CNSOPB

CANADA-NOVA SCOTIA
OFFSHORE PETROLEUM BOARD

Geophysical, Geological, Geotechnical and Environmental Program Guidelines

26 January 2015

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1.0 INTRODUCTION

The Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) is responsible for the administration of the regulations pertaining to all exploration for, and production of, hydrocarbons in the Nova Scotia offshore area. These guidelines have been prepared to help operators who wish to conduct a geophysical, geological, geotechnical or environmental program in offshore Nova Scotia. They replace those issued by the CNSOPB in 1992. The Guidelines are based on the *Canada-Nova Scotia Offshore Petroleum Resources Accord (August 26, 1986) and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act, R.S., 1988 collectively called the "Accord Acts", Nova Scotia Offshore Petroleum Occupational Health & Safety Requirements, Nova Scotia Offshore Petroleum Geophysical Operations Regulations,* and the *Canadian Environmental Assessment Act. These guidelines also incorporate the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environmental.*

Geophysical Programs are defined as those involving the indirect measurement of physical properties of rocks. This includes but is not limited to 2-D, 3-D and 4-D seismic surveys, seabed surveys, controlled source electromagnetic (CSEM), airborne gravity and magnetic surveys. In the case of well-related seismic surveys, (vertical seismic profiles – VSP), any survey where the seismic source is activated from a vessel (walk-away or walk-above) rather than suspended directly from the drilling unit (zero offset), is also considered a geophysical program.

Geological Programs are defined as those involving the collection and analysis of lithological, paleontological or geochemical materials.

Geotechnical Programs are described as those involving the measurement of physical properties of the seabed and shallow subsurface.

Environmental Programs are defined as those involving the study of physical, chemical and biological elements of the lands, oceans or coastal zones.

Prospective operators who propose to employ a foreign vessel and/or personnel to conduct their programs should be aware that additional Federal legislation applies and the relevant Federal Government departments should be consulted if such use is contemplated. Information as to the appropriate contacts in these departments is given in Appendix D of this document.

These guidelines also include information regarding the procedures for obtaining permission to sample well material curated by the CNSOPB at the Geoscience Research Centre, and the reporting for any work completed on such material.

The CNSOPB has in place a cost recovery program to recover costs associated with processing program authorization applications, which are subject to change from time to time. An applicant for an authorization to conduct a geophysical, geological, environmental, or geotechnical program should check with the CNSOPB to determine the costs that an applicant would be required to pay in association with an application.

For most programs, information must be submitted to the CNSOPB in three stages; at the time of the application for authorization (program assessment, during field operations (weekly reporting), and after completion of the program (final reports and data submission).

Within these guidelines, geophysical, geological, geotechnical or environmental programs will be referred to as technical programs, and the personnel responsible for collecting the data relating to these programs as the technical crew.

Additional information may be obtained from the CNSOPB at:

Canada-Nova Scotia Offshore Petroleum Board
1791 Barrington Street
8th Floor TD Centre
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Forms are available on our website: www.cnsopb.ns.ca

2.0 OPERATING LICENCE

No exploratory activity involving field work will be authorized by the CNSOPB unless the applicant holds a valid operating licence. Any individual or corporation may apply to the CNSOPB for an operating licence. The following documentation is required to be submitted with each application.

1) Completed Operating Licence Application form
2) $25.00 fee payable to the Receiver General for Canada
3) If the licensee is a corporation, written evidence that the corporation is in good standing, or if the licensee is an individual, a valid birth certificate verifying that the individual is at least 18 years of age

Operating licences are issued for a maximum period of one year and are valid from their commencement date to March 31st of the following year. An operating licence is not transferable.

3.0 AUTHORIZATIONS

3.1 Programs

Any technical program involving field work in the Nova Scotia Offshore area must be authorized by the CNSOPB prior to its commencement. The environmental project description must be submitted at least **6 months** in advance of the proposed commencement date. The Environmental Assessment for a proposed technical program must be submitted at least **120 days** in advance of the proposed commencement date. The remaining information requested in Sections 3.1.1 to 3.1.5 is required at least **30 days** prior to program commencement (for use of chemical explosives as the proposed seismic energy source, information must be submitted **90 days** before). Please refer to Table 1.0 below.

Table 1.0: Submission dates for documentation in support of the application

Document	Required Submission Date
Environmental Project Description	6 months prior to program start
Environmental Assessment	120 days prior to program start
Application and remaining documentation	30 days prior to program start 90 days before if the use of chemical explosives as the proposed seismic energy source

Seabed geohazard surveys, VSP's and technical programs like aeromagnetic or CSEM may require less than six months' advance filing of the environmental project description.

Upon receipt of an application for authorization, the CNSOPB will notify and/or will consult those Federal and Provincial government departments that may have interests in, or concerns about, the proposed field work. Comments received from these agencies are taken into account by the CNSOPB in establishing conditions for the program authorization granted to the operator. During the review of an application for authorization, the CNSOPB will address the following matters:

a) program description
b) safety of operations
c) Canada-Nova Scotia benefits
d) environmental protection and
e) financial responsibility

The information pertaining to these matters must be submitted with the Application for Authorization is outlined in Sections 3.1.1 to 3.1.5 below.

Once all matters have been satisfactorily addressed by the operator, the work or activity may be authorized by the CNSOPB. A unique program number will be assigned by the CNSOPB for each program. This should be quoted on all subsequent correspondence. Any subsequent amendment or addition to the program must be forwarded to the CNSOPB for approval. Significant additions or amendments may require an additional authorization to be issued. The CNSOPB may also place additional program specific conditions on an authorization.

3.1.1 Program Description

A full description of the proposed field work should be submitted including the following information:

a) One original, signed application for Geophysical/Geological Environmental/Geotechnical Program Authorization forms;
b) A detailed description of the aims and objectives of the proposed program and any relevant documentation: for example , for geophysical programs, relevant documentation would include descriptions of source, and detector equipment, including geometry and configuration, peak pressure and rise time of source and acquisition parameters;
c) One copy of a location map detailing the proposed program and its relationship to the land interests in the area (paper and PDF);
d) One copy of a page size map showing the relationship between the proposed program and neighboring coastlines, provincial or territorial boundaries, and other pertinent geographic features (paper and PDF); and
e) For a geophysical program, a digital file with beginning and end points for each proposed 2-D line, or an outline of the area to be surveyed for a 3-D program. Data should reference NAD 83.

3.1.2 Safety of Operations

Prior to authorizing the program the CNSOPB requires that the operators demonstrate that they have taken all reasonable measures necessary to ensure that:

a) All applicable regulatory requirements, inclusive of CNSOPB directives, notices and guidelines, as appropriate, are met;

b) All equipment to be used in the program, inclusive of support vessels and aircraft, are fit for the purposes for which they are to be used;
c) The various procedures governing the conduct of operations for the program are appropriate;
d) All personnel are properly certificated and competent on the basis of education, training, skills experience and medical fitness; and
e) Adequate controls are in place to ensure that the above conditions continue to be satisfied throughout the duration of the program

To attest to the above, for all programs involving field work, Section 143 of the Accord Acts require that the operators submit to the CNSOPB a duly executed "Declaration" (commonly known as a "Declaration of Operator" (DOO)). The DOO is issued on a standard template provided by the CNSOPB.

In order to effectively substantiate the due execution of the DOO, operators must provide the following information as part of the application for authorization, specific to the program's activities:

a) Details on the principal contractors and subcontractors;
b) The operator's Safety Plan specific to the program, setting out the procedures, practices, resources, sequence of key safety-related activities and monitoring measures necessary to ensure the safety of the proposed work or activity, including the following information:
    i) a description of the organizational structure for the proposed work or activity;
    ii) a summary of and references to the management system that demonstrate how it will be applied to the proposed work or activity;
    iii) a summary of the risk assessments undertaken to identify hazards and to evaluate safety risks related to the proposed work or activity;
    iv) a description of the hazards that were identified and the results of the risk evaluation;
    v) a summary of the measures to avoid, prevent, reduce and manage safety risks;
    vi) a list of all equipment and systems critical to safety and a summary of the system in place for their inspection, testing and maintenance; and
    vii) A summary of the compliance assurance plan for the program (e.g. reporting, reviews and audits/inspections)

    Note: the *Drilling and Production* and *Safety Plan Guidelines* may be considered in developing the Safety Plan recognizing that geophysical programs are smaller in scope and certain parts of the *Safety Plan Guidelines* are not relevant.

c) The operator's security assessment for the program and resultant security plan, referencing the procedures and arrangements for mitigating the identified security risks. NOTE: the security assessment and plan may be included in the broader Safety Plan.;
d) Emergency response plans and procedures;
e) A summary and results of the operator's verification activities (e.g. contractor qualification and selection screening activities, audits, inspections, or surveys) carried out at contractors' premises and onboard installations, support vessels and aircraft, which verify the suitability of equipment, policies/procedures and personnel for the proposed program;
f) A summary of the activities undertaken (e.g. gap analysis, audits, etc.) to ensure compliance with the *Nova Scotia Offshore Area Petroleum*

Geophysical Operations Regulations and other applicable CNSOPB requirements, such as directives, notices and guidelines, along with evidence that any identified gaps have been closed; and

g) A summary of planned deviations, along with regulatory query forms, for any of the regulations or other CNSOPB requirements that cannot be complied with.

