NWT OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS

DRAFT

GEOPHYSICAL REPORTING GUIDELINES AND INTERPRETATION NOTES

OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS

Acknowledgements:

OROGO would like to acknowledge the following for their contribution to the creation of these guidelines: (to be finalized)

Geophysical Reporting Guidelines and Interpretation Notes

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1. INTRODUCTION

1.01 Purpose

The *Geophysical Reporting Guidelines and Interpretation Notes* (Guidelines) provide guidance to operators on the filing of geophysical reports and the treatment of those reports after the expiry of the privilege period. These reports are an important resource for Northwest Territories residents, governments, and potential operators to understand the nature and extent of the petroleum resource endowment of the Northwest Territories.

As part of a negotiating process that devolved province-like legislative, land and resource management powers from the federal government to the Government of the Northwest Territories in 2014, federal legislation relating to land and resource management including oil and gas works and activities was "mirrored" in new territorial legislation. The mirroring of the *Canada Petroleum Resources Act* (CPRA), the *Canada Oil and Gas Operations Act* (COGOA), and their respective regulations as of April 1, 2014, preserved the continuity and legislative intent of the pre-devolution regime.

In *Geophysical Service Incorporated v. Encana Corporation*[1], the Court of Queen's Bench of Alberta commented on federal Parliament's purpose and intention in enacting the original legislation:

> *Parliament's purpose and intention when it enacted the CPRA was to allow for public disclosure of seismic data after a period of time to allow for necessary oil and gas exploration of the Canadian offshore and frontier lands. The wording of the CPRA, properly interpreted, allows for disclosure without restriction after a defined period of time. It is a complete and specific code that applies to all oil and gas intellectual property in the offshore and frontier lands, including seismic data. Its provisions supplant any more general pieces of legislation, such as the Copyright Act or the AIA.*

The Guidelines will further clarify the operation of the reporting requirements and the administration of the privilege accorded to those reports under section 91 of the *Petroleum Resources Act* (PRA). This will provide clarity to geophysical operators, users of the data collected, and better realize the legislative intent that was carried over in territorial legislation.

[1] 2016 ABQB 230. This paragraph was cited with approval by the Court of Appeal of Alberta in 2017 ABCA 125, page 31.This decision is currently the subject of a request for leave to appeal to the Supreme Court of Canada, File 37634.

1.02 Legislation

The legislative provisions relevant to reporting on oil and gas related geophysical operations can be found in:

- Section 91 of the PRA, which describes the privilege period for documents provided under OGOA.
- Section 52 of the *Oil and Gas Operations Act*, which allows for the establishment of regulations for the purposes of the exploration, production and conservation of oil and gas resources.
- Section 18 of the *Oil and Gas Operations Act*, which allow the Regulator to issue guidelines and interpretation notes with respect to, among other things, any regulations made under section 52 of that Act.
- Part 5 of the *Oil and Gas Geophysical Operations Regulations* (OGGOR), made under section 52 of the *Oil and Gas Operations Act*, which establishes the reporting requirements for oil and gas related geophysical operations.

1.03 Reporting Requirements

The Guidelines set out the minimum requirements for filing geophysical reports. Applicants may suggest alternative approaches, where those approaches are demonstrated to meet or exceed the same standards, upon approval of the Chief Conservation Officer.

1.04 Submissions

All reports required under these Guidelines must be submitted to the Chief Conservation Officer (CCO) via e-mail, or post, and are subject to the format requirements found in these Guidelines.

Chief Conservation Officer
Office of the Regulator of Oil and Gas Operations
PO Box 1320
(4th Floor, 5201 – 50th Ave)
Yellowknife, NT X1A 2L9
E-mail: orogo@gov.nt.ca

1.05 Paramountcy

Where a conflict exists between the Guidelines and the OGGOR, the OGGOR are paramount.

1.06 Approvals

Reporting requirements are met when reporting is complete to the satisfaction of the Chief Conservation Officer.

1.07 Objectives

The objectives of the Guidelines are to:

- Support operator compliance with the OGGOR;
- Clarify how OROGO will administer the privilege granted by section 91 of the PRA to geophysical reports;
- Maintain a measure of consistency with the requirements of other Canadian regulators, where appropriate; and
- Fulfill the purpose of the legislation and regulations, which have been commented upon by courts in the federal context.

1.08 Authority

These Guidelines are issued by the Regulator under section 18 of the *Oil and Gas Operations Act* (OGOA).

