

STATE OF WESTERN AUSTRALIA
PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967

SCHEDULE OF GEOTHERMAL
EXPLORATION AND PRODUCTION
REQUIREMENTS – 2009

(Amended 20 May 2010)

NB: The clauses and sub-clauses with the “strike through” lines have been deleted following gazettal of geothermal safety legislation on 14 May 2010

*Published by:
Petroleum Division
Department of Mines and Petroleum
Western Australia*



CONTENTS:

**This Schedule is divided into
eight parts as follows:-**

CLAUSE	PAGE
<u>SCHEDULE OF GEOTHERMAL</u>	I
PART I - INTRODUCTORY	1
101 Application of Schedule	1
102 Exemptions (102(2)(b)(ii) Revoked)	1
103 Verification	2
104 Definitions	2
105 Certificate of Competence	6
106 Personnel Qualifications and Performance	6
107 Tests	6
108 General Duties and Responsibilities of Operators and Contractors	7
109 Responsibilities of Supervisor (109(2) Revoked)	7
110 Responsibilities of Employees (110(a) Revoked)	8
111 Posting of the Schedule	8
112 Codes, Standards and Specifications	8
113 Protection of Environment	8
114 Inspectors	9
115 Issue of Notices by Inspectors	9
116 Interference with Public Utilities	10
117 Identification and Protection of Wells	10
118 Containment of Geofluids	10
PART II SAFETY	11
<u>DIVISION 1 - GENERAL REQUIREMENTS</u>	11
201 General Duty of Care	11
202 Safety Manual	11

203	Emergency Response Manual	11
204	Updating of Manuals	12
205	Availability of Manuals and Directions	12
206	Instruction of Personnel	12
207	Admittance to an Operational Site	12
208	Person-in-Charge	13
209	Communications	13
210	Protective Equipment	13
211	Responsibility for Wearing Equipment	14
212	Noise Levels	14
213	Radio-active Substances	14
214	Notices	15
215	Fire-fighting Equipment	15
216	Medical	15
217	Contaminated Atmosphere	16
218	Ropes and Slings	17
219	Safe Use of Equipment	17
220	Machinery Maintenance	18
221	Repair of Plant	18
222	Mobile Equipment	18
223	Hours of Vehicle Operation	19
224	Transportation of Persons by Vehicle	19
225	Cranes	20
226	Crane Driver Competence	20
227	Crane, Hoist and Winch Loads	20
228	Waterborne Operations	21
229	Debris Constituting a Fire Hazard	21
230	Siting of Geofluid Disposal Pit	21

231	Temporary Well Site Production Equipment	22
232	Siting of Production Equipment	22
233	Venting of Flammable Vapours	23
234	Smoking, Naked Lights, Welding and Cutting	23
235	Internal Combustion Engines	24
236	Fuel Tanks	25
237	Lighting	25
238	Temporary Cessation of any Operation	26
239	General Safety Precautions (239 (1)(2)(3)(4)(5)(7) Revoked)	26
240	Working In Elevated Places	27
<u>DIVISION 2 - SAFE DRILLING PRACTICES</u>		<u>28</u>
241	Raising and Lowering Masts and Derricks	28
242	Platforms and Handrails	29
243	Drawworks Controls	29
244	Making-up and Breaking Joints	29
245	Protection of People at Work	30
246	Ancillary Escape	30
247	Stabbing Boards	30
248	Safety Belts	31
249	Riding Hoisting Equipment	32
250	Weight Indicator	32
251	Brakes	32
252	Rotary Table	32
253	Racked Pipes	33
254	Mud Savers	33
255	Rig Safety	33
256	Mast and Derrick Platforms	34
257	Inside Derrick Platforms	35

258	Ladders and Stairways	35
259	Hoisting and Other Wire Ropes	35
260	Travelling Blocks	36
261	Catheads	37
262	Guards	38
263	Pressure Hoses	39
264	Crown Blocks	39
265	Counter-balance	39
266	Pipe Racks and Pipe Handling	39
267	Pipe Hooks	40
268	Back-up Posts and Tong Safety Lines	40
269	Pressure Relief Valves	41
	<u>DIVISION 3 - AIR AND GAS DRILLING</u>	42
270	General	42
271	Warning Notices	42
272	Delivery Lines	42
273	Vehicles	43
274	Fire Precautions	43
275	Siting of Compressors	43
276	High Pressure Lines and Manifolds	44
277	Bloocy Line	44
278	Substructure Ventilation	44
279	Supply Line Valves	44
280	Drillstring Float	44
281	Lighting	45
282	Mud Stocks	45
283	Gas Detection Equipment	45

<u>DIVISION 4 - REPORTING</u>	46
284 Reporting of Death and Serious Injury	46
285 Written Records of Death and Injury	46
286 Reporting Serious Damage	46
287 Reporting a Potentially Hazardous Event	47
288 Reporting Damage Less Than \$20,000	47
289 Reporting Escape or Ignition of Geofluids and Other Material	48
290 Reporting of Emergencies	48
291 Reporting Radiation Monitoring	48
<u>PART III - ELECTRICAL INSTALLATIONS</u>	49
301 Wiring Rules	49
302 Electrical Generators, Alternators and Motors	50
303 Portable Electrical Systems Equipment	50
304 Protection of Circuits	51
305 Earthing and Lightning Protection	51
306 Control of Static Electricity	51
307 Portable Lights and Tools	52
308 Maintenance, Repairs or Alterations	52
309 Electric Shock	53
310 Electricians and Inspection of Electrical Equipment	53
311 Control Equipment	54
<u>PART IV - EXPLOSIVES</u>	55
<u>DIVISION 1 - DRILLING AND WORKOVER OPERATIONS</u>	55
401 General	55
402 Competence of Workers	55
403 Safety of Rig Personnel	55
404 Radio Transmitters	55

405	Operations During Darkness	55
406	Shut-down of Electrical Generating Plant	56
407	Earth-return Electrical Systems	56
408	Adverse Weather Conditions	56
409	Safety on the Floor	56
410	Earthing	56
<u>DIVISION 2</u> GEOPHYSICAL AND GEOLOGICAL SURVEYS		57
411	General	57
412	Storage and Transportation	57
413	Explosives not be exposed to heat, etc.	57
414	Competence of Workers	57
415	Nature of Responsibilities	57
416	Magazines	58
417	Use of Secure Containers	58
418	Surplus Explosives	58
419	Handling, Preparing and Firing	59
420	Warnings	59
421	Use of Safety Fuses	59
422	Electric Firing	60
423	Short-circuiting of Detonators and Firing Cables	61
424	Precautions Against Stray Currents	61
425	Use of Power Cables	61
426	Drilling near Explosive Charges	62
427	Firing in Vicinity of People and Buildings	62
428	Firing in the Vicinity of Radio Transmitters	62
429	Portable Radio Transmitters	62
430	Misfires	63
431	Damaged Wires	64

432	Inspection After Firing	64
433	Abandoning a Shot Point	65
434	Preloading	65
435	Adverse Weather Conditions	65
<u>PART V - DRILLING AND WORKOVER</u>		66
<u>DIVISION 1 - GENERAL REQUIREMENTS</u>		66
501	Approval to Drill	66
502	Approval of Operating Manuals and Drilling Equipment	67
503	Equipment to Conform to Certain Standards	68
504	Location Surveys	68
505	Prohibited Drilling Areas	70
506	Casing	71
507	Cementing of Casing	72
508	Blow-out Prevention Control	73
509	Pressure Testing Blow-out Prevention Equipment	75
510	Mud Monitoring System	76
511	Penetration Rate and Formation Pressure Monitoring	76
512	Accumulators	76
513	Blow-out Prevention Drills	77
514	Formation Integrity Testing	77
515	Drilling Fluid	78
516	Deviation Surveys	78
517	Conversion of Wells into Water Wells	78
518	Evaluation of Geothermal Energy Resources	79
519	Core and Samples Cuttings	79
520	Reports on Analysis of Core and Cuttings	80
521	Age Dating of Samples	80
522	Fluid Samples	80

523	Well Evaluation Logs	81
524	Protection of Aquifers	81
525	Production Tests on Wells	81
526	Flammable Vapours	84
527	Approval to Abandon or Suspend a Well	84
528	Abandonment of a Well	85
529	Well Completion	86
530	Disposal of Produced Oil and Gas	87
531	Disposal of Waste Fluids	87
532	Replacement of Well Site Fencing	87
533	Restoration of Site	87
<u>DIVISION 2</u> REPORTING AND DATA SUBMISSIONS		88
534	Discovery of Geothermal Resource and Estimate of Resource	88
535	Daily Report of Drilling or Re-entry or Workover Operations	88
536	Weekly Report of Drilling and Workover Operations	89
537	Report on Modification, Abandonment or Suspension of Well	89
538	Well Completion Report	89
<u>DIVISION 3</u> SPECIAL SERVICES		92
539	Special Services	92
540	Equipment (540(6) Revoked)	92
541	Operations	92
542	Swabbing (542(3) Revoked)	93
543	Blow-out Prevention	93
<u>PART VI</u> GEOTHERMAL ENERGY PRODUCTION		94
<u>DIVISION 1</u> GENERAL REQUIREMENTS		94
601	Consent for Production Equipment and Recovery of Geothermal Resource (601)(1)(a)(b)(c)(2)(3) Revoked)	94
602	Manuals	94

603	Other Operations	95
604	Production Facilities	95
605	Equipment to Comply with Certain Standards	95
606	Production Isolation Valves	96
607	Construction Approval	96
608	Initial Production Tests	97
609	Geothermal Energy Recovery Development Plan	98
610	Rate of Recovery of Geothermal Energy	98
611	Production Tests on Producing Wells	99
612	Measurement of Produced Geofluids	99
613	Measurement of Production to Determine Royalties	99
614	Surface Connections	100
615	Production From More Than One Reservoir From One Well	100
616	Production From More Than One Reservoir From More Than One Well	100
617	Segregation of Zones	100
618	Waste or Contamination	101
619	Waste Liquid	101
620	Monitors and Control Mechanisms	101
621	Safety Devices	102
622	Workover of Wells	102
623	Wireline Operations in Wells	103
624	Sampling Geothermal Streams	103
625	Meter Proving	103
626	Pressure Vessel Inspection	103
627	Protection of Completed Wells	103
628	Plugging of Wells	104
629	Removal of Facilities	104
630	Restoration of Lands	104

<u>DIVISION 2</u>	REPORTING AND DATA SUBMISSION	106
631	Program of Work	106
632	Estimate of Geothermal Energy Resource	106
633	Monthly Production Report	106
634	Production Facility Maintenance Reporting	107
635	Records of Periodic Inspections	108
636	Production Records and Reports	108
637	Reports on Wireline Surveys and Sub-surface Safety Valves	109
638	Reports on Pressure Vessels	109
<u>PART VII GEOPHYSICAL AND GEOLOGICAL SURVEYING</u>		110
<u>DIVISION 1</u>	GENERAL REQUIREMENTS	110
701	Application	110
702	Authorization	110
703	Person-in-charge	110
704	Approval to Carry out Geophysical and Geological Surveys	110
705	Application for Geological and Geophysical Surveys	111
706	Protection of the Environment	112
707	Special Conditions Governing Geophysical and Geological Surveys	112
708	Explosives	112
709	Manuals	112
710	Communications	113
711	Operations near Mines, Quarries and Petroleum Production Operations	113
712	Operations on Roads and in Inhabited Areas	113
713	Marking Seismic Lines	113
714	Shot Points Near Buildings and Public Facilities	113
715	Shot Hole Temporary Plug	114
716	Permanent Shot Hole Plugs	114
717	Uncontrolled Flow of Water	114

<u>DIVISION 2</u>	REPORTING	115
718	Weekly Reports	115
719	Basic Data Submission	115
720	Final Reports on Geophysical and Geological Surveys	116
721	Reports of Damage to Property	117
PART VIII - REPORTING REQUIREMENTS FOR EXPLORATION TITLES		119
801	Periodic Reports	119
APPENDIX I		120
GUIDELINES FOR ONSHORE GEOTHERMAL GEOPHYSICAL SURVEYING		120
APPENDIX 2 FORM 1		131

**SCHEDULE OF GEOTHERMAL EXPLORATION AND PRODUCTION
REQUIREMENTS - 2009**

PART I - INTRODUCTORY

101 Application of Schedule

In this Schedule unless otherwise specified – “The Act” means the Act as amended from time-to-time and under which this schedule is made and any Act which is incorporated with that Act.

Notwithstanding anything to the contrary in this Schedule, this Schedule applies only to or in relation to acts, omissions, matters, circumstances or things touching, concerning, arising out of or connected with the exploration or exploitation of the subsoil for geothermal energy resources.

In case of encountering hydrocarbons, reference should be made to the applicable petroleum schedule instead of the current geothermal schedule.

102 Exemptions

(1) Where the Director is satisfied -

- (a) that compliance with a requirement of this Schedule is, in a particular case, unnecessary, impracticable or undesirable; and
- (b) that alternative action that is at least as safe as a requirement of this Schedule will be taken and that, in the circumstances of a particular case, it is appropriate to do so,

the Director may exempt any person or class of persons from the duty to comply with the particular requirement subject to such conditions as the Director thinks applicable.

(2) Where

- (a) a person contravenes or fails to comply with a condition of an exemption; or
- (b) the Director is satisfied -
 - (i) that the circumstances under which an exemption was granted have altered; or
 - ~~(ii) that in the interests of health or safety it is necessary to do so;~~

the Director may revoke the exemption (either as it applies to a particular person, or generally).

103 Verification

The construction, alteration or reconstruction of drilling and production equipment, safety systems and emergency facilities shall not be undertaken without approval and, where required by the Director, verification by a Verifying Body.

104 Definitions

In this Schedule, unless inconsistent with the context or subject matter:

“**the Act**” means the State of Western Australia *Petroleum and Geothermal Energy Resources Act, 1967*, as amended from time-to-time.

“**ANSI**” means the American National Standards Institute:

“**API**” means the American Petroleum Institute:

“**approval**” or “**approved**” means the approval of or approved by the Director:

“**ASEG-GDF**” means Australian Society of Exploration Geophysicists General Data Format:

“**ASME**” means the American Society of Mechanical Engineers:

“**Australian Standard**” (or “**AS**”) means a standard of the Standards Association of Australia:

“**basic data**” includes all data acquired in the field or laboratory including physical and chemical measurements conducted as part of the analysis of fluid or core and cutting samples:

“**blooey line**” in relation to air or gas drilling, means a system of pipes arranged to carry away from the drilling rig any air or gas that has returned to the surface:

“**business day**” means any day except Saturday, Sunday or a public holiday:

“**circulation**” means the passing of fluid down the drill pipe, casing or tubing in a well and back up to the surface, or the passing of fluid in the reverse direction:

“**clause**” means a clause of a part to this Schedule:

“**completion**” means a flowpath in a well that allows the production of fluids from a discrete formation interval through the well, or the injection of fluids into a discrete formation interval through the well, and includes the equipment necessary for that production or injection independent of other flowpaths in the well:

“**conductor casing string**” means a pipe installed to cover unconsolidated surface formations, and which may provide a means for return of drilling fluid from the well before the surface casing is installed:

“**contractor**” means a person engaged to perform work for an Operator under contract (not being a contract of employment):

“**cubic metre**” in relation to gas or liquid, means the amount of gas or liquid in a cubic metre of space at standard conditions of 101.325 kilopascals absolute pressure and 15°C temperature:

“**derrick**” means a fixed framework over a well that is used in supporting, hoisting and lowering operations:

“**directional drilling**” in relation to drilling a well, means drilling that involves intentional changes in the direction of drilling:

“**Director**” means the Director Petroleum and Environment Division of the Department of Mines and Petroleum:

“**drilling rig**” includes a workover or well service rig, but does not include a seismic shot hole drilling rig:

“**existing pipeline**” means an existing pipe or system of pipes that is being used, or is capable of being used, for the transmission of fluid:

“**explosive atmosphere**” means an atmosphere which would explode and burn if a source of ignition was introduced into that atmosphere:

“**extension well**” means a well drilled principally to define more accurately the extent or nature of a previously discovered geothermal energy resource:

“**flame type equipment**” means any electric or fired equipment that uses an open flame, electric arc or element:

“**flowing well**” means a well from which oil, gas or water is produced without the use of artificial lifting equipment:

“**geofluids**” are all fluids that flow from geological formations including all gases, water, oil etc:

“**geophysical surveying**” means geophysical investigation by any generally recognised method including seismic, gravimetric, magnetic, electrical, geochemical, or radioactive methods, (excluding direct well evaluation practices):

“**geothermal energy**” means thermal energy that results from natural geological processes and is contained in geothermal energy resources:

“**geothermal title**” means a geothermal exploration permit, a retention lease, a geothermal production licence, a scientific investigation, a geothermal drilling reservation or a geothermal special prospecting authority:

“**geothermal well**” means a hole in the ground that is made for the purpose of

- (a) searching for, or producing, geothermal energy and geothermal energy resources
- (b) injecting fluid into an underground geothermal
- (c) disposing of waste fluids that result from production operations; or
- (d) producing geofluids for reinjection purposes;

and includes any casing or down hole equipment used in conjunction with the well and any wellhead that is installed in or on the hole from time-to-time, but does not include a water bore or a seismic shot hole:

“**good operations practice**” means all those things that are generally accepted as good and safe in the carrying on of exploration for geothermal energy resources, or in operations for the recovery of geothermal energy as the case may be:

“**injector well**” means a well used to inject geofluids into a geothermal energy resource:

“**Inspector**” means a person appointed as an Inspector under the Act:

“**mast**” includes any portable or collapsible framework that is used over a well in supporting, hoisting and lowering operations:

“**monument**” means a survey mark used to establish –

- (a) a corner, boundary or station of a geothermal energy resource title; or
- (b) a cadastral, geodetic or topographic survey, and includes any related reference marks:

“**multiple completion well**” means a well that has more than one completion:

“**operation**” means any activity relating to exploration for, or the production, processing or transportation of, geothermal energy:

“**operator**” means the representative of the title holder responsible for the overall management and control of operations for the exploration or exploitation of geothermal energy resources for which the title is held:

“**Person-in-charge**” – a person appointed by an Operator to provide on site management and control of any specified operation:

“**plant**” includes -

- (a) any machinery, equipment, vehicle, implement, tool or article used in, or in connection with, an operation;
- (b) any tank, vessel, pit or dump used in, or in connection with, an operation;
- (c) any pipeline:

“**process vessel**” means a vessel used to process fluids or solids by mechanical, fluid mechanical, chemical, thermal or other means:

“**production facility**” means a system (other than a short-term or temporary system) made up of plant (other than pipelines) that is used in a production, processing or transportation operation, or in an operation to treat or dispose of waste materials that result from geothermal energy production:

“**production potential**” means the capacity of a geothermal resource to produce energy calculated or measured in accordance with generally accepted procedures:

“**quarter**” means any three month period commencing on 1 January, 1 April, 1 July or 1 October in any year:

“**reservoir**” means any porous and permeable rock that is capable of storing fluids and yielding them to a well:

“**reservoir measurements**” means measurements of reservoir pressure and temperature, and measurements of the movement of fluids and fluid interfaces within a reservoir:

“**reservoir pressure**” means the static or stabilised pressure that exists, or that is inferred to exist, in a reservoir at a given datum:

“**seismic source**” means an energy source used to create shock waves in the earth (so that the reflections may be recorded when investigating sub-surface strata):

“**separator**” means an apparatus used at the surface to separate fluids produced from a well:

“**shot hole**” means a hole drilled for the purpose for firing an explosive charge:

“**shot point**” means the surface location of, and the area immediately surrounding, a shot hole or other place where a seismic source is initiated:

“**Verifying Body**” means an approved body qualified to -

- (a) verify the design, construction and installation of geothermal facilities;

- (b) verify the design, construction and operating condition of cranes and pressure vessels; or
- (c) carry out such verification as the Director may require.

“**wellhead**” means the casing head and includes any casing hanger or spool, or tubing hanger, and any flow control equipment up to and including the wing valves:

“**well logging**” means recording one or more physical properties, formation characteristics or reservoir measurements as a function of depth of a well:

“**workover**” means any operation carried out on a well in order to improve productivity or remedy a down hole mechanical defect, including but not limited to:

- (a) Recovering tubing
- (b) Reperforating
- (c) Recompleting
- (d) Stimulating
- (e) Or in anyway altering the down hole configuration of the well:

105 Certificate of Competence

Where a person carries out an activity for which that person is required to have a certificate of competence, an authorisation or a qualification by a law of the State such person shall have such certificate, authorisation or qualification.

106 Personnel Qualifications and Performance

The Director may at any time require that such evidence be furnished as the Director considers necessary to enable the Director to determine whether a person is competent to be engaged in the particular activity or operation to be carried out.

107 Tests

Except where otherwise specified in this Schedule any test required under this Schedule shall be carried out in such a manner as will enable the results to be recorded and certified -

- (a) in an endorsed document within the meaning of the By-laws of the National Association of Testing Authorities, Australia; or
- (b) where the test is not a test in respect of which an endorsed document of the kind referred to in paragraph (a) can be given, to the satisfaction of the Director; or
- (c) where the test is a test in respect of which an endorsed document of the kind referred to in paragraph (a) can be given but for practical reasons

acceptable to the Director the requirement for such endorsement has been waived, to the satisfaction of the Director.

108 General Duties and Responsibilities of Operators and Contractors

- (1) Subject to this Schedule -
 - (a) it is the duty of an Operator and any contractor to ensure compliance with these requirements; and
 - (b) in the event of a contravention of, or failure to comply with a provision of these requirements, the Operator and contractor are each guilty of an offence.
- (2) In addition to the operation of Sub-Clause (1), if a requirement provides that a particular person shall perform or discharge a function or duty under the requirement, that person is guilty of an offence if the person contravenes, or fails to comply with the requirement.
- (3) Subject to any express provision in a particular requirement -
 - (a) the Operator shall provide, install and maintain such plant as is necessary to enable compliance with this Schedule; and
 - (b) where a contractor has been engaged to perform particular work, the contractor shall also, in relation to the performance of that work, provide, install and maintain such plant as is necessary to ensure compliance with this Schedule.
- (4) It is a defence to a charge for an offence against this Schedule for the accused to prove -
 - (a) that the offence relates to a matter over which the accused did not know and could not reasonably have been expected to have known; or
 - (b)
 - (i) that it was not reasonably practicable for the accused to comply with the relevant direction in the circumstances of the particular case; and
 - (ii) that the accused took alternative action that was at least as safe and effective as the terms of the relevant requirement.

109 Responsibilities of Supervisor

- (1) A supervisor shall ensure, so far as is reasonably practicable, that work is carried out in accordance with these requirements.
- ~~(2) A supervisor shall ensure, so far as is reasonably practicable.~~

~~(a) that work is carried out in a safe manner; and~~

~~(b) that all plant used in that work is in good working condition.~~

110 Responsibilities of Employees

A person shall not engage in or cause any person to engage in an unauthorised activity which may either directly or indirectly-

~~(a) Endanger the safety of persons engaged in the operation.~~

(b) Endanger equipment or facilities associated with the operation.

(c) Interfere with the safe operations of the equipment or facilities associated therewith.

111 Posting of the Schedule

A copy of these requirements shall be reasonably available for inspection on each drilling and workover rig, and at all other main operational locations.

112 Codes, Standards and Specifications

(1) Reference in this Schedule to a code, standard or specification, unless inconsistent with the context or subject matter, is a reference to the latest edition of that code, standard or specification issued by the authority or organisation which made the code, standard or specification.

(2) In sub-clause (1) “edition” includes an issued code, standard or specification and amendments thereto issued by the authority or organisation which made the code, standard or specification.

113 Protection of Environment

(1) An Operator shall ensure that operations are carried out in a manner that avoids or, where that is not practicable, minimises any adverse impact on the environment.

(2) Unless alternative arrangements are established to the satisfaction of the Director, an Operator shall, at least 3 months (6 months in an environmentally sensitive area) before the commencement of –

(a) a drilling program;

(b) the construction of a production facility; or

(c) fracturing of rock

submit to the Director a proposal document to initiate the environmental impact assessment process in accordance with the Environmental Protection Act 1986.

- (3) Before an operation is commenced, the Operator shall have an approved code of environmental practice relevant to the area of operations containing an outline of the procedures that are proposed –
 - (a) to minimise hazards to the health and well-being of persons working in the operation, and the public generally;
 - (b) to protect wildlife, livestock, flora and sites of natural, historical or cultural significance;
 - (c) to minimise disturbance of the land surface; and
 - (d) to clean up any areas disturbed by the operation and, if there is no proposal for the subsequent development of the land, to leave the land in a state that will facilitate its restoration.
- (4) The holder of a geothermal title shall ensure that all his employees and contracts comply with an approved Code of Environmental Practice, in the absence of specific directions the operations shall be carried out in accordance with the APPEA Code of Environmental Practice.

114 Inspectors

- (1) In accordance with Section 118 of the Act, the Minister may, by instrument in writing, appoint a person to be an Inspector for the purposes of the Act and Schedule.

115 Issue of Notices by Inspectors

- (1) Where an Inspector considers -
 - (a) that any plant is in an unsafe condition; or
 - (b) that work being carried out under a geothermal title –
 - (i) is contravening a provision of the Act, these directions, or any, additional conditions imposed by the Director;
 - (ii) is unsafe; or
 - (iii) is not in accordance with good operations practice,

the Inspector may, by a notice in writing, refer the matter to the relevant Operator.
- (2) The notice shall specify a day by which the Operator shall report to an Inspector on the action taken in relation to the notice.
- (3) An Inspector may –

- (a) direct that no further work may be carried out until the matter referred to in the notice is remedied, or until an Inspector otherwise approves the resumption of work;
 - (b) give directions as to the measures to be taken to remedy the matter referred to in the notice, which directions may include –
 - (i) that plant be repaired or replaced;
 - (ii) that any part of the environment be restored or rehabilitated;
 - (iii) that a particular work-practice be altered or discontinued.
- (4) An Operator shall not contravene, or fail to comply with, a notice given under this requirement.

