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1 Observatory Crescent  
Ottawa Canada  
K1A 0Y3

1 Place de l'Observatoire  
Ottawa Canada  
K1A 0Y3

**Geothermal Service  
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du Canada**

**STUDY OF WELL LOGS IN THE ARCTIC ISLANDS  
TO OUTLINE PERMAFROST THICKNESS AND/OR  
GAS HYDRATE OCCURENCE**

**Hardy Associates (1978) Ltd.  
Calgary, Alberta**

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## Abstract

The report outlines the distribution of permafrost and gas hydrates as determined from conventional well logs run in 151 wells in the Arctic Islands. Ice-bearing permafrost is interpreted to exist on land to depths ranging from 131 m to 860 m. Although it is also observed in the offshore the data is inadequate to map the occurrence accurately. Natural gas hydrates are interpreted in 90 of the 151 wells to depths of 1923 m.

## Résumé

Ce rapport trace la distribution du pergélisol et des hydrates de gaz naturel, telle qu'indiquer par les diagraphies classiques de 151 forages dans les Iles de l'Arctique. L'interprétation des diagraphies à terre révèle l'existence du pergélisol portant de la glace jusqu'à des profondeurs variant entre 131 et 860 m. Quoique ce pergélisol a été également détecté sous la mer, les données ne sont pas suffisantes pour établir sa distribution avec précision. L'interprétation révèle aussi la présence d'hydrates de gaz naturel dans 90 des 151 forages, à des profondeurs allant jusqu'à 1923 m.

**STUDY OF WELL LOGS  
IN THE ARCTIC ISLANDS  
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GAS HYDRATE OCCURENCE**

**Prepared For  
SUPPLY AND SERVICES CANADA  
(DSS File No. 27SQ. 23225-3-1035)**

**On Behalf Of  
EARTH PHYSICS BRANCH, EMR  
Ottawa, Ontario**

**By  
HARDY ASSOCIATES (1978) LTD.  
Calgary, Alberta**

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## 1.0 INTRODUCTION

Hardy Associates (1978) Ltd. was retained by Supply and Services Canada, on behalf of the Earth Physics Branch (Energy, Mines and Resources), to undertake a "Study of Well Logs in the Arctic Islands to Outline Permafrost Thickness and/or Gas Hydrate Occurrence" Authorization to proceed with the study was received, under DSS Contract No 27SQ.23225-1035, in September, 1983.

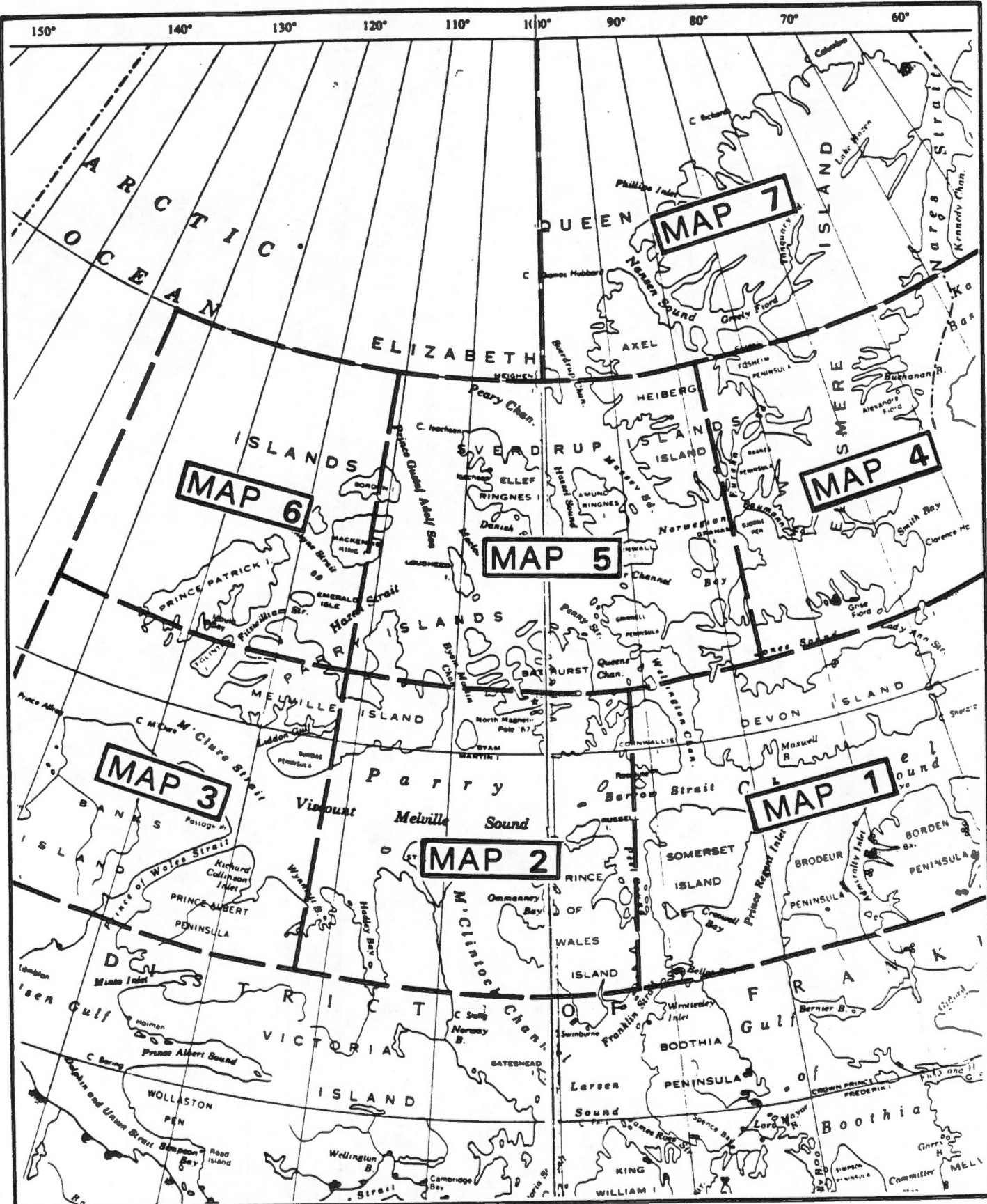
### 1.1 SCOPE OF STUDY

Since the early 1960's, a large number of wells have been drilled in the Canadian Arctic Islands, in connection with petroleum exploration. These are located throughout the islands but have been concentrated in two main exploration areas: the Sverdup Basin and Parry Island Fold Belt. Almost all of the wells, both on and offshore, have encountered permafrost and, in a number of instances, the presence of natural gas (methane) hydrates has been either suspected or confirmed.

The overall objective of the present study was to "outline permafrost thickness and/or gas hydrate occurrence" in the area, through a comprehensive examination and evaluation of downhole geophysical (petrophysical) logs.

The study area, comprising the portion of the Arctic Islands that is located between latitudes  $72^{\circ}\text{N}$  and  $90^{\circ}\text{N}$  and longitudes  $80^{\circ}\text{W}$  and  $126^{\circ}\text{W}$ , is shown on Figure 1. For ease of discussion and presentation in the report, it has been subdivided into seven sections (also shown on Figure 1), that each correspond





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**STUDY AREA LOCATION PLAN**

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FIGURE 1

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to an International Map of the World (1:1 million scale) map sheet. In all, some 151 wells have been included in the study, each of which had "off-confidential" status as of July 31, 1983. A listing is presented on Table 1.

It is intended that the results of the study should complement data obtained to date from the Arctic Islands by the Earth Physics Branch, with respect to permafrost thickness and distribution and the occurrence of hydrate-prone areas.

## 1.2 TERMS OF REFERENCE

Detailed terms of reference were established in the request for proposal and in our proposal dated August 1983, as follows:

- i) Examine downhole logs of all exploratory wells, both on and offshore, that have passed the confidential period from the Arctic Islands area, to a depth of 2000 m.
- ii) Review reports on similar studies and survey relevant literature to evaluate past practice and apply the best of currently accepted criteria to all available logs on each well. The major logs to be consulted are crystal cable, sonic, resistivity, induction, self-potential and caliper logs.
- iii) Produce a brief report, outlining the techniques used to define permafrost and hydrates and providing a review of the results obtained through concise tables and maps.

TABLE 1

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
<b>A. MAP AREA: LANCASTER SOUND</b>						
1	525	92	Panarctic Deminex <u>Garnier 0-21</u>	1971	73° 41'N, 90° 37'W	See Taylor and Judge (1974)
2	119	55	Lobitos et al <u>Cornwallis Resolute Bay L-41</u>	1963	74° 41'N, 94° 45'W	See Pollard and Nash (1971, Fig. 21), and Taylor and Judge (1974)
3	562	99	Imp IOB Panarctic et al <u>Devon E-45</u>	1972	75° 04'N, 91° 48'W	See Judge et al (1981)
4	530	-	Panarctic Deminex <u>Cornwallis Central Dome K-40</u>	1971	75° 10'N, 94° 43'W	
<b>B. MAP AREA: VISCOUNT MELVILLE SOUND</b>						
5	814	-	KMG Decalta <u>Young Bay F-62</u>	1975	72° 41'N, 96° 50'W	
6	533	-	Sun Panarctic <u>Russell E-82</u>	1972	73° 51'N, 98° 57'W	see Pollard and Nash (1971, Figure 8)
7	104	73	Dome et al <u>Winter Harbour No. 1 A-09</u>	1962	74° 48'N, 110° 31'W	See Pollard and Nash (1971), Hitchon (1974), and Taylor and Judge (1974)
8	916	-	Dome Panarctic et al <u>Herne F-85</u>	1979	74° 44'N, 110° 56'W	
9	894	-	Panarctic et al <u>Beverley Inlet G-13</u>	1978	75° 02'N, 108° 05'W	
10	449	-	Sun KR Panarctic <u>Allison R. N-12</u>	1971	75° 12'N, 98° 36'W	see Pollard and Nash (1971, Figure 9)
11	808	-	Panarctic et al <u>Sabine Bay A-07</u>	1976	75° 26'N, 111° 00'W	
12	121	-	Dome Explorer et al <u>Bathurst Caledonian R. J-34</u>	1964	75° 34'N, 98° 43'W	
13	811	-	Texex <u>King Point West B-53</u>	1976	75° 32'N, 108° 20'W	
14	698	-	Panarctic <u>Apollo C-73</u>	1973	75° 32'N, 111° 59'W	
15	896	-	Panarctic et al <u>Richardson Point G-12</u>	1978	75° 41'N, 105° 35'W	
16	733	-	Dome Panarctic <u>Texex Weatherall 0-10</u>	1974	75° 50'N, 108° 32'W	
17	397	-	Dome Panarctic <u>Texex Tomson Point F-63</u>	1970	75° 52'N, 106° 25'W	see Pollard and Nash (1971, Figure 20)
18	656	-	Panarctic <u>Eldridge Bay E-79</u>	1973	75° 58'N, 109° 30'W	

TABLE 1 Continued ...

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
<b>C. MAP AREA: THOMSEN RIVER</b>						
19	742	-	Columbia et al Amoco <u>Ikkariktok M-64</u>	1974	72° 24'N, 121° 51'W	
20	602	-	Deminex CGDC FOC Amoco <u>Orksut I-44</u>	1974	72° 24'N, 122° 42'W	
21	566	-	Elf <u>Nanuk D-76</u>	1973	73° 05'N, 123° 24'W	
22	777	-	Elfex et al <u>Kusarhaak D-16</u>	1975	73° 25'N, 120° 05'W	
23	763	-	Murphy et al <u>Victoria Island F-36</u>	1975	72° 45'N, 117° 11'W	
24	731	-	Elf Texaco <u>Tiritchik M-48</u>	1974	72° 48'N, 120° 45'W	
25	532	98	Elf et al <u>Storkerson Bay A-15</u>	1971	72° 54'N, 124° 33'W	See Taylor and Judge (1974)
26	925	-	Chevron et al <u>Parker River J-72</u>	1979	73° 32'N, 115° 52'W	
27	592	-	Elf <u>Uminmak H-07</u>	1972	73° 36'N, 123° 00'W	
28	795	-	Panarctic Tenn et al <u>Castel Bay C-68</u>	1975	74° 07'N, 120° 50'W	
29	826	-	Panarctic Elf Bar <u>Harbour E-46</u>	1976	74° 15'N, 123° 54'W	
30	613	160	Panarctic Dome <u>Dundas C-80</u>	1973	74° 39'N, 113° 23'W	See Judge et al (1981)
31	933	-	Dome Panarctic N. <u>Dundas N-82</u>	1979	74° 42'N, 113° 26'W	
32	774	257	Panarctic et al <u>Pedder Point D-49</u>	1974	75° 38'N, 118° 48'W	See Taylor and Judge (1977)
33	699	-	Panarctic Tenneco et al <u>Zeus F-11</u>	1973	75° 50'N, 113° 36'W	
34	766	-	Panarctic Gulf <u>Eglinton P-24</u>	1974	75° 54'N, 118° 08'W	
<b>D. MAP AREA: JONES SOUND</b>						
35	772	-	Panarctic Arco et al <u>Blue Fiord E-46</u>	1974	77° 15'N, 86° 18'W	
36	736	-	Panarctic Tenn et al <u>Eids M-66</u>	1974	77° 26'N, 86° 26'W	
37	705	-	Panarctic CS <u>May Point H-02</u>	1973	79° 21'N, 85° 01'W	
38	609	-	Horn River Panarctic et al <u>Depot Pt L-24</u>	1973	79° 24'N, 85° 44'W	
39	517	97	Panarctic <u>Fosheim N-27</u>	1971	79° 37'N, 84° 43'W	See Pollard and Nash (1971, Figure 19) Taylor and Judge (1974)

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Well Name	Year Completed	Location	Comments
		Earth Physics Branch			
40	615	Imp Panarctic et al <u>Mokka A-02</u>	1973	79° 31'N, 87° 01'W	See Judge et al (1981)
41	712	Panarctic Union Arco <u>Talemen J-34</u>	1974	79° 54'N, 83° 47'W	
42	616	Panarctic Gemini <u>E-10</u>	1973	79° 59'N, 84° 04'W	See Judge et al (1981)
43	542	Panarctic <u>Romulus C-42</u>	1972	79° 51'N, 84° 23'W	
<u>E. MAP AREA: BELCHER CHANNEL</u>					
44	499	BP et al <u>Hotspur J-20</u>	1971	76° 10'N, 104° 05'W	
45	881	Panarctic <u>Sophie Point G-19</u>	1977	76° 18'N, 103° 05'W	
46	845	Panarctic et al <u>Key Point 0-51</u>	1976	76° 11'N, 104° 20'W	
47	715	Dome et al <u>Sherard 0-54</u>	1973	76° 14'N, 108° 20'W	See Acheson (1979)
48	773	Panarctic Dome et al <u>Sherard Bay F-14</u>	1974	76° 14'N, 108° 36'W	See Acheson
49	440	Panarctic <u>Homestead Hecla J-60</u>	1970	76° 20'N, 110° 20'W	
50	663	Panarctic <u>Tenneco et al Hecla I-69</u>	1973	76° 19'N, 110° 23'W	See Judge et al (1981)
51	858	Panarctic <u>S.W. Hecla C-58</u>	1977	76° 17'N, 111° 21'W	Offshore
52	520	Sun KR Panarctic <u>Young Inlet D-21</u>	1971	76° 20'N, 98° 40.5'W	
53	902	Panarctic et al <u>Stokes Range J-11</u>	1978	76° 21'N, 101° 35'W	
54	852	Panarctic <u>Charles Point G-07</u>	1977	76° 26'N, 103° 01'W	
55	903	Panarctic et al <u>Bent Horn A-57</u>	1978	76° 21'N, 103° 49'W	
56	815	Panarctic <u>Bent Horn F-72A/F-72A</u>	1975	76° 21'N, 103° 58'W	See Taylor and Judge (1981) and Taylor et al (1982)
57	711	Panarctic <u>Tenn et al Bent Horn N-72</u>	1974	76° 22'N, 103° 58'W	See Taylor and Judge (1981) and Judge et al (1981)
58	863	Panarctic et al <u>W. Bent Horn I-01/01A</u>	1977	76° 20'N, 104° 01'W	
59	844	Panarctic et al <u>W. Bent Horn A-02</u>	1976	76° 21'N, 104° 01'W	
60	872	Panarctic et al <u>W. Bent Horn M-12</u>	1977	76° 22'N, 104° 07'W	
61	836	Panarctic <u>Bent Horn E-43</u>	1976	76° 22'N, 104° 19'W	

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
62	796	-	Panarctic et al <u>Pym Point C-44</u>	1975	76° 23'N, 104° 14'W	
63	859	-	Panarctic <u>N.E. Drake P-40</u>	1977	76° 30'N, 107° 12'W	Offshore
64	805	-	Panarctic <u>East Drake I-55</u>	1975	76° 25'N, 107° 49'W	Offshore; see Acheson (1979)
65	611	172	Panarctic Tenneco et al <u>POR Drake B-44</u>	1972	76° 23'N, 108° 16'W	See Acheson (1979), and Taylor et al (1982)
66	812	259	Panarctic Tenn et al <u>South Drake D-73</u>	1975	76° 22'N, 108° 29.5'W	See Acheson (1979) and Taylor et al (1982)
67	890	-	Panarctic <u>Drake F-76</u>	1978	76° 25'N, 108° 29'W	Offshore
68	683	199	Panarctic <u>POR Homestead Drake E-78</u>	1974	76° 27'N, 108° 29'W	See Acheson (1979) and Taylor et al (1982)
69	600	-	Panarctic Tenneco et al <u>POR Drake F-16</u>	1972	76° 25'N, 108° 36'W	See Acheson (1979)
70	443	-	Panarctic <u>Drake Point K-67</u>	1970	76° 27'N, 108° 55'W	No Petrophysical Logs Run
71	378	-	Panarctic <u>Drake Point L-67</u>	1970	76° 27'N, 108° 55'W	See Pollard and Nash (1971, Fig. 18) and Acheson (1979)
72	349	-	Panarctic <u>Drake Point N-67</u>	1970	76° 27'N, 108° 55'W	No Petrophysical Logs Run
73	702	198	Panarctic et al <u>Drake Point D-68</u>	1974	76° 27'N, 108° 55'W	See Taylor and Judge (1975)
74	904	-	Panarctic et al <u>Drake Point K-79</u>	1978	76° 29'N, 108° 59'W	
75	788	-	Panarctic et al <u>Chads Creek B-64</u>	1975	76° 23'N, 109° 54'W	
76	825	-	Panarctic <u>E Hecla C-32</u>	1975	76° 21'N, 110° 14'W	
77	630	-	Panarctic Tenneco et al <u>POR Hecla F-62</u>	1972	76° 21'N, 110° 25'W	
78	843	-	Panarctic Tenn et al <u>W. Hecla C-05</u>	1976	76° 24'N, 110° 32'W	
79	738	-	Panarctic Tenn et al <u>CS W. Hecla N-52</u>	1974	76° 22'N, 110° 51'W	Offshore
80	822	-	Panarctic <u>W. Hecla P-62</u>	1976	76° 22'N, 110° 52'W	Offshore
81	818	-	Panarctic Tenn. <u>CS N.W. Hecla M-25</u>	1976	76° 25'N, 110° 11'W	Offshore
82	771	-	Panarctic <u>Cape Fleetwood M-21</u>	1974	76° 31'N, 103° 41'W	
83	760	-	Panarctic Tenn <u>Robert Harbour K-07</u>	1974	76° 37'N, 104° 02'W	See Merritt (1979)
84	794	-	Panarctic Tenn et al <u>Collingwood K-33</u>	1974	76° 33'N, 108° 43'N	See Acheson (1979)

