

Conditions for Geothermal Take and Discharge Resource Consent No.67340

TE AHI O MAUI LIMITED PARTNERSHIP

A resource consent:

- a) under section 14(2)(a), 14(2)(b) and 14(2)(c) of the Resource Management Act 1991 and Rule 73 of the Bay of Plenty Regional Water and Land Plan and Rule 17.4.4(a) of the Tarawera River Catchment Plan to undertake a discretionary activity being to **Take and Use Geothermal Fluid within the Kawerau Geothermal System;** and
- b) under section 15(1) (a),(b) and 15(2A)(b) of the Resource Management Act 1991 and Rule 77 of the Bay of Plenty Regional Water and Land Plan and Rule 17.4.4(d) of the Tarawera River Catchment Plan to undertake a discretionary activity being to **Discharge Geothermal Fluid via Injection within the Kawerau Geothermal System;** and
- c) under section 15(1)(a) of the Resource Management Act 1991 and Rule 37 of the Bay of Plenty Regional Water and Land Plan to undertake a discretionary activity being to **Discharge Anti-Scalant and Other Chemical Inhibitors to Water via Injection;** and
- d) under section 15(1)(b) of the Resource Management Act 1991 and Rule 77A of the Bay of Plenty Regional Water and Land Plan to undertake a discretionary activity being to **Discharge Geothermal Fluid to Ground Soakage;** and
- e) under section 15(1)(b) of the Resource Management Act 1991 and Rule 77A of the Bay of Plenty Regional Water and Land Plan to undertake a discretionary activity being to **Discharge Steam Line Condensate to Ground Soakage;**

subject to the following conditions:

1. **Purpose**

To authorise and set conditions for the abstraction and use of energy from geothermal fluid within the Kawerau Geothermal System; and

To authorise and set conditions for injecting spent geothermal fluid, condensate and other chemicals such as anti-scalant and chemical inhibitors into the Kawerau Geothermal System after use; and

To authorise and set conditions to discharge geothermal fluid to ground soakage resulting from unplanned or unscheduled disruptions to the normal operation of the well field, and scheduled or unscheduled maintenance such that geothermal fluid is discharged to brine dumps or soakage ponds; and

To authorise and set conditions for the discharge of steam line condensate to ground soakage associated with operation and maintenance activities.

2. Quantity and Rate

- 2.1 The quantity of geothermal fluid taken shall not exceed a maximum of 5.475 mega tonnes of geothermal fluid per annum.
- 2.2 The quantity of geothermal fluid taken shall not exceed a maximum of 16,000 tonnes per day, and the annualised average daily quantity of geothermal fluid taken (calculated over any consecutive twelve month period) shall not exceed 15,000 tonnes per day.
- 2.3 The annualised average daily quantity of geothermal fluid and other chemical inhibitors discharged to deep injection shall not exceed 15,000 tonnes per day (calculated over any consecutive twelve month period).
- 2.4 Any geothermal fluid abstracted and used under this consent shall be for electricity generation and cascade uses.
- 2.5 The consent holder shall ensure that, as far as practicable, all geothermal fluid not otherwise consumed by the consent holder or discharged as condensate to ground in accordance with network management requirements, is injected back into the Kawerau Geothermal System.
- 2.6 Notwithstanding Condition 2.5, the daily quantity (tonnes) of geothermal fluid and other chemical inhibitors discharged to injection shall not be less than 77% of the geothermal fluid taken. The discharge shall be to deep injection, except for wells that are required to avoid or mitigate subsidence or surface effects by targeted injection, which may be completed at shallower depths where approved by the Chief Executive of the Regional Council or delegate in accordance with Condition 11.1.

3. Source of Supply

- 3.1 From existing and any future wells within the Kawerau Geothermal System as shown within the area indicated as the "production locations" in the TAOM Area on the latest version of B.O.P.R.C. Plan Number RC 67340-1, unless approved in accordance with condition 10.1.
- 3.2 For each new well drilled, the consent holder shall create a new version of Plan Number RC 67340-1 showing the location of the new well head and well track. The revised plan shall clearly show the revision number and date of the revision. A copy of the latest version of the revised plan shall be provided to the Chief Executive of the Regional Council or delegate ("Regional Council") within 30 working days of completion of the new well.

4. Points of Discharge

- 4.1 From existing and any future wells within the Kawerau Geothermal System as shown within the area indicated as the "injection locations" in the TAOM Area on map referenced as B.O.P.R.C. Plan Number RC 67340-1 unless approved in accordance with condition 11.2.
- 4.2 For each new well drilled, the consent holder shall create a new version of Plan Number RC 67340-2 showing the location of the new well head and well track. The revised plan shall clearly show the revision number and date of the revision. A copy of the latest version of the revised plan shall be provided to the Regional Council within 30 working days of completion of the new well.

5. Map Reference

The consent holder shall provide map reference (NZTM Coordinates) for each well(s) head shown on map B.O.P.R.C. Plan Number RC 67340-2 provided in accordance with condition 4.2.

6. Legal Description

Pt Kawerau A8D, BLK IX, Rangitaiki Upper (SD), CT 301500, (Whakatane District) (the TAOM Area) (refer to Advice Note 10).