116 Interference with Public Utilities

An operation shall not be carried out in a manner that interferes with a road, railway or pipeline, a telephone or power line or cable, a radio or television mast, or any other form of public utility or facility.

117 Identification and Protection of Wells

The Operator shall, after the release of a rig, ensure that the well is adequately fenced and clearly marked in a permanent manner with the field name and well number.

118 Containment of Geofluids

- (1) If any geofluids are obtained from land comprised in a geothermal title it shall be confined to tanks, gas holders, pipes or other receptacles in accordance with good operations practice.
- (2) Except as a temporary measure during an emergency, geofluids shall not be placed or kept in an earthen pit.

PART II SAFETY

DIVISION 1 - General Requirements

~~201~~ ~~General Duty of Care~~

~~An Operator and any contractor shall in respect of an operation, so far as is reasonably practicable—~~

~~(a) provide and maintain—~~

~~(i) a safe working environment;~~

~~(ii) safe systems of work;~~

~~(iii) plant and substances in a safe condition; and~~

~~(b) provide to any person carrying out work as part of that operation such information, instruction and training as are reasonably necessary to ensure that the person is safe from injury or risk to health.~~

202 Safety Manual

- (1) Operations shall not be carried out unless subject to and in accordance with an approved safety manual.
- (2) In the event of and to the extent of any conflict or inconsistency between an approved safety manual and the requirements of this Schedule, these requirements shall prevail.

203 Emergency Response Manual

- (1) Operations shall not be carried out unless there is an approved Emergency Response Manual which sets out the procedures to be followed and actions to be taken, and identifies the persons to be responsible for following these procedures and taking these actions, in the event of an emergency arising during the operations by reason of –
 - (a) the escape or ignition of geofluids
 - (b) serious injury to a person;
 - (c) a vessel or aircraft sending a distress signal;
 - (d) any other emergency associated with the operations,
- (2) In the event of an emergency of a kind identified in sub-clause (1) arising, operations shall, where applicable, be carried out in accordance with the procedure set out in the emergency response manual referred to in sub-clause (1).

204 Updating of Manuals

- (1) In this clause “the manuals” means the manuals referred to in clauses 202 and 203.
- (2) The manuals shall be updated as required by changed circumstances or as required by the Director.
- (3) Any update of the manuals shall be submitted to the Director for approval.

205 Availability of Manuals and Directions

The manuals referred to in clauses 202 and 203 and all relevant Directions shall be readily available at all times to every person involved in the operation.

206 Instruction of Personnel

- (1) The manuals referred to in clauses 202 and 203, and this Schedule of Requirements shall be drawn to the attention of every person on or before the date on which that person commences to be engaged in or concerned with the conduct of operations or the execution of works in the geothermal title area, and each such person shall be advised to comply with the provisions of the manuals and Requirements issued pursuant to Section 95 of the Act.
- (2) Any amendments to the manuals referred to in clauses 202 and 203 and any amendments to the Schedule of Requirements shall be drawn to the attention of every person engaged in or concerned with the conduct of operations or the execution of works in the licence area and each such person will be advised to comply with the provisions of the amended manuals and these requirements.
- (3) On entering the work place for the first time each person shall be required to sign an acknowledgment that the manuals referred to in clauses 202 and 203, and the Schedule of Requirements (and any amendments thereto) have been drawn to their attention and that they have been advised to comply with the provisions of the Manuals and these Requirements.
- (4) Records of all acknowledgments shall be held by the Operator for a period of not less than 6 years and made available for inspection by the Director or an Inspector.

207 Admittance to an Operational Site

A person who is not engaged in or directly concerned with the carrying on of operations or the execution of works in the permit area shall not be admitted to a site without approval by the “person-in-charge” and, where such approval has been granted, that person shall be given all necessary instructions required by

the manuals referred to in clauses 202 and 203 and relevant Requirements on or before the arrival of that person at the site.

208 Person-in-Charge

- (1) The name of the person-in-charge of any operation shall be clearly displayed on the site of that operation.
- (2) The person-in-charge shall ensure to the best of his ability that all personnel in his charge know and comply with all relevant Requirements and safety procedures applicable to the operations under his control.

~~209 Communications~~

- ~~(1) Radio or telephone communication facilities shall be maintained at each main operational location, main tank farm, main pumping station and main compressor station and shall also be available in connection with any well drilling, or servicing operations.~~
- ~~(2) All communication equipment shall be maintained in good working condition.~~

~~210 Protective Equipment~~

~~A licensee shall cause the following personal protective safety equipment to be provided for and used by all persons engaged in or concerned with operations being carried out or works being executed in relation to a geothermal title area:~~

- ~~(a) adequate personal clothing where the nature of the work involves or is likely to involve the risk of body injury from geofluids or environmental conditions. Adequate clothing is considered to be a minimum of short sleeved shirt and full leg length trousers or coveralls, of natural fibres or such other fibres that will resist burning;~~
- ~~(b) a safety helmet conforming to Australian Standards AS 1800 and AS 1801, Industrial Safety Helmets, where the nature of the work involves or is likely to involve the risk of head injury;~~
- ~~(c) eye protection in accordance with Australian Standards AS 1336, 1337 and 1338, Industrial Eye Protection, where the nature of the work involves or is likely to involve the risk of eye injury;~~
- ~~(d) gloves in accordance with Australian Standard 2161 where the nature of the work involves or is likely to involve handling equipment or material which may cause hand injury;~~
- ~~(e) safety boots conforming to Australian Standard AS 2210, Safety Footwear, where the nature of the work involves or is likely to involve the risk of foot injury;~~

- ~~(f) — hearing protection devices conforming to Australian Standard AS 1270, Hearing Protection Devices, where the nature of work involves or is likely to involve excessive noise;~~
- ~~(g) — breathing apparatus conforming to Australian Standards 1715 and 1716 where the nature of the work involves or is likely to involve the breathing of hazardous gases or fumes; and~~
- ~~(h) — appropriate dust masks where the nature of work involves or is likely to involve excessive dust.~~

~~211 — Responsibility for Wearing Equipment~~

~~A person who has been provided with any protective equipment referred to in Clause 210 shall wear the equipment at all times while working under conditions which require it to be provided.~~

~~212 — Noise Levels~~

~~A person shall not be exposed to noise levels in excess of those described within the Code of Practice “Managing Noise at Workplaces” issued in 2002 by the Department of Consumer and Employment Protection of Western Australia.~~

~~213 — Radio-active Substances~~

- ~~(1) The Director shall be informed, in writing, whenever it is proposed to use any radioactive material, other than in routine well logging or non-destructive testing.~~
- ~~(2) A person engaged in the handling of, or the use of, radiation apparatus or radio-active substances shall comply with the requirements of all applicable radiation control legislation.~~

214 ————— **Notices**

~~(1) The following notices (or a combination of those notices) shall, and where appropriate, be displayed in connection with the carrying out of an operation:~~

~~DANGER — EXTREMELY HOT FLUIDS
DANGER — HYDROGEN SULPHIDE GAS
DANGER — FLAMMABLE GAS
DANGER — EXPLOSIVES IN USE
DANGER — FLAMMABLE LIQUIDS
DANGER — MACHINERY UNDER REPAIR
SAFETY HELMET AREA
SAFETY FOOTWEAR AREA
EYE PROTECTION AREA
NO SMOKING OR NAKED LIGHTS
KEEP OUT~~

~~(2) Other notices shall be displayed, as the circumstances of a particular case may require, in relation to other conditions that are hazardous to the health or safety of any person, or to the safety of any property.~~

~~(3) A notice required under this clause shall comply with the appropriate requirements of Australian Standard 1319 “Rules for the Design and use of Safety Signs for the Occupational Environment”.~~

215 **Fire-fighting Equipment**

(1) Adequate fire-fighting equipment shall be provided at each drilling and workover rig used in connection with well servicing, at any tank farm, and at any other location where there is a substantial risk of the occurrence of fire, or a substantial risk of serious damage in the event of a fire.

(2) Every employee shall be trained in the effective use of the equipment that the employee might be required to use in the event of a fire.

(3) All fire-fighting equipment shall be maintained in good working condition.

216 ————— **Medical**

~~(1) An adequate first aid kit shall be maintained at each drilling rig, well testing operation, production facility, construction site and camp.~~

~~(2) A suitable stretcher shall be available at each drilling rig.~~

~~(3) The Operator shall ensure —~~

- ~~(a) — that a person who is suitably trained in first aid (and who is holding a current qualification) is always available to attend at short notice in the event that a person is injured during an operation;~~
 - ~~(b) — that adequate procedures are in place for the treatment and transportation of any person who may need medical attention; and~~
 - ~~(c) — that each main operational location has a suitable room that may be used as a first aid room and that is always stocked with an adequate supply of instruments, bandages, dressings, drugs, splints, stretchers, oxygen breathing apparatus and other items for the provision of first aid.~~
- ~~(4) — Where a seriously injured person must be transported, the person shall, where practicable, be accompanied by at least one other person (other than the person in charge of the vehicle in which the injured person is being transported) who is suitably trained in first aid.~~
- ~~(5) — For the purpose of determining whether a first aid kit, a procedure or first aid supplies are adequate for the purposes of this regulation, consideration shall be given to the nature and extent of the risks associated with the operation being carried out at the relevant time, and generally to the surrounding circumstances.~~

~~217~~ — ~~Contaminated Atmosphere~~

- ~~(1) — Where, in a work area —~~
- ~~(a) — there is, or may be, an insufficient supply of oxygen; or~~
 - ~~(b) — gases, fumes or vapours exist, or may exist, that could involve a risk to health,~~
- ~~the relevant requirements of AS 1715 “Selection, Use and Maintenance of Respiratory Protective Devices” and AS 1716 “Respiratory Protective Devices” shall be observed.~~
- ~~(2) — Where a person is required to work in a confined space, the work shall be carried out in accordance with AS 2865 “Safe Working in a Confined Space”.~~
- ~~(3) — Where there is a reasonable risk of the occurrence of hydrogen sulphide in an operation, self contained respiratory apparatus shall be kept available.~~
- ~~(4) — Where an abrasive blasting operation involves the use of materials containing free silica, the person carrying out the operation, and any person in the vicinity who could be at risk shall wear a full face shield that provides a filtered supply of clean air.~~

218 — Ropes and Slings

Unless otherwise approved -

- ~~(1) — steel wire ropes shall comply with SAA AS 1656, Steel Ropes (other than for Mining Purposes);~~
- ~~(2) — lifting slings made of wire rope shall comply with SAA AS 1666, Wire Rope Slings;~~
- ~~(3) — lifting slings made of natural or synthetic fibre shall comply with SAA AS 1380, Fibre Rope Slings;~~
- ~~(4) — all wire rope slings shall be marked with identification and safe working load information as detailed in Section 9 of SAA AS 1666, Wire Rope Slings;~~
- ~~(5) — all steel wire ropes and slings shall be regularly inspected and maintained in accordance with SAA ASMB1, Steel Wire Rope Manual and an approved maintenance and inspection program, and shall be used in accordance with SAA AS 1666, Wire Rope Slings and SAA AS MB1, Steel Wire Rope Manual; and~~
- ~~(6) — Slings and wire ropes under dynamic loading shall have approved end fittings complying with SAA AS MB1, Steel Wire Rope Manual. Bull dog and fist grips shall not to be used as a means of fastening in this application.~~

219 — Safe Use of Equipment

- ~~(1) — A person (other than a supervisor) shall not use or operate any machinery or equipment without authorisation.~~
- ~~(2) — A person shall, before starting any machinery or equipment, ensure that all guards are in place and that no person will be endangered by starting the machinery or equipment.~~
- ~~(3) — Where a person uses or operates any tool, machine or equipment, or carries out any work, process or procedure, in circumstances where the safety of the person, or of another, could be endangered, the person shall be competent to perform the work.~~

~~(4) — All —~~

- ~~(a) — belts, ropes or chains used for the transmission of power (except where operated from a cathead);~~
- ~~(b) — gears, sprockets, clutches, cranks and connecting rods; and~~
- ~~(c) — other exposed moving parts of machinery (except catheads and any parts that are supported or driven by a rotary table),~~

~~shall be enclosed or screened or railed off so as to prevent them from coming into contact with any person while in use.~~

~~(5) — Any pinch point on a machine, and the cutting edge of any power tool, shall, where practicable, be guarded so to prevent accidental contact with any person.~~

~~(6) — An abrasive wheel shall, where practicable, be guarded in a way that restrains flying debris and limits the spread of dust and other material produced through the use of the wheel.~~

~~(7) — Any power-driven machinery shall be fitted with a stopping device located within easy reach of the operator.~~

~~(8) — A machine that is not driven by its own motor shall be equipped with a clutch or other mechanism that enables the machine to be stopped quickly and safely.~~

~~(9) — A starting control on a machine shall be designed and located so as to minimise the risk of accidental starting.~~

~~220 — Machinery Maintenance~~

~~A person shall not clean, oil or otherwise maintain any machinery in circumstances where the person may come into contact with a moving part of the machinery.~~

~~221 — Repair of Plant~~

~~A person shall not carry out repairs on any plant until proper procedures for the safe repair of the plant have been established.~~

~~222 — Mobile Equipment~~

~~(1) — Mobile equipment —~~

- ~~(a) — shall be maintained in good condition;~~
- ~~(b) — shall be used by a competent person; and~~

- ~~(c) — shall not be abused, or used for a purpose that is inconsistent with the purpose for which it is designed.~~
- ~~(2) — Where mobile equipment must be used in a situation where there is a danger of falling objects, the equipment shall be fitted with an overhead guard to protect the driver or operator of the equipment.~~
- ~~(3) — Where mobile equipment uses a hoisting or hauling rope or chain and the driver or operator of the equipment could be injured if that tackle broke under tension, the equipment shall be fitted with a guard to protect the operator from that risk.~~
- ~~(4) — A cab or similar compartment on any mobile equipment shall be sufficiently ventilated.~~
- ~~(5) — Vehicle and load shall comply with relevant Road Traffic Regulations governing load widths and wide load warning signs.~~
- ~~(6) — The operator of any mobile equipment is responsible for the safe operation of that equipment.~~
- ~~(7) — Where the vision of the operator of any mobile equipment is obstructed, the operator shall be assisted by a signal person.~~
- ~~(8) — Vehicles driven during hours of darkness shall be appropriately equipped and maintained.~~

~~223 — Hours of Vehicle Operation~~

- ~~(1) — A person shall not drive or operate a motor vehicle that weighs more than 4,500 kilograms when unladen for a period of five consecutive hours without having, at the end of that period, a rest period of at least 30 minutes.~~
- ~~(2) — A person shall not drive or operate a motor vehicle that weighs more than 4,500 kilograms when unladen for a period of 16 consecutive hours (including rest periods taken under sub-clause (1)) without having, at the end of that period, a rest period of at least 8 hours.~~

~~224 — Transportation of Persons by Vehicle~~

- ~~(1) — There shall be a seat for each passenger being carried by a vehicle.~~
- ~~(2) — A seat shall be securely fastened to the floor or to a wall of the vehicle and the rear ends of a longitudinal seat shall be constructed so that a person sitting on it cannot slide, or be jolted, off the vehicle.~~
- ~~(3) — Each seat in a vehicle (other than a licensed bus) shall be fitted with an appropriate seat belt.~~

- ~~(4) — A passenger shall not, while in or on a vehicle that is in motion, sit with legs hanging over a side of the vehicle.~~
- ~~(5) — If a passenger on a vehicle is located in an enclosed compartment separated from the driver—~~
- ~~(a) — appropriate ventilation shall be provided to prevent contamination of air in the compartment;~~
 - ~~(b) — the compartment shall be fitted with an interior light; and~~
 - ~~(c) — the passenger shall be able to communicate with the driver at any time.~~
- ~~(6) — Where the rear end of the body of a vehicle is open, the exhaust outlet shall be located at the side of the vehicle.~~
- ~~(7) — Any equipment or material that is being carried on or in a vehicle shall be properly secured.~~

~~225 — Cranes~~

~~The design, maintenance and operation of a crane, shall be in accordance with Australian Standard 1418 “SAA Crane Code”.~~

~~226 — Crane Driver Competence~~

~~A crane shall not be driven except by a person holding a valid certificate of competence issued by an approved authority.~~

~~227 — Crane, Hoist and Winch Loads~~

- ~~(1) — A person shall not remain or ride on a load or part of a load that is being raised or lowered.~~
- ~~(2) — A tag line, of sufficient length to ensure that the person controlling the tag line cannot be struck by a movement of the load, shall be used in appropriate cases.~~
- ~~(3) — A person shall not work, stand or pass under a suspended load, between a winch mechanism and a load that is being winched, or in an area where a person could be injured if a winch line or winch mechanism failed.~~

- ~~(4) The load on a winch mechanism, line, sling, hook or fitting shall not exceed the safe working load recommended by the manufacturer, and any such equipment shall only be used in a manner that is consistent with its design capabilities.~~
- ~~(5) A winch mechanism, line, sling, hook or fitting shall be inspected by the person who is to operate or use it before the commencement of work, and at such other times as the nature of the particular work may reasonably require.~~
- ~~(6) If an item is found to be deficient on an inspection under sub-clause (5), it shall not be used again until it is repaired or otherwise returned to good working order.~~

~~228~~ **Waterborne Operations**

~~The master of any vessel used in an operation shall ensure that the vessel is in a sound and sea-worthy condition.~~

229 Debris Constituting a Fire Hazard

- (1) Any rubbish, debris or oil refuse that could constitute a fire hazard shall be removed or drained to a safe distance of not less than 45m away from all buildings, installations, wells and production facilities.
- (2) The rubbish, debris or oil refuse shall then be burned or otherwise disposed of in a proper manner that is consistent with the applicable Code of Environmental Practice.

230 Siting of Geofluid Disposal Pit

- (1) A disposal pit or the end of a discharge line shall not be located within 45m of a well, separator, below-ground pipeline, storage tank or temporary production facility, or within 45m of an unprotected source of flammable vapour.
- (2) A disposal pit or the end of a discharge line shall not be located within 100 metres of an established road, railway, above ground pipeline or building.
- (3) A discharge line shall be securely staked down.
- (4) All permanent discharge installations shall be fenced off and an approved method, acceptable to an Inspector, shall be provided to commence discharging.
- (5) A disposal pit shall be sited and constructed so as not to create a hazard to property or natural vegetation.

- (6) Proper supervision and fire fighting equipment and materials shall be available to meet an emergency during disposal operations.
- (7) In the case of encountering petroleum, where a flare could be extinguished during production or testing operations, provision shall be made for relighting the flare by a device acceptable to an Inspector.

231 Temporary Well Site Production Equipment

- (1) A fire or unprotected flame or any flame-type equipment, shall not be located within 45m of a well or unprotected source of flammable vapour.
- (2) Subject to sub-clause (3), a fuel storage tank shall not be located within 45m of a well.
- (3) The Director may allow the distance referred to in sub-clause (2) to be reduced, but the distance shall not be less than 25m.
- (4) Flame-type equipment shall not be placed within 25m of a process vessel unless the equipment is fitted with an adequate flame arrester and flame-proofed air inlets.
- (5) A pressure vessel containing flammable material shall not be placed within 25m of a well, or within 25m of other different flammable materials.
- (6) This requirement does not prevent the grouping of similar items of production equipment.

232 Siting of Production Equipment

- (1) All permanent production equipment and process vessels shall be sited and spaced after taking into account Australian Standard 2430 "Classification of Hazardous Areas" and details of those sittings and spacings shall be furnished to the Director or an Inspector on request.
- (2) Production equipment shall not be located within 45m of an established road, railway or building.
- (3) Surface hydrocarbon storage tanks, other than temporary well-test tanks, shall be enclosed by a main bund wall and the bund capacity shall be greater than the volume of the largest tank or group of interconnected tanks (whichever is the greater), plus 10 per cent of the combined volume of all other tanks within the bund.
- (4) Subject to sub-clause (5), a tank shall not be located within 45m of a well.
- (5) The Director may allow the distance referred to in sub-clause (4) to be reduced, but the distance shall not be less than 25m.

- (6) A pressure vessel shall not be located within a bund surrounding a tank or group of tanks.

233 Venting of Flammable Vapours

- (1) All process vessels, instruments and equipment from which flammable vapour may be emitted shall be safely vented to the atmosphere.
- (2) All vent lines and drain lines from process vessels or storage tanks that are vented to flare pits or flare stacks shall be fitted with flame arresters or other similar safety devices.

234 Smoking, Naked Lights, Welding and Cutting

- (1) Smoking, open fires and naked lights shall not be allowed within 45m of a well or plant which has a source of flammable vapour.
- (2) Except during gas drilling operations, a well-site geological unit that contains unprotected electrical or gas fuelled equipment may be located within 45m, but not less than 15m, from plant referred to in Sub-Clause (1), subject to the following conditions -
 - (a) that the only drilling operation during which the use of unprotected electrical or gas-fuelled equipment may occur is a routine non-hazardous drilling operation; and
 - (b) that any electrical or gas fuel circuit to which unprotected equipment is connected is controlled by a master switch or shut-off that is readily accessible to any person in the unit to enable the supply of fuel to be immediately shut-off in an emergency.
- (3) This Requirement does not prevent the use of welding or flame cutting plant within the 45m distance referred to in sub-clause (1), provided that the use of the equipment in such a situation has been authorized by the person responsible for the particular operation and that all reasonable precautions have been taken to ensure the safety of persons in the area.

Internal Combustion Engines

- (1) An internal combustion engine shall not be used within 30 metres of a well or other source of flammable vapour unless it is fitted with an effective exhaust muffler, spark arrester and, where appropriate, a brushless alternator.
- (2) An internal combustion engine shall not be used within 15m of a well or other source of flammable vapour unless -
 - (a) it is of the compression ignition type;
 - (b) the engine and all ancillary components have been rendered spark proof;
 - (c) all operating electrical components are flame proof;
 - (d) the end of an exhaust pipe shall not be closer than 6 metres to the vertical centre line of the well, projected upwards and shall be directed away from the well; and
 - (e) exhaust pipes, manifolds and turbo chargers are insulated, cooled or otherwise constructed or protected so as to prevent the ignition of flammable vapours or liquids.
- (3) A diesel engine shall not be used within 15m of a well or other source of flammable vapour unless it is fitted with one of the following -
 - (a) air intake shut-off valves operated by engine overspeed, remote controlled from the rig floor, or some other means approved in writing by the Director;
 - (b) a system that injects inert gas into the cylinders and is operated by engine overspeed, remote controlled from the rig floor, or some other means approved in writing by the Director;
 - (c) a duct that allows air for the engine to be obtained at least 15m from the source of flammable vapour; or
 - (d) some other device approved by, and operated under such conditions as may be stipulated in writing by, the Director.
- (4) Where an engine is fitted with a system referred to in Sub-Clause (3)(a) or (b), the engine and its shut-down system shall be tested as follows:
 - (a) during the drilling of a well, the engines shall be tested before the cement plug at the shoe of the surface casing is drilled out, and thereafter at intervals not exceeding seven days;

- (b) during any workover, the engines shall be tested before operations are commenced on the well, and thereafter at intervals not exceeding seven days; and
 - (c) where the engine is part of a production facility, the engine shall be tested at the commencement of operations and thereafter at intervals not exceeding one month.
- (5) Where a test is carried out under sub-clause (4), a record of the test shall be made in the tour report or in a log book kept in accordance with clause 239 (8).
- (6) Sub-clauses (1), (2) and (3) do not prevent the use of a diesel engine on a permanent well pumping installation where -
- (a) the engine is at least 6m from the well;
 - (b) any hydrocarbons encountered are minimal; and
 - (c) the shut-in wellhead pressure of each producing formation in the well does not exceed 5,000 kPa.

236 ————— **Fuel Tanks**

- ~~(1) No liquid fuel shall be stored within 45m of a well unless it is stored in an operating storage tank.~~
- ~~(2) The drainage from any place where liquid fuel is stored shall be in a direction away from any well within the immediate vicinity.~~

237 ————— **Lighting**

- ~~(1) A work site shall have adequate lighting while work is in progress.~~
- ~~(2) The following minimum illumination (measured 500mm above the relevant location) shall be maintained while work is in progress:~~
 - ~~(a) 50 lux on main working floors and mast platforms, inside buildings, and around all working machinery;~~
 - ~~(b) 25 lux at a wellhead, processing plant or tank, on stairways, and at all other work areas.~~

~~238~~ — ~~Temporary Cessation of any Operation~~

~~Prior to, or immediately following, the cessation or temporary shut down of any drilling, workover or production operation, each well and all plant shall be made safe in accordance with good oilfield practice.~~

239 ~~General Safety Precautions~~

- ~~(1) — A person shall not use any unsafe plant or substance.~~
- ~~(2) — All hand tools shall be kept in good state of repair and neatly stored when not in use.~~
- ~~(3) — All fixed platforms, drilling and workover rig working floors, walkways, stairways and ladders shall conform with Australian Standard 1657 “SAA Code for Fixed Platforms, Walkways, Stairways and Ladders”.~~
- ~~(4) — Notwithstanding Sub-Clause (3), chain or wire rope may be used as a handrail on mud tank walkways provided that the chain or wire rope is kept taut.~~
- ~~(5) — All buildings and other structures, machinery and equipment shall be of sufficient size and strength to withstand safely loads placed on them and to perform safely the functions for which they are designed.~~
- (6) All buildings and other structures, machinery and equipment shall be inspected on a regular basis and a proper record of the inspection, signed by the person who conducted the inspection, shall be entered in the tour report or a log book or in some other similar system.
- ~~(7) — Where any unsafe or defective plant or unsafe situation is found on an inspection under Sub-Clause (6) —~~
 - ~~(a) — an appropriate note shall be included in the report referred to in that sub-clause;~~
 - ~~(b) — action shall be taken to repair or replace the plant, or to rectify the situation; and~~
 - ~~(c) — once that action is taken, a further record shall be made.~~
- (8) a log book, or similar system, shall be kept at each operational site or the central field office.
- (9) Any information recorded in a tour report or log book (or other system) shall be accurate and include all relevant dates and times.

