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CONSOLIDATED NEWFOUNDLAND AND LABRADOR REGULATION 1150/96

Petroleum Drilling Regulations
under the
Petroleum and Natural Gas Act
(O.C. 96-225)

Under the authority of section 9 of the *Petroleum and Natural Gas Act* and the *Subordinate Legislation Revision and Consolidation Act*, the Lieutenant-Governor in Council makes the following regulations.

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Short title

1. These regulations may be cited as the *Petroleum Drilling Regulations*.

Definitions

2. In these regulations

- (a) "abandoned" means, in respect of a well or test hole, a well or test hole that has been permanently plugged;
- (b) "Act" means the *Petroleum and Natural Gas Act*;
- (c) "authority to drill a well" means the authority granted to an operator under section 32 to drill a well;
- (d) "authorized person" means a person authorized by the director to undertake the tasks and make the inspections or investigations that are permitted by these regulations;
- (e) "casing liner" means a casing that
 - (i) is suspended from a string of casing previously installed in the well, and
 - (ii) does not extend to the wellhead;
- (f) "completed" means, in respect of a well or test hole, a well or test hole that has been prepared to permit the
 - (i) production of fluids from the well,
 - (ii) observation of the performance of a reservoir,
 - (iii) injection of fluids into the well, or
 - (iv) disposal of fluids into the well;
- (g) "conductor casing" means casing that is installed in a well to facilitate well control during drilling of the hole for the surface casing;
- (h) "conductor pipe" means a large diameter pipe installed in a well to provide a conductor for drilling fluid through surficial formations;
- (i) "development well" means a well that is drilled in a field or pool for the purpose of the
 - (i) production of fluids from the well,
 - (ii) observation of the performance of a reservoir,
 - (iii) injection of fluids into the well, or
 - (iv) disposal of fluids into the well;
- (j) "director" means the officer that the minister has made responsible for the administration of these regulations;
- (k) "discovery well" means an exploratory well that, in the opinion of the director, has encountered oil or gas in quantities of commercial significance;

(l) "diverter" means a device fitted on a wellhead for the purpose of directing the flow of fluids away from the drill floor in an emergency;

(m) "drill crew" means the personnel whose primary duties consist of the operating of a drilling rig;

(n) "drill floor" means the stable platform surrounding the rotary table that provides support for the drill crew during drilling operations;

(o) "drill site" means a location where a drilling rig is or may be installed;

(p) "drilling base" means the stable foundation on which a drilling rig is installed;

(q) "drilling program" means a program for the drilling of one or more wells within a specified area and time using one or more drilling rigs and includes all operations and activities ancillary to the program;

(r) "drilling program approval" means the authority granted to a person under section 12 to conduct a drilling program;

(s) "drilling rig" means the plant used to make a well by boring or other means and includes a derrick, draw works, rotary table, mud pump, blowout preventer, accumulator, choke manifold and other associated equipment including power, control and monitoring systems;

(t) "environmental conditions" means meteorological and other natural conditions that may affect the operations of a drilling program;

(u) "exploratory well" means a well or part of a well, other than a development well or test hole, that is drilled for the purpose of discovering petroleum or obtaining geological information;

(v) "formation flow test" means an operation to induce the flow of formation fluids to the surface of a well for the purpose of procuring reservoir fluid samples and determining reservoir flow characteristics;

(w) "intermediate casing" means a casing string installed in a well, following the installation of a surface casing in the well, through which further drilling operations may be carried out in a well;

(x) "kick" means the spontaneous flow of fluids at the surface of a well caused by the entrance of formation fluids into the well-bore;

(y) "minister" means the minister appointed under the *Executive Council Act* to administer the Act;

(z) "muster list" means a placard giving details of procedures for crew members to follow in the event of an emergency;

(aa) "natural environment" means the physical and biological environment in the specified area of a drilling program;

(bb) "operator" means an individual or company that seeks or has been granted approval under these regulations to conduct a drilling program;

(cc) "pressure system" means a boiler, pressure vessel or pressure plant;

(dd) "production casing" means the casing installed in a well-bore for production or injection purposes and may include an intermediate casing;

(ee) "relief well" means a well drilled to assist in controlling a blowout in an existing well;

(ff) "rig discharges" means fluids or other contents produced at the drill site including sewage effluent, grey water, oil wastes, drilling fluids, drill cuttings and cementing discharges;

(gg) "rig release date" means the date on which a drilling rig last conducted operations on a well in accordance with the authority to drill a well in respect of that well;

(hh) "spud-in" means, in respect of the drilling of a well, the initial penetration of the ground by the primary drilling rig;

(ii) "stepout well" means a well drilled adjacent to a proven well in an effort to determine the boundaries of a producing formation;

(jj) "surface casing" means the casing installed in a well to a depth sufficient to establish well control for the continuation of the drilling operations;

(kk) "surface improvement" means a railway, pipeline or other right-of-way, road allowance, surveyed roadway, dwelling, industrial plant, aircraft runway or taxiway, a building used for military purposes, a permanent farm building or a school, church or other place of public concourse;

(ll) "suspended" means, in respect of a well or test hole, a well or test hole in which drilling or producing operations have temporarily ceased;

(mm) "terminated" means, in respect of a well or test hole, a well or test hole that has been abandoned, completed or suspended in accordance with these regulations;

(nn) "test hole" means a hole other than a well or seismic shot hole, drilled through sedimentary rock to a depth of more than 30 metres;

(oo) "U.L.C." means the Underwriters' Laboratories of Canada;

(pp) "waste material" means refuse or garbage or other useless material generated during a drilling program and ancillary operations but does not include drilling fluid and drill cuttings;

(qq) "well" means an opening in the ground that is not a seismic shot hole and that is made, to be made or is in the process of being made, by drilling, boring or another method

(i) through which oil or gas could be obtained,

(ii) for the purpose of searching for or obtaining oil or gas,

(iii) for the purpose of obtaining water to inject into an underground formation,

(iv) for the purpose of injecting gas, air, water or other substance into an underground formation, or

(v) for any purpose through sedimentary rock to a depth of at least 150 metres;

(rr) "well-bore" means the hole drilled by a bit in order to make a well;

(ss) "well control" means the control of the movement of fluids in or from a well;

(tt) "well material" means a formation or reservoir material obtained from a well, including a cutting, core or fluid; and

(uu) "wireline" means a line that is used to run survey instruments or other tools in a well and that is made of

(i) steel, or

(ii) several wires of steel, copper or other metals together with electrical insulation.

149/82 s2

Application

3. These regulations apply

(a) to an operator who explores or drills for petroleum under the Act; and

(b) in respect of a well and test hole drilled under the Act.

149/82 s3

Availability of regulations

4. An operator shall ensure that a copy of these regulations is

(a) kept at all drilling sites during the period a drilling program is being conducted under a drilling program approval; and

(b) available for scrutiny on request by a person on the drill site.

149/82 s4

PART I DRILLING PROGRAM

Approval required

5. A person shall not drill a well on land or land covered by water which is within the jurisdiction of the Legislature of the province unless that person has obtained a drilling program approval in accordance with section 12 and an authority to drill a well approved by the director in accordance with section 32.

149/82 s5

Presumption

6. (1) All equipment, procedures, courses or programs which are by these regulations required to be approved by or be acceptable to the director shall be considered to be so approved or acceptable until the time that the director in writing directs the operator that the equipment, procedure, course or program is no longer acceptable.

(2) An operator informed under subsection (1) shall modify or acquire the equipment, procedure, course or program within the time that the director may specify to meet the standards as the director shall in writing require.

149/82 s6

Application

7. A person may apply for a drilling program approval in respect of a proposed drilling program by completing and forwarding in triplicate to the director an application in the form prescribed by the director.

149/82 s7

Information required

8. The following information shall be furnished by an applicant and forwarded with the application for approval of a drilling program referred to in section 7:

- (a) the purpose, area, timing, nature and logistics of the program;
- (b) a description and the specifications of a drilling rig to be used in the program;
- (c) particulars of special conditions or circumstances that may affect the safety of the drilling operations;
- (d) on request of the director, the particulars and specifications in respect of the make, model, type and rated capacity of drilling equipment, including the derrick or mast and the draw works, blocks, hook and swivel;
- (e) a description of the natural environment in the area of the program including environmental conditions that may affect the operations of the drilling program;
- (f) general dimensional arrangement drawings of the drilling rig, drill site, drilling base and administrative area used or intended to be used during drilling operations; and
- (g) on the request of the director, in the case of every drilling rig used or intended to be used by an applicant during the program
 - (i) the data and particulars on which the applicant relies to show that the drilling rig has adequate stability to safely conduct the proposed program,
 - (ii) a description of the relationship between the performance characteristics of each drilling rig and the prevailing environmental conditions in the area of the program, and
 - (iii) general arrangement drawings that show the arrangement of all drilling equipment on the rig, bulk transfer systems, drilling fluid systems, well control

systems including blowout preventers, choke manifolds, testing and flowing apparatus, cranes, and firefighting appliances and communication and alarm systems.

149/82 s8

Anticipated environmental effect

9. An operator shall, on the request of the director, submit to the director a description of the anticipated effect that a proposed drilling program will have on the natural environment of the area described in the application for drilling program approval.

149/82 s9

Personnel qualification

10. An operator shall, on the request of the director, provide the director with a description of the qualifications of each person involved in the drilling program who is employed by that operator in a supervisory capacity.

149/82 s10

Contingency plans

11. (1) An operator shall ensure that contingency plans have been formulated and that equipment is available to cope with a foreseeable emergency situation during a drilling program, including

- (a) a serious injury to or the death of a person;
- (b) a major fire;
- (c) the loss or disablement of a drilling rig;
- (d) the loss of well control;
- (e) arrangements for the drilling of a relief well should it become necessary;
- (f) hazards unique to the site of the drilling operations; and
- (g) spills of oil or other pollutants.

(2) The plans referred to in subsection (1) shall provide for the coordination with existing local or national contingency plans.

(3) An operator shall

- (a) have one copy of the plan referred to in subsection (1) readily accessible at each drilling rig; and
- (b) forward 2 copies to the director with the application for approval of a drilling program referred to in section 7.

Drilling program approval

12. The drilling program approval, when approved by the director, shall constitute authority to conduct a drilling program.

Term of approval

13. Notwithstanding section 12, a drilling program approval shall be for a specified term not exceeding 3 years.

Conditions of approval

14. Notwithstanding section 12, as a condition of the approval of a drilling program approval, an operator shall, before the commencement of drilling, when required by the minister to do so

- (a) furnish to the minister a performance bond in a form and in an amount satisfactory to the minister requiring the surety named in the bond to terminate the well and leave the drill site in a satisfactory condition in the event of the failure of the operator to comply with these regulations; and
- (b) furnish evidence to the minister, in a form satisfactory to the minister, that he or she is financially able to meet financial liability that may be incurred as a result of the drilling of a well.

Experimental equipment

15. Drilling equipment that has not been fully developed or has not been proven under field conditions may be approved by the director for use in a drilling program but that approval shall cease to be valid if the actual performance of the equipment does not meet or exceed the performance characteristics specified for that equipment set out in the application for the drilling program approval.

Minimum disturbance

16. The establishment of a drill site shall to the extent practicable, be carried out so as to minimize a disturbance of the ground surface and vegetation and a change in the thermal regime of the ground in the area of the drill site.

