

CANADA LANDS SURVEYS RECORDS
7 1 9 5 1
DATE 10 JAN. 1989

PLAN AND FIELD NOTES
OF SURVEY OF OFFSHORE
EXPLORATORY WELL LOCATION

PETRO-CANADA et al
TERRA NOVA H-99

LATITUDE: 46° 28' 29.39" N
LONGITUDE: 48° 28' 50.01" W
GRID AREA: 46° 30' N, 48° 15' W
SURVEYED: JUNE 11-20, 1987

BY: McELHANNEY OFFSHORE SURVEYS LTD.

FOR: PETRO-CANADA INC.
CANADA OIL AND GAS LAND REGULATIONS
EXPLORATION AGREEMENT No. 196

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 Beothuk 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 a Magnavox G.P.S. T-Set satellite positioning system (Mean of 53 acceptable positions with D.O.P. = 6 and altitude fixed). Documentation for its program can be obtained from Magnavox of Torrance, California. The translation components used for the local datum shift from World Geodetic System 84 to NAD 27 were $X_0 = -41$ m, $Y_0 = +147$ m, $Z_0 = +181$ m, as published for station SATANT-730100, in Surveying Offshore Canada Lands for Mineral Resource Development, Third Edition, 1982.

The Diagram Showing Location of Wellsite is a UTM projection with the Central Meridian at 51° W, Zone 22.

The coordinates and distances show 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.

All geographic coordinates are referred to 1927 North American Datum (1927 NAD) Clarke 1866 ellipsoid.

(c) indicates calculated distances.

Water depth at the location is approximately 96 m, as determined by an echo sounder during the site survey.

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

Geoff Wright
C.L.S.
WITNESS *Robert Clarke*
7 October 1987
DATE

PETRO-CANADA INC.