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
85	919	-	Panarctic AIEG Desbarats B-73	1979	76° 42'N, 105° 57'W	Offshore
86	758	-	Panarctic Hmstd POR N. Sabine H-49	1974	76° 48'N, 108° 45'W	
87	892	-	Panarctic et al Roche Pt. 0-43	1978	76° 43'N, 109° 46'W	Offshore
88	912	-	Phillips Aquit et al Hazen F-54	1979	77° 03'N, 110° 39'W	
89	515	-	Sun KR Panarctic Skybattlle Bay C-15	1971	77° 14'N, 105° 06'W	see Pollard and Nash (1971, Figure 22)
90	911/947	-	Panarctic AIEG Whitefish H-63/2H-63	1979/1980	77° 12'N, 106° 53'W	Offshore
91	551	-	BP et al Graham C-52	1972	77° 21'N, 90° 51'W	
92	932	291	Mobil Cornwall 0-30	1979	77° 30'N, 94° 39'W	See Judge et al (1981)
93	797	258	Panarctic Tenneco et al Pat Bay A-72	1975	77° 21'N, 105° 27'W	See Judge et al (1981)
94	420	-	Elf Cape Norem A-80	1970	77° 29'N, 110° 27'W	
95	618	195	Sun Gulf Global Linckens Island P-46	1973	77° 46'N, 97° 45'W	See Judge et al (1979)
96	891	-	HB Norcen Phillips Cape Allison L-50	1978	77° 49.5'N, 110° 18'W	
97	528	-	Panarctic Tenneco et al King Christian N-06	1971	77° 46'N, 101° 02'W	
98	459	-	Panarctic King Christian D-18A	1971	77° 47'N, 101° 07'W	
99	450	-	Panarctic King Christian D-18	1971	77° 47'N, 101° 07'W	No Petrophysical Logs Run
100	690	256	Dome Arctic Ventures Sutherland 0-23	1974	77° 43'N, 102° 09'W	See Judge et al (1981)
101	626	-	Dome Arctic Ventures Wallis K-62	1973	77° 52'N, 102° 25'W	
102	451	-	Elf Wilkins E-60	1971	77° 59'N, 111° 22'W	See Taylor and Judge (1974)
103	923	-	Dome Panarctic et al Hoodoo E-05	1979	78° 04'N, 99° 34'W	
104	386	86	Panarctic Hoodoo Dome H-37	1970	78° 06'N, 99° 46'W	See Taylor and Judge (1977)
105	828/841	-	Panarctic Tenn Sun Dome Jackson G16/G16A	1976	78° 05'N, 101° 07'W	See Hood (1980)
106	750	-	Sun GA KRC Con Panarctic Elve M-40	1974	78° 10'N, 101° 50'W	
107	659	-	Panarctic Tenneco et al Thor H-28	1973	78° 07'N, 103° 11'W	

## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
108	588	170	Panarctic Tenneco et al <u>Thor P-38</u>	1972	78° 08'N, 103° 15'W	See Judge et al (1981)
109	727	-	Imp. Panarctic Union PP <u>Sherwood P-37</u>	1974	78° 17'N, 89° 45'W	
110	452	-	Panarctic Amund <u>Central Dome H-40</u>	1971	78° 19'N, 96° 16'W	
111	587	-	Imp. Panarctic Dome et al <u>Hoodoo L-41</u>	1972	78° 11'N, 99° 54'W	
112	535	155	Panarctic Tenneco et al <u>Kristoffer Bay G-06</u>	1972	78° 15'N, 102° 32'W	See Judge (1982) and Judge et al (1981)
113	695	-	Imp. Panarctic Union PPL E. <u>Amund M-05</u>	1973	78° 25'N, 95° 04'W	
114	581	-	Panarctic Gulf <u>West Amund I-44</u>	1972	78° 24'N, 97° 50'W	
115	558	-	Panarctic Gulf <u>Dumbbells E-49</u>	1972	78° 28'N, 100° 24'W	
116	601	171	Panarctic Dome Tenneco et al <u>Dome Bay P-36</u>	1972	78° 26'N, 103° 16'W	See Taylor and Judge (1975)
117	917	-	Panarctic et al <u>Noice D-41</u>	1979	78° 20'N, 104° 24'W	
118	612	-	Panarctic et al <u>Noice G-44</u>	1972	78° 23'N, 104° 22'W	
119	816	-	Panarctic <u>Mocklin Point D-23</u>	1975	78° 22'N, 104° 45'W	
120	574	-	Panarctic <u>Helicopter J-12</u>	1972	78° 42'N, 100° 37'W	
121	629	169	Panarctic Dome Tenn et al <u>Louise O-25</u>	1973	78° 45'N, 102° 42'W	See Judge (1982) and Taylor and Judge (1977)
122	617	-	Panarctic Tenneco et al <u>Pollux G-60</u>	1973	79° 09'N, 104° 57'W	
123	708	-	Panarctic Tenneco et al W. <u>Pollux E-59</u>	1973	79° 08'N, 105° 29'W	
124	730	-	Panarctic Home Tenn et al <u>Sirius K-28</u>	1974	79° 18'N, 103° 44'W	
125	689	-	Panarctic et al <u>Isachsen J-37</u>	1973	79° 17'N, 105° 17'W	
126	610	-	Horn River CCS Getty <u>Mid Fiord J-53</u>	1974	79° 53'N, 94° 57'W	
127	952	-	Panarctic et al <u>Char G-07</u>	1980	77° 36'N, 99° 31'W	Offshore
128	953	-	Panarctic et al <u>Balaena D-58</u>	1980	77° 37'N, 100° 22'W	Offshore
129	961	-	Dome et al <u>Wallis A-73</u>	1980	77° 52'N, 102° 27'W	
130	972	-	Panarctic AIEG PRC PPC <u>Cleco B-66</u>	1981	77° 25'N, 106° 24'W	Offshore



## ARCTIC ISLAND WELLS INCLUDED IN THIS STUDY

Well No.	Drilling Authority No.	Earth Physics Branch No.	Well Name	Year Completed	Location	Comments
131	974	-	Panarctic AIEG PPC Dome MacLean I-72	1981	77° 32'N, 103° 56'W	Offshore
132	973	-	Panarctic AIEG PPC Dome Skate B-80	1981	77° 49'N, 104° 57'W	Offshore
133	982	-	Panarctic Dome N. Hoodoo N-52	1981	78° 12'N, 99° 58'W	
134	960	-	Panarctic BP AIEG Vesey A-27	1981	76° 56'N, 109° 08'W	
<b>F. MAP AREA: BALLANTINE STRAIT</b>						
135	824	-	Elf et al Dyer Bay L-49	1976	76° 09'N, 121° 49'W	
136	455	-	Sun KR Panarctic Kitson R. C-71	1971	76° 10'N, 112° 59'W	see Pollard and Nash (1971, Figure 7)
137	848	-	Panarctic Norcen AIEG et al Grassy I-34	1978	76° 24'N, 113° 11'W	Offshore
138	874	-	Panarctic AIEG et al Depot Island E-44	1977	76° 23'N, 114° 18'W	
139	356	-	Panarctic Sandy Point L-46	1969	76° 23'N, 115° 18'W	See Pollard and Nash (1971, Fig. 6)
140	377	-	Panarctic Marie Bay D-02	1969	76° 21'N, 115° 33.5'W	
141	803	-	Elfex et al Wilkie Point J-51	1975	76° 30.5'N, 117° 20'W	
142	614	-	BP et al Emerald K-33	1973	76° 43'N, 113° 43'W	
143	503	91	Elf Jameson Bay C-31	1971	76° 40'W, 116° 44'W	See Taylor and Judge (1975)
144	605	-	Elf Intrepid Inlet H-49	1973	76° 58'N, 118° 45'W	
145	504	-	BP et al Panarctic Satellite F-68	1972	77° 17'N, 116° 55'W	
146	696	-	Elfex Andressen L-32	1973	77° 12'N, 118° 14'W	
147	541	-	Panarctic et al Brock C-50	1972	77° 49'N, 114° 17'W	
148	595	158	Panarctic Brock I-20	1972	78° 00'N, 114° 34'W	See Taylor and Judge (1977)
<b>G. MAP AREA: BOBESON CHANNEL</b>						
149	765	-	Dome Arctic Ventures Crocker I-53	1974	80° 03'N, 98° 55'W	
150	691	-	Panarctic Halycon O-16	1973	80° 16'N, 84° 07'W	
151	739	197	Gulf WC et al Neil O-15	1974	80° 45'N, 83° 07'W	See Judge et al (1981)



### 1.3 METHODOLOGY

In order to achieve the project objectives, the assignment was carried out in stages.

Firstly, available sources of published and unpublished information, pertinent to the requirements of the study, were reviewed. Reference was made to three main types of data source:

- i) Earth Physics Branch (E.P.B.) publications, concerning the distributions of ground temperatures, permafrost and hydrate-prone areas.
- ii) Published interpretations of permafrost and hydrate occurrence in the Arctic Islands, based on downhole well logs, and those released by the operators.
- iii) Published interpretations for other areas, primarily the Mackenzie Delta - Beaufort Sea area and Alaska.

Throughout, emphasis was placed on gaining an overall impression of permafrost and hydrate distribution and on identifying the downhole logging techniques that have proven to be of value in the past.

Based on the literature review and extensive previous petrophysical logging experience, diagnostic criteria were then developed for identifying permafrost thickness and hydrate occurrence using the downhole petrophysical logs. The procedures and criteria were refined and improved as the



initial stages of log interpretation proceeded. Section 2.0 provides a detailed description.

The log interpretation was carried out in three stages. Firstly, wells to be included in the study were selected (by reference to D.I.A.N.D. (1980) and required downhole logs obtained. The logs from wells for which interpretations of permafrost and/or hydrate occurrence have already been published, or released by the operators, were then examined. About 50 wells fell into this category. Of this group, data on the wells for which precise temperature surveys are available (carried out either by the Earth Physics Branch (E.P.B.) or industry) were reviewed initially, and then those for which temperature data are not available. In each case, all available logs were examined, so as to provide either support for the published interpretation or, if necessary, a revised or alternative interpretation. Finally, the logs of wells for which interpretations have not been made available previously were examined. Using the diagnostic criteria developed, permafrost thickness and/or hydrate occurrence were "picked". Wherever possible, wells with existing temperature data were examined first.

Preparation and submission of this report constituted the final study task.

#### 1.4 PROJECT TEAM

The assignment was carried out by Hardy Associates (1978) Ltd., Calgary, Alberta, with petrophysical logging expertise provided, on a sub-contract basis, by Petrophysical Consultants International Ltd. Key personnel were as follows.



Dr. J.F. Nixon, P.Eng., of Hardy Associates was project manager, responsible for overall supervision of the assignment and internal review.

Mr. G.E. Dawson-Grove, P.Eng., P.Geol., of Petrophysical Consultants International, developed the diagnostic criteria and carried out the petrophysical log interpretation.

Mr. I. Jones, M.Sc., P.Geol., of Hardy Associates supervised the study on a day-to-day basis, and was responsible for the review of existing literature and final report preparation.

#### 1.5 ACKNOWLEDGEMENTS

Petrophysical logs for the majority of the Arctic Island wells were obtained on a commercial basis. We are grateful, in addition, to the following, for assistance in obtaining the remaining data:

Mr. L. Bruch, M.J. Systems, who arranged for the timely use of a microfiche reader-printer.

Messrs. J. Greenslade and J. Thompson of Panarctic Oils Ltd., who arranged for logs of recently off-confidential Panarctic wells, mud gas logs, and crystal cable data to be made available.

#### 2.0 DIAGNOSTIC CRITERIA

This section describes the criteria adopted to determine permafrost thickness and the occurrence of natural gas hydrates, based on analysis of downhole well logs. Following



a review of pertinent definitions and concepts, the response of petrophysical and other logs to the occurrence of the two phenomena is outlined, based on theoretical considerations and on a review of the literature. With this basis, Sections 2.4 and 2.5 detail the diagnostic techniques developed, and improved upon, in this study, to determine permafrost thicknesses and natural gas hydrate occurrence in the Arctic Islands. A brief summary is presented in Section 2.6.

## 2.1 DEFINITIONS AND CONCEPTS

### 2.1.1 Permafrost

Permafrost, or perennially frozen ground, is the thermal condition that exists when the ground (whether rock or unconsolidated material) remains at a temperature below 0°C for two or more years.

An important implication of this temperature-based definition is that it does not require the ground to be frozen. Thus, materials containing ice in the pore spaces and those that do not are both considered to be permafrost, provided the temperature condition (i.e. remaining at less than 0°C for two or more years) is met. Since the application of petrophysical logging techniques in this study is dependent on the recognition of physical changes in log response due to the presence of ice, it is convenient to follow Osterkamp and Payne (1981) in separating the two conditions. The former, therefore, is denoted as ice-bearing permafrost (IBPF) and the latter as permafrost per se (defined, as above, solely on the basis of temperature).



The base of permafrost corresponds to the position of the 0°C ground temperature isotherm at depth; as such, permafrost thickness may be delineated only on the basis of precise temperature surveys. The base of ice-bearing permafrost (IBPF), on the other hand, may be determined, as shown in this study, based on interpretation of petrophysical (downhole) well logs. These reflect the physical changes that occur in response to the phase change from pore water to ice.

The bases of permafrost and ice-bearing permafrost rarely, if ever, correspond, since there is generally a marked difference in temperature at the two depths. This temperature difference, termed the freezing point depression (FPD), is a function of pressure, chemical and soil particle effects (Osterkamp and Payne, 1981). D&S Petrophysical Consultants (1983) suggest FPD may range from about 1.28°C in coarse grained sands to as much as 8.24°C in shales. The impact of FPD may be illustrated by an example. Thus, assuming an average geothermal gradient for the Arctic Islands area of 30°C/km (tti Geotechnical Resources, 1983) and the above FPD values, the base of IBPF may be shown to vary from about 43 m above the 0°C isotherm in clean (i.e. non-shaly) sands to over 275 m above the isotherm in shales. An implication is that the lowest "ice" indications, picked from the electrical logs, in any well may actually be the lowest levels of gas hydrate occurrence. In this case, the base of permafrost could be at an appreciably higher level.

Most well logs also exhibit a transition zone below the IBPF base, within which the resistivity and sonic travel times gradually change. The results of this study indicate the thickness of the transition zone may range from about 10 m to



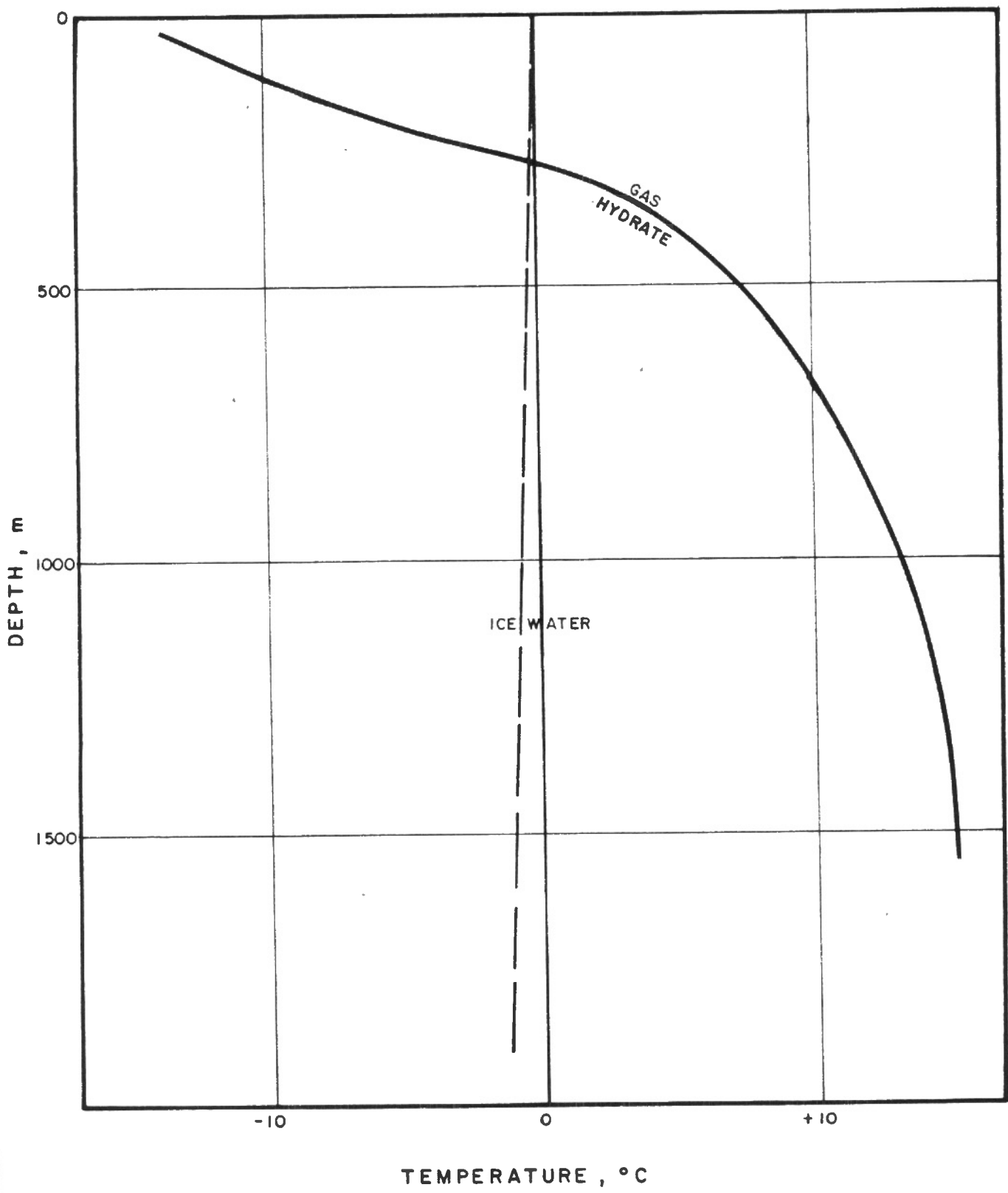
greater than 100 m. Likely, this is again a function, at least in part, of lithology (i.e. proportion of shale). Thermodynamically, however, ice and water will co-exist in fine pore spaces, so that the transition zone likely also represents the increasing unfrozen water content as the melting point is approached (Desai and Moore, 1968).

### 2.1.2 Natural Gas Hydrate

Natural gas hydrates, or clathrates, are solid, ice-like, mixtures of natural gas and water which, under pressure, can form at temperatures considerably above the freezing point of water.

The hydrate structure consists of a latticework of water molecules held together by hydrogen bonds, with the gas molecules filling in the voids. According to Davidson et al (1978), gas hydrates may be of two main types: Structure I formed by "small" gas molecules, such as methane and ethane, and Structure II containing larger molecules, such as propane and isobutane.

A phase diagram for the methane-water system, which is of primary importance in this study, is presented on Figure 2. As shown by Judge (1982) and others, superimposition of a measured (for example, E.P.B.) ground temperature profile on to the diagram, may provide an appreciation of whether or not the area is hydrate-prone. If so, the likely thickness of the hydrate-bearing interval may also be estimated.



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FIGURE 2

HT09 - 79/05





## 2.2 PETROPHYSICAL LOG RESPONSE

Up to eight individual logs (run in varying combinations) are typically available for wells drilled within the study area. In most instances, the log exhibits a characteristic response as the logging tool moves up-hole, from unfrozen material into ice-bearing permafrost and through zones that may or may not contain natural gas hydrates.

The following sections categorize the petrophysical response (or lack thereof), based both on theoretical considerations and actual experience. Reference is made also to the results of earlier studies reported in the literature. Features that are of particular value in delineating IBPF and/or hydrate zones are highlighted.

