Return to Jim Tarnow
with thanks KW

ABANDONMENT OF ARCTIC WELLS PRESERVED FOR SUBSURFACE TEMPERATURE OBSERVATIONS: A STATUS REPORT

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Geothermal Service of Canada

INTERNAL REPORT 85-2

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Earth Physics Branch
Energy, Mines and Resources Canada
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SUMMARY

As part of the continuing northern program of the Geothermal Service of the Earth Physics Branch, EMR, subsurface temperatures have been measured at over 128 sites in the permafrost region of Canada. Data are usually gathered at resource exploration holes in cooperation with the companies involved and, in the case of petroleum exploration holes, in cooperation with the Canada Oil and Gas Lands Administration. This body regulates the manner in which wells have been made accessible for our use and sets the requirements for the final surface abandonment of the well to be undertaken at the end of the science program. At the majority of the petroleum exploration wells, the original operators have retained the responsibility to effect a final abandonment procedure at each well. At 30 wells, EMR has assumed responsibility to carry out final abandonment to the extent of placement of the final surface plug in the well casing; 25 of these are now abandoned and most of those remaining require only a simple procedure to be undertaken.

This report describes in detail the two abandonments effected by EMR during the 1984 field season, the Panarctic Garnier O-21 and Louise O-25 wells. The status of EMR's abandonment program is summarized, bringing up-to-date a similar report prepared in 1983 (Taylor, Judge and Burgess, 1983). Over the next two years, the operators will be abandoning many of their other suspended wells, some of which EMR has been using as temperature observation sites. EMR's science program is largely complete at these wells; however, several wells are of particular interest and EMR has proposed that about 8 be instrumented for long term temperature measurements in a fashion that would allow the wells to be considered as abandoned.

CONTENTS

1.0 INTRODUCTION

The Geothermal Service has been undertaking subsurface temperature measurements throughout northern Canada since the mid-1960's. The data, with maps and tables of permafrost thicknesses derived from it, have been published regularly as volumes in the Geothermal Series; the most recent edition is Taylor, Burgess, Judge and Allen (1982).

In all but a couple of cases, these data are taken at wells drilled in the course of resource exploration. Taylor and Judge (1976) describe the preservation techniques used at many of these wells to accommodate subsequent measurements of temperature. For the majority of the petroleum exploration sites used as temperature observation wells, responsibility for any final abandonment procedure in accordance with regulations of the Canada Oil and Gas Lands Administration has remained with the original operator. These latter sites have, in most cases, large 'Christmas trees' on the wellhead for purposes unrelated to our use. EMR has accepted responsibility at a small number of these temperature observations wells to undertake final abandonment at the end of the science program. At present, no responsibility for abandonment has been assumed by EMR for the mining holes that are used.

For most petroleum exploration wells completed prior to 1973, final abandonment requires the placing of a five-sack cement plug in the top 10m of the surface casing. After 1973, a steel bullplug closing off the open hole has been considered adequate by COGLA (Figure 1 in Taylor et al., 1983). However, prior to abandoning a site for which EMR holds responsibility, details of the particular completion are discussed with and approved by COGLA.

A previous report (Taylor, Judge and Burgess, 1983) outlines the status at that time of our temperature monitoring program and of EMR's outstanding responsibility to abandon some of the preserved wells. This report describes two abandonments completed during the past field season and outlines EMR's abandonment intentions on the five remaining wells for which EMR has accepted a responsibility to abandon. EMR's abandonment program is summarized in Table 1, parts 1 and 2.

Over the past few months, COGLA and the various well operators have been reviewing the status of all arctic wells with the intention of abandoning many that are currently in suspended status. As this review involves some 47 temperature observation wells, EMR's involvement and continued interest in these wells is described in this report; Table 2, parts 1 and 2 summarizes this group of wells in a format similar to Table 1.

ABANDONMENTS COMPLETED BY EMR IN 1984

2.1 Arctic Islands

Garnier O-21

The Garnier well was successfully abandoned in August of the past field season. A previous attempt had been made in the summer of 1980 on the way back from the Rowley abandonment. At that time, the wellhead was found in a state considerably different from that expected, and we were unable to complete the well with the equipment at hand. It appeared as if the 6" casing had been cut about a metre below the local ground level; a previous internal

report describes the situation (Taylor and Judge, 1981; page 3 and pictures, pages 41-44). Further investigation on the 1984 visit revealed that the cut was really a rusted weld between the lower 6" casing and a lighter walled length of 6" riser.

The condition of the well necessitated a summer abandonment. As the casing break was submerged in the sump under about 3 cubic metres of water and 10 cm of ice, a small gas-driven pump was used to pump out the water and the ice was removed; as the casing cut was below the active layer, periodic pumping was necessary to keep the sump clear of water. An attempt to weld a steel plate across the 6" casing was abandoned; instead, ice was chopped from inside the casing as far down as an arm could reach to remove the chips (just under a metre). A 10 gallon barrel with both ends out was put over the casing and a 4m, 2" riser with new sign attached was inserted into the casing and wedged with stones. The casing and barrel were then filled with 3 sacks of permafrost cement to complete the abandonment. The abandonment configuration is shown in the figure in Appendix A.

