4.0. LONG-TERM OUTLOOK, MEAGER CREEK

Based on comparison with other geothermal areas, the geophysical properties measured to date are consistent with the model of a reservoir and volcanic complex having a potential in excess of 200 Mw. A clearer definition of the geological and geophysical properties is necessary, however, before siting and drilling a large diameter exploratory well having a potential steam zone as the target.

We tentatively suggest, subject to final analysis of the resistivity and current drilling information, that a program of continued surface geophysics is in order. We visualize 50 to 100 line miles of continued resistivity, a micro-seismic map of the reservoir area, and as many as 15 additional shallow temperature gradient and heat flow drill holes. At some point a road into the property would be justified to avoid continued helicopter costs. If these geophysical steps/

steps continue to meet productive criteria during two more field seasons of such work, a deep exploratory well could be considered for the summer of 1978.

5.0. CURRENT RECONNAISSANCE, VANCOUVER ISLAND

An airborne infrared survey was carried out during December 1975 of the geologically favorable parts of the west coast of Vancouver Island. The survey was done by Integrated Resources Photography Ltd. of Vancouver using an AGA Thermovision infrared scanner mounted in a Cessna 180 aircraft based at Tofino B.C. Several thermal anomalies were detected in the Hot Spring Cove area, the Ahousat area, and near Fair Harbour where a hot spring is reported to occur.

During May of 1975 ground follow-up of these areas and several others was carried out. The anomalies at Ahousat appear to result from shallow pools of standing water containing considerable amounts of decaying vegetation. The most interesting anomaly at Hot Spring Cove is attributed to a cold spring, probably a few degrees warmer than the nearby ocean water, with which its temperature was compared by the scanner. The Fair Harbour anomaly has yet to be checked, along with several areas south of Barkley Sound where thermal springs are rumoured to occur. Two alleged hot springs near Kennedy Lake were searched for but not found possibly because of high water at the time of the visit.

The ground follow up program in these areas is expected to continue into September 1975.

Respectfully Submitted:

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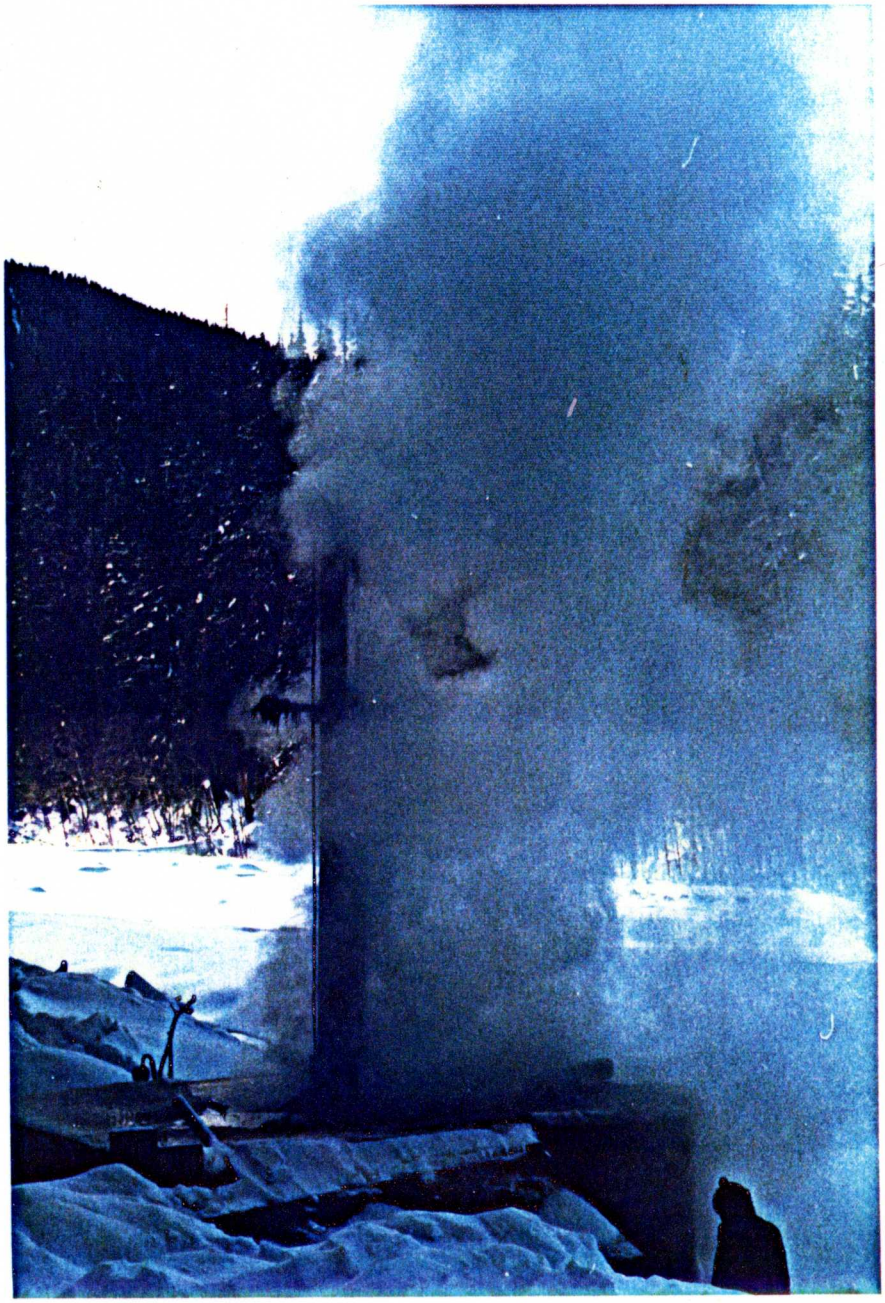
AEN/jrt.