### 2.2.1 Resistivity Logs (IES, EL, DLL, DILL, DISFL, Etc.)

In general, frozen porous formations are considerably more resistive than similar non-frozen materials. On this basis, an abrupt increase in resistivity can be expected at the base of IBPF. As noted by Hnatiuk and Randall (1977), however, this may not always be the case, since the resistivity increase may be masked by the effects of thermal invasion around the well bore. Fortunately, in most of the Arctic Island wells examined, an increase in resistivity can be observed. As a result, indications on the resistivity log (in combination with other features, such as drift in the spontaneous potential log) were used, in the majority of wells, as the primary indicator of the IBPF base.



Resistivity logs, generally of the Electrical Log (EL), Dual Lalerolog (DLL), or Dual Induction Laterolog (DILL) types are available for almost all wells within the study area (see individual Analysis Details, Appendix "A").

### 2.2.2 Sonic (Acoustic) Logs (BHCS, S, LSS)

It is well documented, based on laboratory studies, that sonic (acoustic) velocities in porous formations are higher at low temperatures (i.e. when ice is present) than they are at higher temperatures. On this basis, a distinct shift from low to high velocity could be expected when passing up-hole into ice-bearing permafrost or through a hydrate zone (assuming a material of relatively uniform lithology and porosity). In practice, however, the opposite is usually the case, since thermal invasion and thawing cause the borehole walls to crumble and wash out, in both permafrost and hydrate-bearing zones. The result is "cycle skipping" that gives rise to spuriously slow travel times which completely obscure the real (faster) values.

As shown in Sections 2.4 and 2.5, "cycle skipping" may be put to use as a permafrost and (especially) hydrate indicator. It needs to be borne in mind at the same time, however, that other features (e.g. high porosity sands, presence of gas, fracturing) can also give rise to very slow acoustic travel times and cycle skipping. Thus, it is preferable to use a number of logs in combination rather than a single log to pick IBPF and/or hydrates.

Sonic logs are available for almost all Arctic Island wells. These are, in most instances, of the borehole-compensated type



(BHCS); however, long-spaced sonic (LSS) logs have also been run in some wells.

### 2.2.3 Spontaneous Potential Log (SP)

The SP curve records the difference in potential between a moveable electrode in the well and a fixed surface electrode (Hnatiuk and Randall, 1977). Characteristically, it shows a negative drift while moving uphole through permafrost, the start of which can often be used to locate the IBPF base or to confirm the pick determined from analysis of the resistivity logs. It is suggested the SP drift may be related to an increase in pore water salinity with depth (Desai and Moore, 1968; Pollard and Nash, 1971); however, according to Hnatiuk and Randall (1977), this is not proven.

Collett (1983) suggests that "there is a relatively lower (less negative) spontaneous potential deflection in a hydrate zone when compared to that associated with free gas".

SP logs are available, generally in combination with the resistivity log, for almost all wells considered.

### 2.2.4 Gamma Ray Log (GR)

This log, generally run in conjunction with sonic and caliper, measures the natural radiation of the formations surrounding the well bore. As might be expected, passing uphole into ice-bearing permafrost and/or through a hydrate zone has no direct influence on the GR log. However, the log was of value in this study for determining the distribution of sand (as opposed to shale) horizons and, thus, potential hydrate-



bearing zones. In the same way, non-correspondence of the GR with the SP was sometimes an indication of IBPF or hydrate intervals (see Section 2.6).

Gamma ray logs are available for almost all Arctic Island wells.

#### 2.2.5 Caliper Log (C)

Drilling through permafrost and/or hydrates, using conventional mud, leads to the creation of a zone of thermal invasion. In all but the most competent formations, development of an overgauge hole often results, due to thawing, caving and hydrate decomposition. Such effects may range in severity from a mild rugosity of the borehole wall to a gross washout. They are readily identified on the caliper log.

Caliper surveys are usually run in combination with the sonic and density/neutron logs. As a result, they are available for almost all wells in the study area.

#### 2.2.6 Formation Density Log (FD, FDEN)

There is a density difference between ice and water and also, probably, between gas hydrate and ice. Since the water, ice and/or hydrate components of any rock occupy only the pore spaces, the ability of the density log to distinguish between fluids or other substances within naturally occurring rock masses is significantly reduced. As a result, differences in density are likely too small to be recognizable directly.



Thawing of permafrost and decomposition of hydrates ( due to an increase of temperature or decrease in pressure beyond critical levels) may, however, result in crumbling or even gross washout of the borehole walls. The density log is sensitive to hole irregularities (it becomes distorted to the point of being useless in a washed-out hole). Thus, it can indirectly indicate the presence of IBPF and/or hydrates. It may be noted, however, that in reacting in this manner, the density log is actually providing no more information than the caliper. Furthermore, it has also to be remembered that hole rugosity (and washouts) can be caused by a variety of factors other than thawing permafrost and/or decomposing gas hydrates.

Density logs are available for the majority of Arctic Island wells. They are run singly (FDEN) or with the compensated neutron (FD).

#### ..2.7 Neutron Logs (CN, SNP), GRN)

The neutron log responds to hydrogen ion concentration, small differences in which may exist between rock containing water, ice and gas hydrates. Such differences are very small, however, so that although theoretically possible (Collett, 1983), it is unlikely the neutron log can be used in practice to distinguish between permafrost, unfrozen materials and gas hydrate-bearing rock, directly.

Fortunately, like the density log, modern (pad-type) neutron tools are sensitive to hole washout. Thus, both "sidewall neutron" (especially) and the "compensated neutron" logs may indicate permafrost and gas hydrate occurrence indirectly, by reacting to hole rugosity or washout. The old (non pad-type)



neutron tools, on the other hand, are relatively insensitive to hole conditions and will contribute little or nothing to recognition of permafrost and hydrates.

All neutron logs are very sensitive to the presence of shale. As a result, even under perfect hole conditions, variations in the shale content of sands will likely mask any effects due to small variations in hydrogen ion content (associated with permafrost, unfrozen water bearing rock and gas hydrate bearing rock).

Neutron logs are available for most of the wells considered. Two types of log are predominant: "compensated neutron" (CN) and "sidewall neutron porosity" (SNP).

#### 2.2.8 Temperature Log (TEMP)

Temperature surveys (run using a downhole tool, rather than a precise thermistor probe) are available for a number of wells. As described by Pollard and Nash (1971), the base of ice-bearing permafrost is generally indicated by a "plateau-like" feature; this is accompanied by a marked change in temperature gradient (Pollard and Nash, 1971: Figures 21, 22). The temperature log may be used to confirm the IBPF "picks" derived from other sources (e.g. resistivity logs).

#### 2.3 OTHER DATA SOURCES

In addition to the petrophysical logs, mud gas logs, crystal cable data and detailed temperature surveys are also available for a limited number of wells. Characteristics of these data sources are described below.



### 2.3.1 Mud Gas Logs

This log provides a continuous record of drilling mud gas returns and, according to Collett (1983), "... serves as the best tool available for the differentiation of a hydrate saturated unit from gas-free ice-bearing permafrost". It is our experience that mud gas log peaks do indeed give confirmation of hydrate "picks" derived from other sources (e.g. sonic logs). However, some caution is necessary, since the logs may also exhibit relatively continuous gas shows related to water-bearing sands, that contain dissolved gas, or to continuing degradation of hydrates drilled through previously (i.e. higher in the well).

Mud gas logs for some 15 wells were reviewed (see side-by-side log presentations).

### 2.3.2 Crystal Cable Data

Crystal cable (downhole seismic velocity) surveys were reviewed for a limited number of wells. As noted by Hnatiuk and Randall (1977), "by recording seismic wave first arrival times to geophones suspended in the well from shot holes displaced horizontally from the well bore, a velocity plot which is not significantly influenced by the zone of thermal invasion can be plotted". Walker and Stuart (1976) have described the successful use of this technique in the Mackenzie Delta area.

In this study, crystal cable data were used to verify the petrophysical log picks only.



### 2.3.3 Detailed Temperature Surveys

Precise temperature surveys, which provide the only conclusive means of determining depths to the 0°C isotherm (and, thus, permafrost thickness), are available for some thirty Arctic Island wells. These data, collected by the Earth Physics Branch, EMR, form part of the Canadian Geothermal Data Collection - Northern Wells. Pertinent information is presented on Table 2; as described in Section 3.3.1, the E.P.B. data constitute a valuable control on the results of the present study. In all instances, E.P.B. depths to the 0°C isotherm have been converted to depths below kelly bushing (K.B.).

### 2.4 DETERMINATION OF PERMAFROST THICKNESS

The base of permafrost (IBPF) was picked on the logs of Arctic Island wells in four main steps, as follows:

- i) Firstly, E.P.B. data on depth to the base of permafrost (0°C isotherm) were reviewed for the well, if available, and, if not, for wells in the general area. The objective was to gain an appreciation of the likely frozen ground thickness to be anticipated.
- ii) The resistivity and spontaneous potential logs for the well were then examined. Moving uphole, an attempt was made to identify a relatively abrupt increase in resistivity that was associated with a negative drift in SP. Once this had been done (resistivity increase - SP drift was used to pick the base of IBPF in the great





majority of wells), the presence or absence of a transition zone below the IBPF base was determined.

iii) After the likely bases of IBPF and the transition had been identified, based on resistivity and SP, the other logs were reviewed to provide confirmation. As described in Section 2.2, indications of IBPF include: hole washout, shown on the caliper (and often reflected in the neutron and density logs), non-correspondence between SP and gamma ray and cycle-skipping on the sonic. The selected IBPF and transition base depths were then confirmed or modified, as necessary.

iv) Finally, a reliability factor was assigned to each pick, ranging from 1 (good) to 3 (relatively poor).

Interpreted IBPF and transition base depths are shown on the individual analysis detail sheets (Appendix "A") and the side-by-side log presentations (Appendix "C"). The results are summarized on Table 2, and described in Section 3.0.

## 2.5 IDENTIFICATION OF GAS HYDRATE OCCURENCE

Hydrates form where gas (methane in most Arctic Island wells) is present and their occurrence follows the same rules as apply for any other hydrocarbon accumulation: both a porous reservoir host rock and a trapping mechanism are required. Thus, hydrates occur preferentially in sand (or occasionally silt) units, and are found either throughout or at the top of the unit (since gas gravitates upward). In addition, more is needed than merely a high pressure and low temperature for hydrates to be present; even if pressure/temperature

TABLE 2

## SUMMARY OF RESULTS

Well Number	Name	EPB Data		IBPF	Likely Hydrate Occurrence		Comments
		0°C Isotherm (m)*	Base (m)		Trans. (m)	Overall Interval (m)	
1	Garnier 0-21	497+	274	311	-	-	No hydrates logged.
2	Resolute Bay L-41	EX 600	518	-	-	-	Probably hydrates throughout (to 1500 m +)
3	Devon E-45	X1 594	780	875	942-1247	305	
4	Central Dome K-40	-	860	1021	158-1600	1442	
5	Young Bay F-62	-	253	277	-	-	No hydrates logged.
6	Russell E-82	-	305	349	158-387	229	
7	Winter Harbour No. 1	E2 530	384	-	424-1862	1438	Scattered hydrates only below 935 m.
8	Herne F-85	-	310	340	154-1510	1356	
9	Beverley Inlet G-13	-	308	357	-	-	No hydrates logged.
10	Allison R. N-12	-	396	454	969-1813	844	Traces of hydrate 969 - 1676 m.
11	Sabine Bay A-07	-	< 366	-	< 366-1714	> 1348	No IBPF within logged interval; crystal cable suggests IBPF base at 245 m.
12	Bathurst Caledonian R. J-34	-	808	846	433-1029	596	
13	King Point West B-53	-	296	335	-	-	No hydrates logged.
14	Apollo C-73	-	549	671	34-204	724	
15	Richardson Point G-12	-	747	768	27-751	724	
16	Weatherall 0-10	-	235	352	1126-1151	25	
17	Towson Point F-63	-	646	-	-	-	No hydrates logged.
18	Eldridge Bay E-79	-	509	631	300-768	468	
19	Ikkariktok M-64	-	305	360	283-896	607	
20	Orksut I-44	-	616	680	354-931	577	
21	Nanuk D-76	-	< 603	-	675-1244	569	IBPF above DILL log top.
22	Kusrhaak D-16	-	434	503	-	-	No hydrates logged.
23	Victoria Is. F-36	-	235	290	-	-	"Saturated" DILL.
24	Tiritichik M-48	-	764	829	853-1250	937	
25	Storkerson Bay A-15	X 495	529	561	-	-	No hydrates logged.

\* Converted to m below K.B.

X1 Depth to 0°C isotherm, extrapolated.

E2 Depth to 0°C, isotherm, based on logarithmic return equation.

## SUMMARY OF RESULTS

Well Number	Name	EPB Data		IBPF	Likely Hydrate Occurrence			Comments
		0°C Isotherm (m)*	Base (m)		Trans. (m)	Overall Interval (m)	Thickness (m)	
26	Parker River J-72	-	523	607	1255-1312	57	IBPF "pick" based on CNFD	
27	Uminmak H-07	-	539	640	658-872	214		
28	Castel Bay C-68	-	514	555	299-1687	1388		
29	Bar Harbour E-46	-	283	363	231-363	132		
30	Dundas C-80	E 570	479	543	451-1000	549		
31	Dundas N-82	-	342	420	-	-	No hydrates logged.	
32	Pedder Point D-49	E 338	283	-	211-320	109		
33	Zeus F-11	-	445	524	640-951	311		
34	Eglinton P-24	-	317	415	-	-	No hydrates logged.	
35	Blue Fiord E-46	-	430	527	1121-1381	260		
36	Eids M-66	-	338	393	332-814	482		
37	May Point H-02	-	610	655	594-856	260		
38	Depot Pt L-24	-	372	-	-	-	No hydrates logged.	
39	Fosheim N-27	293+	252	296	311-1836	1525	Scattered hydrates throughout.	
40	Mokka A-02	EX 492	460	503	622-695	73		
41	Taleman J-34	-	716	762	753-930	177		
42	Gemini E-16	E 495	411	539	459-1169	710		
43	Romulus C-42	-	262	407	549-1807	1258		
44	Hotspur J-20	-	530	573	154-622	468		
45	Sophie Point G-19	-	597	674	-	-	No hydrates logged.	
46	Key Point 0-51	-	779	831	1288-1387	99		
47	Sherard 0-54	-	248	349	-	-	No hydrates logged.	
48	Sherard Bay F-14	-	183	259	155-408	253		
49	Hecia J-60	-	750	814	930-960	30		
50	Hecia I-69	E 138	347	381	-	-	No hydrates logged.	

\* Converted to m below K.B.

x1 Depth to 0°C isotherm, extrapolated.

E2 Depth to 0°C, isotherm, based on logarithmic return equation.

TABLE 2 CONTINUED . . .

## SUMMARY OF RESULTS

Number	Well Name	EPB Data		IBPF	Likely Hydrate Occurrence		Comments
		0°C Isotherm (m)*	Base (m)		Trans. (m)	Overall Interval (m)	
51	S.W. Hecla C-58	-	< 623	-	-	-	No hydrates logged; IBPF above log top.
52	Young Inlet D-21	-	399	495	491-1695	1204	
53	Stokes Range J-11	-	521	692	241-250	9	Possible hydrates only.
54	Charles Point G-07	-	457	597	959+	-	Possible hydrates only.
55	Bent Horn A-57	-	539	660	-	-	No hydrates logged.
56	Bent Horn F-72/A	E 653	587	701	530-1338	808	
57	Bent Horn N-72	E 718	629	732	597-640	43	
58	W. Bent Horn I-01/A	-	< 610	-	-	-	No hydrates logged; IBPF above log top.
59	W. Bent Horn A-02	-	224	320	-	-	No hydrates logged.
60	W. Bent Horn M-12	-	695	-	619-1923	1304	
61	Bent Horn E-43	-	262	299	119-1890	1771	
62	Pym Point C-44	-	419	500	-	-	No hydrates logged.
63	N.E. Drake P-40	-	686	759	835-986	151	
64	East Drake I-55	-	< 374	-	-	-	No hydrates logged; IBPF above log top.
65	Drake B-44	E 177	131	224	-	-	No hydrates logged.
66	Drake D-73	E 283	432	-	-	-	No hydrates logged; IBPF above log tops.
67	Drake F-76	-	< 396	469	-	-	No hydrates logged.
68	Drake E-78	E 166	530	552	631-1131	500	
69	Drake F-16	-	411	491	1094-1123	29	
70	Drake Point K-67	-	-	-	-	-	No petrophysical logs run.
71	Drake Point L-67	-	238	277	957-1146	189	
72	Drake Point N-67	-	-	-	-	-	No petrophysical logs run.
73	Drake Point D-68	E 257	< 420	-	506-1417	911	IBPF above log tops.
74	Drake Point K-79	-	174	299	299-390	91	
75	Chads Creek B-64	-	< 421	-	696-707	11	Poss. IBPF 543 m; poss. hydrates only.

\* Converted to m below K.B.

x1 Depth to 0°C isotherm, extrapolated.

E2 Depth to 0°C, isotherm, based on logarithmic return equation.

## SUMMARY OF RESULTS

Number	Well Name	EPB Data		IBPF	Likely Hydrate Occurrence		Comments
		0°C Isotherm (m)*	Base (m)		Trans. (m)	Overall Interval (m)	
101	Wallis K-62	-	393	491	293-1161	868	Apparently abundant hydrates
102	Wilkins E-60	266+	< 366	451	808-878	70	IBPF above DILL log top.
103	Hoodoo A-05	-	< 239	-	239-497	258	IBPF above RES log top.
104	Hoodoo Dome H-37	E 301	192	259	-	-	No hydrates logged.
105	Jackson G-16	-	< 314	-	-	-	IBPF above log tops; no hydrates logged.
106	Elve M-40	-	204	296	104-204	100	
107	Thor H-28	-	213	-	939-1175	236	Hydrate indications higher in well.
108	Thor P-38	E 331	253	344	165-823	658	
109	Sherwood P-37	-	247	299	-	-	Possible hydrates only.
110	Amund Central Dome H-40	-	285	-	245-1597	1352	
111	Hoodoo L-41	-	241	296	177-242	65	
112	Kristoffer Bay G-06	E 440	326	376	< 154-619	465+	
113	E. Amund M-05	-	357	364	439-549	110	Possible hydrates only.
114	West Amund I-44	-	256	320	410-500	90	Possible hydrates only.
115	Dumbbells E-49	-	366	457	312-530	128	Possible hydrates only.
116	Dome Bay P-36	X 655	661	756	212-518	306	
117	Noice D-41	-	320	365	500-517	3	Possible hydrates only.
118	Noice G-44	-	628	768	273-1152	879	Hydrate traces only.
119	Mocklin Point D-23	-	524	605	323-1698	1375	Hydrate traces only.
120	Helicopter J-12	-	436	550	436-1155	719	
121	Louise 0-25	E 251	< 221	271	1103-1106	3	Poss. hydrates only; IBPF above log top.
122	Pollux G-60	-	509	564	< 305-503	198+	
123	W. Pollux E-59	-	361	408	399-680	281	
124	Sirius K-28	-	338	460	399-629	230	
125	Isachsen J-37	-	556	591	469-1207	738	

\* Converted to m below K.B.

x<sup>1</sup> Depth to 0°C isotherm, extrapolated.E<sup>2</sup> Depth to 0°C, isotherm, based on logarithmic return equation.