We note here that some refuse from the drilling operation remains in the area; this consists of several 45 gallon barrels, steel strapping and wood, and is visible in pictures taken this year (Appendix A) and in 1980 (pages 41-44 in Taylor et al., 1981). The quantity is not large and could be removed in a single visit with a Twin Otter (site clean-up is not assumed when EMR takes responsibility for a final abandonment procedure).

Louise O-25

Since 1980, an extensive snow field had covered the Louise site, which is located in the bottom of a steep-sided valley in the badlands topography of Ellef Ringnes Island. A landing at the site in May, 1980, confirmed that the well and riser were entirely covered by the snow, a situation aggravated by the relatively short riser (about 1.3m) on this well. The same condition existed when an overflight was made of the area in May, 1982, but in the same month this year, the snow field had largely disappeared. The well was logged in detail to total depth, and the required steel bullplug was fastened on the 2" swage on the casing. To better mark the well, additional lengths of 2" line pipe were inserted between the bullplug and the existing sign, giving an overall height of about 3m (see Figure in Appendix A). It might be noted here that the threads on the 2" casing swage are damaged, making it quite difficult to start threading the bullplug; in the event that this well is opened at some future time, a 2" NPT die might be used to clean up the threads.

A summary of each abandonment is given in the Appendix A, following the format used in past years to tabulate clearly the pertinent details and to facilitate copies of these forms to be transferred to the particular well file at COGLA.

In August, an attempt was made to abandon the Pedder Point well on Eglinton Island. Low cloud and fog patches in the area prevented us finding the well and would have probably prohibited a landing anyway.

2.2 Mackenzie Delta and region

No abandonments were undertaken in this area in 1984.

3.0 CURRENT STATUS

3.1 Abandonments completed by 1984

To summarize, of the 30 wells for which EMR accepted responsibility for final abandonment since the 1960's, 25 had been abandoned by August, 1984 (Table 1, part 1). The costs of this overall program are summarized in an earlier report (Figure 1 in Taylor and Judge, 1981); abandonments since then have been done largely during routine logging visits and the marginal cost to EMR associated with the actual abandonment has been small; the earlier figures may be taken for all practical purposes to represent the cost to date.

In addition to these wells, EMR has been taking temperature measurements in 47 wells for which the responsibility to abandon remained with the operator involved. In many cases, a production-style well head assembly, or 'Christmas tree', was left on the well for purposes unrelated to our science program. To the best of our knowledge, a small number of this group of temperature observation wells has already been abandoned by the operators; these are summarized in Table 2, part 1.

3.2 Abandonments remaining to be done

3.2.1 EMR Responsibility

Table 1, part 2 lists the 5 wells for which EMR has an outstanding responsibility to abandon. The Neil O-15 well is abandoned with a minor deviation from the requirements (Taylor et al., 1983); this will be rectified in spring, 1986. During the same trip, Pedder D-49 and Cornwall O-30 will be abandoned as well, unless other programs in the area make a visit cost effective before then. We are suggesting (section 4.0) that both the Horton River G-02 and the North Ellice J-23 wells be instrumented as long term temperature monitoring sites.

3.2.2 Operator responsiblity

Table 2, part 2 lists the 47 wells currently suspended as temperature observations wells, at which the responsibility for meeting any abandonment procedures required by COGLA remains with the operator involved. EMR's temperature measurement program is essentially complete at most of these sites. However, several of these wells in the Mackenzie Delta and Arctic Islands are of particular interest as long term measuring sites; EMR has requested a deviation from the normal abandonment configuration at 8 wells so as to permit a permanent, multithermistor cable to be left in the well and the well thus be accessible for measurements at the surface, in a fashion that may be considered a final, regulatory abandonment of the well. Such long term measurements, spanning perhaps 10 to 20 years or more, would add appreciably to our knowledge of well thermal dynamics and variation in permafrost temperatures over time. The group of wells proposed as long term measurements sites is listed in Table 3; the motivation for choosing these wells is given in section 4.0. If this modification is acceptable to COGLA and agreeable to the operators, the Earth Physics Branch will supply a specially-designed multithermistor cable for each well and undertake a periodic logging of the well in the future; on some of these, an automatic data logger will be attached to the cable from time to time. Following the present practice, the data would be transmitted to the particular operator at the time of

measurement, and would be included in a data collection and released to the public at regular intervals.

4.0 Proposed long term temperature observation wells

The accumulation of precise temperature observations throughout northern Canada has been a major program for the Geothermal Group of the Earth Physics Branch for over 20 years. The data set has made a major contribution to our knowledge of the distribution and thickness of permafrost (Taylor et al., 1982) and to our understanding of permafrost dynamics. As the data set grew and matured, it became apparent that a few wells had particularly interesting properties or environments that might be further studied only though a long term measuring program. This small group of wells is listed in Table 3.

