Queensland

Geothermal Energy Act 2010

Geothermal Energy Regulation 2012

Current as at 1 September 2019

Queensland

Geothermal Energy Regulation 2012

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Geothermal Energy Regulation 2012

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Division 1 Introduction

1 Short title

This regulation may be cited as the *Geothermal Energy Regulation 2012*.

2 Commencement

This regulation commences on 2 March 2012.

Division 2 Interpretation

3 Dictionary

The dictionary in schedule 5 defines particular words used in this regulation.

Division 3 Large-scale geothermal production

4 Large-scale geothermal production—Act, s 16

For section 16(2) of the Act, the prescribed criteria are as follows—

(a) the total thermal power of all geothermal wells measured at the wellhead is 5 megawatts thermal (MW_{th}) or more;

Example of measurement of thermal power—

For a geothermal well that produces 50 tonnes an hour of geothermal fluid with specific enthalpy of 900 kilojoules a kilogram, the thermal power of the geothermal well measured at the wellhead is 2.5 megawatts thermal (above 0°C).

(b) the geothermal production is for a commercial or industrial purpose.

Part 2 Requirements for proposed work programs, geothermal viability reports and development plans

5 Proposed work program—Act, s 47

For section 47(1)(f) of the Act, the prescribed matters for a proposed work program for a proposed geothermal permit are each of the following—

(a) a description of the geological model for the geothermal reservoirs in the area of the proposed permit;

(b) an assessment of the potential for the discovery of geothermal resources in the area of the proposed permit;

Examples of information that may be included in an assessment of the discovery of geothermal resources—

- an estimate of the recoverable thermal energy in the area using units of petajoules thermal (PJ_{th}) or megawatt thermal-years (MW_{th}-years)
- the geoscientific information, standards and procedures used to make the estimate of recoverable thermal energy

(c) an explanation of the rationale, having regard to the geological model, for the activities proposed to be carried out under the proposed permit;

(d) an outline of the expected outcomes to be achieved by the proposed work program.

6 Geothermal viability report—Act, s 65

(1) For section 65(4)(a)(i) of the Act, the prescribed requirements for a geothermal viability report for a geothermal permit are each of the following—

(a) identify each geothermal reservoir in the area;

(b) include an estimate of all proven and probable geothermal reserves identified in each geothermal reservoir in the area;

Example of an estimate of all proven and probable geothermal reserves—

an estimate of the economically recoverable part of a geothermal resource using units of PJ_{th} or MW_{th}-years relative to clearly stated base and cut-off temperatures

(c) state the geoscientific information, standards and procedures used to make the estimate mentioned in paragraph (b);

Examples of geoscientific information—

geological, geochemical, geophysical or geotechnical information

(d) state whether, in the geothermal permit holder's opinion, geothermal production in the area is currently commercially viable;

(e) if the holder's opinion is that geothermal production is not commercially viable—state whether, in the holder's opinion, it is likely to become commercially viable within 10 years;

(f) include data, and an analysis of the data, to support each opinion mentioned in paragraphs (d) and (e);

(g) include technical data for—

(i) the geology of the area; and

(ii) the geothermal reservoirs in the area supported by resource assessments and numerical reservoir modelling studies that include the market and financial data supporting the assessments and studies.

Examples of supporting market and financial data—

- an engineering and economic feasibility study showing that geothermal production in the area of the permit can be economically and technically justified
- data showing the uses for the geothermal energy

(2) In this section—

area means that part of the area of the geothermal permit that is a potential geothermal commercial area.

numerical reservoir modelling study means a study of the numerical model of a geothermal reservoir.

resource assessment means an estimate of the future potential for geothermal production in a geothermal reservoir.

7 Proposed initial development plan—Act, s 89

(1) For section 89(1)(e) of the Act, the prescribed matters are—

(a) for each geothermal reservoir identified in the proposed geothermal lease's area—the area limit of each geothermal reservoir; and

(b) details, including the location, type and size, of the infrastructure intended to be located in the proposed geothermal lease's area.

Examples of infrastructure—

- communication systems, compressors, pipelines, powerlines, pumping stations, reservoirs, roads and substations
- temporary structures or structures of an industrial or technical nature, including mobile and temporary camps

(2) In this section—

area limit, of a geothermal reservoir, means the location of the boundaries of—

(a) the proven and probable geothermal reserves in the reservoir; or

(b) the geothermal reserves in the reservoir worked out in a way the chief executive considers appropriate.

Example for paragraph (b)—

geothermal reserves worked out under a code other than the geothermal reporting code

Part 3 Requirements for giving notices to chief executive

8 Notice of intention to drill a geothermal well

(1) A geothermal tenure holder must, at least 10 business days before starting to drill a geothermal well in the area of a geothermal tenure, give the chief executive a notice stating that the well is to be drilled.

(2) The notice must state a proposed identifying name for the geothermal well.

(3) The proposed identifying name for the geothermal well must not be the same, or substantially the same, as an identifying name for another well recorded in the register.

9 Notice of completion, alteration or abandonment of geothermal well

(1) This section applies if—

(a) drilling of a geothermal well is completed; or

(b) the completion configuration of a geothermal well changes; or

(c) a geothermal well is abandoned.

(2) The geothermal tenure holder for the geothermal well must, within 10 business days after an event mentioned in subsection (1) happens, give the chief executive a notice stating that the event has happened.

(3) For subsection (1)—

(a) drilling of a geothermal well is completed if—

(i) the drilling rig last used to drill the well is moved so it is no longer above the well; and

(ii) the geothermal tenure holder for the well does not intend to continue drilling the well; and

(b) the completion configuration of a geothermal well changes if, after drilling of the well is completed—

(i) additional casing is installed in the well; or

(ii) any part of the well is plugged, other than for decommissioning the well; or

(iii) an interval in the well is altered in any other way.

10 Notice of intention to carry out geophysical survey or scientific or technical survey

(1) This section applies if a geophysical survey or a scientific or technical survey is to be carried out in the area of a geothermal tenure.

(2) The geothermal tenure holder must, at least 10 business days before the survey starts, give the chief executive a notice stating the following—

(a) a proposed identifying name for the survey;

(b) the type of survey to be carried out;

Examples—

seismic, geochemical, geotechnical, gravity, magnetic and MT

(c) a description of the area of the tenure to be surveyed;

(d) the day surveying will start;

(e) the expected duration of the surveying.

(3) The notice must be accompanied by a map showing the location of the area of the tenure to be surveyed.

(4) The proposed identifying name for the survey must not be the same, or substantially the same, as an identifying name for another survey recorded in the register.

11 Notice of completion of geophysical survey or scientific or technical survey

(1) This section applies if a geophysical survey or a scientific or technical survey has been completed in the area of a geothermal tenure.

(2) The geothermal tenure holder must, within 10 business days after the survey is completed, give the chief executive a notice stating that the survey has been completed.

(3) For subsection (1), a survey is completed as soon as all of the raw data for the survey has been recorded or recovered.

12 Notice of intention to carry out hydraulic fracturing activities

(1) This section applies if a geothermal tenure holder intends to carry out hydraulic fracturing activities in the area of the geothermal tenure.

(2) The holder must, at least 10 business days before starting the hydraulic fracturing activities, give the chief executive a notice stating that the activities are to start.

13 Notice of completion of hydraulic fracturing activities

(1) This section applies if a geothermal tenure holder has completed hydraulic fracturing activities in the area of the geothermal tenure.

(2) The holder must, within 10 business days after completing the hydraulic fracturing activities, give the chief executive a notice stating that the activities have been completed.

14 How notices are to be given

A notice required to be given to the chief executive under this part must be given electronically using the system for submission of notices made or approved by the chief executive and available on the department's website.

Part 4 Requirements about reports and samples for geothermal tenures

Division 1 Reports

Subdivision 1 Relinquishment report

15 Relinquishment report for partial relinquishment of geothermal tenure—Act, s 190

(1) For section 190(2)(b) of the Act, the following information is prescribed for a report about the relinquishment of part of an area of a geothermal tenure (a ***partial relinquishment report***)—

(a) for the geothermal tenure—

(i) the tenure information; and

(ii) the general area information; and

(iii) a hazard information report;

(b) for the relinquished part of the area of the geothermal tenure—

(i) a description of the geological model for the geothermal reservoirs in the area; and

(ii) a summary of the results of all authorised activities carried out in the area since the tenure took effect; and

(iii) an analysis of the conclusions drawn from the results of the authorised activities carried out in the area since the tenure took effect; and

(iv) an index of all reports given to the chief executive about the authorised activities carried out in the area since the tenure took effect; and

(v) an estimate of the total mass flow of geothermal fluid produced from each geothermal well in the area for each year since the tenure took effect; and

(vi) the reason the holder relinquished the area.