Operator's duties

17. An operator shall ensure that

- (a) the drilling of a well is conducted in a manner that maintains full control of the well at all times;
- (b) plans have been made and equipment is available to deal with all abnormal situations that may reasonably be anticipated;
- (c) the administrative and logistic support that is provided for in a drilling program includes the following:
 - (i) transportation facilities suitable for the area of operations,
 - (ii) suitable supplies of drilling consumable, food and fuel,
 - (iii) accommodation for personnel,
 - (iv) medical facilities,
 - (v) storage and repair facilities, and
 - (vi) communication systems;
- (d) the drilling of the well is conducted in accordance with the procedures and equipment authorized under these regulations or as otherwise prescribed by the minister;
- (e) equipment including travelling blocks and ancillary equipment, masts, substructures, drilling lines, well control equipment and pressure vessels are operated within the limits specified by the manufacturer of the equipment;
- (f) at the end of each crew shift, the retiring drilling supervisor of a drilling rig informs the new supervisor of mechanical deficiencies that have not been rectified during the shift and of downhole conditions or other problems that have a bearing on the safe conduct of the drilling of the well; and
- (g) differences in language or other barriers to effective communication do not jeopardize the safety of operations on a drilling rig.

149/82 s17

Hazards

18. An operator shall take all reasonable precautions for the protection of personnel and equipment from naturally occurring and man made hazards in the area described in the drilling program approval issued to that operator.

149/82 s18

Standards for drilling equipment

19. (1) The minimum acceptable standards for a derrick, mast, draw works, mud pump and for related drilling rig equipment that is installed on a drilling rig are those standards that are equal or superior to the relevant specifications of the American Petroleum Institute.

(2) The derrick, mast, draw works, mud pump and related equipment of a drilling rig shall be designed to operate safely and efficiently under the maximum load conditions anticipated during a drilling operation.

149/82 s20

Defective or experimental equipment

20. (1) An operator shall, in the interest of safety,

- (a) immediately repair or replace defective equipment that is being used during a drilling operation;
- (b) alter an operational procedure that is unsafe, inadequate or deficient; and
- (c) where necessary, initiate a new operational procedure in respect of the drilling operation.

(2) Where under subsection (1) the operator is required to replace equipment or alter a procedure described in the application for drilling program approval, he or she shall obtain the approval of the director.

149/82 s21

Requirements for drilling bases

21. (1) A drilling base to be used in a drilling program shall be designed and constructed to

- (a) withstand the environmental conditions and effects that may reasonably be anticipated; and
- (b) provide a base on which drilling and related operations can be conducted safely and efficiently.

(2) All parts of the drilling base shall be protected against erosion and corrosion.

149/82 s22

Requirements for drilling rigs

22. An operator shall ensure that a drilling rig and associated equipment used in a drilling program

- (a) is maintained in good working conditions at all times during the drilling program; and
- (b) is inspected in accordance with good oilfield practice, at least annually and a report is prepared in respect of the inspection.

Rig protection

23. All parts of the drilling rig shall be protected against erosion and corrosion.

PART II AUTHORITY TO DRILL A WELL

Unauthorized drilling prohibited

24. (1) A person shall not

- (a) drill a well unless authorized by an authority to drill a well; or
- (b) re-enter a well that has been suspended unless the re-entry has been authorized by the director.

(2) A person shall not drill a test hole unless authorized in writing by the director.

Name, classification and status of wells

25. The director may assign or change the name, classification or status of a well.

Surveys

26. (1) A legal survey shall be used to confirm the location of

- (a) a development well;
- (b) an exploratory well that has been assigned the status of a discovery well by the director under section 25; or
- (c) another well, on the request of the director.

(2) An operator shall submit to the director a plan of a legal survey made under subsection (1) as soon as practical.

Location of a well

27. (1) The location of a well is subject to the approval of the director.

(2) The surface location of a development well shall be selected and the drilling procedures for that well designed to ensure that the well intersects the reservoir at a point consistent with good reservoir engineering practice.

149/82 s29

Surface improvements

28. (1) An operator shall not drill a well within 100 metres from a surface improvement unless that person

(a) justifies to the director the drilling of the well within a lesser distance; and

(b) establishes to the director that the operation can be conducted without damage or threat to the surface improvement.

(2) A test hole may be drilled at a location within 100 metres of a surface improvement if the operation can be conducted without damage to the surface improvement.

(3) Where a well is to be drilled within 5 kilometres of a licensed airport, the operator shall advise the Regional Director, Airways, Department of Transport, of the proposed location of the well not later than the date on which he or she submits the application for an authority to drill a well in respect of that well.

(4) A well shall not be drilled that may penetrate a mineral deposit where there are mining operations or where mining operations may be undertaken unless measures satisfactory to the director are taken to

(a) protect the mineral deposits from damage or loss of value; or

(b) prevent interference with the mining operation.

149/82 s30

Application for well drilling authority

29. (1) An operator shall submit in triplicate to the director an application for an authority to drill a well not less than 21 days before the date he or she plans to spud-in.

(2) The application required under subsection (1) shall be in a form satisfactory to the director and shall include

(a) the name of the well;

(b) the geographical coordinates of the well;

(c) the proposed total depth of the well;

(d) the name of the drilling contractor and the identification of the drilling rig to be used;

(e) the proposed spud-in date of the well and estimated time required to drill the well;

(f) the proposed evaluation program including a program for the taking of conventional cores, wireline logs or formation flow tests;

(g) the casing program and the volume of cement estimated to be used;

(h) the elevation of

(i) the ground surface at the wellhead, and

(ii) the rotary table or the drill floor where no rotary table is employed;

(i) other information that the director may require.

(3) The application required under subsection (1) shall be accompanied by

(a) a copy of the complete well site survey;

(b) a copy of the well prognosis described in section 30; and

(c) a copy of an approved plan described in section 31.

149/82 s31

Well prognosis

30. (1) An operator shall prepare a well prognosis to supplement information submitted in accordance with section 29.

(2) The well prognosis referred to in subsection (1) shall include information in respect of

(a) the manner in which the program for the drilling of the well has been designed to overcome the meteorological conditions referred to in the application for drilling program approval;

(b) the prevailing environmental conditions in the area of the drill site;

(c) the expected rig discharges at the drill site;

(d) the equipment, procedures and resources to be employed to protect the natural environment in the vicinity of the proposed well;

(e) the detailed geological prognosis including

(i) a diagrammatic presentation of the stratigraphic section and the interval velocities used to produce the section,

(ii) the depth, thickness and lithology of formations,

(iii) the depth of geological and seismic markers,

(iv) the prospective horizons,

(v) a series of time structure or depth structure contour maps illustrating the areal configuration of the major horizons, and

- (vi) if seismic data has been acquired, at least 2 fully processed seismic sections, crossing the proposed well site or projected across the proposed well site which preferably should be orthogonal;
- (f) the details of the well evaluation program;
- (g) the subsurface conditions anticipated at the proposed drill site that may affect the safety and efficiency of the drilling operations including the depth and nature of formations where problems such as lost circulation, swelling shale and abnormal pressure zones are anticipated;
- (h) the details of the casing program including
 - (i) calculations of the design safety factors, and
 - (ii) the anticipated fracture gradient curves and pore pressure profiles;
- (i) the details of the cementing program for each casing string;
- (j) the blowout preventer system and variations in the blowout preventer system from those described in the application for drilling program approval;
- (k) the details of the sequence of drilling operations and procedures to be used for each phase of the hole;
- (l) the basic type of fluid system and a summary of expected properties to be maintained for each phase of the hole;
- (m) a summary or description of the offset well data used in the planning and engineering of the well; and
- (n) other information that the director may require.

149/82 s34

Pollution prevention plan

31. (1) Where a proposed well is to be located within 100 metres of the normal high water mark of a body of water or permanent stream, the operator shall submit evidence that he or she has obtained prior written approval of his or her plan to prevent pollution of the water from those regulatory bodies that have jurisdiction in respect of the drill site.

(2) The plans referred to in subsection (1) shall

- (a) indicate the elevation of the land and water surfaces adjoining the drill site;
- (b) describe special problems at the drill site;
- (c) include details of the construction and maintenance of dikes, reservoirs and other installations intended to be constructed; and
- (d) provide particulars in respect of the method to be used to dispose of mud, oil, water or other fluids associated with the proposed drilling operations.

149/82 s35

Authority to drill well

32. (1) The application for authority to drill a well referred to in section 29 shall, when approved by the director, constitute authority for the operator to drill a well.

(2) The approval of an application for an authority to drill a well referred to in subsection (1) is on condition that the drilling of the well is in accordance with the particulars of section 29 required to be included in the application submitted by the operator unless otherwise authorized by the director.

(3) Notwithstanding subsection (1), the approval of an application for an authority to drill a well shall be on condition that the operator commences drilling under the authority to drill a well within 120 days of the day the authority to drill a well was approved.

(4) Where the re-entry of a well has been authorized under paragraph 24(1)(b), the authorization shall be on condition that the operator commences the re-entry of the well within 120 days of the authorization.

149/82 s36

Withdrawal of authority to drill well

33. (1) The director may withdraw the authority to drill a well where the safety of operations becomes uncertain owing to

(a) the level of performance of the drilling rig being demonstrably less than the level of performance indicated in the application for a drilling program approval submitted by the operator; or

(b) the environmental conditions encountered in the area of the drilling program for which the application for the authority to drill a well was approved under subsection 32(1), being more severe than those predicted by the operator when the drilling program approval was approved under section 12.

(2) The director may withdraw the authority to drill a well or suspend the authority to drill a well for a definite time or indefinitely if it is made to appear that a contravention of these regulations or of an order, declaration or directive issued by the minister has occurred with respect to the well for which the authority to drill a well was approved under subsection 32(1).

149/82 s37

Equivalent standards and exemptions

34. (1) The director may

(a) authorize the use of equipment, methods, measures or standards instead of any required by these regulations, where the director is satisfied that the use of that other equipment and those other methods, measures or standards would provide a level of safety, protection of the environment and conservation of petroleum resources equivalent to that provided by compliance with the regulations; or

(b) grant an exemption from any requirement in these regulations in respect of equipment, methods, measures or standards, where the director is satisfied with the level of safety, protection of the environment and conservation of petroleum resources that will be achieved without compliance with that requirement.

(2) No person contravenes the regulations if that person acts in compliance with an authorization or exemption under subsection (1).

104/96 s1

Guidelines and interpretation notes

35. (1) The director may issue and publish, in the manner the director considers appropriate, guidelines and interpretation notes with respect to the application and administration of the regulations.

(2) Guidelines and interpretation notes issued under subsection (1) shall not be subordinate legislation for the purposes of the *Statutes and Subordinate Legislation Act*.

104/96 s1

PART III CASING

Casing

36. (1) An operator shall submit to the director for approval the casing setting depths, the casing program and the casing cementing program for each test hole or well that he or she intends to drill.

(2) Casing to be used in a well shall be new pipe or, subject to subsection (3), reconditioned pipe.

(3) Reconditioned pipe shall not be used as casing unless it has been inspected by an approved method and found to have adequate strength for its intended purpose.

149/82 s38

Design of casing

37. (1) The casing to be installed on a well shall be designed to withstand burst, collapse, tension, bending, buckling or other stresses that are known to exist or that may reasonably be expected to exist.

(2) The design of a well casing shall be based on formulae listed in the latest edition of American Petroleum Institute Bulletin 5C2 using the performance ratings for casing published by the manufacturer of the casing.

(3) The minimum design factors used in the design of well casings shall be

(a) 1.33 for burst, for surface and intermediate casing;

(b) 1.0 for burst, for conductor casing, production casing and liners;

(c) 1.0 for collapse; and

(d) 1.6 for tension.

149/82 s39

Burst pressure assumptions

38. (1) The casing to be installed in a well shall be designed to withstand burst pressures using the following assumptions:

- (a) the maximum internal pressure in the conductor casing and surface casing is 22 kilopascals per metre of depth to which it is run;
- (b) the maximum internal pressure in intermediate casing is equal to 50% of the maximum anticipated formation fluid pressure at the depth to which the well is to be drilled before setting a further casing;
- (c) the maximum internal pressure for production casing is the maximum reservoir pressure;
- (d) the maximum internal pressure determined in accordance with paragraphs (b) and (c) is reduced by an internal pressure equivalent to a head of methane gas that extends from the wellhead to the depth to which the well is to be drilled before setting a further casing;
- (e) for surface and intermediate casing, an external pressure exists that is equivalent to a head of water from the casing shoe to the top of the highest known water table.

