



Surveyor General Branch

Beyond Boundaries

NOTICE OF ADDENDUM

From: *Surveyor General of Canada Lands*

Addendum 1.12

Addendum to: *National Standards for the Survey of Canada Lands (1.1)*

Object: *Chapter 11: OIL & GAS SURVEYS – NT, NU, AND OFFSHORE*

This Addendum is published to modify and modernize the whole of Chapter 11 of the *National Standards for the Survey of Canada Lands (1.1)* and replaces the Chapter 11 in its entirety.

The following herein shall constitute an official amendment to the document it refers to which it refers.

DETAIL

These changes are necessary to incorporate new tables of uncertainty, to clarify some of the items for survey reports, to update information regarding names of regulations.

Note that the changes to Chapter 11 are shown in red in the text hereafter.

Chapter 11: OIL & GAS SURVEYS – NT, NU, AND OFFSHORE

11.1 Introduction

This Chapter is for legal surveys carried out by Canada Lands Surveyors for oil and gas surveys in the Northwest Territories and Nunavut, and offshore Canada Lands.

On April 1st 2014, the new *Oil and Gas Land Regulations* under the *Northwest Territories Lands Act* came into force and are applicable to Territorial Lands in that Territory. It should be noted that though all references to Oil and Gas Regulations contained forthwith in this chapter are to the *Canada Oil and Gas Land Regulations* they **are** generally applicable to the *Oil and Gas Land Regulations* for the Northwest Territories as well.

1. **Legal surveys carried out by Canada Lands Surveyors (CLS) related to oil and gas are carried out under the *Canada Oil and Gas Land Regulations*** in order to establish:
 - a. the position of a well on land within a unit of a grid area pursuant to Section 12, 13, 20, or 21 (2) (a) of the Regulations; and
 - b. the position of monuments on a fixed offshore platform pursuant to Section 21 (3) (a) of the Regulations.
2. The same survey and plan prepared under the *Canada Oil and Gas Land Regulations* is used to confirm the position of wells under Section 74 of the *Canada Oil and Gas Drilling and Production Regulations* and under parallel Regulations of the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB), the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB), **and the Northwest Territories Office of the Regulator of Oil and Gas Operations (OROGO).**

Under the Production Regulations in the respective jurisdiction, a licensed Canada Lands Surveyor must certify the plan and a copy of the plan filed in the Canada Lands Survey Records (CLSR). However, the plan is not required for the disposition of oil and gas rights under the *Canada Oil and Gas Drilling and Production Regulations*. It is used only to confirm the position of wells for management and safety.

3. Revisions are required to some parts of the *Canada Oil and Gas Land Regulations*. When they came into force in 1961:
 - a. Under Section 9 of these Regulations, North American Datum of 1927 (NAD27) is the datum to be used for defining the latitude and longitude of grid areas, sections, units, and wells. However, **North American Datum 1983** (NAD83) is now the coordinate reference system used in Canada.
 - b. Under Section 16 of these Regulations, if the position of any boundary of a grid area, permit area, lease area, section, unit, or well position has been established by a legal survey approved by the Surveyor General, the position of that boundary or well is deemed to be the true position, and it determines the position of all other sections or units within the grid area. In 1961, positioning technology was rudimentary, wells were most often in remote areas, and geodetic control was sparse. Now with **Global Navigational Satellite Systems** (GNSS) and improved acoustic positioning for the offshore, positioning is sufficiently accurate that different surveys should result in no practical discrepancies in the positioning of grid areas.
 - c. Under Section 14 of these Regulations, the ground positions of grid areas, permit areas, lease areas, sections, units, and wells are to be determined by reference to physical monuments. Now, GNSS positioning **requires** less reliance on physical monumentation.
4. The following information is provided as an interim measure until the *Canada Oil and Gas Land Regulations* are updated.

11.2 Establishing Grid Areas, Sections, and Units

5. Sections 4 to 9 of the *Canada Oil and Gas Land Regulations* describe the land division system (consisting of grid areas, sections, and units) used for referencing surveys and oil and gas interests.
6. If no previous legal survey has been approved under the Regulations for the subject grid area, positions may be derived from control monuments or by GNSS observations.
7. Consultation with the Surveyor General Branch is required to determine if the grid area in which the surveyor is working has been established by a legal survey approved by the Surveyor General, and whether or not the surveyor will have to use control from the previous survey for new surveys within the same grid area.