In the Mackenzie Delta area, the Horton River G-02 well has a very high temperature gradient within the permafrost section and unusually large convective overturn of the wellbore fluid has been observed intermittently over periods of minutes to hours during manual temperature logging. It is proposed to install a thermistor cable in this well and to use an automatic logger at a high repetition rate to further study the thermal dynamics of this well. At the North Ellice J-23 well permafrost is 74m thick, typical of the new delta, and less than one quarter the thickness at many wells in the old delta to the east. This well is ideally suited to observe the aggradation of permafrost over a longer time and the influence of the nearby channel of the Mackenzie River on subsurface temperatures. Temperature logs from the wells in the Taglu field have an isothermal section a degree or so below 0°C for several hundred metres below the surface. Thermal modelling suggests that the Taglu area was once intruded by the sea for a period of time after a considerable thickness of permafrost had developed. Wells in this area provide the unique opportunity to observe the aggradation of permafrost at the surface and to carry out further modelling to compare with the analogous regime of degradational permafrost beneath the Beaufort Sea. Two wells, selected from Taglu C-42, D-43 or H-54, have been singled out as potential long term measurement sites.

In the Arctic Islands, the thermal influence of Holocene shoreline emergence is most evident in wells on the Sabine Peninsula. It is proposed to preserve the Drake E-78 well, at two metres elevation and beside the sea, as a long term monitoring site. The Marryatt K-71 well further inland is above the Holocene marine limit and would provide a control on permafrost dynamics on the peninsula. Thermistor cables would be designed to have several sensors across the measured base of permafrost. Our temperature logs on the Sutherland O-23 well suggest a depth to 0°C almost 100m less than the depth to the base of the frozen section indicated by some borehole geophysical logs, which may indicate a gas hydrate horizon underlying the permafrost. A cable through this interval would monitor the long term stability of this zone and may contribute to the resolution of this problem. The deepest measured permafrost in Canada, 726m, occurs in the Bent Horn oilfield, at well N72. A nearby well, Bent Horn F-72A, is open to about 2900m and a cable to near this depth might detect longer term variations in temperature relating to water flow in the upper part of the Sverdrup Basin beneath the permafrost.

5.0 ACKNOWLEDGEMENTS

We want to reiterate our appreciation to the petroleum companies for making some of their wells available to us for temperature logging, and to the Department of Indian and Northern Affairs and the Canada Oil and Gas Lands Administration for approving the procedures used for preservation and final abandonment.

Logistic suport for the abandonment program has been provided by the Polar Continental Shelf Project. Some further logistic assistance has been provided by the Western Arctic Scientific Resource Centre at Inuvik. We thank Bill Presley and Peter Osborne of PCSP Resolute and Anne Wilkinson of EPB Ottawa, for assistance in 1984; Osborne assisted with the welding attempt and the cementing at the Garnier well.

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TABLE 1

LIST OF WELLS USED BY EMR AS TEMPERATURE

OBSERVATION WELLS (EMR RESPONSIBILITY TO ABANDON)

1) WELLS ABANDONED

EPB file No.	Name of Well	Abandonment Details
55	Lobitos et al Resolute L-41	EPB contract, 1977 ($2415)
62	Socony Mobil N. Cath B-62	EPB personnel, 1970 (cost about $2000)
70	IOE Providence A-47	EPB personnnel, 1970 (cost about $1000)
76	CPOG Kugaluk N-02	by company
86	Panarctic Hoodoo H-37	EPB personnnel, 1982 ($150, note 3)
87	Elf Wilkins E-60	Company responsiblity, (letter from Robertson September 17/74; see Appendix B)
89	Shell Beaverhouse H-13	by company
90	Panarctic Amund Central Dome H-40	EPB personnel, 1982 ($100, note 3)
91	Elf Jameson Bay C-31	by company (note 1)
92	Panarctic Deminex Garnier O-21	EPB personnel, 1984 ($250)
93	Panarctic et al Cornwallis Central Dome D-40	EPB personnel 1980 ($1000, note 4)
94	Candex et al. Dahadinni M-43A	EPB contract 1977 ($1700)
95	Aquitaine et al Rowley M-04	EPB personnel 1980 ($1400, note 4)
97	Panarctic Fosheim N-27	by company (note 2)

EPB file No.	Name of Well	Abandonment Details
98	Elf et al Storkerson A-15	Company responsibility (letter from Robertson, Sept. 17/74, Appendix B)
100	Arco Clarke et al Hume River D-57	EPB contract, 1977 ($2650)
151	Arco West Whitefish H-34	EPB contract 1977 ($2650)
158	Panarctic Brock I-20	EPB personnel, 1982 ($150, note 3)
168	Panarctic Dundas C-80	EPB personnel 1980 ($100, note 3)
169	Panarctic Louise Bay O-25	EPB personnel, 1984 ($150)
174	Highland Lake I-23	Company responsiblity (letter from Chizelle, July 12, 1973; see Appendix B)
175	Gemini E-10	EPB personnel, 1982 ($100, note 3)
258	Panarctic Pat Bay A-72	EPB personnel, 1982 ($100, note 3)
276	Shell Ulu A-35	EPB personnel, 1978 ($100, note 3)
281	Mobil Gulf Sadene D-02	EPB personnel, 1982 ($100, note 3)