- (10) An inspector is, at any reasonable time, entitled to inspect, and to take extracts from, or make copies of, any tour report or log book (or other documentation).

~~240~~ ~~Working In Elevated Places~~

- ~~(1) A person shall not, while climbing a ladder, mast or structure (other than by way of a stairway or ramp) carry any tool, equipment or materials unless the person's hands are free at all times to secure a safe hold.~~
- ~~(2) Tools, equipment or materials shall not be carried or placed in a mast or derrick unless they are immediately required for use, and in that case proper steps shall be taken to prevent them from falling.~~
- ~~(3) Where a person is engaged in manual activity at a height of more than 4.5m while standing on a ladder or ginpole, or in a mast, the person shall use a safety belt.~~

DIVISION 2 – Safe Drilling Practices

241 – Raising and Lowering Masts and Derricks

- (1) ~~Before a mast is raised or lowered, or a derrick is erected or dismantled, a thorough inspection shall be carried out by the toolpusher or some other competent person to ensure, as far as is practicable, that the mast or derrick, and all its components are in a condition that will allow the operation to be carried out without undue danger to any person..~~
- (2) ~~A toolpusher or other competent person shall be in charge of an operation to raise or lower a mast or to erect or dismantle a derrick.~~
- (3) ~~Work shall not be carried out below, or in the immediate vicinity of, a mast while it is being raised or lowered.~~
- (4) ~~A mast or derrick that is of a height exceeding 30m above ground level shall be fitted with a mast head light and that light shall be kept illuminated during the hours of darkness.~~
- (5) ~~Where the safe bearing capacity of soils on the location would otherwise be exceeded, supplemental footings shall be provided to distribute concentrated loads from the mast or mast mounts, or from the derrick, to the ground.~~
- (6) ~~Supplemental footings provided under Sub-Clause (5) shall be capable of distributing the loads that are anticipated during drilling operations, and, in the case of a mast, while raising and lowering the mast.~~
- (7) ~~A well site shall be graded and adequately drained.~~
- (8) ~~The guying system for a mast shall be constructed and installed in accordance with the manufacturer's specifications and guy line ground anchors shall be adequate taking into account the anticipated service and soil conditions.~~
- (9) ~~A mast or derrick shall not be operated in excess of its rated capacity.~~

- (10) ~~Before any structural changes or repairs are made to a mast or derrick, the manufacturer or a competent engineer shall be consulted about the effects of the proposed changes or repairs and the materials and welding techniques that should be used.~~
- (11) ~~The Director shall be advised in writing whenever significant changes or repairs are made to a mast.~~
- (12) ~~Loose tools and materials shall be removed from a mast or derrick before it is raised, lowered or operated.~~

242 — Platforms and Handrails

~~Before —~~

- (a) ~~drilling operations are commenced; or~~
- (b) ~~a well is re-entered for repairs, workover or any other reason,~~

~~all necessary platforms, stairways and handrails shall be installed and securely fastened in position.~~

243 — Drawworks Controls

- (1) ~~An automatic cathead shall have a separate control, or be fitted with a locking device that will prevent accidental engagement.~~
- (2) ~~Where practicable, a drawworks master control lever shall be locked with a locking device when the drawworks is not in use.~~
- (3) ~~A person operating the drawworks controls shall, before engaging the controls, ensure that all persons are warned and clear of the area.~~
- (4) ~~All drawworks controls shall be properly marked.~~

244 — Making-up and Breaking Joints

- (1) ~~A person shall not snap up a tool joint with an automatic cathead or pipe joint breaker of the jaw clutch type that automatically disengages its clutch at the completion of a fixed cycle or travel.~~
- (2) ~~A person shall not use the rotary table for the final making-up or initial breaking-out of a pipe connection.~~
- (3) ~~The spinning chain shall not be handled over the rotary table while it is in motion.~~

245 — Protection of People at Work

- (1) — Every floor, platform, walkway, ladder and runway shall be kept reasonably clear of obstructions and free from drilling fluids, mud, oil, grease, ice or other substances that might, by reason of their slippery nature, create a risk to safety or prevent or hinder the escape of persons in an emergency.
- (2) — Appropriate protection from inclement weather shall be provided for a person working on a drilling rig.

246 — Ancillary Escape

- (1) — Each drilling rig mast or derrick shall be equipped with a specially rigged and securely anchored escape line that is attached to the mast or derrick and that provides a ready and convenient means of escape for each person from the principal working platform.
- (2) — The escape line shall be installed before drilling out of the surface casing.
- (3) — The escape line shall be 12mm diameter wire rope and shall be tightened to a tension that allows a person descending on the line to touch clear ground between 6m to 8m from the ground anchor.
- (4) — The minimum length of the escape line shall be double the vertical distance between the ground and the point at which it is attached to the mast.
- (5) — An escape line shall be equipped with a safety buggy or other approved device fitted with a suitable handbrake and that buggy or device shall be kept at the principal working platform and be readily accessible at all times.
- (6) — A person shall not ride the safety buggy or other device from the mast or derrick except in an emergency or for training purposes.
- (7) — The safety buggy or other device shall be given running and static tests on or near the ground before being hoisted to the working platform, and static tests shall be carried out at intervals not exceeding one week thereafter to ensure that it is in good working condition.

247 — Stabbing Boards

- (1) — A stabbing board may be used as a temporary working platform when work cannot be performed from a fixed platform.
- (2) — The stabbing board shall not be less than 300 millimetres in width and of sufficient strength to support safely any load that it will be expected to bear.

- ~~(3) — Each end of the stabbing board shall project at least 300 millimetres beyond the inner edges of the derrick girts or other supports on which it is placed.~~
- ~~(4) — Each end of the stabbing board shall be secured to the derrick girts or other supports on which it is placed by wire rope, chain or equivalent safety fastenings.~~
- ~~(5) — A safety fastening shall be so secured as to prevent the stabbing board from being shifted longitudinally from its supports, and to prevent either end from falling should it be broken, and should also have sufficient slack—
 - ~~(a) — to permit the stabbing board to be tipped up on its edge should the travelling block, or the equipment attached to it or suspended from it, catch under the board in its upward travel; and~~
 - ~~(b) — to permit the board to move away from the travelling block, or the equipment attached to it or suspended from it, should the block swing sideways against the board.~~~~
- ~~(6) — The supports on each side of a derrick of which a stabbing board is placed shall be at the same elevation and the stabbing board shall be rigid and horizontal.~~
- ~~(7) — A stabbing board constructed of wood shall be made of a suitable wood free from knots, and shall be reinforced.~~

~~248~~ — **Safety Belts**

- ~~(1) — Where a person is required to work above the rig floor in a place which is not completely protected by a handrail that complies with these regulations, the person shall be supplied with, and shall use, a safety belt.~~
- ~~(2) — The rope attached to the safety belt shall be manila rope that is at least 25mm in diameter, or other rope of equal strength, and shall be securely fastened to the mast or derrick, or to a running line stretched across the mast or derrick approximately 2m above the platform on which the person is working.~~
- ~~(3) — A running line may also be manila rope that is at least 25mm in diameter, or other rope of equal strength.~~
- ~~(4) — Safety belt lines and fittings shall be inspected daily and kept in good repair.~~

249 ————— **Riding Hoisting Equipment**

- (1) ————— A person shall not ride the travelling block, hook or elevators, or slide down a pipe or kelly hose, or any other line other than the escape line.
- (2) ————— A person shall not ride, or be required or permitted to ride the catline. A man riding winch line may be used to perform duties that cannot be performed by a person from an inside mast platform, stabbing board, or the mast floor, and then only by sitting in a riding belt securely attached to the winchline, or in another equally safe and secure carriage.
- (3) ————— When a person is being raised by the winch line, the driller and another person authorised by the driller or toolpusher shall be responsible for operating the man riding winch, and each shall remain there until the person returns to the rig floor.

250 ————— **Weight Indicator**

- (1) ————— A drilling rig shall be equipped with a reliable weight indicator that allows the driller to determine the hook load being carried on the drilling line.
- (2) ————— When the indicator is hung above the floor, a safety wire rope shall be attached to the indicator and secured to the derrick or mast.

251 ————— **Brakes**

- (1) ————— Where practicable, the brakes on the drawworks of a drilling rig shall be tested by each driller when he comes on tour, and shall also be examined at least once each week by the toolpusher, or a person acting on his behalf.
- (2) ————— Except when operating under automatic feed control, a brake shall not be left unattended unless it is chained down.

252 ————— **Rotary Table**

- (1) ————— A rotary table shall not be engaged until all persons and materials are clear.
- (2) ————— Hoses, lines or chains shall not be handled or used near a rotary table while the rotary table is in motion.
- (3) ————— When visibility on a rig floor is obscured, a person shall not work on the rig floor while the rotary table is in motion.

253 Racked Pipes

- (1) The rig floor shall be kept drained of all fluids draining from drill pipe, collars or tubing racked in the mast or derrick.
- (2) When drill pipe, collars, tubing, casing, rods or other similar equipment are racked in a mast or derrick, they shall be secured at or near the top ends so as to prevent them from falling out of or across the mast or derrick.

254 Mud Savers

- (1) A mud saver that prevents liquid from being sprayed on a person at work and that prevents, as far as is practicable, liquids from being spilled on the floor shall be used on drill pipe and tubing at the point above the rig floor level where a wet joint or stand of pipe or tubing is being unscrewed and disconnected.
- (2) The mud saver shall have a hose or pipe connected to the bottom of it that conveys the saved liquid to an appropriate place away from the rig floor, walkways and passageways.

255 Rig Safety

- (1) An exit shall be provided—
 - (a) on at least two sides of the rig floor; and
 - (b) from the dog house direct to the outside, away from the rig floor.
- (2) An exit door shall open away from the rig floor and shall not be held closed with a lock or an outside latch while a person is working on the rig floor.
- (3) Access and egress to and from a floor, platform, walkway or runway that is 600 mm or more above or below ground level, or an adjacent floor level, shall be by means of a stairway, ramp, walkway or runway that is at least 600 mm wide and placed at the most convenient and safe location for operational purposes.
- (4) Except for an opening that is necessary for the installation or use of equipment, each rig floor shall completely cover—
 - (a) the area within the perimeter of the mast or derrick substructure; and
 - (b) any work area that extends beyond the perimeter of the mast or derrick substructure.

- ~~(5) — Unless occupied by equipment or immediately required for the purposes of work, an opening in a rig floor shall be covered or guarded so as to prevent a person from stepping into or falling through the opening.~~
- ~~(6) — A rig floor, walkway or engine room floor shall not be used as a storage platform for equipment or material that is not required for immediate or emergency use.~~
- ~~(7) — Sub clause (6) does not apply if the equipment or material is properly racked or stored so as to avoid congestion on work areas or walkways.~~
- ~~(8) — The substructure in the vicinity of the wellhead shall be adequately ventilated.~~

~~256~~ — **Mast and Derrick Platforms**

- ~~(1) — Each mast and derrick shall have a landing platform that is level with, and extends to, the derrickman's principal working platform.~~
- ~~(2) — Each outside mast and derrick platform —~~
 - ~~(a) — shall be at least 500 mm in width; and~~
 - ~~(b) — shall have openings not exceeding 750mm by 750mm for persons climbing the mast or derrick ladders.~~
- ~~(3) — The outer edges of each outside mast platform, derrick platform and ladder offset platform shall be equipped with a handrail and toeboard that conform to Australian Standard 1657.~~
- ~~(4) — Unless the mast is equipped with a climbing device that allows the person climbing the ladder full access to the platform and that is acceptable to the Director, where an outside mast platform, derrick platform or ladder offset platform terminates on one side only of a mast or derrick ladder, the handrail on the outer edge of the platform shall continue over the end of the platform and in front of the climbing face of the ladder to a point not less than 50mm and not more than 75mm beyond the further stile of the ladder and then inward to the mast or derrick.~~
- ~~(5) — A derrick that is constructed for drilling or equipped for re-drilling, and any mast, shall, if the design of the derrick or mast so provides, be equipped with a platform at the crown -~~
 - ~~(a) — that is fitted at its outer edges with a handrail and toeboard that conform with Australian Standard 1657; and~~
 - ~~(b) — that is, so far as may be practicable, at least 500mm wide.~~

257 — **Inside Derrick Platforms**

~~A platform erected on the inside of a derrick (except a stabbing board) shall completely cover the space from the working edge of the platform back to the legs and girts of the derrick.~~

258 — **Ladders and Stairways**

~~(1) — Unless fitted with a climbing device, that is acceptable to the Director, each mast or derrick ladder shall be fitted with ladder platforms at appropriate levels.~~

~~(2) — Where practicable, a stairway shall be installed beside the "V" door ramp so as to extend from the pipe racks to the rig floor (although such a stairway need only be fitted with one handrail on the outer side).~~

259 — **Hoisting and Other Wire Ropes**

~~(1) — A rotary drilling line service record shall be kept on each rotary drilling rig and shall be produced to an Inspector on request.~~

~~(2) — The record shall be in a form that accords with the provisions of API RP 9B, "Recommended Practice of Application, Care and Use of Wire Rope for Oil Field Service", or such other form as may be acceptable to the Director.~~

~~(3) — The minimum design factors for a hoisting line that is used for drilling, servicing or abandoning operations shall conform to API RP 9B.~~

~~(4) — A person who is operating hoisting equipment shall use care to minimize shocks or impact, and to minimize acceleration or deceleration of the load.~~

~~(5) — Where part of a hoisting line is unserviceable, unsafe or damaged (because of worn or broken wires, corrosion, or otherwise), it shall be replaced.~~

~~(6) — A sandline may be spliced but a rotary hoisting line may not be spliced.~~

~~(7) — The end of a hoisting line wound on a drum shall be fastened to the drum in a manner acceptable to an Inspector and there shall be a sufficient number of wraps of line on the drum to prevent undue strain being placed on the fastening to the drum.~~

~~(8) — In a line cutting or slipping operation —~~

~~(a) — the blocks shall be laid down on the rig floor; or~~

- (b) ~~a wire rope not less than 25mm in diameter shall be used to support the blocks and each end of the line shall be secured with at least three wire rope clamps, or with some other securing device acceptable to an Inspector.~~
- (9) ~~When a load is placed on a hoisting line, the line shall not, at any point between its point of contact with the hoist drum and the dead line anchor, be in direct contact with a mast member or any equipment or material in the mast (other than a member or equipment that is designed for such contact).~~
- (10) ~~Where a hoisting line can swing and make contact with a mast member or equipment, or any material in the mast, a stabilizer or stabilizers shall be used to prevent the line from making that contact (but a stabilizer shall not grip the line so tightly as to prevent free movement of the line through the stabilizer).~~
- (11) ~~Metal parts of a line spooler or line stabilizer shall be guarded against contact with the hoist line by rubber or other suitable non-metallie material.~~
- (12) ~~An overhead sheave or pulley on which a line, line spooler or counterweight rope runs shall be securely fastened to its support.~~
- (13) ~~All rope drums, sheaves and rollers shall be generally in accordance with the recommendations of the rope suppliers.~~

260 — Travelling Blocks

- (1) ~~The sheaves of a travelling block shall have heavy guards to prevent accidental contact by any person or thing with the sheaves, or with the nip point where the hoisting lines run onto and off the sheaves.~~
- (2) ~~Travelling block sheave guards shall be securely fastened to the travelling block to prevent the guards from becoming accidentally displaced.~~
- (3) ~~A travelling block hook, and any hook or open link suspended from a travelling block, to which an elevator, elevator link, swivel bail or other equipment is either directly or indirectly attached (including the open hooks or links of such attached equipment) shall be equipped with a safety latch or device that will provide a completely and securely closed hook or link.~~
- (4) ~~Every travelling block, travelling block hook, elevator and elevator link and other similar travelling equipment shall, as far as practicable, be free of projecting bolts, nuts, pins or other parts that may catch clothing or foul the mast or derrick members, or other equipment or material in the mast or derrick.~~

~~(5) A drilling rig shall be fitted with a device, acceptable to an Inspector, that disengages the power to the hoisting drum and applies the brake to prevent the travelling block from coming into contact with the crown structure.~~

~~261~~ — ~~Catheads~~

~~(1) When a rope or line is being manually operated on a cathead, a competent person shall be at the controls of the cathead.~~

~~(2) A cathead shall be immediately stopped in an emergency.~~

~~(3) A cathead on which a rope or line is manually operated shall be equipped with a device that keeps the first full encircling wrap of rope from contact with the pinch point of the on-running rope at its first point of contact with the cathead.~~

~~(4) The device referred to in Sub-Clause (3) —~~

~~(a) shall have its edge nearest the friction surface of the cathead fitted and adjusted to within 6.5mm of the friction surface of the cathead; and~~

~~(b) shall be maintained free of sharp edges that may cut or materially abrade a rope used on the cathead.~~

~~(5) The friction surface and flanges of a cathead on which a rope or line is manually operated shall be as smooth as practicable.~~

~~(6) The friction surface of a cathead shall have a uniform diameter across its entire width between the inner and outer flanges, to a tolerance of no more than 4.5mm.~~

~~(7) The key way and projecting key on a cathead shall be covered with a smooth thimble or plate.~~

~~(8) When a rope or line is being used on a cathead, the excess rope or line shall be coiled or spooled in a safe place.~~

~~(9) All other ropes and lines shall be placed so as not to come into contact with the cathead, or any rope or line in use on the cathead.~~

~~(10) A rope or line operated manually on a cathead shall not be left unattended while wrapped on, or in contact with, a cathead, other than when the power has been disconnected and steps taken to prevent the power being turned on.~~

~~(11) Except for specially spliced ropes that are used for spinning casing, a rope splice or a frayed part of a rope or line shall not be operated manually on the friction surface of a cathead.~~

- (12) ~~Only manila rope may be used on a cathead.~~
- (13) ~~A headache post or guard shall be in position whenever a line is being run on or off a cathead at an angle that brings the line near to the person at the controls.~~

~~262~~ ~~Guards~~

- (1) ~~Heavy metal guards that are strong enough to withstand the shock of a sprocket chain breaking shall be installed on both sides of the drawworks so as to guard all drive sprockets and chains and to prevent a person from coming into contact with the moving parts.~~
- (2) ~~The guard for the low gear drum drive sprockets and chain next to the driller shall be flanged with a steel plate so that if a chain breaks, it cannot strike the driller or foul the brake lever.~~
- (3) ~~The pinion shaft, couplings and bevel gears on a chain drive rotary table shall be guarded with strong metal shields.~~
- (4) ~~The tops and outer sides of the hoisting drum brake flanges shall be guarded by a steel plate that is at least 3mm thick, and that guard shall be—~~
- ~~(a) installed with a minimum working clearance from the brake; and~~
 - ~~(b) securely bolted in place.~~
- (5) ~~A rotary table shall have at least 125mm of its top outer surface covered in a rough-tread metal plate guard—~~
- ~~(a) that is at least 9.5mm thick; and~~
 - ~~(b) that has welded to its outer edge a circular metal band or skirt that is at least 6.3mm thick and that extends down to cover completely the exposed rotating side of the rotary table (including the pinion gear).~~
- (6) ~~A substantial guard of plate or expanded mesh shall be installed in front of the hoisting drum so as to reduce the area of the opening in the drum enclosure to the minimum area necessary for the equipment in use.~~

263 ————— **Pressure Hoses**

~~All mud system and cementing pressure hoses and all swivel joints on steel pressure hoses shall be equipped with—~~

- ~~(1) — clamps and wire rope that has a diameter of 15mm; or~~
- ~~(2) — a fastening of equal strength that is secured to adequate supports to prevent dangerous movement in the case of coupling, near coupling hose or swivel joint failure.~~

264 ————— **Crown Blocks**

- ~~(1) — The crown block assembly shall be securely fastened to the crown block beams so that no part of the assembly can be accidentally dislodged under normal operating conditions.~~
- ~~(2) — No opening between the beams, the main supporting members or the framework of a crown block may be large enough to allow a person to fall through.~~
- ~~(3) — Where bumper blocks are attached to the underside of crown beams, the blocks shall have a safety cable that is fastened along their full length, and to the mast or derrick at both ends.~~

265 ————— **Counter-balance**

- ~~(1) — Where a tong or other counter balance is not fully encased or run in permanent guides with positive protection against over-run, the counter balance shall be positioned and constrained so that it does not create a hazard to any person.~~
- ~~(2) — The wire rope connecting a tong to a counter weight shall be at least 12.5mm in diameter.~~

266 ————— **Pipe Racks and Pipe Handling**

- ~~(1) — Pipe racks—~~
 - ~~(a) — shall be designed and constructed so as to support the load that they shall bear;~~
 - ~~(b) — shall be set level; and~~
 - ~~(c) — shall be firm.~~
- ~~(2) — End stops shall be fitted and used to ensure that pipes and other tubular or round items cannot accidentally roll off a pipe rack.~~

- ~~(3) — When pipe is being transferred between pipe racks, catwalks or vehicles, temporary supports or skids shall be constructed, placed and anchored so as to support adequately the particular load.~~
- ~~(4) — Spacers shall be used between the layers of pipe or other items on a pipe rack.~~
- ~~(5) — When pipe or other similar items are being loaded, unloaded or otherwise moved, a person shall not be on top of the load, or between the load and any pipe rack.~~
- ~~(6) — Where pipe is to be loaded, unloaded or otherwise moved manually it shall be handled from the pipe ends.~~
- ~~(7) — Where pipe is to be loaded on to, or unloaded from, a truck, the pipe shall be loaded or unloaded by one layer at a time.~~
- ~~(8) — Lifting subs shall be used during the transfer of drill collars, tubular goods or other similar items that do not have shoulders or recesses from the "V" door ramp into the mast.~~
- ~~(9) — If a trailer is to be used for transporting pipe, or as a pipe rack during drilling, servicing or pipe salvaging operations, the trailer shall have a guard fitted over the full length of each side of the trailer.~~
- ~~(10) — A guard that is fitted to a trailer side shall be so designed and constructed as to ensure that when pipe is being hoisted into the mast, the lower end of the pipe will not roll off the trailer and, when the pipe trailer deck is higher than the rotary table, the inward swing of the lower end of the collar shall be controlled by a snubbing line or similar means.~~

~~267~~ — **Pipe Hooks**

~~Where a pipe or rod hook is used above the rig floor, the hook shall be secured to the mast or derrick so as to prevent the hook from falling.~~

~~268~~ — **Back-up Posts and Tong Safety Lines**

- ~~(1) — A rotary tong shall be attached to a back-up post, or to the mast, by means of two wire rope safety lines that are at least 15.5mm in diameter and that are secured at each end by at least three wire rope clamps, or equivalent fittings (except that on a single stand portable mast that uses a small tong, the safety lines need only be 12.5mm in diameter).~~
- ~~(2) — Each fitting used to attach a wire rope safety line to the back-up post or mast shall have a breaking strength equal to, or greater than, the combined breaking strength of all the wire ropes attached to it.~~
- ~~(3) — A wire rope safety line shall not be secured to an object that may cause damage to, or be damaged by, the wire rope.~~

269 ————— **Pressure Relief Valves**

- (1) — A pressure relief device shall be installed on each power driven mud pump and there shall not be a valve between the pump and the pressure relief device.
- (2) — The pressure relief device shall be set to discharge at a pressure that is less than the manufacturer's recommended maximum working pressure of the pump and connecting pipes and fittings.
- (3) — A shear pin used in a pressure relief device shall be of a design and strength specified by the manufacturer.
- (4) — A guard shall be placed around the shear pin and spindle on a pressure relief device.
- (5) — Any fluid discharged from a pressure relief device shall be directed to a place where it will not endanger any person.
- (6) — There shall not be a valve of any kind in the discharge opening of a pressure relief device, or in the discharge pipe connected to it.
- (7) — The piping connected to the pressure side and discharge side of a pressure relief device shall not be smaller than the normal pipe size openings on the pressure relief device.
- (8) — The piping on the discharge side of a pressure relief device shall be securely tied down and self draining.
- (9) — All pipes and fittings connected to or used in mud circulating systems shall have a rating sufficient to withstand the maximum working pressure of the pump.