## SUMMARY OF RESULTS

Well Number	Name	EPB Data			IBPF	Likely Hydrate Occurrence			Comments
		0°C Isotherm (m)*	Base (m)	Trans. (m)		Overall Interval (m)	Thickness (m)		
126	Mid Fiord J-53	-	332	375	-	-	-	No hydrates logged.	
127	Char G-07	-	< 620	-	-	-	-	No hydrates logged. IBPF above log tops.	
128	Balaena D-58	-	< 297	-	-	-	-	No hydrates logged. IBPF above log tops.	
129	Wallis A-73	-	375	440	344-560	216	-	No hydrates or IBPF logged.	
130	Cisco B-66	-	< 1700	-	-	-	-	No hydrates or IBPF logged.	
131	MacLean A-72	-	< 645	-	-	-	-	No hydrates or IBPF logged.	
132	Skate B-80	-	680	777	867-1573	706	-		
133	N. Hoodoo N-52	-	390	450	450-690	240	-		
134	Vesey A-27	-	690	785	375-1470	1095	-		
135	Dyer Bay L-49	-	652	783	448-753	305	-		
136	Kitson R. C-71	-	296	360	625-703	78	-	No hydrates logged.	
137	Grassy I-34	-	512	582	-	-	-	No hydrates logged.	
138	Depot Is. C-44	-	506	613	1292-1605	313	-	No hydrates logged.	
139	Sandy Point L-46	-	491	546	-	-	-	No hydrates logged.	
140	Marie Bay D-06	-	393	-	328-811	483	-	IBPF may be base of transition.	
141	Wilkie Point J-51	-	305	344	311-1868	757	-		
142	Emerald K-33	-	701	802	445-559	104	-		
143	Jameson Bay C-31	E 478	396	466	369-442	73	-	No hydrates logged.	
144	Intrepid Inlet H-49	-	628	692	-	-	-	No hydrates logged. Noisy BHCS.	
145	Satellite F-68	-	210	271	901-1952	1051	-	Possible hydrates only.	
146	Andreasen L-32	-	302	396	1554-1570	16	-		
147	Brock C-50	-	293	-	255-317	62	-	No hydrates logged.	
148	Brock I-20	E 422	460	571	-	-	-	Transition not logged; wet sand zone; no evidence of hydrates.	
149	Crocker I-53	-	494	-	-	-	-	No hydrates logged.	
150	Halycon O-16	-	384	530	-	-	-	No hydrates logged.	
151	Neil O-15	E 543	373	495	1006-1012	6	-	Possible hydrates only.	

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\* Converted to m below K.B.

X1 Depth to 0°C isotherm, extrapolated.

E2 Depth to 0°C, isotherm, based on logarithmic return equation.

conditions are favourable at a given location, hydrate may or may not be present, or extend to the limits of the theoretical hydrate envelope (Figure 2).

With these considerations and the previously-described diagnostic criteria in mind, gas hydrate occurrence was interpreted as follows:

- i) By reference to the methane stability curve and using measured temperature (E.P.B.) data from the closest instrumented well, the likely presence or absence of hydrates (at the well or in the general area) was determined. If the likely presence of hydrates was indicated, the approximate limits of the hydrate-prone zone was also noted. These data were used as a basis only for the interpretation; in practice, logs for all wells were reviewed, whether or not the presence of hydrates was anticipated.
- ii) The occurrence of likely hydrate-bearing intervals (i.e. sands) within the hydrate-prone zone was next determined, based on a review of the gamma ray log. Low GR readings opposite shales, due to grossly washed-out hole, were "screened out" by reference to the caliper log.
- iii) The likely presence of hydrates in the sands was then identified by reference to the other logs, as outlined in Section 2.2. Indications include: non-correspondence between SP and gamma ray, evidence of hole washout on the caliper and density or neutron (the density correction curve was often a good indicator), cycle

skipping on the sonic log, "tracking" of the GR and sonic and "hour-glassing" of the caliper and sonic.

- iv) Finally, the hydrate "picks" were compared with peaks on the mud gas logs, where available.

Results of the hydrate interpretation are shown on the individual analysis detail sheets (Appendix "A") and on the side-by-side presentations (Appendix "C"). In each instance, the estimated reliability of the pick is indicated, ranging from good (1, "hydrate") to fairly good (2, "? hydrate") to relatively poor (3, "possible hydrate"). The results are summarized on Table 2, with respect to limits of the hydrate prone zone and overall thickness.

## 2.6 SUMMARY

The diagnostic criteria developed in the preceding sections may be summarized, in point form, as follows.

### 2.6.1 Indications of the Base of Ice-Bearing Permafrost

In moving uphole, the following may be used in the Arctic Islands, generally in combination, as indicators of the base of IBPF:

- i) a relatively abrupt increase in resistivity
- ii) a negative drift of the S.P. log
- iii) hole washout, shown by the caliper log
- iv) non-correspondence between the S.P. and gamma ray logs
- v) cycle skipping on the sonic log, due to hole washout.



On most wells the presence of a transition zone, of variable thickness, below the IBPF base is also indicated.

#### 2.6.2 Gas Hydrate Indications

When reviewing the petrophysical logs, the following were used to interpret occurrences of natural gas hydrate:

- i) a low gamma ray reading, indicating sand; plus
- ii) cycle skipping on the sonic log
- iii) non-correspondence between the S.P. and gamma ray logs
- iv) some degree of hole washout (on caliper)
- v) location in sand bodies (throughout or at top)
- vi) "tracking" of the GR and sonic logs and tendency for the caliper and sonic to "hour-glass"
- vii) peaks on the mud gas log, if available.

It should be emphasized that, in both permafrost and gas hydrate delineation, all available log (and other) information was reviewed before a preferred "pick" was selected. It may also be noted that the diagnostic criteria used in this study were developed for the Arctic Island wells. While they should be applicable, in theory, to permafrost/gas hydrate delineation in other areas, it has to be recognized that this may not necessarily be the case.

### 3.0 PERMAFROST THICKNESSES, ARCTIC ISLANDS

#### 3.1 EXISTING INFORMATION

The Arctic Islands are entirely situated within the continuous permafrost zone so that frozen ground underlies almost all the land areas and, existing data suggests, many of the channels between islands (Judge 1974). Available site-specific information, on permafrost thickness is limited, however, and generally, from widely distributed sites.

Pre-1970's data have been summarized in a pioneer paper by Brown (1972). He concluded that permafrost might range in thickness from about 300 m in southern Victoria Island to 600 m in northern Ellesmere Island, and be considerably thicker in interior Ellesmere Island.

Since the early 1970's, more information has become available, primarily from abandoned hydrocarbon wells that have been instrumented by the Earth Physics Branch. Data from some 30 wells in the study area are now available (see Table 2). Measured permafrost thicknesses (i.e. depths, below K.B., to the 0°C isotherm) range from 138 m in Hecla I-69 to 718 m in Bent Horn N-72.

A number of permafrost depth estimates have also been published by industry, based on the application of petrophysical and geophysical techniques. Results of these studies (notably by Pollard and Nash (1971), Merritt (1979) and Acheson (1979)) are summarized, and compared with the findings of this investigation, in Section 3.3.

### 3.2 RESULTS OF THIS STUDY

Interpreted depths to the base of IBPF in the study area are shown on Figure 3 and, in detail, on Maps 1 to 7 (Appendix "B", Volume 2). It should be noted that Figure 3 provides a generalized approximation only of IBPF depths and distribution, intended to provide an overall illustration of trends in the results of the study. The data, also presented with the related transition base depths on Table 2, are briefly discussed below.

#### 3.2.1 Lancaster Sound (Map 1)

Interpreted IBPF depths range from 274 m on Somerset Island (Garnier) to 860 m in central Cornwallis Island (Table 2). The thickest permafrost interpreted during the study occurs at the latter site (Cornwallis Central Dome); deep permafrost also exists on Devon Island (Figure 3). Depths to the transition base at these sites vary from 311 m to 1021 m. A total of four wells are located within the Lancaster Sound map sheet; in each instance the reliability rating, assigned to the IBPF and transition base picks, was "relatively poor".

#### 3.2.2 Viscount Melville Sound (Map 2)

Excepting sections of Melville and Bathurst Islands (where interpreted IBPF thicknesses exceed 600 m, ranging up to as much as 808 m), IBPF thicknesses are relatively consistent, in the 300 m to 500 m range (Figure 3). Less than 300 m of IBPF is interpreted in central Melville Island (Figure 3). Depths to the base of transition, at the 14 wells located in this map area, exhibit a similar trend: a minimum of 235 m in central



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FIGURE 3

Melville Island and maximum of 846 m (Bathurst Caledonian R.) in central Bathurst Island (Table 2).

3.2.3 Thomsen River (Map 3)

Interpreted IBPF thicknesses exhibit considerable variation over relatively short distances, ranging from 764 m in eastern Banks Island (Tiritchik) to 235 m in northwestern Victoria Island (Map 3). Transition base depths range from 290 m to 829 m (Table 2). In all, 16 wells are located within the Thomsen River map area, primarily on Banks Island. The results suggest that thick IBPF (>600 m) is relatively widespread in central Banks Island (Figure 3).

3.2.4 Jones Sound (Map 4)

This map includes some nine relatively widely distributed wells, located on the Bjerne and Fosheim Peninsulas of Ellesmere Island and on Axel Heiberg Island. Interpreted IBPF thicknesses range from 252 m (Fosheim) to 716 m (Taleman), with corresponding transition base depths of 296 m to 762 m (Table 2).

3.2.5 Belcher Channel (Map 5)

A total of 91 wells are located within this map area. As in other sections of the study area, interpreted IBPF depths vary considerably, even over relatively short distances: from 131 m (Drake B-44, Linckens Island) to 779 m (Key Point West, on Vanier Island). A number of wells have also been drilled offshore. Interpreted IBPF base depths range up to 680 m (Skate) and 780 m (Roche Pt), however in most instances, the

IBPF base (if present) could not be picked (Table 2). Depths to the transition base in the Belcher Channel map area range from 224 m to 831 m.

As shown on Figure 3, thick permafrost (>600 m) is interpreted on Ellef Rignes, King Christian, and Cameron Islands, and in the northwestern Sabine Peninsula (including the offshore).

### 3.2.6 Ballantyne Strait (Map 6)

Permafrost (IBPF) thicknesses in the 14 wells in this map area are interpreted to range from 210 m (Satellite, in western Prince Patrick Island) to 701 m (on Emerald Island). Corresponding depths to the transition base are 271 m and 802 m, respectively. As shown on Figure 3, the study results suggest that thick permafrost is relatively extensive on Prince Patrick Island.

### 3.2.7 Robeson Channel (Map 7)

Only three, widely distributed, wells are located within this map sheet. Interpreted permafrost (IBPF) thicknesses range from 373 m to 494 m (Map 7), depths of the transition base from 495 m to 530 m (Table 2).

## 3.3 COMPARISON WITH PREVIOUS INTERPRETATIONS

In addition to the results of precise E.P.B. ground temperature surveys, a number of interpretations of permafrost thickness in Arctic Island wells have been published. Objectives in this section are to compare pertinent results of the present study with the previous interpretations.

3.3.1. Earth Physics Branch

Estimates of permafrost thickness, based on precise ground temperature surveys, have been published for a total of 30 Arctic Island wells. These results are contained in a series of publications concerning the Canadian Geothermal Data Collection - Northern Wells (Taylor and Judge, 1971, 1974, 1975, 1976; Judge et al, 1979, 1981; Taylor et al, 1982).

For comparison purposes, the E.P.B. permafrost depth estimates are presented with the corresponding interpreted IBPF and transition base depths on Table 2. A review of these data sets suggests the following:

- i) In most instances (24 wells out of 30), the correspondence between measured and interpreted results is good. Measured (0°C isotherm) permafrost depths at these sites are in excess of the IBPF and, often, transition base depths (the latter reflect the occurrence of ice bonding, rather than sub-zero temperatures per se). Depth differences range from 5 m or less, in the Jameson Bay C-31 and Dome Bay P-36 wells, to 170 m, at Neil 0-15 (Table 2). Such differences are apparently a reflection of freezing point depression effects, as described in Section 2.1.1.
- ii) At two sites (Hecla I-69 and Drake E-78), measured permafrost depths are considerably less than those interpreted.



iii) Available data for the Drake D-73, Drake Pt D-68, Wilkins E-60 and Louise Bay 0-25 wells are not adequate to provide a valid comparison (generally because an interpreted IBPF base depth is not available). The remaining results usually suggest a reasonable correspondence.

Based on the above, the comparison between E.P.B. measured permafrost thicknesses and those reported here is considered to be good.

### 3.3.2 Pollard and Nash (1971)

In this pioneer petrophysical study of permafrost conditions, Pollard and Nash make reference to ten Arctic Island wells. Table 3 provides a comparison with the results of this study.

Comparison is difficult in four instances since Pollard and Nash were unable to provide an interpretation of permafrost conditions. Of the six wells for which a direct comparison is possible, however, there is a reasonable to excellent correlation in four cases (Kitson R., Russell, Allison R. and Resolute Bay). In the Sandy Pt and Skybattle Bay wells, the correlation is relatively poor (Table 3).

### 3.3.3 Merritt (1979)

Based on seismic reflection data, Merritt interprets a distinct velocity break, at a depth of 610 m, as the base of ice bonded permafrost in the Robert Harbour K-07 well. Analysis of petrophysical logs as part of this study "picked"



TABLE 3

COMPARISON WITH POLLARD AND NASH (1971)

Well	Pollard and Nash		This Study		Comment
	Figure	Permafrost (m)	IBPF (m)	Base Trans. (m)	
Sandy Pt L-46	6	421 - 451	491	546	
Kitson R. C-71	7	335 - 357	296	360	Fair agreement
Russell E-82	8	297 - 335	305	344	Good agreement
Allison R. N-12	9	396	396	454	Excellent agreement
Drake Pt. L-67	18	-	238	277	Pollard and Nash unable to interpret
Fosheim N-27	19	-	252	296	"
Towson Pt. F-63	20	-	646	-	"
Winter Harbour	-	-	384	-	"
Resolute L-41	21	488	518	-	
Skybattle Bay C-15	22	381	244	335	

TABLE 4

COMPARISON WITH ACHESON (1979)

Well No.	Name	Acheson*	Acheson**	This Study	
		(Figure 8) (m)	(Figure 20) (m)	IBPF (m)	Base Trans. (m)
47	Sherard O-54	186	120	248	349
48	Sherard Bay F-14	183	171	183	259
64	E Drake I-55	-	< 30	< 374	-
65	Drake B-44	174	152	131	224
66	Drake D-73	192	190	< 432	-
68	Drake E-78	160	-	530	552
69	Drake F-16	-	143	411	491
71	Drake Pt L-67	135 (est)	160 (est)	238	277
73	Drake Pt D-68	152 (est)	168	< 420	-
84	Collingwood K-33	-	265	< 610	-

\* Based on electric logs and temperature data.

\*\* Based on near-surface seismic velocity data.

Analysis of petrophysical logs as part of this study "picked" the IBPF base at a depth of 622 m (Table 2). Agreement is, thus, very good.

#### 3.3.4 Acheson (1979)

For ten wells in the Drake Point area, Acheson compares early estimates of permafrost thickness based on electric logs and temperature data, with more recent interpretations based on near surface seismic velocity data. The results are presented, together with pertinent data from this study, on Table 4.

Comparison with the Acheson results is not altogether favourable, since:

- i) in four wells (I-55, D-68, D-73 and K-33), the data are such that a comparison is not possible,
- ii) for the B-44 and F-14 wells, there is reasonable agreement,
- iii) interpreted permafrost thicknesses at the other sites are considerably greater than those published by Acheson.

#### 3.3.5 Taylor and Judge (1981)

Taylor and Judge compare E.P.B. measured and predicted permafrost thicknesses for two closely spaced wells on Cameron Island: Bent Horn F-72A and Bent Horn N-72. Measured and predicted values (converted to metres below K.B.) were 653 m and 683 m, and 718 m and 738 m respectively (Taylor and Judge, 1981; Figure 4a).



**INTERPRETED GAS HYDRATE OCCURENCE  
ARCTIC ISLANDS**

**FIGURE 4**



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Interpreted IBPF base depths of 587 m and 629 m for the F-72A and N-72 wells, and depths to the transition base of 701 m and 732 m, respectively, were obtained in this study (Table 2). These results suggest the closest comparison is between the E.P.B. predicted depths and the interpreted transition base (rather than IBPF) depths as would be expected.

#### 3.4 SUMMARY

Depths to the IBPF base have been interpreted for 128 of the 151 Arctic Island wells considered. In three instances, the logs were run; in the others, the data do not permit a pick to be made.

The results of the study, shown in a generalized fashion on Figure 3, suggest that ice-bearing permafrost in excess of 600 m thick occurs on and generally in the interior of Banks, Devon, Cornwallis, Melville, Prince Patrick and King Christian Islands. Isolated occurrences of thick permafrost also apparently exist offshore. The shallowest interpreted IBPF depths are in the Sabine Peninsula and southern sections of the study area. In most other areas, interpreted IBPF thicknesses are in the 300 to 600 m range.

Comparisons with previous interpretations are variable. Agreement with temperature-based and petrophysical interpretations is generally fairly good. However, geophysical interpretations do not usually match very accurately.

#### 4.0 GAS HYDRATE OCCURENCE, ARCTIC ISLANDS

##### 4.1 EXISTING INFORMATION

Although Pollard and Nash suggested the likely presence of gas hydrates in the Arctic Islands in 1971, the first documented occurrences were reported from the Mackenzie Delta by Bily and Dick (1974). Subsequently, Hitchon (1974) and Hood (1980) recorded possible occurrences from the Arctic Islands (see Section 4.3).

Available information has recently been reviewed by Judge (1982). Based on comparison of observed temperatures and gradients relative to the methane stability curve, he proposed depths of occurrence and likely hydrate thickness ranging from 960 m and 820 m, respectively, in the eastern Arctic Islands. These increased to 1400 m and 1260 m, respectively, on the Arctic Platform (Judge, 1982: Table 1).

##### 4.2 RESULTS OF THIS STUDY

Objectives in the sections that follow are to describe the interpreted distribution of natural gas hydrates. Maximum encountered depths and thicknesses within each of the previously-described map areas are summarized below. The basic data are presented on Table 2 and plotted on Maps 1 to 7. Figure 4 illustrates the overall distribution of interpreted hydrate occurrences and non-occurrences.

4.2.1 Lancaster Sound (Map 1)

Maximum interpreted depth of hydrate occurrence is 1600 m (in the Cornwallis Central Dome well), with an inferred hydrate interval thickness of 1442 m (Table 2). Hydrates are interpreted to be present in three of the four wells (Map 1).

4.2.2 Viscount Melville Sound (Map 2)

Ten of the fourteen wells in the Viscount Melville Sound map area are interpreted to have intersected hydrates. Maximum depths of occurrence range from 204 m to 1862 m (Winter Harbour No. 1); the theoretical hydrate-bearing zone at Winter Harbour may be in excess of 1400 m thick (Table 2).

4.2.3 Thomsen River (Map 3)

Natural gas hydrates are interpreted in nine of the sixteen wells. Hydrate zones ranging from 109 m to 1388 m in overall thickness are inferred. The maximum interpreted depth of occurrence of 1687 m in the Castel Bay well, in north-central Banks Island.

4.2.4 Jones Sound (Map 4)

Hydrate occurrence is apparently relatively widespread, with hydrates interpreted at 8 out of 9 sites. Maximum inferred depth of occurrence is 1836 m (Fosheim) and the thickest interpreted hydrate-bearing zone has a thickness of 1525 m (Table 2).

4.2.5 Belcher Channel (Map 5)

The relative complex distribution of hydrates in this map area is shown on Map 5. In general, hydrate occurrence is considerably less frequent than in other sections of the study area: in only 50 of 91 wells. With some exceptions (for example, in Bryam Martin Channel), hydrates are rarely interpreted in the offshore. On land, they are inferred infrequently in the Sabine Peninsula area.