(2) For the purpose of paragraph (1)(b), where the formation fluid pressure is not known, the formation fluid pressure at any depth shall be assumed to be 11 kilopascals per metre of well depth.

149/82 s40

Collapse loading assumptions

39. (1) The casing to be installed on a well shall be designed to withstand collapse loading based on the following assumptions:

- (a) the hydrostatic head of the drilling fluid in which the casing is run acts on the exterior of the casing at a given depth;
- (b) the conductor and surface casing are completely evacuated;
- (c) the intermediate casing and other protective casing is at least 50% evacuated; and
- (d) the casing used for production purposes is completely evacuated.

(2) For the purpose of subsection (1), the effect of axial stresses on collapse resistance shall be taken into account.

149/82 s41

Tensile loading assumptions

40. Well casing shall be designed to withstand tensile loading based on the following assumptions:

- (a) the weight of casing is its weight in air; and
- (b) the tensile strength of the casing is the yield strength of the casing wall or of the joint, whichever is the lesser.

149/82 s42

Alternative casing design

41. (1) Where casing liners are used instead of full casing strings, the casing liner and the casing to which it is attached shall together meet the relevant design criteria set out in sections 37 to 40.

(2) Notwithstanding sections 37 to 40, a casing design criteria, other than the criteria set out in those sections, may be applied to casing to be used if the operator submits details of the design criteria that shows that the design criteria submitted, if followed, provides casing, the safety of which is equivalent or superior to the safety of the casing designed in accordance with those sections.

149/82 s43

Casing setting depths

42. The setting depth of a casing string shall be based on relevant geological and engineering data.

149/82 s44

Casing program

43. (1) Where normal pressure conditions exist, the casing program shall, in respect of an exploratory well, include

- (a) conductor pipe or conductor casing, or both, set to a depth sufficient to ensure the return of drilling fluids;
- (b) surface casing set in a competent formation at a depth of not less than 150 metres and not more than 4 times the depth of the previous conductor casing or 500 metres, whichever is greater; and
- (c) intermediate casing set at a depth to ensure that at least 25% of the hole is cased during all drilling operations below surface casing.

(2) Notwithstanding subsection (1), the director may

- (a) where abnormal pressure conditions are known to exist or are anticipated, require the operator to install casing in addition to the casing required by those subsections; and
- (b) where the operator provides data to show that an equivalent degree of safety to that required by subsection (1) is provided with different casing setting depths, approve casing setting depths other than those required by those subsections.

(3) An operator may, with the approval of the director, install additional casing in a well, including production casing and liners, below the intermediate casing referred to in paragraph (1)(c).

(4) An operator shall not set a casing in a well unless he or she has received approval from the director for the depth at which the casing may be set.

149/82 s45

Cementation of casing

44. (1) An operator shall ensure that

(a) the cementation of casing and casing liners is carried out in accordance with the program specified in the authority to drill a well;

(b) where practicable, fluid returns are visually observed during all cementation operations; and

(c) the cement rise in the annulus, based on observations made under paragraph (b) and on the design data, is calculated and is recorded.

(2) Subsection (1) does not apply where the operator provides data to show that other measures will provide an equivalent or greater degree of well control.

149/82 s46

Proper cementation

45. (1) The volume of cement slurry used for the cementation of a casing shall be at least 30% greater than the estimated annular volume to be filled unless that estimate is based on a reliable caliper log in which case the volume shall be at least 10% greater than the estimated annular volume.

(2) Where there are indications during or after the completion of cementation that the casing is not properly cemented, the operator shall conduct a pressure test at the shoe of the casing or otherwise determine the effectiveness of the cement in the annulus and ensure that necessary remedial action is taken.

149/82 s47

Cement mixture and process

46. The mixture of the cement to be used and the procedure to be followed in the cementing of casing strings in a well shall be designed to

(a) prevent the movement of formation fluids in the casing-formation annuli or casing-casing annuli;

(b) provide support for the casing; and

(c) retard corrosion of the casing.

Cementing intervals

47. (1) The conductor casing shall be cemented where practicable from the shoe of the casing to the surface.

(2) Surface casing unless otherwise approved by the director shall be cemented to surface or to a depth that is not less than 25 metres above the base of a previous casing string.

(3) Intermediate casing shall be cemented with sufficient cement to

- (a) isolate all hydrocarbon or potable water zones;
- (b) isolate abnormally pressured intervals from normally pressured intervals; and
- (c) rise to a minimum of 300 metres above the casing shoe.

Liner cementing intervals

48. Where practicable, a casing liner shall be cemented for its full length.

Waiting on cement time

49. (1) An operator shall ensure that the time interval while waiting for cement to harden before resumption of drilling after cementation of a casing is in no case less than 6 hours and is less than 12 hours only when the operator determines, by testing representative samples of the cement using acceptable equipment and procedures, that the cement has a compressive strength of at least 3,500 kilopascals.

(2) The time interval and the result of a test referred to in subsection (1) shall be recorded on tour sheets.

PART IV

WELL CONTROL EQUIPMENT

Well control equipment

50. Equipment for the purpose of well control shall

- (a) have sufficient structural strength to withstand normal loading conditions associated with drilling and related operations; and

(b) be protected against the effects of all environmental conditions that may reasonably be anticipated.

149/82 s52

Equipment function and installation

51. An operator shall ensure that all well control equipment, including the casing, the blowout preventer system and the surface equipment necessary for formation flow testing, is

(a) installed in a manner that ensures that it can properly fulfil its function; and

(b) pressure tested on installation and periodically after that in accordance with sections 61 to 63.

149/82 s53

Blowout preventer system requirements

52. (1) Where drilling and related operations are being carried out below the conductor casing of a well a diverter or blowout preventer system shall be installed on the wellhead.

(2) A blowout preventer system installed under subsection (1) shall be capable of being activated from the drill floor of a drilling rig and from one other location remote from the wellhead.

(3) Where hydraulic control lines are used to activate a blowout preventer system, the lines shall be fire resistant.

(4) A blowout preventer system installed under subsection (1) shall have a rated working pressure in accordance with section 55.

(5) Notwithstanding subsection (4), the rated working pressure of a blowout preventer system installed under subsection (1) shall not be less than 13 megapascals.

(6) A blowout preventer system installed under subsection (1) shall be equipped with

(a) a control panel whose functions are clearly identified on it and in full view and within easy access of the driller's station;

(b) a control panel in addition to the control panel described in paragraph (a), located in a readily accessible and protected location remote from the drill floor;

(c) a secondary control system and a secondary source of operating power capable of activating the blowout preventers in case the primary control system or primary power source fails;

(d) a control system that is capable of closing

(i) a ram-type preventer within 30 seconds of activation,

(ii) an annular-type blowout preventer smaller than 450 millimetres bore diameter within 45 seconds of activation, and

(iii) another type of preventer within 60 seconds of activation;

(e) an accumulator and a recharging system located in a readily accessible and protected area at least 20 metres from the drill floor.

(7) An accumulator in a hydraulic blowout preventer control system installed on a wellhead during the drilling of a well shall be capable of closing and opening the annular-type preventer and one of the ram-type preventers in one continuous sequence of operations without recharging.

(8) The blowout preventer system installed under subsection (1) shall be designed to permit the maintenance, retrieval and replacement of a major component of the system while maintaining well control.

149/82 s54

Exceptions

53. (1) Section 52 does not apply in the case of a test hole or a well that is drilled for a purpose other than

(a) the production of oil or gas;

(b) exploring for oil or gas;

(c) obtaining water to inject into an underground formation; or

(d) the injecting of gas, air, water or other substance into an underground formation.

(2) Notwithstanding subsection (1), the director may direct that a diverter or blowout preventer system be installed on a test hole or well referred to in that subsection during the drilling of the test hole or well.

149/82 s55

Diverter system

54. An operator shall ensure that a diverter system is installed on the conductor pipe where necessary to ensure that the hole below the conductor pipe can be drilled safely.

149/82 s56

Preventer required below surface casing

55. (1) An operator shall ensure that a blowout preventer system is installed on the wellhead during all drilling operations that are carried out below the surface casing.

(2) The blowout preventer system for all drilling operations below the surface casing shall have a rated working pressure that is

(a) greater than 20 megapascals unless the operator provides data to show that a blowout preventer system with a pressure rating of less than 20 megapascals can be used without jeopardizing the safety of the well; and

(b) greater than 50% of the maximum anticipated formation pressure.

(3) Notwithstanding paragraph (2)(b), the pressure rating of an annular-type preventer need not exceed 35 megapascals except that the director may require a second annular-type preventer or other blowout prevention equipment where the anticipated bottom hole pressure exceeds 69 megapascals.

(4) For the purpose of subsection (2), where the maximum formation pressure is not known, it shall be assumed to be equal to or greater than the product obtained by multiplying 11 kilopascals per metre by the well depth in metres.

(5) An operator shall ensure that the blowout preventer system referred to in subsection (1) includes at least,

(a) 3 hydraulically operated blowout preventers comprising

(i) one annular-type preventer, and

(ii) 2 ram-type preventers, one of which is fitted with blind rams and one with rams that fit the drillpipe in use;

(b) a drilling spool with side outlets, unless side outlets are provided in the body of the preventer;

(c) a pressure relief line and kill line; and

(d) a choke manifold.

149/82 s57

Preventer required when running casing

56. An operator shall ensure that a blowout preventer system is installed on the wellhead consisting of at least one annular preventer and one ram-type preventer fitted with rams to fit the casing while running intermediate and production casing.

149/82 s58

Safety valves

57. An operator shall ensure that

(a) a safety valve is installed in the drill string immediately above and below the kelly; and

(b) there is available on every drill floor

(i) full opening drill string safety valves to fit each type of connection in the drill string, and

(ii) a suitable inside blowout preventer valve.

149/82 s59

Choke manifold

58. (1) An operator shall ensure that a choke manifold that has a rated working pressure equal to or greater than the pressure rating of the blowout preventers referred to in sections 54 to 56 is installed on or near the drill floor.

(2) The inside diameter of all lines and valves comprising the choke manifold referred to in subsection (1) shall be greater than 50 millimetres.

(3) The flow from a well shall be capable of being directed through the main flow line and 2 or more secondary lines of the choke manifold and each secondary line shall be equipped with an adjustable choke.

(4) The main flow line referred to in subsection (3) shall be equipped with

- (a) a hydraulically or pneumatically operated full-opening choke; or
- (b) a hydraulically operated full-opening valve that has a manual override.

(5) The choke manifold referred to in subsection (1) shall

- (a) be equipped with at least one pressure gauge; and
- (b) have installed a sufficient number of outlets to permit the installation of gauges to measure the pressure under a selection of flow route.

(6) The operator shall ensure that during all drilling operations gauges sufficient in number to fit all gauge outlets on the choke manifold are available for immediate installation.

(7) Where a choke manifold referred to in subsection (1) has a pressure rating greater than 20 megapascals, the manifold shall be equipped with an automatic choke and the control for the automatic choke shall be on or near the drill floor.

(8) The choke manifold referred to in subsection (1) shall be protected against freezing.

(9) Where a choke manifold is in an enclosed area, the area shall be properly ventilated and have at least 2 exits.

149/82 s60

Flow lines from wells

59. (1) All flow lines, pressure relief lines, kill lines and choke lines shall

- (a) be made of steel or high pressure flexible hose covered with fire resistant material;
- (b) have an inside diameter that is greater than 50 millimetres;
- (c) be properly installed and securely tied down;
- (d) be designed so that there is a minimum number of changes in the direction of flow and, where an abrupt change is necessary, that change shall be protected against erosion; and
- (e) be identified by colour or other means at the choke manifold.

(2) The main flow line from the well shall be equipped with a valve located near the wellhead that may be operated from the drilling station.