1.09 Regulator's Discretion

Application of these Guidelines is subject to the Regulator's discretion under OGOA.

1.10 Scope

The Guidelines apply to all oil and gas related geophysical operations and reports in the jurisdiction of the Regulator, effective the date of the Regulator's approval.

1.11 Jurisdiction

OROGO regulates oil and gas operations in the Northwest Territories, outside federal areas and the Inuvialuit Settlement Region.

1.12 Previously filed Geophysical Reports

Reports from non-exclusive programs authorized prior to April 1, 2014 are subject to the legislation and practices in effect at the time the operation was authorized.

Further details on the administration and release of data can be found under section 5.

1.13 Correcting Errors and Omissions

Pursuant to section 37(8) of the OGGOR, a person who has submitted a report required under section 37 of the OGGOR shall immediately notify the COO of any errors, omissions or corrections identified in or made to the survey location data subsequent to the furnishing of the report.

1.14 General Definitions

Definitions used for terms found within the guidelines can be found in the following legislation:

Oil and Gas Operations Act

Oil and Gas Geophysical Operations Regulations

Oil and Gas Drilling and Production Regulations

Petroleum Resources Act

2. WEEKLY STATUS REPORTS

2.01 Summary

This section describes the reporting requirements for status reports under section 36 of the OGGOR for geophysical operations where field work is being conducted.

2.02 Timing

Weekly Status Reports must be submitted at the beginning and end of the geophysical operation and once a week during the operation. Reports must be submitted by noon each Monday.

2.03 Submissions

The operator shall submit the Weekly Status Report to the Chief Conservation Officer.

2.04 Format

Operators should consult with OROGO regarding the format for weekly reporting. The required reports should be forwarded by e-mail or another mutually agreed method to the Chief Conservation Officer.

Digital formats for reports are described in Appendix 1.

Map formats are described in Appendix 2.

Digital images of enclosures and GIS formats are not required for weekly reports.

2.05 Report Contents [OGGOR 36 (a-f)]

The Weekly Status Report should include the following information:

2.05.1 General Information:

a. Geophysical Operations Authorization Number;
b. Type of Geophysical Operation;
c. Date of Report;
d. Time period covered by the report;
e. Name of Operator;
f. Name of Contractors;
g. Field Contact Information.

2.05.2 Description of program activity for the week:

a. Number of kilometers recorded;

b. Line numbers recorded;

c. Number of source points, gravity/magnetic stations;

d. Location of any shot hole from which gas or water has come to the surface.

2.05.3 Location map (see Appendix 2A for format requirement) showing:

a. Work completed to date;

b. Work completed in past week;

c. Work remaining.

2.05.4 A summary of any significant or unusual downtime and causes including weather conditions, incidents, near-misses, equipment failures, discovery of archaeological site or a burial ground, or technical difficulties.

[OGGOR 26, 39] Obligations for reporting under this weekly report do not fulfill the reporting requirements under sections 26 and 39 of the OGGOR to notify the Regulator of any incident, near-miss or discovery of archaeological site or burial ground.

2.05.5 A summary of any communication regarding the operation with trappers, fishers, guides, outfitters, community members or resource owners.

2.05.6 A summary of projected upcoming activities, including the work area for future activities.

2.05.7 A summary of environmental impacts such as observed displacement of wildlife, wildlife incidents or encounters.

2.05.8 Additional information as specified in the authorization.

3. FINAL REPORT – GEOPHYSICAL OPERATION (EXCLUSIVE AND NON-EXCLUSIVE)

3.01 Summary

This section describes the Final Report requirements under section 37 of the OGGOR, for

a. a geophysical operation that is conducted solely for the use of the operator and participants (exclusive); and

b. a geophysical operation that is conducted to acquire data for the purpose of sale, in whole or in part, to the public (non-exclusive).[2]

3.02 Timing
[OGGOR 37(1),(7)]

The Final Report must be submitted within 12 months of the date of termination of the geophysical operation. A program is considered to be terminated when field data collection is complete.

3.03 Submissions
[OGGOR 37(1)]

The operator shall submit the Final Report to the Chief Conservation Officer.

3.04 Format

All maps, graphs, and plots must be printed at appropriate scales for readability as determined by the Chief Conservation Officer.

Hardcopies and digital media can be sent by courier.

Digital formats must meet the criteria described in the appendices and be submitted on DVD or USB media.