7. General Requirements

- 7.1 Within five (5) working days of the exercise of this consent, the consent holder shall notify (in writing) to the Regional Council:
- a) Details of which party is responsible for the management of the abstraction, injection and discharge of residual geothermal fluid or condensate and responsibilities for compliance with conditions of this consent (see Advice Note 6); and
 - b) The date at which the consent holder will start exercising this resource consent.
- 7.2 The consent holder shall keep and maintain, and, where necessary, upgrade the wells and associated equipment (including any reticulation equipment used to supply other users of geothermal energy from the wells) in good and safe condition in accordance with recognised geothermal engineering practices or, where applicable, industry standards (including the latest version of the Code of Practice for Deep Geothermal Wells (NZS 2403) or any document that replaces that Code) for the time being in effect or otherwise to the satisfaction of the Regional Council.
- 7.3 The consent holder shall keep a record of any alteration, maintenance or testing undertaken on any of the wells. The consent holder shall provide the Regional Council, in writing, with the details of the work performed within one calendar month of the work being undertaken.

8. **Operational Management Plan**

- 8.1 Within twelve months of commencement of this consent, the consent holder shall prepare and provide to the Regional Council, an Operational Management Plan in order to demonstrate how the requirements of this consent will be complied with.
- 8.2 The specific objectives of the **Operational Management Plan** are to:
- a) Demonstrate that the geothermal resource will be used in an efficient and sustainable manner by the consent holder;
 - b) State all field developments proposed by the consent holder for the next five years; and
 - c) Define the procedures for ensuring compliance with this consent.
- 8.3 As a minimum, the **Operational Management Plan** shall include the following information, including likely future changes where known, for the next five years:
- a) Monitoring requirements (take and discharge rates, flows, levels as required by consent conditions);
 - b) Protocols for the management of adverse effects on the Parimahana Reserve, Ruruanga Stream areas and other features contained within the TAOM Area as shown on the latest version of B.O.P.R.C. Plan Number 67340-2;
 - c) A detailed map showing the location of the existing infrastructure associated with the consent (i.e. production and injection bores);
 - d) Proposed wells, workovers and abandonments;
 - e) Other proposed geothermal field developments such as pipelines, changes to infrastructure, earthworks and activities relating to waterways;
 - f) Proposed significant changes to fluid abstraction, output or operations of the power plant that utilises geothermal fluid taken from the Kawerau Geothermal System under this consent; and
 - g) Mitigation and emergency management procedures.
- 8.4 The consent holder shall operate in accordance with the **Operational Management Plan** provided to the Regional Council in accordance with conditions 8.1 or 8.5 of this consent.
- 8.5 As a minimum, the **Operational Management Plan** shall be reviewed and updated every five years or as directed by the Regional Council. An updated version of the Plan shall be submitted to the Regional Council for comments by 30 November of the year that it is due. Once provided, the updated **Operational Management Plan** will supersede all earlier versions of the plan.

9. **Access**

The consent holder shall maintain adequate access to the wellheads and all reticulation for monitoring purposes to the satisfaction of the Regional Council.

10. **Production Wells**

- 10.1 The consent holder shall ensure that production wells are designed and located to optimise the long term energy potential of the Kawerau Geothermal System and as far as practicable, to minimise material adverse surface subsidence effects and property damage.
- 10.2 The consent holder shall ensure that future production wells are cased into the greywacke reservoir or to a depth not less than 1000 metres below ground surface whichever is the deeper, except where approval is obtained from the Regional Council upon taking advice from the Peer Review Panel.
- 10.3 Unless otherwise agreed in writing by the affected legally authorised abstractor, the consent holder shall ensure that future production wells shall be designed and located to avoid, to the extent practicable, material interference with any other legally authorised abstractor's (see Advice Note 3) existing production wells.
- 10.4 Unless otherwise agreed in writing by the affected legally authorised abstractor, the minimum vertical and horizontal separation distance between the consent holder's future production wells and those of any legally authorised abstractor's at the time of drilling shall be 320 metres as measured between the closest point of the open hole (the perforated liner) sections of the wells (see Advice Note 3 and Schedule 1).
- 10.5 The consent holder shall forward a copy of any written agreement made under conditions 10.3 and 10.4 to the Regional Council prior to the installation of the production well.

11. **Injection Wells and Monitoring Well(s)**

- 11.1 The consent holder shall ensure that future injection wells are located at the margins of the Kawerau Geothermal System in order to provide pressure support while minimising potential for cooling of the productive reservoir. Injection wells may be located within other areas of the Kawerau Geothermal System if those wells are required to avoid or mitigate material adverse subsidence or surface effects by targeted injection and the location of the wells has been approved by the Regional Council based on advice from the Peer Review Panel.
- 11.2 The consent holder shall ensure that future injection wells designed for deep injection are cased at a depth of no less than 1100 metres below sea level (RSL), except where approval is obtained from the Regional Council, after taking advice from the Peer Review Panel.