The following lists are provided to give operators guidance on the type of information to be described, submitted and /or referenced as appropriate. These lists do not substitute the relevant legislation, nor do they absolve the operators of their responsibility to ensure compliance with all applicable regulatory and other requirements.

The CNSOPB normally assigns officers to conduct health, safety and environmental protection audits and/or inspections at the operator's/contractor's premises, prior to commencement of the program. The operator must make the appropriate arrangements to accommodate such, including advance submission of any requested documents, records, or other information.

Corrective actions will have to be developed and implemented to address any non-conformities identified during these audits/inspections. Depending on the severity or nature of the nonconformities, implementation of the corrective actions may have to be verified by the CNSOPB prior to issuing the authorization.

Marine Programs

For programs that propose to use marine vessel(s), the following information and/or documentation is required to be submitted as part of the application for authorization, or described/referenced in the program description:

1) Vessel specifications (including support vessels) to demonstrate their suitability for the intended purpose, including:

    a) Vessel's identification (name, flag, type, class, notations, owner, operator, etc.);
    b) Construction details (as a minimum year, shipyard, and conversions);
    c) Main characteristics (dimensions, deadweight, gross/net registered tonnage, crew/passenger accommodations, speed, bollard pull, etc.);
    d) Hospital particulars (dimensions, equipment and medical supplies);
    e) For vessels that may be used for towing operations, the vessel's bollard pull, details on towing equipment (main/auxiliary winches, tow pins) and critical procedures (connecting/controlling /disconnecting the tow wire, emergency release, back deck access, etc.);
    f) Machinery, propulsion and steering systems;
    g) Deck equipment (cranes, winches, windlasses, capstans, etc.);
    h) Work boat/daughter craft and launching system specifications;
    i) Tanks (type, number, and capacity);
    j) Details on main lifesaving, firefighting, pollution control and communications equipment;
    k) Details on seismic equipment; and
    l) Helideck or helicopter winching area specifications.

2) If helicopters are to be used, the following information is required to be submitted to demonstrate their suitability for the intended purpose:

a) Identification of contractor and heliport to be used;
b) Aircraft specifications (model, carrying capacity, operating range, dimensions, etc.);
c) List of operations contracted for (e.g. passenger transfers, emergency response, etc.);
d) Operator's aircraft and helideck survey reports, including evidence of follow-up/closure; and
e) A copy of the aircrafts' Certificate of Airworthiness.

3) A summary of each vessel's operating history in undertaking a similar work scope in similar operating environments.

4) For foreign-flagged vessels, copies of each vessel's main statutory certificates, including the most recent annual/periodical endorsements, specifically:

a) Certificate of Registry/Nationality;
b) Classification Certificate;
c) Safety Construction Certificate;
d) Safety Equipment Certificate;
e) International Load Line Certificate;
f) Safe Manning Document;
g) Safety Radio Certificate;
h) Safety Management Certificate (SMC);
i) Company ISM Code Document of Compliance (DOC);
j) International Ship Security Certificate (ISSC);
k) International Oil Pollution Prevention Certificate (IOPP);
l) International Sewage Pollution Prevention Certificate (ISPP); and
m) Any exemption certificates pertinent to the above.

Note: Copies of the certificates of Canadian-flagged vessels need not be submitted; however the status of the vessels certification may be examined during CNSOPB audits/inspections.

5) A summary document, preferably in the form of training matrix or table, showing the certification status of all personnel with respect to the following:

a) Certificates of competency, appropriate to the rank;
b) Medical Fitness;
c) Marine Emergency Duties (MED) or Basic Survival Training;
d) GMDSS Radio Operator;
e) FRC/Workboat Coxswain;
f) First Aid administrators and medics, as required by the draft Nova Scotia Offshore OHS requirements;
g) Workplace Hazardous Materials Information Systems (WHMIS);
h) Ship Security Officer (SSO);
i) Nova Scotia Offshore Area Regulatory Awareness; and
j) If personnel are to be transported by helicopter, Helicopter Underwater Escape Training (HUET) and Helicopter Underwater Escape Breathing Apparatus (HUEBA), if not already included in BST.

6) Critical safety and environmental protection work practices and procedures as defined in the Operator's Safety Management System, including but not limited to:

a) Work boat operations;
b) High pressure systems and operations;
c) Crew change and field personnel transfer operations (vessels and helicopters);
d) Passenger pre-departure safety briefing;
e) Offshore Bunkering and cargo transfers;
f) Casevacs and medevac; and
g) Other critical procedures as requested by the CNSOPB.

7) Details of arrangements to ensure a physician, who has specialized knowledge in the treatment of safety and health problems that may be encountered in an oil and gas industry, is available to the vessel at all times for medical consultation, in accordance with the Nova Scotia Offshore OHS requirements.

Airborne programs

If the proposed field work is to be conducted using an aircraft, the following information/documentation will be required:

1) The name, address, work history and safety record of the aircraft operator/owner.

2) A general description of the aircraft to include the following:

a) Registration, designation, call sign;
b) Dimensions;
c) Fuel capacity;
d) Range;
e) Safety equipment;
f) Communications and navigation equipment;
g) Operating history; and
h) Safety record.

3) A copy of a Valid Certificate of Airworthiness for the aircraft

4) A description of:

a) The flight following procedures; and
b) The procedures to be followed in the event of a missing or overdue aircraft. If the aircraft is not registered in Canada, additional information may be requested

Programs using a Mobile Offshore Drilling Unit

If the proposed program is to be conducted using a MODU, additional information/documentation may be required.

3.1.3 Canada - Nova Scotia Benefits Plan

A Canada-Nova Scotia Benefits Plan must be submitted to, and approved by, the CNSOPB prior to authorization of any work or activity in the Nova Scotia Offshore area.
The CNSOPB's *Canada-Nova Scotia Benefits Plan Guidelines* are applicable to technical programs. These guidelines can be found at www.cnsopb.ns.ca

Operators should review these guidelines in detail and consult with CNSOPB staff prior to submitting a Canada-Nova Scotia Benefits Plan.

3.1.4 Environmental Protection

3.1.4.1 Environmental Assessment

As part of its environmental protection responsibilities, the CNSOPB must ensure that an environmental assessment of proposed technical programs in the Nova Scotia Offshore Area is conducted for a seismic survey (e.g. 2-D or 3-D seismic, a seabed survey or a VSP program), in which the air pressure measured one metre from the energy source will be greater than 275.79 kPa (2.7579 bar-metres or 228.8 dB).

At least **6 months** prior to the planned commencement of a technical program, the operator should submit to the CNSOPB a project description that describes the activities to be undertaken, the schedule of those activities and the location.

Seabed geohazard surveys, VSPs and technical programs like aeromagnetic or remote hydrocarbon detection may require less than six months' notice. The operator is still advised, however, to submit a project description to Operations/Health Safety & Environment as early in the planning process as possible.

Based on the information provided in the project description, the CNSOPB will provide the operator with a Scoping Document that describes the scope of the assessment to be conducted, including the scope of the factors to be included in the assessment.

Following its receipt of the Scoping Document, the operator will be responsible for submission of an Environmental Assessment report that:

1) Describes its assessment of the potential environmental effects associated with the proposed program, in a manner that satisfies the requirements of the Scoping Document;

2) Reports on consultations with interested parties who may be affected by program activities. Such parties included, but are not limited to, the Department of Fisheries and Oceans (DFO), Environment Canada (EC), the Department of National Defence (DND) and all relevant fisheries. The report should identify specific areas of concern that were raised in these consultations and the proposed means by which valid concerns will be addressed; and

3) Is suitable for public release.

The Environmental Assessment report should be submitted to the CNSOPB at least 120 days prior to the planned commencement of activities.

3.1.4.2 Environmental Protection Measures and Reporting

In May 2008 the CNSOPB adopted the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment (the Statement), which, in its entirety, is contained in Appendix B of these Guidelines. Operators should implement the mitigations listed in the statement when planning and undertaking marine seismic surveys, as a minimum in addition to any other project-specific measures that may be identified during the environmental assessment process.

Appendix B also describes recommended practices for interaction with other ocean users, particularly fisheries interests, and recommended reporting formats for marine mammal and seabird observations. A report on the results of any monitoring undertaken during seismic surveys is considered follow-up to the environmental assessment and should be submitted to CNSOPB within 6 months of completion of the field work in a format that is suitable for public release.

3.1.5 Financial Responsibility

Prior to applying for any authorization from the CNSOPB an operator is required to submit proof of financial responsibility for approval by the CNSOPB. For technical programs, the form, amount and scope of coverage is dealt with the *Guidelines Respecting Financial Responsibility Requirements for Work or Activity in the Newfoundland Nova Scotia Offshore Areas* can be found at www.cnsopb.ns.ca.

4.0 ALLOWABLE EXPENDITURES

Allowable Expenditures are the direct and indirect costs of exploration that are incurred by the Interest Owner during the term of the Exploration Licence.

If an Interest Representative plans to claim Allowable Expenditures for geophysical, geological, and/or geotechnical studies against the Work Deposit or Rentals for an Exploration Licence, the Interest Representative should refer to Terms and Conditions of the Exploration Licence for additional information or contact CNSOPB staff.