DIVISION 3 - Air and Gas Drilling

~~270~~ — ~~General~~

- ~~(1) — This division applies whenever air or gas is used as a circulating fluid in rotary drilling operations.~~
- ~~(2) — If there is an inconsistency between a regulation under this Division and another regulation, the regulation under this Division prevails to the extent of the inconsistency.~~
- ~~(3) — The person in charge of an operation that uses air or gas drilling shall, especially in relation to wellhead design and blowout prevention equipment, take into account the recommendation of API RP 54, “Oil and Gas Well Drilling and Servicing Operations”, Section 17.~~

~~271~~ — ~~Warning Notices~~

~~A warning notice that complies with Clause 214 and that states —~~

~~**CAUTION — GAS DRILLING IN PROGRESS;**
or
CAUTION — AIR DRILLING IN PROGRESS;
(whichever is applicable)~~

~~shall be displayed at each entrance to a drilling location where gas or air drilling is being carried out.~~

~~272~~ — ~~Delivery Lines~~

- ~~(1) — (a) Where gas drilling is carried out and the high pressure delivery line is not protected by burial, warning notices that comply with Clause 214 and that state —~~

~~**CAUTION — HIGH PRESSURE GAS**~~

~~shall be displayed to indicate the route of the line.~~

- ~~(b) — Where extreme hot geofluids returns to the surface the line should be protected against any burning and a warning notice that complies with clause 214 and that state —~~

~~**CAUTION — EXTREMELY HOT FLUIDS**~~

~~shall be displayed to indicate the route of the line.~~

- ~~(2) — The main air or gas supply line shall be positioned so that —~~
 - ~~(a) — it does not interfere with vehicular access to the drilling location;
and~~

- ~~(b) — it does not cross areas on the drilling location frequented by vehicles and persons.~~
- ~~(3) — A check valve shall be installed on the delivery line at or near the standpipe.~~
- ~~(4) — Each pipe and fitting connected to or used in an air, gas or hot fluid circulating system shall have a rating sufficient to withstand the maximum supply pressure.~~
- ~~(5) — All pressure lines shall be properly restrained and all hoses fitted with clamps and wire rope that is at least 15mm in diameter, or a fastening of equal strength, and secured to adequate supports to prevent dangerous movement in the event of coupling, or near coupling hose, failure.~~

~~273 — Vehicles~~

~~Any vehicle that is not required for an operation on a well shall be kept at least 45m from the well.~~

~~274 — Fire Precautions~~

- ~~(1) — At least four 9 litre and one 68 litre dry chemical type extinguishers (or their equivalent) shall be kept at strategic locations on or around the rig.~~
- ~~(2) — At least one water or mud nozzle shall be permanently mounted under the substructure and pointed directly at the rotating blowout preventor assembly.~~
- ~~(3) — The line between the high pressure pump and the nozzle shall be controlled by a single valve situated at the pump end of the line.~~
- ~~(4) — If the mud pump is not to be kept in continuous operation, pump starting controls shall be installed both at the pump and at the driller's control panel.~~

~~275 — Siting of Compressors~~

- ~~(1) — Where practicable compressors and boosters used in drilling shall be located at least 45m from the rig; and~~
- ~~(2) — Oil and diesel fuel shall be stored at least 15m from the compressors.~~

276 ————— **High Pressure Lines and Manifolds**

- (1) — The entire gas or air supply system shall be designed to meet maximum expected operating pressures.
- (2) — Any main valve in the supply system that may need to be closed in the event of an emergency shall be rapid acting, clearly labelled and readily accessible.

277 ————— **Bloocy Line**

- (1) — A bloocy or bleed off line shall extend at least 45m from the wellhead and shall, where practicable, be laid downwind of the well, or at right angles to the direction of the prevailing wind.
- (2) — Any geological sample catcher installed on a bloocy line shall be designed to avoid flashback and to protect persons from dust.
- (3) — A space shall be cleared around the end of a bloocy or bleed off line so as to prevent the ignition of vegetation.
- (4) — Where dust discharged by drilling causes a risk to the health of any person, water shall be injected into the bloocy line to suppress the dust.
- (5) — Any gas discharged from a bloocy or bleed off line shall be immediately ignited by a safe and reliable method acceptable to an Inspector.

278 ————— **Substructure Ventilation**

The rig substructure shall be kept adequately ventilated (either by natural ventilation or by fans).

279 ————— **Supply Line Valves**

- (1) — The main air or gas supply line shall have at least two valves,
- (2) — One valve shall be on the standpipe and accessible from the rig floor, and the other shall be at least 25m from the well.
- (3) — In the case of high pressure gas drilling, the main supply line shall have a valve at least 45m before the place where the first item of major equipment is connected to the delivery line (but in this case the second valve referred to in Sub-Clause (2) need not be fitted).

280 ————— **Drillstring Float**

A downhole float valve shall be fitted in the drilling string and both top and bottom kelly cocks shall be installed.

~~281~~ ——— **Lighting**

~~Flood lighting shall be used to illuminate the whole operational area around a rig.~~

282 Mud Stocks

Mud stocks that are adequate to fill the hole and to establish and maintain circulation -

- (a) shall be kept on location; and
- (b) shall be kept in good condition by frequent mixing so that the mud can be used at any time.

~~283~~ ——— **Gas Detection Equipment**

~~A portable gas detector, of a kind acceptable to an Inspector, shall be available for use at a drilling location where air or gas drilling is in progress.~~

DIVISION 4 - Reporting

284 Reporting of Death and Serious Injury

- (1) In this clause and clauses 286 and 287 a reference to a serious injury is a reference to an injury to a person as a result of which the person requires immediate attention by a medical practitioner.
- (2) Where a person dies or suffers a serious injury -
 - (a) a report of the death or injury shall forthwith be made to an Inspector; and
 - (b) a report in writing giving full particulars of the death or injury and all related circumstances shall be transmitted to the Director as soon as practicable after the occurrence of the death or injury.

~~285 Written Records of Death and Injury~~

- ~~(1) A record in an approved form and as far as practicable in accordance with SAA AS 1885.1 Workplace Injury and Disease Recording Standard, shall be kept of each death and injury, whether or not a serious injury, suffered by a person including -
 - ~~(a) particulars of the death or injury;~~
 - ~~(b) the circumstances leading to the occurrence of the death or injury; and~~
 - ~~(c) the treatment (if any) given to the injured person and the name of each medical practitioner (if any) consulted in relation to the injury.~~~~
- ~~(2) A copy of the records, referred to in sub-clause (1), of injuries shall be transmitted to the Director not later than the 15th day of each month covering injuries that occurred during the last preceding calendar month together with such statistical analyses and injury indices as the Director determines.~~

286 Reporting Serious Damage

- (1) In this clause and clauses 287 and 288 a reference to serious damage to property is a reference to -
 - (a) the loss or destruction of property with a value exceeding \$20,000;
 - (b) damage to property, the repair of which damage would cost an amount exceeding \$20,000; and

- (c) the loss or destruction of any property, or any damage to property, by reason of which any person dies or suffers serious injury.
- (2) Where serious damage to property occurs -
- (a) a report of each occurrence shall forthwith be made to an Inspector; and
 - (b) a report in writing of such occurrence shall be submitted to the Director as soon as practicable specifying -
 - (i) the date, time and place of such occurrence;
 - (ii) particulars of the damage;
 - (iii) the events so far as they are known or suspected that caused or contributed to the occurrence;
 - (iv) particulars of repairs carried out or proposed to be carried out to damaged property; and
 - (v) measures taken, or to be taken, to prevent a possible recurrence.

287 Reporting a Potentially Hazardous Event

Where an event occurs which is not in the normal or ordinary course of a particular operation and which is professionally considered to be likely to cause injury to a person or serious damage to property, but such event does not cause injury or serious damage -

- (a) a report of the event shall forthwith be made to an Inspector; and
- (b) a report in writing of the event shall be submitted to the Director as soon as practicable specifying measures taken or to be taken to prevent a possible recurrence.

288 Reporting Damage Less Than \$20,000

Where damage to property occurs which is not serious damage to property but which result is a significant loss of structural integrity or load bearing capacity in the property damaged or results in some other significant unsafe condition -

- (a) a report of the damage shall forthwith be made to an Inspector; and
- (b) a report in writing of the damage shall be submitted to the Director as soon as practicable specifying measures taken or to be taken to prevent a possible recurrence.

289

Reporting Escape or Ignition of Geofluids and Other Material

- (1) A report shall forthwith be made to an Inspector upon the occurrence of -
 - (a) a significant spillage of geofluids which is in excess of 500 litres.
- (2) A report in writing of any occurrence referred to in sub-clause (1) shall be submitted to the Director as soon as practicable after the occurrence specifying -
 - (a) the date, time and place of the occurrence;
 - (b) the estimated quantity of liquid that escaped or burned;
 - (c) particulars of damage caused by the escape or ignition;
 - (d) the events so far as they are known or suspected that caused or contributed to the escape or ignition;
 - (e) particulars of methods used to control the escape or ignition;
 - (f) particulars of methods used or proposed to be used to repair property damaged by the escape or ignition; and
 - (g) measures taken, or to be taken, to prevent a possible recurrence of the escape or ignition.

290

Reporting of Emergencies

Any emergency shall be reported forthwith to an Inspector.

291

Reporting Radiation Monitoring

~~Where, as a requirement of any relevant legislation relating to radiation control, a report is prepared in respect of the monitoring of radiation in connection with geothermal operations, a copy of that report shall be sent to the Director as soon as practicable.~~

PART III – ELECTRICAL INSTALLATIONS

301 — Wiring Rules

- (1) — Subject to the requirements of any act or any other directions, all electric wiring, earthing and installations used in geothermal exploration or production operations shall comply with the relevant requirements of Australian Standard 3000 “SAA Wiring Rules”.
- (2) — Hazardous locations on or about a drilling rig, and during well servicing or well testing operations, in relation to which the provisions of Class 1, Zone 1 and Class 1, Zone 2 of the SAA Wiring Rules will apply are as follows:
 - (a) — Class 1, Zone 1: all areas classified as division 1 in A.P.I. RP500B “Classification of Areas for Electrical Installations at Drilling Rigs and Production Facilities on Land and on Marine Fixed and Mobile Platforms”;
 - (b) — Class 1, Zone 2: the total mast space, all areas within 15m of a well or temporary production facility, and all areas within 12m of an area classified as Class 1, Zone 1, other than mud tanks containing oil free drilling fluids downstream of the shale shaker tank (in which case the Class 1, Zone 2 classification will apply for a distance of 3m from the top of such tanks).
- (3) — Within an area classified as Class 1, Zone 2 under sub-clause (2) —
 - (a) — the Director may approve the use of electrical equipment of vapour tight construction that is totally enclosed and gasketted to exclude or resist the passage of vapour; and
 - (b) — all electrical connectors (such as plugs and sockets) shall have a seal, acceptable to an Inspector, to prevent inadvertent breaking of any electrical circuit that is capable of producing arcing or sparking.
- (4) — Hazardous locations for all production and processing operations shall be defined in accordance with Australian Standard 2430 “Classification of Hazardous Areas” and details of those locations shall be furnished to the Director or an Inspector on request.

~~302~~ ~~Electrical Generators, Alternators and Motors~~

- ~~(1) An electrical generator or alternator that does not have approved flame protection shall not be operated within 15m of a well or production facility, or within 12m of an area classified as Class 1, Zone 1.~~
- ~~(2) Unless the motor has approved flame protection, cooling or purge air for an electric motor shall not be drawn from a point within 15m of a well or production facility, or within 12m of an area classified as Class 1, Zone 1.~~
- ~~(3) Sub-clauses (1) and (2) do not prevent the use of a brushless electric alternator, generator or motor on a permanent well pumping installation where—
 - ~~(a) the alternator, generator or motor is not within 6m of the well;~~
 - ~~(b) the shut in wellhead pressure of each producing formation in the well does not exceed 5MPa.~~~~

~~303~~ ~~Portable Electrical Systems Equipment~~

- ~~(1) Where practicable, a flexible electrical cable that is designed for hard use and has inherent resistance to dampness and petroleum products shall be used on any portable electrical equipment.~~
- ~~(2) A power cable shall be installed in a manner that protects it from abrasion, traffic, burns, cuts and other damage.~~
- ~~(3) If multicore Tough Rubber Sheathed (TRS) or Thermoplastic Sheathed (TPS) cable is installed, it shall, unless it is protected on account of its particular location be guarded up to a height of at least 3m above the ground or floor.~~
- ~~(4) A cable shall not lie unprotected on the ground or floor.~~
- ~~(5) Unless a cable is buried or protected, it shall be installed—
 - ~~(a) in areas used by vehicles—at least 5.5m clear of the ground;~~
 - ~~(b) in all other areas—at least 3m clear of the ground or floor.~~~~
- ~~(6) A damaged cable shall not be used.~~
- ~~(7) Makeshift wiring, components or installations shall not be used in, or in connection with, any portable electrical equipment or cable.~~

304 — Protection of Circuits

- (1) — An electrical circuit shall be protected against overload and short circuit.
- (2) — A circuit above extra low voltage shall be protected against the leakage of current to earth by an earth leakage circuit breaker as follows:
 - (a) — the earth leakage circuit breaker shall comply with the requirements of Australian Standard 3190 “Approval and Test Specifications for Current Operated (Core Balance) Earth-Leakage Devices” and operate when the earth leakage current exceeds the following values:
 - (i) — 1 ampere on low voltage and medium voltage circuits;
 - (ii) — 30 milliamperes on circuits supplying portable and hand held tools and apparatus;
 - (b) — the operating time for the trip of an earth leakage fault shall be within the time stated by the manufacturer of the earth leakage circuit breaker;and
 - (c) — the earth leakage circuit breaker shall be set up so as to allow it to be tested.

305 — Earthing and Lightning Protection

- (1) — The structure of a permanent facility for handling flammable liquids shall be protected against lightning in accordance with Australian Standard 1768 “Manual on Lightning Protection”, or some other code or practice acceptable to the Director.
- (2) — The structure of a drilling rig need not be so protected against lightning if it is earthed so that the maximum resistance to earth does not exceed 10 ohms.

306 — Control of Static Electricity

- (1) — The metal parts of a drilling rig shall be earthed for the safe removal of static electricity so that the maximum resistance to earth does not exceed 10 ohms.
- (2) — The well casing may be used for earthing if it is electrically connected to all tools and other equipment used in the particular operation.

- ~~(3) Any metallic part of a container of flammable liquid shall be safely earthed to remove static electricity, but shall not be connected so as to form part of the earth circuit.~~
- ~~(4) If flammable liquids or finely divided flammable or explosive materials are transferred from one container to another, the containers shall be in firm contact with each other or be continuously electrically bonded so as to prevent the accumulation of static charges.~~
- ~~(5) Where a tank, mixer or processing vessel holds flammable liquids or flammable or explosive materials, it shall be electrically bonded and earthed.~~

307 ————— Portable Lights and Tools

- ~~(1) Subject to sub-clause (2), an electrically operated hand-held light or tool used in a hazardous location shall be of vapour-tight or flame proof construction.~~
- ~~(2) An Operator may, if reasonable steps are taken to ensure that an area is safe, authorise the use of a hand-held tool that has a general purpose enclosure.~~
- ~~(3) The voltage of a hand held light or tool shall not exceed 250 volts.~~
- ~~(4) An electrically operated hand-held tool shall be tested and examined at regular intervals by a competent electrical worker, and any defect shall be immediately corrected.~~
- ~~(5) A record shall be kept of the results of any such test or examination.~~

308 ————— Maintenance, Repairs or Alterations

- ~~(1) Maintenance, repairs or alterations shall not be carried out on a conductor or apparatus while it is live with electricity.~~
- ~~(2) A switch that is opened to permit work to be carried out on lines or equipment shall be prominently marked to warn against closure.~~
- ~~(3) Except for a hand held light or tool, electrical equipment shall be disconnected from the power supply before it is moved.~~
- ~~(4) The rewiring and replacement of a fuse may be carried out by a person authorised to do that work but shall then be checked as soon as possible by a licensed electrical worker.~~
- ~~(5) Electrical welding return conductors shall be connected directly to the equipment being welded, as well as to the earthing system of the rig or other plant.~~

309 ——— Electric Shock

~~Instructions on the procedure and treatment to be followed in case of electric shock shall be kept prominently displayed on the rig floor or in the driller's doghouse, in any generator house and at any other appropriate place.~~

310 ——— Electricians and Inspection of Electrical Equipment

~~(1) — A person shall not —~~

~~(a) — install an electrical apparatus or circuit;~~

~~(b) — carry out maintenance work on an electrical apparatus or cables (including any automatic or other protective device);~~

~~(c) — carry out an examination of, or test on, an electrical apparatus or cable;~~

~~(d) — carry out a test of the effectiveness of the earthing system, the continuity of the earthing conductors or the condition of any electrical insulation; or~~

~~(e) — carry out an examination of, or test on, an electrical apparatus or cable that has been newly connected, or dismantled and reconnected in a new position,~~

~~unless the person is a licenced electrical worker.~~

~~(2) — Sub-clauses (1) (c), (d) and (e) do not apply to apparatus carrying voltages not exceeding extra low voltage, or apparatus in, and ancillary to, wireline logging units, mud logging units and electronically equipped production control and gauging installations.~~

~~(3) — The tests and examinations referred to in sub-clause (1) shall be carried out —~~

~~(a) — in the case of drilling rigs — prior to spudding in each well, and thereafter at intervals not exceeding two months;~~

~~(b) — in the case of temporary installations — at intervals not exceeding two months; and~~

~~(c) — in the case of permanent installations — at intervals not exceeding one year.~~

- (4) — ~~The results of a test or examination shall be recorded by the electrical worker on the tour report or in a log book, and shall be countersigned by the person supervising the work on the particular site.~~
- (5) — ~~The Director may require that other, or additional, tests or examinations be carried out.~~

311 — Control Equipment

- (1) — ~~Any switch gear or starting equipment for a motor shall be fitted with an isolating switch interlocked with the cover of the equipment so as to prevent the opening or removal of the cover while the equipment is live or the switch is in the closed position.~~
- (2) — ~~If the live part of any equipment is exposed when the equipment is opened, that part of the equipment shall be effectively screened to the satisfaction of an Inspector.~~

PART IV — EXPLOSIVES

DIVISION 1 — Drilling and Workover Operations

401 — General

~~This division applies to the use of explosives in down-hole perforating, back-off shooting, the explosive cutting of tubulars or junk, fracturing, wire-line sampling, wire-line formation testing or other operations of a similar nature in connection with geothermal exploration or production operations.~~

402 — Competence of Workers

~~The use, handling, preparation of firing of explosives under this Division and the disposal of any resultant misfires, shall be done by or under the direct supervision of a competent wireline engineer.~~

403 — Safety of Rig Personnel

~~(1) During an operation involving loading, connecting, running or recovering a tool charged with explosives, only work that is essential to the immediate operation may take place on the rig floor, and only those persons who are required to carry out that work may remain on the rig floor.~~

~~(2) All other persons shall remain at a safe distance.~~

404 — Radio Transmitters

~~Except in the case of an emergency, any radio transmitter that is not a safe distance away from the firing circuit of a tool that is charged with explosives and ready to run in the hole (as determined in accordance with Australian Standard 2187 “SAA Explosives Code”) shall be shut down until the tool has been retrieved and the firing cable and detonator disconnected.~~

405 — Operations During Darkness

~~(1) A down-hole perforating operation shall only be commenced during daylight hours.~~

~~(2) A perforating tool shall not be loaded on the well site during the hours of darkness unless adequate lighting is available.~~

406 — Shut-down of Electrical Generating Plant

~~Insofar as may be appropriate, the generating plant shall be shut down while a tool that is charged with explosives is being prepared for running in the hole or is connected to the firing cable, and until the tool has been run to at least 30 metres below ground level (except where the operation is being carried out during the hours of darkness, in which case adequate lighting must be provided to permit the safe handling of the explosive tool).~~

407 — Earth-return Electrical Systems

~~An earth return electrical system shall not be used on a rig or close to a well during an operation involving the use of explosives.~~

408 — Adverse Weather Conditions

~~Work involving the use of explosives shall not be undertaken during a thunderstorm, or dust storm, high winds or heavy rains.~~

409 — Safety on the Floor

~~Before a down hole shooting operation commences, the rig floor at the site shall be washed clean and unnecessary obstructions removed.~~

410 — Earthing

~~Before firing circuits are completed—~~

~~(1) — the drilling rig and any ancillary equipment, the service unit and cabin, and any other equipment used for or in connection with perforating or any other down hole shooting operation, shall be efficiently earthed; and~~

~~(2) — electrical bonding shall be established between the equipment and the wellhead.~~

DIVISION 2 Geophysical and Geological Surveys

411 — General

~~This division applies to the use of explosives in geophysical and geological surveys.~~

412 — Storage and Transportation

~~(1) The storage, transportation and use of explosives in or in connection with a geothermal operation shall be carried out in accordance with the appropriate requirements of Australian Standard 2187 "SAA Explosives Code".~~

~~(2) A person is, in relation to the storage, transportation or use of explosives in or in connection with a geothermal operation, required to comply not only with the provisions of this Division but also with any relevant requirement of the *Dangerous Goods Safety Act 2004* (and the regulations made under that Act).~~

413 — Explosives not be exposed to heat, etc.

~~Explosives (including detonators) must be stored in a cool and dry place and must not be subjected to shock when transported.~~

414 — Competence of Workers

~~(1) Subject to sub-clause (2), a person shall not use, handle, prepare or fire explosives unless the person –~~

~~(a) is the holder of an approved shortfirers permit;~~

~~or~~

~~(b) is working under the direct supervision of the holder of an approved shortfirers permit, is of or over the age of 18 years, and has good command of the English language.~~

~~(2) Sub-clause (1) does not apply in relation to the use of explosives in wells.~~

415 — Nature of Responsibilities

~~Where explosives are being used in, or in connection with, an operation, all persons who handle, charge or fire the explosives are jointly and severally responsible for the proper handling, charging and firing of the explosives.~~

~~416~~ — ~~Magazines~~

- ~~(1) — Except as approved by an inspector, a detonator (other than an electric detonator) must not be issued from a magazine for use unless it is attached to a fuse.~~
- ~~(2) — The space immediately around and above a magazine shall be cleared of all flammable material to a distance of at least 4m.~~
- ~~(3) — A magazine shall be placed under the charge of a competent person who will be responsible for—
 - ~~(a) — keeping the keys to the magazine;~~
 - ~~(b) — ensuring the safe storage of explosives contained in the magazine; and~~
 - ~~(c) — keeping a proper record of the explosives that come into, or are issued from, the magazine.~~~~
- ~~(4) — An inspector is entitled to inspect a magazine, and the record required under sub-clause (3)(c), at any time.~~

~~417~~ — ~~Use of Secure Containers~~

- ~~(1) — Any explosives that are taken out of a magazine shall be kept in a strong and secure container acceptable to an inspector.~~
- ~~(2) — The container shall be made entirely of wood, fibre, bronze, brass, rubber or other minimum sparking material.~~
- ~~(3) — A separate container shall be used for carrying detonators.~~
- ~~(4) — Explosives shall be taken directly to the place where they are to be used.~~

~~418~~ — ~~Surplus Explosives~~

~~A person shall not draw from a magazine more explosives than required for the particular day, and in the event of a surplus the explosives shall (except as otherwise provided by the *Dangerous Goods Safety Act 2004* be returned to the magazine on the same day.~~

419 Handling, Preparing and Firing

- (1) A person who is involved in preparing or firing explosives shall wear a safety helmet.
- (2) A case containing explosives may only be opened with a tool that is made entirely of wood, fibre, brass, rubber or other minimum-sparking material.
- (3) Except in the case of a primer or as otherwise approved by an inspector, a person must not remove the wrapper around a cartridge of nitroglycerine explosives that is to be used to charge a hole.
- (4) A cartridge of explosives may only be cut on a wooden surface by the use of a knife that is made of minimum-sparking material and that has a fixed blade.
- (5) A shot hole shall be of sufficient diameter to accommodate the explosives that are to be loaded into it.
- (6) A tamping rod or stick shall be of wood, or other material acceptable to an inspector.
- (7) Explosives may be pressed or stamped into a hole that has been prepared for them, but shall not be rammed or unduly forced.
- (8) A weight used to load a shot hole shall be of non-ferrous material.

420 Warnings

The person who is supervising a firing operation shall, before any explosives are fired –

- (1) ensure that all persons in the vicinity are safe, and warn them of the firing; and
- (2) place a person at each approach to the area to ensure that no person goes within an unsafe distance of the explosion.

421 Use of Safety Fuses

- (1) A safety fuse shall not be used for firing a charge in seismic prospecting.
- (2) Where more than one fuse is being ignited, the igniter shall be of a kind acceptable to an inspector.
- (3) Reasonable precautions shall be taken to ensure that no portion of a burning igniter can fall into a hole or on to a fuse.