Where present, hydrates are interpreted to occur to depths of as great as 1890 m (Bent Horn E-43). The thickness of the hydrate-bearing zone varies from 30 m to 1771 m (Table 2).

4.2.6 Ballantyne Strait (Map 6)

Nine of the fourteen wells located within this map area are interpreted to have intersected hydrates. As shown on Table 2, the maximum inferred depth of occurrence is 1952 m (Satellite), while the thickness of the hydrate-bearing zone ranges from 62 m to 1051 m.

4.2.7 Robeson Channel (Map 7)

Hydrates are apparently absent in the three wells located in this map area.

4.3 COMPARISON WITH PREVIOUS INTERPRETATIONS

Published reports of natural gas hydrate occurrence in the Canadian Arctic Islands are limited. The following sections

briefly describe the previous reports and interpretations and provide a comparison with the results of this study.

4.3.1 Hitchon (1974)

Reference is made by Hitchon (quoting A. Bryant, of Dome Petroleum) to a reported small gas flow, from the interval 319 m to 727 m, in the Winter Harbour No. 1 Well. As shown on the side-by-side log presentation for this well, the presence of gas hydrates is interpreted in three separate zones within the overall interval considered (453-538 m, 573-617 m, and 722-935 m). The reliability of the hydrate interpretation is rated fair to good.

4.3.2 Hood (1980)

In reporting the results of an oil industry survey, relative to experience with gas hydrates, Hood makes reference to one Arctic Islands well: Jackson G-16/G-16A. At this location, gas kicks and mud gas were encountered in the interval 522.9 to 600.3 m. Available information suggested a high pressure, low volume, free gas rather than hydrate source. The results of the present study are in agreement, since the occurrence of gas hydrates was not interpreted (see side-by-side log presentation in Appendix "C").

4.3.3 Judge (1982)

Judge presents predictions of possible gas hydrate occurrence for four Arctic Island wells, based on superimposing measured temperature profiles on the hydrate stability curve: Louise



0-25, Kristoffer Bay G-06, Bent Horn N-72, and ? Drake Pt B-44  
(Judge, 1982; Figure 2).

According to Judge:

"Two of the superimposed temperature curves lie outside the methane-hydrate zone because, although mean surface temperatures are very low ..., geothermal gradients are high ... At these sites (Drake Point ... and Louise Bay ...), only free gas would be encountered within and below the permafrost. By contrast, the low geothermal gradients coupled with low subsurface temperatures at Kristoffer Bay ... and at Bent Horn ... indicate zones of possible gas-hydrate presence."

Results of the present study are in good agreement (Table 2). Thus, no hydrates were logged in the Louise and Drake Point wells (hydrates were, however, interpreted in other wells at Drake Point). Further, gas hydrates were logged in the intervals 154-619 m and 597-640 m, respectively, in the Kristoffer Bay and Bent Horn wells (Table 2).

#### 4.4 SUMMARY

The overall distribution of areas of interpreted hydrate occurrence and non-occurrence is shown on Figure 4.

Hydrates are apparently widespread in the Arctic Islands, with thick hydrate-bearing zones extending to considerable depth. In general, hydrates are interpreted to be least abundant, and most sporadically distributed, in the Sverdrup Basin (e.g. Bent Horn and Drake Point areas). With some exceptions, hydrates are not widely interpreted in the offshore.

Comparison with previous interpretations is generally good.

5.0 DISCUSSION

This report presents the results of a study of permafrost conditions and gas hydrate occurrence in 151 Arctic Islands wells. Ice-bearing permafrost is interpreted to exist on land to depths ranging from 131 m (Linckens Island) to 860 m (Cornwallis Central Dome). It also occurs in the offshore; however, available data are inadequate to map its occurrence with any accuracy in the latter areas. Natural gas hydrates are interpreted in about 90 of the 151 wells, extending to depths ranging from 27 m to 1923 m.

A number of areas for potential future work have been identified, arising out of the this study; most of these relate to additional petrophysical studies:

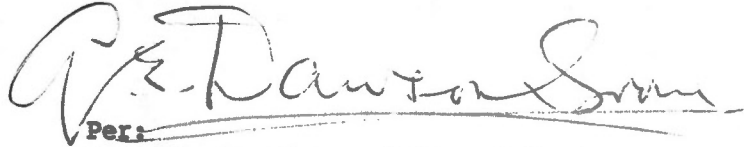
- i) Estimation of ice contents in IBPF, based primarily on analysis of resistivity and sonic logs,
- ii) Determination of hydrocarbon saturation in hydrates, based on petrophysical analysis,
- iii) Detailed analysis of mud gas logs, relative to various sources of gas, such as hydrates, dissolved gas in water sands, dry gas accumulations, gas associated with oil accumulations.



- iv) More detailed assessment of offshore permafrost occurrence in the Arctic Islands.

Respectfully submitted,

PETROPHYSICAL CONSULTANTS INTERNATIONAL LTD.



Per:

G.E. Dawson-Grove, P.Eng. P.Geol.

HARDY ASSOCIATES (1978) LTD.

Per:

I. Jones, M.Sc., P.Geol.

Reviewed by:

J.F. (Derick) Nixon, Ph.D., P.Eng.

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**APPENDIX "A"**  
**Analysis Details**





ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 1  
 D.A. NO.: 525  
 E.P.B. NO.: 92

NAME: Garnier G-21

K.B.: 371.2 m

G.L.: 368.5 m

T.D.: 1985.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	506	6498	900	1020	3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	506	6500						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	F DEN	506	6500						
Neutron	-								
Temperature	-								
E.P.B. Temp.	X			1630					
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.  
 Evidence of fractures on BHCS below 3100.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 2  
 D.A. No.: 119  
 E.P.B. No.: 55

NAME: Cornwallis Resolute Bay L-41

K.B.: - m

G.L.: 60.1 m (estimated)

T.D.: 1475.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	IES	702	4837	1700	-	3			
Long-spaced Res.	-								
Sonic (Acoustic)	-								
Long-spaced Sonic	X								
S.P.									
Gamma Ray	GR	250	4836						
Caliper	X								
Density	-								
Neutron	N	250	4836						
Temperature	X								
E.P.B. Temp.	X				1968+				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

Non match of SP and GR and high RES suggests hydrates throughout.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 3  
 D.A. No.: 562  
 E.P.B. No.: 99

NAME: Devon E-45

K.B.: 247.5 m

G.L.: 243.8 m

T.D.: 1837.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	1996	6021	2560	2870	3		
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	0	6022				3090	4090
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1994	6020					
Neutron	SNP	1996	6020					
Temperature	-							
E.P.B. Temp.	X							1949+
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3090 - 3320	3
3360 - 4090	3 (Traces)

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 4  
 D.A. No.: 530  
 E.P.B. No.: -

NAME: Cornwallis Central Dome K-40

K.B.: 192.9 m

G.L.: 187.5 m

T.D.: 3063.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	518	6600	2820	3350	3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic S.P.	BHCS	518	6600				520	5250	3
Gamma Ray	X								
Caliper	X								
Density	FDEN	518	6600						
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
520	3	3600	3 (scattered)	5230	3
1500	3	4120	3	5250	
3475	3	5020	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 5  
 D.A. NO.: 814  
 E.P.B. NO.: -

NAME: Young Bay P-62

K.B.: 25.9 m

G.L.: 21.3 m

T.D.: 1628.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (ft)	Bottom (ft)	Rase (ft)	Trans. (ft)	From (ft)	To (ft)
						Reliability	Reliability
Resistivity	DILL	711	5337	830	910	3	
Long-spaced Res. Sonic (Acoustic)	-						
Long-spaced Sonic S.P.	BHCS	711	5294				
Gamma Ray	X						
Caliper	X						
Density	FD	50	5343				
Neutron	CN	50	5343				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.  
 DILL saturated: carbonates?

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 6  
 D.A. NO.: 533  
 E.P.B. NO.: -

NAME: Russell E-82

K.B.: 120.4 m

G.L.: 114.0 m

T.D.: 1834.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability	Reliability
Resistivity	DILL	519	6014	1000	1145			1-3	
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	519	6019			520	1270	1-3	1-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1800	6020						
Neutron	SNP	1800	6020						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
520 (csg)	1
790	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 7  
 D.A. No.: 104  
 E.P.B. No.: 73

NAME: Winter Harbour No. 1 A-09

K.B.: 27.4 m

G.L.: 22.9 m

T.D.: 3823.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	IES/LL	1047	6600	1260		3			
Long-spaced Res.	-								
Sonic (Acoustic)	S	1047	6600				1390	6110	2-3
Long-spaced Sonic	-								
S.P.									
Gamma Ray	GR	1047	6600						
Caliper	C	1047	6600						
Density	-								
Neutron	-								
Temperature	X								
E.P.B. Temp.	X					1739			
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1390 1765	2	2370 3070	3
1880 2025	3	4900 6100	3 (scattered)

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 8  
 D.A. No.: 916  
 E.P.B. No.: -

NAME: Herne F-85

K.B.: 85.8 m

G.L.: 81.2 m

T.D.: 1676.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		Reliability
		Top (m)	Bottom (m)			From (m)	To (m)	
Resistivity	DILL-MSFL	153	1673	310	340			2
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	153	1660			154	1510	1-3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	46	1549					
Neutron	CN	46	1549					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability	Interval (m)	Reliability	Interval (m)	Reliability
154	1	585	3	1027	3
186	1	590	3	1045	3
250	1	600+, 631+	3	1050	3
330	1	1000, 1010	3	1490	2
343	1			1510	2

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 9  
 D.A. NO.: 894  
 E.P.B. No.: -

NAME: Beverley Inlet G-13

K.B.: 179.8 m

G.L.: 172.2 m

T.D.: 4060.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DLL/DILL	110	6600	1010	1170			3
Long-spaced Res. Sonic (Acoustic)	BHCS	1497	6600					-
Long-spaced Sonic S.P.	X							-
Gamma Ray	X							
Caliper	X							
Density	FD	1497	6600					
Neutron	CN	1497	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 10  
 D.A. No.: 449  
 E.P.B. No.: -

NAME: Allison R. N-12

K.B.: 229.2 m

G.L.: 223.1 m

T.D.: 3584.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	469	6600	1300	1469	5850	5930	2
Long-spaced Res. Sonic (Acoustic)	BHCS	1796	6600			3180	5930	2-3
Long-spaced Sonic S.P.	X					5850	5930	2
Gamma Ray	X							
Caliper	X							
Density	FDEN	499	6600					
Neutron	SNP	499	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3180 - 5500	3
5850 - 5930	2

**D. COMMENTS**

Hydrate traces only from 3180-5500  
 Indications on SP, RES and C for lower hydrate zone.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 11  
 D.A. NO.: 11  
 E.P.B. No.: 808

NAME: Sabine Bay A-07

K.B.: 147.5 m

G.L.: 140.5 m

T.D.: 5192.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1201	6600	> 1201	-	-	1201	5625	1-2
Long-spaced Res. Sonic (Acoustic)	BHCS	1201	6600						
Long-spaced Sonic S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	1201	6600						
Neutron	CN	1201	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	X			804		3			
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1201	2	2710	1
2000	1	4350	2
2360	2	5625	

**D. COMMENTS**

No permafrost within petrophysically logged interval.  
 IBPF base at 804 feet, based on crystal cable.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 12  
 D.A. No.: 121  
 E.P.B. No.: -

NAME: Bathurst Caledonian R. J-34

K.B.: 144.8 m

G.L.: 140.2 m

T.D.: 3048.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	LL	1014	6600	2650	2775	1			
Long-spaced Res.	-								
Sonic (Acoustic)	S	1014	6600				1420	3375	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	GR	1014	6600						
Caliper	X								
Density	-								
Neutron	N	130	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1420	2	2650	2
2170	2	2790	3
2250	2	2790	3
		3375	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 13  
 D.A. No.: 811  
 E.P.B. No.: -

NAME: King Point West B-53

K.B.: 236.8 m

G.L.: 228.9 m

T.D.: 3126.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	EL/DILL	78	6600	970	1100			1	
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	78	6600						
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	820	6600						
Neutron	CN	820	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 14  
 D.A. No.: 698  
 E.P.B. No.: -

NAME: Apollo C-73

K.B.: 268.5 m

G.L.: 261.2 m

T.D.: 3665.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	48	6600	1801	2201			2
Long-spaced Res. Sonic (Acoustic)	-	30	660			110	670	2-3
Long-spaced Sonic S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	48	6600					
Neutron	SNP	48	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	X			2100				3
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
110 - 155	2
155 - 670	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 15  
 D.A. NO.: 896  
 E.P.B. NO.: -

NAME: Richardson Point G-12

K.B.: 148.4 m

G.L.: 138.7 m

T.D.: 3355.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DLL	100	6600	2450	2520	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1200	6600						
Long-spaced Sonic	LSS	100	2600				90	2465	2-3
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
90 (csg)	2	1710	3
370	3	1950	2
		1775	
		2465	

**D. COMMENTS**

Hydrates logged on LSS.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 16  
 D.A. No.: 733  
 E.P.B. No.: -

NAME: Weatherall G-10

K.B.: 157.9 m

G.L.: 153.0 m

T.D.: 2286.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	49	6600	770	1150			2
Long-spaced Res. Sonic (Acoustic)	EL (Long) BHCS	84	2493	770	1150			2
Long-spaced Sonic	-	49	6000			3700	3775	2
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	701	3994					
Neutron	CN, SNP	701	2493					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3700 - 3775	2

**D. COMMENTS**

Ice indications on BHCS: 770-1150.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 17  
 D.A. NO.: 397  
 E.P.B. No.: -

NAME: Towson Point F-63

K.B.: 279.8 m

G.L.: 276.1 m

T.D.: 1561.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	IGR/DILL	71	5116	2120	-	-	3		
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	1215	5116						
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	X								
Neutron	FDEN	71	4903						
Temperature	SNP	71	4903						
E.P.B. Temp.									
Velocity									
Crystal Cable									
Mud Gas									

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 18  
 D.A. No.: 656  
 E.P.B. No.: -

NAME: Eldridge Bay E-79

K.B.: 29.3 m

G.L.: 21.6 m

T.D.: 3048.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)
Resistivity	DILL	984	6600	1670	2070		
Long-spaced Res.	-						
Sonic (Acoustic)	BHCS	984	6600			984	2520
Long-spaced Sonic	-						
S.P.	X						
Gamma Ray	X						
Caliper	X						
Density	FDEN	4016	6600				
Neutron	SNP	3800	6600				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	-						
							2
							2-3

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	
	Interval (ft)	Reliability
984 1300	2070 2340	3
1390 1670	2440 2520	3
1750 1950		3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 19  
 D.A. No.: 742  
 E.P.B. No.: -

NAME: Ikkariktok M-64

K.B.: 127.7 m

G.L.: 121.0 m

T.D.: 1288.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL/DL	517	4113	1000	1180	1-2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	517	4118				930	2940	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	517	4118						
Neutron	CN	517	4118						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
930	3	1870	3
980	3	2536	3
1120	3	2915	3
1185	3	2940	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 20  
 D.A. NO.: 602  
 E.P.B. No.: -

NAME: Orksut I-44

K.B.: 136.6 m

G.L.: 129.5 m

T.D.: 3060.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	526	6600	2020	2230	2-3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	526	6600				1160	3500	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	X								
Neutron	FDEN	526	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
1160+	3	1400+, 1495+	3	1810	3
1275	3	1505, 1535	3	3005	3
1325+	3	1570+	3	3200	3

**D. COMMENTS**

Scattered hydrates.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 21  
 D.A. NO.: 566  
 E.P.B. NO.: -

NAME: Nanuk D-76

K.B.: 99.7 m

G.L.: 94.5 m

T.D.: 1377.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avall./Type	Logged Interval		Permafrost Base (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1978	4509	1978	-			
Long-spaced Res. Sonic (Acoustic)	BHCS	50	4515			2215	4080	2-3
Long-spaced Sonic S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1980	4515					
Neutron	SNP	1980	4515					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
2215 2225	2	3230 3240	3
2445 2455	2	3880 3890	3
2506 2750	3 (scattered)	3890 4080	2

**D. COMMENTS**

IBPF above DILL log top (1978); no indication on GR.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 22  
 D.A. No.: 777  
 E.P.B. No.: -

NAME: Kusraak D-16

K.B.: 138.7 m

G.L.: 132.3 m

T.D.: 3810.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	501	6600	1425	1650	3	-	-	-
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	501	6600						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 23  
 D.A. No.: 763  
 E.P.B. No.: -

NAME: Victoria Island P-36

K.B.: 155.8 m

G.L.: 147.5 m

T.D.: 2457.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	417	6600	770	950			3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	417	6600					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	417	6600					
Neutron	CN	417	660					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF from SP and BHCS; DILL "saturated" (probably due to "tight" carbonates).  
 No hydrates logged on BHCS.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 24  
 D.A. No.: 731  
 E.P.B. No.: -

NAME: Tiritchik M-48

K.B.: 111.3 m

G.L.: 106.7 m

T.D.: 2215.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL/DL	2020	4508	2505	2720			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS	160	5695			2800	4100	3
Gamma Ray	X							
Caliper	X							
Density	FD	4630	5704					
Neutron	CN	4630	5704					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
2800 - 2815	3	3890 - 4060	3
3140 - 3290	3	4080 - 4100	3
3350 - 3450	3		

**D. COMMENTS**

Washed out hole above 2505.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 25  
 D.A. NO.: 532  
 E.P.B. No.: 98

NAME: Storkerson Bay A-15

K.B.: 19.5 m

G.L.: 14.3 m

T.D.: 2048.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	512	5911	1735	1840			1
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	3810	5916					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	-							
Neutron	-							
Temperature	-							
E.P.B. Temp.	X			1624				
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 26  
 D.A. NO.: 925  
 E.P.B. NO.: -

NAME: Parker River J-52

K.B.: 191.6 m

G.L.: 184.0 m

T.D.: 3010.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		Reliability
		Top (m)	Bottom (m)			From (m)	To (m)	
Resistivity	DISFL	315	2000					
Long-spaced Res. Sonic (Acoustic)	BHCS	1208	2000			1266	1312	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	315	2000	523	607			3
Neutron	CN	315	2000					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
1255 - 1312	3

**D. COMMENTS**

Low quality IBPF pick, from CN-FD.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 27  
 D.A. NO.: 592  
 E.P.B. No.: -

NAME: Uminmak H-07

K.B.: 112.2 m

G.L.: 107.0 m

T.D.: 1698.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1462	5558	1770	2100	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1462	5563				2160	2860	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1462	5563						
Neutron	SNP	1462	5563						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2160 - 2860	3

**D. COMMENTS**

Hydrate zone interpreted on all logs.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 28  
 D.A. NO.: 795  
 E.F.B. No.: -

NAME: Castel Bay C-68

K.B.: 155.1 m

G.L.: 150.6 m

T.D.: 2904.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	982	6600	1685	1820	2-3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	982	6600				982	5535	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	50	6600						
Neutron	CN	50	6600						
Temperature	-								
E.F.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

	Interval (ft)	Reliability	Interval (ft)	Reliability
982 (csg)	2020	3	4970	3
2910	3080	3	5110	3
4000	4500	3	5535	

**D. COMMENTS**

Hydrate picked on both BHCS and CNFD.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 29  
 D.A. NO.: 826  
 E.P.B. NO.: -

NAME: Bar Harbour E-46

K.B.: 52.7 m

G.L.: 48.5 m

T.D.: 1835.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trana. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	812	6014	930	1190			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS - X X	812	5987			760	1190	3
Gamma Ray Caliper	X X							
Density	FD	150	6019					
Neutron	CN	150	6019					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
760 - 1190	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 30  
 D.A. No.: 613  
 E.P.B. No.: 168