4.1 Data Submission for Geophysical , Geological & Geotechnical Expenditures

When claiming geophysical, geological, and/or geotechnical expenditures, the Allowable Expenditures will not be credited against the Work Deposit or Rentals until all of the Reporting Requirements have been met.

Reporting Requirements are pursuant to the *Nova Scotia Offshore Petroleum Geophysical Operations Regulations*. Information concerning data and report submission for Allowable Expenditures can be found in Section 6.2.6.

5.0 REPORTING REQUIREMENTS DURING FIELD WORK

5.1 Weekly Reports

The weekly progress report should include, but not limited to, the following:

a) Program name;
b) Program number assigned by the CNSOPB;
c) Date of the report;
d) Time period covered by the report;
e) Operator or interest Owner;
f) Latest known position of the vessel or installation involved;
g) Number of line kilometers recorded/week;
h) Line numbers recorded/week;
i) Number of kilometers recorded to date;
j) Number of proposed kilometers;
k) For 3D surveys, in addition to the kilometers recorded, the total number of square kilometers for the completed program;
l) Significant dates such as commencement, suspension, re-commencement and completion of field work;
m) Any significant downtime and its causes (e.g. weather, equipment failures, technical difficulties, and other related details);
n) Description of all communications and/or interaction with fishers and their relevant organizations;
o) Next work assignment for the vessel or crew, if known;
p) Additional information required as a condition of program approval; and
q) Shut downs related to marine mammal or sea turtle interactions.

5.2 Reporting of Incidents and Incident Statistics

Any accident or hazardous occurrence as specified by Section 27 of the *Nova Scotia Geophysical Operations Regulations* or Element 2, Section 15.4 of the *Nova Scotia Petroleum OSH Regulations*, must be reported to the CNSOPB. Guidance on the reporting and investigation of incidents is provided in the *C-NLOPB / CNSOPB Guideline for the Reporting and Investigation of Incidents*.

Quarterly statistics reports must also be provided to the CNSOPB. Guidance and forms for the reporting of statistics have been provided in the *C-NLOPB / CNSOPB Guideline for the Reporting and Investigation of Incidents*.

5.3 Reporting of Occupational Health and Safety Committee Meeting Minutes

Meeting minutes from Occupational Health and Safety Committee meetings must be submitted to the CNSOPB as soon as practicable following each meeting.

5.4 Demobilization Plan

Approximately 10 days prior to the planned end-date of the program (or season) the operator should submit a draft Demobilization Plan to the CNSOPB, describing the dates, times and locations where demobilization activities are to be carried out, including:

a) Last-shot point;
b) Retrieval of seismic gear from the water;
c) Disembarkation of program-specific personnel (e.g. Marine Mammal Observers (MMO), Fisheries Liaison Officers (FLOs); and

d) Crew changes and any equipment transfers that may be necessary following completion of the program.

The purpose of this plan is for the CNSOPB to obtain a clear understanding of the operator's intentions regarding demobilization, in order to determine when its jurisdiction over the operator and its contractors will cease. The draft plan will remain a 'live' document until the actual completion of the program, or a season within the program.

6.0 FINAL REPORTS

Program Completion Date

The program is considered "complete" at the point where one of the following conditions is met (whichever occurs first):

a) Data acquisition has been completed and all vessels have departed from the offshore area, or
b) Even though still in the offshore area, all the vessels have completed all of the activities related to the program's demobilization process (e.g. retrieval of program gear from the water, personnel or equipment transfers, etc.).

The operator should notify the CNSOPB when the program is completed (i.e. the point where one of the above criteria have been met) and at the same time submit a written closure to the Declaration of Operator (DOO).

This completion date will be used as the reference point for determining the due dates for the final reports.

For all geophysical, geological or environmental programs, the final report must be submitted to the CNSOPB within one year or completion of the field work. Geotechnical reports must be submitted within 90 days of rig release or completion of field work. For programs in which no field work is involved, the final report must be submitted to the CNSOPB within one year of the estimated completion date shown on the authorization form.

The report should be in a form acceptable to the CNSOPB, and contain the information described below that is relevant to the program conducted. Interpretation reports must be submitted as print copies. In addition, a CD containing a searchable PDF formatted copy of the report, with sufficiently high resolution for the enclosures that original quality will be maintained if reprinted, should be submitted. Operations and processing reports should also, be submitted in a searchable PDF format. Unless otherwise noted, all reports and maps described below must be submitted in paper and searchable PDF format. The numbers required of each type of report are shown in Table 2.0 below.

Table 2.0: Required copies of reports

	Interpretation, Operations & Processing	
	Print	**Digital**
All Offshore Areas	1	1

Any correction to, or omission from, the report that is made or discovered after its submission must be reported to the CNSOPB.

6.1 All Technical Programs: Common Reporting Requirements

a) Title page containing:
   i) Program number, as assigned by the CNSOPB;
   ii) Operator's report name;
   iii) Type of survey;
   iv) Survey locality;
   v) Year of field work;
   vi) Name of program operator (or legal representative or agent) and participants;
   vii) Names of principal contractors;
   viii) Specific interests involved;
   ix) Name of author or person responsible for the report; and
   x) Report date.
b) Table of contents and list of enclosures;
c) Introduction;
d) Locality map, preferably page size, showing the location of the survey with respect to the licences involved and latitude/longitude co-ordinates;
e) Statistical summary, including:
   i) Mobilization/demobilization dates;
   ii) Significant dates such as commencement, suspension, recommencement and termination;
   iii) Number of technical and marine personnel and their nationality;
   iv) Production data, time lost and daily production;
   v) Summary of conditions pertaining to weather, ice conditions or sea state; and
   vi) Summary of factors which caused significant down time.
f) Description of the data acquisition equipment and field procedures, including, where appropriate:
   i) All vessels or aircraft, including ownership and flag of registry; and
   ii) All components of the navigation system, with estimates of accuracy and repeatability.

6.2 Geophysical and Geological Programs: Specific Reporting Requirements

Any final report submitted to fulfill the reporting requirements of a geophysical or geological program authorization, should be signed by a professional geoscientist and include the following information, in addition to that detailed in Section 6.1. **This is defined as a minimum, but is not meant to limit what the operator may submit to enhance the overall completeness of the final report.** Maps and enclosures should not depend on colour to impart information such as contour values.

6.2.1 Operations Report

a) Additional information on the data acquisition equipment and field procedures to include:
   i) The energy source parameters, including pressure/time plots;
   ii) The detector equipment, including detector array geometry;
   iii) Streamer tracking system;
   iv) The recording system;
   v) The on-board processing facility;
   vi) Recording parameters, such as shotpoint interval, station interval, sampling rate, recording filter(s) settings, gain control, polarity, fold, aircraft elevation; and
   vii) Fathometer used.

6.2.2 Processing Report

a) Description of the geophysical data processing and display, including:
   i) For seismic reflection data, complete processing flow through to final products;
   ii) Final processed bin (grid) coordinates;
   iii) For electromagnetic data:
      a. all corrections applied to field and metadata;
      b. all processing procedures applied to the final data; and
      c. discussion of methods and processing for all 2-D and 3-D modeling and inversion.
   iv) 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; and
      e. loop closure maps for elevation control.
   v) 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; and
      f. method of magnetic modeling.

6.2.3 Interpretation Report

a) Written discussion of the maps and seismic sections, including the correlation between the geophysical and geological events, correlations between gravity, magnetic, CSEM and seismic data, details of corrections or adjustments applied to the data during interpretation, examples of correlated seismic sections which illustrate the interpretative technique for structural and stratigraphic interpretation, and any velocity information used for time-to-depth conversion.

b) Geological program reports should include a written discussion of the results of the project and tie the project into the regional geological framework. Illustrations should include:

   i) Measured sections;
   ii) Correlation or structural cross-sections;
   iii) Core or sample descriptions;
   iv) Geotechnical and other analyses;
   v) Micro-paleontology and palynology; and
   vi) Interpretative maps such as paleogeographic, facies and isopach.

6.2.4 Maps and Enclosures

a) Seismic shotpoint maps, gravity station maps, magnetic survey maps, EM source/receivers maps, track plots and flight lines with numbered fiducial points, which are on a working scale and show these geophysical data in relation to the operator's previous data in the area. One paper print of each map should accompany each copy of the report.

All map scales should be selected by the operator to appropriately present the data at a workable level of detail.

b) Bathymetry maps.

c) Interpretative maps appropriate to the type of survey, which indicate the interpretation of data from the survey and integration with previous surveys recorded by the operator in the same area, for example:

   i) For seismic reflection 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, derivative maps (if maps were not made, individual gravity profiles with sufficient annotation for interpretation);
   iii) For magnetic surveys, all maps displaying total magnetic intensity, corrected total field, residual magnetic field and derivative maps (if maps were not made, individual profiles with sufficient annotation for interpretation); and
   iv) For electromagnetic surveys, MVO and PVO curves, 2-D receiver line resistivity cross sections, and 3-D model resistivity cross sections and maps.

d) Any other information, used or produced during the interpretation, such as synthetic seismograms or seismic modeling or attribute analyses.