G. M. V. D.
87.10.13
DATE

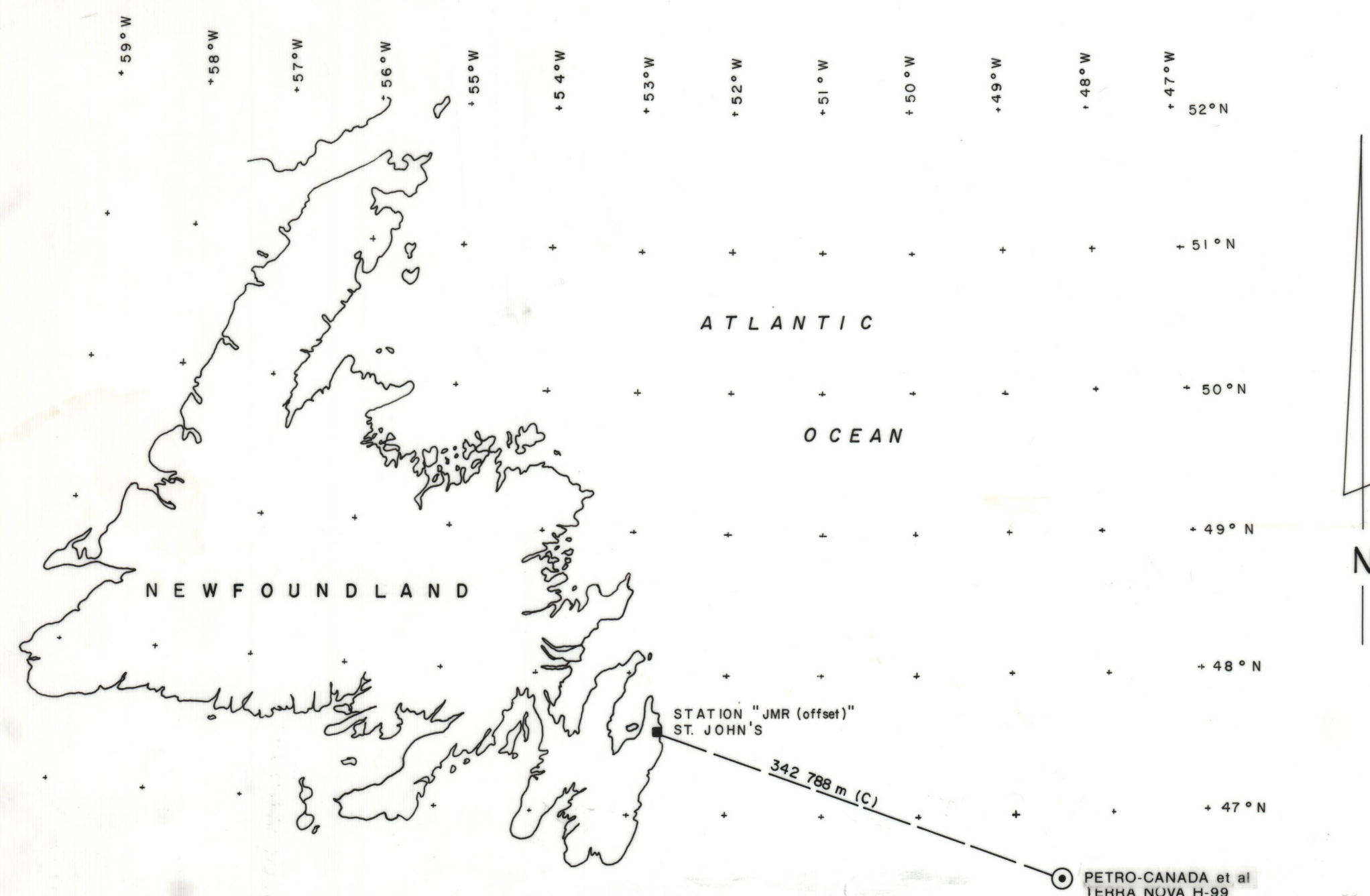
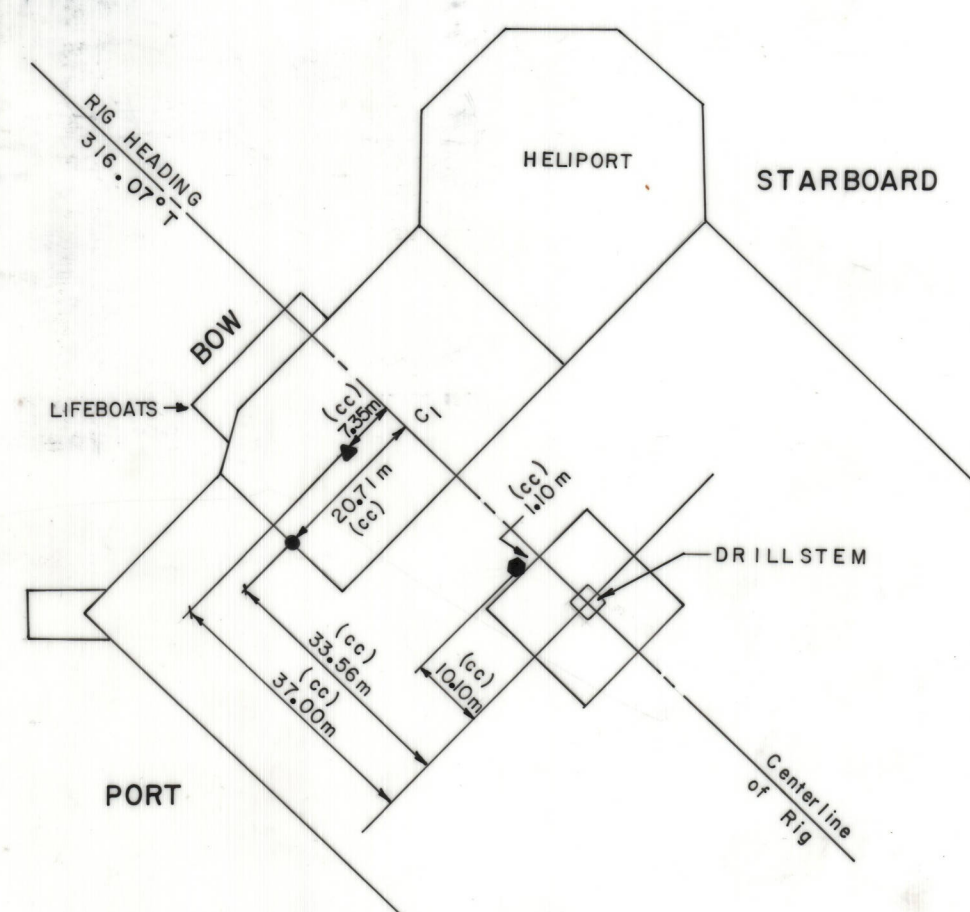


DIAGRAM SHOWING LOCATION OF WELLSITE
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
SCALE 1: 4 000 000

100 000m 0 100 000m 200 000m



ANTENNA OFFSETS FROM
DRILLSTEM ON SEDCO-710

NOT TO SCALE

ALL MEASUREMENTS IN METRES

- MX 1502 ANTENNA
- ▲ G.P.S. T-SET ANTENNA
- ▲ MINI RANGER III ANTENNA

NOTE:

- (CC) CHECK CHAINED
- RIG HDG. OF 316.07° T WAS DETERMINED BY SURVEY VESSEL
- CONFIRMATION BY RIG GYRO 316.0° T

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

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° 15'	5 153 059.8	711 015.0
	NW	46° 30'	48° 30'	5 152 421.8	691 832.5
	SE	46° 20'	48° 15'	5 134 541.7	711 659.3
	SW	46° 20'	48° 30'	5 133 903.6	692 418.1
UNIT H SECTION 99	NE			5 149 707.9	693 839.5
	NW			5 149 691.9	693 359.7
	SE			5 149 244.9	693 854.3
	SW			5 149 229.0	693 374.5