(2) In this section—

general area information, for a partial relinquishment report for a geothermal tenure, means each of the following—

(a) a map showing—

(i) the location of—

(A) the area of the tenure immediately before the relinquishment (the ***previous tenure area***); and

(B) the relinquished part of the area of the tenure (the ***relinquished area***); and

(ii) the location in the relinquished area of all—

(A) geothermal wells drilled under the tenure; and

(B) seismic lines used to carry out seismic surveys of the area of the tenure and the range of the numbered stations on each line; and

(C) sites used to carry out geophysical surveys, other than seismic surveys;

Examples of geophysical surveys—

gravity, magnetic and MT surveys

(b) a structure contour map of—

(i) the seismic horizons (seismic reflectors) in the relinquished area; and

(ii) values of physical parameters measured during geophysical surveys, other than seismic surveys, in the relinquished area;

(c) a general description of the topographical features of the previous tenure area and the relinquished area, including, for example, access to the areas.

tenure information, for a partial relinquishment report for a geothermal tenure, means each of the following—

(a) the day the tenure was granted;

(b) the day the relinquishment takes effect;

(c) the period of the work program or development plan for the tenure;

(d) a description of the sub-blocks in the relinquished part of the area of the tenure.

Subdivision 2 End of tenure report

16 End of tenure report for geothermal tenure—Act, s 191

(1) For section 191(g) of the Act, the following information is prescribed for a report about the ending of a geothermal tenure (an ***end of tenure report***)—

(a) the tenure information;

(b) the general area information;

(c) a description of the geological model for the geothermal reservoirs in the area of the tenure;

(d) an estimate of the total mass flow of geothermal fluid produced from each geothermal well in the area for each year since the tenure took effect.

(2) Subsection (1) does not apply to the extent the information required under this section has already been included in a partial relinquishment report or surrender report given to the chief executive for the geothermal tenure.

(3) In this section—

general area information, for an end of tenure report for a geothermal tenure, means each of the following—

(a) a map showing—

(i) the location of the area of the tenure; and

(ii) the location, in the area of the tenure, of all—

(A) geothermal wells drilled under the tenure; and

(B) seismic lines used to carry out seismic surveys of the area of the tenure and the range of the numbered stations on each line; and

(C) sites used to carry out geophysical surveys, other than seismic surveys;

(b) a structure contour map of—

(i) the seismic horizons (seismic reflectors) in the area of the tenure; and

(ii) values of physical parameters measured during geophysical surveys, other than seismic surveys, in the area of the tenure;

(c) a general description of the topographical features of the area of the tenure, including, for example, access to the area.

tenure information, for an end of tenure report for a geothermal tenure, means each of the following—

(a) the day the tenure was granted;

(b) the period of the work program or development plan for the tenure.

Subdivision 3 Daily drilling report

17 Requirement to give daily drilling report for geothermal tenure

(1) A geothermal tenure holder must, for each day on which drilling of a geothermal well is carried out in the area of the

geothermal tenure, give the chief executive a report about the drilling of the well (a ***daily drilling report***).

(2) The daily drilling report must—

(a) be given to the chief executive not later than 5p.m. on the next business day after the day's drilling; and

(b) comply with sections 18 and 19.

18 General information for daily drilling report

The daily drilling report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the name and postal address of the operator of the geothermal well;

(c) the identifying name of the well;

(d) the name of the geothermal tenure holder;

(e) a map showing the location of the well;

(f) the name of the author of the report;

(g) the name of the person submitting the report;

(h) the date of the report, in day-month-year format.

19 Details of geothermal well for daily drilling report

The daily drilling report must include the following details about the drilling of the geothermal well—

(a) the well's depth in metres at the end of the day;

(b) the type of drilling rig used to drill the well;

(c) the bit record for the well;

(d) the drilling fluids and additives used during the day's drilling;

(e) a summary of the drilling operations carried out during the day's drilling;

(f) diagrams showing the hole sizes of the well at the end of the day's drilling;

(g) the depth in metres of the top and bottom of any geothermal feature intervals identified in the well during the day's drilling;

(h) a description of—

(i) all surveys, tests and measurements carried out during the day's drilling including the results of the surveys, tests or measurements; and

Examples of tests—

completion test, injectivity test, drill stem test, pressure fall-off test and pressure build-up test

Examples of measurements—

injectivity index, permeability thickness and stable reservoir pressure

(ii) all core or cutting samples taken during the day's drilling; and

(iii) all casing and cementing activities carried out during the day's drilling; and

(iv) all surface observations made about the geothermal feature intervals identified in the well during the day's drilling.

Subdivision 4 Well completion report

20 Requirement to give well completion report for geothermal tenure

(1) A geothermal tenure holder must, within 6 months after the rig release day for a geothermal well, give the chief executive a report about the completion of the well (a ***well completion report***).

(2) The well completion report must comply with sections 21 to 28.

21 General information for well completion report

The well completion report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the name and postal address of the operator of the geothermal well;

(c) the identifying name of the well;

(d) the name of the geothermal tenure holder;

(e) a map showing the location of the well;

(f) the name of the author of the report;

(g) the name of the person submitting the report;

(h) the date of the report, in day-month-year format.

22 Details of geothermal well for well completion report

The well completion report must include the following details about the drilling of the geothermal well—

(a) the well's total depth in metres;

(b) the type of drilling rig used to drill the well;

(c) the bit record for the well;

(d) the drilling fluids and additives used to drill the well;

(e) the ground level in metres for the well;

(f) the kelly bushing level in metres for the well;

(g) diagrams showing the hole sizes of the well;

(h) information about the path of the well;

Example for paragraph (h)—

a survey that plots the path of the well

(i) the day drilling of the well started;

(j) the day the total depth of the well was reached;

(k) the rig release day for the well;

(l) a description of—

(i) the alteration type of the rock surrounding the well; and

(ii) the stratigraphy of the rock layers that the well intersects; and

(iii) all core or cutting samples taken during the drilling of the well; and

(iv) all surveys, tests and measurements carried out during the drilling of the well including the results of the surveys, tests and measurements;

Examples of tests—

completion test, injectivity test, drill stem test, pressure fall-off test and pressure build-up test

Examples of measurements—

injectivity index, permeability thickness and stable reservoir pressure

(m) the depth in metres of the location of each core or cutting sample taken from the well.

Examples of samples—

cuttings, conventional cores and sidewall cores

23 Casing and equipment details for well completion report

The well completion report must include the following details about the casing and other equipment, including prescribed equipment, inserted into the geothermal well—

(a) the features of the casing and equipment, including, for example—

(i) the size and type of casing and equipment; and

(ii) the characteristics of the casing and equipment that may cause a hazard;

(b) diagrams showing the location of the casing and equipment;

(c) the location of all perforations made to the casing of the well;

(d) the depth in metres of the top and bottom of each perforation interval made to the well.

24 Squeeze cementing or cement plugging details for well completion report

The well completion report must include the following details about all squeeze cementing or cement plugging carried out in the geothermal well—

(a) the type of cement and additives used in the well;

(b) the depth in metres of the top and bottom of each cemented interval in the well;

(c) any losses of cement caused by seepage in voids or permeable strata;

(d) the method, materials and volume of cement used to cement the voids;

(e) the method used to overcome losses of cement.

25 Details about stimulation of geothermal well

If stimulation of the geothermal well was carried out during the drilling of the well, the well completion report must include the following details—

(a) the depth in metres of the top and bottom of the geothermal feature intervals in the well over which stimulation was carried out;

(b) a description of the equipment used to carry out the stimulation;

(c) for the chemicals and other additives used in the fracturing fluid used to carry out the stimulation, the concentration of the chemicals and additives with time;

(d) a copy of all records made about the stimulation by the person who carried it out;

(e) any other details about the stimulation that are reasonably necessary to make a future assessment of the impact of the stimulation on the safety of the well.

26 Other information to be included in well completion report

The well completion report must also include the following information about the geothermal well—

(a) an assessment of—

(i) the geothermal production potential of the well; and

(ii) the impacts the well may have on the future management of the geothermal reservoirs in the area of the geothermal tenure; and

(iii) the data obtained from geophysical (or wireline) logs run in the well; and

(iv) the status of the well on the rig release day for the well;

Examples of status—

abandoned, injecting, producing

(b) identification of the geothermal feature intervals in the well that have the potential to produce geothermal energy;

(c) a description of the geological model for the well;

(d) the geothermal tenure holder's reasons for choosing the location of the well.

27 Accompanying information for well completion report

(1) The well completion report must be accompanied by the following—

(a) a digital image of all core or cutting samples taken from the geothermal well;

(b) a copy of—

(i) the well card for the well; and

(ii) the well's drilling program; and

(iii) a schematic diagram of the wellhead installed in the well after its completion; and

(iv) a description of the geological model for the area of the geothermal tenure; and

(v) a pie chart showing the times taken to carry out drilling operations for the well; and

Examples of drilling operations—

coring, drilling, fishing, plugging, reaming, tripping and waiting

(vi) a graph of the actual drilling time compared to the initial drilling program for the well; and

(vii) the raw data from geophysical (or wireline) logs run in the well; and

(viii) a digital image of the graphic representations of the raw data mentioned in subparagraph (vii).