NOTES

1. Observed cemented to surface during logging trip of 1976.
2. By agreement, EPB cable remains through the cement plug. Cable failed shortly after installation.
3. Abandonments by EPB personnel done normally during routine temperature logging; cost represents any material used, such as couplings and bullplugs, or cement.
4. As for note 3. Special trip from Ottawa required to these jobs in summer conditions. Includes share of $800 airfare and $1000 salary estimate.

TABLE 1
2) TEMPERATURE OBSERVATION WELLS
REMAINING TO BE ABANDONED
(EMR RESPONSIBILITY)

EPB file No.	Name of Well	Hardware Required	Status
77	Elf Horton River G-02	cement plug	R (note 1)
197	Gulf WC et al Neil 0-15	2-3" NPT coupling 1-3" NPT bullplug presently on well (see Appendix 2 of Taylor et al., 1983)	R
257	Panarctic et al Pedder Pt. D-49	2-2 1/2" SCH 80 coupling 1-2 1/2" Bullplug, 8 threads per inch	R
271	SOBC Can. Sup. et al North Ellice J-23	cement or welded bullplug	R (note 1)
291	Panarctic Cornwall 0-30	2-2" NPT coupling 1-2" NPT bullplug	A (1987)

A = active measurement site (year of expected completion of science program)

R = measurements complete, ready to be abandoned.

NOTES

1. Tentative plans are to install a multithermister cable and automatic temperature recorder to monitor convective overturn (at Horton) and long term permafrost growth (at North Ellice).

TABLE 2

LIST OF WELLS USED BY EMR AS TEMPERATURE

OBSERVATION WELLS (OPERATOR RESPONSIBILTY TO ABANDON)

1) WELLS ABANDONED

EPB file No.	Operator	Name of Well	Details
73	Dome	Winter Harbour No. 1	letter from R.J. Brooks, Dec. 12, 1973 (see Appendix B)
260	Gulf	Red Fox P-21	
261	Imperial	Kimik D-29	
262	Imperial	Atertak E-41	
263	Imperial	Pikiolik M-26	
264	Imperial	Pikiolik E-54	
265	Imperial	Mallik A-06	
266	Imperial	Ivik J-26	

TABLE 2

2) TEMPERATURE OBSERVATION WELLS

REMAINING TO BE ABANDONED (OPERATOR RESPONSIBILITY)

EPB file No.	Operator	Name of Well	Status
63	Gulf	Reindeer D-27	severe thermal erosion and exposure of ice lens around wellhead. See pictures in Appendix 2 of Taylor et al., 1983 and correspondence in Appendix B.
87	Elf	Wilkins E-60	see correspondence from B. Robertson, Elf Oil, Sept. 17/74 (Appendix B).
98	Elf	Storkerson Bay A-15	see correspondence from B. Robertson, Elf Oil, Sept. 17/74 (Appendix B).
99	Imperial	Devon E-45	R
155	Panarctic	Kristoffer Bay B-06	R
165	Gulf	Kilagmiotak F-48	R
166	Panarctic	Mokka A-02	R
167	Shell	Unipkat I-22	R
170	Panarctic	Thor P-38	R
171	Panarctic	Dome Bay P-36	R
172	Panarctic	Drake B-44	R
173	Shell	Niglintgak H-30	R
174	Aquitaine	Highland Lake I-23	R see correspondence from G. Chizelle, Aquitaine, July 12/73 (Appendix B)
176	Gulf	Ya Ya P-53	R
177	Gulf	Titalik K-26	R
178	Gulf	Parsons N-10	R
179	Gulf	Reindeer F-36	R

EPB file No.	Operator	Name of Well	Status
192	Shell	Kugpik O-13	R
193	Gulf	Ikhil I-37	R
194	Gulf	Atigi O-48	R
195	Sun	Linckens Island P-46	R
196	Panarctic	Bent Horn N-72	R
198	Panarctic	Drake D-68	R
199	Panarctic	Drake E-78	R (cable)
200	Panarctic	Hecla I-69	R
253	Ashland	Tedji Lake K-24	R
254	Gulf	Ya Ya A-28	R
256	Dome	Sutherland O-23	R (cable)
259	Panarctic	Drake D-73	R
267	Imperial	Taglu C-42	R (cable)
268	Imperial	Taglu D-43	R (cable)
269	Imperial	Taglu D-55	R
270	Shell	Niglintgak M-19	R
272	Gulf	Parsons L-43	R
273	Gulf	Kamik D-48	R
274	Gulf	Siku C-11	R
276	Gulf	Parsons N-17	R
277	Gulf	Siku A-12	R
278	Shell	Niglintgak B-19	R
279	Gulf	Parsons L-37	R
280	Shell	Kumak E-58	R
282	Imperial	Taglu N-43	R
284	Gulf	Siku E-21	R