11.3 Survey Methods

8. In addition to meeting the requirements specified in Sections 10 to 17 of the *Canada Oil and Gas Land Regulations*, surveys carried out under the Regulations must comply with the relevant provisions in Chapter 1: Surveys in the *National Standards for the Survey of Canada Lands* and the provisions in paragraphs 9 to 13 below.

Geo-Referencing

9. The survey must be geo-referenced in accordance with the requirements specified in Chapter 1.9: Geo-Referencing in the National Standards, with the following exceptions:
 - a. Land based absolute positioning requirements must be better than +/- 1 metre at the 95% confidence level.

- b. Seabed positioning accuracy requirements are dependent on the depth of the water and **other environmental and equipment factors**, and must be equal to or better than the minimum values **for the subsea well or structure**, at the 95% confidence level, specified in the following table:

Table of Horizontal Uncertainty based on Well Type

Absolute Positioning Accuracy				
Water Depth Range	0 to 250 metres	251 to 1000 metres	1001 to 2000 metres	2001 to 3000 metres
Exploration	± 2 metre	± 2 to 5 metres	± 5 to 10 metres	± 10 to 15 metres
Relative Positioning Accuracy				
Distance Between Subsea Structures	Within 100 metres	101 to 250 metres	251 to 500 metres	501 to 1000 meters
Development, Production, Injection or Disposal	± 1 metre	± 1 to 3 metres	± 3 to 4 metres	± 4 to 6 metres

The surveyor shall use methods, procedures and equipment that will meet the accuracy standard and be satisfied that the survey would meet the standard. For absolute positioning the lower value in the accuracy range should be commensurate with a shallower depth. For the relative positioning the lower value in the accuracy range should be commensurate with the shortest distance between structures.

- c. To achieve the positioning accuracy requirements the following formulae should be used :

$$\sqrt{a^2 + (b * d)^2}$$

Where,

a = constant depth error in metres

b = factor of depth dependent error

d = depth in metres for absolute positioning accuracy, or

d = distance between structures in metres for relative positioning accuracy

The adopted “a” and “b” values shall be explained and justified in the Survey Report making sure to discuss all of the components of the subsea solution, including at least the following:

- the vessel surface positioning, heading, offset to rotary table, and roll and pitch;
- environmental factors such as sea surface effects, excessive vessel motion causing cavitation and the speed of sound of the full water column;
- acoustic positioning such as ultra short baseline systems (USBL) and long baseline systems (LBL); and
- offset distance from the USBL transducer.

Surveys on Land

- Where the purpose of the survey is to establish the position of a well on land, at least two monuments must be established near the well but in locations safe from damage that could result from development or other operations.

11. For monuments placed in positions other than at section or unit corners, each placed monument must be marked with the letter “C,” followed by a distinguishing serial number (e.g., C23, C34, and C34A).
12. Survey connections must be made to permanent structures that may serve as permanent reference positions, such as well casings, wellhead equipment, or concrete foundations, and these positions must be described in the survey returns.

Offshore Surveys

13. For a subsea well (whether used for exploration, development, production, injection or disposal) the defined geo-referenced point must be the centre of the well bore encompassed in a blowout preventer or other device on the seabed. For subsea structures on the seabed geo-reference at least two (2) corners or other definable points (such as a machined slot with tight tolerances for the transponder or the centre of a transponder bucket). Include a sketch on the survey plan to show details of the subsea well or structure surveyed.

11.4 Plan Preparation

14. A plan and field notes are required, and they may be combined (see *Section 11.6: Specimen Plans* below).

The plan and field notes must comply with the relevant provisions in Section 2.2: Guidelines for Preparation of Survey Plans and Chapter 3: Field Notes in the National Standards.