6.2.5 Data

a) For 2-D and 3-D seismic programs, SEG-Y data and TIFF images are required to be submitted for all final data processing outputs produced, such as post-stack and pre-stack time and depth migrations. (Refer to Tables 3.0 & 4.0 for submission requirements.)

   i) For 3D seismic volumes, the required spacing is 1000m for inlines, 1500m for cross-lines, and 500 ms/500 m for time/depth slices;
   ii) The SEG-Y format should use SEG Standard as shown in Appendix C.
   iii) Each TIFF image must include the following information: line number, horizontal scale bar and horizontal annotation with CDP and SP numbering that matches the track plot. The images should be created at 300DPI with a horizontal scale of 1:100,000 or 50 traces per inch and at a vertical scale of 2.5 inches (or 5 cm) per second;
   iv) TIFF images should be a 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);
   v) A digital copy of the final processed shotpoint location data is required. Location data should reference the NAD83 datum and identify the appropriate UTM zone;
   vi) A digital copy of the processing velocity data is required;
   vii) Data should be submitted on USB or an alternate compatible portable hard drive; and
   viii) Copies of other versions of the processed seismic data may be requested.

b) For wellsite survey programs using either 2-D high resolution seismic or reprocessed 3-D seismic, SEG-Y data and TIFF images are required to be

submitted for all final data processing outputs produced. (Refer to Table 5.0 for submission requirements)

i) For 3D seismic volumes, the required spacing is 500m for inlines and cross-lines;
ii) The SEG-Y format should use SEG Standard as shown in Appendix C.
iii) TIFF format images will include horizontal annotation with CDP and SP numbering that matches the track plot;
iv) TIFF images should be a 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);
v) A digital copy of the final processed shotpoint location data is required. Location data should reference the NAD83 datum and identify the appropriate UTM zone;
vi) Data should be submitted on USB or an alternate compatible portable hard drive; and
vii) Copies of other versions of the processed seismic data may be requested.

c) Controlled Source Electromagnetic Surveys (Refer to Table 6.0 for Submission Requirements)

i) Raw field data recorded at each receiver, with navigation and metadata for transmitter and receiver locations;
ii) Final processed data (2-D and 3-D models if generated), SEGY or equivalent format;
iii) Amplitude/magnitude vs. offset (AVO/MVO) curves from all receivers (all harmonics);
iv) Phase vs. offset (PVO) curves from all receivers (all harmonics); and
v) Resistivity cross sections (TIFF format) – on all receiver lines, 2-D vertical and horizontal slices through the 3-D resistivity model at 500 m intervals (x, y and z (depth)), if generated.

d) Gravity Surveys (Refer to Table 7.0 for Submission Requirements)

i) One copy of digital records of any gravity data in ASCII format containing latitude/longitude, water depth, observed absolute value of gravity, calculated Bouguer anomaly and Free-air anomaly, for all data points.

e) Magnetic Surveys (Refer to Table 7.0 for Submission Requirements)

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

f) Other Surveys (Refer to Table 7.0 for Submission Requirements)

i) Any surveys not included are required to submit equivalent data, interpretation, operations and processing information.

Data submissions are subject to confidentiality provisions described in Section 9. During its confidentiality period these datasets may be accessed by both the Provincial Minister of Energy and the Federal Minister of Natural Resources Canada via Section 19 of the Accord Act.

Table 3.0: 2-D Seismic Data Submission Requirements

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

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Raw Navigation	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	P2/94 or equivalent information
Shotpoint location data (final navigation data)	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	P1/90 or equivalent information – see comments above.
SEGY - final migrated PSTM and PSDM if generated	1 digital (each)	(SEG Standard)	12 months after completion of program	USB	See Appendix C for SEG Standard
Digital images of, final processed data (PSTM and PSDM if generated). Images should be annotated as per section 6.2.5(a)(iii).	1 digital (each)	TIFF All 2D lines should be submitted at a minimum resolution of 300 DPI with a horizontal scale of 1:100,000 or 50 traces per inch and at a vertical scale of 2.5 (or 5 cm) per second	12 months after completion of program	CD/DVD/USB	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)
Velocity data	1 digital	ASCII	12 months after completion of program	CD/DVD/USB	Including line number, shotpoint, time, RMS pairs for both stacked and migrated velocities.
Interpretation Report* Operations Report Processing Report	2 copies paper 1 copy digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and CD/DVD/USB	See above for required content. .

Table 4.0: 3-D Seismic Data Submission Requirements

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

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Shotpoint location data (final navigation data)	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	P1/90 or equivalent information – see comments above.
Polygonal position data (full fold outline)	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	Survey inflection points describing the corner points in inline/cross-line, lat/long and UTM coordinates.
SEGY - final migrated PSTM and PSDM if generated	1 digital (each)	SEGY (SEG Standard)	12 months after completion of program	USB	See Appendix C for SEG Standard
Digital images of, final processed data (PSTM and PSDM if generated). Images should be annotated as per section 6.2.5(a)(iii).	1 digital (each)	TIFF 3D lines should be submitted at a spacing of 1000 m for inlines and 1500 m for cross-lines at a minimum resolution of 300 DPI with a horizontal scale of 1:100,000 or 50 traces per inch and at a vertical scale of 2.5" (or 5 cm) per second	12 months after completion of program	CD/DVD/USB	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)
Velocity data	1 digital	ASCII	12 months after completion of program	CD/DVD/USB	Including line number, shotpoint, time, RMS pairs for both stacked and migrated velocities.
Interpretation Report* Operations Report Processing Report	2 copies paper 1 copy digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and CD/DVD/USB	See above for required content.

Table 5.0: Wellsite Seismic Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Shotpoint location data (final navigation data)	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	P1/90 or equivalent information – see comments above
SEGY - final products	1 digital (each)	SEGY (SEG Standard)	12 months after completion of program	CD/DVD/USB	See Appendix C for SEG Standard
Digital images of seismic sections -	1 digital (each)	TIFF All 2D lines should be submitted and for reprocessed 3D surveys inline and cross-lines should be submitted at a spacing of 500m at a minimum resolution of 300 DPI	12 months after completion of program	CD/DVD/USB	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)
Interpretation Report Operations Report Processing Report	2 copies paper 1 copy digital (each)	Paper and searchable PDF	12 months after completion of program	Paper and CD/DVD/USB	See above for required content

Table 6.0: Controlled Source Electromagnetics Data Submission Requirements

Other electromagnetic surveys must submit equivalent data to CSEM requirements where applicable.

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Raw field data	1 digital	ASCII or equivalent format	12 months after completion of program	CD/DVD/USB	Including navigation (UKOOA) for Transmitter and Receiver with all associated metadata.
Final processed data, 2-D and 3-D model data	1 digital	SEGY or equivalent format	12 months after completion of program	CD/DVD/USB	
Magnitude and Phase vs. Offset data (MVO and PVO) (all harmonics)	1 digital (each)	PDF or TIFF or equivalent format	12 months after completion of program	CD/DVD/USB	
Fully annotated image of final processed data	1 digital	TIFF (300 DPI minimum)	12 months after completion of program	CD/DVD/USB	2-D receiver lines and inline/cross-line/depth slices through the 3-D volume.
Interpretation Report Operations Report Processing Report	2 paper copies 1 digital copy (each)	Paper and searchable PDF	12 months after completion of program	Paper and CD/DVD/USB	See above for required content.

Table 7.0: Gravity/Magnetics/Other Data Submission Requirements

Data Required	Report	Format	Date for Submission	Submission Media	Remarks
Track plot location data (Final Navigation data)	1 digital	UKOOA	12 months after completion of program	CD/DVD/USB	P1/90 or equivalent information
Raw Field Data	1 digital	ASCII/ SEGY/ equivalent	12 months after completion of program	CD/DVD/USB	Navigation and all raw field data with associated meta data
Processed Data	1 digital	ASCII/ SEGY/ equivalent	12 months after completion of program	CD/DVD/USB	Including final navigation and calculated field data Gravity specific – see above Magnetic specific – see above
Digital images of interpretation maps	1 digital	TIFF (300 DPI minimum)	12 months after completion of program	CD/DVD/USB	Include all maps from the interpretation report in separate geo-referenced TIFF images
Interpretation Report Operations Report Processing Report	2 paper copies 1 digital copy (each)	Paper and searchable PDF	12 months after completion of program	Paper and CD/DVD/USB	See above for required content.

6.2.6 Non-Exclusive Geophysical or Geological Programs: Specific Reporting Requirements

Operators of non-exclusive geophysical or geological surveys, where the data has been acquired with the intention of selling it to the public, are obliged to submit a report covering Sections 6.1 and Sections 6.2 (excluding 6.2.3 and 6.2.4). If the data is no longer available for sale, or the CNSOPB becomes aware that the data is not being made available for sale, the operator must submit Sections 6.2.3 and 6.2.4, as appropriate, within twelve months of the date of withdrawal of the data.

Purchasers of non-exclusive data, who claim the costs of allowable expenditures for an Exploration Licence, must submit an interpretation report covering Sections 6.2.3 and 6.2.4 above. Purchasers of non-exclusive data that reprocessed the data and apply to have the reprocessing fees accredited against their Work Deposits or Rentals must submit as per Section 6.2.5.