- 11.3 The consent holder shall ensure that any future wells designed for targeted injection shall be cased into competent formations in order to prevent surface breakout and interference with the productive reservoir.
- 11.4 Unless otherwise agreed in writing by the affected legally authorised abstractor, the consent holder shall ensure that future injection wells shall be designed and located to avoid, to the extent practicable, material interference with any other legally authorised abstractor's existing production or injection wells.
- 11.5 Unless otherwise agreed in writing by the affected legally authorised abstractor, the minimum vertical and horizontal separation distance between the consent holders future injection wells and the wells of any other legally authorised abstractor's shall be 320 metres as measured between the closest point of the open hole (the perforated liner) sections of the wells (see Advice Note 3 and Schedule 1).
- 11.6 The consent holder shall forward a copy of any written agreement made under conditions 11.4 and 11.5 to the Regional Council prior to installation of any injection well.
- 11.7 Unless otherwise agreed in writing by the Regional Council, the consent holder shall ensure that the injection pressure shall not exceed the natural production pressure (See Advice Note 4).
- 11.8 Unless otherwise agreed in writing by the Chief Executive of the Bay of Plenty Regional Council or delegate, the consent holder shall ensure that the injection pressure shall not exceed a fracture gradient of 0.6 psi/ft, or a wellhead pressure (gauge) of 3.8 bar per 100 metres of casing.
- 11.9 The consent holder shall ensure that the injection temperature of the injectate is consistent with the Kawerau Reservoir Model assumptions or as otherwise approved by the Regional Council.
- 11.10 Monitoring well(s) shall be designed and constructed in accordance with best practices for the intended purposes (reservoir monitoring).
- 11.11 The consent holder shall prepare and adhere to an Injection Strategy/Management Plan to cover items such as but not limited to:
- a) Provide pressure support for the Kawerau Geothermal reservoir;
 - b) Minimise potential cooling of the productive geothermal reservoir; and
 - c) Any other matters that need to be addressed in relation to injection strategy.

12. **Anti-Scalant, Inhibitors and Tracers**

- 12.1 Prior to any anti-scalant, chemical inhibitors and tracers being used on-site, other than those listed in Schedule 3 attached to these conditions of consent, the consent holder shall provide the Regional Council with:

- a) details of the proposed materials (Material Safety Data Sheets);
- b) the concentration at which the product will be used; and
- c) an assessment of the potential adverse environmental effects of the product and how the use of the product will be managed to avoid, remedy or mitigate adverse effects.

13. Peer Review Panel (Kawerau Geothermal System)

- 13.1 Within six months of the commencement of this consent, the Regional Council will appoint an independent peer review panel. The operation of this consent shall be subject to the scrutiny of the peer review panel for the Kawerau Geothermal System (see Advice Note 1).
- 13.2 The Peer Review Panel for the Kawerau Geothermal System shall consist of not less than three independent experts suitably qualified and experienced in geothermal resource monitoring, geothermal reservoir management or related environmental effects.
- 13.3 The Peer Review Panel shall meet at least once per 12 month period for the duration of this consent; and shall meet at other times as required by the Regional Council for the purpose of assisting the Regional Council to fulfil its functions in respect of the exercise of this consent and its effects.
- 13.4 The Peer Review Panel may recommend to the Regional Council that other specialists be seconded or technical studies be commissioned from time to time for the proper exercise of its functions. The decision on whether to act on such a recommendation will rest with the Regional Council after consultation with the consent holder.
- 13.5 The role of the Peer Review Panel is to assist the Regional Council to manage, supervise and monitor the exercise of this consent. The functions and responsibilities of the Peer Review Panel, in addition to those specified elsewhere in this consent, shall include but not be limited to:
 - a) Review the Kawerau Reservoir and Subsidence Models (including proposed modifications), model predictions (outputs) and reports to make recommendations to the Regional Council as to modifications to the model that are considered appropriate to fulfil the requirements of the conditions of consent;
 - b) Review the consent holder's Operational Management Plan, annual reports, monitoring data, monitoring plans and reports submitted as appropriate, and making recommendations to the Regional Council on the content of these plans and reports in relation to the sustainable management of Kawerau Geothermal System;
 - c) Review monitoring reports and data and providing advice as to the interpretation of monitoring results to the Regional Council, including reporting on trends, identifying any matters of concern and recommending changes to monitoring requirements;

- d) Review predictions of changes to reservoir conditions and predictions of the potential consequential effects of resource use (including subsidence and tilt) and making recommendations to the Regional Council on the significance of such changes and effects;
- e) Advise the Regional Council on the suitability of current and proposed injection temperatures, pressures, location and depth;
- f) Make recommendations on changes required to the injection strategy as well as current and proposed production strategy;
- g) Recommend to the Regional Council the appropriate geothermal reservoir management response should any actual or predicted reservoir temperature, pressure, discharge enthalpy, reservoir fluid state or ground level vary significantly from outcomes predicted by the Kawerau Reservoir or Subsidence Models immediately prior to the exercise of this consent;
- h) Review compliance with the conditions of this consent and making recommendations regarding any measures the consent holder needs to undertake to achieve compliance with consent conditions;
- i) Recommend to the Regional Council that a review of conditions be undertaken for the purpose of avoiding, remedying or mitigating adverse effects;
- j) Provide the Regional Council with a written report that includes Peer Review Panel comments and recommendations on the annual report submitted in accordance with condition 16.2 of this consent;
- k) Consider any report or information referred to it by the Regional Council arising from the KISG forum, if established, under condition 17.4 and make recommendations to the Regional Council as it considers appropriate; and
- l) Consider any report or information referred to it by the Regional Council arising from the process in relation to property damage in condition 18, in particular condition 18.8 and make recommendations to the Regional Council as it considers appropriate.

13.6 The consent holder shall provide the Regional Council with baseline monitoring reports and all other resource data, information, reports and surveys, including modelling results (if applicable) and data that the Regional Council considers to be necessary to carry out its work. Such information shall also be provided to the Peer Review Panel.