EPB file No.	Operator	Name of Well	Status
285	Gulf	Parsons D-20	R
286	Panarctic	Bent Horn F-72A	R (cable)
287	Imperial	Taglu H-54	R
293	Paramount	Cameron B-13	A (1987)
299	Panarctic	Marryatt K-71	A (1988; cable)

Notes:

A = active measurement site (year of expected completion of science program)

R = temperature measurment program complete, ready to be abandoned

R (cable)= permanent temperature cable proposed to be installed in well at time of final abandonment procedure. Well to become a long term measurement site. See section 4.0 and Table 3.

TABLE 3

PROPOSED LONG TERM TEMPERATURE OBSERVATIONS WELLS

EPB FILE NO.	NAME OF WELL	MOTIVATION FOR USE AS LONG TERM SITE
a)Mackenzie/Beaufort area		
77	Horton River G-02	Monitor convective overturn of well fluid and thermal dynamics of heat transfer in well
267	Taglu C-42	study long term behaviour of a thick interval of isothermal permafrost unique to the Taglu field but similar to degradational permafrost underlying the Beaufort Sea.
268	Taglu D-43	
287	Taglu H-54	
271	North Ellice J-23	study growth of permafrost near a major river channel in an area typical of the new delta
b) Arctic Islands		
199	Drake E-78	study permafrost dynamics at an emerging shoreline
256	Sutherland O-23	study long term behaviour of several intervals of gas hydrate (indicated by geophysical logs).
286	Bent Horn F-72A	a well open to 2900 m affording opportunity to compare thermal regime within thick permafrost to regime in formations below.
299	Marryatt K-71	an 1100 m observation well above the Holocene Marine limit on the Sabine Peninsula; control for studies at Drake E-78

APPENDIX A

Well abandonment reports
for sites completed in 1984

Garnier 0-21
Louise 0-25

WELL ABANDONMENT REPORT

WELL:	Panarctic Deminex Garnier O-21
LOCATION:	$73^{o}40.9'N$ $90^{o}36.8'W$
ELEVATION:	369m
SPUD:	1971 May 23
RIG RELEASE:	1971 July 9

SUBSEQUENT MEASUREMENTS BY EARTH PHYSICS BRANCH: One temperature logs only, on 1971 July 10. Subsequently, cable destroyed by freezeback. Published in Taylor and Judge, 1974, Canadian Geothermal Data Collection - Northern Wells, 1955 to February 1974. Geothermal Series no. 1, Earth Physics Branch, EMR, 171 pages.

PERMAFROST DEPTH: greater than 500m

ABANDONMENT BY EPB:

DATE: 1984 August 2

TECHNIQUE: The well contains frozen drilling mud to several hundred metres. The upper 0.7m of the 6" casing was cleared of ice, and a 4m section of 2" linepipe with a 4" flange on the lower end was cemented into the casing. Cement was carried further up by using a 10 gallon barrel set around the top of the casing. Stones were used as wedges to keep the riser upright; 3 sacks of permafrost cement were used in total.
A new 1/4" steel plate sign 24" x 18" was bolted to the top of the riser. The sign is labelled with bead weld with the well name and location, and is bake painted orange.

