

CANADA LANDS SURVEYS RECORDS
7 2 2 4 9
DATE 15 JUNE 1989

PLAN AND FIELD NOTES
OF SURVEY OF OFFSHORE
EXPLORATORY WELL LOCATION

PETRO-CANADA et al
TERRA NOVA C-09

LATITUDE 46° 28' 09.58" N

LONGITUDE 48° 30' 58.80" W

GRID AREA 46° 30' N, 48° 30' W

SURVEYED NOVEMBER 29 to DECEMBER 16, 1987

BY: McELHANNEY OFFSHORE SURVEYS LTD.

FOR: PETRO-CANADA INC.

CANADA OIL AND GAS LAND REGULATIONS

EXPLORATION LICENCE No. 208

NOTE:

The final position was determined by Doppler satellite translocation between the base station JMR (offset) in St. John's, Newfoundland and the drilling platform Sedco 710. The tie between Geodetic Surveys of Canada station SATANT No. 730100 and station JMR (offset) is shown on the Plan and Field Notes of Survey of Exploratory Well Location Canterra PCI et al Beathuk M-05 C.L.S.R. No. 70616 and given in the associated Survey Report recorded as No. F.B. 33506 C.L.S.R. Magnavox MX 1502 satellite receivers were used. The post-processing of the combined data from both stations was carried out using the GEODOP program, documentation for which is available from Geodetic Surveys of Canada.

The final position was confirmed by the survey vessel M.V. Balder Challenger using an Argo DM-54 / Motorola Mini-Ranger III positioning system with shore stations on the coast of Newfoundland. Information about the Argo DM-54 can be obtained from Cubic Precision, Tullahoma, Tennessee. Documentation for McElhanney's navigation programs can be obtained from McElhanney Offshore Surveys Ltd. Monuments at Cape Race, Cape St. Francis and Cape Bonavista are shown on Survey Control Plan C.L.S.R. No. 67818. Ties to the Argo stations are shown on Plan of Survey of Offshore Exploratory Well Location Mobil et al Sheridan J-87 (C.L.S.R. No. 67825). The monument at Cape Freels is shown on Survey Control Plan (C.L.S.R. No. 70182). The Argo station is located on the monument.

Coordinates and distances shown on the Unit Detail are UTM plane referred to ZONE 22, Central Meridian 51° W, using a false easting of 500 000 m.

All other distances are ellipsoidal distances (in metres) and are not reduced to the UTM plane unless indicated.

(c) indicates calculated distances.

All geographic coordinates are referred to 1927 North American Datum (1927 NAD).

Water depth at the location is approximately 93 metres as determined by echo sounding during the site survey.

I HEREBY CERTIFY THAT THE SURVEY REPRESENTED ON THIS PLAN
IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

C.L.S. *Geoff Wright*
WITNESS *Barry Bryan*
DATE 19 February 1988

PETRO-CANADA INC.