14. **Kawerau Reservoir and Subsidence Numerical Models**

14.1 The consent holder shall retain the use of a calibrated (pressure and temperature) and validated (peer reviewed) geothermal reservoir numerical model ("**Kawerau Reservoir Model**") and a 3D subsidence model ("**Kawerau Subsidence Model**") for the Kawerau Geothermal System.

- 14.2 The consent holder shall not adopt a **Kawerau Reservoir or Subsidence Model** that is different to that used in support of the resource consent application without the written approval of the Regional Council.
- 14.3 If at any time during the exercise of this consent, the results of monitoring by the consent holder indicates that the properties (discharge enthalpy, pressure, temperature, chemistry) of the Kawerau Geothermal reservoir have varied to a material degree from what was predicted by the Kawerau Reservoir Model and if that variation is likely to result in a material adverse effect, the consent holder shall implement an appropriate management response to the satisfaction of the Regional Council.
- 14.4 If at any time during the exercise of this consent, the results of monitoring by the consent holder indicate that the ground level within the Kawerau Geothermal System has varied or will vary to a material degree from what was predicted by the **Kawerau Subsidence Model** and if that variation is likely to cause a material adverse effect, the consent holder shall implement an appropriate management response to the satisfaction of the Regional Council.
- 14.5 Prior to the use of any new production or injection wells drilled from locations other than those locations indicated on BOPRC Plan No RC 67340-1, the consent holder shall use the **Kawerau Reservoir Model** to predict the effects of planned abstraction and/or injection and be satisfied that the long term energy potential of the Kawerau Geothermal reservoir can be optimised and subsidence effects minimised before proceeding with the production or injection activities.
- 14.6 To the extent practicable, the consent holder shall, in conjunction with other legally authorised abstractors (in a manner consistent with their consent conditions) use the **Kawerau Reservoir and Subsidence Models** at not less than five yearly intervals to predict physical changes in the Kawerau Geothermal System for the next five, ten, twenty five and fifty years. Modelling shall incorporate realistic abstraction and injection scenarios for the consent holder and any legally authorised abstractors of geothermal fluids, subject to the provision of necessary and appropriate information from such abstractors.
- 14.7 If the **Kawerau Reservoir or Subsidence Models** are not performing satisfactorily (to the satisfaction of the Regional Council following advice from the Peer Review Panel), the consent holder shall revise the model, to the extent practicable, address the deficiencies and then shall undertake the modelling predictions specified under condition 14.6.
- 14.8 The consent holder shall undertake such investigations and measurements, including those that may be directed by the Regional Council (following advice from the Peer Review Panel) from time to time, that are necessary for the continued evaluation of the effectiveness and applicability of the **Kawerau Reservoir and Subsidence Models** for the Kawerau Geothermal System.

15. **Monitoring**

15.1 The consent holder shall, as a minimum, undertake:

- a) Continuous recording of production well head pressures and temperatures;
- b) Continuous recording of production steam and water flows. All production well flows shall be summed to give the total mass extraction from the reservoir (see Advice Note 7);
- c) Continuous recording of injection water flows, temperatures and well head pressures as measured at individual wells;
- d) Continuous recording of pressure or temperature in designated monitoring wells;
- e) Periodic (no less than annual) chemical sampling of two phase fluid, steam and separated water from pipelines for liquid and gas chemistry;
- f) Periodic tracer tests, using chemical or radioisotope tracers, to determine injection flow paths and possible returns to any production wells in the Kawerau Geothermal System subject to availability and access;
- g) Monthly measurements of water levels, temperatures and water chemistry (including pH, chloride, total bicarbonate and magnesium) as an indicator of the presence of geothermal fluids, in special purpose groundwater monitoring wells (10 to 100 metres deep), groundwater monitoring wells down gradient of permanent well ponds and selected springs and seeps;
- h) If practicable, collect reservoir temperature and pressure profiles from wells (see Advice Note 9);
- i) In conjunction with other operators on the Kawerau Geothermal System, ensure that levelling surveys of the subsidence benchmark network comprising surface benchmark elevations that were established and operative at the commencement of this consent and any new benchmarks subsequently installed are undertaken (see Advice Note 5 and Schedule 2);
- j) Subject to the approval of the respective land owners and property owners (or their legal successors), and in conjunction with other operators on the Kawerau Geothermal System, annual levelling surveys of primary industrial plant and buildings located in the Carter Holt Harvey, SCA Hygiene Australasia, and Norske Skog Tasman industrial complexes; and
- k) Completion test run and heat up survey (2) on new wells;

15.2 Notwithstanding the requirements of condition 15.1, the consent holder shall, after consultation with Mighty River Power Limited, Ngati Tuwharetoa Geothermal Assets Limited, the Department of Conservation and the Regional Council, develop a **Monitoring and Mitigation Plan** for the TAOM Area, Parimahana Reserve in its entirety and the Te Kaukahiwi o Tirotirowhetu Scenic Reserve within six months of commencement of this consent. The plan shall be approved by the Regional Council and shall include but not necessarily be limited to:

- a) Addressing the cultural and environmental concerns of local tangata whenua;
- b) Periodic observations of natural geothermal surface features within the TAOM Area, the Parimahana Reserve in its entirety and Te Kaukahiwi o Tirotirowhetu Scenic Reserve in accordance with the Regional Council "Guideline for Mapping and Monitoring Geothermal Surface Features";
- c) Monitoring of the groundwater levels and temperatures in the vicinity of thermal features within the TAOM Area, the Parimahana Reserve in its entirety, and the Te Kaukahiwi o Tirotirowhetu Scenic Reserve;
- d) Monitoring of vegetative patterns (including ground temperature) within the TAOM Area, the Parimahana Reserve in its entirety, and the Te Kaukahiwi o Tirotirowhetu Scenic Reserve;
- e) Two yearly photographic surveys of selected features; and
- f) Six monthly monitoring and reporting on temperature, flow rate and chemistry of discharging springs.