GARNIER O-21

Figure

Details of abandonment

Pictures

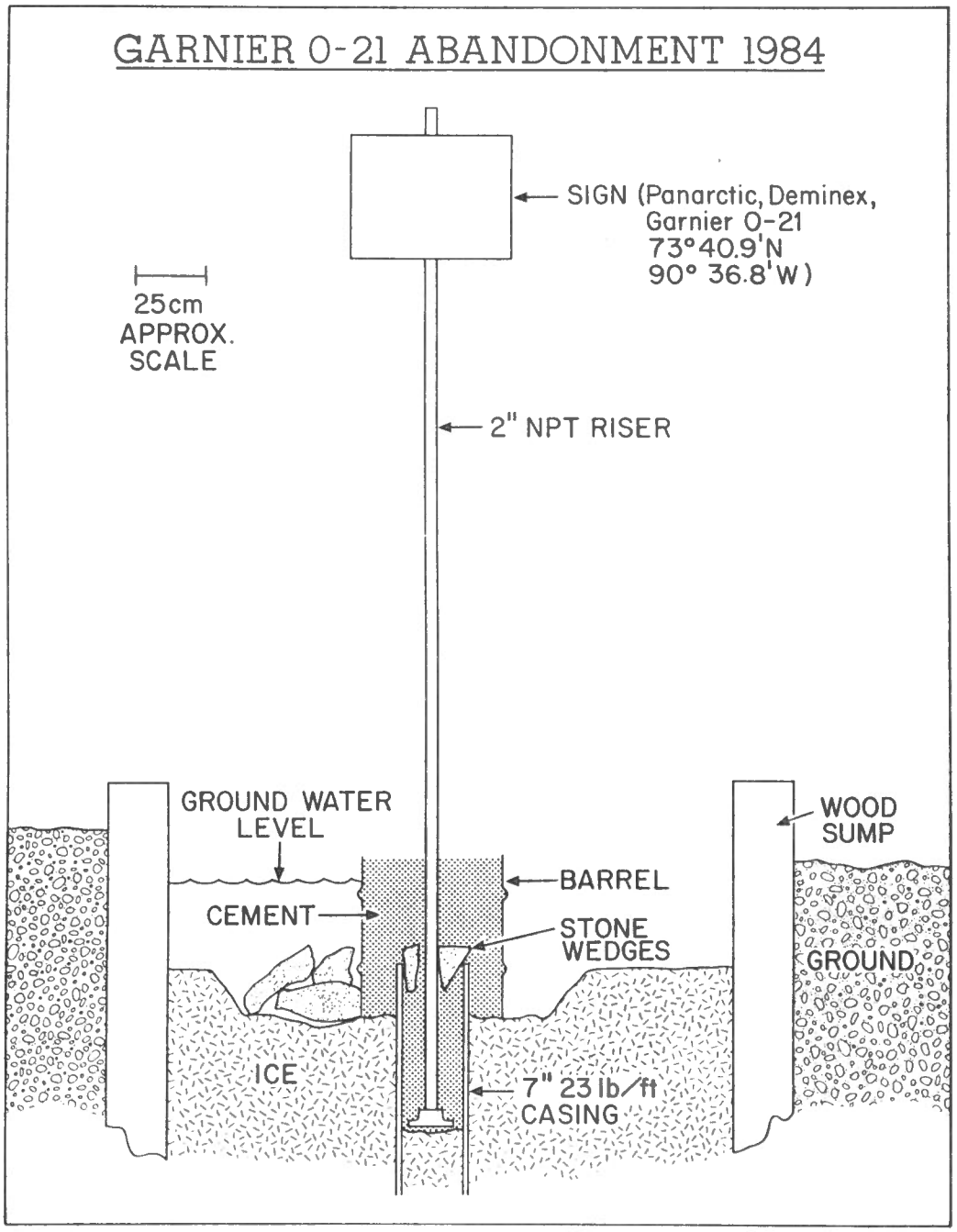
1. 1984 view of site from air. Well is slightly lower-left of centre. Debris can be seen in lower-right.

2. Pumping water from sump. Note old riser consisting of light 6" pipe and 2" riser. Small amount of debris in background is visible on previous photo about 2 cm at 11 o'clock from well.

3. View from well looking in opposite direction from previous photo.

4. Well sump, as abandoned, showing 2" riser in cement-filled casing and 10 gallon barrel. Old, light walled 6" riser pipe is visible incorner.

5. Well, as abandoned, showing heigth of riser and orange steel sign.


GARNIER 0-21 ABANDONMENT 1984
SIGN (Panarctic, Deminex,
Garnier 0-21
73°40.9'N
90° 36.8'W)
25cm
APPROX.
SCALE
2" NPT RISER
GROUND WATER
LEVEL
WOOD
SUMP
BARREL
CEMENT
STONE
WEDGES
GROUND
ICE
7" 23 lb/ft
CASING

1

2

3

4

5

WELL ABANDONMENT REPORT

WELL: Panarctic Louise Bay O-25

LOCATION: $78^{o}44.9'N$ $102^{o}42.0'W$

ELEVATION: 69m

SPUD: 1972 November 23

RIG RELEASE: 1973 January 27

SUBSEQUENT MEASUREMENTS BY EARTH PHYSICS BRANCH: Four temperature logs to 672m over a period of 11 years. First three logs published in Taylor and Judge, 1977, Canadian Geothermal Data Collection - Northern Wells 1976-77. Geothermal Series no. 10, Earth Physics Branch, EMR, 194 pages.

PERMAFROST DEPTH: 260m

ABANDONMENT BY EPB:

DATE: 1984 May 14

TECHNIQUE: The final temperature log was taken prior to abandonment. A 2" NPT bullplug was threaded onto the casing swage using thread locking compound. Since the original sign was only 1.5m high, it was completely covered with snow in May, 1980 and 1982; for the abandonment, a 2.5m extension pipe was used to elevate the original sign to better mark the well.