Enc: Maps: 1. Generalized Map - Meager Creek Area.
2. Generalized Map - Vancouver Island.

Photographs: Meager Creek Well 74-H-1.
Reservoir rocks, Meager Creek.
Campsite and Geophysical Crew - Meager Creek.
Ahousat Warm Spring, Flores Island.
Hot Spring Cove - Vancouver Island.



Vapour rising from the heat flow well (74-H-1) on Meager Creek during January 1975. This hole reached a depth of 347 M and a maximum temperature of 68.9°C.

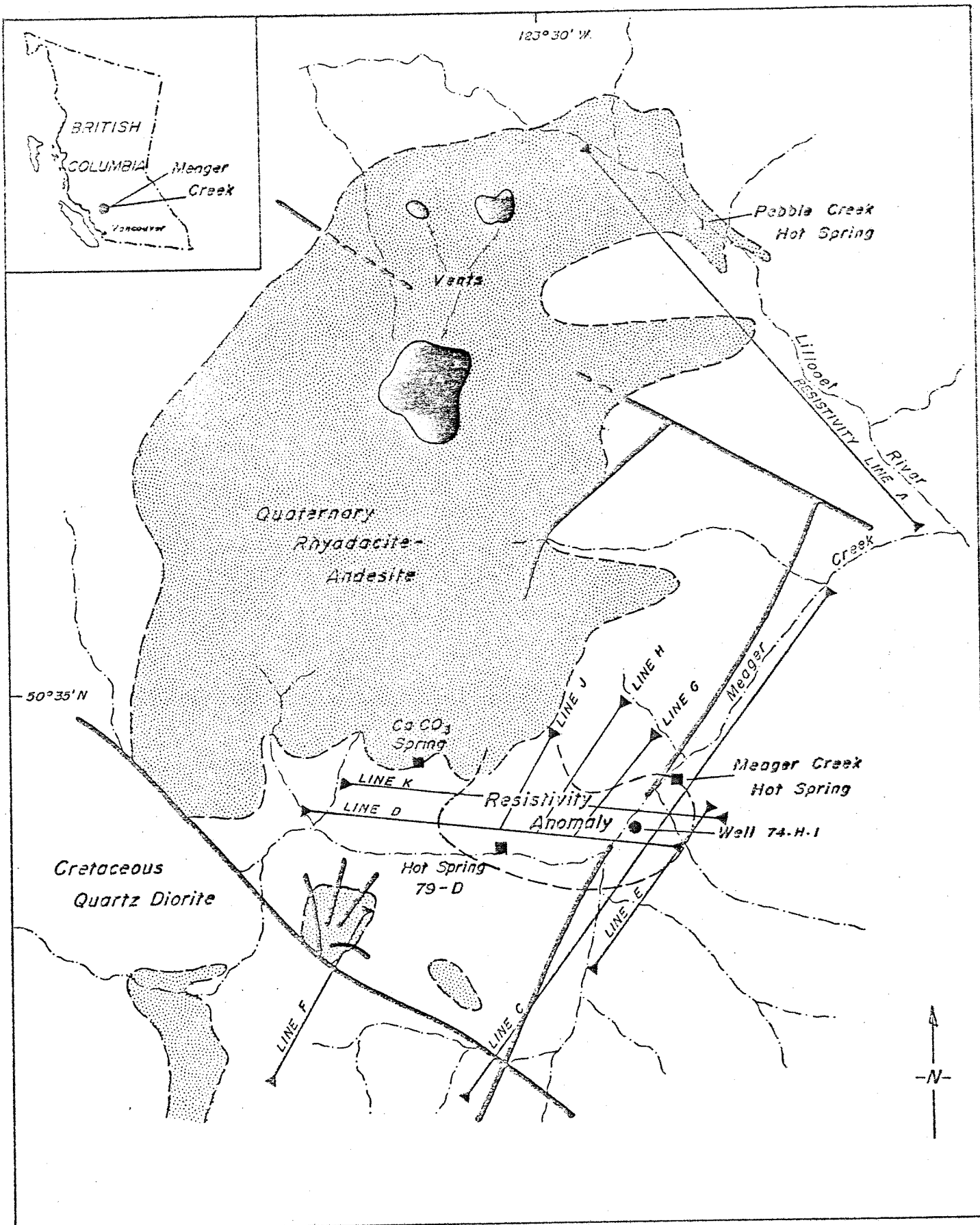
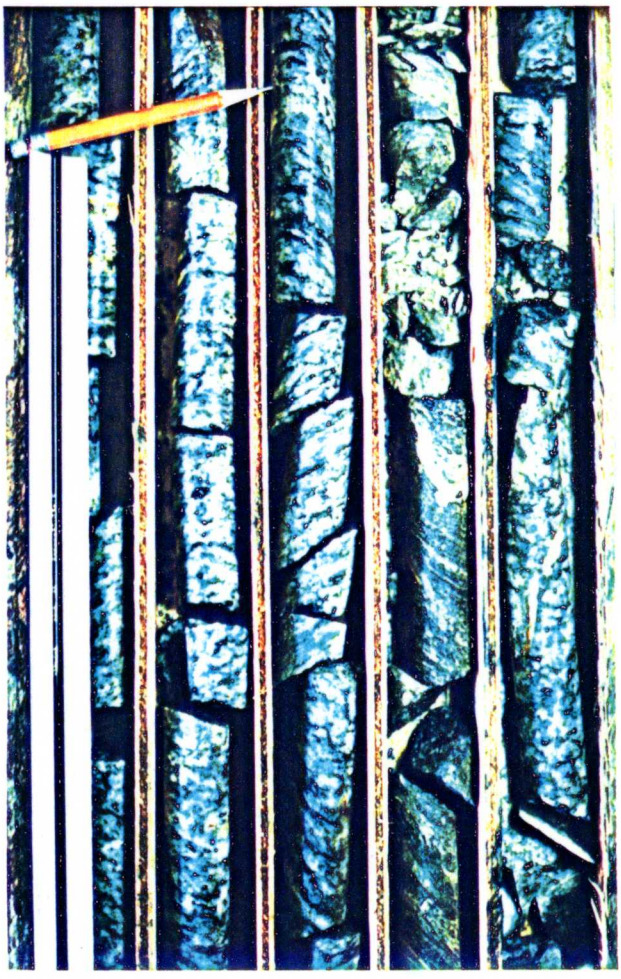