Within six months of the completion of the Monitoring and Mitigation Plan, the consent holder shall undertake baseline monitoring of:

- (a) natural geothermal surface features;
- (b) groundwater levels and temperatures in the vicinity of thermal features; and
- (c) geothermal vegetative patterns and conditions including threatened plant species

within the TAOM Area, the Parimahana Reserve in its entirety, and the Te Kaukahiwi o Tirotirowhetu Scenic Reserve;

15.3 Within six months of the **Monitoring and Mitigation Plan** required by condition 15.2 of this consent being approved, the consent holder shall commence monitoring that is consistent with the requirements of the Plan.

15.4 The monitoring plans referred to in conditions 15.1 and 15.2 may be amended subject to the written approval of the Regional Council.

15.5 The geothermal fluid and groundwater metering devices and methods used to undertake the monitoring required by condition 15.1 and 15.2 shall have a

reliable calibration, which shall be maintained to a final accuracy of +/- 5 percent. Evidence of the calibration shall be provided to the Regional Council upon request.

16. **Annual Reporting**

16.1 All data and reports provided to the Regional Council shall be hard copy and a suitable electronic format compatible with Regional Council computer systems, as agreed to by the Regional Council.

16.2 By 31 March of each year, the consent holder shall produce and provide to the Regional Council, an Annual Report (for the previous calendar year) that includes:

- a) any change in reservoir pressures;
- b) any change in reservoir temperatures;
- c) any changes that the reservoir model may indicate for the future operation and management of the Kawerau Geothermal System;
- d) the state of the Kawerau Geothermal System based on the results of the modelling, monitoring, measurements, investigations and surveys specified in conditions of this consent and an interpretation of those results including geothermal reservoir output enthalpy and mass flow and subsidence predictions and subsurface changes;
- e) monitoring results required under condition 15.1 and 15.2;
- f) complete records of well drilling activities, proposed wells, well workovers and well abandonments over the period;
- g) other proposed geothermal developments such as pipelines, changes to infrastructure, earthworks, and activities relating to water ways;
- h) the volume of geothermal fluid abstracted and injected under this consent;
- i) any proposed significant changes to fluid abstraction, use and injection from the operation of the power plant; and
- j) Any adaptive management or mitigation activities undertaken.

17. Liaison Groups

Community Liaison Group

- 17.1 The consent holder shall, in conjunction with other operators of the Kawerau Geothermal System, establish and service a **Community Liaison Group** for the duration of this consent and shall as a minimum invite, in writing, interested parties to annual meetings to provide feedback and comment on environmental issues related to the exercise of this consent and its associated geothermal abstractions, injections and discharges. The annual meetings shall be held in a suitable venue in the month of April each year. The interested parties shall include, but not be limited to, tangata whenua representatives, the Department of Conservation and the parties who submitted on the resource consent application.
- 17.2 Parties attending the annual meetings shall be provided with a copy of the Annual Report (required under condition 16.2) excluding any parts of the report that are considered confidential or commercially sensitive. Minutes recording attendance, main topics of discussion such as compliance monitoring and any agreed outcomes shall be forwarded to the Regional Council and the meeting participants within 20 working days of any meeting held.

Kawerau Industrial Stakeholder Group

- 17.3 The Consent Holder shall within three months of the commencement of this consent adopt a mechanism for the purposes of providing:
- (a) information to industrial operators in the Kawerau area who may be adversely affected by geothermal operations authorised by this consent, as a minimum, Carter Holt Harvey Limited, SCA Hygiene Australasia Limited, Norske Skog Tasman Limited, Mighty River Power Limited and Ngati Tuwharetoa Geothermal Assets Limited; and
 - (b) a forum for discussing, at the earliest practicable time, the potential for activities authorised by this consent to adversely affect land, buildings and fixed plant over and in the vicinity of the Kawerau Geothermal System and other relevant matters regarding the operation of and effects of the resource consent and the integrated management of the Kawerau Geothermal System.
- 17.4 The mechanism for providing the information and forum shall be either through:
- (a) contractual arrangements (existing or future) with Carter Holt Harvey Limited, SCA Hygiene Australasia Limited, Norske Skog Tasman Limited, Mighty River Power Limited, and Ngati Tuwharetoa Geothermal Assets Limited and any other industrial operator who may be adversely affected by the geothermal operations authorised by this consent as determined by the Regional Council (including suitable arrangements as to confidentiality); or
 - (b) the establishment of a Kawerau Industrial Stakeholder Group ("KISG").