6.3 Environmental Programs: Specific Reporting Requirements

Final reports for environmental field programs should include the following, in addition to the items described in Section 6.1:

a) a general overview of the data or samples which were acquired during the program, and of any analyses which were performed upon them;
b) a description of quality control and quality assurance procedures which were in place during the field program and, where appropriate, which were in place at facilities where sample handling and analysis were performed;
c) the data or information which was collected during the program. The scope of this reporting will be determined on a case-by-case basis, and may take the form of a data appendix to the report, or a digital data storage medium accompanying the report; and
d) the results of any analyses which were performed upon the data collected during the program.

6.4 Geotechnical Programs: Specific Reporting Requirements

Final reports for geotechnical programs should be signed by a professional engineer or geoscientist and should include the following information in addition to that mentioned in Section 6.1:

a) Location maps at a working scale;
b) A description of the boring and geotechnical equipment that was used during the program;
c) A description of sample handling procedures, storage, onboard measurements and results;
d) A description of the laboratory procedures, measurements and results;
e) Correlations between borehole data and available geophysical data;
f) Interpretative maps showing distribution and thickness of relevant geological/geotechnical units; and
g) Any other information, such as bathymetry, used or produced during the interpretation of the data.

6.5 Reporting Address:

All reports and data should be delivered to the address below:

Canada-Nova Scotia Offshore Petroleum Board
Geoscience Research Centre
201 Brownlow Avenue, Suite 27
Dartmouth, Nova Scotia B3B 1W2
Canada
Phone: (902) 468-3994
Fax: (902) 468-4584

7.0 SEABED SURVEYS

7.1 General

Seabed surveys, using geophysical and geotechnical methods are conducted to determine the nature of the sea floor and underlying sediments. As such, they may be required to assist with the positioning of wells, pipelines or production facilities.

Prior to positioning a jack-up or gravity-based structure, a geotechnical survey may be required as outlined below.

a) Jack-Up Drilling Units

Prior to preloading the jack-up at a wellsite, an independent geotechnical engineering consultant shall evaluate the geotechnical and foundation characteristics of the seabed. In most cases, at least one geotechnical borehole (drilled no further than 100 m from the proposed wellsite) will be required to be drilled to a depth of the anticipated spud-can penetration plus 1½ times the maximum spud-can diameter. In some cases, the consultant may have sufficient information to assess the foundation characteristics without the benefit of a borehole. The depth, sampling interval and number of boreholes in the program shall be at the discretion of the consultant in consultation with the operator.

b) Platforms, Caissons and Artificial Islands

Where a platform, artificial island or caisson-type structure is to be used to support a drilling rig or production facility, the geotechnical and foundation characteristics of the seabed at the proposed site and/or of the fill material, must be evaluated before any excavation, fill placement or installation of the structure occurs.

7.2 Objectives

The objectives and typical methodology for seabed surveys are shown in Table 8.0.

Table 8.0: Objectives and Typical Methodology for Seabed Surveys

Objectives	**Typical Methodology**
Identification of shallow geological hazards; for example, slump scars, channels, faulting, gas, gas hydrates, shallow trap closure.	High resolution seismic using sparker, small airgun array, or sleeve exploder; supplemented with 3-D seismic, if available. Reprocessed 3-D high resolution may replace a conventional 2-D high resolution dataset in deepwater.
Detailed bathymetry.	Echo sounder.
Identification of surficial geology, boulder till, channel fill, slumping, faulting, gas-charged sediments.	Sub-bottom profiler.
Nature and characteristics of sea floor sediments.	Side scan sonar, grab samples **and/or** gravity/piston and cores of the sea floor and near surface sediments, sea floor photographs.
Identification of iceberg scours, morphology of depositional units, shipwrecks, sea floor obstructions, bedforms indicative of sea floor sediment dynamics.	Sidescan sonar, sea bottom photographs. Sub-bottom profiler.
Engineering data on seabed deformation, bearing capacity and stability (if required).	Borehole core samples, in situ and laboratory tests.
Location and identification of sea floor installations, wrecks and cables.	Side scan sonar (magnetometer survey as required).

7.3 Well Locations

An operator who proposes to drill a well in the Nova Scotia offshore area must ensure that such an operation is conducted safely. The submission of an application for Approval to Drill a Well (ADW) must be preceded or accompanied by documentation to show that the operator has investigated the immediate area of the proposed location to identify any possible hazards to drilling on the seafloor, and during the drilling of the well prior to setting surface casing. A seabed survey should be conducted to achieve these objectives. Existing 3-D seismic data should also be used to assist in the interpretation for all areas where available.

It is mandatory that a seabed survey, including high-resolution seismic data be conducted for all well locations**. In addition, all proposed well locations must be positioned on a high-resolution seismic line**. In deep water (>500m) it is acceptable to use reprocessed 3-D seismic in lieu of 2-D high-resolution seismic data for identification of shallow drilling hazards (see Section 7.6).

If the 2-D high-resolution seismic line spacing is greater than 250 m, the well can only be drilled if there is conventional 3-D seismic available to supplement interpretation over the surrounding area. In this case, the operator must additionally submit the following with the ADW - three inlines and three cross-lines, no more than 250 m apart, with two passing through the proposed well location.

Existing Survey

a) A pre-existing seabed survey may be used if the area covered by the earlier survey is adequate, except in areas where movement of hydrocarbons due to drilling activity is suspect.
b) If the surficial data is more than two years old, an inspection of the seabed in the vicinity of the well and anchor pattern should be carried out prior to spud.

7.4 Survey Design

The wellsite survey must have sufficient density and areal extent to identify hazards and tie regional geology. It is recommended the survey be large and dense enough to allow for changes in well location due to identification of surficial or subsurface hazards and changes to well planning. Survey design will be specific to the intended drilling rig. Figure 1 and 2 represent guidance for MODU and Jack-up drilling units. Operators specialists should design a program to best suit their given conditions and equipment.

7.4.1 MODU Specific Requirements

The wellsite survey should cover a radius of the anchor limit plus 1 km, allowing for potential changes in location and identification of any regional features such as slump deposits. A maximum primary line spacing of 250 m with tie lines at 500 m is recommended.

7.4.2 Jack-Up Specific Requirements

The wellsite survey should have a line spacing of 50 m, recorded within a radius of 200 m of the proposed location. With additional lines spaced at 100 m out to 500 m for both inlines and cross-lines. In addition, two orthogonal lines should be acquired through the proposed location to a distance of two km from the well location to allow for interpretation of the local/regional geological setting.

Figure 1.0: MODU WellSite Survey Pattern.