Figure No. – 1

GENERALIZED MAP OF

MEAGER CREEK AREA B.C.

0 1 2 3 4 Km.

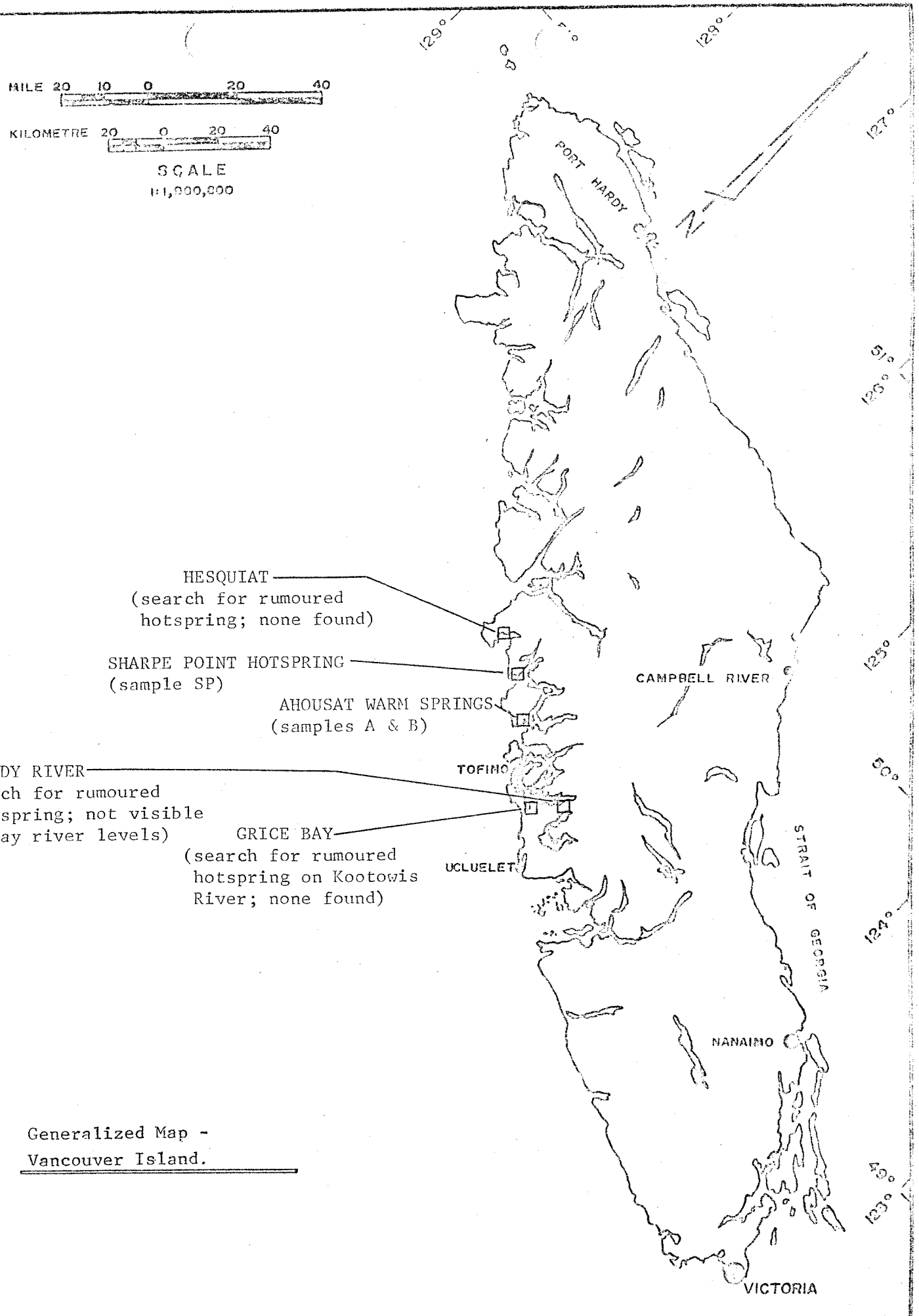


Above: J.T. Crandall at Meager Creek inspecting fractured diorite and black dyke - the rocks which comprise the geothermal reservoir.

Left: Core from Research Well 74-H-1 which produced 50°-70°C water from interconnected fractures.

Top: Camp near Meager Creek, July 1975.