(3) Subsection (2) does not apply to drilling rigs and service rigs that have applied power of less than 375 kilowatts or equivalent to the rotary table and main hoist.

149/82 s61

Flare line and flare pit

60. (1) A flare line and other pipeline downstream of the choke manifold referred to in subsection 58(1) shall have an inside diameter not less than the inside diameter of the largest line in the choke manifold.

(2) A valve shall not be located on the flare line downstream of the choke manifold while drilling operations are in progress.

(3) For every well, there shall be a flare pit or flare tank at the drill site that

- (a) is located at least 40 metres from the well-bore; and
- (b) has a rear firewall of sufficient height to contain the flame within the pit.

(4) An operator shall ensure that a flare line

- (a) extends from the choke manifold to the flare pit or flare tank;
- (b) is designed to prevent the accumulation of a fluid within the line;
- (c) is properly installed and anchored; and
- (d) where hydrogen sulphide gas is known or expected to be produced in excess of 1% by volume of the gas produced, is equipped with a flare stack that is
 - (i) located at least 40 metres from the well-bore,
 - (ii) at least 10 metres in height,
 - (iii) equipped with a pilot flame or other ignition device to ensure continuous ignition of vented gas, and
 - (iv) equipped with a guard to protect the flame from being extinguished by the wind.

149/82 s62

Pressure tests of casing and preventers

61. (1) An operator shall ensure that

- (a) a blowout preventer is visually inspected before or immediately after installation to confirm that

- (i) it is in good working order, and
 - (ii) the packing elements and seals for each preventer are in good condition; and
 - (b) the blowout preventer control system is pressure tested to 50% of its maximum operating pressure immediately following installation.
- (2) When pressure testing a blowout preventer, choke manifold, kill line and pressure relief line as required by these regulations, an operator shall ensure that
- (a) a low viscosity fluid is used; and
 - (b) the following 2 test pressures are used for each test:
 - (i) a test pressure of 1,500 kilopascals, and
 - (ii) a test pressure equal to that prescribed for a casing pressure test in paragraph 63(2)(b), except in the case of an annular-type preventer, in which case the test pressure shall be equal to 50% of the rated working pressure of the preventer or the pressure prescribed under paragraph 63(2)(b), whichever is lesser, and this test shall be made with the preventer closed on the drillpipe being used.

149/82 s64

Pressure testing equipment

62. (1) An operator shall ensure that

- (a) the equipment referred to in subsection 61(2) is pressure tested
 - (i) after installation,
 - (ii) before drilling out a string of casing installed in a well,
 - (iii) before commencing a formation flow test or a series of tests, unless a pressure test has been conducted within the previous 7 days,
 - (iv) following repairs that require disconnecting a pressure seal in the wellhead assembly, and
 - (v) not less than once every 15 drilling days;
 - (b) appropriate remedial measures are undertaken immediately where the blowout preventers fail to meet pressure test requirements; and
 - (c) blowout preventers are not removed from the wellhead unless the well is adequately plugged.
- (2) Notwithstanding paragraph (1)(a), the operator need not pressure test shear rams in a blowout preventer stack where there is a separate set of blind rams in the same stack.

149/82 s65

Pressure testing casing

63. (1) An operator shall ensure that casing is pressure tested

- (a) after installation and before drilling out the cement plug or casing shoe;
- (b) immediately after remedial cementing;
- (c) at least once every 1,000 rotating hours or more frequently where casing wear is detected; and
- (d) immediately before perforating or using the casing for purposes of formation flow testing.

(2) An operator shall ensure that

- (a) conductor casing is tested to a minimum surface pressure of 1,000 kilopascals;
- (b) surface casing, intermediate casing and intermediate liners are pressure tested to a surface pressure that is equal to or greater than the lesser of
 - (i) the rated working pressure of the blowout preventers,
 - (ii) 40% of the maximum formation fluid pressure anticipated during the next phase of the drilling operation, or
 - (iii) the calculated formation fracture pressure at the casing shoe; and
- (c) production casing and production liners are tested to a surface pressure that is equal to at least 90% of the maximum reservoir pressure.

(3) For a casing pressure test to be satisfactory, the test pressure prescribed in subsection (2) shall be maintained for 5 minutes with no pressure decline or for 15 minutes with a pressure decline of less than 5% of the test pressure.

(4) An operator shall advise the director where the excessive casing wear is suspected and shall conduct a pressure test on the request of the director.

(5) Where a casing string does not hold the required pressure throughout its length, the director may direct that

- (a) drilling or testing operations be suspended;
- (b) drilling be terminated at a particular depth; or
- (c) precautions or remedial measures be taken before drilling or testing operations are continued.

149/82 s66

PART V DRILLING OPERATIONS AND PROCEDURES

Operating manual

64. (1) An operator shall prepare an operating manual for all normal drilling and related operations carried out by him or her and for all abnormal conditions or situations that can be reasonably anticipated during drilling operations.

(2) A copy of the operating manual referred to in subsection (1) shall be

- (a) readily accessible at each drilling site where drilling operations are being carried out; and
- (b) submitted to the director.

149/82 s67

Approval and procedure displayed

65. An operator shall ensure that

- (a) the authority to drill a well and the drilling program approval are displayed in a prominent place on the drill site to which they apply; and
- (b) current information on the status of the well, including the elevation of blowout preventers and mud density, together with the detailed procedures for controlling a kick are displayed in a conspicuous place in the doghouse or at the driller's station.

149/82 s68

Reference for well depths

66. (1) The measurement of depth in a well made during the drilling or on the termination of the well shall be measured from a single reference point.

(2) The reference point referred to in subsection (1) shall be either the rotary table or the kelly bushing of the drilling rig unless a different reference point has been approved by the director before the commencement of drilling.

(3) The operator shall measure and record

- (a) the elevation of the natural ground surface before spud-in; and
- (b) the elevation of the casing flange and kelly bushing after the installation of conductor casing.

149/82 s69

Drilling unsafe to continue

67. (1) An operator shall ensure that an operation at a drill site shall cease as soon as possible where the continuation of that operation

- (a) causes or may cause pollution; or

(b) endangers or may endanger the safety of personnel, the security of the well or the safety of the drilling rig.

(2) Where an operation has ceased under subsection (1), the operation shall not be resumed until it can be resumed safely and without causing pollution.

(3) Where a fatal accident occurs at a drill site, every operation associated with the fatality shall be suspended as soon as possible and shall not be resumed without the approval of the director.

(4) An operator shall ensure that drilling operations at a drill site are suspended where the following conditions exist:

(a) an inability to maintain well control;

(b) a failure of a major component of the blowout prevention system, casing or drilling fluid system;

(c) an inability to maintain the properties, volume or circulation rate of the drilling fluid as required by these regulations;

(d) an inability to maintain on location the amounts of drilling consumable required by section 75;

(e) an uncontrolled fire;

(f) a loss of a significant portion of the primary power; and

(g) an inability to safely handle the drillpipe, casing or heavy equipment necessary for the operation in progress.

(5) Where drilling is suspended in accordance with subsection (4), the operator shall not resume drilling until the condition ceases to exist.

(6) Where, during the drilling of a well, a formation that is potentially dangerous is likely to be encountered or a potentially hazardous operation is to be undertaken near the end of a drilling season, the director may order, in the interests of safety, that all drilling and testing of the well be suspended until the subsequent drilling season.

149/82 s70

Lost circulation

68. Except while drilling the hole for the conductor casing, an operator shall ensure that drilling ceases immediately when lost circulation occurs to the extent that the hole cannot be kept full of drilling fluid and that drilling is not resumed until adequate circulation has been regained or until approval has been obtained from the director to continue drilling the well in accordance with procedures prescribed by the director.

149/82 s71

Pressure transition zone

69. (1) The fluid content and the characteristics of the lithology of the formations being drilled shall be continuously monitored during an exploratory drilling and the monitoring techniques shall be such that the pressure transition zone between normally and abnormally pressured formations can be detected.

(2) An operator shall, when a pressure transition zone is detected

- (a) cease drilling;
- (b) attempt to verify the presence of the zone; and
- (c) take those measures that are necessary to control the anticipated pressures before drilling is resumed.

(3) Where, on the basis of seismic or other data and on the results observed during the drilling of a well, the existence of an over-pressured zone is indicated to be within the next 100 metres of drilling, the director may, in the interest of safety, prescribe the rate of penetration for further drilling.

149/82 s72

Drilling fluid system

70. (1) The drilling fluid system, including the drilling fluid, the circulating system and the associated monitoring and maintenance equipment used during a drilling operation shall be capable of

- (a) preventing the uncontrolled entry of formation fluids into the well-bore;
- (b) allowing proper well evaluation;
- (c) coping with all lithological, operational, pressure, temperature and other well conditions that may be encountered; and
- (d) removing excess drill solids, weighting material and formation fluids from the drilling fluid.

(2) The combined capacity of the drilling fluid tanks of a drilling fluid system shall be not less than

- (a) 120 cubic metres; or
- (b) 50% of the volume of the hole.

(3) The equipment provided to monitor the drilling fluid of a drilling fluid system shall include

- (a) a mud pit level indicator with a warning device to alert personnel of mud volume gains and losses;
- (b) a mud volume measuring device that accurately determines the mud volume used to fill the hole on trips;
- (c) a mud-return or full-hole indicator that monitors drilling fluid returns;
- (d) equipment to test the physical and chemical properties of the drilling fluid entering and leaving the hole, including density, viscosity, water loss, filter cake, salinity, pH, solids content and gel strengths; and

(e) automatic gas detecting, measuring and recording devices that trip an automatic audio alarm to warn of an increase in the gas content of the drilling fluid.

(4) The indicators and alarms required under subsection (3) shall be strategically located on the drilling rig to alert a drilling supervisor.

(5) An operator shall provide a means of disposing of drilling fluids, drill cuttings and gas separated from the drilling fluid.

(6) Notwithstanding subsection (5), the means referred to in that subsection shall require the approval of the director.

(7) Paragraph (3)(c) does not apply to drilling rigs and service rigs that have applied power of less than 375 kilowatts or equivalent to the rotary table and main hoist.

149/82 s73

Monitoring of drilling fluid

71. An operator shall ensure that

(a) the drilling fluid is monitored during the drilling of a well, after the conductor casing has been installed in the well, to determine

(i) its volume, flow rate and chemical and physical properties, and

(ii) where an automatic gas detecting, measuring and recording facility is required under subsection 70(3), the nature and relative quantity of gas in the drilling fluid returns;

(b) the results of the determination made in accordance with paragraph (a) are recorded and the record maintained at the drill site;

(c) the detectors, indicators, alarms and other monitors required under subsection 70(3) are maintained in good working order; and

(d) a continuous surveillance of the drilling fluid returns is maintained when significant amounts of formation fluid are entering the well-bore or when a zone that is over-pressured or contains oil or gas is being penetrated.

149/82 s74

Operator's duties

72. (1) An operator shall ensure that

(a) the rate of the penetration of the formations of a well is recorded continuously while drilling or coring by an automatic device located on the drill floor;

(b) the drilling fluid and the drilling fluid system is maintained and operated in a manner as to prevent formation fluids entering or leaving the well-bore except under controlled conditions; and

(c) drilling ceases and remedial measures are undertaken immediately when the hydrostatic head of the drilling fluid fails to over-balance the formation fluid pressure, except where drilling in an under-balanced condition has been approved by the director.

(2) Unless approval to drill in an under-balanced condition has been obtained from the director, an operator shall endeavour to keep the hole filled with a fluid of sufficient density to over-balance formation pressures.

(3) During tripping and except as provided under subsection (2), an operator shall ensure that the hole is filled with the correct amount of drilling fluid after every fifth stand of drillpipe or every single stand of drillcollars is withdrawn from the hole.

149/82 s75

Volume of drilling fluid

73. (1) During a drilling operation the volume of active drilling fluid in the surface system of a well shall not be less than 50% of the hole capacity or 65 cubic metres, whichever is less.