(2) In this section—

initial drilling program, for a geothermal well, means the engineering plan for the construction of the well, that includes the following details about the well and its construction—

(a) hole sizes;

(b) casing programs;

(c) mud program;

(d) cementing program;

(e) well control plan and equipment;

(f) initial bit selections.

28 Additional information for well completion report for directional well

(1) If the geothermal well is a directional well, the well completion report must also state the position of—

(a) the geological units that the well intersects; and

(b) the bottom of the well; and

(c) any other geothermal wells that intersect the directional well.

(2) For subsection (1), the position must be expressed in relation to—

(a) the total vertical depth in metres of the well; and

(b) the horizontal plane of the well.

Subdivision 5 Well abandonment report

29 Requirement to give well abandonment report for geothermal tenure

(1) If a geothermal well is plugged and abandoned, the geothermal tenure holder for the well must give the chief executive a report about the abandonment of the well (a ***well abandonment report***)—

(a) for a well that is plugged and abandoned before the rig release day for the well—with the well completion report for the well; or

(b) otherwise—within 2 months after the completion day.

(2) The well abandonment report must comply with sections 30 to 34.

(3) In this section—

completion day means the day the plugging and abandoning of the well is completed in compliance with section 59.

30 General information for well abandonment report

The well abandonment report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the name and postal address of the operator of the geothermal well;

(c) the identifying name of the well;

(d) the name of the geothermal tenure holder;

(e) the name of the author of the report;

(f) the name of the person submitting the report;

(g) the date of the report, in day-month-year format.

31 Details of the geothermal well for well abandonment report

(1) The well abandonment report must include the following details for the geothermal well—

(a) the well's total depth in metres;

(b) the type of drilling rig used to drill the well;

(c) the bit record for the well;

(d) the drilling fluids and additives used to drill the well;

(e) the top and bottom, and the thickness of any of the following intersected by the well—

(i) an alteration zone;

(ii) a geothermal reservoir;

(iii) an aquifer;

(f) diagrams showing the hole sizes of the well.

(2) For subsection (1)(e), the top and bottom of an alteration zone, a geothermal reservoir or an aquifer must be identified in relation to—

(a) for a directional well—

(i) the total vertical depth in metres of the well; and

(ii) the horizontal plane of the well; or

(b) otherwise—the depth in metres of the well.

(3) In this section—

alteration zone means a depth interval in a geothermal well with abundant altered minerals.

32 Casing and equipment details for well abandonment report

The well abandonment report must include the following details about the casing and other equipment, including prescribed equipment, inserted into the geothermal well—

(a) the features of the casing and equipment, including, for example—

(i) the size and type of casing and equipment; and

(ii) the characteristics of the casing and equipment that may cause a hazard;

(b) diagrams showing the location of the casing and equipment;

(c) the location of all perforations made to the casing of the well;

(d) the depth in metres of the top and bottom of each perforation interval made to the casings.

33 Squeeze cementing or cement plugging details for well abandonment report

The well abandonment report must include the following details about all squeeze cementing or cement plugging carried out in the geothermal well—

(a) the type of cement and additives used in the well;

(b) the depth in metres of the top and bottom of each cemented interval in the well;

(c) any losses of cement caused by seepage in voids or permeable strata;

(d) the method, materials and volume of cement used to cement the voids;

(e) the method used to overcome losses of cement.

34 Other information to be included in well abandonment report

(1) The well abandonment report must include the following information about the geothermal well—

(a) a description of—

(i) all surveys, tests and measurements carried out during the drilling of the well including the results of the surveys, tests and measurements; and

Examples of tests—

completion test, injectivity test, drill stem test, pressure fall-off test and pressure buildup test

Examples of measurements—

injectivity index, permeability thickness and stable reservoir pressure

(ii) any other procedures used to abandon the well;

(b) if stimulation of the well was carried out before it was plugged and abandoned, the matters mentioned in subsection (2);

(c) any other details of the activities carried out in relation to drilling, plugging and abandoning the well that would help a person in making an assessment of the potential risks to the safe and efficient future operation of the well;

(d) a summary and history of the well;

(e) a map showing the location of the well;

(f) the day the completion report for the well was given to the chief executive.

(2) For subsection (1)(b), the matters are each of the following—

(a) the depth in metres of the top and bottom of the intervals in the well over which the stimulation was carried out;

(b) a description of the equipment used to carry out the stimulation;

(c) a copy of any record made about the stimulation by the person who carried it out;

(d) any other details about the stimulation that would help a person to make a future assessment of the impact of the stimulation on the safety of the well.

Subdivision 6 Annual geothermal reserves report

35 Annual geothermal reserves report

(1) A geothermal tenure holder must, within 40 business days after the last day of each year for the tenure, give the chief executive a report about geothermal reserves for the tenure (an ***annual reserves report***).

(2) The annual reserves report must include the following information—

(a) the type and number of the geothermal tenure;

(b) for each geothermal reservoir in the area of the geothermal tenure—

(i) the location, and estimated amount, of all proven geothermal reserves and probable geothermal reserves identified on the first day and the last day of the year; and

(ii) details of all material changes to the proven and probable geothermal reserves mentioned in subparagraph (i) for the year.

Examples of material changes to a geothermal reserve—

fluid temperature changes, fluid chemical changes or fluid flow rate changes

Subdivision 7 Production testing report

36 Requirement to give production testing report for geothermal well

(1) If production testing of a geothermal well is carried out under a geothermal tenure, the geothermal tenure holder must, within 40 business days after the production testing period ends, give the chief executive a report about the testing for the period (a ***production testing report***).

(2) The production testing report must comply with sections 37 and 38.

(3) In this section—

production testing period, for production testing of a geothermal well, means—

(a) if the testing is carried out for not more than 30 days—the period starting on the day the testing first starts and ending 30 days after testing starts; or

(b) otherwise—the period starting on the day testing first starts and ending on the day testing ends.

37 General information for production testing report

The production testing report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the identifying name of the geothermal well;

(c) identification of—

(i) each geothermal reservoir in the area of the geothermal tenure identified by the production testing during the production testing period; and

(ii) the geological units that produced geothermal fluid in the area of the tenure during the production testing period; and

(iii) the geological units in the area of the tenure that were injected with disposal fluid during the production testing period;

(d) details of the wellhead pressure of the geothermal well measured during the production testing period.

38 Production testing information for production testing report

The production testing report must include the following information about the production testing—

(a) the duration of the testing;

(b) the type of testing methods used during the testing;

(c) the specifications of the equipment used during the testing;

(d) for any geothermal fluid produced during the testing—

(i) the value of the specific enthalpy of the fluid; and

(ii) details of all changes to the specific enthalpy of the fluid; and

(iii) details of the chemistry of the fluid;

(e) details of—

(i) the air-lifting program, if any, used to stimulate the well during the testing; and

(ii) all downhole surveys (pressure, temperature and spinner) carried out during the testing; and

(iii) the calculations made of the geothermal well's productivity index, including the methods used to calculate the productivity index during testing; and

(iv) the location of any major and secondary feed zones made in the well during the testing; and

(v) the wellhead pressure of the well when it was in full open discharge during the testing; and

(vi) the wellhead pressure of the well's throttled discharges during the testing; and

(vii) the output characteristics of the well expressed as a function of the wellhead pressure of the well during the testing; and

(viii) any wellbore simulation modelling carried out during the testing;

(f) an estimate of the total mass flow of any geothermal fluid produced during the testing;

(g) an estimate of the mass flow rate of all brine and steam separated during the testing;

(h) details of all changes in the steam separation pressure values during the testing.

Subdivision 8 Injection testing report

39 Requirement to give injection testing report for geothermal well

(1) If injection testing of a geothermal well is carried out under a geothermal tenure, the geothermal tenure holder must, within 40 business days after the injection testing period ends, give the chief executive a report about the testing for the period (an ***injection testing report***).

(2) The injection testing report must comply with sections 40 and 41.

(3) In this section—

injection testing period, for injection testing of a geothermal well, means—

(a) if the testing is carried out for not more than 30 days—the period starting on the day the testing first starts and ending 30 days after testing starts; or

(b) otherwise—the period starting on the day testing first starts and ending on the day testing ends.

40 General information for injection testing report

The injection testing report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the identifying name of the geothermal well;

(c) identification of the geological units that were injected with water or disposal fluid during the injection testing period;

(d) the wellhead pressure of the geothermal well measured during the injection testing period.

41 Injection testing information for injection testing report

The injection testing report must include the following information about the injection testing—

(a) the duration of the testing;

(b) the types of testing methods used during the testing;

(c) the specifications of the equipment used during the testing;

(d) for water or disposal fluid injected during the testing—

(i) the temperature of the water or disposal fluid; and

(ii) the chemistry of the water or disposal fluid;

(e) details of—

(i) all downhole surveys (pressure, temperature and spinner) carried out during the testing; and

(ii) the calculations made of the geothermal well's injectivity index, including the methods used to calculate the injectivity index, during the testing; and

(iii) any changes in the wellhead pressure of the well measured during the testing; and

(iv) any wellbore simulation modelling carried out during the testing;

(f) an estimate of the total mass flow of water or disposal fluid injected during the testing.

