

Geothermal Energy

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Coordination of Geothermal Research

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## Coordination of Geothermal Research - January 1978

During January 1978 the Geothermal Coordinator visited contractors and Federal and Provincial Government personnel in Regina, Calgary, Vancouver and Victoria, in order to review progress and results of activities of 1977-78 and to plan activities for 1978-79.

### Projects of 1977-78

Projects for 1977-78 are now either completed or close to completion. The individual contracts are reviewed below: item numbers correspond to the list of April 1977 (Internal Report 77-4)

- a) Detailed assessment of Meager Creek
- 1. Geological mapping of Meager Mountain (Souther). Field work completed, report not completed. Committed \$22,088, expended \$15,400.
- 2. Magneto-telluric survey of Lillooet and Meager Valley. (Law). Field work complete, verbal report and results received, complete report expected during February. Committed \$30,762, expended \$23,718.
- 3. Seismic study of lower Lillooet Valley (Law). Work complete and report received. Committed \$9520, expended \$9520.
- 4. Seismic study of upper Lillooet Valley (Law). Work complete and report received. Committed \$22,807, expended \$17,882.
- 13. (new item) Isotope studies of hot spring water (Souther). Work delayed by difficulties of sample collection, but now substantially complete. Committed \$6850, expended \$0.

b) Regional volcanological and geothermal studies

5. Drilling in Garibaldi volcanic belt (Jessop). Work complete, temperature data published as Open File 78-2, thermal properties of core now being measured. Committed \$56,675, expended \$56,675.

6(a) Age dating of volcanic centres (Souther). Work complete, results received, final invoices awaited. Committed \$13,000, expended \$6500.

6(b) Separate contract to alternate contractor. Work in progress, results expected during February. Committed \$4000, expended \$0.

7. Collection of samples for age dating, isotope analysis and chemical analysis. Funds allocated \$5000. Being used in small portions, with no remainder anticipated. Expended to date \$4038.

8. Completion of hot spring inventory (Souther) Work complete. Committed \$3000, expended \$3000.

14. (new item) Chemical analysis of volcanic rocks. Work in program, results expected in March. Committed \$3000, expended \$0.

15. (new item) Collection of petrological data of sedimentary rocks. (Jessop) Contract now let for work during both 1977-78 and 1978-79. Committed \$20,000 (1977-78), \$16,289 (1978-79). expended \$0.

c) Feasibility studies.

9. Study of potential for space heating at Regina (Jessop). Work complete, report received, invoice awaited. Committed \$38,820, expended \$0.

18. (new item) Seismic study at Regina (Jessop). Field work complete. Analysis delayed by failure of sub-contractor to submit results by agreed date. Results now on hand, verbal report received, completed report expected during February. Committed \$20,998 expended \$0.

10. Study of possible uses of existing hot water - abandoned.

- d) Instrument development
- 11 Testing of Geoprobe (Collett)
  - a. by GSC personnel      expended \$2709
  - b. field work under contract, work completed.      Committed \$6291 expended \$6291.
  - c. analysis under contract, work in program, report expected during March  
Committed \$2000,      expended \$0.
- e) Preliminary studies of other areas
- 12. Geological mapping of Franklin Glacier Complex (Souther). Field work completed, report awaited.      Committed \$7770, expended \$658.

Studies of the potential of sedimentary formations

At the time of the Coordinators visit to Regina (23 Jan), the study by the University of Regina was in the final stages of report preparation. The text was substantially complete but it required compiling and typing. Diagrams were complete, with minor exceptions, and small corrections were needed before reproduction. Contributions by subcontractors were on hand. The seismic study had been delayed by the sub-contractor, who had taken a long time for the analysis of the data, but the results have now been received. The final report of the main study has now been received (9 Feb.). The basic conclusions of the studies are: (1) the Winnipeg and Deadwood formations should provide ample porosity and permeability for a water production rate of  $100 \text{ m}^3/\text{hr}$ ; (2) temperature should be greater than  $70^\circ\text{C}$  in the Winnipeg formation, and probably greater than  $75^\circ\text{C}$  at the base of the Deadwood formation; (3) salinity will be about 150,000 ppm sodium chloride, or about half-saturation; (4) formation pressure will bring the water to within about 250 ft. of the

surface; and (5) the strata below the University contain no salt-solution or other unusual features that might invalidate predicted characteristics or cause problems in drilling.

The University of Regina is now preparing specifications for the building that will utilise the geothermal heat. The building will house the offices and workshops of the Energy Research Unit, but most of it will be a sports facility to contain hockey and curling rinks, indoor track and field facilities, tennis, squash, volley ball and basket ball courts, and a general-purpose gymnasium. Depending on the final content and design, the total floor area is estimated at about  $200,000 \text{ ft}^2$  ( $20,000 \text{ m}^2$ ). One pair of wells, producing 5MW of heat, can supply about 200 single family houses of 100 to  $1500 \text{ m}^2$  each, for a total of 20,000 to  $30,000 \text{ m}^2$ . Since the losses of one large building will be considerably less than the losses of many small houses, the two-well system will easily supply the needs of the proposed building.