~~(4) — At least two persons shall, where practicable, count the number of exploding shots.~~

~~(5) — A misfire will be taken to have occurred if the count is lower than the number of fuses lit, or if there is disagreement over the count.~~

~~422~~ — **Electric Firing**

~~(1) — Where an exploder is used to fire shots electrically, the exploder, cables and wires shall be appropriate to the conditions under which the firing is being carried out.~~

~~(2) — Detonator wires shall be unravelled or unwound slowly when a charge is being lowered into a hole by the wires.~~

~~(3) — Detonator wires shall not be unravelled or unwound by being thrown or dragged on the ground.~~

~~(4) — Detonator wires shall not be anchored to a ground conductor.~~

~~(5) — An exploder shall be fitted with a locking device that prevents the circuit from being completed.~~

~~(6) — There shall only be one key issued for use with a particular exploder and that key must be kept by the person who is supervising the firing operations.~~

~~(7) — An exploder shall be kept locked while it is not in use.~~

~~(8) — An exploder shall not be connected to the firing cable until all other steps preparatory to the firing of the shot have been completed, and all persons are in a safe place.~~

~~(9) — Immediately before firing, the electrical circuit shall be tested by a circuit test of a kind acceptable to an inspector.~~

~~(10) — Immediately after firing, the locking device shall be used to break the firing circuit, and then the firing cables must be disconnected from the exploder and short-circuited by twisting together the ends of the wires.~~

~~(11) — Detonators shall not be fired by battery power except through an exploder that is acceptable to an inspector and that provides at least 100 volts.~~

~~(12) — All equipment and apparatus shall be maintained in good working order and tested at such intervals as may be necessary to ensure their constant efficiency.~~

~~(13) — Any equipment or apparatus found to be damaged, inefficient or otherwise unsuitable shall be immediately withdrawn from use.~~

~~423 — Short-circuiting of Detonators and Firing Cables~~

~~(1) — Where shots are to be fired electrically, the detonator lead wires shall remain short-circuited until the explosive charge is at the required firing position in the shot hole.~~

~~(2) — The firing cable leading to the explosive charge shall also remain short-circuited while the leads from the detonators or the extension are being connected to each other and to the firing cable.~~

~~(3) — The short circuit in the firing cable shall not be opened until all persons are in a safe place and then it may only be opened in a location where a premature explosion would not harm the person opening it.~~

~~(4) — After a shot has been fired, the firing cables shall immediately be removed from the firing switch and short-circuited.~~

~~424 — Precautions Against Stray Currents~~

~~Where shots are fired electrically in the vicinity of power or lighting cables, the firing cables shall not be allowed to come into contact with, or be affected by, any leakage of electrical current from those cables.~~

~~425 — Use of Power Cables~~

~~(1) — Electric power cables may only be used for firing shots if the firing switch is of a kind acceptable to an inspector.~~

~~(2) — The firing switch shall be constructed and protected so as to ensure a total absence of current or current leakage into the firing cables leading to the point where the wires from the charges to be fired are connected (other than when the switch is closed).~~

~~(3) — A firing switch shall be placed in a fixed locked box on its own, the box being constructed so that it cannot be shut unless the switch is in the safety position.~~

~~(4) — There shall only be one key issued for a particular box and that key must be kept by the person who is supervising the firing operations.~~

~~(5) — The firing switch shall not be connected to the power source until all persons are in a safe place.~~

- ~~(6) — Electrical contact shall not be made to the firing switch until immediately before firing.~~
- ~~(7) — Electrical contact shall be disconnected immediately after firing, and the box locked.~~
- ~~(8) — Firing cables or wires used for firing shots at a particular place shall not be subsequently used for firing shots at another place until steps have been taken that ensure that the firing cables or wires have been disconnected from the leads used at the first place.~~
- ~~(9) — All equipment and apparatus shall be maintained in good working order and tested at such intervals as may be necessary to ensure their constant efficiency.~~
- ~~(10) — Any equipment or apparatus found to be damaged, inefficient or otherwise unsuitable shall be immediately withdrawn from use.~~

~~426 — **Drilling near Explosive Charges**~~

~~A hole shall not be drilled in a direction that would bring it into contact with a hole containing an explosive, and a hole in which an explosive has been previously charged shall not be redrilled.~~

~~427 — **Firing in Vicinity of People and Buildings**~~

~~Where explosives must be fired in the vicinity of an established road, railway or building, the person firing the explosive shall take all reasonable precautions to protect the safety of persons and property.~~

~~428 — **Firing in the Vicinity of Radio Transmitters**~~

~~Electric firing shall not take place near a source of radio frequency radiation (the minimum permissible distance being determined in accordance with Australian Standard 2187 “SAA Explosives Code”).~~

~~429 — **Portable Radio Transmitters**~~

- ~~(1) — The power switch on a portable radio transmitter shall be in the “off” position at all times while detonators are outside the magazine and above ground, unless the transmitter is a safe distance from all points in the firing circuit (as determined in accordance with Australian Standard 2187 “SAA Explosives Code”).~~

- ~~(2) — During firing operations, radio transmission shall not take place unless—~~
- ~~(a) — the transmitter is outside the minimum distances that apply in sub-clause (1); or~~
 - ~~(b) — the transmission is an essential part of a geophysical exploration operation.~~
- ~~(3) — When a firing operation is being carried out in an area where a portable radio transmitter other than those used by the firing crew may be present, appropriate signs shall be displayed in accordance with sub-clause 214 to ensure that every person in the vicinity complies with sub-clause (1).~~

430 — Misfires

- ~~(1) — Where a charge prepared for firing by a safety fuse misfires, a person shall not approach the charge for at least 30 minutes.~~
- ~~(2) — Where a charge prepared for firing by an electric current misfires, a person shall not approach the charge unless—~~
- ~~(a) — at least 10 minutes have elapsed since the attempted firing; and~~
 - ~~(b) — the firing cables have been disconnected and short-circuited.~~
- ~~(3) — Where a charge has misfired, no attempt may be made to withdraw it from the hole, but an attempt must be made to remove the stemming, either by high pressure water, or by a mixture of compressed air and water, applied through a copper tube or a rubber hose that does not have ferrous metal at its free end (although where the charge was blasting powder and the firing mechanism was a safety fuse only, the charge may also be removed by using a copper pricker).~~
- ~~(4) — If the stemming is removed, a further priming charge shall be placed and fired to explode the original charge.~~
- ~~(5) — If a charge of ammonium nitrate mixture that has a single primer originally located below the charge fails to explode after being reprimed in accordance with sub-clause (4), an attempt shall be made to wash the explosive out of the hole and, if this is successful, a further primer shall be placed and fired to detonate the original primer.~~
- ~~(6) — Where—~~
- ~~(a) — it is found to be impracticable to remove the stemming in accordance with sub-clause (3);~~
 - ~~(b) — it is found to be impracticable to wash out a charge of ammonium nitrate mixture in accordance with sub-clause (5); or~~

~~(e) — a charge of explosive (other than that described in paragraph (b)) fails to explode when reprimed and fired in accordance with sub-clause (4);~~

~~the person supervising the firing operations shall consult with the operator, the person who bored the hole and an inspector to determine what should be done to clear up the misfire.~~

~~(7) — Where, after a misfire, one work shift relieves another, the supervisor of the outgoing shift shall inform the supervisor of the incoming shift (verbally and in writing) of the number and position of the outstanding misfired shot or shots.~~

~~(8) — Where a misfire cannot be cleared up before the cessation of work for the day, the supervisor shall -~~

~~(a) — cause a barricade or other suitable structure to be erected to prevent persons from approaching the misfire;~~

~~(b) — cause appropriate signs to be displayed in accordance with Clause 214 to warn persons of the danger.~~

~~(9) — If, after consultation in accordance with sub-clause (6), it is decided to abandon a misfire~~

~~(a) — a report on the location and circumstances of the misfire shall be immediately furnished to the Director; and~~

~~(b) — if any part of the charge is within 15m of the surface of the land, the location shall be marked by a permanent marker post acceptable to an inspector.~~

431 — Damaged Wires

~~A damaged lead, or a damaged firing cable or other wire, shall not be used in a firing circuit.~~

432 — Inspection After Firing

~~Before a person proceeds to inspect a hole or charge that has been fired or attempted to be fired, the person shall ensure that the connection between the exploder and the firing line is broken and the wires short circuited.~~

~~433~~ — ~~Abandoning a Shot Point~~

~~Before abandoning a shot point, any portion of a charge that has been blown from the shot hole shall be destroyed, and all other waste removed.~~

~~434~~ — ~~Preloading~~

~~(1) — Where a shot hole is preloaded in an inhabited area, the firing shall be short-circuited and concealed until it is connected to the firing circuit, and appropriate signs displayed in accordance with Clause 214 to warn people of the danger from explosives.~~

~~(2) — A preloaded shot hole shall be fired as soon as practicable after it is charged.~~

~~435~~ — ~~Adverse Weather Conditions~~

~~(1) — A shot hole loading operation shall not be carried out during a thunderstorm or duststorm, high winds or heavy rains.~~

~~(2) — If a thunderstorm threatens while a shot hole is being loaded, or after a shot hole has been loaded, the operation shall immediately stop, and the following steps shall be immediately taken:~~

~~(a) — the hole shall be covered with suitable waterproof material (except in the case of a seismic shot hole that is filled with water)~~

~~(b) — unloaded detonators and other explosives shall be immediately returned to their respective magazines or containers; and~~

~~(c) — portable magazines and containers shall be moved to a distance of at least 250m from the nearest established road, railway or building (or as near as possible to that distance).~~

~~(3) — Any person who is not required to carry out work under sub-clause (2) shall immediately proceed to a safe place.~~

PART V - DRILLING AND WORKOVER

DIVISION 1 - General Requirements

501 Approval to Drill

- (1) An application for approval to
 - (a) drill a new geothermal exploration or development well, shall be made in duplicate not less than three months (or 6 months if an environmentally sensitive area is involved), or such other period as may be approved prior to the commencement of the operation, and such an operation shall not be commenced without prior approval.
 - (b) workover an existing geothermal exploration, development or producing well shall be made not less than one month, or such other period as may be approved, prior to the commencement of the operation, and such an operation shall not be commenced without prior approval.
- (2) An application under this clause shall include -
 - (a) proposed well name and number;
 - (b) location, elevation and co-ordinates of the well site;
 - (c) programmed depth;
 - (d) estimated spud-in date;
 - (e) estimated drilling time;
 - (f) name and address of drilling contractor;
 - (g) type of rig and blow-out prevention equipment, including description of equipment and method of operation;
 - (h) names and addresses of other contractors involved in the operations and the nature of the services they will perform;
 - (i) detail of the drilling program, including particulars of casing program (with designs safety factors for burst, collapse and tension), complete casing cementation program, drilling fluid and formation evaluation procedures (cuttings and fluid sampling, coring, and wireline and mud logging);
 - (j) name of person responsible for communications with the Director;

- (k) proposed well path;
 - (l) drilling procedures manual;
 - (m) geological prognosis of the area which includes well objectives for exploration wells, accompanied by a time or depth map of near target horizon(s) and seismic sections where possible;
 - (n) pollution control measures; and
 - (o) such other information as the Director requests.
- (4) The drilling program referred to in clause 501(2)(i) shall in the case of an exploration well in a permit area, be accompanied by a current Landgate Public Plan, showing the existing land tenure i.e., reserves, private property, etc. in relation to the location of the proposed drill site and access road and shall make reference to any other wells, public utilities or any other structure within 150m of the proposed well location.
- (5) Any information not available at the time of initial application must be forwarded no later than one month prior to the expected spud date.
- (6) An approved program shall not be varied without approval.

502

Approval of Operating Manuals and Drilling Equipment

A person shall not commence or continue to use drilling and associated equipment unless -

- (1) the drilling and associated equipment has, in the case of a first well to be drilled by a unit in Western Australia, been inspected by an Inspector prior to the commencement of drilling;
- (2) operating manuals covering emergency procedures and the drilling and associated equipment have been submitted to the Director and the Director has given his approval, in writing, of these manuals. Refer to Clauses 202, 203, 204 and 205;
- (3) the Inspector is satisfied that the drilling and associated equipment is in good condition, is compatible with that detailed in the operating manual and capable of being operated safely;
- (4) Where drilling is carried out by a person other than the geothermal title holder the name and address of the person carrying out the drilling has been supplied to the Director.

503**Equipment to Conform to Certain Standards**

Materials and equipment used in drilling and workover operations shall conform to such standards as are listed below so as to safely withstand the conditions likely to be encountered during such operations for -

- (a) derricks and masts API Std 4A, Specification for Steel Derricks (including Standard Rigs), API Std 4D, Specification of Portable Masts, or API Std 4E; Specification for Drilling and Well Servicing Structures;
- (b) rotary drilling equipment API Spec 7, Specification for Rotary Drilling Equipment;
- (c) well casing, tubing and drill pipe, API Spec 5CT, Specification for Casing, Tubing and Drill Pipe;
- (d) wellhead and Christmas tree equipment API Spec 6A, Specification for Wellhead and Christmas Tree Equipment;
- (e) blowout preventors, drilling spools and adapters, API Spec 16A, Specification for Drill Through Equipment;
- (f) hoisting equipment API Spec 8A, Specification for Drilling and Production Hoisting Equipment;
- (g) wire rope API Spec 9A and AS 1656; Specifications for Wire Rope;
- (h) cement API Spec 10, Specification for Materials and Testing of Well Cements.

504**Location Surveys**

- (1) Subject to this clause, as soon as practicable after the final location of a well is established, but in any event no later than one month after the drilling rig is released (or such longer period as the Director may allow) the Operator shall determine the location and elevation of the well in accordance with this clause.
- (2) A survey undertaken for the purposes of sub-clause (1) shall, unless otherwise approved by the Director.
 - (a) be tied as to the horizontal position -
 - (i) to a control point based on the Geodetic Datum of Australia (GDA 94) or a station derived therefrom, or to a point in a cadastral or other survey approved by the Director;

- (ii) to two reference marks established not more than 200m from the well site; and
 - (b) be tied as to elevation –
 - (i) to a heightened control point within the Australian Height Datum, or to a heightened control point derived therefrom; and
 - (ii) to a reference bench mark established not more than 200m from the well site.
 - (c) the well location and elevation shall be determined by a surveyor licensed under the Licenced Surveyors Act 1909 or having other equivalent qualifications or experience acceptable to the Director.
- (3) The accuracy of the survey shall be such that –
- (a) the well location will not be in error by more than one metre in any direction for each 4 kilometres of distance from, and relative to, the initial control point; and
 - (b) the difference in elevation between the wellsite, the reference bench mark, and the Datum heightened control point, measured in metres, is not in error by more than one-tenth of the square root of the distance, measured in kilometres, from the well to the heightened control point.
- (4) The Operator shall, as soon as practicable after the survey is completed but in any event not later than one month after its completion, submit to the Director a plan certified as to accuracy by the person identified in sub-clause 2 (c) above.

The plan shall show –

- (a) the location of the well relative to the horizontal control point;
 - (b) the well name and number;
 - (c) the heightened control point and the bench mark referred to in subregulation (2) (b) (together with reasonable particulars);
 - (d) any other well and all roads, public utilities or substantial buildings or other structures within 300m of the well;
 - (e) if not Crown land, and if applicable, the boundaries and legal description of the section of land within which the well is situated.
- (5) A plan under sub-clause (4) must also indicate –

- (a) the co-ordinates of the well in the Map Grid of Australia (MGA 94) values, and the latitude and longitude of the well in the Geodetic Datum of Australia (GDA 94) values, computed within the accuracy limits of the survey specified by subclause (3);
 - (b) the direction of true north;
 - (c) ground level at the well site; and
 - (d) any permanent reference marks established in accordance with these requirements.
- (6) Alternative Location Survey techniques are acceptable i.e. utilisation of Global Positioning System (GPS) to specifications acceptable to the Director.

505 Prohibited Drilling Areas

- (1) A geothermal title holder shall not drill a well any part of which is less than 300 m from a boundary of the permit area or licence area, as the case may be, except with the consent in writing of the Director and in accordance with such conditions, if any, as are specified in the instrument of consent.
- (2) Where a geothermal title holder does not comply with sub-section (1) of this section, the Director may, by instrument in writing served on the geothermal title holder, as the case may be, direct him to do one or more of the following, within the period specified in the instrument –
- (a) to plug the well;
 - (b) to close off the well; and
 - (c) to comply with such directions relating to the drilling or maintenance of the well as are specified in the instrument.

A person to whom a direction is given under sub-section (2) of this section shall comply with the direction,

- (3) A well shall not be drilled within 75m of a railway, pipeline, cable, high voltage power line of other service facility without the approval of the Director.
- (4) A well shall not be drilled within three kilometres of subsurface mine workings without the approval of the Director.
- (5) The Director may give an approval under this direction subject to the Operator complying with conditions specified by the Director.
- (6) The Director may refuse to approve a well that could adversely affect a producing petroleum field or mining operation.

Casing

- (1) The design and placement of casing strings shall take into account known or predicted formation strength, known or predicted formation pore fluid pressures and programmed drilling fluid densities, and the maximum performance properties used in the design of casing strings shall be those indicated as minimum performance properties in API Bull. 5C2, Bulletin on Performance Properties of Casing Tubing and Drill Pipe.
- (2) Casing strings shall be run and cemented at the approximate setting depths specified in the drilling program and any significant variations to the prescribed setting depths shall be notified to the Director prior to running casing.
- (3) All casing strings and liner strings shall be capable of withstanding all anticipated collapse and burst pressures, tensile loadings, temperatures, and environments likely to be encountered.
- (4) All casing strings, other than liner strings shall extend to the wellhead.
- (5) Casing recovered from a well shall not be re-used in another well unless it has first been inspected in accordance with API RP 5C1, Recommended Practice for Care and Use of Casing and Tubing and the physical characteristics established by such inspection enable compliance with sub-clause (3).
- (6) Conductor pipe shall be installed in a well to protect the well and equipment against surface formation instability and to enable the circulation of drilling fluid from the well before surface casing is installed.
- (7) Surface casing shall be set at least 25m into a competent formation, and minimum surface casing requirements are -
 - (a) 200 m; or
 - (b)
 - (i) in relation to an exploration well where normal pressure gradients are anticipated, at least 15 per cent of the total depth to which uncased hole will be drilled to a depth of 2,500m, plus 5 per cent of the incremental depth of uncased hole beyond 2,500 m;
 - (ii) in relation to an appraisal or development well where normal pressure gradients are known to exist, at least 10 per cent of the total depth to which uncased hole will be drilled.

(although the Director may specify or approve another depth in a particular well or area).

- (8) The design of the conductor pipe or surface casing string shall take into account the support of other casing strings and or the BOP Stack.
- (9) Where evidence indicates the possibility of above normal formation pore pressure in a well, the surface casing design shall be considered on a well by well basis.
- (10) Where -
 - (a) abnormal pressure, lost circulation or unstable zones are known or expected in a well; or
 - (b) artesian water, high mud weights or extensive drilling time may lead to down-hole problems in a well.

consideration shall be given to setting an intermediate casing string.

- (11) When a liner string is installed in a well there shall be an overlap of at least 30m between the top of the liner string and the shoe of the next larger casing string previously run.
- (12) After cementing, all casing strings, except the conductor casing string, shall be pressure tested to an approved pressure before drilling out of the casing shoe, or in the case of production casing string, before proceeding with operations to complete or test a well, and such pressure test shall be held for as long as is necessary to ascertain that there is no continuous pressure drop and the result recorded in the driller's log.
- (13) Drilling operations or operations to complete or test the well shall not commence until a satisfactory pressure test pursuant to Sub-Clause (12) has been obtained.

507

Cementing of Casing

- (1) Conductor casing strings (other than those placed by jetting or driving) shall be cemented with sufficient cement to fill the annular space between the casing string and the wall of the hole from the casing shoe of the conductor casing string to surface.
- (2) Surface casing strings shall be cemented with a volume of cement sufficient to fill the annular space between the casing string and the hole to a height of at least 450 metres above the shoe of the casing string, or to the surface if such casing string is less than 450 metres in length.
- (3) Intermediate and production casing strings and liner strings shall be cemented with sufficient cement to fill the annular space between the casing string and the wall of the hole or next outer casing string as follows -
 - (a) from each cementing point (including the casing shoe) to a height of at least 150 m above the cementing point;

- (b) to a height of at least 100 metres above any zone not previously cased containing fluid hydrocarbons;
 - (c) additionally, in case of a liner string which is used as an intermediate or production casing string, the overlap between the liner string and the next larger casing string previously set shall be cemented to fill at least 30 metres measured length of the annular space between the liner string and the next larger casing string, unless provision is made for the overlap to be sealed in some other effective manner or unless otherwise approved.
- (4) All casing string cementations shall be carried out in accordance with good oil field practice and the details of the cementing operations shall be recorded in the driller's log. If there is any reason to suspect a faulty cementing operation, the Director shall be notified.
 - (5) After the cementing of casing strings, drilling shall not be commenced until a time lapse of -
 - (a) 24 hours; or
 - (b) 8 hours under pressure for the surface casing string and 10 hours under pressure for all other casing strings.
 - (6) For the purpose of Sub-Clause (5)(b) the cement is considered to be under pressure if during the time lapse referred to in that sub-clause the cement after placing is restrained from movement by the use of float valves or other approved equipment.
 - (7) If the cementing requirements of this clause have not been achieved by primary cementing operations, endeavours shall be made to meet those requirements by recementing or by remedial cementing, unless otherwise approved.

508

Blow-out Prevention Control

- (1) Blow-out preventers and related well control equipment shall be installed, operated, maintained and tested generally in accordance with API RP 53 , Recommended Practices for Blow-out Prevention Equipment Systems for Drilling Wells, and shall be adequate to control expected pressures. The results of all tests shall be recorded in the driller's log.
- (2) Unless otherwise approved, prior to drilling below the conductor casing string in exploration wells, or in development wells in those areas having known shallow gas accumulations, a diverter system incorporating a pipeline of adequate diameter with control valves shall be installed so as to safely divert hydrocarbons and other fluids in the event of pressures occurring below the shoe of the conductor string which may fracture the formation.

- (3) Prior to drilling below the surface casing string the blow-out prevention equipment shall include a minimum of -
- (a) three remotely controlled, hydraulically operated blow-out preventers with a working pressure that exceeds the maximum anticipated surface pressure, including one equipped with pipe rams, one with blind rams and one of the annular type; all ram type blow-out preventers shall be equipped with extension hand wheels or hydraulic locks;
 - (b) a drilling spool with side outlets for the attachment of choke and kill lines, if side outlets are not provided in the blow-out preventer body. These side outlets, at least two in number, shall be connected to pipelines of sufficient strength to withstand a pressure equal to the pressure rating of the blow-out preventer assembly to which they are connected. One of the said pipelines shall be available for the purpose of killing the well and shall have a minimum internal diameter of 50mm. The remaining pipeline shall be available for the purpose of bleeding well fluid to the choke manifold and shall have a minimum internal diameter of 75mm;
 - (c) a choke manifold containing not less than two adjustable chokes, one of which shall be hydraulically controlled, connected to the chokeline referred to in paragraph (b);
 - (d) a kill pump facility connected to the kill line referred to in paragraph (b); and
 - (e) a fill-up line.
- (4) It shall be ensured that –
- (a) an inside blow-out preventer assembly (back pressure valve) and a full opening drill string safety valve in the open position are kept on the rig floor at all times whilst operations are in progress, with suitable crossover substitutes to enable installation on all drill pipe, drill collars and tubing in use; and
 - (b) A kelly cock is installed immediately below the swivel and another at the bottom of the kelly, of such design that it can be run through the blow-out preventers.
- (5) It shall be ensured that –
- (a) the blow-out prevention equipment is not removed until the well has been adequately sealed; and
 - (b) the Director is notified when the blow-out prevention equipment has been removed for repairs, of the nature of the repairs and of the measures taken to seal the well.

- (6) During operations there shall be a control panel for operating blow-out preventers, located at such a distance from the drill floor as to ensure safe and ready access in times of emergency.
- (7) Each choke manifold shall have the following equipment clearly visible to the choke operator when standing in his normal operating position for either the remotely or hand adjustable chokes -
 - (a) a pressure gauge which indicates the drill pipe pressure at the drill floor; and
 - (b) a pressure gauge which indicates the casing string/drill string annulus pressure at a known point upstream of the choke.

509 Pressure Testing Blow-out Prevention Equipment

- (1) The blow-out preventer equipment shall be tested in the manner and at the times outlined hereunder. In the event that a test indicates that the equipment is not operating correctly, operations shall be discontinued until the deficiencies have been corrected and the equipment subjected to another test -
 - (a) after setting the blow-out preventer stack the pipe rams, the wellhead connection, and the choke and kill lines shall be tested to the maximum anticipated surface pressure consistent with the requirements of clause 508 (1) or such other pressure as may be approved by the Director and the annular type blow-out preventers to 70% of their rated pressure or 70% of the test pressure for the pipe rams, whichever is less, at the following times -
 - (i) when installed;
 - (ii) before drilling out of each casing string;
 - (iii) not less than once each week whilst drilling;
 - (iv) following repairs that require disconnecting a pressure seal in the assembly; and
 - (v) before undertaking perforating and/or production testing program unless a valid pressure test has occurred in the past 48 hours.
 - (b) the blind rams shall be function-tested at the times stipulated in paragraph (a) provided that after installing each casing string the blind rams shall be pressure tested to a pressure not less than 70% of the burst pressure of the casing string just installed, or to their working pressure, or as provided in

paragraph (a), whichever is the least.

- (c) The blow-out preventers shall be function-tested on each round trip but not more frequently than once per day with the exception of the annular type blow-out preventers where a weekly function test is required.

- (2) Each blow-out preventer test shall be recorded in the driller's log.

510 Mud Monitoring System

The following mud system monitoring equipment, with drill floor indicators shall be installed, and used during all drilling operations after setting and cementing the conductor casing string –

- (a) a recording mud pit level indicator to determine mud pit volume gains and losses. This indicator shall include a visual and audio warning device;
- (b) a mud volume measuring device for accurately determining the mud volumes required to fill the hole on trips;
- (c) a mud return or full hole indicator to determine when returns have been obtained or when they occur unintentionally, as well as to determine that returns essentially equal the pump discharge rate;
- (d) a pump stroke counter;
- (e) a gas separator, gas knockout pot and or a mud degasser;
- (f) a mud gas monitoring device to determine the concentration of gas in the drilling mud.

511 Penetration Rate and Formation Pressure Monitoring

Drilling operations shall not be commenced or continued unless the drilling rig is equipped with a penetration rate recorder that will give a clear indication of a change in formation, that can be used as a guide to warn against approaching areas of abnormal pressure, and which shall be maintained in good working order and be in continuous operation while drilling.

512 Accumulators

- (1) Accumulators shall be located a minimum of 15 metres away from the rig floor, and without accumulator pump assistance, shall have sufficient capacity at all times to -
 - (a) open or close the hydraulically operated choke line valve;
 - (b) close or open the annular type blow-out preventer; and

- (c) close or open all blow-out preventer pipe rams.
- (2) Accumulator pumps shall be capable of re-building fluid pressure in the accumulators within a period of three minutes to a sufficiently high level to -
 - (a) open the hydraulically operated choke line valve; and
 - (b) close the annular type blow-out preventer
- (3) Accumulators shall be connected to the blow-out preventers with lines of working pressure at least equal to the working pressure of the accumulator, and where lines are located under the substructure these lines shall be of steel construction unless completely sheathed with adequate fire resistant sleeving.
- (4) Accumulator pumps shall have two independent sources of power.