- 17.5 In the event that the information and forum referred to in Condition 17.3 is to be provided via contractual arrangements, the Consent Holder shall advise the Regional Council accordingly, including advice that issues of confidentiality have been satisfactorily addressed. (For the avoidance of doubt, the Consent Holder shall not be required to provide any commercially sensitive or confidential information unless suitable arrangements in relation to confidentiality have been entered into.)
- 17.6 In the event that KISG is to be established, the Consent Holder shall:
- (a) Within three months of the commencement of this consent invite representatives of (as a minimum) Carter Holt Harvey Limited, SCA Hygiene Australasia Limited, Norske Skog Tasman Limited, Geothermal Developments Limited, Mighty River Power Limited, and Ngati Tuwharetoa Geothermal Assets Limited to participate. To achieve the purposes stated in condition 17.3, the KISG requires access to all information and analysis required by the conditions of this consent to the extent that such information is reasonably necessary to understand the potential for activities authorised by this consent to adversely affect land, buildings and fixed plant over and in the vicinity of the Kawerau Geothermal System.
 - (b) Provide KISG members all information referred to in condition 17.6(a) on request, including any such information or analysis that is considered confidential or commercially sensitive, provided that the parties to whom the information is to be provided have entered into appropriate confidentiality agreements.
 - (c) Hold meetings of the KISG no less frequently than annually or at any other times necessary to satisfy condition 17.3.
 - (d) Forward minutes of the KISG meeting to the Regional Council and the meeting participants within 20 working days of any meeting held.

18. **Property Damage**

- 18.1 The consent holder shall keep a register of complaints lodged with it in respect of any property damage which has allegedly occurred or is reasonably anticipated to occur ("anticipated property damage") within the Kawerau Geothermal System as a result of the activities authorised by this consent. For the purposes of these conditions (18.1 to 18.17), "property damage" means damage to land, buildings, or fixed plant.
- 18.2 The register shall record for each complaint:
- a) The date and time of the complaint;
 - b) The name, contact details and description of the complaint including details of any alleged property damage; and
 - c) The outcome of the complaint in terms of the process set out below.

A copy of the complaint shall be forwarded to the Regional Council within seven working days of receiving the complaint.

18.3 Upon receiving a complaint under condition 18.1, the consent holder shall either:

- (a) Remedy the damage to the satisfaction of the complainant and advise the Regional Council of the action taken; or
- (b) Engage a suitably qualified and experienced person (“assessor”) to objectively assess and report on the cause of the property damage or anticipated property damage and whether it is caused by geothermal activities or some other cause; and if caused by geothermal activities, then:
 - i. Whether the property damage or anticipated property damage is or will be the result of any rate of subsidence or tilt, or hydrothermal activity, that is significantly greater than the measured and recorded trend of historical subsidence or tilt or hydrothermal activity that existed prior to the commencement of the consent holder’s abstraction and injection activities;
 - ii. Whether, and if so the extent to which, any property damage or anticipated property damage arising from significantly greater rate changes determined under condition 18.3(b)(i) is attributable to the abstraction or injection of geothermal fluids;
 - iii. Whether, and if so the extent to which, any property damage or anticipated property damage arising from significantly greater rate changes determined under condition 18.3(b)(i) is attributable to the abstraction or injection of geothermal fluids identified under condition 18.3(b)(ii) as a result of the consent holder's abstraction or injection activities; and
 - iv. Whether any buildings or fixed plant established after the commencement of this consent were unlawfully established.

Property damage or anticipated property damage identified under condition 18.3(b)(iii) shall be deemed “qualifying property damage”.

18.4 The consent holder shall instruct the assessor engaged under condition 18.3 to consult with other abstractors from the Kawerau Geothermal System in undertaking the assessment to assess the extent to which any alleged or anticipated property damage is attributable to abstraction or injection of geothermal fluids undertaken by them pursuant to their consents. The consent holder shall not be required to comply with this condition if any other abstractor refuses to consult with the assessor.

18.5 The consent holder shall engage a suitably qualified and experienced person, or persons if necessary, to make recommendations to the consent holder on appropriate ways to avoid, remedy or mitigate any qualifying property damage.

- 18.6 If the qualifying property damage has not occurred but is reasonably anticipated to occur, then the consent holder may (after consultation with and subject to the approval of the property owner) undertake preventative measures, recommended under condition 18.5, designed to avoid the actual occurrence of the damage.
- 18.7 If the qualifying property damage has already occurred then the consent holder shall document what remedial actions (if any), recommended under condition 18.5, it intends to take to remedy or mitigate (either physically or financially) the qualifying property damage (after consultation with the property owner) and may undertake those remedial actions if the property owner agrees that they can be undertaken and shall advise the Regional Council of the action undertaken.
- 18.8 If the property owner does not agree that any proposed preventative measures or remedial actions are sufficient, the consent holder shall forward any property damage complaint it receives under condition 18.1, the report under condition 18.3, the recommendations under condition 18.5, and its proposed preventative measures and remedial actions (if any) under conditions 18.6 and 18.7 to the Regional Council, within 60 working days of first receiving the complaint.
- 18.9 The Regional Council shall, on receipt of a complaint under condition 18.8:
- (a) Assess, after consultation with the complainant the adequacy of the report under condition 18.3 and its proposed preventative measures and remedial actions under condition 18.6 and 18.7; and
 - (b) Identify any additional preventative measures or remedial actions required if in the view of the Regional Council the preventative measures or remedial actions proposed by the consent holder are inadequate.

For the purpose of giving effect to this condition the Regional Council may engage the assistance of the Peer Review Panel or any other independent expert.