Cam Jones
DATE 28/01/89

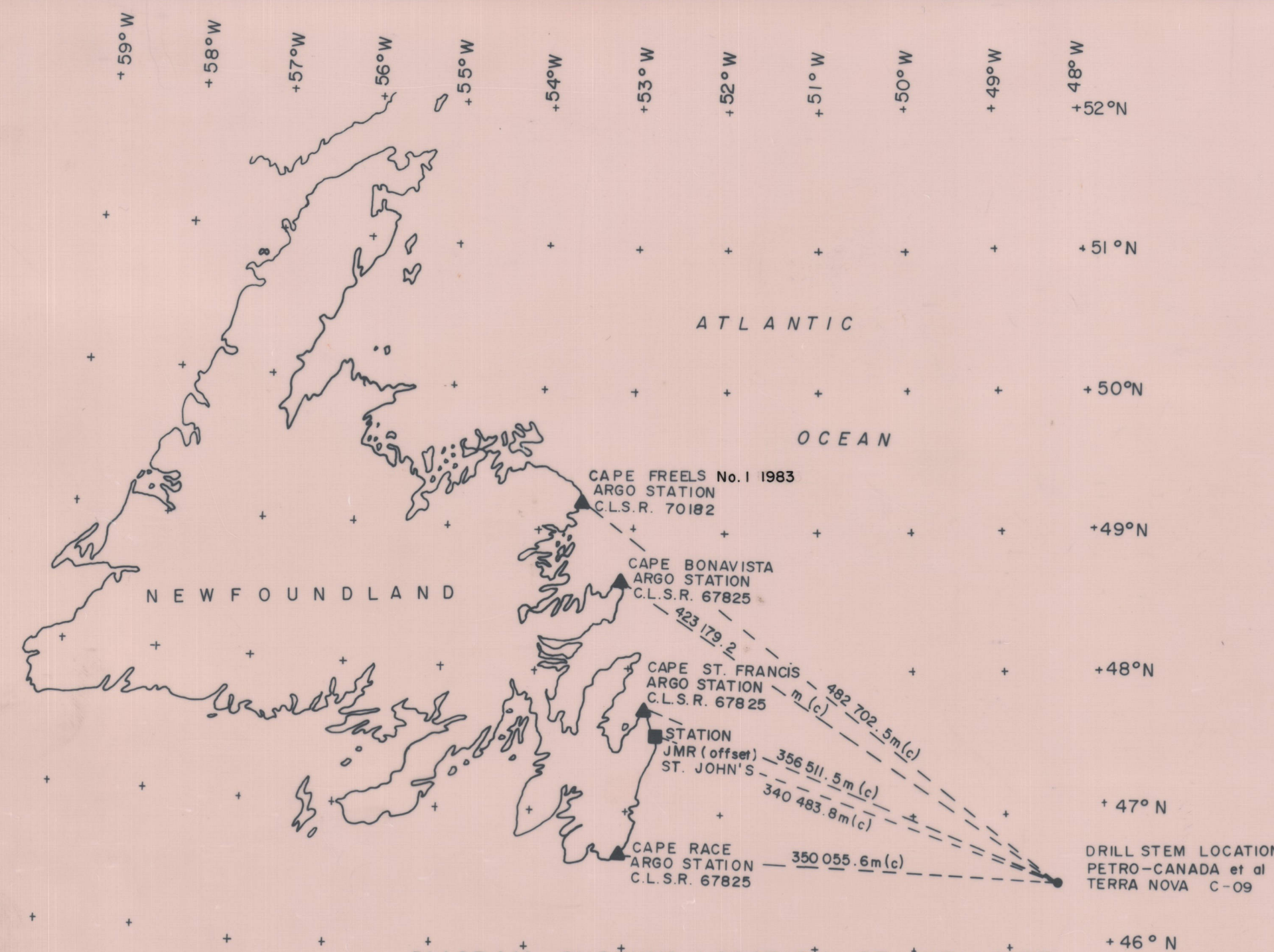