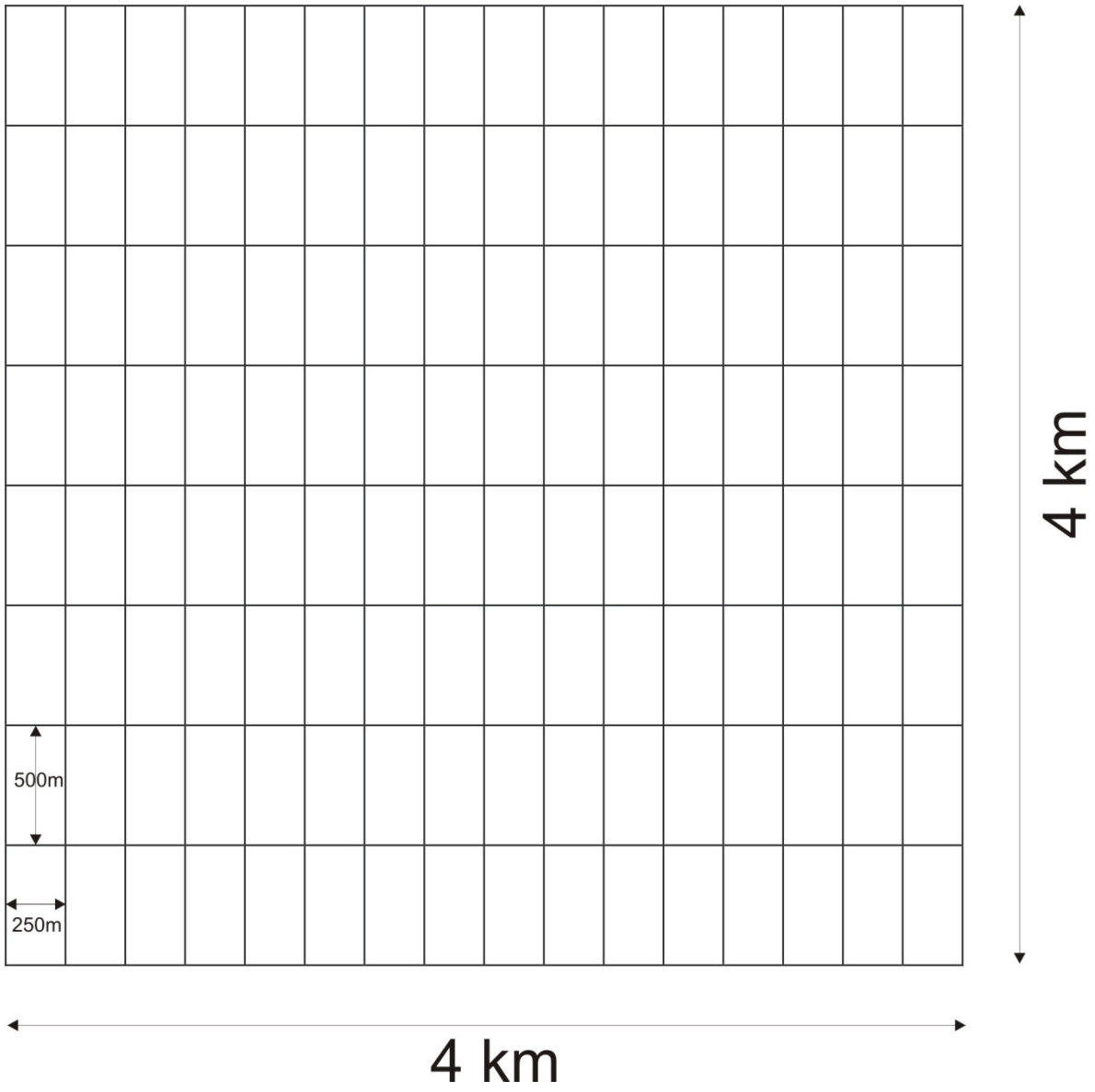
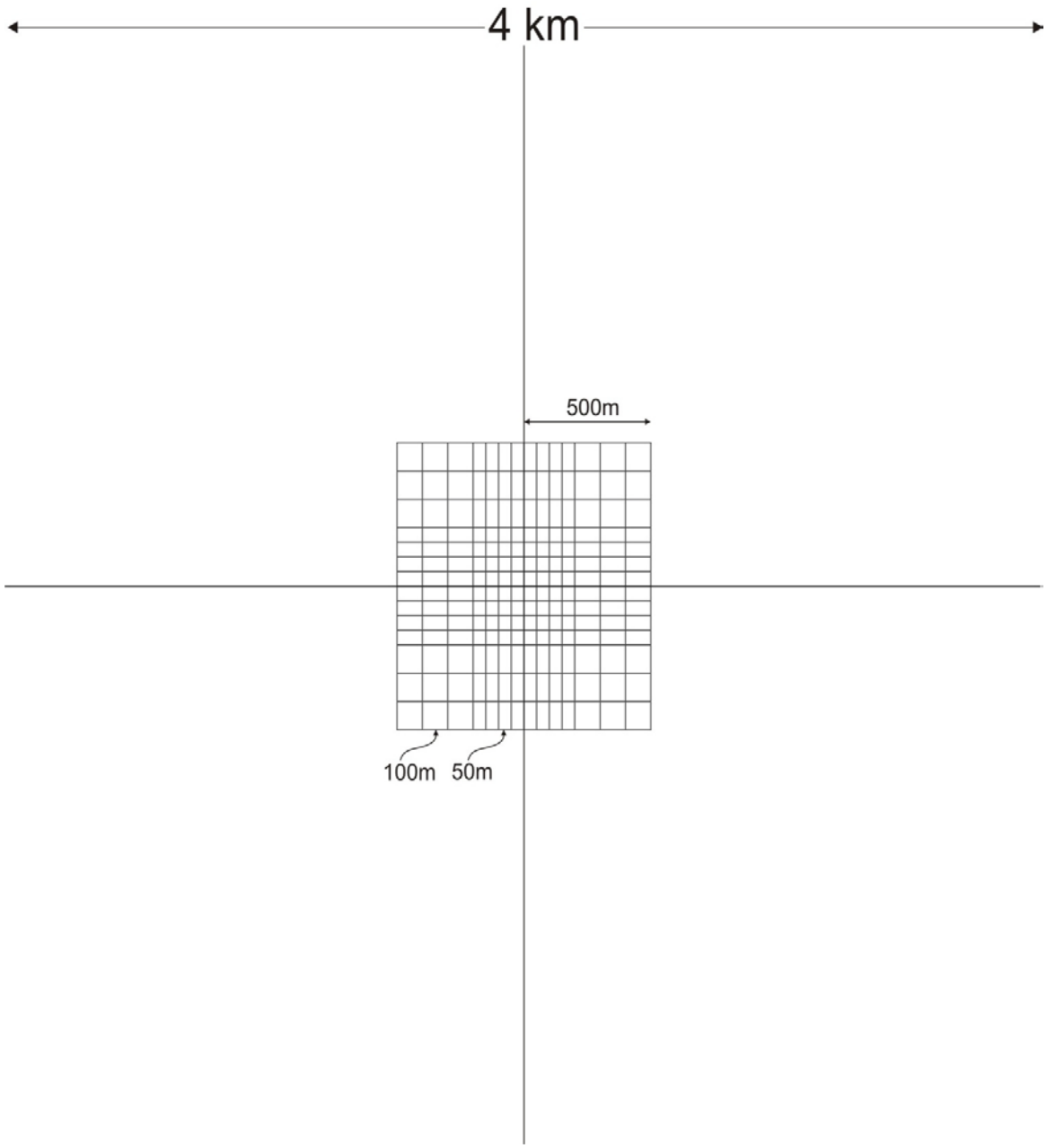


Figure 2.0: Jack-up Drilling Unit Wellsite Survey Pattern.



7.5 Authorizations and Reporting During Field Work

The CNSOPB's requirements for seabed surveys prior to and during field work activity are as described in Sections 3 and 5 above.

7.6 Reprocessed 3-D Seismic Data

The use of conventional 3-D seismic data reprocessed to 3-D high-resolution seismic data is acceptable for replacement of 2-D high-resolution wellsite seismic data in deepwater. Currently deep water is defined as greater than 500 metres water depth (>500 m). The reprocessing of 3-D seismic data for geohazard use is expected to maximize the sampling rate and frequency content of the original 3-D seismic data. Operators desiring to use reprocessed 3-D seismic for geohazard identification should contact the CNSOPB.

7.7 Final Reports

Final reports for seabed surveys must be submitted within one year of completion of field work, or prior to an Application to Drill a Well on the surveyed location. Please refer to Table 5.0 for details on the reporting requirements. The following data, specifically relating to seabed surveys, should also be included:

a) Basic technical data:
   i) digital TIFF copies of the relative amplitude and automatic gain control stack sections;
   ii) digital shotpoint location data of the survey;
   iii) prints of representative bottom photographs or a copy of the video;
   iv) any material remaining after analysis of sea bottom samples or geotechnical test hole material.
   vi) * prints of borehole photographs;
   vii) * bathymetric profiles in the form of annotated single paper copies;
   viii) * sub-bottom profiler records in single paper copies; and
   ix) * sidescan data in the form of single paper copies of corrected or uncorrected records.

   ***Note**: Items (v) to (viii) need to be submitted only if the operator plans to destroy the data. If, at any future date, the operator plans to destroy these data, prior approval must be obtained from the CNSOPB.

b) Description of the (re)processing applied to the high resolution or 3-D seismic data;
c) Results of interpretation:
   i) structure maps and isopach maps of the most significant events picked from the seismic data;
   ii) detailed bathymetric map;
   iii) surficial geology map;
   iv) results of sidescan sonar surveys, including side scan mosaics, and a description and discussion of the distribution and morphology of sedimentary units, pock marks, sea floor photographs, sea floor features such as sediment distribution, and, where appropriate, a discussion of ice scours, with an analysis of scour density, cross-sectional shape, depth of sediment disturbance and dimensions;
   v) descriptions of sea bottom photographs and their locations;
   vi) location and description of samples and cores;

vii) results of any geotechnical investigations or other studies carried out during the survey;
viii) identification of man-made obstacles; and
ix) compilation map showing type, depth and extent of features considered to be drilling hazards.

The CNSOPB may inform other operators in the area if any significant hazards to drilling are detected during a wellsite investigation.

8.0 DISPOSITION OF SAMPLES AND RESIDUAL TEST HOLE MATERIAL

All bottom samples and geotechnical test hole materials not used for analysis should be properly preserved, packed or stored and forwarded to the CNSOPB's Geoscience Research Centre. All materials must include reference to the original CNSOPB program number, a brief description of the relevant survey and a detailed inventory list of all materials submitted.

9.0 RELEASE OF DATA

With the exception of well data, under the Accord Acts, reports and data resulting from most technical programs in the Nova Scotia offshore area, cease to be privileged five years following completion of the program. However, the CNSOPB has extended the confidentiality period for non-exclusive programs to ten years following program completion. For data disclosure purposes, the completion date for geophysical, geological and geotechnical programs involving field work is established as six months following the termination date of the field work. A detailed breakdown of specific data confidentiality periods is available in Table 9.0.

Reports detailing the results of monitoring of marine mammals, sea turtles and sea birds, undertaken as part of a technical program, will be released one year following completion of the field work.

Well material obtained directly from the drilling of a well will be released as per the *Data Acquisition and Reporting Guidelines* (October, 2011) available on the website www.cnsopb.ns.ca.

Technical and environmental programs which are well specific are released with the well material or five years and six months following completion of field work, whichever date is earlier. Technical environmental programs which are not well specific are released five years and six months following completion of field work. A full listing of the geophysical and geological reports and data released by the CNSOPB may be found in the publication Information on Well Data, Geological Data and Geophysical Data, April 2014, copies of which may be obtained from the CNSOPB's website www.cnsopb.ns.ca.