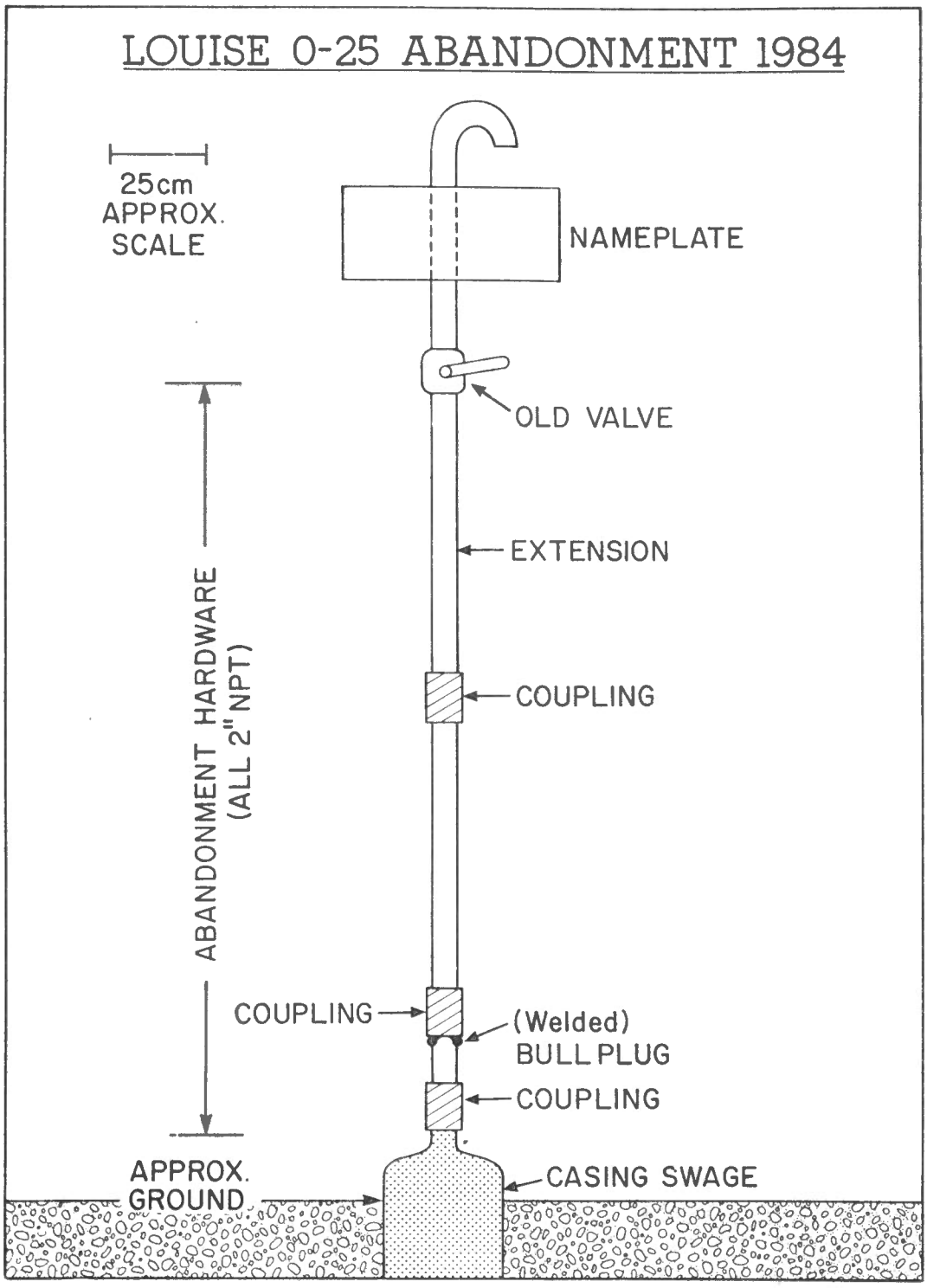
LOUISE O-25

Figure

Details of well abandonment. Total heigth is about 3m.

Pictures

No photos are available following the abandonment.


LOUISE 0-25 ABANDONMENT 1984
25cm
APPROX.
SCALE
NAMEPLATE
OLD VALVE
EXTENSION
COUPLING
ABANDONMENT HARDWARE
(ALL 2" NPT)
COUPLING
(Welded)
BULL PLUG
COUPLING
APPROX.
GROUND
CASING SWAGE

APPENDIX B

Supporting Correspondence

EPB # 174

AQUITAINE COMPANY OF CANADA LTD.

2000 AQUITAINE TOWER · 540-5TH AVENUE S.W.

PHONE: 267 9111 · AREA CODE 403 · TELEX 038 22649 PETRAKI CGY · CABLES. PETRAKI CALGARY

CALGARY, ALBERTA, CANADA

T2P OM4

Date: July 12, 1973

File: WF

Re: Your Letter Dated July 4th, 1973
(Aquit Highland Lake I-23)

Department of Energy Mines and Resources
Earth Physics Branch
Ottawa, Ontario
K1A 0E4

Attention: Mr. Alan Judge

Dear Sir:

We are presently making an inquiry with Halliburton, the service company which cemented the 2 3/8 tubing of the well referred to above. At present we do not see any reason for the blockage. The tubing was not flushed out with diesel fuel after cementing as we used an Omega latch down plug followed by diesel. The specific purpose of this plug is to remove any cement left in the tubing. Such flushing was not included in our program, a copy of which was sent to your attention on March 12, 1973.

It will help if you can give us some more information on how your logging survey was done:

- type of wire line unit.
- how many and what size of sinker bars were used, if any?
- did you run impression block or sample catcher?
- (how did your representative have the impression that drilling mud was left in the tubing - could it be cement?)