Subdivision 9 Production report

42 Requirement to give production report for geothermal tenure

(1) A geothermal tenure holder must, within 40 business days after the end of each 1-year period for the geothermal tenure, give the chief executive a production report for the period for each geothermal well under the tenure (a ***production report***).

(2) The production report must include the following information—

(a) the type and number of the geothermal tenure;

(b) the identifying name of each geothermal well in the area of the tenure;

(c) identification of—

(i) each geothermal reservoir in the area of the tenure; and

(ii) each geological unit in the area of the tenure that produced geothermal fluid during the period;

(d) the total number of geothermal wells in the area of the tenure that produced geothermal fluid during the period;

(e) the total mass flow of any geothermal fluid produced from a geothermal well in the area of the tenure during the period;

(f) for any electrical and thermal energy produced in the area of the tenure during the period—

(i) the total amount of electrical and thermal energy; and

(ii) the total amount of the electrical and thermal energy used for internal consumption during the period;

(g) for the geothermal fluid mentioned in paragraph (e)—the total amount of the geothermal fluid released into the environment during the production of electrical and thermal energy in the period and the reasons for its release;

(h) for each geothermal well that produced geothermal fluid during the period, the following details about the well—

(i) any changes in the wellhead pressure of the well during the period;

(ii) any scaling and corrosion problems met with during the period and the preventative measures taken to reduce the scaling and corrosion;

(i) for a geothermal well mentioned in paragraph (h), the following details about any geothermal fluid taken from the well—

(i) changes in the chemistry or chemical composition of the fluid during the period;

(ii) changes to the fluid specific enthalpy of the fluid during the period.

Subdivision 10 Injection report

43 Requirement to give injection report for geothermal tenure

(1) A geothermal tenure holder must, within 40 business days after the end of each 1-year period for the geothermal tenure, give the chief executive an injection report for the period for each geothermal well under the tenure (an ***injection report***).

(2) The injection report must include the following information—

(a) the type and number of the geothermal tenure;

(b) the identifying name of each geothermal well in the area of the tenure;

(c) identification of—

(i) each geothermal reservoir in the area of the tenure; and

(ii) each geological unit in the area of the tenure that was injected with water or disposal fluid during the period;

(d) the total mass flow of—

(i) all water or disposal fluid injected into each geothermal well in the area of the tenure during the period; and

(ii) disposal fluid reinjected into each geothermal well in the area of the tenure during the period;

(e) the following details about each geothermal well in the area of the tenure that was injected with water or disposal fluid during the period—

(i) any changes in the wellhead pressure of the well during the period;

(ii) any scaling and corrosion problems met with in the well during the period and the preventative measures taken to reduce the scaling and corrosion.

Subdivision 11 Hydraulic fracturing activities completion report

44 Requirement to give hydraulic fracturing activities completion report

(1) This section applies if a geothermal tenure holder completes hydraulic fracturing activities in the area of the geothermal tenure after the tenure takes effect.

(2) The holder must, within 2 months after completion of the activities, give the chief executive a report about the activities (a ***hydraulic fracturing activities completion report***).

(3) The hydraulic fracturing activities completion report must comply with sections 45 to 48.

45 General information for hydraulic fracturing activities completion report

The hydraulic fracturing activities completion report must include the following information on its first page—

(a) the type and number of the geothermal tenure;

(b) the name and postal address of the person who carried out the hydraulic fracturing activities;

(c) the identifying name of each geothermal well subject to the activities;

(d) the day the activities for each well started;

(e) the day the activities for each well ended;

(f) the name of the author of the report;

(g) the name of the person submitting the report;

(h) the date of the report, in day-month-year format.

46 Assessment of impact of hydraulic fracturing activities on future management of geothermal reservoirs

The hydraulic fracturing activities completion report must include the following information about the hydraulic fracturing activities—

(a) an identification of each method of hydraulic fracturing activity carried out;

(b) the depth in metres of the top and bottom of—

(i) each interval of the geothermal well over which the activities were carried out; and

(ii) each geological unit in the well over which the activities were carried out and the name of each geological unit;

(c) a summary of the operations carried out at each stage of the activities, including the volume and type of chemicals used at each stage;

(d) an assessment of the impact of the activities on the future management of each geothermal reservoir in the area of the geothermal tenure;

(e) for each stage of the activities—a graphic representation of the following—

(i) the casing pressure with time;

(ii) the calculated bottom hole pressure with time;

(iii) the calculated bottom hole concentration with time;

(iv) the rate at which hydraulic fracturing fluid was pumped into the geothermal well with time;

(v) the concentration of liquid chemicals and other additives used in the hydraulic fracturing fluid with time;

(vi) the maximum surface treatment pressure reached during each stage of the activities;

(vii) the estimated targeted fracture pressure for the activities carried out over each interval in the well.

47 Other information to be included in hydraulic fracturing activities completion report

The hydraulic fracturing activities completion report must include details of each of the following—

(a) the equipment used to perform and monitor the hydraulic fracturing activities;

(b) the diagnostic techniques used to monitor the activities;

(c) if known—

(i) all geological connections between an interval in a geothermal well over which the activities were carried out and an aquifer; and

(ii) the distance between an interval in a geothermal well over which the activities were carried out and an aquifer;

(d) the total mass flow of hydraulic fracturing fluid, in tonnes, used in each geothermal well during each stage of the activities;

(e) if a known event relating to the hydraulic fracturing activities has caused material environmental harm, or serious environmental harm, within the meaning of the *Environmental Protection Act 1994*—details of each step taken to mitigate the harm.

48 Accompanying information for hydraulic fracturing activity completion report

The hydraulic fracturing activities completion report must be accompanied by a document (a ***hydraulic fracturing fluid activity statement***) stating the following about the hydraulic fracturing fluid used to carry out the activities—

(a) the composition of the hydraulic fracturing fluid;

(b) the quantity of each component of the fluid in kilograms, litres or tonnes, as appropriate;

(c) the concentration of each component in the fluid;

(d) the name of all chemical compounds in the fluid.

Subdivision 12 Surrender report

49 Surrender report for geothermal tenure—Act, s 302

For section 302(2)(c) of the Act, the prescribed information for a report that must accompany a surrender application for

all or part of the area of a geothermal tenure (a ***surrender report***) is as follows—

(a) the day the geothermal tenure was granted;

(b) a description of, and a map showing, the area (the ***surrendered area***) the subject of the surrender application, including a description or map of access points to the area;

(c) a description of the methods used to produce geothermal energy in the surrendered area;

(d) an estimate of—

(i) the amount of geothermal energy produced from each geothermal well in the surrendered area for each year since the geothermal tenure took effect; and

(ii) the volume of water or disposal fluid injected into each injection well in the surrendered area;

(e) a description of the geological features of the proven geothermal reserves and probable geothermal reserves in the surrendered area from which geothermal energy was produced;

(f) an index of all reports given to the chief executive under the Act about all authorised activities carried out in the surrendered area;

(g) a hazard information report for the surrendered area;

(h) an annual reserves report for the surrendered area for the period starting on the day after the period covered by the last annual reserves report was given for the geothermal tenure and ending on the day the surrender report is given to the Minister;

(i) the reason the geothermal tenure holder has applied to surrender all or part of the tenure's area;

(j) a map showing the location, in the surrendered area, of—

(i) the geothermal wells drilled under the geothermal tenure; and

(ii) the seismic lines used to carry out seismic surveys of the area of the tenure and the range of the numbered stations on each line; and

(iii) the sites used for carrying out geophysical surveys, other than seismic surveys;

Examples of geophysical surveys—

gravity, magnetic and MT surveys

(k) a structure contour map prepared for the surrendered area showing—

(i) the seismic horizons (seismic reflectors) in the surrendered area; and

(ii) values of physical parameters measured during geophysical surveys carried out for the surrendered area.

Subdivision 13 Geophysical survey report

50 Geophysical survey report for geothermal tenure

(1) This section applies if a geothermal tenure holder—

(a) carries out a geophysical survey of the area of the tenure; or

(b) reprocesses raw data obtained from a survey mentioned in paragraph (a).

(2) The holder must, within 6 months after the completion day for the survey, give the chief executive a report about the survey (a ***geophysical survey report***).

(3) The geophysical survey report must comply with sections 51 and 52.