Digital formats for reports and enclosures are described in Appendix 1.

Map and GIS data formats are described in Appendix 2.

[2] The additional reporting requirements for non-exclusive surveys that cease to be available for sale to the public can be found in section 37(4) of the *Oil and Gas Geophyscial Operations Regulations.*

3.05 Report Contents

The Final Report shall include the following information, organized and identified in sections as listed below:

1. General information (see 3.06 for details)
2. Operations Report (see 3.07 for details)
3. Processing Report (see 3.08 for details)
4. Maps and Enclosures (see 3.09 for details)

3.06 General Information

[OGGOR 37(1) (a-f)]

3.06.1 Title page including:

a. Geophysical Operations Authorization number;
b. report title;
c. type of operation conducted;
d. location of the operation;
e. dates of operations at that field location;
f. names of the contractors;
g. legal company name of program operator (or legal representative or agent);
h. interest owners (as defined in the PRA), if any;
i. name of the report author or person responsible for the report;
j. date of the report.

3.06.2 Table of contents linking each item to the appropriate OGGOR requirement and identifying the digital file(s) associated with each item.

3.06.3 Introduction or abstract.

3.06.4 Location map showing each area of interest covered by the operation and its respective identification number.

3.06.5 Summary of the operation, including:

a. significant dates such as commencement, suspension, recommencement and termination;
b. number of members of the geophysical crew;
c. type and number of each type of equipment used;

d. production data acquired ie: number of shots or stations;

e. total distance surveyed;

f. downtime per day;

g. number of kilometers of data recorded per day.

3.06.6 Summary of weather, sea, ice and topographic conditions and their effect on the operation, as applicable.

3.07 Operations Report
[OGGOR 37(1)(g)]

A general description of operations includes information on the data acquisition equipment and field procedures including:

a. the type of energy source used (dynamite, vibroseis etc.) and its parameters, including signal design;

b. the accuracy of the navigation, positioning and survey systems;

c. the detector equipment, including detector array geometry;

d. the recording system and parameters such as shotpoint interval, station interval, sampling rate, recording filter(s) settings, gain control, polarity, fold, aircraft elevation, etc.;

e. field configuration of source lines and receiver lines;

f. line naming convention;

g. equivalent information for other types of surveys.

3.08 Processing Report
[OGGOR 37(1)(h)]

Description of the data processing methods applied to the data including the processing sequence and the processing display parameters for seismic, magnetic, gravimetric and other geophysical surveys, including:

3.08.1 For seismic data:

a. each type of processing for which sections were generated, including the processing procedures and the sequence they were applied to the field data;

b. survey line list documenting lines that were processed; and

c. final processed seismic trace location coordinates.

3.08.2 For gravity data:

a. all corrections applied;
b. method of correcting discrepancies at line intersections;
c. method of spatial filtering, residual mapping and second derivative mapping;
d. method of gravity modeling, if any;
e. loop closure maps for elevation control; and
f. file format documentation.

3.08.3 For magnetic data:

a. all corrections applied to the total field data;
b. correction for diurnal;
c. correction with regional field;
d. method of spatial filtering, residual mapping and second derivative mapping;
e. method of correcting discrepancies at line intersections;
f. method of magnetic modeling;
g. file format documentation.

3.09 Maps and Enclosures

All map scales should appropriately present the data at an acceptable level of detail. One paper print and digital image of each map should accompany each copy of the report. Only one copy of GIS data is required.

Digital format requirements for enclosures are described in Appendix 1.

Map and GIS data format requirements are described in Appendix 2.

3.09.1 Maps and enclosures required for the Final Report include:

[OGGOR 37(1)(i-m)]

a. seismic shotpoint maps (paper and digital);
b. gravity station maps (paper and digital);
c. magnetic survey maps (paper and digital);
d. track plots and flight lines (paper and digital) with numbered fiducial points, which are on a working scale;
e. shotpoint/source/detector location data (digital only);
f. a fully processed, migrated seismic section for each seismic line recorded and for 3-D surveys a sub-set of

the lines and crosslines (digital only);

g. a high-resolution section for each line recorded in a well-site seabed survey or a pipeline route survey (digital only);

h. a series of gravity and magnetic profiles across all gravimetric and magnetic surveys for which interpretative maps have not been made (digital only).