(2) An operator shall, in respect of an exploratory well,

(a) have stored on the drill site a reserve stock of weight material in an amount satisfactory to the director; and

(b) have suitable facilities for the rapid addition of the reserve stock to the drilling fluid system.

149/82 s76

Air, foam and gas drilling

74. (1) An operator may drill a well using air, gas, foam or other fluid in the circulatory system if the procedure is approved by the director.

(2) Where air or gas is used in the circulatory system referred to in subsection (1), the operator shall install and maintain

(a) a rotating head capable of diverting the return air or gas flow into a bleed-off line that is as straight as practicable and not less than 50 metres in length;

(b) where formations that may contain hydrogen sulphide are being drilled, a hydrogen sulphide monitor continuously on the bleed-off line;

(c) a device to provide a continuous source of ignition at the end of the bleed-off line; and

(d) a reserve volume of mud that is

(i) in suitable condition to be pumped into the well without delay,

(ii) equal in volume to at least 1.5 times the volume of the hole, and

(iii) not less than 1,200 kilograms per cubic metre in density.

(3) Notwithstanding subsections 38(1) and 55(2), where air, gas or foam is used in the circulatory system referred to in subsection (1), the blowout preventer system and casing program shall be designed to contain the maximum formation pressure that may be encountered.

149/82 s77

Quantities of consumables

75. An operator shall ensure that sufficient quantities of fuel, drilling fluid materials, cement and other drilling consumables are stored on the drill site to meet normal and foreseeable emergency conditions.

149/82 s78

Bulk handling of fuel and consumables

76. An operator shall ensure that bulk fuel storage containers for use at a drill site are surrounded by an impermeable dike of sufficient height and strength to contain within its perimeter all the fuel in the storage containers.

149/82 s79

Formation leak-off test

77. (1) An operator shall conduct a pressure test in the hole to determine the pressure integrity of the formations present in the hole

(a) before drilling more than 60 metres below the shoe of a casing other than the conductor casing; and

(b) when an over-pressured zone is about to be penetrated.

(2) The test referred to in subsection (1) shall test the formation to a pressure which is the lesser of one and one-third times the indicated formation fluid pressure and the pressure at which the formation begins to accept the test fluid before the point of fracturing.

(3) Where a well is to be abandoned, an operator shall pressure test a formation to its fracture point on the request of the director during the abandonment of the well.

149/82 s80

Directional and deviation surveys

78. (1) An operator shall ensure that deviation surveys are taken at intervals not exceeding 150 metres during the drilling of a well.

(2) In an area of compass reliability, directional surveys shall be taken at sufficiently frequent intervals during the drilling of a well to permit the location of a point in the well-bore to be calculated within 30 metres of its actual location.

(3) Notwithstanding subsection (1), the director may extend the intervals at which deviation surveys must be taken when drilling below intermediate casing.

(4) Except in the case of a relief well, an operator shall ensure that a well is drilled in a manner that does not intersect an existing well.

(5) On request of the director, an operator shall ensure that a directional survey is taken before installing a casing string in a well or before placing a well on production.

149/82 s81

Plugging back of wells

79. Where the lower portion of a well is to be plugged, that portion shall be abandoned in accordance with section 111 and sections 127 to 129 and a minimum of 30 metres of cement shall be left in place at the top of the plugged interval unless the operator provides data to show that it is not practicable to do so.

149/82 s82

Maximum pressure during well stimulation

80. The maximum injection pressure used during a well stimulation operation shall not exceed the burst pressure resistance of the weakest joint in the casing or tubing used for the injection or the rated working pressure of the wellhead, whichever is less.

149/82 s83

Inspections and tests of equipment

81. An operator shall ensure that

(a) all major components of the blowout preventer system, except the blind rams, are actuated once each day that drilling operations are carried out if

(i) the drill string is out of the hole, or

(ii) the drill bit is within the casing;

(b) notwithstanding paragraph (a), where the drill string referred to in that paragraph is not out of the hole or the drill bit referred to in that paragraph is not within the casing, all major components of the blowout preventer system, except the blind rams, are actuated at least once every 3 days that drilling operations are carried out;

(c) the blind rams are actuated at least once each time the drill string is out of the hole; and

(d) auxiliary equipment that may be used for well control, including the degasser, hydraulic control lines and inside drillpipe blowout preventers are available for instant use.

149/82 s84

Waste material

82. An operator shall ensure that all waste material, drilling fluid, drill cuttings, formation water and other rig discharges at a drill site are handled and disposed of in a manner that

- (a) does not create a hazard to safety, health or to the environment;
- (b) does not create potential for interference with renewable resource activities; and
- (c) is approved by the director.

149/82 s85

Petroleum waste storage, collection and disposal

83. An operator shall ensure that

- (a) oil or gas produced during formation flow tests is stored in suitable tanks or flared in a manner approved by the director;
- (b) where an oil spill occurs, oil spill counter measures of a chemical nature are not used unless, in the opinion of the director, there is a severe threat to the safety of persons, property or the natural environment;
- (c) waste fuel, oil or lubricant is collected in a closed system that is designed for the purpose; and
- (d) stored waste oil or oily material, not burned at the drill site, is transported in a suitable container for disposal at an approved disposal site.

149/82 s86

Other waste

84. An operator shall ensure that for all aspects of a drilling program

- (a) all sewage, galley and other domestic waste that might contribute to pollution is disposed of in a manner approved by the director;
- (b) combustible trash is not burned at a drill site except where precautions are taken to ensure that the fire does not endanger personnel, the environment or the safety of the well;
- (c) spent acid or excess acid is disposed of in a manner approved by the director; and
- (d) all noncombustible trash is disposed of in an approved manner.

149/82 s87

Personnel records

85. An operator shall ensure that a daily record is kept of all persons employed or visiting at a drill site.

149/82 s88

Safety and well evaluation information

86. (1) An operator shall record information obtained during the drilling program that is relevant to the safety of the program or to the evaluation of the well at the time the information is obtained in a suitable book or log kept at the drill site.

(2) An operator shall submit to the director a report regarding applied research work or studies obtained or compiled by him or her that contains information relevant to safety of drilling operations in the area set out in the application for drilling program approval as soon as the report is available.

149/82 s89

Tour sheets

87. An operator shall ensure that a comprehensive record of the drilling operation and observations of the environmental conditions are maintained during a drilling program in the form of tour sheets.

149/82 s90

Tour sheet particulars

88. (1) The tour sheets referred to in section 87 shall be kept during the period a drilling rig is engaged

- (a) in a drilling program; or
- (b) in a well completion or repair operation.

(2) A legible copy of the tour sheets referred to in section 87, signed by or on behalf of the operator, shall be submitted to the director at least once each week.

(3) A legible copy of the tour sheets referred to in section 87 for each well shall be kept on the drilling rig during the time drilling operations are being carried out.

(4) The following information shall be recorded on the tour sheets referred to in section 87:

- (a) the elevation of the rotary table or kelly bushing and of the ground;
- (b) the time spent by the drill crew at each separate operation carried out during the drilling program;
- (c) the volume of the drilling fluid in surface tanks that is available for use and the properties of and the materials added to the drilling fluid;

- (d) the pumping pressure, the circulating rate of the drilling fluid and any loss of the drilling fluid in the well;
- (e) the make-up of drilling assemblies including the size and type of bit and the size, number and length of all tubulars;
- (f) the increase in the depth of the well made by drilling or coring in each shift of a drill crew;
- (g) the weight on the bit and rotary table speed;
- (h) particulars of the running of and results of deviation or directional surveys;
- (i) particulars of the running and cementing of a casing, including the type and quantity of casing and cement;
- (j) the results of a pressure test or function test of the blowout preventer system;
- (k) the results of a pressure test on casing, open formations or packers;
- (l) particulars of wireline logging operations, including the type of wireline log run;
- (m) details of a safety meeting held;
- (n) details of a blowout prevention drill held;
- (o) particulars of the failure of or significant damage to equipment that affects the drilling operations;
- (p) details in respect of the accidental spillage of fuel, drilling fluid or other material;
- (q) details of an apparent gain in volume of the drilling fluid at the surface and the steps taken to control any kick that may have been encountered;
- (r) particulars of the perforating of casing including numbers of shots and intervals;
- (s) particulars of the stimulating of a formation including the type and quantity of the fluid used and the pressure and rate at which the fluid was injected into the formation;
- (t) particulars of the running of a formation flow test;
- (u) details of the recovery by wireline of a formation sample or formation fluid sample;
- (v) particulars in respect of the loss of tubulars or other material in the well and a description of operations undertaken for their recovery;
- (w) particulars of the suspension of operations for any cause; and
- (x) details in respect of the termination of the well.

(5) Where a drilling rig is being used for a well completion, re-completion or a remedial operation, the information to be recorded on the tour sheets shall, in addition to the data referred to in subsection (4), include

- (a) a summary of the operations undertaken;
- (b) the amounts of workover fluids used, injected, lost or recovered from the well;

- (c) the details of a casing or tubing used in the completion;
- (d) the results of tubing and packer pressure tests;
- (e) the landing depths for tubing or casing packers and the depths of tool seats; and
- (f) the details of recovered fluid and of fluid levels observed during swabbing operations.

149/82 s91

Monitoring of environmental conditions

89. (1) On the request of the director, an operator shall provide facilities and equipment capable of observing, measuring and recording the environmental conditions and the effect that those conditions have on the drilling operations at a drill site.

(2) Where the facilities referred to in subsection (1) are required for a well, the director may request the operator to observe and record the wind direction and velocity, the temperature and the precipitation at those intervals that he or she may specify.

149/82 s92

PART VI WELL EVALUATION

Sufficient data to be gathered

90. (1) An operator shall obtain sufficient well tests, wireline logs, analyses, surveys and samples during the drilling of a well to ensure that a comprehensive geological and reservoir evaluation can be made.

(2) On the request, in writing, of the director, an operator shall

- (a) take a wireline log, test or survey;
- (b) cut a core; or
- (c) collect a sample of drill cuttings or formation fluids.

(3) Where

- (a) the bottom of a well is in a sedimentary rock formation;
- (b) the well depth approved in the authority to drill a well has not been reached; and
- (c) a continuation of drilling would not expose the operator conducting the drilling program to a hazardous operation, the operator shall, in writing, if so directed by the director, continue drilling until the approved well depth is reached or until a non-sedimentary rock formation is encountered, whichever first occurs.

(4) An operator shall, if requested by the director, submit an analysis and interpretation of well evaluation data.

Downhole survey accuracy

91. An operator shall ensure that every wireline log or other survey made in the well

(a) is recorded at a scale that provides a degree of sensitivity appropriate to the measurements being made; and

(b) has recorded on it a description of a tool calibration or other data that is necessary in the interpretation of the wireline log or survey.

Collection of drill cuttings

92. (1) An operator shall, on the request of the director, ensure that samples of drill cuttings are collected from those portions of the well designated by the director.

(2) Where the samples referred to in subsection (1) are for lithological purposes, they shall be collected at a frequency of one sample for every 5 metres drilled.

(3) Notwithstanding subsection (2), where the rate of penetration is abnormally high or where the quantity of drill cuttings returning to the surface is abnormally low, the frequency at which the samples are collected may be reduced to a minimum of one sample for every 10 metres drilled or a lesser frequency if approval has been obtained from the director.

(4) Where the samples referred to in subsection (1) are for the purpose of determining hydrocarbon source potential, they shall be collected at a frequency of at least one sample for every 10 metres drilled or a lesser frequency if approval has been obtained from the director.

(5) Where samples referred to in subsection (1) are collected for lithological purposes, they shall be

(a) collected in sufficient portions to satisfy the requirements of section 93; and

(b) placed, at the time of collecting, in suitable containers that are accurately and durably labelled with the name of the well and the depth interval from which they were obtained.

(6) Where samples referred to in subsection (1) are collected for the purpose of determining hydrocarbon source potential, they shall be collected, canned and sealed on the drill site in a manner approved by the director.