513 Blow-out Prevention Drills

- (1) Blow-out prevention drills shall be conducted weekly for each drilling crew to ensure that all equipment is operating and that crews are properly trained to carry out emergency duties.
- (2) All blow-out prevention drills and response times shall be recorded in the driller's log.
- (3) There shall be, displayed on the rig floor, a notice providing details of the well control procedures proposed to be followed in the event that indication of a well kick is observed and all drilling crews shall be trained in those procedures.
- (4) All on-site personnel holding the position of driller (including any person who may temporarily stand in for the driller) or more senior shall attend, at least once every 24 months, an accredited well-control school or refresher course in well-control and obtain a certificate of proficiency from such school or course.

514 Formation Integrity Testing

- (1) A formation integrity test shall be conducted after drilling out the casing shoe of surface and intermediate casing strings to establish that the casing shoe cementation and the formation strength at the casing shoe are adequate to sustain the maximum anticipated pressures which may be imposed at the casing shoe during the subsequent drilling operations. The results of the test shall be recorded in the driller's log.
- (2) Where the result of a test referred to in subclause (1) requires that the approved drilling and casing program need to be amended, any such amendments shall be submitted to the Director for approval.

- (3) Where formations are encountered below a casing shoe which require the use of drilling fluid densities not anticipated in the approved drilling program and which could result in pressures being imposed at the casing shoe in excess of those determined by the test referred to in sub-clause (1) an additional formation integrity test shall be performed, and if the result of that additional test differs from that performed at the casing shoe, the Director shall be notified forthwith and the casing program shall be amended if necessary.

515 Drilling Fluid

- (1) The characteristics and use of the drilling fluid shall provide adequate control of any sub-surface pressures likely to be encountered in the well.
- (2) The well shall be maintained full of such drilling fluid.
- (3) Sufficient reserves of drilling fluid and supplies of drilling fluid materials shall be available at the well site for immediate use to comply with sub-clauses (1) and (2).
- (4) Tests consistent with API RP 13B, Recommended Practice for Standard Procedure for Testing Drilling Fluids, shall be performed on a regular basis while drilling and the results of such tests recorded in the driller's log.

516 Deviation Surveys

- (1) Deviation surveys shall be taken at intervals of not more than 200m to ascertain the deviation of a well from vertical.
- (2) The Director may at any time direct the Operator to conduct a discretionary survey to establish the location of any point in a well.
- (3) A well shall not be directionally drilled without the approval of the Director except as permitted in sub-clause (4).
- (4) Directional drilling may be carried out without the approval of the Director if the drilling is for a short distance to straighten a hole sidetrack junk or correct other mechanical difficulties.

517 Conversion of Wells into Water Wells

- (1) When, for the purpose of drilling a well, an Operator –
 - (a) obtains a right of entry from an owner/occupier of land; or
 - (b) gives an owner/occupier notice of an intention to enter land,

the Operator shall raise with the owner/occupier the possibility of converting the well into a water well should the well not be capable of producing geothermal energy in commercial quantities.

- (2) The Operator shall furnish the Director with copies of any correspondence entered into under sub-clause (1).
- (3) If it is decided to convert a well into a water well, the Operator shall furnish details of the proposed conversion to the Director for his approval as soon as practicable after the decision is made.

518 Evaluation of Geothermal Energy Resources

If the Director considers that an Operator is not carrying out sufficient coring, logging or testing to evaluate the occurrence, or potential occurrence, of geothermal energy resources, the Director may require the operator to carry out such coring, logging or testing operations as the Director thinks necessary and reasonable in the circumstances.

In relation to any core plugs or cuttings retained overseas for further analysis, an annual report on the progress of these studies shall be sent to the Director.

519 Core and Samples Cuttings

- (1) Where cuttings are recovered in connection with the drilling of a well two sets of samples of cuttings each a minimum of 100g dry weight, shall be washed, dried in an approved manner and placed in suitable plastic bags that are properly labelled for identification and distributed as directed by the Director.
- (2) Where cores other than side-wall cores are recovered in connection with the drilling of a well the cores shall where practicable be slabbed vertically and a sample, which is at least one vertical quarter of the core, shall be placed in suitable containers that are properly labelled for identification and sent to the Director.
- (3) Full diameter core samples may, where approved, be retained for special studies.
- (4) Where core samples are retained in accordance with sub-clause (3) -
 - (a) the samples shall be retained in Australia unless otherwise approved;
 - (b) in the course of such studies care shall be taken that the core is subjected to no more damage than is necessary for the purpose of the studies; and
 - (c) all residues remaining shall be lodged with the Director on completion of the studies.

- (5) Side-wall cores which are recovered shall not be sent out of Australia unless otherwise approved, and all residues remaining after any studies have been made on the cores shall be preserved and lodged with the Director on completion of such studies.
- (6) Where approval has been given for the export of cuttings, core plugs or whole cores, any skeletal material from whole cores shall be returned to Australia within 12 months of the approval being given, and residues from exported core plugs or cuttings shall be returned at the conclusion of the analyses and all such residue retained in Australia.
- (7) In relation to any core plugs or cuttings retained overseas for further analysis, an annual report on the progress of these studies shall be sent to the Director.

520 Reports on Analysis of Core and Cuttings

- (1) Where an investigation, analysis or study is conducted on cuttings or cores, a copy of the report of the investigation, analysis or study shall be sent to the Director as soon as practicable after the completion of the investigation, analysis or study.
- (2) Palynological and palaeontological and petrological slides prepared from cuttings or cores shall be stored and maintained in an appropriate manner and shall be lodged with the Director when requested or in any event prior to the surrender, expiry or cancellation of the title.

521 Age Dating of Samples

The Operator shall take all reasonable steps to ascertain, by palaeontological, radiometric or other suitable means, the ages of all rocks penetrated by a well.

522 Fluid Samples

- (1) All formation fluid recovered from formation tests or non-routine production tests shall, in so far as may be practicable, be sampled
- (2) The samples shall be labelled and analysed, and liquid samples shall be preserved for at least six months.
- (3) Fluid samples shall upon request be sent to the Director.
- (4) Results obtained from the analysis of samples shall be furnished to the Director as soon as practicable after they are obtained.

523

Well Evaluation Logs

- (1) Before a well is cased (other than with surface casing), completed, suspended or abandoned, an approved suite of logs shall be run and recorded.
- (2) The suite shall at least be sufficient to provide a proper determination of
 - (a) formation porosity;
 - (b) formation fluid saturations;
 - (c) stratigraphic correlation with surrounding wells; and
 - (d) if inadequate control exists in the vicinity of the well, velocity control.
- (3) The following shall be furnished to the Director -
 - (a) a copy of each log run, which shall be forwarded as soon as possible after it is recorded;
 - (b) one paper print and one stable base transparency of each log (which shall be furnished as soon as practicable after they are made);
 - (c) one digital copy of all logs on magnetic tape, in log information standard (LIS) format (or other medium and format acceptable to the Director), shall be forwarded as soon as practicable after they become available; and
 - (d) one paper print and one stable base transparency of the mud log.

524

Protection of Aquifers

All reasonable steps shall be taken during an operation on a well to prevent communication between, leakage from, or the pollution of, aquifers that serve, or could serve, any useful purpose.

525

Production Tests on Wells

- (1) A person shall not, in a Geothermal Title area, conduct a production test in an exploration well or development well not yet producing, except with and in accordance with the approval of the Director.
- (2) An application by the Geothermal Title holder to the Director for approval to conduct a production test in an exploration well or production well not yet producing in a Geothermal Title area shall be accompanied by particulars of -

- (a) the equipment proposed to be used for the test;
 - (b) the proposed testing program;
 - (c) the intervals in the well proposed to be tested;
 - (d) the proposed duration of the test;
 - (e) the maximum quantity of geofluids and geothermal energy proposed to be produced;
 - (f) the proposed method of disposal of the geofluids produced;
 - (g) method to measure water losses; and
 - (h) method to measure contained heat value.
- (3) The approval of the Director to conduct a test is subject to a condition that the test shall not be considered unless -
- (a) at least 24 hours notice of intention to conduct the test has been given to an Inspector appointed under the Act or such shorter notice as may be approved; and
 - (b) if required, facilities have been provided to enable an Inspector to be present during the testing.
- (4) The following conditions shall pertain to production tests -
- (a) When formation testing is to be performed at a well site that is in the vicinity of an inhabited area, all reasonable steps shall be taken to warn those persons who could be affected by the testing, and the tests shall be conducted in a manner that minimizes the risk of injury to those persons or damage to their property;
 - (b) All personnel shall be familiar with the emergency procedures for the testing that is being performed;
 - (c) All flowlines, valves and equipment used in a formation test shall have a rated working pressure in excess of all anticipated pressures and, where appropriate, shall be tested prior to initial use of each well to at least those anticipated pressures;
 - (d) Open hole formation tests shall not be opened for flow during the hours of darkness except with the prior approval of the Director;
 - (e) Subject to sub-clause (f), if formation fluids are produced into the test string, the formation fluids shall be reverse circulated from the test string before the test string is pulled from the hole;

- (f) In a cased hole, formation fluids in the test string may be displaced back into the formation from which they were produced;
 - (g) During formation testing, or the removal of any pipe after a formation test, a competent person must remain at the rig and oversee the operation;
 - (h) During formation testing, all motors, engines and lights that are not required for the operation shall be shut off;
 - (i) During formation testing, the annular space of the well shall be kept full of drilling fluid of a density adequate to control formation pressure;
 - (j) Fluids brought to the surface during formation testing shall be safely and correctly disposed of through an independent test manifold and choke;
 - (k) Any choke equipment that forms part of the blow-out prevention equipment shall not be used for flow control during a formation test;
 - (l) If swivel joints or flexible hoses are used in the system during formation testing, the swivel joints and hose connections shall be equipped with wire rope or chain safety lines that are sufficient to contain any undue movement or whipping of the pipe or hose in the event of failure;
 - (m) All test strings shall be equipped with the means to reverse circulate out the contents of the test string;
 - (n) No swabbing or acidizing stimulation shall be performed during the hours of darkness; and
 - (o) There is a suitably constructed flare pit no less than 45 metres from the well and in conformance with clause 230; and
 - (p) All rig equipment that the produced fluid passed through shall be suitable for an extreme hot geofluid system.
- (5) In addition to the requirements of sub-clause (5), an Operator shall furnish the Director with -
- (a) a copy of the relevant operational report;
 - (b) a legible copy of the pressure recorder chart for each test taken at the well; and
 - (c) an interpretation of those tests.

526

Flammable Vapours

All vessels and equipment from which flammable vapours may issue shall be safely vented to atmosphere, and any significant volume of gas that is vented shall be burnt through a flare system as described in Clause 230.

527

Approval to Abandon or Suspend a Well

- (1) A well shall not be abandoned or suspended without prior approval, except as provided for in sub-clause (4).
- (2) Subject to sub-clause (4), while drilling operations are being undertaken, a well shall not be left in a condition which in the opinion of the person-in-charge or the Director, is unsafe. Prior to the cessation of drilling operations, even temporarily, the well shall be made safe in accordance with good operations practice.
- (3) Subject to Sub-Clause (4), where casing is being installed, if a well encounters or has encountered:
 - (a) hydrocarbons;
 - (b) abnormally pressured fluids;
 - (c) extremely hot fluids;
 - (d) unstable coals or shales; or
 - (e) lost returns;

the drilling operations shall be continued to the next scheduled casing point at which point the hole will be logged, cased and secured at the surface.
- (4) In the event of an emergency or adverse weather conditions requiring, in the opinion of the person-in-charge or the Director, cessation of drilling operations, the well shall be made safe in accordance with good oilfield practice.
- (5) An application for approval to abandon or suspend a well shall give particulars of:
 - (a) the name of the well;
 - (b) the reason for abandonment or suspension;
 - (c) the proposed abandonment or suspension program including the method by which the well will be made safe; and
 - (d) such further information as the Director may require.

- (6) The abandonment or suspension program referred to in sub-clause (5)(c) shall conform to the relevant requirements of clause 531.

528

Abandonment of a Well

For abandonment of a well the following shall apply -

- (1) In the uncased portions of a well, cement plugs shall be placed such as to provide a minimum of 30m of cement above and a minimum of 30m of cement below any significant oil, gas or fresh water zones.
- (2) Where there is open hole immediately below the casing string, there shall be placed in that casing string -
 - (a) a cement plug placed by displacement method so as to extend at least 30m above and at least 30m below the casing shoe; or
 - (b) a cement retainer with effective back pressure control set at least 10m, but not more than 30m, above the casing shoe with a cement plug calculated to extend at least 30m below the casing shoe and at least 15m above the retainer; or
 - (c) where lost circulation conditions exist or are anticipated, a permanent type bridge plug set within 45m above the casing shoe with at least 15m of cement on top of the bridge plug.
- (3) If the casing string is cut and recovered, a cement plug shall be placed to extend at least 30m above and at least 30m below the cut end of the casing string, and a retainer may be used in setting the required plug.
- (4) Where the casing string has been perforated-
 - (a) a cement plug shall be placed opposite the perforations and shall extend from at least 30m below to 30m above the perforated interval; or
 - (b) the perforated interval may be plugged by means of a cement retainer set in the casing string no more than 45m above the top of the perforated interval with a cement plug extending at least 15m above the retainer, provided the perforated interval is isolated from open hole below; or
 - (c) subject to sub-clause (b) where a succession of retainers is used to isolate a series of perforated test intervals, only the topmost retainer need have a minimum of 15m of cement plug placed above it;
- (5) In a cased hole containing a liner string or strings, a cement plug shall be placed immediately above each liner hanger to extend at least 30m above the liner hanger.

- (6) A surface cement plug extending at least 15m below the surface shall be placed in the innermost string of casing that extends to the surface.
- (7) Any annular space that extends to the surface, and which is open to drilled hole, shall be plugged with sufficient cement to fill at least 30m of the annular space;
- (8) The location and integrity of cement plugs shall be tested in a manner acceptable to the Director;
- (9) Any intervals of cased hole between cement plugs shall be filled with fluid that is of an appropriate density and suitably inhibited to prevent any corrosion of the casing;
- (10) Blow-out preventers shall not be removed until all plugs that are required to isolate the open hole have been set and their location and integrity satisfactorily determined;
- (11) No casing may be recovered if its recovery would expose any abnormal pressure, lost circulation or petroleum or water zone; and
- (12) A steel well marker plate shall be installed at least two metres above ground level, and that plate shall –
 - (a) be welded to a suitable steel post that is in turn welded to the casing head or outermost casing stub;
 - and
 - (b) have the well name and number bead-welded to it.

529

Well Completion

- (1) The surface and sub surface equipment of a completed well shall (where applicable) be arranged to permit the measurement of the pressure and temperature at the wellhead and at the bottom of the hole (closed in or flowing), and to permit any other generally recognized test to be carried out.
- (2) The surface equipment shall be fitted with sampling connections.
- (3) The Operator shall, on a completion and any recompletion of a well, keep and make readily available to an Inspector an accurate record of all subsurface equipment and junk in the well.
- (4) Before opening a well to production, and after every major repair, recompletion or workover, the wellhead and flow line connection shall be pressure tested.

530

Disposal of Produced Oil and Gas

- (1) Any oil or gas that is circulated out of, or produced from, a geothermal well during a drilling operation, and that is not flowed through the well's flowline to a gathering facility, shall be flowed through an appropriate manifold and properly staked temporary flow line to a storage tank or flare.
- (2) The lines referred to in sub-clause (1) shall, so far as possible, be free from unprotected bends, elbows and tees.
- (3) Clean up operations that use temporary well site facilities shall be commenced during daylight hours.
- (4) If any petroleum is flowed to a flare during any operations referred to in this clause, the flare shall be kept, so far as may be possible, continuously alight.

531

Disposal of Waste Fluids

- (1) All waste materials from work on a well or produced from a well as it cleans up (whether or not contaminated with oil) shall, unless otherwise removed from the well site to a satisfactory storage, be dumped or drained to a waste sump.
- (2) A waste sump referred to in sub-clause (1) –
 - (a) unless it only contains clean water, shall be adequately fenced (and the fencing, if removed during an operation shall be replaced immediately after the operation is completed); and
 - (b) shall incorporate every reasonable precaution to prevent pollution of surface and underground water through seepage.

532

Replacement of Well Site Fencing

If fencing protecting the wellhead from outside interference is removed during an operation, the fencing shall be replaced immediately after the operation is completed.

533

Restoration of Site

Insofar as is possible or necessary the well site area shall be restored to its former condition and if any part of a wellhead is left above ground level, it shall be adequately fenced. Mousehole and rathole shall be plugged at surface.

DIVISION 2 Reporting and Data Submissions

534 Discovery of Geothermal Resource and Estimate of Resource

- (1) In addition to fulfilling the requirements of the Act with respect to reporting a discovery of a geothermal resource, the results of the evaluation of the shall be conveyed in writing to the Director within 3 months of the date of discovery or such further period as the Director allows.
- (2) In the month of September or such other month as the Director may nominate in each year two copies of a current estimate of the geothermal reserves in a title area shall be sent to the Director.
- (3) An estimate referred to in sub-clause (2) shall be in an approved form and shall specify -
 - (a) the location of the geothermal resource and its areal extent;
 - (b) the depth and temperature of the resource;
 - (c) the data upon which the estimate is based; and
 - (d) the volume of resource.
- (4) When a field study resulting in a revised estimate of the geothermal resource has been carried out, two copies of a report of the study and the revised estimates shall be sent to the Director.

535 Daily Report of Drilling or Re-entry or Workover Operations

- (1) Each day before midday a daily report of the drilling or re-entry or workover operations for the previous 24 hours shall be sent to the Director.
- (2) The daily report shall contain -
 - (a) the name of the well;
 - (b) the drilled depth;
 - (c) the work carried out;
 - (d) the lithology of formations penetrated and the interpreted depth of any marker horizons;
 - (e) any temperature and in situ stress data collected;
 - (f) results of surveys made in the well bore; and
 - (g) estimated daily and cumulative well costs.

536 Weekly Report of Drilling and Workover Operations

Each week one copy of a report on the drilling operations carried out during the previous week, including a summary of the daily drilling reports referred to in clause 535, together with one copy of the daily driller's logs and weekly rig inspection report, shall be sent to the Director.

537 Report on Modification, Abandonment or Suspension of Well

A report providing details of any repair, modification, recompletion, production test, abandonment or suspension of a well shall as soon as practicable be sent to the Director.

538 Well Completion Report

- (1) Where a well has been plugged and abandoned, suspended or completed, whether newly drilled or re-entered, one copy of a report, in writing, in accordance with this clause shall be furnished to the Director not later than six months after the completion of the well.
- (2) A report in accordance with this clause relating to the making of a well shall include, but not necessarily be limited to -

General Data

- (a) the name of the well;
- (b) the elevation of the ground level and Kelly bushing (Clause 504) onshore, or elevation of the Kelly bushing and water depth offshore;
- (c) the well location (Clause 504) with respect to the nearest population centre, geographic coordinates and shotpoint location where appropriate.
- (d) in the case of a well that has been deviated from an approximately vertical path -
 - (i) the surveyed path of the well;
 - (ii) the coordinates of the bottom hole location; and
 - (iii) in the case of a potential producer, the coordinates at the intersection of the reservoir horizon.
- (e) the drilling rig used to make the well;
- (f) the spud date, the date of reaching total depth and date of the rig release;

- (g) the depth of the well measured by its along hole length and the true vertical depth measured by the distance below the rotary Kelly bushings;
- (h) a statement whether the well has been -
 - (i) completed as a producing well;
 - (ii) suspended as a potential producing well; or
 - (iii) abandoned.
- (i) the depth of the perforations in the geothermal reservoir (if any);

Drilling

- (j) particulars of the equipment installed in or on the well;
- (k) particulars of the casing and equipment installed in or on the well complete with schematics showing major dimensions with features of such casing and equipment;
- (l) particulars of all deviation surveys made in the well;
- (m) particulars of cementing operations carried out in or on the well;
- (n) bit records;
- (o) particulars of drilling fluids used in the well;

Formation Evaluation

- (p) depths and types of all cores, (including sidewall cores), cuttings, well evaluation logs (including measurement-while-drilling logs, pressure detection logs, lithology logs and mud logs) and fluid samples;
- (q) particulars of any geothermal indications including temperature data, geothermal gradients any in situ stress evaluations made;
- (r) particulars of the operation and results including full raw pressure-time listings for all formation fluid sample tests and production tests (if any) carried out on the well;

Geology

- (s) the along hole and true vertical depths of marker horizons;
- (t) particulars of the geological interpretations of the observations made as a result of drilling the well including, but not limited to

for exploration wells:

- (i) lithology and stratigraphy;
- (ii) reservoir quality;
- (iii) source rock quality; may be (heat source quality)
- (iv) geothermal indications; and

for development wells:

- (i) details of changes to the current geothermal reservoir model;

for exploration wells - a discussion of the relevance of the findings of the well to the evaluation of the geothermal potential of the area around the well and of the basin containing it;

for development wells - the implications for future resource management.

Appendices

- (u) reports of technical studies on velocity surveys, logs, samples, cores and sidewall cores obtained from wells (including thermal conductivity analysis, petrophysical analysis, palaeontology, reservoir characteristics, fluid saturations, relative permeability, capillary pressure, fluid analysis and geochemical analysis). Where for any reason these are not included in the final well report or have not previously been submitted, they must be furnished to the Director as soon as they become available. (See Clauses 520, 522, 523, 525)
- (v) one stable base transparency and one paper print of -
 - (i) a composite well log including, where appropriate, wireline logs, sampling and testing details, interpreted formation tops and lithology of intervals penetrated;
 - (ii) the enclosures in the velocity survey report;
 - (iii) a mud log; and
 - (iv) a lithology log, if prepared.
- (w) a well index sheet.

DIVISION 3 Special Services

539 Special Services

- (1) Special services include logging, perforating, testing, cementing or portable laboratory services, power-tong services, wireline services, coiled tubing operations, acidizing, fracturing, artificial lift or similar services carried out at a well location.
- (2) The installation and operation of well pumping units, and the operation of wireline and coiled tubing services, acidizing, fracturing, cementing, hot oil operations and other special services shall be carried out in accordance with these directions and the applicable recommended practices set forth in A.P.I. RP54, "Oil and Gas Well Drilling and Servicing Operations".

540 Equipment

- (1) Where a system of high pressure piping and swivel joints is used in well stimulation or similar operations, the swivel joints shall be secured with wire rope safety lines or chains and anchored at each end.
- (2) Where a system of high pressure piping and swivel joints is used in well stimulation or similar operations, the operation shall be carried out by remote control so as to minimise the requirement for a person to be in the area between the pump discharge and the wellhead.
- (3) Swivel joints that have lugs for hammer tightening shall not be used in a well servicing operation unless manufactured from steel.
- (4) Where a treating line is used during well servicing operations (other than during cementing operations), a check valve shall be fitted at the wellhead end of the treating line.
- (5) Where a check valve is fitted adjacent to the wellhead, a bleed-off valve shall be installed between the check valve and the wellhead.
- ~~(6) Where materials potentially corrosive or harmful to the skin are in use, suitable eye wash and emergency shower facilities shall be available on site.~~

~~541 Operations~~

- ~~(1) When liquid carbon dioxide or nitrogen is used for well stimulation or cleanout, the controls for the valve that regulates the flow of the liquid shall be located on the side of the unit that is opposite to the pipe supplying the liquid to the well.~~

- (2) ~~All piping, pumps, valves and fittings used in servicing operations shall be hydraulically pressure tested, to a pressure not less than the maximum expected treating pressure, prior to the commencement of each servicing operation, and lines shall be adequately staked.~~
- (3) ~~Before pumping flammable fluids, the components of the particular system shall be bonded together to ensure that electrical continuity is established and maintained.~~

542 Swabbing

- (1) While swabbing operations are being carried out all engines, motors and other possible sources of ignition that are not essential to the operation shall be shut down.
- (2) During swabbing operations, the swabbing line shall be packed off at the surface so that fluids are directed as much as possible through a closed flow system.
- ~~(3) During swabbing operations —~~
 - ~~(a) the fluids shall be piped directly to a production facility, flare pit, skid or mobile tank located at least 45m from the well; and~~
 - ~~(b) any flare line shall incorporate a device to prevent back burning.~~
- (4) Swabbing operations to induce formation flow shall not be conducted during the hours of darkness.

543 Blow-out Prevention

Blow-out prevention equipment for workover strings (including coiled tubing and wire line operations) shall be installed and tested to the maximum anticipated wellhead pressure before operations are commenced on the well.

PART VI GEOTHERMAL ENERGY PRODUCTION

DIVISION 1 General Requirements

601 Consent for Production Equipment and Recovery of Geothermal Resource

- (1) The recovery of geothermal energy, other than recovery of geofluids during a production test of a well, shall not be carried out unless construction of production equipment, safety systems, personnel emergency facilities and accommodation has been approved and -
- ~~(a) the production equipment and personnel emergency facilities have been verified in such manner (if any) as the Director determines and have been approved by the Director as suitable for use in operations for the recovery of geothermal energy;~~
 - ~~(b) such safety systems as the Director defines as production safety systems have been approved as suitable for use in operations for the recovery of geothermal energy;~~
 - ~~(c) the Minister has given consent for the operation of a pipeline or a secondary line, or there are in the licence area approved storage tanks, or approved facilities for the conveyance of geothermal energy from the licence area other than by means of a pipeline;~~
 - (d) the Minister has given consent in writing to the recovery of geothermal energy in the licence area using the approved production equipment, safety systems and personnel emergency facilities;
- ~~(2) The construction, alteration or reconstruction of production equipment, safety systems, personnel emergency facilities and accommodation shall not be undertaken without approval and, where applicable, verification by a verifying body. Equipment, systems, facilities and accommodation so constructed, altered or reconstructed shall not be used unless the construction, alteration or reconstruction has been completed to the satisfaction of the Director.~~
- ~~(3) An application for approval to construct, alter or reconstruct production equipment, safety systems, personnel emergency facilities and accommodation shall be accompanied by a description, plans and drawings containing such details as the Director requires.~~

602 ~~Manuals~~

~~Operations shall not be carried out unless manuals which comply with clauses 202, 203, 204 and 205 have been approved.~~

603 Other Operations

Operations for –

- (a) the disposal of produced geofluids if necessary
- (b) the injection of water into an underground formation –

shall not be carried out unless the method and the equipment for carrying out those operations have been approved.