NAME: Dundas C-80

K.B.: 247.2 m

G.L.: 240.2 m

T.D.: 3999.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1012	6600	1570	1780	1-2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1012	6600				1480	3280	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1012	6600						
Neutron	SNP	4446	6600						
Temperature	-								
E.P.B. Temp.	X			1870	-				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1480 - 1580	3	2880 - 2895	3
2660 - 2690	2	3265 - 3280	3
2720 - 2760	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 31  
 D.A. NO.: 933  
 E.P.B. No.: -

NAME: N. Dundas N-82

K.B.: 2280 m

G.L.: 221.0 m

T.D.: 4100.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		Reliability
		Top (m)	Bottom (m)			From m)	To m)	
Resistivity	DISFL	36	1183	342	420			2-3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	1171	2000					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	36	2000					
Neutron	CN	36	2000					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged, below 1180 m.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 32  
 D.A. NO.: 774  
 E.P.B. NO.: 257

NAME: Pedder Point D-49

K.B.: 105.8 m

G.L.: 101.2 m

T.D.: 1875.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DILL	693	6136	930	-	1			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS						693	1050	2
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	2094	6140						
Neutron	CN	2094	6140						
Temperature	-								
E.P.B. Temp.	X			1109	-				
Velocity	-								
Crystal Cable	X								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
693 - 1050	2

**D. COMMENTS**

No high velocity layers noted on crystal cable.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 33  
 D.A. NO.: 699  
 E.P.B. No.: -

NAME: Zeus F-11

K.B.: 200.6 m

G.L.: 196.0 m

T.D.: 3114.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	EL/DILL	508	3114	1460	1720	2-3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	508	3122				2100	3120	1-3
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	2002	3118						
Neutron	SNP	2002	3118						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
2100 - 2470	2	2670 - 2680	3	3020 - 3120+	1
2520 - 2565	3	2775 - 3000	3 (Scattered)		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 34  
 D.A. No.: 766  
 E.P.B. No.: -

NAME: Eglington P-24

K.B.: 75.6 m

G.L.: 71.0 m

T.D.: 1837.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Bottom (ft)	Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates From (ft)	To (ft)	Reliability
Resistivity	DILL	701	6018	1040	1360	1			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	700	6024						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	2412	6024						
Neutron	CN	2412	6024						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 35  
 D.A. NO.: 772  
 E.P.B. No.: -

NAME: Blue Fiord E-46

K.B.: 285.6 m

G.L.: 279.9 m

T.D.: 2744.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	EL/DILL	847	6600	1410	1730	3			
Long-spaced Res. Sonic (Acoustic)	-	848	6600				3680	4530	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	848	6600						
Neutron	CN	848	6600				4100	4390	3
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
3680 - 3705	3	4000 - 4015	3	4500 - 4530	3
3800 - 3810	3	4095 - 4110	3		
3900+	3	4380 - 4390	3		

**D. COMMENTS**

Hydrate logged on both BHCS and CNFD.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 36  
 D.A. No.: 736  
 E.P.B. No.: -

NAME: Eids M-66

K.B.: 234.1 m

G.L.: 227.7 m

T.D.: 3352.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1035	6600	1110	1290	3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1035	6600				1090	2670	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	1035	6600						
Neutron	CN	1035	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1090 - 1175	3
1875 - 1985	3
2640 - 2670	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 37  
 D.A. No.: 705  
 E.P.B. No.: -

NAME: May Point H-02

K.B.: 14.3 m

G.L.: 7.6 m

T.D.: 2991.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	DILL	998	6600	2000	2150			1	
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	998	6600			1950	2810		3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	998	6600						
Neutron	SNP	998	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	X								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1950 - 2250	3
2500 - 2810	3

**D. COMMENTS**

No high velocity layers noted on crystal cable.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 38  
 D.A. No.: 609  
 E.P.B. No.: -

NAME: Depot Pt. L-24

K.B.: 609.6 m

G.L.: 602.0 m

T.D.: 4115.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	403	6600	1220	-	-	-	2
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	403	6600					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	-							
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No evidence of hydrates.  
 SP suggests ice from 2000-2950; relict permafrost?

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 39  
 D.A. NO.: 517  
 E.P.B. NO.: 97

NAME: Fosheim N-27

K.B.: 568.5 m

G.L.: 561.7 m

T.D.: 4273.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval Top (ft)	Bottom (ft)	Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates From (ft)	To (ft)	Reliability
Resistivity	IES/DILL	508	6600	827	971	3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	508	6600				1020	6025	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	508	6600						
Neutron	SNP	508	6600						
Temperature	-								
E.P.B. Temp.	X			961	-				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
1020	3	3260	2	4085	3
3125	3	3280	3	4720	3
3175	3	3520	3	5385	3
		3535		5750	3
				6025	

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 40  
 D.A. NO.: 615  
 E.P.B. NO.: 166  
 NAME: Mokka A-02  
 K.B.: 261.5 m  
 G.L.: 253.3 m  
 T.D.: 3300.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	534	6600	1510	1650			2
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	534	6600			2040	2280	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	534	6600					
Neutron	SNP	535	6600					
Temperature	X							
E.P.B. Temp.	X			1614				
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2040 - 2050	3
2200 - 2215	3
2265 - 2280	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 41  
 D.A. No.: 712  
 E.P.B. No.: -

NAME: Taleman J-34

K.B.: 275.2 m

G.L.: 268.2 m

T.D.: 3553.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1528	6600	2350	2500			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	2	6600			2470	3050	2
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1527	6600					
Neutron	SNP	1527	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2470 - 3050	2

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 42  
 D.A. No.: 616  
 E.P.B. No.: 175

NAME: Gemini E-10

K.B.: 132.6 m

G.L.: 125.9 m

T.D.: 3844.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	465	6600	1350	1770	1-2			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	1506	6600				1506	3835	2-3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1506	6600						
Neutron	SNP	1506	6600						
Temperature	X								
E.P.B. Temp.	X				1624				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
1506 - 1905	3	3210 - 3225	3	3770 - 3835	3
2290 - 2300	3	3300 - 3320	2		
2500 - 2660	3	3490 - 3530	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 43  
 D.A. No.: 542  
 E.P.B. No.: -

NAME: Romulus C-42

K.B.: 160.0 m

G.L.: 153.3 m

T.D.: 4553.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	492	6600	860	1340	1		
Long-spaced Res. Sonic (Acoustic)	-	492	6600				1800	5930
Long-spaced Sonic	BHCS							1-3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	492	6600					
Neutron	SNP	0	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1800	1	3230	2
2660	2	5010	3
2935	1		

**D. COMMENTS**

Also scattered hydrate occurrences: 1000-1800, 3950-4700.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 44  
 D.A. No.: 499  
 E.P.B. No.: -

NAME: Hotspur J-20

K.B.: 211.8 m

G.L.: 207.0 m

T.D.: 3835.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	IES	507	6600	1740	1880			2
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	50	6600			505	2040	2
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	507	6600					
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
505 2040	2

**D. COMMENTS**

Possible hydrates at greater depth.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 45  
 D.A. No.: 881  
 E.P.B. No.: -

NAME: Sophie Point G-19

K.B.: 24.7 m

G.L.: 18.0 m

T.D.: 3791.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)
						Reliability	Reliability
Resistivity	DILL	1528	6600	1960	2210		
Long-spaced Res. Sonic (Acoustic)	-	1528	6600				
Long-spaced Sonic S.P.	BHCS	84	1517				
Gamma Ray	LSS						
Caliper	-						
Density	FD	100	6600				
Neutron	CN	100	6600				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	X						
						2-3	-

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 46  
 D.A. NO.: 845  
 E.P.B. No.: -

NAME: Key Point 0.51

K.B.: 22.3 m

G.L.: 15.5 m

T.D.: 3482.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	994	6600	2555	2725			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS	994	6600			4225	4550	3
Gamma Ray	X							
Caliper	X							
Density	FD	30	6600					
Neutron	CN	30	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	X							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
4225 - 4435	3
4550+	3

**D. COMMENTS**

Poor crystal cable data.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 47  
 D.A. NO.: 715  
 E.P.B. NO.: -

NAME: Sherard 0-54

K.B.: 21.0 m

G.L.: 17.4 m

T.D.: 1228.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	500	4022	815	1145			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	36	4025					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	X							
Neutron	FDEN	500	4025					
Temperature	SNP	500	4025					
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 48  
 D.A. No.: 773  
 E.P.B. No.: -

NAME: Sherard Bay F-14

K.B.: 50.0 m

G.L.: 43.0 m

T.D.: 1342.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	EL/DI/L	51	4396	600	850			1
Long-spaced Res. Sonic (Acoustic)	BHCS	51	4406			510	1340	3
Long-spaced Sonic S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	1406	4403					
Neutron	CN	1406	4403					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
510 - 940	3	1100 - 1165	3
990 - 1065	3	1190 - 1340	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 49  
 D.A. No.: 440  
 E.P.B. No.: -

NAME: Hecla J-60

K.B.: 5.2 m

G.L.: 0.9 m

T.D.: 3616.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	2246	6600	2430	2670			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS -	2246	6600			3050	3150	3
Gamma Ray Caliper	X X							
Density Neutron	X -							
Temperature E.P.B. Temp.	- -	2246	6600					
Velocity Crystal Cable	- -							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3050 - 3150	3

**D. COMMENTS**

Low quality IBPF pick; may be above RES log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 50  
 D.A. No.: 663  
 E.P.B. No.: 200

NAME: Hecla I-69

K.B.: 6.1 m

G.L.: 1.5 m

T.D.: 1456.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1012	3792	1140	1250	2			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic S.P.	BHCS	1012	3795						
Gamma Ray	X								
Caliper	X								
Density	FDEN	3415	4495						
Neutron	SNP	4010	4496						
Temperature	-								
E.P.B. Temp.	X			453					
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 51  
 D.A. NO.: 858  
 E.P.B. NO.: -

NAME: S.W. Hecla C-58

K.B.: 4.9 m

G.L.: -305.4 m

T.D.: 1219.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	2045	3990	2045	-	-	-	-	-
Long-spaced Res. Sonic (Acoustic)	BHCS	2046	3982						
Long-spaced Sonic S.P.	- x								
Gamma Ray	x								
Caliper	x								
Density	FD	907	3986						
Neutron	CN	907	3986						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF above RES log top.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 52  
 D.A. No.: 520  
 E.P.B. No.: -

NAME: Young Inlet D.21

K.B.: 219.8 m

G.L.: 213.4 m

T.D.: 1846.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base Trans.		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	(ft)	(ft)	From (ft)	To (ft)	
Resistivity	DILL	508	6051	1310	1625			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	508	6055			1610	5560	3
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	FDEN	1834	5600					
Neutron	SNP	1834	5600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1610 - 1630	3
5310 - 5560	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 53  
 D.A. NO.: 902  
 E.P.B. NO.: -

NAME: Stokes Range J-11

K.B.: 341.4 m

G.L.: 334.7 m

T.D.: 3339.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DLL-MSFL	77	6600	1720	2270			1
Long-spaced Res. Sonic (Acoustic)	BHCS	1115	6600			790	820	2
Long-spaced Sonic	LSS	77	1097					
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	FD	30	6600					
Neutron	CN	30	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	x							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
780 - 820	2

**D. COMMENTS**

Hydrate traces: 130-1020.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 54  
 D.A. No.: 852  
 E.P.B. No.: -

NAME: Charles Point G-07

K.B.: 35.4 m

G.L.: 27.7 m

T.D.: 3863.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1500	6600	1500	1960			3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1376	5774			3147±		3
Long-spaced Sonic	LSS	1501	6600					
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	FD	143	6600					
Neutron	CN	143	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

<u>Interval (ft)</u>	<u>Reliability</u>
3147±	3

**D. COMMENTS**

IBPF above RES log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 55  
 D.A. NO.: 903  
 E.P.B. NO.: -

NAME: Bent Horn A-57

K.B.: 68.6 m

G.L.: 61.9 m

T.D.: 3627.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	MSFL-DLL	205	6600	1770	2165	-	-	3
Long-spaced Res. Sonic (Acoustic)	BHCS	2761	6600					
Long-spaced Sonic S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	50	6600					
Neutron	CN	50	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 56  
 D.A. No.: 815  
 E.P.B. No.: 286

NAME: Bent Horn F-72/72A

K.B.: 51.5 m

G.L.: 43.3 m

T.D.: 3266.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1539	6600	1925	2300	3			
Long-spaced Res. Somic (Acoustic)	-								
Long-spaced Somic	BHCS	1539	6600				1740	4390	3
S.P.	x								
Gamma Ray	x								
Caliper	x								
Density	FD	150	6600						
Neutron	CN	150	6600						
Temperature	-								
E.P.B. Temp.	x			2142	-				
Velocity	-								
Crystal Cable	x			1624		3			
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1740	3	3240	3
2560	3	3400	3
3130	3	4305	3
		4390	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 57  
 D.A. No.: 711  
 E.P.B. No.: 196

NAME: Bent Horn N-72

K.B.: 70.4 m

G.L.: 62.8 m

T.D.: 4382.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1005	6600	2065	2400	1			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1005	6600						
Long-spaced Sonic	-								
S.P.	x								
Gamma Ray	x								
Calliper	x								
Density	FD	1005	6600						
Neutron	CN	1005	6600						
Temperature	x	50	3000	2000	2250				
E.P.B. Temp.	x			2356	-				
Velocity	-								
Crystal Cable	x								
Mud Gas	-								
									> 2477

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

Crystal cable data suggests frozen material to 2477 ft.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 58  
 D.A. NO.: 863  
 E.P.B. No.: -

NAME: Bent Horn 1-01/01A

K.B.: 44.2 m

G.L.: 37.5 m

T.D.: 352.8/3279.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	DILL	2001	6600	2001	-	-	-	3	-
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	82	6600						
Long-spaced Sonic	-								
S.P.	x								
Gamma Ray	x								
Caliper	x								
Density	FD	100	6600						
Neutron	CN	100	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	x								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No evidence of hydrates.  
 Poor quality DILL.  
 IBPF above log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 59  
 D.A. No.: 844  
 E.P.B. No.: -

NAME: W. Bent Horn A-02

K.B.: 28.7 m

G.L.: 18.3 m

T.D.: 3360.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	48	6600	735	1050			2-3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	48	6600					
Long-spaced Sonic	-							
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	-							
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 60  
 D.A. No.: 872  
 E.P.B. No.: -

NAME: W. Bent Horn M-12

K.B.: 17.4 m

G.L.: 9.8 m

T.D.: 3230.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DLL-MSFL	2031	6600	2280	-	-	-	3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	2032	6600			2030	6310	3
Long-spaced Sonic	-							
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	FD	100	5410					
Neutron	CN	100	5410					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	x							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
2030(csg)	3	3960	4030
3080	3	4130	4190
3500	3	5100	5185
3800	3	5535	5640
		5855	6310

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 61  
 D.A. No.: 836  
 E.P.B. No.: -

NAME: Bent Horn E-43

K.B.: 25.9 m

G.L.: 19.2 m

T.D.: 3371.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DILL	59	6600	860	980	1-2			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	59	6600				390	6200	3
S.P.	-								
Gamma Ray	x								
Caliper	x								
Density	FD	0	6600						
Neutron	CN	0	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	x			820					3
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
390	3	3700	3	6150	3
2040	3	3750	3	6200	3
2470	3	4140	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 62  
 D.A. NO.: 796  
 E.P.B. NO.: -

NAME: Pym Point C-44

K.B.: 20.1 m

G.L.: 12.8 m

T.D.: 3561.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1017	6600	1375	1640			3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1017	6600					
Long-spaced Sonic	-							
S.P.	x							
Gamma Ray	x							
Caliper	x							
Density	FD	50	6600					
Neutron	CN	50	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 63  
 D.A. No.: 859  
 E.P.B. No.: -

NAME: N.E. Drake P-40

K.B.: 4.9 m

G.L.: -362.4 m

T.D.: 1295.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	2008	4238	2250	2490			2-3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	2008	4242			2740	3235	3
S.P.	-							
Gamma Ray	x							
Caliper	x							
Density	FD	2008	4245					
Neutron	CN	2008	4245					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2740 - 2810	3
3130 - 3235	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 64  
 D.A. No.: 805  
 E.P.B. No.: -

NAME: East Drake I-55

K.B.: 4.6 m

G.L.: -146.9 m

T.D.: 1188.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1227	3886	1227	-	-	-	-
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1227	3842					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	400	3890					
Neutron	CN	400	3890					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF above RES log top.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 65  
 D.A. No.: 611  
 E.P.B. No.: 172

NAME: Drake B-44

K.B.: 8.8 m

G.L.: 4.0 m

T.D.: 1396.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	DILL	140	4567	430	735			1-3	
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1427	4572						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1427	4572						
Neutron	SND	30	4573						
Temperature	-								
E.P.B. Temp.	X								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrate logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 66  
 D.A. No.: 812  
 E.P.B. No.: 259

NAME: South Drake D-73

K.B.: 38.1 m

G.L.: 33.2 m

T.D.: 1360.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	1416	4448	1416	-	-	-	-	-
Long-spaced Res. Sonic (Acoustic)	BHCS	1416	4421						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	50	4452						
Neutron	CN	50	4452						
Temperature	-								
E.P.B. Temp.	X			928	-				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF above RES log top.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 67  
 D.A. No.: 890  
 E.P.B. No.: -

NAME: Drake F-76

K.B.: 9.8 m

G.L.: -54.9 m

T.D.: 935.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	422	3687	1300	1540	3	-	-
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	422	3692					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	210	3692					
Neutron	CN	210	3692					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 68  
 D.A. No.: 683  
 E.P.B. No.: 199

NAME: Drake E-78

K.B.: 8.2 m

G.L.: 3.7 m

T.D.: 1356.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1525	4022	1740	1810			2-3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	1525	4027			2070	3710	3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	1525	4028					
Neutron	CN	1523	4028					
Temperature	-							
E.P.B. Temp.	X			545	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2070 - 2140	3
3640 - 3710	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 69  
 D.A. NO.: 600  
 E.P.B. No.: -

NAME: Drake F-16

K.B.: 57.0 m

G.L.: 53.3 m

T.D.: 1478.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	975	4827	1350	1610			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	975	4828			3590	3685	3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	X							
Neutron	FDEN	2911	4829					
Temperature	SNP	2911	4829					
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3590 - 3685	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 70  
 D.A. No.: 443  
 E.P.B. No.: -

NAME: Drake K-67

K.B.: 37.8 m

G.L.: 37.2 m

T.D.: 974.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	Reliability
Resistivity								
Long-spaced Res.								
Sonic (Acoustic)								
Long-spaced Sonic								
S.P.								
Gamma Ray								
Caliper								
Density								
Neutron								
Temperature								
E.P.B. Temp.								
Velocity								
Crystal Cable								
Mud Gas								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No petrophysical logs run.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 71  
 D.A. No.: 378  
 E.P.B. No.: -

NAME: Drake Point L-67

K.B.: 60.9 m

G.L.: 56.4 m

T.D.: 3252.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	620	6600	780	910			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS	0	6600			3140	3760	3
Gamma Ray	X							
Caliper	X							
Density	-							
Neutron	SNP	620	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3140 - 3210	3
3720 - 3760	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 72  
 D.A. NO.: 349  
 E.P.B. NO.: -

NAME: Drake Point N-67

K.B.: 38.1 m

G.L.: 33.5 m

T.D.: 2576.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity								
Long-spaced Res.								
Sonic (Acoustic)								
Long-spaced Sonic								
S.P.								
Gamma Ray								
Caliper								
Density								
Neutron								
Temperature								
E.P.B. Temp.								
Velocity								
Crystal Cable								
Mud Gas								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No petrophysical logs run.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 73  
 D.A. No.: 702  
 E.P.B. No.: 198