51 General information for geophysical survey report

The geophysical survey report must include the following information about the geophysical survey—

(a) a description of—

(i) the location of the area surveyed; and

(ii) the type of survey carried out; and

(iii) how the raw data obtained from the survey was processed or, for a survey mentioned in section 50(1)(b), reprocessed; and

(iv) each method used to acquire the raw data from the survey, including the equipment used to acquire the data and the techniques and equipment used to record and test the data;

(b) a map showing the location of the sites used to carry out the survey;

(c) if the report is not accompanied by files for the area surveyed in digital form, details of—

(i) the interpreted data for the area surveyed; and

(ii) the isopach map and depth to basement map obtained from the survey;

(d) a summary of the geology of the area surveyed;

(e) a summary of the objectives of the survey;

(f) details about the activities carried out for the survey, including the days the activities were carried out;

(g) an interpretation of the processed or reprocessed data obtained from the survey;

(h) an index of all previous geophysical surveys, of the same type as the survey for which the report was given, carried out under the tenure, and a summary of the survey results.

52 Accompanying information for geophysical survey report

The geophysical survey report must be accompanied by each of the following in digital form—

(a) the raw data obtained from the survey;

(b) the records made as the raw data was recorded (commonly known as the 'observer's logs');

(c) the location of the area surveyed, including the coordinates and elevation of each site used to carry out the survey;

(d) the processed or reprocessed data obtained from the survey;

(e) a graphical representation of the processed or reprocessed data;

(f) if an activity for the survey was carried out by a contractor of the geothermal tenure holder, a copy of all reports given to the tenure holder by the contractor about the activity.

Subdivision 14 Scientific or technical survey report

53 Scientific or technical survey report

(1) This section applies if a geothermal tenure holder—

(a) carries out a scientific or technical survey of the area of the tenure; or

(b) reprocesses raw data obtained from a survey mentioned in paragraph (a).

(2) The holder must, within 6 months after the completion day for the survey, give the chief executive a report about the survey (a ***scientific or technical survey report***).

(3) The scientific or technical survey report must include the following information—

(a) a description of—

(i) the location of the area surveyed; and

(ii) the type of survey carried out; and

(iii) how the raw data obtained from the survey was processed or, for a survey mentioned in subsection (1)(b), reprocessed; and

(iv) each method used to acquire the raw data from the survey, including the equipment used to acquire the data and the techniques and equipment used to record and test the data;

(b) a summary of the geology of the area surveyed;

(c) a summary of the objectives of the survey;

(d) details of the activities carried out for the survey, including the days the activities were carried out;

(e) an interpretation of the processed or reprocessed data obtained from the survey;

(f) details of all measurements made or samples taken during the survey;

(g) an index of all previous scientific or technical surveys, of the same type as the survey for which the report is given, carried out under the tenure, and a summary of the survey results;

(h) each of the following in digital form—

(i) the raw data obtained from the survey;

(ii) the processed or reprocessed data obtained from the survey.

Division 2 Other matters about reporting

54 General requirements for how amounts must be reported

(1) This section applies if a measurement of any of the following matters is required to be included in a report mentioned in this part—

(a) injected water;

(b) geothermal fluid;

(c) separated steam;

(d) disposal fluid;

(e) energy generation;

(f) specific enthalpy;

(g) geothermal reserves.

(2) The measurement must be stated in—

(a) for injected water—tonnes; and

(b) for geothermal fluid—tonnes; and

(c) for separated steam—tonnes; and

(d) for disposal fluid—tonnes; and

(e) for energy generation, including electrical and thermal energy generation—megawatt hours (MWh); and

(f) for specific enthalpy—kilojoule for each kilogram (kJ/kg); and

(g) for geothermal reserves—petajoules thermal (PJ_{th}).

Division 3 Samples for geothermal tenures

55 Keeping samples

(1) For section 193(1) of the Act, the samples about the authorised activities carried out under a geothermal tenure that must be kept by the holder of the tenure are the samples mentioned in sections 56 to 58.

(2) A sample must be kept until the later of the following—

(a) the end of the term of the geothermal tenure;

(b) the sample, or part of the sample, is given to the chief executive under section 194 of the Act.

(3) A sample must be kept in a way that prevents unnecessary deterioration or loss of the sample.

(4) Despite subsection (1), the holder need not keep a sample (the ***new sample***) if, on written application by the holder, the chief executive exempts the holder from having to keep the new sample because—

(a) the holder has previously given the chief executive a sample, or part of a sample, (the ***previous sample***) from the same geothermal well, or another geothermal well drilling the same geothermal reservoir; and

(b) the new sample has similar properties to the previous sample.

56 Cutting samples

(1) A geothermal tenure holder must, for each geothermal well drilled under the tenure, keep cutting samples of the geological formations penetrated by the drill for each interval mentioned in subsection (2).

(2) For subsection (1), the intervals are—

(a) for an exploration well or appraisal well—

(i) each 10m interval, or part of a 10m interval, from the surface of the geothermal well to as close as practicable to the top of the geological formation nearest to the surface that is likely to contain a geothermal reservoir; and

(ii) each 3m interval, or part of a 3m interval, from as close as practicable to the top of the geological formation mentioned in subparagraph (i) to the bottom of the well; and

(b) for a development well—each 3m interval, or part of a 3m interval, from as close as practicable to the top of a geological formation nearest to the surface that is likely to contain a geothermal reservoir to the bottom of the well.

(3) A cutting sample for each interval must—

(a) weigh at least 250g, but not more than 500g; and

(b) be washed and dried; and

(c) be given in a box or other container suitable for its long-term storage and handling that is labelled with the following information—

(i) the identifying name of the geothermal well from which the sample was taken;

(ii) the depth in metres of the top and bottom of the interval from which the sample was taken.

57 Core samples

(1) A geothermal tenure holder must, for each geothermal well drilled under the geothermal tenure, give the chief executive a sample of each core recovered from the well.

(2) The sample must—

(a) be at least 50% of the core recovered; and

(b) have as complete a vertical face as is practicable; and

(c) be given in a box or other container suitable for its long-term storage and handling that is labelled with the following information—

(i) the identifying name of the geothermal well from which the core was recovered;

(ii) the depth in metres of the top and bottom of the interval from which the core was recovered;

(iii) if more than 1 core is recovered from the well—the number of the core;

(iv) the length in metres of the core recovered.

58 Fluid samples

(1) This section applies if a geothermal tenure holder recovers a sample of water, steam or gas (a ***fluid sample***) from a geothermal reservoir in the area of a geothermal tenure.

(2) The holder must—

(a) keep the fluid sample; and

(b) as required under section 194 of the Act, give the chief executive the following—

(i) if the fluid sample is water—

(A) 200ml of the sample in a high density polyethylene (HDPE) or polypropylene (PP) plastic bottle; and

(B) 200ml of the sample in a glass bottle with an airtight cap to prevent its contact with air;

(ii) if the fluid sample is steam or gas—

(A) 300ml of the sample in a gas sampling bulb or glass bottle with an airtight cap to prevent its contact with air; and

(B) 200ml of the sample in a high density polyethylene (HDPE) or polypropylene (PP) plastic bottle.

(3) Despite subsection (2), the holder need not keep a fluid sample (the ***new sample***) from a geothermal reservoir in the area of a geothermal tenure if—

(a) the holder has previously given the chief executive a sample, or part of a sample, (the ***previous sample***) from the same geothermal reservoir; and

(b) the new sample has similar properties to the previous sample.

(4) Each fluid sample given to the chief executive must be labelled with the following information—

(a) the identifying name of the geothermal well from which the sample was taken;

(b) the depth in metres of the top and bottom of the interval from which the sample was recovered;

(c) a description of the type of sample recovered;

(d) the day the sample was recovered;

(e) the method used to recover, filter or preserve the sample.

Example of method used to filter a water sample—

filtering with 0.2µm cellulose acetate

Example of method used to preserve a water sample—

preserving with 0.5ml Suprapur HNO_3

Part 5 General provisions about geothermal wells and shot holes

59 Plugging and abandoning geothermal well

For section 200(3)(a) of the Act, a geothermal well must be plugged and abandoned in the way stated in section 60 and schedule 1.

60 Requirement to remove particular equipment from geothermal well

(1) A geothermal tenure holder must use the holder's best endeavours to ensure that all prescribed equipment in, or immediately adjacent to, a geothermal well in the area of the tenure is removed before the well is plugged and abandoned.

(2) If, after the geothermal tenure holder uses the holder's best endeavours to remove the equipment, the equipment can not be removed before the well is plugged and abandoned, the holder must ensure that—

(a) the location of the equipment is surveyed before the well is plugged and abandoned; and

(b) details of the equipment and its location are included in an end of tenure report given under section 16 for the geothermal tenure.

61 Requirement to plug shot holes

(1) A geothermal tenure holder must ensure that, if a hole is drilled in the area of the tenure for use as a shot hole—

(a) as soon as practicable after the hole is no longer required for use as a shot hole—

(i) the hole is plugged with solid material; and

Example of solid material—

concrete, rock or soil

(ii) any area surrounding the hole that has been disturbed by the firing of an explosive is restored as far as is practicable to its original state; and

(b) if the hole caves in or collapses after it is plugged as required under paragraph (a)—all subsequent damage caused by the hole caving in or collapsing is remedied.