604 Production Facilities

- (1) A production facility shall be designed, manufactured, constructed, tested, operated, inspected and maintained in accordance with relevant Australian or A.P.I. Standards or codes of practice, or to specifications and practices acceptable to the Director.
- (2) The Operator shall maintain accurate records of each production facility under the relevant title.

~~**605 Equipment to Comply with Certain Standards**~~

- ~~(1) Wellhead equipment shall comply with API Spec 6A, Specification for Wellhead Equipment.~~
- ~~(2) Pressure piping shall be designed, constructed, operated and maintained in accordance with American National Standard Code for Pressure Piping, Chemical Plant and Petroleum Refinery Piping, ANSI/ASME B31.3.~~
- ~~(3) Valves used in production equipment shall comply with –
 - ~~(a) API Spec 6D, Specification for Pipeline Valves, End Closures, Connectors and Swivels; or~~
 - ~~(b) API Std 600, Steel Gate Valves, Flanged or Butt welding ends.~~~~
- ~~(4) Pipe flanges and flanged fittings used in production equipment shall comply with –
 - ~~(a) American National Standard, Steel Pipe Flanges and Flanged Fittings, ANSI/ASME B16.5; or~~
 - ~~(b) API Std 605, Large Diameter carbon Steel Flanges.~~~~
- ~~(5) All unfired pressure vessels shall be designed, constructed, tested and maintained in accordance with SAA AS 1210, Unfired Pressure Vessels.~~

~~(6) All pressure relief valves shall be designed, constructed, tested and installed in accordance with SAA AS 1271, Valves, water gauges and other fittings for boilers and unfired pressure vessels.~~

~~A pressure relief valve used to protect pressure vessels or piping shall be inspected and tested—~~

~~(a) at approved intervals; and~~

~~(b) immediately after any indication that the valve may not operate correctly—~~

~~by a person trained in such inspection and testing.~~

606 Production Isolation Valves

A production facility shall be arranged and equipped with isolation valves that permit shut off in the event of a fire or other emergency.

607 Construction Approval

- (1) An Operator shall, before commencing the construction of a production facility, submit details of the location, design and proposed standards and method of construction of the production facility for the approval of the Director.
- (2) In addition to the requirements of sub-clause (1), if it is proposed to make significant additions or modifications to a production facility (other than for maintenance purposes), the additions or modifications shall not be commenced until the proposal has been submitted for the approval of the Director.
- (3) Information on a proposal under sub-clause (1) or (2) shall be submitted in a manner and form acceptable to the Director.
- (4) The Director may give an approval under this regulation subject to the Operator complying with conditions specified by the Director.
- (5) The Operator shall not breach, or fail to comply with, a condition imposed under sub-clause (4).
- (6) Unless the Director otherwise approves, a survey, map, data plot, location plan or profile submitted to the Director for the purposes of this regulation shall use (and only use) Geodetic Datum of Australia and Australian Height Datum.
- (7) An Operator shall not commence construction work to which this requirement applies unless or until the Director's approval is given.

Initial Production Tests

- (1) A newly completed or recompleted completion shall, before being brought onto production, or within one month of being brought onto production, be subjected to a production test to determine, as far as practicable -
 - (a) representative chemical analyses of fluids, as they existed in the geothermal resource;
 - (b) the production capacity of the well; and
 - (c) the formation characteristics that exist at least 10m from the well bore.
- (2) Unless valid data are in existence, where a completion is to be subjected to a major stimulation procedure (such as fracturing or acidizing), a test shall be carried out not more than six months before the stimulation and then, unless otherwise approved by the Director, a further test shall be carried out not more than three months after the completion of the stimulation.
- (3) A test under sub-clause (2) shall determine as far as practicable –
 - (a) any changes in the fluid flowing from the completion as a result of the stimulation;
 - (b) any changes in the producing capacity of the completion as a result of the stimulation; and
 - (c) any changes in formation characteristics as a result of the stimulation.
- (4) To such extent as the equipment installed in or on a well may permit, where a test is carried out under sub-clause (1) or (2), the closed in and flowing bottom hole pressures shall be measured.
- ~~(5)~~ The Operator shall notify the Director of a proposal to carry out a production test on a newly discovered geothermal resource under this requirement.
- ~~(6)~~ A notification under sub-clause (5) shall be given as soon as a decision is made as to when the test will be carried out.
- (7) A detailed report on the results of a production test shall be furnished to the Director within three months after the completion of the test (although the results of a test prior to a major stimulation may be combined with the results of the test after the stimulation).
- (8) A report under sub-clause (7) shall be submitted in a manner and form acceptable to the Director.

- (9) For the purposes of this requirement, a reference to a recompleted completion is a reference to a change to the completion that requires the approval of the Director under Clause 501.
- (10) Where an extended production test is approved a monthly report detailing pressure information, quantities of fluids produced and any sales of geothermal energy shall be submitted to the Director prior to the 15th day of the succeeding month.

609 Geothermal Energy Recovery Development Plan

For the purposes of Section 62A and 62B of the Act, a geothermal energy recovery development plan must contain

- (1) a description of the relevant existing geological and geothermal energy resource data that relate to the geothermal title area, and of the interceptions of that data; and
- (2) details of all proposed further data acquisitions and studies to enhance geological and geothermal energy resource understanding of the geothermal title area; and
- (3) a geothermal energy resource management plan that
 - (i) describes how the energy will be extracted
 - (ii) provides the reasons for adopting the proposed approach, and
 - (ii) estimates the future performance of the geothermal energy resource; and
 - (iii) specifies the proposed rate of recovery of geothermal energy
- (4) require that a geothermal energy recovery development plan be revised from time to time.
- (5) a geothermal energy recovery development plan, or a proposed variation of such a plan, shall be submitted to the Director in a manner and form acceptable to the Director.

610 Rate of Recovery of Geothermal Energy

- (1) For a fully developed resource, the annual rate of recovery of geothermal energy from that resource shall be subject to approval
- (2) The licensee's application under sub-clause (1) for approval of the rate of recovery of geothermal energy from a fully developed resource shall include a proposed rate of recovery, past performance of wells and the resource, prediction of future performance and estimate of ultimate recovery from the resource.

- (3) For a geothermal resource under development, a periodic review of the reservoir description, production policy and current resource performance shall be submitted at the request of the Director to demonstrate that it is being developed in a manner consistent with sound resource management practices and compatible with optimum long-term recovery.

611 Production Tests on Producing Wells

- (1) A production test to estimate the rate of recovery of geofluids and geothermal energy from the well, shall be carried out on each producing well at least once each month unless –
 - (a) the rate of recovery of geofluid from the well is monitored continuously; or
 - (b) the testing of the well at intervals greater than one month has been approved.
- (2) An application for approval of the testing of a well at intervals greater than one month shall be accompanied by a statement of the reasons for the application.

612 Measurement of Produced Geofluids

- (1) Geofluids shall not be recovered, vented, disposed of or used in recovery operations unless approved equipment and procedures are used on each completion enabling both the quantity and composition of such fluids to be determined.
- (2) Where the Director considers that inadequate production information is being obtained from a procedure being carried out for the purposes of this requirement, the Director may require that additional testing be carried out to the Director's satisfaction.
- (3) A metering device used on geofluids, gathering system, production facility or pumping station shall conform to a recognized standard.
- (4) A meter or other device used to measure the production of geofluids shall be proved and certified as to its accuracy in a manner, and at a frequency, determined by the Director.

613 Measurement of Production to Determine Royalties

- (1) The Director may, for the purposes of determining the geothermal energy royalty payable in relation to an operation, select a measuring facility installed at a well or production facility, or on a pipeline, vessel or other receptacle that is used for the storage of geofluids produced from a well.

- (2) Except in an emergency, a seal fixed under sub-clause (1) shall not be tampered with or removed without written permission of the Director.

614 Surface Connections

Each well from which geofluids is recovered shall be provided with such surface connections and equipment as are necessary to prevent the injection of geofluids into the well from another well or from production equipment.

615 Production From More Than One Reservoir From One Well

Geofluids shall not be recovered simultaneously from more than one reservoir in a well unless provision is made to maintain in a well separation of geofluids recovered from each reservoir until the geofluids pass a point where the quantity and composition of geofluids from each reservoir is determined in accordance with clause 612.

616 Production From More Than One Reservoir From More Than One Well

Geofluids recovered from different reservoirs and from more than one well shall not be commingled until the geofluids pass a point where the quantity and composition of geofluids from each well and from each reservoir in which these wells are completed is determined in accordance with clause 612.

617 Segregation of Zones

- (1) An Operator shall, in relation to each multiple completion well, demonstrate that segregation between the completions has been achieved and maintained -
 - (a) after the initial well completion, after any change of subsurface equipment and after any other operation that may disturb, or exert abnormal differential pressures on, subsurface equipment; and
 - (b) additionally, at least once in a year, or at such other intervals as the Director may require or approve.
- (2) An Operator shall, within one month after completing a test carried out to meet the requirements of Sub-Clause (1), furnish the Director with a report of the test which includes all relevant data obtained from the test, and analysis and interpretation of the results of the test to prove or confirm segregation.
- (3) If a test carried out to meet this requirement, or the production characteristics of a well indicate that segregation between completions is ineffective, the Director shall be immediately informed.
- (4) All reasonable steps shall be promptly taken to re-establish segregation and, if those steps are not successful, the Director may order that one or more of the completions be sealed off.

- (5) If an Operator fails to demonstrate to the Director in accordance with this regulation that segregation between completions has been achieved, the Director may require that the well be shut-in or produced in a specified manner specified by the Director.
- (6) An Operator shall give the Director at least three days notice of an intention to carry out a test for the purposes of this requirement.

618 Waste or Contamination

- (1) Where, in the opinion of the Director, there is a reasonable possibility that –
 - (a) geofluids are being wasted or;
 - (b) geofluids are being contaminated,the Operator shall carry out such tests specified by the Director.
- (2) An Operator shall carry out the test required under sub-clause (1) within a reasonable time and if, as a result of those tests, it is established that waste or contamination is occurring, the Operator shall take such steps as may be necessary to remedy or prevent the waste or contamination.
- (3) If steps are taken under sub-clause (2), the Director may then require the Operator to carry out further tests to determine the effectiveness of those steps in remedying or preventing the waste or contamination.
- (4) The results of any test carried out under this requirement shall be furnished to the Director as soon as practicable after they are obtained by the Operator.

619 Waste Liquid

All formation water, and other waste fluids produced from a well, shall be disposed of in a manner acceptable to the Director, and in no case may the disposal of formation water, drilling fluid or refuse from tanks or wells be allowed to constitute a risk to public health or safety, or to contaminate water or land not specifically designated for waste disposal.

620 Monitors and Control Mechanisms

Approved monitors and control mechanisms shall be used to -

- (a) control the rate of recovery of geofluids from a well;
- (b) control the pressure in pressure vessels and associated piping so that the safe working pressure of the vessels and piping is not exceeded;

- (c) prevent the escape of geofluids;
- (d) shut down the artificial lift device (if any) and close in a well in the event of -
 - (i) a break in a pressure vessel or associated piping receiving or conveying petroleum or water flowing from the well;
 - (ii) any failure of any control mechanism associated with the well which might result in an unsafe condition being caused by the escape of geofluids; or
 - (iii) any fire or explosion in the vicinity of the well; and
- (e) activate fire control mechanisms in the event of the outbreak of fire or an explosion.

621 Safety Devices

A well that is capable of producing geofluids by natural flow shall be equipped with an approved safety device, which shall be -

- (a) designed so that it closes off automatically the flow of geofluids from the well if the flow line or associated production equipment is damaged in such a way that would allow the escape of geofluids;
- (b) located in an approved position;
- (c) operated and tested at approved regular intervals; and
- (d) where a test indicates that it may not operate correctly, repaired or replaced forthwith.

622 Workover of Wells

- (1) A well shall not be worked over without prior approval (refer to clause 501).
- (2) An application for approval to work over a well shall include particulars of -
 - (a) the zone in the well proposed to be abandoned (if any);
 - (b) the zone in the well proposed to be developed (if any);
 - (c) proposed modifications and changes of the equipment in the well;
 - (d) proposed changes (if any) in the wellhead and production equipment; and

- (e) procedures proposed to be used.

623 Wireline Operations in Wells

Except in an emergency, notice acceptable to the Director shall be given of an intention to conduct a wireline survey in a well or to move an item of subsurface equipment in a well.

624 Sampling Geothermal Streams

Notice acceptable to the Director shall be given of an intention to sample for royalty purposes a geothermal stream.

625 Meter Proving

Notice acceptable to the Director shall be given of an intention to prove for royalty purposes a heat geothermal metering device.

~~**626 Pressure Vessel Inspection**~~

~~(1) Before a pressure vessel is placed in service it shall be inspected and tested by an inspector or a person authorized to carry out such inspections and testing and a test report shall be submitted to the Director.~~

~~(2) All pressure vessels shall be inspected and tested by a competent person(s)~~

~~(a) in accordance with approved procedure;~~

~~(b) at approved intervals.~~

~~(3) Notice acceptable to the Director shall be given of an intention to inspect and test a pressure vessel.~~

627 Protection of Completed Wells

(1) Reasonable steps shall be taken to protect a completed well and a notice warning persons of the danger that exists in relation to the well shall be kept on display in the vicinity of the well.

(2) A well that has not been suspended or plugged and abandoned shall be inspected at intervals not exceeding six months.

(3) On an inspection under sub-clause (2) -

(a) all tubing and annulus pressures shall be measured;

(b) any evidence of communication shall be evaluated; and

(c) the extent of any necessary repairs or maintenance shall be determined.

- (4) An Operator shall, at the end of each month, furnish the Director with a report on the wells that have been worked over during the previous month.
- (5) A report under sub-clause (4) shall be furnished in a manner and form acceptable to the Director.

628 Plugging of Wells

- (1) Upon completion of production activities and within 2 years after the surrender of a production licence, all wells will be plugged and abandoned in accordance with Clauses 527 and 528.
- (2) Wells may remain without being plugged and abandoned in a licence area following 2 years after the surrender of a geothermal production licence only with approval.
- (3) The Director may direct that a well or wells be plugged and abandoned within a reasonable time-frame determined by the Director –
 - (a) in the interest of safety;
 - (b) for the protection of the environment; or
 - (c) for the purpose of the elimination of waste or contamination.

629 Removal of Facilities

- (1) Upon completion of production activities and within 2 years after the surrender of a geothermal production licence, every production facility shall be dismantled and removed or abandoned in a reasonable manner acceptable to the Director.
- (2) Production facilities may remain intact in a licence area following 2 years after the surrender of the geothermal production licence only with approval.
- (3) The Director may direct that any part or all of a production facility be dismantled and removed or abandoned within a reasonable time-frame determined by the Director –
 - (a) in the interest of safety;
 - (b) for the protection of the environment; or
 - (c) for the purpose of the elimination of waste or contamination.

630 Restoration of Lands

Following the completion of production activities and within 2 years after the surrender of a geothermal production licence, the land surrounding or affected by production facilities and wells shall be restored as far as practicable to its original condition to the reasonable satisfaction of the Director.

DIVISION 2 Reporting and Data Submission

631 Program of Work

A licensee shall before 30 September, or such other date as the Director nominates, in each year submit to the Director a program of work proposed to be carried out in the licence area by the licensee during the period of the next 12 months commencing on 1 January or 3 months after that nominated date.

632 Estimate of Geothermal Energy Resource

- (1) In the month of September or such other month as the Director nominates in each year a licensee shall send to the Director two copies of a report in accordance with this clause in respect of the amount of the geothermal energy resources in the licence area of the licensee.
- (2) A report referred to in sub-clause (1) shall be in an approved form and shall specify –
 - (a) the location of the geothermal energy resource;
 - (b) the estimated amount of geothermal energy resource; and
 - (c) the data upon which the estimates used in the report are based –

and shall be accompanied by any specific reports made during the last preceding year in connection with reservoir performance and production optimisation.

When a field study resulting in a revised estimate of the geothermal energy resource has been carried out, two copies of a report of that study and the revised estimate shall be sent to the Director.

633 Monthly Production Report

Not later than the 15th day of each month two copies of a monthly production report in respect of each resource in a licence area, in an approved form, relating to the last preceding calendar month and containing the following information shall be sent to the Director -

- (a) the total quantities of –
 - (i) thermal energy (contained heat value) produced;
 - (ii) thermal energy delivered –

and the cumulative quantities of geofluids used as at the end of the month;
- (b) for each well -

- (i) its identification name and number;
- (ii) a summary of all work performed on each well in the licence area during the previous month;
- (iii) the result of the production test required by clause 611, including the metering facility;
- (iv) its status at the end of the month;
- (v) the number of days of production or injection; and
- (vi) the total estimated quantities of geofluids used during the month and the cumulative quantities of thermal energy produced or injected as at the end of the month.

634 Production Facility Maintenance Reporting

- (1) Reports on the following shall be furnished to the Director as soon as practical after they occur -
 - (a) mechanical damage, heat stress or corrosion that could affect the safety or integrity of a production facility to an extent that necessitates a change in operations;
 - (b) any non-routine corrosion investigation (such as instrumented pigging, acoustic emission testing and pipe examinations).
- (2) A report under sub-clause (1) shall include, or be followed by, a report on the repairs carried out as a result of any matter identified under sub-clause (1).
- (3) Where a pressure test is carried out on a section of a production facility, a report on the results of the test, and any interpretation of those results, shall be furnished to the Director within one month after the completion of the test.
- (4) In addition to the other requirements of this clause, the Operator shall within two months after the end of each year furnish the Director with a report -
 - (a) summarizing the routine corrosion and other surveys carried out on a production facility during the year; and
 - (b) assessing the condition of the production facility as at the end of that year.
- (5) A report under this requirement shall be furnished in a manner and form acceptable to the Director.

635**Records of Periodic Inspections**

- (1) Accurate records shall be maintained of all periodic inspections of facility equipment and piping.
- (2) Records shall include the particulars of the inspections, testing or proving of -
 - (a) pressure vessels;
 - (b) meters;
 - (c) pressure relief valves;
 - (d) control valves; and
 - (e) any other items, equipment or piping reasonably determined by the Director.
- (3) Records of inspections for corrosion shall be maintained for the production facility, equipment and piping.
- (4) There shall be submitted to the Director not later than the last day of each month the reports of all pressure vessel inspections carried out during the preceding month which include evaluation of the inspections and set out any intended further actions considered necessary as a result of the evaluation.
- (5) Notwithstanding the requirements of sub-clause (4) in the case of the discovery of serious damage or deterioration requiring immediate corrective action, a report shall be made forthwith to an Inspector, and a written report as soon as practicable made to the Director.

636**Production Records and Reports**

- (1) Where geofluids from two or more wells is commingled before it is measured, the Director may, on the application of an Operator, allow records to be kept, and reports to be furnished on a combined basis but, in that event, the production from each individual well shall be estimated in a manner acceptable to the Director to determine, so far as may be practicable, the actual production from each well (and that estimate will represent the production of that well for the purposes of the Act and these requirements).
- (2) An Inspector is entitled at any reasonable time –
 - (a) to inspect production records that are required to be kept under these requirements; and

- (b) to copy and take extracts from those records, or to require a person to provide a copy of those records.
- (3) A person shall not refuse or fail to comply with a request made of such person for the purposes of this requirement.
- (4) In this requirement – “Inspector” includes an authorized officer under the Act.

637 Reports on Wireline Surveys and Sub-surface Safety Valves

Where a survey using wireline techniques is conducted in a well during any month, one copy of a report of the survey, together with any records made for the purpose of the survey, shall be submitted to the Director not later than the 15th day of the next succeeding month.

~~638 Reports on Pressure Vessels~~

- ~~(1) There shall be submitted to the Director not later than the last day of each month the reports of all pressure vessel inspections carried out during the preceding month which include evaluation of the inspections and set out any intended further actions considered necessary as a result of the evaluation.~~
- ~~(2) Notwithstanding the requirements of sub-clause (1) in the case of the discovery of serious damage or deterioration requiring immediate corrective action, a report shall be made forthwith to an Inspector, and a written report as soon as practicable made to the Director.~~

PART VII GEOPHYSICAL AND GEOLOGICAL SURVEYING

DIVISION 1 General Requirements

701 Application

This part applies to all geophysical and geological surveys carried out in the search for geothermal energy.

702 Authorization

A Geothermal title holder shall carry out all geophysical and geological surveys in accordance with the provisions of this Schedule and the guidelines for Onshore Geothermal Geophysical Surveying as specified in Appendix I.

703 Person-in-charge

- (1) The name of the person-in-charge of any geological or geophysical party shall be clearly displayed on the site of that operation.
- (2) The person-in-charge shall ensure to the best of his ability that all personnel in his charge know and comply with all relevant requirements of this Schedule and safety procedures applicable to the operations under his control.

704 Approval to Carry out Geophysical and Geological Surveys

- (1) A person shall not carry out a geophysical or geological survey in connection with exploration for geothermal energy or the development of a geothermal energy resource except with the approval of the Director.
- (2) An application to the Director for approval to carry out a geophysical or geological survey shall be made by a Geothermal Title Holder, and
 - (a) shall state the type of survey, the proposed date of commencement and the estimated duration of the survey; and
 - (b) shall be accompanied by a copy of the current Landgate Public Plan showing the existing land tenure, i.e. reserves, private property, etc. in relation to the survey lines.

The public plan shall also have marked on it the –

- (i) plan name and number;
- (ii) scale
- (iii) latitude and longitude
- (iv) Geothermal title and other mineral and petroleum title and petroleum boundaries;

- (c) shall, in the case of a seismic survey –
 - (i) give details of the energy source to be used;
 - (ii) indicate on the public plan the proposed survey traverses;
 - (iii) be in accordance with the approved Form (reference Appendix 2).
- (d) where a geophysical or geological survey is carried out by a person other than the Geothermal Title holder, the name and address of the person carrying out the survey shall be supplied to the Director;
- (e) may set out any other matters that the applicant wishes the Director to consider in connection with the application.

705

Application for Geological and Geophysical Surveys

- (1) An application to carry out a geophysical or geological survey in those areas which include reserves under the *Land Administration Act 1997* and the *Petroleum and Geothermal Energy Resources Act 1967* pursuant to Section 15A thereof
 - (a) shall be made three months prior to the commencement of the survey; and
 - (b) the applicant shall nominate the reserves affected and request the Director to seek approval for entry into the reserves.
- (2) In all other cases an application to carry out a geological or geophysical survey may be submitted one month prior to the commencement of operations,
 - (a) or two weeks before the proposed date of commencement of an extension of –
 - (i) the approved area in which a survey is being carried out; or
 - (ii) the duration of the survey
- (3) Where the Director has given approval to a person to carry out a seismic survey, the person shall not commence the survey, unless the Director otherwise permits, until the expiration of 48 hours after the person has informed the following people of the intention to commence the survey and of the location at which and approximate times at which explosives (if any) are to be detonated –

- (a) the Director or other person nominated by the Director; and
- (b) where a survey is to be carried out in Inland Waters, an inspector appointed under the Fish Resources Management Act 1994 of the State of Western Australia as re-enacted or amended from time to time.

706 Protection of the Environment

The Geothermal Title holder shall ensure that all employees and contractors comply with environmental requirements as specified in the Guidelines for Onshore Petroleum Geophysical Surveying (Appendix I) and the APPEA Code of Environmental Practice.

707 Special Conditions Governing Geophysical and Geological Surveys

- (1) Prior to the carrying out of any ground work, including reconnaissance within a State Forest, the Title holder shall, in order to minimise the spread of jarrah dieback, seek the Department of Environment and Conservation approval to use its road and tracks.
- (2) Prior to submitting an application to the Director for approval to carry out a seismic or drilling operation within a State Forest the Title holder shall first contact the Department of Environment and Conservation, to negotiate conditions aimed at minimising the disturbance of the forest environment.
- (3) No vehicle or disease carrier may be taken into any area proclaimed as a disease risk area, i.e. quarantined, whether State Forest or otherwise, without first obtaining a permit from the Department of Environment and Conservation.
- (4) Prior to the commencement of geophysical operations agreement shall be reached with the appropriate municipality (city, town, or shire) in respect of those operations to be carried out on property controlled by the municipality.

~~708 Explosives~~

~~All operations involving the use of explosives shall be in accordance with the Dangerous Goods Safety Act 2004 and Dangerous Goods Safety (Explosives) Regulations 2007 and Part IV Division 2 of this Schedule.~~

~~709 Manuals~~

- ~~(1) Manuals shall be provided as requested in Clauses 202, 203, 204 and 205.~~

~~(2) The manuals shall incorporate, but not necessarily be limited to, the handling of explosives and all the requirements included in this Schedule and in other Directions issued under the Act except insofar as—~~

~~(a) the requirements relate only to the Geothermal Title holder; and~~

~~(b) the Director approves any omission.~~

~~710 Communications~~

~~Radio or telephone communication facilities shall be available at, or accessible to, all geophysical or geological operations.~~

~~711 Operations near Mines, Quarries and Petroleum Production Operations~~

~~(1) The operator shall notify the Director of any plan to carry out a seismic operation within 300m of a mine, quarry, petroleum production operation and facility or pipeline.~~

~~(2) The Director may require that the seismic operation be carried out in accordance with special requirements determined by the Director and the operator shall comply with those requirements.~~

712 Operations on Roads and in Inhabited Areas

(1) Where a geophysical or geological operation is to be carried out on a road or track ordinarily used by the public, or in the vicinity of an inhabited area, the operator shall give written notice of the proposed operation to any council under the *Local Government Act 1995* in whose area the road, track or inhabited area is situated.