(7) Notwithstanding subsection (1), where an operator cannot obtain samples from a portion of the well as required by subsection (1) for any reason, he or she shall record the depth interval for which samples were not obtained, the reason for it and submit the record to the director.

Handling of drill cuttings

93. (1) An operator shall ensure that

(a) a portion of each sample of drill cuttings collected in accordance with section 92 is washed and dried

(i) to remove a drilling fluid or other contaminants, and

(ii) in a manner that minimizes changes in the natural appearance or lithologic characteristics of the cuttings;

(b) the portion referred to in paragraph (a) is of sufficient volume to fill one vial container;

(c) the vials referred to in paragraph (b) are of a type approved by the director and are accurately and durably labelled with the name of the well and the depth interval from which the drill cuttings were obtained;

(d) notwithstanding paragraph (a) at least 500 grams of each sample of drill cuttings referred to in that paragraph are left unwashed and are placed in a moisture-proof container; and

(e) the container referred to in paragraph (d) is durably labelled with the name of the well and the depth interval, which may be coded, from which the sample was taken.

(2) Notwithstanding subsection (1), where it is not practicable to obtain sufficient samples to allow the operator to meet the requirements of that subsection, he or she shall process those samples as he or she has obtained in a manner satisfactory to the director.

149/82 s101

Gas content of drilling fluid

94. (1) Where a gas detection device is required under paragraph 70(3)(e), all drilling fluid returning to the surface shall be sampled and tested to determine the total hydrocarbon gas content and, where the facility has the capability, the relative amounts of methane, ethane, propane and butane gas.

(2) The results of the sampling and testing referred to in subsection (1) shall be recorded.

149/82 s102

Wireline logs

95. (1) An operator shall ensure that wireline logs that are necessary for the proper evaluation of a well are taken over all uncased intervals in the well below the surface casing.

(2) For the purpose of subsection (1), sufficient wireline logs shall be taken in a well to

(a) permit an accurate calculation of the porosity, fluid saturation and fluid contact for any potential reservoir;

(b) measure the formation pressure of any potential reservoir;

(c) measure the size of the hole and the spontaneous potential and natural radioactivity of a formation;

(d) assist in determining the lithology of a formation; and

(e) permit the calculation of accurate values of the vertical angle and direction of the hole and of the structural dips of a formation, where requested by the director.

(3) An operator shall ensure that the wireline logs referred to in subsection (2) yield data of good quality by ensuring that they are taken

(a) as soon as practical after penetrating a potential reservoir;

(b) before altering the nature of the drilling fluid in a manner that would affect the quality of the wireline logs;

(c) before enlarging the diameter of the hole for the purpose of installing casing; and

(d) at sufficiently frequent time intervals during the drilling of a well that the nature of the formation fluids adjacent to the well-bore have not been significantly altered by invasion of the drilling fluid.

(4) For the purpose of subsection (1), a sufficient number of types of porosity measuring wireline logs shall be taken in a well so that the effects of the shaliness, hydrocarbons, complex lithology and the walls of the hole can be compensated for in determining the porosity of formations.

(5) Unless otherwise approved in the authority to drill a well, at least 2 types of porosity wireline logs shall be taken if significant reservoir development is indicated in the portion of the hole in which the wireline logs are to be taken.

(6) For the purpose of subsection (1), a sufficient number of types of resistivity measuring wireline logs shall be taken in a well so that the distortion caused by filtrate invasion, thin beds, the drilling fluid and the walls of the hole can be compensated for in calculating the formation resistivity.

149/82 s103

Surface hole logging

96. Wireline logs shall be taken in the hole drilled for the surface casing when the requirement to do so is stated in the authority to drill a well.

149/82 s104

Temperature measurement

97. Where a wireline log referred to in section 95 is taken,

(a) the maximum bottom-hole temperature shall be measured with at least 2 maximum-recording thermometers; and

(b) the formation temperature, the time that the circulation of the drilling fluid stopped and the time that the wireline log instrument left the bottom of the hole shall be recorded on the wireline log.

149/82 s105

Salt formation logging

98. Notwithstanding subsection 95(1) and section 96, where the formations in a well are composed of salt only, those wireline logs that are necessary to measure the diameter of the hole, the radioactivity of the formation and sonic transit time of the formation are required.

149/82 s106

Operator's duties re logging

99. (1) An operator shall ensure that the wireline log referred to in sections 95 and 96 is taken at a rate that yields good quality data and does not cause formation fluids to be swabbed into the well.

(2) Where conditions in a well are such that the taking of a wireline log referred to in section 95 would endanger the safety of a person, the well or the drilling rig, the operator shall defer the taking of the wireline logs until the conditions are such that the taking of the wireline log can be done safely.

(3) Where the taking of a wireline log is deferred under subsection (2), the operator shall

(a) immediately notify the director of the deferment; and

(b) submit a program for approval of the director detailing the procedures to be used to obtain the information that would have been obtained from the deferred wireline log.

(4) An operator shall

(a) submit to the director, by the most rapid and practical means, 2 field-print copies of all wireline logs run by that operator;

(b) submit, on request of the director, wireline logs in digital form if they have been prepared in that form; and

(c) submit, on the request of the director, all wireline log data in respect of a well before the well is terminated.

149/82 ss107&108

Conventional cores

100. (1) An operator shall ensure that conventional cores are taken in accordance with the program contained in the authority to drill a well unless it is not operationally practicable.

(2) An operator shall advise the director as soon as possible of a case where it is not practicable to take the cores referred to in subsection (1).

(3) A core taken under subsection (1) shall be

(a) extracted from the core-barrel in accordance with good oilfield practices;

(b) described immediately in accordance with good geological practices;

(c) where the nature of the core is amenable, marked in a way that identifies the depth interval from which the core was obtained and the orientation that the core had before its being removed from the formation; and

(d) placed in a core container.

(4) A core container referred to in paragraph (3)(d) shall

(a) be sufficiently strong to protect the core from breakage;

(b) be approximately 800 millimetres in overall length; and

(c) be accurately and durably labelled with the name of the well, the depth interval from which the core was obtained and the sequential number of the container.

(5) The information referred to in paragraph (4)(c) of this section and subsection 102(2) may be given in a coded form.

149/82 s109

Conventional core analysis

101. (1) An operator shall ensure that

(a) a conventional core is analyzed to determine the basic reservoir characteristics of all potential reservoir intervals in the core;

(b) a conventional core is entirely photographed in its unaltered state before an analysis and those photographs shall be submitted to the director;

(c) the analysis referred to in paragraph (a) includes the measurement of

(i) porosity,

(ii) permeability, in the direction of maximum horizontal permeability, normal to the direction of maximum permeability and in the vertical direction, and

(iii) other property requested by the director; and

(d) when any samples necessary for the analysis referred to in paragraph (a) have been removed from the core, the remaining core or a longitudinal slab of the core that is not less than one-third of the cross-sectional area of the core shall be submitted to the director.

(2) Notwithstanding subsection (1), the director may approve or require the preservation of all or a portion of a core for the purpose of a full-core analysis.

149/82 s110

Sidewall cores

102. (1) A person shall not extract a sidewall core from a core gun before the firing head of the core gun has been removed.

(2) An operator shall ensure that a sidewall core obtained is described immediately in accordance with good geological practice and is placed in a suitable container that is accurately and durably labelled with the name of the well and the depth interval from which the core was obtained.

149/82 s111

Storage of core material

103. An operator shall store any sidewall core material remaining after petrographic, reservoir, paleontological, palynological or other analyses have been conducted in containers that are durably labelled with the name of the well and the depth from which the core was obtained.

149/82 s112

Deposition of well samples

104. (1) An operator shall ensure that a sample of a drill cutting, a core or sample of well fluid that is taken from a well in compliance with these regulations is transported and stored in a manner that prevents loss or deterioration of the cutting, core or sample.

(2) An operator shall not transport

- (a) a sample of well fluid that is collected for purposes of analysis in a plastic container or in another container that may cause or permit the chemical properties of the samples to be significantly altered; or
- (b) a sample of gas, the pressure of which is greater than the pressure rating of the gas container.

149/82 s113

Analysis of fluid samples

105. (1) An operator shall ensure that

- (a) each sample of gas, condensate, oil or water obtained from a well is analyzed to determine
 - (i) its density, and
 - (ii) its constituent compounds and the relative proportion of each of the compounds;
- (b) each sample of gas referred to in paragraph (a) is analyzed to determine
 - (i) its gross heating value in the dry acid-free condition, and
 - (ii) its pseudo-critical temperature and pressure;
- (c) the viscosity of each sample of oil referred to in paragraph (a) is measured at 2 different temperatures with a variance of at least 20° celsius;

(d) the resistivity and pH of each sample of water referred to in paragraph (a) is measured; and

(e) where the well produces more than one fluid phase, the analysis of a recombined sample is made to determine the physical and chemical factors that affect the performance of the reservoir.

(2) The result of an analysis or measurement referred to in subsection (1) shall be reported in units that are acceptable to the director.

149/82 s114

PART VII FORMATION FLOW TESTING

Formation sampling and flow testing

106. (1) An operator shall ensure that every formation in a well is sampled or tested to obtain fluid flow and reservoir pressure data from the formation where there is an indication that the result of that sample or test will contribute substantially to the evaluation of the formation.

(2) For the purpose of subsection (1), an operator shall ensure that a formation flow test is conducted if fluid samples and productivity data are required and wireline formation samples do not provide sufficient information for the evaluation of the formation.

149/82 s115

Approval of flow test

107. An operator shall, at the request of the director, submit a detailed testing program before conducting the formation flow test referred to in subsection 106(2).

149/82 s116

Testing equipment

108. (1) Equipment used in the formation flow test shall have the capacity to

(a) accurately measure the data and information referred to in section 112;

(b) reverse circulate the test string;

(c) conduct the flow from the well through the surface control valve to the choke manifold;
and

(d) treat, store, burn or otherwise dispose of the fluids produced during the testing operation.

(2) The rated working pressure of formation flow test equipment and related equipment shall be equal to or greater than the maximum shut-in formation pressure that may reasonably be anticipated.

(3) The formation flow test equipment referred to in subsection (1) shall include a downhole safety valve that permits closure of the test string above the packer.

149/82 s117

Flow test equipment requirements

109. (1) An operator shall ensure that during a formation flow test no formation fluids are allowed to flow to the surface or are circulated to the surface unless there is adequate illumination in the vicinity of the test tree, flow lines and test tanks.

(2) An operator shall ensure that before starting a formation flow test

(a) all safety equipment and fire protection equipment is inspected and found ready for immediate use;

(b) where the test is to be conducted in an interval of a well that is protected by casing, the annulus between the test string and the casing is pressure tested to confirm that the packer will withstand pressure from above the packer; and

(c) all sections of the flow test equipment are pressure tested to at least the maximum pressure to which the equipment may reasonably be expected to be subjected during the test.

149/82 s118

Operator's duties re formation flow test

110. An operator shall ensure that

(a) during a formation flow test, all flow rates and pressures are measured and controlled;

(b) produced well fluid is

(i) sampled to determine if it contains hydrogen sulphide gas,

(ii) monitored to determine if it contains a significant amount of sand, and

(iii) stored and disposed of in accordance with sections 82 to 84;

(c) a formation flow test is stopped immediately where

(i) hydrogen sulphide gas is present, or

(ii) significant sand erosion is occurring, unless precautions have been taken to ensure the safety of personnel and the control of the well; and

(d) after the completion of the formation flow test and before pulling the test string used to conduct the test out of the well, any formation fluid in the test string is circulated to the surface or is otherwise recovered.

149/82 s119

Plugging perforated intervals

111. (1) Except in a development well, an operator shall ensure that every interval in a casing string that has been perforated for flow testing or another purpose is plugged before perforating another interval in the casing string.