The Energy Research Unit also plans to include a solar energy collector and storage unit, using a  $2500 \text{ ft}^2$  ( $250 \text{ m}^2$ ) rock-bed for seasonal heat storage. Since solar demonstration projects are plentiful, and rock-bed storage units are very inefficient because of the low surface area to volume ratio of the material, the geothermal coordinator suggested that the deep aquifers constitute a much better storage facility for the high solar production of the summer months, provided that water can be brought to a temperature of  $75^\circ\text{C}$  or greater. This would have the added advantage of extending the life of the main geothermal heat source of the building.

The technical requirements of producing water at 75°C by solar collection and injecting this water into the normally producing well need study.

Present plans include continuing analysis by the University of the content and design requirements of the proposed sports building including the heat exchange system, and the drilling of the first deep well on the campus during the summer of 1978. The geothermal coordinator will begin immediately to prepare specifications and cost estimates for the drilling programme, which will be funded by DEMR and managed by the University.

Regional work, now begun by the Coordinator in the form of a data package contract to Sproule Associates will continue over the next two or three years. The present work is intended to lead to a broad assessment of the thermal regime of the formations below the western plains, with emphasis on the availability and movement of water. This will be a major project and parts of it may be suitable for research topics for graduate students.

#### Planning for 1978-79

A meeting took place to plan projects for 1978-79 at the offices of the Geological Survey of Canada on 1st February 1978. Those present were J.G. Souther (G.S.C. Vancouver), L.K. Law (E.P.B. Victoria) and the Coordinator (E.D.B. Ottawa).

The Coordinator explained that the financial requirements of a major drilling project at Regina during 1978 will probably leave only about K\$60 for work in the Cordillera. This represents a cut of about 70% from the level of the previous year. However, if the Regina drilling does not proceed as planned, a substantial part of the present energy funds reserved for that

project will become available for work in the Cordillera. Alternatively, if the Regina drilling is separately supported at a higher than anticipated fraction of its cost, some intermediate amount of money will become available. Any plans made were thus necessarily tentative. It was agreed to make a list of projects, not all of which would be performed during 1978-79. The final selection will depend on the money available and also on the availability of suitable contractors.

The projects discussed were as follows:

a) Evaluation of techniques in the area of Meager Mountain

1. Magneto-telluric measurements over the central part of the Meager Mountain volcanic complex, in order to investigate the extent of conductivity anomalies detected during 1977. Becker will not be available as a contractor during 1978, and Law will explore alternatives. Estimated cost K\$20.

2. Theoretical analysis of the problem of interpreting magneto-telluric measurements in high rugged terrain. Law will explore requirements and possible contractors. Estimated cost K\$5.

3. Drilling on north side of Meager Mountain, as near as possible to latest eruptive centres. At present only access to area is by helicopter from end of road about 2km beyond Pebble Creek. Souther will enquire into road building plans of logging companies and availability of drill in area. Low funds will probably prevent progress during 1978-79. Estimated cost K\$60.

4. Drilling on south side to investigate thermal character of resistivity anomaly. Existing holes in area are too shallow for valid conclusions.

Same comments on access and funds apply. Estimated cost K\$60.

5. Mercury vapour reconnaissance. This technique has been used to detect areas of high thermal gradient. Souther will explore possibility of experimental survey. Estimated cost K\$5.

6. Isotope analysis of hot-spring and other ground water. Continuation of current studies by University of Waterloo. Supervised by Souther. Estimated cost K\$3.

7. Radon detection survey in the Meager Creek hot spring area and higher in the valley. The 'Track Etch' method is proposed. To be organized by T. Lewis. Estimated cost K\$10.

b) Regional volcanological and geothermal studies

8. Collection of samples and supervision of contracts. To be used by Souther in small amounts as required. Estimated cost K\$1.5

9. Age dating of rocks from recent volcanic centres, continuation of current work by University of British Columbia. Supervised by Souther. Estimated cost K\$10.

c) Preliminary studies of other potential resource areas

10. Reconnaissance geological mapping of Mount Silverthrone volcanic complex. Needs contractor who is good volcanologist and also skilled mountaineer.



Souther will explore. Estimated cost K\$20.

11. Geological and hydrological study of Coryuelle syenite plutons of Arrow Lakes area. Many intrusive bodies of high heat production and hot springs are known. Souther will explore scope of work and possible contractors. Estimated cost K\$15.

A K\$60 package will probably consist of items 1, 5, 6, 7, 8, 9 and 11, depending on the availability of contractors and negotiated costs. These factors will be explored by the people mentioned, the bulk of this work falling on those people on the west coast.

If more money becomes available later for operations in the cordillera the other items can be activated and possibly some items can be enlarged in scope.

#### Forthcoming meeting

There will be a half-day symposium on geothermal energy in Vancouver at 9.00 on 26 April 1978. This symposium is co-sponsored by the Canadian Geothermal Resources Association as part of the CIM Annual Meeting. The DEMR Coordinator has suggested that there should be an informal discussion on the progress at Meager Mountain, to be held at either the Geological Survey or B.C. Hydro offices, and to be open to Federal and Provincial personnel and contractors. The purpose of the discussion would be to relate the results of different surveys and to identify needs for further work. This discussion, if held, will probably be on 27 April, the day after the symposium.