...../2

Our intent is to restore this well if economically feasible or to bear the whole cost of the completion.

No decision can be made now as we do not know yet if we will be drilling again in the Highland Lake area this winter or later on. In any case, we are returning your cheque for the completion costs until the problem is solved. We are very sorry for the inconvenience this has caused.

Yours very truly,

AQUITAINE COMPANY OF CANADA LTD.

G. Kuhn de Chizelle
Drilling Superintendent

GKC:ls
Attachment

Energy, Mines and Resources Canada

Science and Technology

October 8, 1981

Mr. John Hnatiuk,
Manager, Frontier Development,
Gulf Canada Ltd.,
P.O. Box 130,
Calgary, Alberta T2P 2H7

Dear John:

I enclose here several photographs showing the slumping that occurred this summer in the vicinity of the Reindeer D-27 well. As you can see the well presently sits in the back wall of the slide which presumably will undergo further degradation due to thermal erosion.

Should you plan on abandoning the well this coming winter, we would appreciate advance notice to enable us to read the cable one last time, and then remove it from the well.

With the well as a good reference point we have an ideal opportunity for careful observations on the rates of erosion etc. over the next several years. We probably should also be monitoring the thermal regime in and around the slump if we had the available manpower.

We have very much appreciated the opportunity to use the well over the past 16 years, the resulting data set is one of the best in existence and has been used in many papers to discuss the restoration of thermal equilibrium and freezeback in Arctic wells.

Best wishes.

Alan Judge
Division of Seismology
and Geothermal Studies

cc: Martin Smith

AJ:dw

Earth Physics Branch
Division of Seismology
and Geothermal Studies
Observatory Crescent
Ottawa Canada
K1A 0Y3

Direction de la physique du globe
Division de la sismologie
et des études géothermiques
Observatoire fédéral
Ottawa Canada
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elf OIL EXPLORATION AND PRODUCTION CANADA LTD.

#1700, 202 - 6TH AVENUE S.W.
CALGARY, ALBERTA, CANADA T2P 2R9

TELEPHONE: (403) 263-7300
TELEX: 038-22661
CABLE: ELFCAN

17 September 1974

Energy, Mines and Resources
Earth Physics Branch
Seismology Division
1 Observatory Crescent
Ottawa, Ontario
K1A 0E4

Attention: Mr Alan Judge

Dear Sir:

Re: Wilkins and Storkerson Observation Wells

During August of this year, Elf visited the subject temperature observation wells with the intention of installing a marker at Storkerson Bay and repairing the wellhead riser at Wilkins.

Upon inspection of these wellhead installations, we found in both cases that the steel plate which had been welded over the 13-3/8" and 9-5/8" casing stubs had been broken off. In considering this matter, there was no evidence that these plates or attached risers had in fact been broken off by heavy machinery or in any way was caused by our people. It is our feeling that the likely cause of this problem resulted from the contraction of the casing strings as they cooled after abandonment of the well, causing stresses that resulted in the breaking of the weld around the 9-5/8" casing. The 9-5/8" casing may well have also collapsed at some point near the surface, in the permafrost zone. In any case, the uneven contraction of the casing strings in both wells has resulted in the weld between the surface plate and riser breaking away from the casing.

In both wells, ice was found at surface in the 9-5/8" casing, and was chipped down as far as possible by hand, with no end to the ice plug evident. The water, during summer periods, had flowed into the casing through the broken welds, and later froze. It now appears that the use of these wells for your purposes or the restoration of the wells would be impossible without

incurring prohibitive costs.

Elf Oil will undertake to complete the final surface abandonment of these two wells in conjunction with direction from the Conservation Engineer of the Oil and Gas Section of Indian and Northern Affairs. Also, if at some future date, Elf has the necessary equipment in the area of these wells, we will undertake to rework and place the wells back in service.

We express our disappointment and apologies for the inconvenience caused to your department by the difficulties encountered at these wells.

Yours very truly

ELF OIL EXPLORATION AND
PRODUCTION CANADA LTD.

RBRobertson

Bryan Robertson
Arctic Operations Supervisor

RBR/jm
E.74.575

DOME PETROLEUM LIMITED

J. P. GALLAGHER
PRESIDENT

P.O. Box 200
CALGARY, CANADA
T2P 2H8

TELEPHONE
267-3910
(AREA 403)

December 12, 1973

Department of Energy, Mines & Resources
Earth Physics Branch
1 Observatory Crescent
Ottawa, Ontario
K1A 0E4

Attention: Mr. Alan Judge
Seismology Division

Dear Sir:

In reply to your letter of November 16, 1973, please be advised that we will abandon the Winter Harbour #1 well to D.I.A.N.D. specifications.

Yours very truly,
DOME PETROLEUM LIMITED,

R. J. Brooks
Manager, Arctic Drilling

RJB:jvr

cc: Mr. A. J. McCaskill