3.09.2 (Exclusive) [OGGOR 37(1)(n-p) & 37(2)]

Additional maps and enclosures are also required in the Final Report for geophysical operations that are conducted solely for the use of the operator and participants (Exclusive) and include:

a. topographic maps or bathymetric maps that are compiled from the data collected (paper and digital);

b. interpretative maps (paper and digital), appropriate to the type of survey, which include the interpretation of data from the survey and the operator must also integrate previous surveys collected by the operator within the map area, including:

(i) for seismic surveys, all maps displaying time structure, depth structure, isopach, isochron, velocity, seismic amplitude and character change;

(ii) for gravity surveys, all maps displaying Bouguer gravity, residual gravity field, and derivative maps;

(iii) for magnetic surveys, all maps displaying total magnetic intensity, corrected total field, residual magnetic field and derivative maps;

c. synthetic seismograms and seismic modelling studies that use synthetic seismograms, vertical seismic profiles at wells that were used in the interpretation of the operation data, amplitude versus offset studies, and seismic inversion sections, if any (digital only).

3.09.3 (Exclusive) [OGGOR 37(1)(q)]

An interpretation report and seismic sections are also required for geophysical operations that are conducted solely for the use of the operator and participants (Exclusive) and includes a written discussion of:

a. all interpreted seismic horizons;

b. the maps and sections, including:

(i) the correlation between the geophysical and geological events; and

(ii) correlations between gravity, magnetic and seismic data;

c. details of corrections or adjustments applied to the data during interpretation;

d. examples of un-correlated and correlated seismic section (paper and digital) which illustrate the interpretative technique for structural and stratigraphic interpretation; and

e. any velocity information used for time-to-depth conversions.

4. FINAL REPORT - PURCHASED AND REPROCESSED DATA FOR CREDIT

4.01 Summary

This section describes the Final Report requirements under section 37 of the OGGOR, for:

a. purchasers of geophysical data in an area subject to an interest who wish to have the costs of the purchase credited against deposit or rental requirements of that interest; or

b. purchasers of geophysical data in an area subject to an interest who wish to have the costs of the reprocessing credited against deposit or rental requirements of that interest.

4.02 Timing
[OGGOR 37(7)]

Operators must obtain pre-approval of eligible costs of purchasing or reprocessing from the Petroleum Resources Division of the Government of the Northwest Territories.

The Final Report must then be submitted to the Chief Conservation Officer with evidence of pre-approval.

Costs will not be credited against the deposit or rental requirements of the interest until reports are approved by the Chief Conservation Officer.

4.03 Submission

The operator shall submit the Final Report to the Chief Conservation Officer.

4.04 Format

Hardcopies can be sent by courier. All maps, graphs, and plots must be printed at appropriate scales for readability as determined by the Regulator.

Digital formats must meet the criteria described in the appendices and be submitted on DVD or USB media.

Digital formats for reports and enclosures are described in Appendix 1.

Map and GIS data formats are described in Appendix 2.

4.05 Report Contents

The Final Report shall include the following information, as applicable, organized and identified in applicable sections as listed below:

a. Final Report – purchased for credit:
   1. Maps and Enclosures (see section 4.06.1)
   2. Interpretation Report (see section 4.06.2)
b. Final Report – reprocessed for credit:
   1. Title page (see section 4.07.1)
   2. Processing report (see section 4.07.2)
   3. Maps and enclosures (see section 4.07.3)
   4. Interpretation report (see section 4.07.4)

4.06 Final Report - Purchased for Credit

[OGGOR 37(5)]

Purchasers of geophysical data in an area subject to an interest who wish to have the costs of the purchase credited against deposit or rental requirements of that interest must submit all the information in 4.06 that have been prepared by or for the purchaser.

All map scales should appropriately present the data at an acceptable level of detail. One paper print and digital image of each map should accompany each copy of the report. Only one copy of GIS data is required.

Digital format requirements for enclosures are described in Appendix 1.

Map and GIS data format requirements are described in Appendix 2.

4.06.1 (Purchased for Credit)

[OGGOR 37(1)(n-p)]

Maps and enclosures required in the Final Report include:

a. topographic or bathymetric maps that are compiled from the data purchased (paper and digital);
b. interpretative maps (paper and digital) appropriate to the type of survey, which indicate the interpretation of data from the survey, including:
   (i) for seismic surveys, all maps displaying time structure, depth structure, isopach, isochron, velocity, seismic amplitude and character change;
   (ii) for gravity surveys, all maps displaying Bouguer gravity, residual gravity field and derivative maps;
   (iii) for magnetic surveys, all maps displaying total

magnetic intensity, corrected total field, residual magnetic field and derivative maps; and

c. synthetic seismograms and seismic modelling studies that use synthetic seismograms, vertical seismic profiles at wells that were used in the interpretation of the operation data, amplitude versus offset studies, and seismic inversion sections, if any (digital only).