Maximum penalty—20 penalty units.

(2) Despite subsection (1), to the extent that a requirement under the subsection is inconsistent with a relevant environmental condition for the geothermal tenure, the relevant environmental condition prevails.

(3) In this section—

shot hole means a hole that has been drilled in the area of a geothermal tenure for the purpose of firing an explosive in connection with carrying out a seismic survey.

Part 6 Releasing required information

62 Prescribed confidentiality period for geothermal tenure holders—Act, s 196

(1) This section prescribes, for section 196(1) of the Act, the confidentiality period for required information for a geothermal tenure.

(2) The period starts on the day the information is given to the chief executive under the Act and ends on the following day—

(a) for a daily drilling report given under section 17 or a well completion report given under section 20—

(i) for an exploration well or appraisal well—the day that is 2 years after the day by which the report is required to be given; or

(ii) for a development well—the day that is 5 years after the day by which the report is required to be given;

(b) for a well abandonment report given under section 29—

(i) for an exploration well or appraisal well—the day that is 2 years after the day by which the report is required to be given; or

(ii) for a development well—the day that is 5 years after the day by which the report is required to be given;

(c) for an annual reserves report given under section 35—the day that is 6 months after the last day of the period to which the report relates;

(d) for a production testing report given under section 36 or an injection testing report given under section 39—

(i) for a geothermal permit—the day that is 2 years after the last day of the period to which the report relates; or

(ii) for a geothermal lease—the day that is 5 years after the last day of the period to which the report relates;

(e) for a production report given under section 42 or an injection report given under section 43—the day that is 6 months after the last day of the period to which the report relates;

(f) for a hydraulic fracturing activities completion report given under section 44, including any accompanying hydraulic fracturing fluid activity statement—the day that is 5 years after the day by which the report is required to be given;

(g) for a geophysical survey report given under section 50 or a scientific or technical survey report given under section 53—the day that is 2 years after the day by which the report is required to be given;

(h) for part of a cutting sample, part of a core sample or part of a fluid sample given under section 194 of the Act—

(i) for an exploration well or appraisal well—the day that is 2 years after the day by which part of the sample is given to the chief executive under that section; or

(ii) for a development well—the day that is 5 years after the day by which part of the sample is given to the chief executive under that section.

(3) However, there is no confidentiality period for making a well abandonment report for a geothermal well available under section 196(1) of the Act to the holder of a petroleum tenement or a coal or oil shale mining tenement under the Mineral Resources Act if the well was drilled within the area of the tenement.

(4) There is no prescribed confidentiality period for required information not mentioned in subsection (2).

63 Publication of required information—Act, s 196

For section 196(1)(a) of the Act, the prescribed ways for publishing required information are each of the following—

(a) in a journal published by the department or under the Minister's authority;

(b) in another publication the chief executive considers appropriate;

(c) on the department's website;

(d) in a publicly available database;

(e) on a map that is made available to the public for inspection or purchase;

(f) in digital or electronic form, including, for example, on a disc or tape;

(g) by displaying it on a notice that is available to the public for inspection at—

(i) the department's head office; and

(ii) other places the chief executive considers appropriate;

(h) by telling it to another person or presenting it to the person in a visual form.

Part 7 Geothermal royalty

Division 1 Preliminary

64 Application of pt 7

This part does not apply to a geothermal producer in relation to geothermal energy produced by or for the geothermal producer before 1 July 2030.

65 Definitions for pt 7

In this part—

component, of the wellhead value of geothermal energy produced by or for a geothermal producer in a royalty return period, means—

(a) an element used to work out the amount under section 67(a) that the geothermal producer could reasonably be expected to realise; or

(b) an expense, or an amount contributing to an expense, under section 68(1)(a), (c) or (d).

geothermal royalty decision see section 70(1)(b).

negative wellhead value see section 69(1)(a).

royalty return period, for geothermal royalty payable by a geothermal producer, means each of the following 3-month periods in a year—

(a) 1 January to 31 March;

(b) 1 April to 30 June;

(c) 1 July to 30 September;

(d) 1 October to 31 December.

wellhead value, of geothermal energy produced by or for a geothermal producer in a royalty return period, means the wellhead value amount worked out under section 67.

Division 2 Working out geothermal royalty

66 Geothermal royalty rate—Act s, 105

For section 105(b) of the Act, the rate of geothermal royalty payable by a geothermal producer for a royalty return period is 2.5% of the wellhead value of all geothermal energy produced by or for the geothermal producer in the period.

67 Working out wellhead value of geothermal energy

The wellhead value of geothermal energy produced by or for a geothermal producer in a royalty return period is—

(a) the amount the geothermal producer could reasonably expect to realise if the geothermal energy were sold on a commercial basis; less

(b) the sum of the following—

(i) the expenses for the royalty return period mentioned in section 68;

(ii) any negative wellhead value deducted under section 69(1).

68 Expenses for royalty return period

(1) For section 67(b)(i), the expenses are each of the following—

(a) a toll, tariff or other charge paid or payable by the geothermal producer to a third party for producing the geothermal energy during the royalty return period if the charges are worked out—

(i) on a commercial basis; or

(ii) if the Minister reasonably believes another basis for working out the charges is a more practical basis—on the other basis;

(b) depreciation of capital costs on an operating plant or pipeline owned by the geothermal producer and used for producing geothermal energy or transporting it from the wellhead of the geothermal well in which it was produced to the point of its disposal, allocated over—

(i) 10 years; or

(ii) if the Minister reasonably believes a shorter period is appropriate having regard to the expected potential for geothermal production from the well in which the geothermal energy was produced—the shorter period decided by the Minister;

(c) an operating cost incurred, or to be incurred, by the geothermal producer that relates directly to—

(i) treating, processing or refining the geothermal energy; or

(ii) transporting the geothermal energy to the point of its disposal;

Examples of operating costs that may be directly related to treating, processing, refining or transporting geothermal energy—

- catering, accommodation and travel costs for personnel
- communication costs
- consumable stores used at the site at which the energy is produced
- costs associated with transporting the geothermal energy, including a reasonable share of road maintenance and repairs, motor vehicle costs, wharfage and harbour fees
- geothermal energy storage costs
- geothermal tenure rents
- personnel wages and salaries
- repairs and maintenance of, and insurance costs for, operating plant and pipelines used to produce geothermal energy or transporting it from the wellhead to the point of its disposal

(d) another expense incurred, or to be incurred, by the geothermal producer in relation to the operation of the site at which geothermal energy was produced that is approved by the Minister for the purpose of this subsection.

(2) However, the following expenses are not included under subsection (1)—

(a) an expense incurred by the geothermal producer in producing the geothermal energy;

Example—

lifting costs

(b) office overhead costs for an office that is not located in the area of the tenure or at the site at which geothermal energy is produced;

(c) marketing costs for producing geothermal energy;

(d) Commonwealth excise levies;

(e) a civil penalty, or interest on an amount, payable by the geothermal producer under the Act.

69 Negative wellhead value for royalty return period

(1) If the expenses mentioned in section 68 for a royalty return period are more than the amount mentioned in section 67(a) for the period—

(a) the amount of the excess is a ***negative wellhead value*** for the royalty return period; and

(b) the negative wellhead value may be deducted under section 67(b)(ii) in a later royalty return period in the same year.

(2) To remove doubt, it is declared that a geothermal producer is not entitled to receive any payment in relation to a negative wellhead value.

70 Working out components of wellhead value of geothermal energy in particular circumstances

(1) Sections 71 to 78 apply if—

(a) the Minister or a geothermal producer reasonably believes in particular circumstances that—

(i) the amount under section 67(a) that the geothermal producer assesses the geothermal energy could reasonably be expected to realise is less than the market value of the geothermal energy; or

(ii) the expenses mentioned in section 67(b)(i) are more than the expenses that would reasonably be incurred in the circumstances; or

(b) a geothermal producer applies to the Minister for a decision (a ***geothermal royalty decision***) about how 1 or more of the components of the wellhead value of the

geothermal energy produced by or for the geothermal producer must be worked out for a particular transaction or particular period.

(2) Without limiting subsection (1)(a), the particular circumstances include the following—

(a) the geothermal energy is used in a power station owned by the geothermal producer;

(b) the geothermal energy is acquired by an associated entity or related party of the geothermal producer;

(c) an expense was paid or payable to an associated entity or related party of the geothermal producer.

(3) In this section—

associated entity, of a geothermal producer, means an entity that, under the Corporations Act, is an associated entity of the geothermal producer.

power station means a power station under the *Electricity Act 1994*.

related party, of a geothermal producer, means an entity that, under the Corporations Act, is a related party of the geothermal producer.

71 Minister's power to decide component of wellhead value of geothermal energy

(1) The Minister may ask the geothermal producer—

(a) to demonstrate that a component of the wellhead value of the geothermal energy produced by or for the geothermal producer is based on an arms-length transaction at market value; or

(b) to apply to the Minister for a geothermal royalty decision.