Table 9.0: Data Release Periods

Note: The confidentiality periods and formats in this table reflect the CNSOPB's current data disclosure policy, however, these confidentiality periods and release formats are under review.

Data Classification	Data Type	Release Format	Confidentiality Period
Exclusive	Reports (Interpretation, Processing, Operations)	Paper/PDF via DMC (Data Management Centre)	5 years
Exclusive	Seismic*	Paper/PDF via DMC	5 years
Exclusive	CSEM, Gravity, Magnetics	Paper/PDF via DMC	5 years
**Exclusive	Reprocessed Seismic** (program without field work)	Paper/PDF via DMC	5 years
Exclusive	Other**	Paper/PDF	5 years
Non-Exclusive	Reports (Processing, Operations)	Paper	10 years
Non-Exclusive	Seismic*	Paper	10 years
Non-Exclusive	CSEM, Gravity, Magnetics	Paper	10 years
Non-Exclusive	Other***	Paper	10 years

*	Seismic includes 2-D/3-D/4-D/VSP/wellsite geophysical programs.
**	Reprocessed Seismic includes any reprocessed data.
***	Other – given rapid changes in technology, this category includes any form of geophysical program not covered explicitly.

Appendix A

Application Forms

Below is a list of CNSOPB forms available on the website:

Operating Licence Application

Declaration of Operator

Geophysical Work Authorization-Application (2D Seismic, 3D Seismic, Wellsite Seismic)

Geotechnical/Geological/Environmental Program Authorization Application

Geoscience Research Centre – Sampling Well Materials Form

Indemnity Agreement

Certificate of Fitness

Incident Notification

Incident Investigation Report

Originals of these forms may be obtained from:

Canada Nova Scotia Offshore Petroleum Board
1791 Barrington Street
8th Floor TD Centre
Halifax Nova Scotia B3J 3K9
Tel: (902) 422-5588
Fax: (902) 422-1799
E-Mail: info@cnsopb.ns.ca
Website: www.cnsopb.ns.ca

Appendix B

Environmental Planning, Mitigation and Reporting

This Appendix contains recommended environmental planning, mitigation and reporting measures for marine seismic surveys in the NS offshore area. Section I contains verbatim the Statement of Canadian Practice with Respect to the Mitigation of Sound in the Marine Environment that describes measures for the planning and conduct of marine seismic surveys that are intended to prevent or minimize potential effects upon the natural environment. Section II contains recommended practices for interaction with other ocean users, particularly fisheries interests, during the conduct of surveys. Finally, Section III contains recommended reporting formats for marine mammal and seabird observations during surveys.

I. STATEMENT OF CANADIAN PRACTICE WITH RESPECT TO THE MITIGATION OF SEISMIC SOUND IN THE MARINE ENVIRONMENT

Context

The Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment specifies the mitigation requirements that must be met during the planning and conduct of marine seismic surveys, in order to minimize impacts on life in the oceans. These Requirements are set out as minimum standards, which will apply in all non-ice covered marine waters in Canada. The Statement complements existing environmental assessment processes, including those set out in settled land claims. The current regulatory system will continue to address protection of the health and safety of offshore workers and ensure that seismic activities are respectful of interactions with other ocean users.

Definitions

Cetacean: means a whale, dolphin or porpoise

Critical habitat: means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy, or in an action plan for the species.

Marine Mammal Observer: means an individual trained to identify different species of marine mammals and turtles that may reasonably be expected to be present in the area where the seismic survey will take place.

Marine mammals: means all cetaceans and pinnipeds.

Passive Acoustic Monitoring: means a technology that may be used to detect the subsea presence of vocalizing cetaceans.

Pinniped: means a seal, sea lion or walrus.

Ramp-up: means the gradual increase in emitted sound levels from a seismic air source array by systematically turning on the full complement of an array's air sources over a period of time.

Seismic air source: means an air source that is used to generate acoustic waves in a seismic survey.

Seismic air source array(s): means one or a series of devices designed to release compressed air into the water column in order to create an acoustical energy pulse to penetrate the seafloor.

Seismic survey: means a geophysical operation that uses a seismic air source to generate acoustic waves that propagate through the earth, are reflected from or refracted along subsurface layers of the earth, and are subsequently recorded.

"Statement": means *the Statement of Canadian Practice for the Mitigation of seismic sound in the Marine Environment*.

Whale: means a cetacean that is not a dolphin or porpoise.

Application

1) Unless otherwise provided, the mitigation measures set out in this Statement apply to all seismic surveys planned to be conducted in Canadian marine waters and which propose to use an air source array(s).

2) The mitigation measures set out in this Statement do not apply to seismic surveys conducted.
   a) on ice-covered marine waters; or
   b) in lakes or the non-estuarine portions of rivers.

Planning Seismic Surveys

Mitigation Measures

3) Each seismic survey must be planned to:
   a) use the minimum amount of energy necessary to achieve operational objectives;
   b) minimize the proportion of the energy that propagates horizontally; and
   c) minimize the amount of energy at frequencies above those necessary for the purpose of the survey.

4) All seismic surveys must be planned to avoid:
   a) significant adverse effect for an individual marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the Species at Risk Act; and
   b) a significant adverse population-level effect for any other marine species.

5) Each seismic survey must be planned to avoid:
   a) displacing an individual marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the Species at Risk Act from breeding, feeding or nursing;
   b) diverting an individual migrating marine mammal or sea turtle of a species listed as endangered or threatened on Schedule 1 of the Species at Risk Act from a known migration route or corridor;
   c) dispersing aggregations of spawning fish from a known spawning area;
   d) displacing a group of breeding, feeding or nursing marine mammals, if it is known there are no alternate areas available to those marine mammals for those activities, or that if by using those alternate areas, those marine mammals would incur significant adverse effects; and
   e) diverting aggregations of fish or groups of marine mammals from known migration routes or corridors if it is known there are no alternate migration routes or corridors, or that if by using those alternate migration routes or corridors, the group of marine mammals or aggregations of fish would incur significant adverse effects.

Safety Zone and Start-up

Mitigation Measures

6) Each seismic survey must:
   a) establish a safety zone which is a circle with a radius of at least 500 m as measured from the center of the air source array(s); and
   b) for all times the safety zone is visible,
      i) a qualified Marine Mammal Observer must continuously observe the safety zone for a minimum period of 30 minutes prior to the start-up of the air source array(s); and
      ii) maintain a regular watch of the safety zone at all other times if the proposed seismic survey is of a power that it would meet a threshold requirement for an assessment under the Canadian Environmental Assessment Act, regardless of whether the Act applies.

7) If the full extent of the safety zone is visible, before starting or restarting an air source array(s) after they have been shut down for more than 30 minutes, the following conditions and processes apply:
   a) none of the following have been observed by the Marine Mammal Observer within the safety zone for at least 30 minutes:
      i) a cetacean or sea turtle;
      ii) a marine mammal listed as endangered or threatened on Schedule 1 of the Species at Risk Act; or
      iii) based on the considerations set out in Sub-Section 4(b), any other marine mammal that has been identified in an environmental assessment process as a species for which there could be significant adverse effects; and
   b) a gradual ramp-up of the air source array(s) over a minimum of a 20 minute period beginning with the activation of a single source element of the air source array(s), preferably the smallest source element in terms of energy output and a gradual activation of additional source elements of the air source array(s) until the operating level is obtained.

Shut-down of Air Source Array(s)

Mitigation Measures

8) The air source array(s) must be shut down immediately if any of the following is observed by the Marine Mammal Observer in the safety zone:
   a) a marine mammal or sea turtle listed as endangered or threatened on Schedule 1 of the *Species at Risk Act*; or
   b) based on the considerations set out in Sub-Section 4(b), any other marine mammal or sea turtle that has been identified in an environmental assessment process as a species for which there could be significant adverse effects.

Line Changes and Maintenance Shut-Downs

Mitigation Measures

9) When seismic surveying (data collection) ceases during line changes, for maintenance or for other operational reasons, the air source array(s) must be:
   a) shut down completely; or
   b) reduced to a single source element.

10) If the air source array(s) is reduced to a single source element as per Sub-Section 9(b), then

a) visual monitoring of the safety zone as set out in Section 6 and shut-down requirements as set out in Section 8 must be maintained; but
b) ramp-up procedures as set out in Section 7 will not be required when seismic surveying resumes.

Operations in Low Visibility

Mitigation Measures

11) Under the conditions set out in this Section, cetacean detection technology, such as Passive Acoustic Monitoring, must be used prior to ramp-up for the same time period as for visual monitoring set out in Section 6. Those conditions are as follows:
    a) the full extent of the safety zone is not visible; and
    b) the seismic survey is in an area that:
        i) has been identified as critical habitat for a vocalizing cetacean listed as endangered or threatened on Schedule 1 of the Species at Risk Act, or
        ii) in keeping with the considerations set out in Sub-Section 4(b), has been identified through an environmental assessment process as an area where a vocalizing cetacean is expected to be encountered if that vocalizing cetacean has been identified through the environment assessment process as a species for which there could be significant adverse effects.