4.06.2 (Purchased for Credit) [OGGOR 37(1)(q)]

An interpretation report and seismic sections required in the Final Report includes a written discussion of:

a. all interpreted seismic horizons;

b. the maps and sections, including:

(i) the correlation between the geophysical and geological events; and

(ii) correlations between gravity, magnetic and seismic data;

c. details of corrections or adjustments applied to the data during interpretation;

d. examples of un-correlated and correlated seismic sections (paper and digital) which illustrate the interpretative technique for structural and stratigraphic interpretation; and

e. any velocity information used for time-to-depth conversions.

4.07 Final Report - Reprocessed Data for Credit [OGGOR 37(6)]

Purchasers of geophysical data in an area subject to an interest who wish to have the costs of the reprocessing credited against deposit or rental requirements of that interest must submit all information in 4.07 that have been prepared by or for the purchaser.

All map scales should appropriately present the data at an acceptable level of detail. One paper print and digital image of each map should accompany each copy of the report. Only one copy of GIS data is required.

Digital formats enclosures are described in Appendix 1.

Map and GIS data formats are described in Appendix 2.

4.07.1 [OGGOR 37(1)(a)]

Title Page including:

a. report title;

b. type of reprocessing conducted;
c. location of the original operation;
d. dates of original operation and the reprocessing;
e. names of the reprocessing contractors;
f. legal company name of reprocessing Operator (or legal representative or agent) and participants;
g. participants and interest owners (as defined in OGGOR and PRA respectively), if any;
h. name of the report author or person responsible for the report;
i. date of the report.

4.07.2 Reprocessing Report

[OGGOR 37(1)(h)] Description of the data reprocessing methods applied to the data including the reprocessing sequence and the reprocessing display parameters for seismic, magnetic, gravimetric and other geophysical surveys, including:

a. For seismic data:
    i. each type of reprocessing for which sections were generated, including the reprocessing procedures and the sequence they were applied to the field data;
    ii. survey line list documenting lines that were reprocessed; and
    iii. final reprocessed seismic trace location coordinates.
b. For gravity data:
    i. all corrections applied;
    ii. method of correcting discrepancies at line intersections;
    iii. method of spatial filtering, residual mapping and second derivative mapping;
    iv. method of gravity modeling;
    v. loop closure maps for elevation control; and
    vi. file format documentation.
c. For magnetic data:
    i. all corrections applied to the total field data;

ii. correction for diurnal;

iii. correction with regional field;

iv. method of spatial filtering, residual mapping and second derivative mapping;

v. method of correcting discrepancies at line intersections;

vi. method of magnetic modeling; and

vii. file format documentation.

4.07.3 (Reprocessed Data for Credit) [OGGOR 37(1)(j) to (l), (o) to (p) & 37(2)]

Maps and enclosures required in the Final Reprocessing Report include:

a. a fully reprocessed, migrated seismic section digital image for each seismic line reprocessed and, in the case of a 3-D survey, a sub-set of lines and crosslines from the 3-D data set;

b. a high-resolution section for each line recorded in a well-site seabed survey or a pipeline route survey;

c. a series of gravity and magnetic profiles across all gravimetric and magnetic surveys for which interpretative maps have not been made (digital only);

d. interpretative maps (paper and digital) appropriate to the type of survey, which indicate the interpretation of data from the survey including:

   i. for seismic surveys, all maps displaying time structure, depth structure, isopach, isochron, velocity, seismic amplitude and character change;

   ii. for gravity surveys, all maps displaying Bouguer gravity, residual gravity field and derivative maps;

   iii. for magnetic surveys, all maps displaying total magnetic intensity, corrected total field, residual magnetic field and derivative maps;

e. synthetic seismograms and seismic modelling studies that use synthetic seismograms, vertical seismic profiles at wells that were used in the interpretation of the operation data, amplitude versus offset studies, and seismic inversion sections, if any (digital only).