(2) Where the perforated intervals referred to in subsection (1) are in formations that contain oil or gas or abnormal fluid pressures, they shall be plugged

(a) by setting a bridge plug not more than 30 metres above the top perforation and by placing not less than 5 metres of cement on the bridge plug;

(b) by squeezing cement into the perforations and then testing the plug to a pressure of not less than 7,000 kilopascals above the formation fluid pressure in the interval; or

(c) by setting a cement plug not more than 30 metres above the top perforation and not less than 30 metres in length.

(3) Notwithstanding subsection (2), where the interval that is perforated is the uppermost perforated interval in a well, a cement plug, the base of which is not more than 30 metres above the top perforation, shall be placed in the casing and the plug shall not be less than 30 metres in length.

149/82 s120

Flow test data collection

112. An operator shall ensure that

(a) all relevant information on a formation flow test is properly recorded; and

(b) the information referred to in paragraph (a) includes, if available

(i) the initial shut-in pressure,

(ii) all flow rates and wellhead pressures with respect to time,

(iii) sufficient build-up pressure and flowing pressure data to calculate the permeability and the static reservoir pressure,

(iv) the total volume of fluid recovered and the volume of each type of fluid produced, and

(v) the temperature and pressure in the well at the point and at the time a fluid sample was taken.

149/82 s121

Flow test records submission

113. (1) An operator shall ensure that a formation flow test obtained by wireline is designed and conducted to obtain the maximum amount of reservoir fluid practicable under the circumstances and that all relevant information in respect of the test is recorded.

(2) The information referred to in subsection (1) shall include

- (a) the name of the well and the depth from which the fluid sample was obtained;
- (b) the date and time the fluid sample was obtained;
- (c) the temperature of the formation from which the fluid was obtained;
- (d) a record of the well pressure during the test; and
- (e) the type, quality and nature of the fluids recovered.

149/82 s122

Records

114. (1) An operator shall submit to the director immediately records made in accordance with section 112 or 113.

(2) The records referred to in subsection (1) shall include accurate reproductions of pressure and flow charts except where accurate reproductions cannot be made in which case the original chart shall be submitted.

(3) Where original charts are submitted under subsection (2), the director shall return the charts to the operator within 30 days of the day he or she received them.

149/82 s123

Fluid samples

115. (1) An operator shall ensure

- (a) that a sample of each type of fluid produced from an exploration well or another well that the director may designate is taken during a formation flow test;
- (b) that the sample referred to in paragraph (a) is of sufficient volume and is collected using techniques that permit the analyses referred to in section 105;
- (c) where the sample referred to in paragraph (a) is a liquid, the sample is analyzed under section 105 and delivered under section 149; and
- (d) where the sample referred to in paragraph (a) is a gas, the sample is analyzed under section 105 and is submitted on the request of the director.

(2) A sample referred to in paragraph (1)(a) shall be placed in a sealed container at the drill site.

(3) The container referred to in subsection (2) shall be

- (a) constructed of a material that ensures that the sample can be safely transported; and
- (b) numbered, properly labelled and accompanied by information setting out
 - (i) the name and depth of the well,
 - (ii) the date and the means by which the sample was obtained, and
 - (iii) where applicable, the type and the number of the formation flow test.

149/82 s124

PART VIII WELL TERMINATION

Termination required

116. An operator shall not remove a drilling rig from a well drilled under these regulations unless the well has been terminated in accordance with these regulations.

149/82 s125

Site restoration

117. An operator shall ensure that, on the termination of a well

- (a) all refuse is cleared from the drill site and the surface of the drill site is restored to the satisfaction of the director; and
- (b) if applicable, a cement plug is placed in the top of the rat hole and in the top of the mouse hole of the well.

149/82 s126

Abandoned well marker

118. An operator shall ensure that the surface location of an abandoned well is marked by a steel marker painted iridescent orange that extends 1.5 metres above ground level and is comprised of

- (a) a length of pipe that is either welded to the cover on the cut-off casing or is set in cement; and
- (b) a steel plate that is at least 5 millimetres thick and measures 500 millimetres by 300 millimetres on which the well name and well location coordinates are bead-welded.

149/82 s127

Surrender of permit or lease

119. The surrender of a permit or lease issued in accordance with the *Petroleum Regulations* in respect of an area specified in a drilling program approval and for which an authority to drill a well has been approved shall not relieve an operator of the responsibility for the proper abandonment of a well drilled by the operator in that area.

149/82 s128

Well termination application

120. (1) Where an operator intends to terminate a well, he or she shall submit the details of the proposed program for the termination to the director for approval.

(2) Where the program referred to in subsection (1) has been approved, the operator shall, subject to subsection 90(3) ensure that the well is terminated in accordance with that program.

(3) Where an operator submits a program referred to in subsection (1), he or she shall forward with the submission the following information in respect of the well to be terminated unless that information is in the possession of the director:

- (a) the current status of the well;
- (b) the lithology and age of any formation;
- (c) the depth and extent of loss of circulation;
- (d) the depth and size of any casing strings;
- (e) the type and properties of any drilling or completion fluids;
- (f) the depth, thickness and nature of any reservoirs;
- (g) the depth and nature of any shows of oil or gas;
- (h) the result of any wireline log surveys; and
- (i) the results of any formation flow tests or sample tests.

(4) Where a well cannot be terminated in accordance with the approved termination program referred to in subsection (2) owing to the existence of conditions not anticipated by the operator at the time the program was submitted for approval, the operator shall

- (a) inform the director that the well has not been terminated in accordance with the program;
- (b) leave the well in as secure a condition as is practicable; and
- (c) terminate the well in accordance with the approved termination program within a period of time specified by the director.

149/82 s129

Changes in termination program

121. The director may

- (a) approve a change in a termination program referred to in subsection 120(2) in respect of the abandonment of a well owing to the existence of conditions not anticipated by the operator at the time the program was submitted for approval; or
- (b) require an operator to perforate a casing installed in a well in order to place cement between porous permeable zones that would not otherwise be isolated.

149/82 s130

Well termination report

122. (1) An operator shall record the details of the manner in which a well has been terminated and shall submit the record to the director within 21 days of the rig release date in respect of the well.

(2) The record referred to in subsection (1) shall, if requested by the director be accompanied by a sketch illustrating the condition of the well after termination.

149/82 s131

Improperly terminated wells

123. (1) An acknowledgement by the director of a well termination record submitted in accordance with subsection 122(1) shall in no way relieve an operator of the responsibility for a proper termination of the well if, at a later date, the termination of the well is found not to be in accordance with these regulations.

(2) Where the director is informed that a well or a portion of a well has not been terminated in accordance with these regulations, he or she may order the operator of the well to properly terminate the well and specify the period of time in which the proper termination of the well is to be carried out.

149/82 s132

Termination of test holes

124. (1) Where an operator intends to terminate a test hole, he or she shall submit the details of the proposed program for the termination to the director for approval.

(2) Where the program referred to in subsection (1) has been approved, the operator shall ensure that the test hole is terminated in accordance with that program.

149/82 s133

Holes to be plugged

125. An operator shall ensure that a hole that is drilled as a part of a drilling program and that is less than 30 metres deep is plugged with a cement plug at the surface.

149/82 s134

Abandonment requirements

126. An operator shall ensure that

- (a) a well or a portion of a well that is not suspended or completed, is abandoned; and
- (b) where a well is abandoned, the well is abandoned in a manner so that a formation fluid is prevented from flowing through or escaping from the well-bore.

149/82 s135

Abandonment plugs

127. For the purpose of paragraph 126(b)

- (a) where practicable, a cement plug shall be set at the bottom of a well except where
 - (i) the formation at the bottom of the well is salt, in which case the bottom cement plug may be set immediately above the top of the salt formation, or
 - (ii) conditions in the bore hole of the well are such that it is not practicable to set a cement plug at the bottom of the well, in which case the bottom cement plug will be set as deep in the well as is practicable;
- (b) cement plugs and mechanical bridge plugs shall be set in accordance with the termination program approved under subsection 120(2) and shall be designed to
 - (i) isolate formations or groups of formations that appear to have abnormal pressures,
 - (ii) separate porous permeable formations that contain formation fluids that are significantly different in nature from each other,
 - (iii) separate porous permeable formations from other porous permeable formations that are significantly different in age, and
 - (iv) separate lost circulation intervals in the well from other porous permeable formations;
- (c) except as provided in paragraphs (a) and (d), a cement plug that is at least 30 metres in length shall be run at the bottom of the deepest casing string in the well and the plug shall
 - (i) extend at least 15 metres below and 15 metres above the shoe of the casing, or
 - (ii) be placed on a bridge plug that is set in the casing within 100 metres of the casing shoe;
- (d) the cement plug referred to in paragraph (c) is not required where

(i) at least 10 metres of cement is left in the bottom of the casing during cementation and the cement is not removed, or

(ii) a bridge plug is set in casing within 100 metres of the bottom of the hole

and the casing is pressure tested;

(e) where a leak exists or is suspected in the innermost casing string, a cement plug shall be set at the time of abandonment to seal the leak;

(f) where an annulus is open to a formation, a cement plug shall be set to seal that annulus;

(g) all casing shall be cut at a point one metre below ground level and a 10 metre plug shall be placed in the innermost casing; and

(h) a steel plate shall be welded over the top of the casing in a manner that completely closes off the well-bore and the annuli between all strings of casing.

149/82 s136

Cement plug composition

128. (1) The cement plugs referred to in paragraph 127(b) unless otherwise approved in the termination program, shall be not less than

(a) 100 metres in length, where set in a portion of the well not protected by casing; and

(b) 30 metres in length, where set in a portion of the well that is protected by casing.

(2) The cement used for cement plugs shall be designed to have a minimum compressive strength of 3,000 kilopascals after it has hardened for at least 8 hours.

149/82 s137

Plug position confirmation

129. (1) An operator shall wait for at least 6 hours for the cement used for plugs to harden and shall then confirm with a force of 90 kilonewtons or the full weight of the cementing string, whichever is the lesser, the position of a cement plug that is not supported by a plug or by the bottom of the well and that is located

(a) at the shoe of the deepest casing string;

(b) above an abnormally pressured zone; or

(c) above a hydrocarbon bearing zone.

(2) Where a plug is found to be so displaced from its intended position as to render it inadequate for the purpose for which it was intended, a supplementary plug shall be set to replace it and the position of it confirmed in accordance with subsection (1).

149/82 s138

Casing removal

130. (1) An operator shall not permanently remove a casing or tubing while abandoning a well except in accordance with subsection (2) and the removal is part of the program referred to in subsection 120(1).

(2) Where the casing referred to in subsection (1) is removed

(a) a mechanical bridge plug shall be set in the casing not more than 15 metres below the cut-off point before cutting the casing;

(b) a 30 metre cement plug shall be placed across the casing stub;

(c) that portion of the well above the cut-off point shall be abandoned in accordance with these regulations; and

(d) notwithstanding paragraph (b), where casing is cut for the purpose of recovering a wellhead, a cement plug that is as long as practicable shall be placed across the casing stub.

149/82 s139

Suspended well requirements

131. (1) An operator shall ensure that a well drilled by him or her that is suspended is left in a manner that

(a) prevents a formation fluid from flowing through or escaping from the well-bore;

(b) permits the installation of a wellhead or the safe and efficient resumption of operations; and

(c) restores, to the greatest extent practicable, the surface location to its natural state.

(2) A well referred to in subsection (1) that is suspended after it is completed shall be equipped with a downhole mechanical plug and a surface mechanical plug in the tubing that are pressure tested to ensure that they are properly installed.

149/82 s140

Well suspension/completion

132. (1) A well that is suspended and that has not been completed shall be completed or abandoned within 6 years of the date of suspension.

(2) A well that is completed and suspended shall be

(a) inspected each year and a report on the condition of the well shall be made to the director; and

(b) placed on production or abandoned within a period of 6 years from the date of suspension unless the director has granted an extension of the period.