NAME: Drake Point D-68

K.B.: 44.2 m

G.L.: 37.5 m

T.D.: 5415.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1377	6600	< 1377	-	-	-	-	-
Long-spaced Res.	-	-	-	-	-	-	-	-	-
Sonic (Acoustic)	BHCS	1378	6600	-	-	-	1660	4650	3
Long-spaced Sonic	-	-	-	-	-	-	-	-	-
S.P.	X	-	-	-	-	-	-	-	-
Gamma Ray	X	-	-	-	-	-	-	-	-
Caliper	X	-	-	-	-	-	-	-	-
Density	FDEN	1378	6600	-	-	-	-	-	-
Neutron	SNP	1379	6600	-	-	-	-	-	-
Temperature	-	-	-	-	-	-	-	-	-
E.P.B. Temp.	X	-	-	843	-	-	-	-	-
Velocity	-	-	-	-	-	-	-	-	-
Crystal Cable	X	-	-	-	-	-	-	-	-
Mud Gas	-	-	-	-	-	-	-	-	-

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1660 - 1730	3
4590 - 4650	3

**D. COMMENTS**

IBPF above RES log top.  
 No high velocity layers noted on crystal cable.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 74  
 D.A. No.: 904  
 E.P.B. No.: -

NAME: Drake Point K-79

K.B.: 92.4 m

G.L.: 87.8 m

T.D.: 1725.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL-SFL	66	5651	570	980	980	1280	3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	66	5625					
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	66	5657					
Neutron	CN	66	5657					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
980 - 1280	3

**D. COMMENTS**

Hydrates interpreted on RES, rather than BHCS.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 75  
 D.A. NO.: 788  
 E.P.B. No.: -

NAME: Chads Creek B-64

K.B.: 79.9 m

G.L.: 72.8 m

T.D.: 5036.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1382	6600	1382				
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	135	6600			2285	2318	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	150	6600					
Neutron	CN	150	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

<u>Interval (ft)</u>	<u>Reliability</u>
2285 - 2318	3

**D. COMMENTS**

IBPF above RES log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 76  
 D.A. No.: 825  
 E.P.B. No.: -

NAME: E. Hecla C-32

K.B.: 15.2 m

G.L.: 10.7 m

T.D.: 1341.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1302	4391	1595	1735			3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1302	4391					-
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	150	4395					
Neutron	CN	150	4395					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 77  
 D.A. No.: 636  
 E.P.B. No.: -

NAME: Hecla F-62

K.B.: 6.1 m

G.L.: 1.2 m

T.D.: 1219.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	832	3994	1350	1500	3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	832	3992						
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	2878	3998						
Neutron	SNP	2878	3998						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 78  
 D.A. No.: 843  
 E.P.B. No.: -

NAME: W. Hecla C-05

K.B.: 7.0 m

G.L.: 2.4 m

T.D.: 1237.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1481	4052	1640	1775			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	1481	4021					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	40	4051					
Neutron	CN	40	4051					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 79  
 D.A. No.: 738  
 E.P.B. No.: -

NAME: W. Hecla N-52

K.B.: 5.2 m

G.L.: -128.4 m

T.D.: 938.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	944	3076	1105	1265			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic S.P.	BHCS	50	3080			944	2735	3
Gamma Ray	X							
Caliper	X							
Density	FD	944	3080					
Neutron	CN	944	3080					
Temperature	X	10	420					
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
944 - 1040	3
1700 - 1720	3
2680 - 2735	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 80  
 D.A. No.: 822  
 E.P.B. No.: -

NAME: W. Hecla P-62

K.B.: 4.7 m

G.L.: -149.0 m

T.D.: 1127.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	615	3689	1900	2100	3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1420	3662				2730	2780	2
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	615	3696						
Neutron	CN	615	3696						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2730 - 2780	2

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 81  
 D.A. NO.: 818  
 E.P.B. No.: -

NAME: N.W. Hecla M-25

K.B.: 4.7 m

G.L.: -281.0 m

T.D.: 1207.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1872	3938	1872	-	-	-	-	-
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1872	3910						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	921	3944						
Neutron	CN	921	3944						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No permafrost or hydrates within logged interval.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 82  
 D.A. No.: 771  
 E.P.B. No.: -

NAME: Cape Fleetwood M-21

K.B.: 57.0 m

G.L.: 49.4 m

T.D.: 3513.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1006	6600	1530	2015			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	1301	6600			465	2835	1-3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	1006	6600					
Neutron	CN	1006	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
465 1006	3
1006 1815	1
1945 2835	2

**D. COMMENTS**

Poor match of SP and GR suggests ice or hydrates may continue below 2835.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 83  
 D.A. No.: 760  
 E.P.B. No.: -

NAME: Robert Harbour K-07

K.B.: 18.3 m

G.L.: 11.6 m

T.D.: 3805.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates			
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability	Reliability
Resistivity	DILL	1240	6600	2040	2320				
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	50	6600						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	1240	6600						
Neutron	CN	1240	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	X			1952					3
Crystal Cable	X								
Mud Gas	X								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.  
 Ice logged on CNFD: 2850-3000.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 84  
 D.A. No.: 794  
 E.P.B. No.: -

NAME: Collingwood K-33

K.B.: 53.9 m

G.L.: 49.4 m

T.D.: 2046.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	2003	6541	2003	-				
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	2003	6517				4705	4785	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	40	6546						
Neutron	CN	40	6546						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
4705 - 4785	3

**D. COMMENTS**

IBPF above RES log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 85  
 D.A. NO.: 919  
 E.P.B. No.: -

NAME: Desbarats B-73

K.B.: 4.9 m

G.L.: -469.0 m

T.D.: 1085.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (m)	Bottom (m)	Base (m)	Trans. (m)	From (m)	To (m)
Resistivity	DISFL	210	1083	555	660		
Long-spaced Res. Sonic (Acoustic)	-						
Long-spaced Sonic	BHCS	210	1071				
S.P.	X						
Gamma Ray	X						
Caliper	X						
Density	FD	210	1085				
Neutron	CN	210	1085				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	-						
						Reliability	Reliability
							3

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 86  
 D.A. No.: 758  
 E.P.B. NO.: -

NAME: N. Sabine H-49

K.B.: 60.4 m

G.L.: 53.3 m

T.D.: 3811.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	1180	6600	1430	1675	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	140	6600				2130	2690	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	1180	6600						
Neutron	CN	1180	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
2130 - 2140	3	2570 - 2580	3
2305 - 2335	3	2675 - 2690	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 87  
 D.A. NO.: 892  
 E.P.B. No.: -

NAME: Roche Pt. 0-43

K.B.: 6.7 m

G.L.: -53.2 m

T.D.: 2881.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DISFL	2400	6600	-	2395	-	-	-
Long-spaced Res. Sonic (Acoustic)	-	500	6600			4430	4600	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	500	6600					
Neutron	CN	500	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
4430 - 4600	3

**D. COMMENTS**

IBPF, if present, above log tops.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 88  
 D.A. No.: 912  
 E.P.B. No.: -

NAME: Hazen F-54

K.B.: 9.8 m

G.L.: -234.0 m

T.D.: 3064.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DISFL	679	2000	-679	-	-			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	679	2000				770	1390	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	679	2000						
Neutron	CN	679	2000						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability	Interval (m)	Reliability
770 - 790	3	1025 - 1030	3
840 - 950	3	1120 - 1390	3

**D. COMMENTS**

IBPF, if any, above RES log top.  
 Hydrates logged on both BHCS and CNFD.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 89  
 D.A. No.: 515  
 E.P.B. No.: -

NAME: Skybatttle Bay C-15

K.B.: 30.5 m

G.L.: 24.1 m

T.D.: 3657.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	504	6600	800	1100	2-3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	504	6600				505	5590	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	2000	6600						
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
505	2	1530	3	5355	3
1310	3	1720	3	5590	3
1370	3	1775	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 90  
 D.A. NO.: 911/947  
 E.P.B. No.: -

NAME: Whitefish H-63/2H-63

K.B.: 6.7 m

G.L.: -277.0 m

T.D.: 2126.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		Reliability
		Top (m)	Bottom (m)			From (m)	To (m)	
Resistivity	DISFL	612	2000	612	-	-	-	-
Long-spaced Res. Sonic (Acoustic)	- BHCS	275	2000			1258	1430	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	241	2000					
Neutron	CN	241	2000					
Temperature	-							
R.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
1258 - 1430	3

**D. COMMENTS**

IBPF, if any, above RES log top.  
 Hydrates picked on both BHCS and CNFD.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 91  
 D.A. No.: 551  
 E.P.B. No.: -

NAME: Graham C-52

K.B.: 25.9 m

G.L.: 21.3 m

T.D.: 3081.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	IES	518	6600	1010	1560	1-2			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic S.P.	BHCS	0	6600				518	5030	3
Gamma Ray	X								
Caliper	X								
Density	FDEN	518	6600						
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
518(csg) 1050	3	3210	3 (traces)
2400 2890	3	4460 5030	3 (traces)

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 92  
 D.A. NO.: 932  
 E.P.B. NO.: 291

NAME: Cornwall 0-30

K.B.: 29.8 m

G.L.: 20.0 m

T.D.: 3583.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (m)	Trans. (m)	Reliability	Gas Hydrates	
		Top (m)	Bottom (m)				From (m)	To (m)
Resistivity	DISFL	117	2000	555	673	3		
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	117	2000					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	117	2000					
Neutron	CN	117	2000					
Temperature	-							
E.P.B. Temp.	X			315+	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 93  
 D.A. NO.: 797  
 E.P.B. NO.: 258

NAME: Pat Bay A-72

K.B.: 23.8 m

G.L.: 17.1 m

T.D.: 3230.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1024	6600	1560	1860			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	1024	6600			1900	1940	2
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	50	6600					
Neutron	CN	50	6600					
Temperature	-							
E.P.B. Temp.	X			961+	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1900 - 1940	2

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 94  
 D.A. No.: 420  
 E.P.B. No.: -

NAME: Cape Noem A-80

K.B.: 14.0 m

G.L.: 9.1 m

T.D.: 2962.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	160	6600	5810	850	3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	220	6600				222	2137	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	2218	6600						
Neutron	SNP	2218	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
222	3	2094	3
2055	3	2137+	

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 95  
 D.A. No.: 618  
 E.P.B. No.: 195

NAME: Linckens Island P.46

K.B.: 6.4 m

G.L.: 0.3 m

T.D.: 1831.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)
Resistivity	EL/DILL	70	6002	430	920		
Long-spaced Res. Sonic (Acoustic)	BHCS	584	6004			585	2855
Long-spaced Sonic	-						
S.P.	X						
Gamma Ray	X						
Caliper	X						
Density	FD	1826	6004				
Neutron	CN, SNP	584	4504				
Temperature	-						
E.P.B. Temp.	X			810	-		
Velocity	-						
Crystal Cable	-						
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
585(csg) 1100	3
1470 1490	3
2795 2855	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 96  
 D.A. No.: 891  
 E.P.B. No.: -

NAME: Cape Allison L-50

K.B.: 7.9 m

G.L.: 4.0 m

T.D.: 2922.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	EL/DIL	100	6500	1860	-	3			
Long-spaced Res. Sonic (Acoustic)	BHCS	100	6300						
Long-spaced Sonic	LSS	140	2500				230	2220	3
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
230 - 335	3 (traces)	1000 - 1080	3	1730 - 1740	3
603 - 840	3	1220 - 1520	3	1835 - 1940	3 (traces)
960 - 970	3	1555 - 1650	3	2090 - 2220	3

**D. COMMENTS**

EL, DIL and BHCS logs show T.V.D.; LSS log shows "well" depths.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 97  
 D.A. No.: 528  
 E.P.B. No.: -

NAME: King Christian N-06

K.B.: 35.7 m

G.L.: 28.7 m

T.D.: 3358.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	524	6600	750	1200	3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	160	6600				915	1150	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	524	6600						
Neutron	SNP	524	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
915 - 1150	3

**D. COMMENTS**

Hydrates traces only

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 98  
 D.A. No.: 459  
 E.P.B. No.: -

NAME: King Christian D-18A

K.B.: 37.1 m

G.L.: 27.1 m

T.D.: 847.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Bottom (ft)	Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates From (ft)	To (ft)	Reliability
Resistivity	DILL	1847	2543	2390	-	2			
Long-spaced Res. Sonic (Acoustic)	-	1848	2543				1920	2375	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	SNP	1848	2543						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1920 - 1990	3	2260 - 2310	3
2045+	3	2375+	

**D. COMMENTS**

Hydrate traces only.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 99  
 D.A. NO.: 450  
 E.P.B. NO.: -

NAME: King Christian D-18

K.B.: 35.7 m

G.L.: 30.5 m

T.D.: 612.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity								
Long-spaced Res.								
Sonic (Acoustic)								
Long-spaced Sonic								
S.P.								
Gamma Ray								
Caliper								
Density								
Neutron								
Temperature								
E.P.B. Temp.								
Velocity								
Crystal Cable								
Mud Gas								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No petrophysical logs run.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 100  
 D.A. No.: 690  
 E.P.B. No.: 256

NAME: Sutherland 0-23

K.B.: 30.2 m

G.L.: 20.7 m

T.D.: 4457.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	704	6600	830	950	1-2	770	4650	1-3
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	64	6600						
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	704	6600						
Neutron	SNP,CN	704	6600						
Temperature	-								
E.P.B. Temp.	X			1020	-				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
770	2	2605	2
820	3	2950	2
1270	1	3260	3
2250	3	4650	
2530			
2550			

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 101  
 D.A. No.: 626  
 E.P.B. No.: -

NAME: Wallis K-62

K.B.: 27.7 m

G.L.: 19.5 m

T.D.: 2628.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	895	6600	1290	1610			1
Long-spaced Res. Sonic (Acoustic)	-	0	6600			960	3810	1-3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	895	6600					
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
960 - 1170	3	2085 - 2360	2	2850 - 3050 (traces)	3
1260 - 1550	1	2420 - 2510	1	3565 - 3810	2
1570 - 2085 (traces)	3	2630 - 2770	1		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 102  
 D.A. No.: 451  
 E.P.B. No.: -

NAME: Wilkins E-60

K.B.: 68.9 m

G.L.: 64.0 m

T.D.: 3395.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Perma Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1202	6600	< 1202	1480			3
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	100	6600			2650	2880	3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	2500	4200					
Neutron	SNP	2500	4200					
Temperature	-							
E.P.B. Temp.	X			873+	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2650 - 2720	3
2800 - 2880	3

**D. COMMENTS**

IBPF above DILL log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 103  
 D.A. No.: 923  
 E.P.B. No.: -

NAME: Hoodoo E-05

K.B.: 125.0 m

G.L.: 115.2 m

T.D.: 2476.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DLL	239	1142	< 239	-	-			
Long-spaced Res.	-								
Sonic (Acoustic)	-								
Long-spaced Sonic	LSS	239	1144				239	497	3
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	25	1143						
Neutron	CN	25	1143						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
239 (csg)	3
340	497
	3

**D. COMMENTS**

IBPF above DLL log top.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 104  
 D.A. NO.: 386  
 E.P.B. No.: 86

NAME: Hoodoo Dome H-37

K.B.: 161.2 m

G.L.: 156.4 m

T.D.: 3374.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates	
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)
Resistivity	IES/DILL	182	6600	650	850		2-3
Long-spaced Res. Sonic (Acoustic)	-						
Long-spaced Sonic	BHCS	182	6600				
S.P.	-						
Gamma Ray	X						
Caliper	X						
Density	FDEN	2025	6600				
Neutron	SNP	182	6146				
Temperature	-						
E.P.B. Temp.	X			988			
Velocity	-						
Crystal Cable	-						
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 105  
 D.A. NO.: 828/841  
 E.P.B. NO.: -

NAME: Jackson G-16/G-16A

K.B.: -66.8/-67.1 m

G.L.: 6.1 m

T.D.: 1202.1/1600.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1029	2525	1029	-				
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1029	2495						
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	200	5248						
Neutron	CN	200	5248						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	X								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No permafrost or hydrates logged (IBPF above log tops).

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 106  
 D.A. No.: 750  
 E.P.B. No.: -

NAME: Elve M-40

K.B.: 10.1 m

G.L.: 4.9 m

T.D.: 1874.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To	
Resistivity	DILL	60	5166	670	970	1			
Long-spaced Res. Sonic (Acoustic)	- BHCS	60	5170				340	670	1
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	60	6143						
Neutron	CN	60	6143						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
340 670	1

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 107  
 D.A. No.: 659  
 E.P.B. No.: -

NAME: Thor H-28

K.B.: 7.6 m

G.L.: 2.1 m

T.D.: 1755.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	3022	4297					
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	3800	5750			3080	3856	2
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X			700	-			3
Caliper	X							
Density	FDEN	3800	4297					
Neutron	SNP	3800	4297					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3080 - 3410 (TVD)	2
3522 - 3856 (TVD)	2

**D. COMMENTS**

IBPF picked from Gamma Ray shift due to washout.  
 Likely hydrates above BHCS log top also.  
 Side-by-side presentation shows "well" depth logs.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 108  
 D.A. No.: 588  
 E.P.B. No.: 170

NAME: Thor P-38

K.B.: 10.1 m

G.L.: 4.9 m

T.D.: 1828.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	599	5999	830	1130	1-3		
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	0	5999				540	2700
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	2100	5998					
Neutron	SNP	2100	5998					
Temperature	-							
E.P.B. Temp.	X			1086				
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
540 (csg)	1	770	3
710	2	1700	3
		2700	

**D. COMMENTS**

Hydrates in lower two zones occur within predominantly siltstone (rather than sand) sequence.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 109  
 D.A. No.: 727  
 E.P.B. No.: -

NAME: Sherwood P-37

K.B.: 496.8 m

G.L.: 488.6 m

T.D.: 3134.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	534	6600	810	980	2			See Below
Long-spaced Res. Sonic (Acoustic)	-	75	6600						
Long-spaced Sonic	BHCS								
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	534	2317						
Neutron	SNP	2316	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

Possible hydrate at 820 ft.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 110  
 D.A. No.: 452  
 E.P.B. No.: -

NAME: Amund Central Dome H-40

K.B.: 68.3 m

G.L.: 63.1 m

T.D.: 3361.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	518	6600	935	-	1			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	518	6600				810	5240	1-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	518	6600						
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
810	3	1415	3	2435	2
1050	1	1515	2	2800	2
1125	1	1730	2	2970+	3
1180	1	1800	3	3200-	2-3 (traces)
				5225	3
				5240	3

**D. COMMENTS**

Ice (? relict PF): 2190-2390.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 111  
 D.A. No.: 587  
 E.P.B. NO.: -

NAME: Hoodoo L-41

K.B.: 79.6 m

G.L.: 73.2 m

T.D.: 4279.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DLL	546	2407	790	971			2
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	546	6600			580	794	3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1150	6600					
Neutron	SNP	546	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
580 - 795	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 112  
 D.A. No.: 535  
 E.P.B. No.: 155

NAME: Kristoffer Bay G-06

K.B.: 20.4 m

G.L.: 15.2 m

T.D.: 3924.9 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	504	6600	1070	1235	< 504	2030	3
Long-spaced Res. Sonic (Acoustic)	BHCS	504	6600					
Long-spaced Sonic S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1703	6600					
Neutron	SNP	1703	6600					
Temperature	-							
E.P.B. Temp.	X			1444	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	X							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
< 504	3
1220	3
1710	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 113  
 D.A. No.: 695  
 E.P.B. No.: -

NAME: E. Amund M-05

K.B.: 86.0 m

G.L.: 77.4 m

T.D.: 2494.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	560	6600	1170	1195	1			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	30	6600				1440	1770	3
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	SNP								
Temperature	-	2997	6600						
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1440 - 1770	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 114  
 D.A. No.: 581  
 E.P.B. No.: -