4.07.4 (Reprocessed Data

An interpretation reprocessing report and seismic sections required in the Final Report includes a written discussion of:

for Credit)

[OGGOR 37(1)(q)]

a. all interpreted seismic horizons;
b. the maps and sections, including:
    i. the correlation between the geophysical and geological events; and
    ii. correlations between gravity, magnetic and seismic data;
c. details of corrections or adjustments applied to the data during interpretation;
d. examples of un-correlated and correlated seismic sections (paper and digital) which illustrate the interpretative technique for structural and stratigraphic interpretation; and
e. any velocity information used for time-to-depth conversions.

5. ADMINISTRATION AND RELEASE OF DATA

5.01 Release of Data

Geophysical work performed on or in relation to petroleum lands will no longer be privileged after the expiration of 5 years following the data of completion of the work, as described in section 91(8)(d)(ii) of the PRA.

All reports and data submitted to the Chief Conservation Officer are eligible for public release after the expiration of the privilege period.

5.01.1 Release of Data Disclosure

Operators are advised that data submitted to OROGO may be provided to the NWT Geological Survey, the Government of the Northwest Territories, or other entities in accordance with the limited circumstances described in section 91 (9) of the PRA.

5.02.2 Grandfathered Authorizations

Confidentiality of reports from non-exclusive operations authorized prior to April 1, 2014 will be administered according to National Energy Board practice at the time of authorization.

5.02 Retention of Data

Operators are required to retain the data in accordance with OGGOR section 38 (1) to (8).

5.03 Liability

Operators and participants in purchases of geophysical data are expected to review and familiarize themselves with section 91 of the *Petroleum Resources Act*, and the limitations on privilege described within the Act. Filings made pursuant to these Guidelines will be treated in accordance with section 91 and in particular, will be subject to public disclosure upon the expiry of the timelines described in section 91(8).

The Regulator, delegates of the Regulator, and OROGO do not accept liability for any loss or damage that may be caused to an operator or third party that are attributable in whole or in part to the disclosure of information and documentation that is no longer subject to privilege under section 91.

6. REGULATOR'S APPROVAL

These *Geophysical Reporting Guidelines and Interpretation Notes* are issued under section 18 of the *Oil and Gas Operations Act* effective [TBD Date].

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Louis Sebert
Regulator

Appendix 1: Digital Document Submission

Operators may contact the Chief Conservation Officer to determine if documents will be accepted in alternative formats.

A. Digital Documents

Text documents (e.g. reports) must be in searchable PDF format.

Tabular data must be provided in PDF format and in a spreadsheet format of either Excel (xls, xlsx) or Open Data Format (ODF).

Images must be in GeoTIFF format where possible, and TIFF format otherwise.

See the OROGO Document Submission Guidelines for further information.

B. 2-D Seismic Enclosures
(see Table 1)

B.1 Fully annotated digital images of each seismic section, including:

a. an example side legend with processing and acquisition parameters for each type of output;

b. spatial annotation with CDP and SP numbering;

c. side legend reference;

d. vertical annotation with time or depth scale numbering; and

e. line numbering on each image.

Images must be of the final processing output, pre-stack time migration (PSTM) and pre-stack depth migration (PSDM) if generated. Where no migrated sections were prepared, copies of the last processing of non-migrated sections should be submitted.

Display trace amplitude in variable density seismic display using a blue-white-red color spectrum. The seismic should be zero-phase with hard or positive events represented by a peak (red) while soft or negative events should be a trough (blue).

B.2 A digital copy of both the shotpoint/source/detector and the final seismic trace locations with time stamp (final processed) data are required.

B.3 A digital copy of the velocity data is required. All appropriate location data should be included with the time and velocity data.

B.4 Data should be submitted on DVD or USB media.

B.5 Copies of other versions of the processed seismic data may be requested.

B.6 All location data should reference the NAD83 datum and identify the appropriate UTM zone.

Table 1: 2-D Seismic Enclosures - Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Shotpoint/Source/Detector location data with time stamp (final survey data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information – see section B above for details
Seismic trace location data with time stamp (final processed data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information – see section B above for details
Digital images of seismic sections - fully annotated, final processed data (PSTM and PSDM)	1 digital (each)	GeoTIFF or TIFF (300 DPI minimum)	12 months after completion of program	DVD/USB	1:50,000 horizontal scale, 5 inches per second or 5 inches per kilometer vertical scale. Amplitudes in variable density as defined in section B.
Velocity data	1 digital	ASCII	12 months after completion of program	DVD/USB	Including line number, shotpoint, time, RMS pairs for both stacked and migrated velocities
Operations Report Processing Report Interpretation Report**	2 paper 1 digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and DVD/USB	See sections 3.07, 3.08, 3.09 or 4.07 for required content. Report to reference time and depth surfaces where applicable

* Copies of other versions of the processed seismic data may be requested.