Fluid in abandoned or suspended wells

133. An operator shall ensure that

- (a) where a well or a lower interval in a well is to be abandoned or suspended, the well or interval shall be filled with fluid of sufficient density to overbalance the formation pressures found in the well; and
- (b) on request of the director, fluid to be placed in the casing-tubing annulus of a well that is to be suspended or completed is fluid that
 - (i) will not freeze under the conditions to which it will be subjected, and
 - (ii) is treated to minimize corrosion of the casing and tubing.

Well completion requirements

134. (1) An operator shall ensure that a well termination program submitted for approval in accordance with section 120 provides for

- (a) the isolation of each completed reservoir interval from another porous or permeable interval penetrated by the well;
- (b) the safe and efficient testing and production of a completed reservoir interval;
- (c) where open-hole completion techniques are used, the installation of production casing at a depth that is not more than 60 metres above the top of the productive interval;
- (d) where cased-holed completion techniques are used, the setting of production casing at a depth that provides a sump of at least 15 metres below the base of the productive interval;
- (e) the setting of a packer as close as practicable to the top of the interval to be completed and the pressure testing of that packer to a differential pressure that is at least 4,000 kilopascals greater than the maximum differential pressure anticipated under production conditions;
- (f) the stimulation of productive formations in a manner that is safe and that permits evaluation of production characteristics; and
- (g) on the request of the director the measurement and control of the amount of sand flowing into the well.

(2) Notwithstanding subsection (1), an operator shall ensure that the wellhead and related equipment on a completed well

- (a) has a working pressure that is greater than the initial reservoir pressure in a productive interval;

(b) is pressure tested to a pressure that is not less than the initial reservoir pressure in a productive interval; and

(c) has installed a means of monitoring

(i) the pressure and temperature at the tubing-head, and

(ii) the pressure at the casing-head.

(3) An operator shall, on the request of the director, install a surface-controlled sub-surface safety valve in a well that has been completed.

149/82 s143

Marking of wellheads

135. An operator shall ensure that the wellhead of a suspended or completed well is

(a) protected against damage; and

(b) identified by a suitable sign.

149/82 s144

Authorized inspection

136. An authorized person may inspect

(a) the operations at a drill site; and

(b) the drilling rig and other equipment referred to in an application for drilling program approval.

149/82 s145

Tests and repairs of equipment

137. An authorized person may, where it is reasonable having regard to the drilling operation in progress and after giving written notice to the operator, require the operator to test the function, capacity or structural integrity of an item of drilling equipment the failure or malfunction of which might affect the safety of personnel or the pressure control of the well.

149/82 s146

Accident investigation

138. (1) The director or an authorized person may investigate an accident or other event that

- (a) involves death or injury or had the potential of so causing;
- (b) causes damage to or failure of drilling equipment; or
- (c) results in pollution.

(2) Where an investigation referred to in subsection (1) is commenced, the appropriate operator shall provide all reasonable assistance to the director or authorized person acting on his or her behalf and make available to the director or to the authorized person all records and data that in the opinion of the director or the authorized person may contain information relevant to the matter under investigation.

149/82 s148

Investigative powers

139. (1) The director or an authorized person acting on his or her behalf may on investigating an accident or other event referred to in subsection 138(1)

- (a) question a person with respect to an accident or other event that he or she is investigating; and
- (b) view a part of a drilling rig and related equipment and shall be given necessary assistance by the operator while so doing.

(2) Where an accident or other event referred to in subsection 138(1) has been investigated, the director shall immediately report the results of the investigation to the minister.

149/82 s149

Non-interference

140. A person shall not obstruct or hinder the director or an authorized person acting on his or her behalf from carrying out an investigation referred to in section 138.

149/82 s150

PART IX GENERAL

Notification of planned operations

141. An operator shall notify the director in writing at least 45 days before commencement of

- (a) the spud-in of a proposed well; or
- (b) the re-entry of a well that has been suspended,

of the day the construction, spud-in or re-entry is to commence.

Notification of operations commencement

142. An operator shall within 24 hours notify the director by telex, telegram or by an equivalent means of the

- (a) date that a drilling rig arrives at a drill site;
- (b) hour and date of a spud-in or of the re-entry of a well for the purpose of further drilling;
and
- (c) hour and date that a drilling rig is released from a well.

Notification of significant event

143. (1) An operator shall notify the director immediately by the most rapid and practical means of a significant situation or event, including the loss of life, a missing person, serious injury to a person, fire, loss of well control, an imminent threat to the safety of a drilling rig or to personnel, loss of or damage to a drilling rig, an oil or toxic chemical spill or the anticipated discovery of oil or gas.

(2) An operator shall submit a full written report of a situation or event referred to in subsection (1) to the director as soon as practicable following the notification required by that subsection.

Notification of structural faults

144. An operator shall notify the director immediately if an inspection of a drilling rig reveals conditions that lessen or might lessen the structural integrity of the drilling rig.

Notification of press release

145. (1) An operator shall notify the director of his or her intention to issue a press release or to hold a press conference concerning a discovery, blowout or other significant event that occurs at a well.

(2) The notification referred to in subsection (1) shall be given at least 24 hours in advance of the issuance of the press release or the holding of the press conference except where an emergency is involved in which case the notification shall be given as long as possible in advance of the issuance of the press release or holding of the press conference.

Required information

146. Information that is required to be submitted under these regulations shall be prepared and submitted in a form and manner satisfactory to the director.

149/82 s158

Research reports

147. An operator shall submit to the director a report regarding applied research work or studies obtained or compiled by him or her that contains information relevant to the safety of drilling operations in that area set out in the application of drilling program approval as soon as the report is available.

149/82 s159

Routine reports

148. (1) An operator shall, during a drilling program, prepare and submit to the director once each week

- (a) a summary of all significant events that occurred at the drill site during the preceding week;
- (b) a report describing the lithology of formation drilled and the nature of reservoir fluids encountered during the preceding week;
- (c) a summary of the results of deviation and directional surveys that were taken during the preceding week including a calculation of the bottom-hole coordinates for a well that was directionally drilled or that has deviated more than 5° from the vertical; and
- (d) a report in respect of an accident that occurred during the preceding week and that involved an injury to or the death of a person.

(2) An operator shall on request of the director during a drilling program submit a report to the director each day by telex, telegram or by an equivalent means, setting out the depth of the well, the detailed lithology of the formations encountered during the previous day, the properties of the drilling fluid, the results of each formation leak off test, the weather, the performance of the drilling rig and other information that may be requested by the director.

(3) An operator shall ensure that a record is maintained on the drill site of the receipt and consumption of all explosive material at the drill site and the records shall be submitted on request to the director.

149/82 s160

Samples and other materials

149. (1) The director may require an operator to deliver to the addresses specified by the director

- (a) any samples and other materials that are required to be submitted under these regulations;
- (b) within 60 days of the rig release date of a well

(i) one complete set of the washed drill cuttings sample referred to in paragraph 93(1)(a),

(ii) a complete set of unwashed drill cuttings referred to in paragraph 93(1)(d), and

(iii) a complete set of the canned drill cuttings referred to in subsection 92(6);

(c) within 6 months of the rig release date, any sidewall core or a remnant of it remaining after an analyses of the core;

(d) within 60 days of the rig release date, any conventional cores and core photographs referred to in section 101;

(e) within 60 days of the date of the formation flow test any fluid or condensate sample referred to in section 115;

(f) within 6 months of the rig release date, any palynological or nano fossil slide produced from a sidewall core destroyed in the production of the slide; and

(g) within 5 years of the rig release date, foraminiferal or petrographic slides produced from a sidewall core destroyed in the production of the slide.

(2) Notwithstanding paragraph (1)(a), on request of the director, a foraminiferal and petrographic slide referred to in paragraph (1)(g) shall be made available for public examination after the expiration of the confidential period for the well required by any law of the province.

149/82 s161

Penetration and gas content records

150. The rate of penetration as recorded in accordance with subsection 72(1) and the record referred to in subsection 94(2) shall be submitted to the director on his or her request.

149/82 s162

Final well reports

151. (1) An operator shall prepare a final well report on termination of a well drilled by him or her and shall submit to the director a copy of the report within a period of 90 days of the rig release date in the case of an exploratory well and within a period of 45 days of the rig release date in the case of a development well unless a different period is approved by the director.

(2) The final well report referred to in subsection (1) for an exploratory well shall contain a record of all operational, engineering and geological information that is relevant to the well and shall be organized into the following sections with appendices, if appropriate:

(a) an introduction;

(b) general well data;

(c) a summary of drilling and related operations;

- (d) a summary of weather conditions during operations at the site;
- (e) geological, palaeontological and geochemical information;
- (f) a summary of directional and deviation surveys and the coordinates of the bottom of the hole;
- (g) a plot of the location of the bore-hole in the case of a well that has deviated more than 10° from the vertical;
- (h) reservoir and well evaluation data; and
- (i) wireline logs, analysis, studies and all other pertinent reports.

(3) The final well report referred to in subsection (1) for the development well shall contain:

- (a) a summary of the completion operations;
- (b) the coordinates of the bottom of the hole and of the top of a productive zone and in the case of a directionally drilled well, a plot showing the location of the well-bore;
- (c) details of the completion equipment and tubing including a diagram of equipment installed on the well;
- (d) results of any formation flow test;
- (e) a copy of a report prepared by contractors of the operator that concern well stimulation; and
- (f) wireline logs, core analysis, studies, reports or records relating to the evaluation of the well.

149/82 s163

Test hole reports

152. (1) An operator shall prepare a final report on the drilling of a test hole or group of test holes drilled by him or her.

(2) A copy of the report referred to in subsection (1) shall be submitted to the director within a period of 90 days of the rig release date of the test hole or group of test holes unless a different period is approved by the director.

(3) The final report referred to in subsection (1) shall be in a form satisfactory to the director and contain information that is requested by the director.

149/82 s164

Confidential information

153. (1) Subject to section 154 and to any law of the province, the director shall securely store and keep confidential all information, reports, cores, cuttings and fluid samples submitted by the operator in accordance with these regulations.

(2) Notwithstanding subsection (1), any information, report, analysis or sample submitted by an operator in accordance with these regulations may be used for the management of oil or gas resources.

149/82 s165

Release of information

154. (1) Subject to subsections (2), (3), (4) and (5), information relating to a drilling program that is given in accordance with these regulations shall not be made public.

(2) General information on a well including the name, classification, location, identity of the drilling rig used by the operator, depth and operational status of the drilling program may be released by the director to the public.

(3) Information that is furnished by an operator in support of an application for drilling program approval referred to in section 8 or included in an application for an authority to drill a well referred to in section 29 in respect of

(a) the proposed design, method of operation of a drilling program and objectives of the proposed well shall not be released without the written consent of the operator;

(b) research work that relates to the safety of the drilling operations at a well, shall not be released before the final well report in subsection 151(1) for that well is released without the written consent of the operator; and

(c) research work or feasibility studies relating to exploration or production techniques and systems shall not be released until 5 years has elapsed from the date the work or studies were furnished.

(4) Information referred to in subsection (3) in respect of environmental studies or contingency plans may be released by the minister.

(5) Notwithstanding another provision of these regulations, the director may 2 years after the rig release date in the case of an exploration well or 60 days after the rig release date in the case of a development well, release information contained within a final well report.

149/82 s166

Exceptions

155. Notwithstanding section 154,

(a) where information submitted by an operator during the drilling of a well in an area has a direct bearing on the safety of the drilling operation being carried out by another operator in the same area, the director may communicate that information to the other operator; and

(b) information contained in the report referred to in subsection 139(2) may be released by the director.

149/82 ss167&168

Prohibition

156. A person may not enter a drill site unless specifically authorized to do so by the operator or the director or the designate of either of them.

149/82 s151

Repeal

157. The Newfoundland and Labrador Petroleum Drilling Regulations, 1982, Newfoundland Regulation 149/82, are repealed.