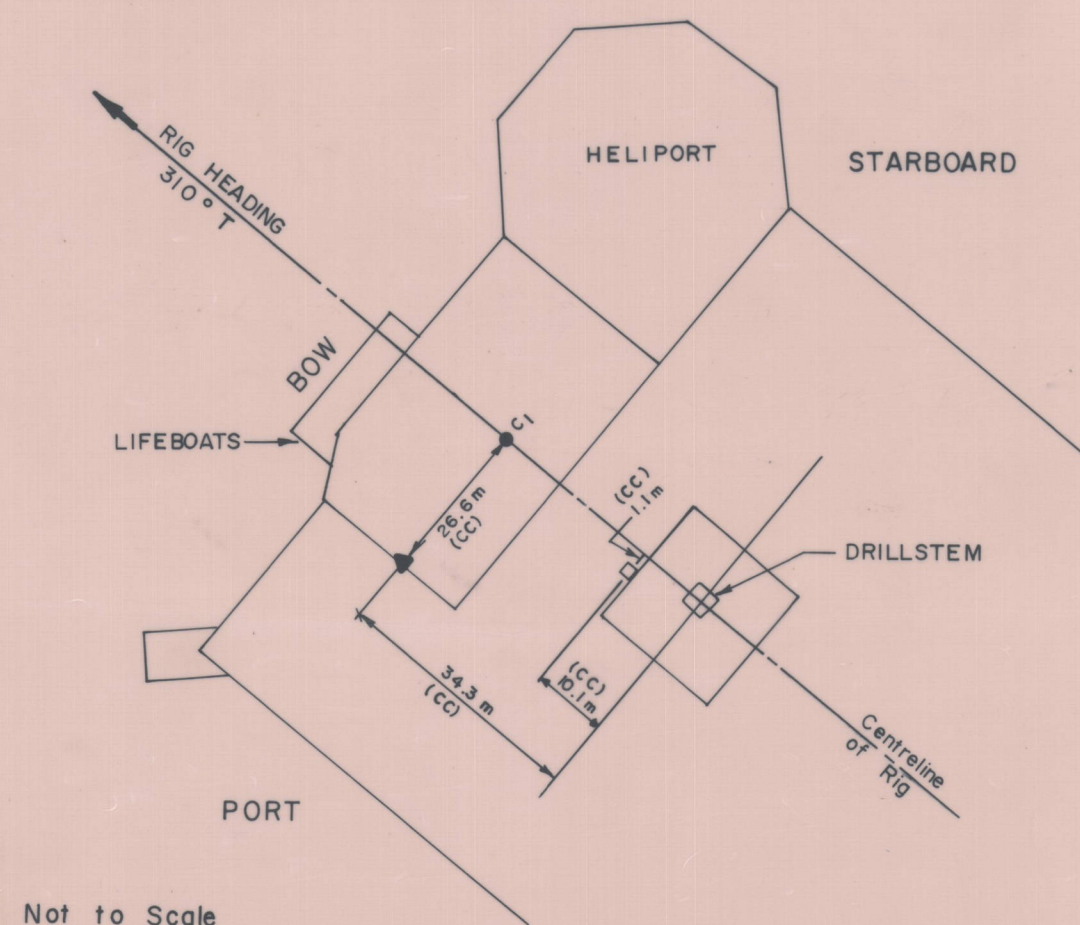