**Interpretation report is not required for non-exclusive 2-D seismic surveys.

C. 3-D Seismic Enclosures

(see Table 2)

C.1 Any 3-D seismic surveys collected in support of 4-D studies have the same submission requirements as listed below and in Table 2.

C.2 Fully annotated digital images of inlines, cross-lines and horizontal slices including:

a. one example side legend with processing and acquisition parameters for each type of output;

b. spatial annotation with CDP and SP numbering;

c. side legend reference;

d. vertical annotation with time or depth scale numbering and

e. line numbering on each image.

Images must be of the final processing output, pre-stack time migration (PSTM) and pre-stack depth migration (PSDM) if generated. Where no migrated sections were prepared, copies of the last processing of non-migrated sections should be submitted.

Display trace amplitude as variable density seismic display using a blue-white-red color spectrum. The seismic should be zero-phase with hard or positive events represented by a peak (red) while soft or negative events should be a trough (blue).

C.3 A digital copy of both the shotpoint/source/detector and seismic trace locations with time stamp (final processed) data is required.

C.4 A digital copy of the velocity data is required. All appropriate location data should be included with the time and velocity data.

C.5 Data should be submitted on DVD or USB media.

C.6 Copies of other versions of the processed seismic data may be requested.

C.7 All location data should reference the NAD83 datum and identify the appropriate UTM zone.

Table 2: 3-D Seismic Enclosures - Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Shotpoint/Source/Detector location data with time stamp (final survey data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information – see section C above for details
Seismic Trace location data with time stamp (final processed data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information – see section C above for details
Polygonal position data (full fold outline)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	Survey inflection points describing the corner points in inline/cross-line, lat/long and UTM coordinates
Digital images of seismic sections - fully annotated, final processed data (PSTM and PSDM)	1 digital (each)	GeoTIFF or TIFF (300 DPI minimum)	12 months after completion of program	DVD/USB	1:50,000 horizontal scale, 5 inches per second or 5 inches per kilometer vertical scale. Amplitudes should be variable density as defined in section C.
Velocity data	1 digital	ASCII	12 months after completion of program	DVD/USB	Including line number, shotpoint, time, RMS pairs for both stacked and migrated velocities
Operations Report Processing Report Interpretation Report**	2 paper 1 digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and DVD/USB	See sections 3.07, 3.08, and 3.09 for required content Report to reference time and depth surfaces where applicable

* Copies of other versions of the processed seismic data may be requested.

**Interpretation report is not required for non-exclusive 3-D seismic surveys.

D. Gravity Survey Enclosures

(see Table 3)

D.1 Measurement Station location data with time stamp.

D.2 One copy of digital records of processed gravity data in ASCII format, containing latitude/longitude, observed absolute value of gravity, Bouger anomaly and Free-air anomaly, for all data points.

E. Magnetic Survey Enclosures

(see Table 3)

E.1 Measurement Station location data with time stamp.

E.2 One copy of digital records of processed magnetic data in ASCII format containing latitude/longitude, total field value corrected for diurnal variation and residual magnetic field for all readings.

Table 3: Gravity/Magnetics Enclosures - Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Station Location data with time stamp (final survey data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information
Processed data	1 digital	ASCII	12 months after completion of program	DVD/USB	Including final survey and calculated field data Gravity specific – see section D above Magnetic specific – see section E above
Digital images of interpretation maps	1 digital	TIFF (300 DPI minimum)	12 months after completion of program	DVD/USB	Include all maps from the interpretation report as separate geo-referenced TIFF images
Interpretation Report* Operations Report Processing Report	2 paper 1 digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and DVD/USB	See sections 3.07, 3.08, and 3.09

*Interpretation report is not required for non-exclusive gravity/magnetic programs.

F. Other Surveys Enclosures

(see Table 4)

F.1 Any other surveys that have not been included in the previous points are required to submit equivalent electronic data, interpretation, operations and processing information.