(2) A wooden stake, spike, pin or other pointed object shall not, in the performance of any geophysical or geological operation, be driven into the carriage way of a road or track.

(3) Where a seismic survey is to be carried out in the vicinity of a building or public utility, all reasonable steps shall be taken to ensure that the operation does not cause any damage, or inconvenience any person.

713 Marking Seismic Lines

A permanent marker shall be set in place at the intersections of survey lines, at the intersection of a survey line and a road that has been formed or graded, and at intervals on each survey line of not more than five kilometres.

714 Shot Points Near Buildings and Public Facilities

(1) Minimum distances from buildings and public facilities to -

- (a) explosive energy source – refer to clause 5 of Appendix 1 “Guidelines for Onshore Geothermal Geophysical Surveying”;
 - (b) in the case of a vibratory or other surface seismic source, 20m of a well, production facility, pipeline, monument, building or heritage item or site, or public utility.
- (2) If a seismic line is to cross a pipeline -
- (a) reasonable notice of the proposed crossing shall be given to the owner of the pipeline;
 - (b) the owner shall be given a reasonable opportunity to inspect the site and to consider the implications of the proposed crossing; and
 - (c) if appropriate, an earth ramp shall be constructed over the pipeline before earth-moving equipment or heavy vehicles begin crossing the pipeline.

715 Shot Hole Temporary Plug

When a drilling crew is so far in advance of a firing crew that a shot hole will not be fired immediately after completion of the drilling, a temporary plug or cover shall be placed in or over the shot hole until the firing crew is ready to fire the charge.

716 Permanent Shot Hole Plugs

- (1) A shot hole shall be suitably plugged with consolidated earth after firing, and the disturbed area restored, so far as is practicable, to its original state.
- (2) Any damage caused by the cave-in or collapse of a shot hole shall be restored.

717 Uncontrolled Flow of Water

- (1) If a flow of artesian water is encountered during seismic drilling operations, or is detected at a subsequent time, it shall be controlled, and the Director shall be notified of the flow, and of the steps taken to control it.
- (2) The Director may require that additional steps be taken to control the flow.

DIVISION 2 Reporting

718 Weekly Reports

A weekly report shall be forwarded to the Director stating progress of the survey. When a survey has been completed, a summary stating the start and completion dates and the number of kilometres or samples acquired (including geochemical samples) shall also be forwarded.

719 Basic Data Submission

- (1) Where a geological or a geophysical survey has been carried out, all basic data pertinent to the survey and all original records obtained in the field as a result of the survey shall be properly stored and maintained so as to prevent undue deterioration and shall be retained in Australia.
- (2) When a geological or geophysical field survey has been carried out, the following information shall, unless otherwise approved, be made available as soon as practicable, but in any event within one month of completion of processing of data, and distributed as directed by the Director -
 - (a) where a gravity or magnetic survey has been carried out, and where applicable, -
 - (i) one copy of processed located and gridded data in the ASEG-GDF format on appropriate media;
 - (ii) one stable base copy of Bouguer gravity, free air gravity, total magnetic intensity and, if prepared, vertical gradient and residual contour maps;
 - (iii) one stable base copy of computer generated profile data; and
 - (iv) one copy of analog monitor records, diurnal records and altimeter records; and
 - (v) any maps or profiles made available pursuant to this clause shall annotate line position, line number, registration marks and processing parameters;
 - (b) where a 2D seismic survey has been carried out, and where applicable, -
 - (i) one stable base transparent copy of both a single survey and composite shotpoint location map together with one copy on approved digital media of shotpoint coordinates and elevations (geographic and Map Grid of Australia) in United Kingdom Offshore Operator Association format if possible and related to the Australian Geodetic Datum;

- (ii) one stable base copy of final processed sections having a vertical scale of not less than 10cm/sec, and, if prepared, migrated sections;
- (c) where a 3D seismic survey has been carried out and where applicable, -
- (i) data submissions will be as per Clause 719(2)(b) (i) and (ii) for 2D surveys, except in (ii) the interval between the lines will be at the discretion of the Director;
 - (ii) at the specific request of the Director, one copy of field data accompanied by observer's logs in an acceptable format; and
 - (iii) one copy of final stacked migrated data on approved digital media, in a specified SEG standard format, suitable for loading onto interactive work stations for interpretation.
- (3) All digital media submitted shall be of at least manufacturer's certified "error free" quality and be accompanied by suitable verification testing.
- (4) Where seismic reprocessing, an analysis, study or operation not covered in sub-clause (1) is undertaken to satisfy the work commitments of the title, a written report of the activity and interpretation of the results shall be forwarded to the Director as soon as possible.
- (5) Activities referred to in sub-clause (4) include but are not limited to geophysical and geological studies and seismic reprocessing. Data submission for seismic reprocessing shall be as in sub-clause (2). Location data previously submitted need not be resubmitted unless the lines have been resurveyed.
- (6) All field and stacked seismic data on approved digital media shall be submitted to the Director prior to the relinquishment or expiry of the geothermal title, however the Director may request seismic tapes at any time.

720

Final Reports on Geophysical and Geological Surveys

- (1) Where a geophysical or geological survey has been completed one copy of a report in writing in accordance with this Clause shall be furnished to the Director not later than six months after the completion of the project.
- (2) A report in accordance with this Clause relating to a geophysical or geological survey shall include -

- (a) the name and location of the survey;
- (b) the dates of commencement and termination of the survey;
- (c) the names of the contractors used to carry out the survey;
- (d) the final line kilometres recorded by the survey;
- (e) particulars of the operations carried out;
- (f) particulars of the system and equipment used for positioning and mapping of the survey;
- (g) particulars of the methods and equipment used for the survey;
- (h) particulars of the processing of the data obtained as a result of the survey;
- (i) particulars of the interpretations made as a result of the survey together with maps and sections drawn on the basis of the interpretations made;
- (j) summary of the costs of the survey; and
- (k) list of magnetic media with index of contents and format.

721 Reports of Damage to Property

- (1) In this clause, a reference to serious damage is a reference to -
 - (a) damage to property, or the event by which it was caused and is required by or under a law of Western Australia to be reported to a person carrying out duties under that law;
 - (b) an event by reason of the occurrence of which a person suffers loss or damage to property of an amount exceeding \$20,000; or
 - (c) damage to property caused by an event by reason of which there occurred death or serious injury within the meaning of Clause 286.
- (2) Where property used for or in connection with operations in the area suffers serious damage –
 - (a) a report of the damage shall forthwith be made to an inspector verbally or by telephone, radio, facsimile or otherwise;
 - (b) a report in writing of the occurrence of the damage shall be given or sent to the Director as soon as practicable after the occurrence of the damage specifying –

- (ii) the date, time and place of the occurrence of the damage;
- (iii) particulars of the damage;
- (iv) the events so far as they are known or suspected that caused or contributed to the damage; and
- (v) particulars of repairs carried out or proposed to be carried out to the damaged property.

PART VIII - REPORTING REQUIREMENTS FOR EXPLORATION TITLES

801 Periodic Reports

(1) Geothermal titles require -

(a) Annual reports

There shall be made available to the Director not later than one month after the expiration of the period to which it relates an annual report.

The annual report may take the place of the fourth quarterly progress report required under sub-clause (a).

The annual report shall be more comprehensive than a quarterly report and shall include –

- (i) a general discussion of permit status and operations carried out (including office studies);
- (ii) technical conclusions derived from the year's operations;
- (iii) a list of reports submitted during the year;
- (iv) an outline of work plans for the next year;
- (v) current and appropriately scaled interpretation maps; and
- (vi) a summary of annual expenditure.

(2) Where a geological or geophysical field survey has been carried out, all basic survey data and supporting material shall be lodged with the Director not less than 3 months prior to the last day of the current term of the title, or at such other time as directed or agreed by the Director.

(3) All records lodged shall be clearly labelled with all necessary information for identification.

GUIDELINES FOR ONSHORE GEOTHERMAL GEOPHYSICAL SURVEYING

1. INTRODUCTION

The following guidelines are designed to help geothermal energy exploration companies and contractors maintain suitable standards that minimise environmental damage. The guidelines define the consultation that is required to enable exploration to be undertaken while, at the same time, accommodating the needs of conservation and other land use issues. Adherence to the guidelines would also ensure:

- (i) that disturbed tracts are constructed and rehabilitated in a manner which will encourage regeneration as soon as practicable after completion of operations;
- (ii) compliance with all relevant requirements for those Acts listed hereunder and any rules, regulations, by-laws or directions applicable to Shires or Districts in which operations are to be performed; and
- (iii) operations are organised and conducted with due regard to good operations practice thus minimising any disturbance to wildlife, livestock, flora and sites of natural, historical and cultural significance.

The guidelines are for exploration work and are not intended to cover feasibility or developmental stages of resource projects.

2. LEGISLATIVE REQUIREMENTS

Onshore exploration for geothermal energy and geothermal energy resources in Western Australia is only permitted by way of a title or authority issued under the *Petroleum and Geothermal Energy Resources Act 1967*.

While the title or authority remains in force it authorises the permittee, subject to any conditions imposed, to carry out all operations necessary to search for geothermal energy and geothermal energy resources on Crown Land and private land within the relevant area.

Most geothermal exploration work is conducted under an exploration permit in accordance with the specified conditions. The permittee must apply in an approved form for approval to conduct each specific exploration operation.

2.1 Crown Land

Crown Land is all land other than private land, which has not been reserved or leased (except that pastoral and timber leases are regarded as Crown Land).

2.2 Private Land

There is provision for private land owners/occupiers to seek compensation for loss of earnings and fire damage to the surface or to any improvements on private land. Similarly compensation is payable to pastoral lessees for loss of earnings, damages to improvements and consequential damage.

Approved operations shall not be conducted on private land until agreement has been reached with the land owner/occupier with regard to compensation (if any). If agreement cannot be reached, either party may apply to have the matter determined in the Local Court.

The title holder must give the land owner and occupier three (3) months notice that the title holder intends to commence operations on the private land.

2.3 Some of the legislation related to other land uses which could impact on geothermal operations includes but is not limited to

- *Aboriginal Affairs Planning Authority Act 1972;*
- *Aboriginal Heritage Act 1972;*
- *Aboriginal Communities Act 1979;*
- *Agriculture and Related Resources Protection Act 1976;*
- *Bush Fires Act 1954;*
- *Conservation and Land Management Act 1984;*
- *Dangerous Goods Safety Act 2004*
- *Environmental Protection Act 1986;*
- *Land Administration Act 1997*
- *Mining Act 1978;*
- *Petroleum and Geothermal Energy Resources Act 1967;*
- *Petroleum Pipelines Act 1969;*
- *Rights in Water and Irrigation Act 1914;*
- *Soil and Land Conservation Act 1945;*
- *Wildlife Conservation Act 1950.*

It needs to be appreciated that geothermal explorers are only one of the bodies which may have authority to utilise the land. At times competing and conflicting interests may occur and it is the explorers' responsibility to conduct their operations in a manner which will not prejudice their future interests and that of others.

A positive way in which to help overcome problems of competing interests is to improve communication and allow sufficient time for problems to be resolved. In this regard applications for operations should be made in a timely manner. An application for a seismic survey affecting reserved land should be made at least three months prior to the commencement date and in areas of largely Crown Land at least two months prior to commencement.

3. OPERATIONAL PLANNING AND MANAGEMENT

The first step in operational planning is to initiate and maintain liaison with all landholders and through the Department of Mines and Petroleum, with regional land management authorities affected by the exploration activities. Such Authorities include the Department of Environment and Conservation, the Department of Agriculture and Food, Local Shires and Land Conservation District Committees. The scope of the exploration plan should be discussed with them using line location maps and/or air photographs or field visits. These discussions should take place prior to detailed planning to identify potential problem areas.

The possibility of requiring expert environmental advice should be anticipated early in the planning process.

The design of seismic grids, access roads, campsites and airstrips should include measures that minimise adverse effects to the environment. Environmental constraints should be considered and included in specifications for survey contracts.

3.1 The exploration programme should incorporate methods that minimise adverse effects to the environment and ensure no long-lasting evidence of activities. Particular attention should be given to:

- reference to topographic and survey maps, air photographs and literature relevant to the region's ecological system;
- incorporation of a programme of environmental protection and restoration;

3.2 Plans should be made to:

- minimise vegetation and topsoil disturbance;
- avoid wind and water erosion;
- avoid alteration to drainage;
- minimise interference to existing land use;
- prevent undesirable third party access;
- limit disturbance to native fauna and flora, especially Gazetted rare species;
- prevent the spread of noxious weeds and plant diseases such as dieback;
- prevent pollution; and
- avoid sites of Indigenous, historical and heritage significance.

3.3 Where a geological or geophysical field survey has been carried out, all basic survey data and supporting material other than referred to in sub-clause (2) shall be lodged in accordance with the instructions of the Director not less than one month prior to the data becoming publicly releasable, or not less than three months prior to the last day of the current term of the title, whichever is the earlier, or at such other time as directed or agreed by the Director –

- (a) where a seismic survey has been carried out;
 - (i) one copy of field tapes accompanied by observer's logs in an acceptable format; and
 - (ii) one copy of stack tapes, in a specified, SEG standard format, and upon request of the Director, one copy of other processed tapes.

3.4 All magnetic tapes or other digital media submitted shall be of at least manufacturers certified "error free" quality and be accompanied by a suitable verification listing.

3.5 At the request of the titleholder, the Director may extend the time of lodgement specified in sub-clause (3) by periods not exceeding three years each, provided –

- (a) the titleholder provides and continues to provide access to the data to the Director and his nominees on request; and
- (b) the data are stored in conditions approved by the Director.

- 3.6** All records that are lodged with the Director shall be clearly labelled with all necessary information for identification.
- 3.7** It is important during planning that a full appreciation of any contentious issue is conveyed in writing and acknowledged by the parties involved. A well prepared survey layout and a description of environmental practices will assist in ensuring that good practices will be employed.
- 3.8** Subsequent to the completion of the survey a final inspection should be made with the landholder or managing authority of all roads, gates, fencelines, campsites and operational sites to ensure that they have been left in an acceptable condition.

4. MANAGEMENT OF IMPACTS

Seismic line construction has the most obvious impact on the landscape. Before construction the operator must check with power, water and pipeline authorities to ascertain the presence of features requiring special consideration. Habitats such as flat sandplains and spinifex may present few problems, whereas Permian outcrops in the Kimberley, Minilya and Gascoyne areas are extremely friable and erode with little disturbance.

Seismic operators should, wherever practicable, adopt the following practices and standards:

4.1 Line Orientation

- While line orientation is a function of subsurface geology, line layout should be designed to avoid erosion and interference to natural drainage patterns.
- Bladed lines should be avoided wherever possible. In particular they should avoid salt lakes, salt flats, clay pans and adjacent dunes as regeneration is slow.
- Oblique traversing of sand dunes, steep cutting and filling that may cause land slides, erosion or slump problems should be avoided, ie. dunes should be approached at right angles and interdunal corridors should be used wherever possible. Dune crests should be cut at an angle to prevent deep cuts.
- Where practical, interruptions to the line of sight should be planned to reduce the visual impact of seismic lines.
- Springs and surface seepages, and associated vegetation should be avoided.

4.2 Line Construction

- Lines should be constructed to encourage rapid natural regeneration. Care should be taken not to plug drainage ways or culverts with earth fill. Existing drainage patterns should be maintained and clearance of vegetation along stream banks or deep gullies should be avoided. Windrows should be avoided, however, where they do occur windrows obstructing sheet flows in arid environments should be removed.
- All seismic traverses and access routes should be designed to minimise the removal of soil and vegetation. Preference should be given to using equipment which leaves root stock intact. Whenever practical, the vegetation should be rolled flat without disturbing the soil.

- Towed rollers and/or stickrakes should be used where practical and blading with heavy earthmoving equipment such as bulldozers avoided, particularly on silcrete, gibber plain and claypans.
- The maximum width of a seismic line must not exceed six metres. However, a single track with passing points is preferable. Where blading is necessary, the bladed width should be minimised.
- If soaks and drainage lines cannot be avoided disturbance should be minimised.
- In prescribed environmentally sensitive areas, the formation of windrows should be avoided. Where they occur, they should be levelled by back-grading onto the cleared line taking care to preserve survey markers.
- Windrows should be broken at approximately 100 metre intervals in flat country and more frequently in hills and undulating terrain to prevent concentration of runoff.
- To prevent erosion of the soil on slopes, construction of check banks and spur drains may need to be undertaken.
- Isolated trees and significant stands of vegetation should be left undisturbed wherever possible, especially in the vicinity of drainage channels.

4.3 Rehabilitation

- Borrow pits no longer in use should be left in a neat condition, with sides battered to a slope of no more than 1 in 5 to allow regrowth and prevent entrapment of stock and wildlife.
- Topsoil must be stripped, retained and finally respread over borrow pits or other excavated areas.
- Vegetation cleared prior to excavation for borrow pits should be returned as brush to the surface of the excavated area after topsoiling.
- To avoid importing soil from a different environment, soil to be used as fill should be taken from an area close to the operation where practicable.
- Tracks, lines and ramped dunes no longer required for access and to which a clay surface has been added should be rehabilitated to re-establish drainage and encourage restoration of the topography. Ripping should be carried out parallel to topographic contours. Deep cuts in dunes should first have their sides battered and brushed to minimise wind-scour and capped dune crests should have drainage bars with spur drains to prevent gully erosion.
- Expert advice should be sought to determine whether compacted soil should be ripped to provide seed and water catchment for native vegetation.

All areas affected by the operation should be restored as near as possible to their natural state. Unless specifically requested, seismic lines should not be left for the landholder to use as fence lines or future tracks, nor should campsite pads be left for future shed pads.

4.4 Access Tracks

- Lines should be concealed and rendered inaccessible from public lands. A dog-leg in the line where it crosses roads or tracks is practical and any vegetation removed should be pushed back to screen the dog-leg on completion of the work. Dog-legs should be clearly pegged and taped to prevent equipment operators accidentally ignoring the dog-leg. Blading should not be used adjacent to any public access. Line of sight should be broken when in public view, eg. on dune crests.
- Site access roads should by-pass or minimise traversing long slopes.
- Traffic in dune fields, the margins of drainage ways, around salt lakes and in wetlands should be restricted.
- Vehicular traffic should be confined to marked roadways, firebreaks around fence lines or to existing seismic lines. The disturbance of windward dune slopes and the removal of vegetation should be kept to a minimum.

4.5 Fire Control

- In periods where fire danger is high a water truck with a 2,000 litre water tank, plus fire fighting equipment should be with the crew at all times. Also, each 4-wheel drive vehicle should carry a knapsack spray unit, shovel, axe and rake. All conditions of the *Bush Fires Act 1954* must be complied with.
- Ensure equipment is adequately cleaned prior to deployment to prevent the introduction of noxious weeds or pathogens.

4.6 Disease and Weed Control

- When operating, current information should be obtained from the Department of Environment and Conservation in order to limit the spread of dieback pathogens and other weed species.

4.7 General

- Litter, fuel, oil drums, used grease cartridges, detonator wires, explosives cases and reels should be removed.
- Where possible, colour photographs should be taken before and after the seismic operation. These photographs should be properly identified and catalogued.
- Care must be taken when preparing seismic lines where there are power lines, coaxial cables, pipelines and other surface and sub-surface conduits.
- Any damage to land improvements should be reported promptly to the land manager, both verbally and in writing. Repairs should be effected without delay.

5. SHOTHOLES AND ENERGY SOURCE

- Vibrators will not be allowed to work within 20m of any gas, oil or water pipeline, electric cable or other utilities or installations.

- All operations involving the use of explosives shall be in accordance with the Dangerous Goods Safety Act 2004 and Dangerous Goods Safety (Explosives) Regulations 2007.
- All shotholes must be drilled off the cleared part of the seismic line.
- A shothole cap must be placed immediately above the highest explosive charge and the shothole backfilled and tamped to surface.
- The Department of Mines and Petroleum is to be notified immediately of any petroleum or artesian water resulting from shothole drilling or the use of explosives.
- Prior to shooting in areas where there are gas or water pipelines, the pipeline owner should be advised.
- Above ground blasting shall not be conducted within 150m of any perennial surface water, residence, well, bore or spring development in the absence of specific instructions from a utility the following charge-distance chart shall apply:

**SUGGESTED MINIMUM DISTANCES FROM FIXED IMPROVEMENT
TO EXPLOSIVE SOURCE**

**BURIED* EXPLOSIVE ENERGY SOURCE
(Charge per shot shown in kilograms)**

Fixed Improvement	Under 2.0kg	2.0 to 3.9kg	4.0 to 8.0kg	8.0 to 15.0kg	16.0 to 37.0kg
Pipeline (less than 15cm dia.)	60m	75m	90m	120m	180m
Pipeline (15-30cm dia.)	90m	120m	150m	180m	240m
Pipeline (greater than 30cm dia.)	120m	150m	180m	240m	300m
Telephone Line	12m	17m	23m	29m	35m
Rail Line or Main Paved Highway	45m	65m	85m	107m	130m
Electric Power Line	90m**	90m**	90m**	90m**	90m**
Water Well, Buildings	180m	210m	240m	270m	300m

* Standards have not been established for explosions on the surface.

** This distance may increase to 120 metres when Primacord is used to detonate the charge.

Source: G.S.I. Field Safety Handbook

-
- Wherever practical shotholes should be sited away from caves, breakaways and other sensitive environments.
 - Shotholes, cave-ins and damage caused by explosives must be suitably plugged with dry, unconsolidated fill and the disturbed area restored as near as possible to its original state. Particular attention should be paid to areas frequented by livestock.
 - Groundwater encountered must be protected from contamination or waste by adequate down-hole cementing.

6. CAMPSITES

- Campsites should be located well away from major water courses, creeks, mound springs, wells and pastoral property infrastructure (such as bores, dams and homesteads).
- Disposal pits will be constructed above water table, away from water courses, creeks and waterholes and will be of an adequate size to contain all of the waste and to allow for deep burial.
- Kitchen and ablution waters must empty into earth drains that allow rapid infiltration, prevent discharge to creeks and surface waters and be of an adequate size to ensure that water is directed away from areas frequented by camp personnel and vehicles.
- Adequate and properly maintained fire fighting equipment will be present at the campsite and all fires and ignition sources will be controlled to prevent bushfire.
- Litter, rubbish and other wastes that have not been buried must be removed from campsites within one week of abandonment and the sites put in such a condition as to encourage rapid rehabilitation.
- Rubbish dumps, sewerage drains, etc. shall be filled to ensure a minimum cover of 1 metre, in such a manner as to restore the land surface and to avoid surface contamination and disturbance by animals. During construction topsoil should be stockpiled and returned after filling to encourage regeneration.
- There should be no burial in sensitive areas. All rubbish should be removed and disposed of in a satisfactory manner.

BIBLIOGRAPHY

AMERICAN PETROLEUM INSTITUTE 1975. API Recommended Land Drilling Operating Practices for Protection of the Environment. API Division of Production, PR52.

CHAMBER OF MINES OF WESTERN AUSTRALIA n.d. Exploration Guidelines for Field Personnel. Pocketbook Brochure, 10pp.

CODE OF ENVIRONMENTAL PRACTICE 1996 by Australian Petroleum Production and Exploration Association

ENVIRONMENTAL MANAGEMENT OF SEISMIC OPERATIONS IN SOUTH-EAST OF SOUTH AUSTRALIA by Department of Mines and Energy South Australia 1996

KLEPACKI, N.M., BLACK, S.J. and MARCHANT, M.H. 1985.
Impact of Petroleum Exploration Activity on Range Resources and Pastoral Pursuits in the West Kimberley.
W.A. Dept. Agric., Division of Resources Management.
Tech. Report 41, 72 pp.

GEOPHYSICAL SERVICES INCORPORATED FIELD SAFETY HANDBOOK.

THE ARID ZONE FIELD ENVIRONMENTAL HANDBOOK by Santos Ltd 1997

STATE OF WESTERN AUSTRALIA
PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT, 1967
APPLICATION FOR PERMISSION
TO CONDUCT A GEOPHYSICAL SURVEY (ONSHORE)

To: Director Petroleum and Environment Division
Department of Mines and Petroleum
100 Plain Street
EAST PERTH WA 6004

.....
(Name of Applicant)
of

being the
(State whether permittee, licensee, or operator for)

.....

.....
of geothermal title

situated in the area specified as being within the State of WESTERN AUSTRALIA hereby
apply for permission to conduct a geophysical survey, and submit the following information
in support thereof:

- 1. Name of survey
- 2. Prime survey
- 3. Secondary survey
- 4. Geothermal title No.
- 5. Application for Access
- Authority attached.
- (Required only if lines extend
beyond the applicant's permits)
- 6. Consent of other permittees
- attached (Required only if
lines extend onto another
holder's permit)

APPENDIX 2 FORM 1

7. Name and address of the contractor

8. Number of the seismic crew

9. Technique

10. Energy source

11. Proposed commencing date

12. Estimated duration

13. Line km

14. Estimated cost

15. Object of survey (Attach statement if insufficient space)

16. Two plans showing the proposed Seismic lines one of which must be a current Landgate public plan.

17. One copy of the safety manual referred to in Clause 709 of this Schedule, if not previously submitted.

18. Other information it is desired to have considered by the Director

.....

.....

Dated at this day of 20 .

.....
(Applicant)

Queries concerning this application should be directed to

Telephone No

Email address