NAME: West Arund I-44

K.B.: 16.2 m

G.L.: 12.8 m

T.D.: 956.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	Reliability
Resistivity	DILL	512	3129	840	1050			1
Long-spaced Res. Sonic (Acoustic)	BHCS	1800	3150					
Long-spaced Sonic S.P.	X							
Gamma Ray Caliper	GR-C X	0	1827			1345	1640	3
Density Neutron	FDEN SNP	1831 1831	3132 3132					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1345 - 1640	3

**D. COMMENTS**

Evidence of hydrates on GR-C, rather than BHCS.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 115  
 D.A. NO.: 558  
 E.P.B. No.: -

NAME: Dumbbells E-49

K.B.: 113.4 m

G.L.: 107.0 m

T.D.: 3408.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	700	6600	1200	1500	1		
Long-spaced Res. Sonic (Acoustic)	- BHCS	700	6600				1025	1740
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	700	6600					
Neutron	SNP	150	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1025 1490	3
1580 1740	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 116  
 D.A. No.: 601  
 E.P.B. No.: 171

NAME: Dome Bay P-36

K.B.: 158.8 m

G.L.: 153.6 m

T.D.: 2453.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	696	6600	2170	2480	3		
Long-spaced Res. Sonic (Acoustic)	BHCS	696	6600				696	1700
Long-spaced Sonic S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	3024	6600					
Neutron	SNP	3024	6600					
Temperature	-							
E.P.B. Temp.	X			2149	-			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
696 (csg) 1115	3
1290 1400	3
1620 1700	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 117  
 D.A. No.: 917  
 E.P.B. No.: -

NAME: Noice D-41

K.B.: 118.0 m

G.L.: 108.0 m

T.D.: 2347.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates	
		Top (m)	Bottom (m)			From (m)	To (m)
Resistivity	DLL	200	2000	320	365		3
Long-spaced Res. Sonic (Acoustic)	-						
Long-spaced Sonic S.P.	LSS X	150	850			500	517
Gamma Ray	X						
Caliper	X						
Density	FD	750	1750				
Neutron	CN	750	1750				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
500 - 517	3

**D. COMMENTS**

Possible hydrates only.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 118  
 D.A. NO.: 612  
 E.P.B. No.: -

NAME: Noice G-44

K.B.: 97.8 m

G.L.: 92.4 m

T.D.: 1765.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft) Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft) To (ft)	Reliability
Resistivity	DILL	816 5781	2060	2520	3		
Long-spaced Res. Sonic (Acoustic)	-	818 5776				895 3780	3
Long-spaced Sonic	-						
S.P.	X						
Gamma Ray	X						
Caliper	X						
Density	F DEN	3000 5776					
Neutron	SNP	3000 5785					
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	X		702		3		
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
895 1555	3	2840 2990	3
2200 2280	3	3220 3330	3
2710 2770	3	3520 3780	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 119  
 D.A. NO.: 816  
 E.P.B. NO.: --

NAME: Mocklin Point D-23

K.B.: 37.8 m

G.L.: 31.1 m

T.D.: 2802.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1060	6600	1720	1985	1			
Long-spaced Res. Sonic (Acoustic)	-	150	6600				1060	5570	3
Long-spaced Sonic	BHCS								
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	3996	6600						
Neutron	CN	3996	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1060 - 1675	3	5325 - 5390	3
3075 - 3135	3	5405 - 5470	3
5180 - 5205	3	5545 - 5570	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 120  
 D.A. No.: 574  
 E.P.B. No.: -

NAME: Helicopter J-12

K.B.: 85.6 m

G.L.: 79.2 m

T.D.: 3813.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	1331	6600	1430	1805	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	30	6600				1430	3790	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	6000	6600						
Neutron	SNP	6000	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	X								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability
1430 (csg)	2	3040	3
1950	3 (scattered)	3745	2
2810	3	3790	2

**D. COMMENTS**

Wet sands on DILL: 1850-4310.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 121  
 D.A. No.: 629  
 E.P.B. No.: 169

NAME: Louise 0-25

K.B.: 94.2 m

G.L.: 89.0 m

T.D.: 2280.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	726	6600	726	890			3
Long-spaced Res. Sonic (Acoustic)	-	726	6600			3620	3630	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	2504	6600					
Neutron	SNP	2504	6600					
Temperature	-							
E.P.B. Temp.	-				823			
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3620 - 3630	3

**D. COMMENTS**

IBPF above RES log top.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 122  
 D.A. No.: 617  
 E.P.B. No.: -

NAME: Pollux G-60

K.B.: 59.7 m

G.L.: 53.3 m

T.D.: 3248.7 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DILL	998	6600	1670	1850	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1000	6600				< 1000	1650	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	998	6600						
Neutron	SNP	1000	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
< 1000 (behind casing)	3
1000 - 1650	2

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 123  
 D.A. No.: 708  
 E.P.B. No.: -

NAME: W. Pollux E-59

K.B.: 12.8 m

G.L.: 6.4 m

T.D.: 914.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	EL/DILL	83	2990	1185	1340			1
Long-spaced Res. Sonic (Acoustic)	-	83	2997			920	2230	1-3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1559	2496					
Neutron	SNP	1559	2496					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
920 - 1090	2
1310 - 1710	1
2170 - 2230	3

**D. COMMENTS**

Ice indicated on EL at 1480+

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 124  
 D.A. No.: 730  
 E.P.B. No.: -

NAME: Sirius K-28

K.B.: 20.7 m

G.L.: 14.0 m

T.D.: 2871.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DILL	1009	6600	1110	1510	1			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1009	6600				1510	2065	1
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1009	6600				1310	2065	1
Neutron	SNP	1009	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1310 1510	1
1510 2065	1

**D. COMMENTS**

Hydrates logged on both BHCS and FDEN.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 125  
 D.A. No.: 689  
 E.P.B. No.: -

NAME: Isachsen J-37

K.B.: 9.1 m

G.L.: 2.7 m

T.D.: 4203.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	64	6600	1825	1940	1			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	64	6600				1540	3960	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1532	6600						
Neutron	SNP	1532	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	X			1558					3
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1540 - 3960	3

**D. COMMENTS**

Possible hydrate throughout interval indicated.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 126  
 D.A. No.: 616  
 E.P.B. No.: -

NAME: Mid Fiord J-53

K.B.: 350.5 m

G.L.: 342.6 m

T.D.: 1989.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	511	6516	1090	1230	1		
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	511	6518					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	511	6521					
Neutron	SNP	2003	6521					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 127  
 D.A. No.: 952  
 E.P.B. No.: -

NAME: Char G-07

K.B.: 7.0 m

G.L.: -276.0 m

T.D.: 2179.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		
		Top (m)	Bottom (m)			From (m)	To (m)	Reliability
Resistivity	DISFL	62-	2000	~ 620	-	-	-	-
Long-spaced Res. Sonic (Acoustic)	- BHCS	620	2000					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	262	2000					
Neutron	CN	262	2000					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF, if any, above RES log top.  
 No hydrates logged.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 128  
 D.A. No.: 953  
 E.P.B. No.: -

NAME: Balaena D-58

K.B.: 4.6 m

G.I.: -236.6 m

T.D.: 1730.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DISFL	297	1727	< 297	-	-			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	297	1728						
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	225	1729						
Neutron	CN	225	1729						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF, if any, above log tops.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 129  
 D.A. No.: 953  
 E.P.B. No.: -

NAME: Wallis A-73

K.B.: 12.2 m

G.L.: 5.4 m

T.D.: 2827.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (m)	Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DIFL	303	2000	375	440	1			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	303	2000				344	560	1-3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	303	2000						
Neutron	CN	303	2000						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
344	2
355	1
395	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 130  
 D.A. No.: 972  
 E.P.B. No.: -

NAME: Cisco B-66

K.B.: 9.8 m

G.L.: -282.8 m

T.D.: 2412.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Reliability	Gas Hydrates	
		Top (m)	Bottom (m)			From (m)	To Reliability
Resistivity	DISFL	1740	2000	< 1700			
Long-spaced Res.	-						
Sonic (Acoustic)	BHCS	1740	2000				
Long-spaced Sonic	-						
S.P.	X						
Gamma Ray	X						
Caliper	X						
Density	FD	1740	2000				
Neutron	CN	1740	2000				
Temperature	-						
E.P.B. Temp.	-						
Velocity	-						
Crystal Cable	-						
Mud Gas	-						

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPP, if present, above log top.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 131  
 D.A. NO.: 974  
 E.P.B. No.: -

NAME: Maclean I-72

K.B.: 11.8 m

G.L.: -303.2 m

T.D.: 2475.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Gas Hydrates		Reliability
		Top (m)	Bottom (m)			From (m)	To (m)	
Resistivity	DISFL	645	2000	< 645	-			
Long-spaced Res. Sonic (Acoustic)	--	645	2000					
Long-spaced Sonic	BHCS							
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	645	2000					
Neutron	CN	645	2000					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

IBPF, if present, above log tops.  
 NO hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 132  
 D.A. No.: 973  
 E.P.B. NO.: -

NAME: Skate B-80

K.B.: 6.7 m

G.L.: -348.0 m

T.D.: 1655.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To	
Resistivity	DISFL	518	1637	680	777	3			
Long-spaced Res. Sonic (Acoustic)	-	325	1630				867	1573	1-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	340	1646						
Neutron	CN	340	1646						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability	Interval (m)	Reliability
867 - 907	1	1557 - 1573	3
980 - 990	2		
1070 - 1075	3		

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 133  
 D.A. No.: 982  
 E.P.B. No.: -

NAME: N. Hoodoo N-52

K.B.: 50.5 m

G.L.: 40.5 m

T.D.: 1650.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (m)	Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DISFL	350	1650	390	450	2-3			
Long-spaced Res. Sonic (Acoustic)	BHCS	350	1650				450	690	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	0	350						
Neutron	CN	0	350						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability
450 - 690	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 134  
 D.A. NO.: 960  
 E.P.B. NO.: -

NAME: Vesey A-27

K.B.: 15.0 m

G.L.: 7.8 m

T.D.: 2992.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (m)	Permafrost Trans. (m)	Reliability	Gas Hydrates		Reliability
		Top (m)	Bottom (m)				From (m)	To (m)	
Resistivity	DISFL	375	2000	690	785	3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	375	2000				375	1470	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	15	1509						
Neutron	CN	15	1509						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (m)	Reliability	Interval (m)	Reliability
375	3	1305	3
1035	3	1470	3
1200	3		

**D. COMMENTS**

Low quality IBPF pick.  
 Some hydrates in siltstone (rather than sand).

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 135  
 D.A. No.: 824  
 E.P.B. No.: -

NAME: Dyer Bay L-49

K.B.: 37.2 m

G.L.: 31.7 m

T.D.: 3171.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1608	1608	2140	2570			3
Long-spaced Res. Sonic (Acoustic)	BHCS	1608	6600			1470	2470	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	100	6600					
Neutron	CN	100	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

<u>Interval (ft)</u>	<u>Reliability</u>
1470 - 2470	3

**D. COMMENTS**



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 136  
 D.A. No.: 455  
 E.P.B. NO.: -

NAME: Kitson R. C-71

K.B.: 76.2 m

G.L.: 70.1 m

T.D.: 2766.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	548	6600	970	1180			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	548	6600			2050	2305	3
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	548	6600					
Neutron	SNP	2000	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
2050 - 2100	3
2190 - 2305	3

**D. COMMENTS**

Fracturing visible on BHCS below 2650.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 137  
 D.A. NO.: 848  
 E.P.B. NO.: -

NAME: Grassy I-34

K.B.: 4.9 m

G.L.: -246.0 m

T.D.: 975.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DISEL	1400	3200	1680	1910	3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	1400	3200						
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FD	700	3200						
Neutron	CN	700	3200						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 138  
 D.A. No.: 874  
 E.P.B. No.: -

NAME: Depot Island C-44

K.B.: 37.2 m

G.L.: 30.2 m

T.D.: 2669.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	DILL	1080	6600	1660	2010			2-3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1080	6600			4240	5265	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FD	1086	6600					
Neutron	CN	1086	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
4240 - 5265	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 139  
 D.A. NO.: 356  
 E.P.B. NO.: -

NAME: Sandy Point L-46

K.B.: 36.0 m

G.L.: 32.6 m

T.D.: 2101.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	1230	6600	1610	1790			2
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	150	6600					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	-							
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 140  
 D.A. No.: 377  
 E.P.B. No.: -

NAME: Marie Bay D-02

K.B.: 24.7 m

G.L.: 21.0 m

T.D.: 1272.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	1075	4111	1290	-	2			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1075	4174				1075	2660	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1075	4173						
Neutron	-								
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1075 - 1280	3
1500 - 2660	3

**D. COMMENTS**

IBPF at 1290 may be base of transition.  
 Scattered hydrates only.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 141  
 D.A. NO.: 803  
 E.P.B. NO.: -

NAME: Wilkie Point J-51

K.B.: 1405. m

G.L.: 135.3 m

T.D.: 2347.0 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	501	6600	1000	1130	2-3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	501	6600				1020	3505	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FD	498	6600						
Neutron	CN	498	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
1020	2	2140	3	2745	3
1430	2	2500+	3	3075	3
2080	3	2505	3	3190	3
		2590		3440	3
		2150		2790	
		2500+		3085	
		2590		3280	
		2590		3505	

**D. COMMENTS**

Scattered hydrates 2150-2500 also.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 142  
 D.A. No.: 614  
 E.P.B. No.: -

NAME: Emerald K-33

K.B.: 12.2 m

G.L.: 4.3 m

T.D.: 3660.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	537	6600	2300	2630	2-3			
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	50	6600				1460	1835	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	2600	6600						
Neutron	SNP	4000	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1460 - 1470	3
1810 - 1835	3

**D. COMMENTS**

Cycle skipping on BHCS below 3000 due to lithology.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 143  
 D.A. NO.: 503  
 E.P.B. No.: 91

NAME: Jameson Bay C-31

K.B.: 63.1 m

G.L.: 58.2 m

T.D.: 2538.1 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	962	6600	1300	1530				
Long-spaced Res. Sonic (Acoustic)	-								
Long-spaced Sonic	BHCS	50	6600				1210	1450	3
S.P.	-								
Gamma Ray	X								
Caliper	X								
Density	FDEN	962	6600						
Neutron	SNP	962	6600						
Temperature	-								
E.P.B. Temp.	X			1568	-				
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
1210 1450	3

**D. COMMENTS**

From 1450 up, SP and GR deviate.



ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 144  
 D.A. No.: 605  
 E.P.B. No.: -

NAME: Intrepid Inlet H-49

K.B.: 70.1 m

G.L.: 65.2 m

T.D.: 1766.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To (ft)
Resistivity	DILL	1839	4846	2060	2270	2	-	-
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	1840	4841					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	1838	4848					
Neutron	SNP	1840	4848					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

Cycle skipping on BHCS due to lithology.  
 No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 145  
 D.A. No.: 504  
 E.P.B. No.: -

NAME: Satellite P-68

K.B.: 25.3 m

G.L.: 20.7 m

T.D.: 3680.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost		Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)	Base (ft)	Trans. (ft)	From (ft)	To (ft)	
Resistivity	YES	506	6600	690	890			3
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	507	6600			2955	6405	3
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	507	6600					
Neutron	-							
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability	Interval (ft)	Reliability	Interval (ft)	Reliability
2955 - 3730	3	4770 - 4810	3	5630 - 6405	3
3830 - 3900	3	4855 - 4910	3		
4264 - 4630	3	4990 - 5510	3		

**D. COMMENTS**

Some hydrate occurrences may be noise on BHCS.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 146  
 D.A. No.: 696  
 E.P.B. No.: -

NAME: Andreasen L-32

K.B.: 46.0 m

G.L.: 41.5 m

T.D.: 2148.8 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	EL/DILL	566	6600	990	1300	1-3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	1661	6600				5100	5150	3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	1661	6600						
Neutron	SNP	1661	6600						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
5100 - 5150	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 147  
 D.A. NO.: 541  
 E.P.B. NO.: -

NAME: Brock C-50

K.B.: 13.1 m

G.L.: 7.3 m

T.D.: 3951.2 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval Top (ft)	Logged Interval Bottom (ft)	Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates From (ft)	Gas Hydrates To (ft)	Reliability
Resistivity	DILL	502	6600	960	-	3			
Long-spaced Res. Sonic (Acoustic)	-	502	6600				855	1040	2-3
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	FDEN	502	6600						
Neutron	SNP	502	660						
Temperature	-								
E.P.B. Temp.	-								
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
835 - 855	2
1200 - 1415	3
1950 - 2040	3

**D. COMMENTS**

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 148  
 D.A. No.: 595  
 E.P.B. No.: 158

NAME: Brock I-20

K.B.: 23.2 m

G.L.: 16.2 m

T.D.: 3176.6 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail/Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	984	6600	1510	1875			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	984	6600					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FDEN	3164	6600					
Neutron	-							
Temperature	-							
E.P.B. Temp.	X			1385				
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 149  
 D.A. NO.: 765  
 E.P.B. No.: -

NAME: Crocker I-53

K.B.: 21.9 m

G.L.: 12.2 m

T.D.: 3584.4 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)			From (ft)	To (ft)	
Resistivity	DILL	846	6600	1620	-			1
Long-spaced Res. Sonic (Acoustic)	-							
Long-spaced Sonic	BHCS	74	6600					
S.P.	-							
Gamma Ray	X							
Caliper	X							
Density	FD	846	6600					
Neutron	CN	846	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	-							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No evidence of hydrates.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 150  
 D.A. NO.: 691  
 E.P.B. NO.: -

NAME: Halycon 0-16

K.B.: 132.6 m

G.L.: 125.9 m

T.D.: 2169.3 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Trans. (ft)	Reliability	Gas Hydrates	
		Top (ft)	Bottom (ft)				From (ft)	To Reliability
Resistivity	DILL	924	6600	1260	1740			
Long-spaced Res.	-							
Sonic (Acoustic)	BHCS	25	6600					
Long-spaced Sonic	-							
S.P.	X							
Gamma Ray	X							
Caliper	X							
Density	FDEN	2548	6600					
Neutron	SNP	2548	6600					
Temperature	-							
E.P.B. Temp.	-							
Velocity	-							
Crystal Cable	X							
Mud Gas	-							

**C. DETAILED GAS HYDRATE INTERPRETATION**

**D. COMMENTS**

No hydrates logged.  
 Poor crystal cable data.

ARCTIC ISLANDS PERMAFROST/GAS HYDRATES STUDY: ANALYSIS DETAIL

**A. WELL INFORMATION**

WELL NO.: 151  
 D.A. NO.: 739  
 E.P.B. NO.: 197

NAME: Neil 0-15

K.B.: 502.4 m

G.L.: 496.2 m

T.D.: 2447.5 m

**B. PERMAFROST AND GAS HYDRATE DATA**

Log Name	Avail./Type	Logged Interval		Permafrost Base (ft)	Permafrost Trans. (ft)	Reliability	Gas Hydrates		Reliability
		Top (ft)	Bottom (ft)				From (ft)	To (ft)	
Resistivity	DILL	826	6600	1225	1625	1-3			
Long-spaced Res.	-								
Sonic (Acoustic)	BHCS	20	6600				3300	3320	1
Long-spaced Sonic	-								
S.P.	X								
Gamma Ray	X								
Caliper	X								
Density	-								
Neutron	-								
Temperature	-								
E.P.B. Temp.	X			1781					
Velocity	-								
Crystal Cable	-								
Mud Gas	-								

**C. DETAILED GAS HYDRATE INTERPRETATION**

Interval (ft)	Reliability
3300 - 3320	1

**D. COMMENTS**

Possible hydrates only.