Bottom: Geophysical crew winding wire at transmitter station at Meager Creek camp.



Generalized Map -
Vancouver Island.

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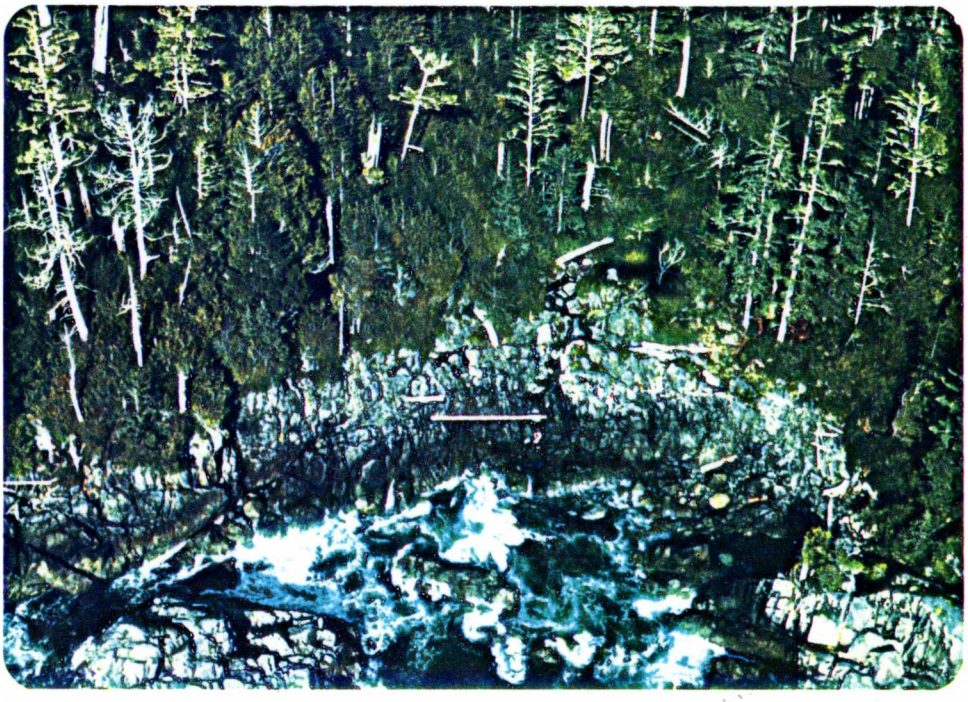
Taking samples from the old bathing pool at the Ahousat Warm Spring, Flores Island.



View from the air of the Sharpe Point Hot Spring on Vancouver Island. The stream at centre is hot and flows from the spring to tidewater on Hot Spring Cove.