In addition, include the following:

- a. in the title block, the name assigned to a well or offshore structure, the unit, section, and grid area in which the well or offshore structure is located, and the license number issued under the *Canada Oil and Gas Land Regulations*;
- b. the items required by Section 11 (2) of the *Canada Oil and Gas Land Regulations*;
- c. table showing geographic coordinates (latitude and longitude) and UTM coordinates in NAD27 of the corners of the grid area, of each unit involved, and of each well;
- d. table showing geographic coordinates (latitude and longitude) and UTM coordinates in NAD27 and NAD83 (CSRS) [Canadian Spatial Reference System] of the well, of monuments (on land), and of permanent objects geo-referenced on the surface platform (in the offshore);
- e. for surveys on land the ground elevation above sea level at the well;
- f. the perpendicular distances from the well or proposed well to the nearest unit boundary; and
- g. for offshore surveys provide the water depth at the subsea well or structure referenced to CGVD2013 along with any other vertical datum relationships established during the survey, at the 95% confidence level, as specified in the following table:

Natural Resources Canada (NRCan) has released the Canadian Geodetic Vertical Datum of 2013 (CGVD2013), which is now the new reference standard for heights across Canada. This height reference system replaced the Canadian Geodetic Vertical Datum of 1928 (CGVD28).

Table of Vertical Uncertainty based on Well Type

Absolute Positioning Accuracy				
Water Depth Range	0 to 250 metres	251 to 1000 metres	1001 to 2000 metres	2001 to 3000 metres
Exploration	± 1 metre	± 1 to 3 metres	± 3 to 5 metres	± 5 to 8 metres
Relative Positioning Accuracy				
Distance Between Subsea Structures	Within 100 metres	101 to 250 metres	251 to 500 metres	501 to 1000 meters
Development, Production, Injection or Disposal	± 1 to 2 metre	± 2 to 3 metres	± 3 to 4 metres	± 4 to 6 metres

The surveyor shall use methods, procedures and equipment that will meet the accuracy standard and be satisfied that the survey would meet the standard. For absolute positioning, the lower value in the accuracy range should be commensurate with a shallower depth. For the relative positioning the lower value in the accuracy range should be commensurate with the shortest distance between structures.

Although for offshore vertical transformations, there is typically a lack of sufficient gravity information to be certain of the geoid separation relationship, the values provided on the Natural Resources Canada website shall be used.

Link: [GPS-H](#)

(<https://webapp.geod.nrcan.gc.ca/geod/tools-outils/gpsh.php?locale=en>)

15. Because the land division system under the *Canada Oil and Gas Land Regulations* is referenced to **NAD27**, a Grid Converter Tool on **the Natural Resources Canada** website is available for computing the NAD83 coordinates and surface areas for the corresponding NAD27 grid areas, sections, and units.

Link: [Oil and Gas Grid Converter](#)

(<http://clss.nrcan.gc.ca/clss/grid-grille/search-recherche>)

11.5 Survey Returns

16. Submit the following survey returns:

- a. Plan of Survey; and
- b. Survey Report containing, in addition to the relevant requirements of Chapter 4: Survey Reports in the National Standards, the following information:
 - i. the method of determining coordinates of grid areas, sections, and units, and the position of wells and of new monuments;
 - ii. the method of determining the ground elevation for wells on land and determining the seabed or subsea well elevations for wells in the offshore.
 - iii. discussion of the maintenance and calibration of all equipment used to ensure the required accuracy is achieved, which for subsea wells shall also include the discussion of the installation and set-up; and

iv. discussion of the quality control and assurance measures used to ensure that accuracy standards and survey requirements are met.

17. Submit plans of survey for legal surveys north of the “Line of Administrative Convenience” (see Chapter 7 in the publication entitled *Getting a Survey Done* (www.nrcan.gc.ca/earth-sciences/geomatics/canada-lands-surveys/getting-surveydone/10874)) to the Surveyor General Branch in Edmonton for review and recording in the CLSR.
18. Submit plans of survey for legal surveys south of the “Line of Administrative Convenience” to the Surveyor General Branch in Ottawa for review and recording in the CLSR.
19. Pending amendment of the *Canada Oil and Gas Land Regulations*, as an interim measure, the Surveyor General will review but not approve survey plans prepared under these Regulations.

11.6 Specimen Plans

Available via the Natural Resources Canada website via Maps, tools and publications / Maps / Canada Lands Survey / For Canada Lands Surveyors / Survey Standards / Specimen Plans, at (<http://clss.nrcan.gc.ca/clss/surveystandards-normesdarpentage/>) for the following:

#29 Plan of Survey of Oil and Gas Well (Onshore)

#30 Plan of Survey of Oil and Gas Well (Offshore Platform)

This Addendum comes into force on the date of its publication on NRCan’s Website.

(Original signed on May 21, 2021)

Jean Gagnon, CLS
Surveyor General of Canada Lands