Table 4: Other Survey Enclosures- Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Station Location data with time stamp (final survey data)	1 digital	UKOOA/SEG-P1	12 months after completion of program	DVD/USB	P1/90 or equivalent information
Processed data	1 digital	ASCII	12 months after completion of program	DVD/USB	Including final survey and calculated field data
Fully annotated images of final processed data	1 digital	TIFF (300 DPI minimum)	12 months after completion of program	DVD/USB	
Interpretation Report* Operations Report Processing Report	2 paper 1 digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and DVD/USB	See sections 3.07, 3.08, and 3.09 for required content

*Interpretation report is not required for non-exclusive programs

Appendix 2: Map and GIS data submission[3]

Operators can contact the Chief Conservation Officer to determine if submissions will be accepted in alternative formats.

A. Maps

A.1 Geographical Features - In addition to base map features (e.g. topography, place names, administrative boundaries, interest areas, previously collected similar data, etc.), maps submitted should also include all project features of interest.

A.2 Map Elements – The maps should include elements such as a map title, map scale (scale bar and/or scale text), graticule labels, data source, date, and disclaimers. Geographic coordinate reference grids must be clearly visible along with their associated coordinate values.

B. GIS Data

B.1 GIS data must be submitted in a format compatible with currently supported versions of ArcMap Desktop. OROGO will accept the following formats:

a. Vector Data

i. Shapefiles with main file (.shp), index file (.shx), projection file (.prj), dBase table (.dbf), and metadata (.xml) are required.

ii. Submit different types of features as individual shapefiles (eg. shotpoints, flight lines).

iii. Contact OROGO to discuss other acceptable formats.

b. Raster Data

i. Tagged Image File Format (TIFF) GeoTIFF (.tif, .tiff and .tff); and

ii. Ortho-corrected and georeferenced;

iii. Contact OROGO to discuss other acceptable formats.

B.2 Metadata

a. The datasets must include basic metadata in the format and standard of Extensible Markup Language (XML). Operators can use one of the Federal Geographic Data Committee (FGDC)

[3] Adapted from Mackenzie Valley Land and Water Board - *Guideline for GIS Submission Standard*

approved metadata standards to fill out the ESRI metadata stylesheet.

b. The documentation must include, as applicable, the following:

i. Operator name;

ii. Interest owners, if any;

iii. Geophysical Operations Authorization Number, if any;

iv. Project/data set description;

v. Scale of data set compilation (e.g. 1:20,000);

vi. Datum and projection of data set compilation;

vii. Citation information e.g. originator;

viii. Date of creation and any updates;

ix. Data source (e.g. GPS, airphoto, etc.) with resolution;

x. Data quality and accuracy;

xi. Agency and person responsible for the data set and contact information;

xii. Restrictions and limitations; and

xiii. List of attributes, description of the attributes and acronyms.

B.3 Attribute table

The attribute table is a dBase table (.dbf) created as part of a shapefile. The dBase table should consist of attribute fields used to describe each entity in each dataset. Acronyms in the attribute table should be identified in the metadata (.xml). The attributes can vary depending on the type of project. The level of detail in the attribute table should reflect the description in the application. In addition to the default fields such as Object ID and Shape (point, polyline, polygon), the attribute table should include fields, if applicable, such as:

i. Name/ID (e.g. program ID, line number)

ii. Type of feature (e.g. shotpoint, seismic line, airstrip, etc.)

iii. Status (e.g. active, suspended, to be constructed, etc.)

iv. Date

v. Other values associated with each entity (e.g. depth, width, capacity).

B.4 Projection and coordinates

GIS data must be in one of the following projections:

i. Northwest Territories Lambert Conformal Conic – NAD83

ii. Canada Lambert Conformal Conic – NAD83

iii. Transverse Mercator – NAD83 UTM Zone #N (zone number between 8N and 12N should be clearly indicated)

iv. Geographic coordinates – NAD83 (decimal degrees)

Any geographic coordinates submitted in table format (e.g. spreadsheets) should be in the format of degree, minutes, seconds or decimal degrees (preferred) as shown below:

Format	Degree, minutes, seconds [1] (DMS)	Decimal degrees [2] (Preferred) (D)
Example	128°38’20.773”W, 66°15’28.522”N	-128.639104˚, 66.257923˚
Longitude, Latitude	DDD˚MM’SS.SS” W, DDD˚MM’SS.SS”N	-D.DDDD˚ , +D.DDDD˚
Unit symbols	D (˚), M (’), S (“)	D (˚)
Direction (west, north)	W, N	-, +

[1] The seconds in DMS format must be to a precision of at least two decimal places.
[2] The decimal degrees must be to a precision of at least four decimal places.