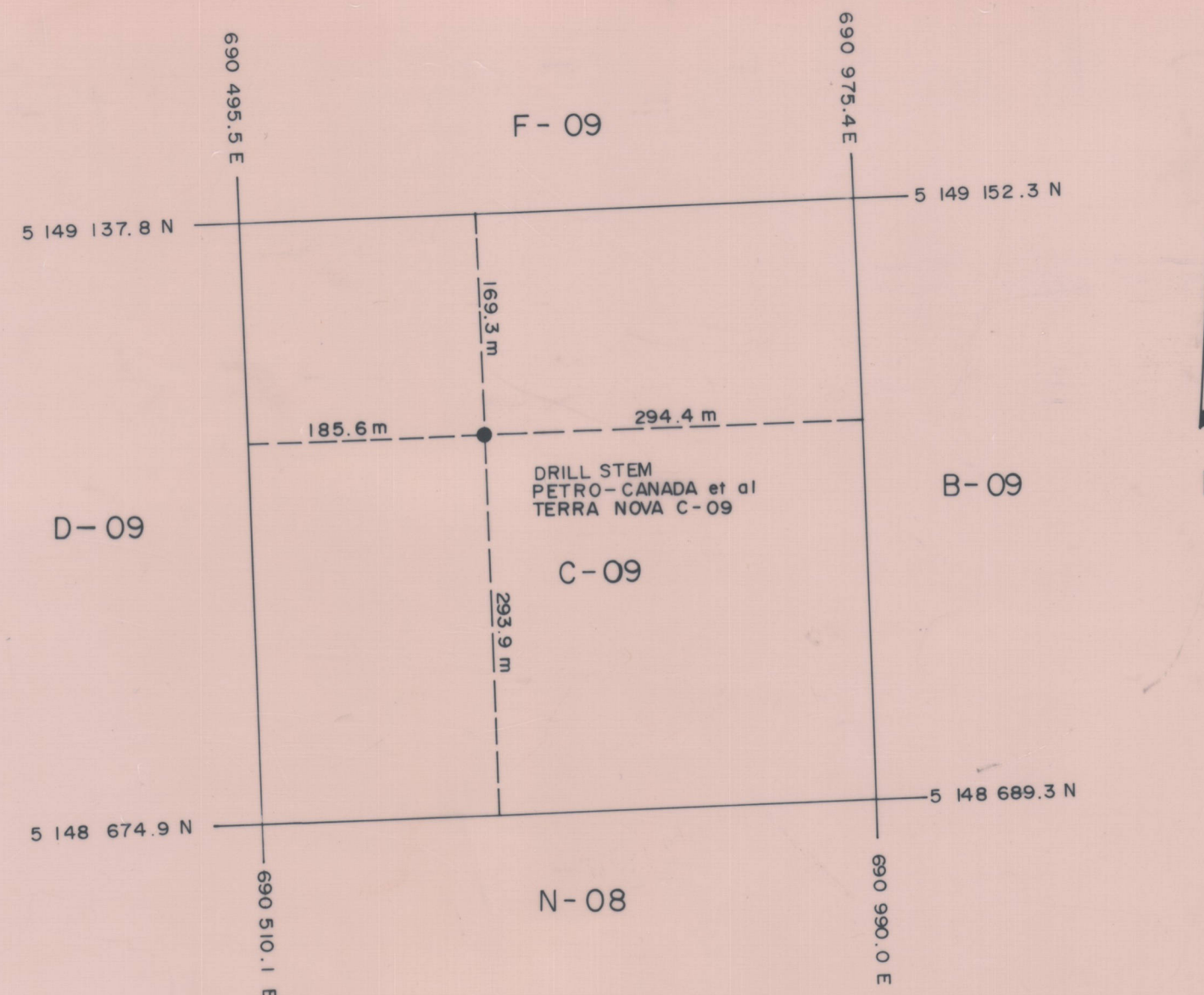
DIAGRAM SHOWING LOCATION OF WELLSITE

SCALE 1:4 000 000
100 000m 0 200 000m
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
CENTRAL MERIDIAN 51° W ZONE 22



ANTENNA OFFSETS FROM
DRILLSTEM ON SEDCO 710

- - MINI-RANGER III ANTENNA
- ▲ - MX 1502 ANTENNA
- CHECK CHAINED
- RIG HEADING 310° T DETERMINED BY RIG'S GYRO
- RIG'S GYRO ACCURACY CONFIRMED BY SURVEY VESSEL TO BE WITHIN 0.1°



DETAIL OF UNIT C SECTION 09

SCALE 1:5 000
100m 0 100m 200m
METRES

OIL AND GAS GRID COORDINATES, NAD 27					
	CORNER	GEOGRAPHIC		UTM, ZONE 22, C.M. 51° W	
		LATITUDE, N	LONGITUDE, W	NORTHING (m)	EASTING (m)
GRID AREA	NE	46° 30'	48° 30'	5 152 421.8	691 832.5
	NW	46° 30'	48° 45'	5 151 844.7	672 649.7
	SE	46° 20'	48° 30'	5 133 903.6	692 418.1
	SW	46° 20'	48° 45'	5 133 326.3	673 176.8
UNIT C SECTION 09	NE			5 149 152.3	690 975.4
	NW			5 149 137.8	690 495.5
	SE			5 148 689.3	690 990.0
	SW			5 148 674.9	690 510.1

FINAL WELLSITE COORDINATES, NAD 27				
	GEOGRAPHIC		UTM, ZONE 22, C.M. 51° W	
	LATITUDE, N	LONGITUDE, W	NORTHING (m)	EASTING (m)
MAGNAVOX MX 1502 ANTENNA	46° 28' 09.63"	48° 31' 00.83"	5 148 974.4	690 643.1
PLATFORM C1	46° 28' 10.29"	48° 31' 00.03"	5 148 995.3	690 659.5
SEDCO 710 DRILL STEM AS DETERMINED BY TRANSLOCATION SURVEY	46° 28' 09.58"	48° 30' 58.80"	5 148 974.2	690 686.4