- 18.10 The Regional Council shall advise the consent holder of the outcome of its assessment required under condition 18.9 within 30 working days (or such shorter or longer period as both the complainant and the consent holder may agree with the Regional Council) of receiving the relevant documentation under condition 18.8.
- 18.11 Subject to condition 18.12 and 18.13, the consent holder shall then implement, as soon as is reasonably practicable, the preventative measures or remedial actions it proposed under condition 18.6 and 18.7 and any additional preventative measures or remedial actions identified by the Regional Council under condition 18.9.
- 18.12 Prior to complying with condition 18.11 the consent holder shall seek the permission of the complainant to undertake the preventative measures or remedial actions if it involves works or services on the complainant's property. In the event that permission is withheld, then compliance with condition 18.11 is not required.

18.13 Where the consent holder disagrees with the requirement for additional preventative measures or remedial actions identified by the Regional Council pursuant to condition 18.9(b), the consent holder shall, within 10 working days of receiving the advice referred to in condition 18.10 above:

(a) Advise the Regional Council and the complainant of such; and

(b) Submit the question of whether:

i. The assessments under conditions 18.3(b) and 18.4 are appropriate; and/or

ii. The additional preventative measures or remedial actions should be undertaken:

to a suitably qualified and experienced independent expert (“expert”) for determination and conditions 18.14 to 18.17 will apply.

18.14 The expert shall be a person agreed to by the consent holder, the Regional Council, and the relevant property owner (“parties”), but if the parties cannot agree on the expert within 10 working days of the date of receipt of the written notice, the expert shall be appointed by the President of the Institute of Professional Engineers of New Zealand.

18.15 Within 10 working days of the expert’s appointment, each party may provide the expert and the other parties with a written submission and any relevant supporting material. The parties have a further 5 working days within which to make a further written submission to the expert and to provide a copy of any such submission to each other.

18.16 The expert is to act as an expert and not as an arbitrator. While being required to consider the written submissions and take them into account the expert may also:

(a) Rely on his or her own knowledge, skills and experience; and

(b) Make his or her own enquiries.

18.17 The expert shall determine the matters under conditions 18.3(b) and 18.4 and/or whether any or all of the additional preventative measures or remedial actions proposed by the Regional Council are necessary and shall advise the parties of that determination as soon as reasonably practicable. The Regional Council shall then advise the parties as soon as reasonably practicable whether any or all of the preventative measures and remedial actions proposed by the Regional Council shall be implemented by the consent holder.

19. **Logging of Complaints**

19.1 The consent holder shall keep a register of complaints lodged with it in respect of its operations on the Kawerau Geothermal System.

19.2 The register shall record for each complaint:

- a) The date and time of the complaint; and
- b) The name and contact details (if they are provided to the consent holder) and a description of the complaint.

The consent holder shall forward a copy of the complaint to the Regional Council (see Advice Note 6) within 7 working days of receiving the complaint.

20. **Lapsing**

Under section 125(1) of the Resource Management Act 1991, this consent will lapse on the seventh anniversary of the date of commencement, as defined by section 116 of the Resource Management Act 1991 unless it is given effect prior to that date.

21. **Review**

21.1 The Regional Council may, in the month of every second anniversary after the commencement of this consent, serve notice on the consent holder under section 128(1) of the Resource Management Act 1991 of its intention to review the conditions of this consent for any of the following purposes:

- a) To deal with any adverse effect on the environment resulting from the subsidence, tilt, induced seismicity, groundwater contamination, or changes to geothermal surface features (including geothermal vegetation) which may arise from the exercise of this consent and which it is appropriate to deal with at a later stage;
- b) To amend or add to peer review, modelling, monitoring, and reporting conditions in order to better evaluate, avoid, remedy or mitigate any adverse effects occasioned by the actions of the consent holder; and
- c) To review the effectiveness and efficiency of the conditions in ensuring the sustainable management of the Kawerau Geothermal System, in the event that resource consents for large scale, deep geothermal extraction and/or discharge in the Kawerau Geothermal System are granted to a person or persons other than the consent holder for the use of geothermal energy.

21.2 The Regional Council may, within 30 working days of receiving recommendations from the Peer Review Panel, serve notice on the consent holder under section 128(1) of the Resource Management Act 1991 of its intention to review the conditions of this consent to address the matters arising from the Peer Review Panel's recommendations.

21.3 The Regional Council may, as a result of compliance or impact monitoring undertaken by the Regional Council which shows significant adverse effects on the environment, serve notice on the consent holder under section 128(1)(a)(i) and/or (iii) of the Resource Management Act 1991 of its intention to review the conditions of this consent. The purpose of such a review is to ensure that management practices are appropriate to avoid, remedy, or mitigate any adverse effects on the environment.

- 21.4 The Regional Council may, at any time, serve notice on the consent holder under section 128(1)(b) of the Resource Management Act 1991 of its intention to review the conditions of this consent, for the purpose of setting restrictions on the taking and/or discharging of geothermal water from the Kawerau Geothermal System in order to meet requirements in an operative Regional Plan.
- 21.5 The Regional Council may, at any time, serve notice on the consent holder under section 128(1)(a)(iii) of the Resource Management Act 1991 of its intention to review the conditions of this consent to meet the requirements of the finalised Kawerau Single System Management Plan created under the Bay of Plenty Regional Policy Statement. The purpose of this review is to consider whether any conditions are required to be changed following the adoption of the Kawerau Single System Management Plan.