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' 29.70"	48° 28' 51.80"	5 149 681.04	693 374.95
PLATFORM C1	46° 28' 30.17"	48° 28' 51.10"	5 149 695.99	693 389.46
DRILLSTEM AS DETERMINED BY TRANSLOCATION SURVEY	46° 28' 29.39"	48° 28' 50.01"	5 149 672.66	693 413.47

CONFIRMATION SURVEY

SUMMARY OF
G.P.S. SATELLITE POINT SURVEY

	PUBLISHED DATUM SHIFTS ②	ANTENNA POSITION SEDCO 710 OBSERVED GEOCENTRIC COORDINATES ① (WGS 84)	ANTENNA POSITION SEDCO 710 DERIVED 1927 NAD COORDINATES (Geocentric minus datum shift)
cartesian coordinates $\begin{cases} x \\ y \\ z \end{cases}$	$\begin{cases} -41.0 \\ +147.0 \\ +181.0 \end{cases}$	$\begin{cases} +2\ 916\ 835.891\text{m} \\ -3\ 294\ 553.394\text{m} \\ +4\ 601\ 791.978\text{m} \end{cases}$	$\begin{cases} +2\ 916\ 876.891\text{m} \\ -3\ 294\ 700.394\text{m} \\ +4\ 601\ 610.978\text{m} \end{cases}$
Latitude ϕ		46° 28' 29.599" N	46° 28' 30.04" N
Longitude λ		48° 28' 47.633" W	48° 28' 50.76" W
Ht. above sea level H		24.00m	24.00m
Geoid ht. (GEM 10b) N		22.20m	32.00m ④
Ht. above ellipsoid h		46.20m ③	64.95m

- Coordinates are on the World Geodetic System, 1984 (WGS 84) Datum.
- Datum shift as published for station SATANT 730100 in "Surveying Offshore Canada Lands for Mineral Resource Development", Third Edition (1982)
- The Ellipsoid Height (h) was obtained by determining the Geoid Separation for the WGS 84 Ellipsoid at the MX 1502 rig antenna and adding the measured GPS antenna height above sea level.
- Geoid ht. derived from computed ellipsoid ht. minus measured ht. above sea level.

DRILLSTEM POSITION BY G.P.S. SATELLITE SYSTEM (CONFIRMATION)	46° 28' 29.35" N	48° 28' 49.31" W	5 149 671.90 N	693 428.43 E
--	------------------	------------------	----------------	--------------

PRIMARY SURVEY

SUMMARY OF
DOPPLER SATELLITE TRANSLOCATION SURVEY

	CONTROL STATION JMR (offset)		DERIVED STATION MAGNAVOX MX 1502 ANTENNA	
	20 common passes observed between 00:42h GMT day 169 and 11:44h GMT day 171		20 common passes observed between 00:42h GMT day 169 and 11:42h GMT day 171	
	1927 NAD COORDINATES	OBSERVED GEOCENTRIC COORDINATES ① (broadcast ephemeris datum)	DERIVED DATUM SHIFT (Geocentric minus NAD)	OBSERVED GEOCENTRIC COORDINATES ① (broadcast ephemeris datum)
cartesian coordinates $\begin{cases} x \\ y \\ z \end{cases}$	$\begin{cases} +2\ 612\ 817.16\text{m} \\ -3\ 429\ 227.84\text{m} \\ +4\ 684\ 759.48\text{m} \end{cases}$	$\begin{cases} +2\ 612\ 782.36\text{m} \\ -3\ 429\ 075.31\text{m} \\ +4\ 684\ 934.61\text{m} \end{cases}$	$\begin{cases} -34.80\text{m} \\ +152.53\text{m} \\ +175.13\text{m} \end{cases}$	$\begin{cases} +2\ 916\ 830.95\text{m} \\ -3\ 294\ 568.76\text{m} \\ +4\ 601\ 779.80\text{m} \end{cases}$
Latitude ϕ	47° 34' 18.174" N	47° 34' 18.174" N		46° 28' 29.70" N
Longitude λ	52° 41' 43.041" W	52° 41' 43.041" W		48° 28' 51.80" W
② Ht. above sea level H	80.32m			22.72m
Geoid ht. (GEM 10b) N	32.00m ③			43.35m ④
Ht. above ellipsoid h	112.32m			66.07m

- Coordinates are on the geocentric "NWL 10D" SYSTEM as provided by the satellite broadcast ephemeris.
- Hts. above sea level are to the electrical centre of the antenna.
- 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.
- Geoid ht. derived from computed ellipsoid ht. minus measured ht. above sea level.