CONFIRMATION SURVEY			
ARGO SHORE STATION COORDINATES, NAD 27			
STATION	GEOGRAPHICS	UTM, ZONE 22 C.M. 51° W	ELLIPSOIDAL DISTANCE TO DRILL STEM (C) ①
CAPE RACE ARGO STATION C.L.S.R. 67825	46° 39' 34.353" N 53° 04' 26.883" W	5 169 202.51 N 341 311.02 E	350 055.6 m
CAPE ST. FRANCIS ARGO STATION C.L.S.R. 67825	47° 48' 23.049" N 52° 47' 19.563" W	5 296 113.41 N 366 065.44 E	356 511.5 m
CAPE BONAVISTA ARGO STATION C.L.S.R. 67825	48° 41' 09.709" N 53° 05' 26.650" W	5 394 444.44 N 346 118.84 E	423 179.2 m
CAPE FREELS No.1 ARGO STATION C.L.S.R. 70182	49° 15' 02.671" N 53° 28' 20.516" W	5 458 052.87 N 320 076.83 E	482 702.5 m
ARGO CONFIRMATION POSITION			
MINI RANGER III ANTENNA	46° 28' 09.65" N 48° 30' 59.50" W	5 148 976.0 N 690 671.4 E	
DRILL STEM POSITION BY ARGO RESECTION (CONFIRMATION ONLY)	46° 28' 09.47" N 48° 30' 59.11" W	5 148 970.6 N 690 679.9 E	
ARGO DM - 54 INFORMATION			
FREQUENCY	1 759.0 kHz		
PROPAGATION VELOCITY (ASSUMED)	299 650 km/sec		
LANE WIDTH (COMPUTED)	85.176 237 m		
① Distances are computed to Satellite-derived Drill Stem.			

PRIMARY SURVEY					
SUMMARY OF DOPPLER SATELLITE POSITION - DIFFERENCE SURVEY					
	CONTROL STATION			DERIVED STATION	
	JMR (offset) 32 common passes observed between 2110 h. G.M.T. day 347 and 0845 h. G.M.T. day 350			MAGNAVOX MX 1502 ANTENNA 32 common passes observed between 2110 h. G.M.T. day 347 and 0845 h. G.M.T. day 350	
	1927 NAD COORDINATES	OBSERVED GEOCENTRIC COORDINATES ① (broadcast ephemeris datum)	DERIVED DATUM SHIFT (Geocentric minus NAD)	OBSERVED GEOCENTRIC COORDINATES ① (broadcast ephemeris datum)	DERIVED 1927 NAD COORDINATES (Geocentric minus Datum shift)
	cartesian coordinates $\begin{cases} x \\ y \\ z \end{cases}$ Latitude ϕ Longitude λ Ht. above sea level H Geoid ht. N Ht. above ellipsoid h	$\begin{cases} +2\ 612\ 816.33\text{ m} \\ -3\ 429\ 226.76\text{ m} \\ +4\ 684\ 757.99\text{ m} \end{cases}$ 47° 34' 18.174" N 52° 41' 43.041" W 78.30 m 32.00 m ③ 110.30 m	$\begin{cases} +2\ 612\ 772.03\text{ m} \\ -3\ 429\ 074.96\text{ m} \\ +4\ 684\ 944.61\text{ m} \end{cases}$ -44.30 m +151.80 m +186.62 m	$\begin{cases} +2\ 915\ 054.95\text{ m} \\ -3\ 296\ 727.14\text{ m} \\ +4\ 601\ 360.50\text{ m} \end{cases}$ 46° 28' 09.63" N 48° 31' 00.83" W 20.75 m ② 39.74 m 60.49 m	
① Coordinates are on the geocentric N.W.L. IOD System as provided by the satellite broadcast ephemeris.					
② Ht. above sea level is to the electrical centre of the antenna.					
③ Geoid ht. given in 'Surveying Offshore Canada Lands for Mineral Resource Development' Third Edition (Energy, Mines and Resources Canada, Surveys and Mapping Branch, December 1982) for station SATANT 730100.					
④ Geoid ht. from GEM IOB coefficients. GEM IOB is the Goddard Earth Model of the geoid for which the given height is computed relative to an eccentric 1927 NAD ellipsoid. The eccentricity used was from datum shifts supplied by the Geodetic Survey of Canada X ₂ -41, X ₂ +147, Z ₂ +181 given in 'Surveying Offshore Canada Lands for Mineral Resource Development' Third Edition (Energy, Mines and Resources Canada, Surveys and Mapping Branch, December 1982) for station SATANT 730100.					