(2) The geothermal producer must comply with the request within—

(a) 40 business days after the request is made; or

(b) if the Minister has, within the 40 business days, agreed to a longer period—the longer period.

(3) The Minister may ask the geothermal producer for additional information or documents about a transaction if—

(a) the Minister made a request under subsection (1)(a); and

(b) the geothermal producer complied with the request as required under subsection (2).

(4) Subsection (5) applies if—

(a) the geothermal producer does not comply with a request made under subsection (1) or (3); or

(b) for a request made under subsection (1)(a), the geothermal producer—

(i) complies with the request; but

(ii) does not demonstrate to the Minister's satisfaction that a component of the wellhead value of the geothermal energy produced by or for the geothermal producer is based on an arms-length transaction at market value.

(5) The Minister may make a geothermal royalty decision under section 74 for a component of the wellhead value of the geothermal energy produced by or for the geothermal producer as if the geothermal producer had made an application for a geothermal royalty decision.

72 Application by geothermal producer for geothermal royalty decision

(1) The geothermal producer may apply to the Minister for a geothermal royalty decision.

(2) The application must be made—

(a) before the geothermal energy is produced; or

(b) before, or as soon as practicable after, a material change of circumstances that may affect whether a component

of the wellhead value of the geothermal energy is based on an arms-length transaction at market value.

73 Requirements for making application

The application for a geothermal royalty decision must—

(a) be in writing; and

(b) be lodged at—

(i) the office of the department for lodging applications for geothermal royalty decisions, as stated in a gazette notice by the chief executive; or

(ii) if no office is stated under subparagraph (i)—the office of the chief executive; and

(c) state why the geothermal producer is seeking the geothermal royalty decision; and

(d) include a statement about how the geothermal producer proposes a component of the wellhead value of the geothermal energy should be worked out for a particular transaction or particular period; and

Examples—

- a fixed value with adjustments in particular circumstances
- a formula for deciding the market value

(e) include a statement about each of the following—

(i) the proposed period for which the geothermal royalty decision will apply;

(ii) whether or not the geothermal royalty decision is to be reviewed;

(iii) if the geothermal producer proposes that the geothermal royalty decision be reviewed—when the decision is to be reviewed.

74 Deciding application

(1) The Minister must make a geothermal royalty decision for the application.

(2) The geothermal royalty decision may state—

(a) a method or formula—

(i) for deciding the market value of the geothermal energy; or

(ii) for working out a particular toll, tariff or other charge paid or payable by the geothermal producer; or

(iii) for adjusting the market value of the geothermal energy or the tolls, tariffs or other charges in particular circumstances; or

(iv) for working out any other component of the wellhead value of the geothermal energy; and

(b) the period for which the geothermal royalty decision applies; and

(c) when the geothermal royalty decision is to be reviewed.

(3) The Minister must give the geothermal producer notice of the geothermal royalty decision and the reasons for the decision.

75 Criteria for decision

In making the geothermal royalty decision, the Minister may consider the following—

(a) the amount received for geothermal energy sold in similar circumstances;

(b) how the value of the geothermal energy can be adjusted to reflect changes to the market value of geothermal energy;

(c) the expenses likely to be incurred by the geothermal producer in arms-length transactions at market value;

(d) the period for which the geothermal royalty decision, or aspects of the decision, will apply;

(e) the need for any future adjustment of the geothermal royalty decision or aspects of the decision;

(f) any submissions made to the Minister by the geothermal producer in relation to a component of the wellhead value of the geothermal energy;

(g) any other matter the Minister considers relevant.

76 Minister's power to amend geothermal royalty decision

The Minister may amend the geothermal royalty decision if there has been a material change of circumstances since the making of the decision.

77 Requirement for making amended geothermal royalty decision on Minister's initiative

(1) If the Minister proposes to amend a geothermal royalty decision on the Minister's own initiative, the Minister must—

(a) give the geothermal producer notice of the proposed change at least 60 business days before the first day of the next royalty return period that would apply to the proposed amended royalty decision; and

(b) invite the geothermal producer to make submissions about the proposed amendment within 30 business days (the ***submission period***) after giving the notice.

(2) In amending the geothermal royalty decision, the Minister—

(a) must consider any submissions made by the geothermal producer in the submission period; and

(b) may consider the matters stated in section 75(a) to (e) and (g).

(3) If the Minister amends the geothermal royalty decision, the Minister must give the geothermal producer written notice of the decision and the reasons for the decision.

(4) The amended geothermal royalty decision must state the period to which the decision applies.

78 Application by geothermal producer for an amended geothermal royalty decision

(1) The geothermal producer may apply to the Minister to amend a geothermal royalty decision.

(2) The application must be made at least 60 business days before the first day of the next royalty return period that would apply to the proposed amended geothermal royalty decision.

(3) Sections 73 to 75 apply to the application as if the reference in the provisions to the geothermal royalty decision were a reference to an amendment of the geothermal royalty decision.

Part 8 Miscellaneous

79 Annual rent—Act, s 130

(1) For section 130(1) of the Act, the annual rent payable for each geothermal tenure is stated in schedule 2.

(2) The annual rent, or a pro-rata amount of the annual rent if the period to which the rent relates is less than a year, must be paid on or before—

(a) on the grant of the geothermal tenure, if the Minister has not already required payment of the rent—the 20th business day after the geothermal tenure takes effect; or

(b) otherwise—31 August each year.

(3) If the annual rent is paid for a year and the geothermal tenure ends during the year, the proportion of the rent that relates to the remainder of the year may be refunded.

(4) The annual rent must be paid by cash, cheque, credit card transaction or electronic transfer of funds.

80 Security for geothermal tenure—Act, s 204

(1) For section 204(2)(a) of the Act, the following forms of security are prescribed—

(a) cash;

(b) cheque;

(c) electronic transfer of funds;

(d) an unconditional security issued by a financial institution that—

(i) is in favour of the 'State of Queensland' and is payable on demand; and

(ii) has no expiry date; and

(iii) states—

(A) the type and number of the geothermal tenure or proposed geothermal tenure; and

(B) the address of the financial institution; and

(iv) is signed for the financial institution by an officer who has authority to sign the security;

(e) a combination of the forms mentioned in paragraphs (a) to (d).

(2) For section 204(2)(b) of the Act, the following amounts are prescribed—

(a) for a geothermal permit or proposed geothermal permit—$14,501;

(b) for a geothermal lease or proposed geothermal lease—$42,298.

82 Prescribed interest on amounts owing to the State—Act, s 372

For section 372(2) of the Act, the rate of interest is 15% a year.

82A Prescribed way for making applications, lodging documents or making submissions

(1) For section 363(2)(b) of the Act, the prescribed way for doing any of the following is electronically using the online system on the department's website—

(a) the making of an application;

(b) the giving of a document to the Minister or chief executive;

(c) the making of a submission.

(2) Also, the chief executive may, by notice given to the person making or giving a document mentioned in subsection (1), require the person to lodge a hard copy of the application, document or submission at the place required under section 363(2)(a) of the Act.

(3) An application, document or submission lodged electronically after 4.30p.m. on a working day and before 8.30a.m. on the next working day (the ***later day***) is taken to have been lodged at 8.30a.m. on the later day.

83 Fees

The fees payable under the Act are stated in schedule 4.

Part 9 Transitional provision

84 Annual rent for converted permit

(1) This section applies to annual rent for a 2004 Act permit that would, before 31 August 2012 and under the unamended provision, be payable on a day before the anniversary day for the 2004 Act permit.

(2) The annual rent must be paid on the anniversary day for the 2004 Act permit.

(3) The annual rent payable on the anniversary day must be worked out using the formula—

A = B/365 x F

where—

A is the amount of the annual rent payable on the anniversary day.

B is the number of days from the anniversary day to 31 August 2012.

F is the annual rent for a geothermal permit under schedule 2.

(4) In this section—

anniversary day means the anniversary of the day the 2004 Act permit took effect.

unamended provision means the *Geothermal Exploration Regulation 2005*, section 7(2)(b) as in force immediately before the commencement of this section.

Schedule 1 Requirements for plugging and abandoning geothermal wells

section 59

Part 1 Requirements for all geothermal wells

1 Abandonment to be consistent with good industry practice

A geothermal well must be abandoned in compliance with good industry practice, to the extent that the practice is consistent with this regulation.

2 Capping of well

A geothermal well must be capped with a metal plate inscribed with the following information—

(a) the identifying name of the well;

(b) the total depth in metres of the well;

(c) the date the well was abandoned.

3 Casing to be sealed

(1) The casing of a geothermal well must be sealed below ground level.

(2) The stub of the casing must be buried below the surface at a depth that—

(a) allows for efficient later re-entry to the well; and

(b) will not adversely interfere with the normal activities of the owner of the land on which the well is located.