12) If Passive Acoustic Monitoring, or similar cetacean detection technology, is used in accordance with the provision of Section 11, unless the species can be identified by vocal signature or other recognition criteria,
    a) all non-identified cetacean vocalizations must be assumed to be those of whales named in Section 8(a) or (b); and
    b) unless it can be determined that the cetacean(s) is outside the safety zone, the ramp-up must not commence until non-identified cetacean vocalizations have not been detected for a period of at least 30 minutes.

Additional Mitigation Measures and Modifications

Mitigation Measures

13) Persons wishing to conduct seismic surveys in Canadian Marine waters may be required to put in place additional or modified environmental mitigation measures, including modifications to the area of the safety zone and/or other measures as identified in the environmental assessment of the project to address:
    a) the potential for chronic or cumulative adverse environmental effects of
    i) multiple air source arrays (e.g., two vessels on one project, multiple projects); or
    ii) seismic surveys being carried out in combination with other activities adverse to marine environmental quality in the area affected by the proposed program or programs;
    b) variations in sound propagation levels within the water column, including factors such as seabed, geomorphologic, and oceanographic characteristics that affect sound propagation;
    c) sound levels from air source array(s) that are significantly lower or higher than average; and
    d) species identified in an environmental assessment process for which there is concern, including those described in Sub-Section 4(b).

14) Variations to some or all of the measures set out in this Statement may be allowed provided the alternate mitigation or precautionary measures will achieve an equivalent or greater level of environmental protection to address the matters outlined in Sections 6 through 13 inclusive. Where alternative methods or technologies are proposed, they should be evaluated as part of the environmental assessment of the project.

15) Where a single source element is used and the ramping up from an individual air source element to multiple elements is not applicable, the sound should still be introduced gradually whenever technically feasible.

II INTERACTION WITH OTHER OCEAN USERS

1) VSP Programs and Well Site Surveys

a) The operator should implement operational arrangements to ensure that the operator and/or its survey contractor and the local fishing interests are informed of each other's planned activities. Communication throughout survey operations with fishing interests in the area should be maintained;
b) The operator should publish a Canadian Coast Guard “Notice to Mariners” and a “Notice to Fishers” via the CBC Radio program Fisheries Broadcast;
c) Operators should implement a gear and/or vessel damage compensation program, to promptly settle claims for loss and/or damage that may be caused by survey operations. The operator should report on the details of any compensation awarded under such a program; and
d) Procedures must be in place on the survey vessel(s) to ensure that any incidents of contact with fishing gear are clearly detected and documented (e.g. time, location of contact, loss of contact, and description of any identifying markings observed on affected gear). As per Section 5.2 of these Guidelines, any incident should be reported immediately as per the *C-NLOPB / CNSOPB Guideline for the Reporting and Investigation of Incidents*.

2) 2-D and 3-D Seismic Programs
In addition to the measures indicated in Section 1 above, the following mitigation measures should also be implemented:

a) Surveys should be scheduled, to the extent possible, to reduce potential for impact or interference with Department of Fisheries and Oceans (DFO) science surveys. Spatial and temporal logistics should be determined with DFO to reduce overlap of seismic operations with research survey areas, and to allow an adequate temporal buffer between seismic survey operations and DFO research activities;
b) The Department of National Defense is contacted to determine if any unexploded ordnances (UXOs) may be present in the project area and to determine if any military exercises are planned during the program timeline; and
c) Seismic activities should be scheduled to avoid heavily fished areas, to the extent possible. The operator should implement operational arrangements to ensure that the operator and/or its survey contractor and local fishing interests are informed of each other’s planned activities.

Communication throughout survey operations with fishing interests in the area should be maintained. The use of a ‘Fisheries Liaison Officer’ (FLO) onboard the seismic vessel is considered best practice in this respect.

III SEABIRD, TURTLE AND MARINE MAMMAL MONITORING

Operators are expected to implement a seabird, turtle and marine mammal observation program throughout survey activities. Such a program should involve a one or more designated observer trained in marine mammal and seabird observations. The seabird and marine mammal observer may be the FLO if properly trained to carry-out both activities.

For marine mammal monitoring, the monitoring protocol outlined in *ESRF Report #156 Recommended Seabird and Marine Mammal Observation Protocols for Atlantic Canada* (2004) should be implemented. The report is available on the internet at the following link: http://www.esrfunds.org/

Monitoring reporting forms are available in Appendix B of the ESRF Report #156. For seabird monitoring, the Canadian Wildlife Service (CWS) has developed a pelagic seabird monitoring protocol that should be used when undertaking seabird observations. Two versions of the protocol have been developed: one for individuals with seabird survey experience, and another for inexperienced observers. Copies of the protocol and reporting forms, and a guide sheet to the pelagic seabirds of Atlantic Canada, are available from the CWS office.

IV REPORTING

A report on the monitoring program and its results should be submitted to the CNSOPB no later than 6 months after completion of the survey. Fisheries conflicts involving damage to active fishing gear are to be reported as per the *Incident Reporting and Investigation Guidelines (November 30, 2012)*. Any vessel strikes of cetaceans are to be reported immediately to the CNSOPB. .Shut-downs related to marine mammal or sea turtle interactions are to be indicated in weekly reports, as per Section 5.1. Any impacts to species at risk that constitute a violation of the *Species at Risk Act*, including but not limited to marine mammals, seabirds and sea-turtles, is to be reported immediately to the CNSOPB.

APPENDIX C

The SEG-Y format in which Seismic Trace Data should be submitted is described herein.

Pure SEG-Y Format Description

Trace Header Item	Byte Location	Format		Trace Header Item	Byte Location	Format
trace number within line	1	integer		correlated, 1=no, 2=yes	125	short
trace number within reel	5	integer		sweep frequency at start	127	short
original trace number	9	integer		sweep frequency at end	129	short
trace number in field record	13	integer		sweep length in ms	131	short
shot point	17	integer		sweep type, 1=linear	133	short
cdp number	21	integer		sweet trace taper length at	135	short
cdp ensemble number	25	integer		sweet trace taper length at	137	short
id code	29	short		taper type	139	short
number of vertically stacked	31	short		alias filter frequency	141	short
number of horizontally stacked	33	short		alias filter slope	143	short
data use, 1=production, 2=test	35	short		notch frequency	145	short
shot to receiver distance	37	integer		notch slope	147	short
receiver elevation	41	integer		low cut frequency	149	short
source elevation	45	integer		high cut frequency	151	short
source depth	49	integer		low cut slope	153	short
receiver datum elevation	53	integer		high cut slope	155	short
source datum elevation	57	integer		year recorded	157	short
water depth at source	61	integer		day of year	159	short
water depth at group	65	integer		hour of day	161	short
scalar for elevations	69	short		minute of hour	163	short
scalar for coordinates	71	short		second of minute	165	short
source coordinate x	73	integer		time basis code, 1=local	167	short
source coordinate y	77	integer		trace weighting factor	169	short
group coordinate x	81	integer		geophone group number of	171	short
group coordinate y	85	integer		geophone group number of	173	short
coordinate units, 1=length	89	short		geophone group number of	175	short
weathering velocity	91	short		gap size	177	short
sub-weathering velocity	93	short		overtravel associated with	179	short
uphole time at source	95	short		optional 1	181	integer
uphole time at rx	97	short		optional 2	185	integer
source static correction	99	short		optional 3	189	integer
group static correction	101	short		optional 4	193	integer
total static correction	103	short		optional 5	197	integer
lag time A	105	short		optional 6	201	integer
lag time B	107	short		optional 7	205	integer
delay recording time	109	short		optional 8	209	integer
start mute	111	short		optional 9	213	integer
end mute	113	short		optional 10	217	integer
number of samples in this trace	115	short		optional 11	221	integer
sampling interval	117	short		optional 12	225	integer
gain type of field instruments	119	short		optional 13	229	integer
gain constant for instruments	121	short		optional 14	231	integer
initial or early gain (db)	123	short		optional 15	237	integer

APPENDIX D

Contacts for the use of Foreign Vessels and/or Persons

Requirements under Federal Legislation

Contact names and numbers of federal departments that may have concerns about the use of foreign vessels and/or personnel during the collection of technical data are included below. The information contained herein is for guidance only and the CNSOPB cautions that additional departments may need to be contacted depending on the circumstances of the application.

Use of Foreign Vessels

Canada Border Services Agency
1583 Hollis Street,
Halifax, Nova Scotia B3J 1V4

Transport Canada
45 Alderney Drive, 11th Floor
PO Box 1013
Dartmouth, Nova Scotia B2Y 4K2
Tel.: 1-800-387-4999

Foreign Personnel Wishing to Work in Canada
Information regarding foreign personnel who wish to work temporarily in Canada may be obtained from either:

Citizenship and Immigration Canada
1741 Brunswick Street, Suite B110
Halifax, NS B3J 3X8

or, outside Canada, any Canadian consulate.

Where immigration deems that Employment Authorizations are required, please contact Service Canada at the following address:

Service Canada (Temporary Foreign Worker Unit) (for regular applications)

For assistance – phone: 1-800-367-5693 (toll-free)

Appendix E

CNSOPB Offshore Jurisdiction Map