Part 2 Additional requirements for wells, other than horizontal wells

4 Isolation of aquifers and porous formations

An aquifer or porous formation intersected by a geothermal well must be isolated so there is no interconnection of gas, steam or water at the point at which the aquifer or porous formation intersects the well.

Example of isolating an aquifer or porous formation—

cementing an interval in a well, where an aquifer or porous formation is intersected by the well, to seal off the aquifer or porous formation

5 Casing of prescribed well

(1) Steel casing must be removed from all sections of a geothermal well that are within or immediately adjacent to geothermal fluid.

(2) However, subsection (1) need not be complied with if it is not technically or commercially feasible to remove the casing.

Example—

production casing that has been cemented in place and can not feasibly be removed

6 Cement to be used for plugs etc.

(1) A geothermal well must have a surface plug of cement in the casing.

(2) Also, if the well has more than 1 casing string and any inner casing string does not reach the surface, the inner casing string must, if required to comply with section 5, be plugged with cement at the top of the string.

(3) The cement used as a plug in a geothermal well must—

(a) be of an industry accepted grade, having regard to the salinity of the fluids in the surrounding strata; and

(b) be tested to ensure that it complies with industry accepted practices and standards.

(4) A plug in, or adjacent to, geothermal fluid in a geothermal well must, if reasonably practicable, be adequately secured.

7 Requirement for packer left in well

A packer in, or adjacent to, a geothermal well that is not to be removed from the well must, if reasonably practicable—

(a) be made of a material that is intrinsically safe; and

(b) be adequately secured.

8 Fluid to be left in well

A geothermal well must be left full of fluid that is of sufficient density to—

(a) help maintain the structural integrity of the well; and

(b) prevent gas influx.

Part 3 Additional requirement for horizontal wells

9 Requirement for liner

(1) A horizontal geothermal well must be abandoned containing a slotted liner that is not made of steel.

Example of a slotted liner not made of steel—

a slotted PVC liner

(2) However, if a horizontal geothermal well has the potential to cause a hazard to future mining because of high levels of methane, the geothermal tenure holder must conduct a risk assessment that includes an assessment of whether a fire resistant anti-static (or FRAS) liner should be used in the well.

Schedule 2 Annual rent

section 79(1)

		$
1	Annual rent for geothermal permit (Act, s 130(1))—for each sub-block included in the area of the permit	2.95
2	Annual rent for geothermal lease (Act, s 130(1))—for each square kilometre included in the area of the lease	159.30

Schedule 4 Fees

section 83

		$
1	Application for geothermal permit (Act, s 36(e))	1,333.00
2	Application for declaration of all or part of the area of a geothermal permit as a potential geothermal commercial area for the permit (Act, s 65(2)(b))	1,063.00
3	Application for geothermal lease over all or part of the area of a geothermal permit (Act, s 78(f))	1,333.00
4	Application for approval to amend development plan for a geothermal lease (Act, s 100(2)(b))	535.00
5	Fee for request for required information for a geothermal tenure (Act, s 196(1)(b))—	
	(a) for information made available in electronic form, other than on a tape or cartridge	166.10
	(b) for information made available on a tape or cartridge	332.50
6	Application for renewal of a geothermal permit (Act, s 292(c)(i))	665.00

Schedule 5 Dictionary

section 3

annual reserves report see section 35(1).

appraisal well means a geothermal well drilled to work out the size of a geothermal resource in an area of a geothermal tenure and how geothermal production in the area of the tenure can be efficiently developed.

bit record, for a geothermal well, means a historical record of how a bit performed in the geothermal well, including information about—

(a) the size, type and depth of the bit used in the well; and

(b) the distance the bit drilled into the well; and

(c) the hours the bit was used on bottom or rotating.

completion day, for a geophysical survey or scientific or technical survey, means—

(a) if the survey involves reprocessing of raw data recorded or recovered for a previous survey—the day on which reprocessing of the data is completed; or

(b) otherwise—the last day on which raw data is recorded or recovered for the survey.

component, for part 7, see section 65.

core sample means a sample of a core taken from a geothermal well during drilling of the well.

cutting sample means a sample of a cutting taken from a geothermal well during the drilling of the well.

daily drilling report see section 17(1).

development well means a geothermal well drilled in the area of a geothermal tenure to enable geothermal production in the area to start.

directional well means part of a geothermal well drilled in the area of a geothermal tenure that is not drilled vertically.

disposal fluid means any spent fluid from a geothermal reservoir.

drilling fluid means a fluid used to aid drilling of a geothermal well.

end of tenure report see section 16(1).

exploration well means a geothermal well drilled to obtain stratigraphic information for the purpose of exploring for geothermal energy.

feed zones means the intervals in a geothermal well that have the potential to produce geothermal fluid.

fluid sample see section 58(1).

geophysical survey means the systematic collection of geophysical data associated with the subsurface features of an area, including burials data to map the subsurface structure of the earth's crust.

geophysical survey report see section 50(2).

geothermal feature interval, in a geothermal well, means a location in the well at which an alteration zone, permeable zone or feed zone occurs.

geothermal fluid means liquid, steam and any associated gases in a heat resource that can be extracted economically from the earth.

geothermal reporting code means The Geothermal Reporting Code – Second Edition (2010), prepared by The Australian Geothermal Reporting Code Committee.

Editor's note—

At the commencement of this section, a copy of this document was available on the Australian Geothermal Energy Group's website.

geothermal reserve means the part of a geothermal resource that is economically recoverable.

geothermal reservoir means the permeable strata or aquifers within a geothermal resource that contain geothermal fluid.

geothermal royalty decision see section 70(1)(b).

hazard means a thing or situation with potential to cause harm to any of the following—

(a) a person, including, for example, financial losses or increased liabilities;

(b) property;

(c) future mining activities;

(d) the environment.

hazard information report means a report that includes—

(a) a summary of all significant hazards that, under the P&G Act safety provisions, are required to be reported by a person; and

(b) for each hazard mentioned in paragraph (a)—details of the hazard.

hydraulic fracturing activities means a form of stimulating a geothermal well by injecting specially engineered fluids at a high pressure and rate into a geothermal reservoir to open fractures in the reservoir.

hydraulic fracturing activities completion report see section 44(2).

hydraulic fracturing fluid means a fluid that—

(a) is a mixture of water, liquid chemicals and other additives, including, for example, proppants; and

(b) is commonly known as slurry.

hydraulic fracturing fluid activity statement see section 48.

identifying name—

(a) for a geothermal well, means the unique identifying name and number for the well recorded in the register; or

(b) for a geophysical survey or scientific or technical survey, means the unique identifying name or number for the survey recorded in the register.

injection report see section 43(1).

injection testing, for a geothermal well, means the evaluation or testing of a geothermal reservoir to work out the rate at which geothermal fluid can be returned to the reservoir using the well.

Examples of a fluid—

water and supercritical carbon dioxide

injection testing period, for injection testing of a geothermal well, see section 39(3).

injection testing report see section 39(1).

injection well means a well used to return geothermal fluid to a geothermal reservoir after its use.

negative wellhead value see section 69(1)(a).

partial relinquishment report see section 15(1).

permeable strata means a rock layer (or geological unit) that has enough permeability to allow fluid to circulate through it.

prescribed equipment, for an area of a geothermal tenure, means any equipment, other than casing, that may create a hazard.

Examples of prescribed equipment—

drilling equipment or geophysical logging tools

probable geothermal reserve means a probable geothermal reserve within the meaning of the geothermal reporting code.

production report see section 42(1).

production testing, for a geothermal well, means the evaluation or testing of a geothermal reservoir to work out the rate at which geothermal fluid can be extracted from the reservoir using the well.

production testing period see section 36(3).

production testing report see section 36(1).

proven geothermal reserve means a proven geothermal reserve within the meaning of the geothermal reporting code.

rig release day, for a geothermal well, means the day—

(a) the drilling rig last used to drill the well is moved so it is no longer above the well; and

(b) the geothermal tenure holder for the well does not intend to continue drilling the well.

royalty return period, for part 7, see section 65.

scientific or technical survey, for a geothermal tenure, means a geochemical or geotechnical survey or other survey for a similar purpose, other than a geophysical survey.

scientific or technical survey report see section 53(2).

seismic survey, for a geothermal tenure, means a survey carried out to work out the subsurface features of an area in the geothermal tenure by transmitting sound waves into the ground and measuring the time the sounds take to return to the surface.

specific enthalpy means a measure of the total energy of a mass in joules a kilogram (J/kg).

squeeze cementing, of a geothermal well, means the process of forcing, by pressure, cement slurry into a part of a geothermal well.

Examples of parts of a geothermal well—

channels or perforations

stimulation, of a geothermal well, means increasing the permeability of a geothermal reservoir by using hydraulic fracturing, cavitations, fracture acidising, proppant treatments or other techniques.

surrender report see section 49.

void, in relation to a geothermal well, means the porous intervals intersected by the well and identified by fractures or channels.

well abandonment report see section 29(1).

well completion report see section 20(1).

wellhead value, for part 7, see section 65.