22. **Term of Consent**

This consent shall expire 35 years from the date of commencement.

23. **Resource Management Charges**

- 23.1 The consent holder shall pay the Regional Council such administrative charges as are fixed from time to time by the Regional Council in accordance with section 36 of the Resource Management Act 1991.
- 23.2 The consent holder shall meet all actual and reasonable costs incurred by the peer review panel and the actual and reasonable costs of any technical experts consulted by the Regional Council in order to enable those parties to fulfil their roles and responsibilities in terms of dealing with compliance with the consent conditions.

24. **The Resource Consent** hereby authorised is granted under the Resource Management Act 1991 and does not constitute an authority under any other Act, Regulation or Bylaw.

Advice Notes:

- An Independent Peer Review Panel will be established to provide independent advice on the exercise of this consent and the management of the Kawerau Geothermal System. Membership will be determined by the Chief Executive of the Regional Council or delegate. The Regional Council expects that the existing Peer Review Panel currently engaged in relation to the management of the Kawerau Geothermal System will be engaged to provide independent advice with regard to this consent.*
- The consent holder is responsible for ensuring that all contractors carrying out works under this consent are made aware of the relevant consent conditions, plans and associated documents. The consent holder is advised that non-compliance with consent conditions may result in enforcement action against the consent holder and/or their contractor(s).*

3. *The minimum horizontal and vertical separation distances for production wells are shown on the drawings in **Schedule 1 attached**. The same minimum separation distances apply to injection wells.*
4. *The Regional Council may seek the advice of the Peer Review Panel regarding the appropriateness of the reinjection pressure, should the consent holder wish to utilise pumped reinjection.*
5. *The subsidence benchmark network is appended in Schedule 2.*
6. *Unless otherwise specified, reporting and notification required for this consent shall be made in writing to the Manager Pollution Prevention, Bay of Plenty Regional Council, PO Box 364, Whakatane 3158 or notify@boprc.govt.nz including the consent number 67340.*
7. *As far as practicable, flows from individual production wells should be recorded from individual wells. If this is not practicable, then flows shall be recorded from individual separation plants. Individual production well flows may then be calculated at regular intervals using tracer techniques backed up with occasional individual production well output tests.*
8. *Complaints of alleged property damage may also be received directly by the Bay of Plenty Regional Council. Council will forward the complaint to the consent holder as soon as is practicable after it is received.*
9. *The consent holder has indicated that during shutdown times, reservoir temperature and pressure profiles from production and injection wells will be undertaken but only if it is practicable to do so.*
10. *The legal description in condition 6 describes the TAOM Block. Sources of supply and points of discharge may be outside the TAOM Block in accordance with conditions 10.1 and 11.2.*
11. *For the purposes of this consent, the following words and expressions have the following meanings:*

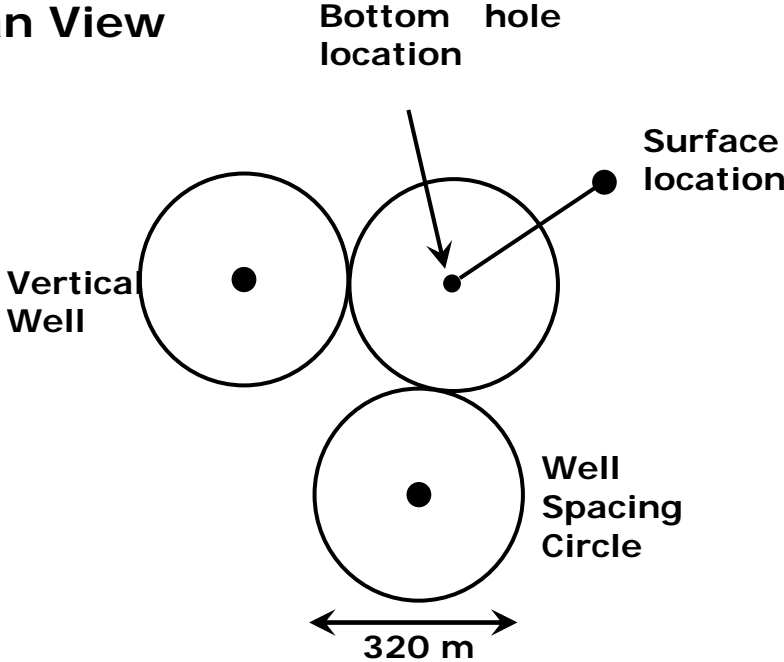
Site:	Legal description of land.
Kawerau Reservoir Model:	The current version of the Numerical Model of the Kawerau Geothermal Reservoir developed by Geothermal Science Incorporated (Version 70 J03).
Kawerau Subsidence Model	The latest version of the 3D Subsidence Model for the Kawerau Geothermal System developed by Geomechanics Technologies.
Future production wells:	Wells drilled after the commencement of this consent.
Future injection wells:	Wells drilled after the commencement of this consent.

Geothermal brine:	Separated liquid following flashing of the geothermal fluid.
Geothermal fluid:	Raw geothermal fluids abstracted from wells – usually a mixture of steam, water and gases.
Continuous recording:	At no less frequently than 15 minute intervals.
Kawerau Single System Management Plan:	Management Plan created for the integrated management of the Kawerau geothermal system in accordance with the Bay of Plenty Regional Policy Statement.

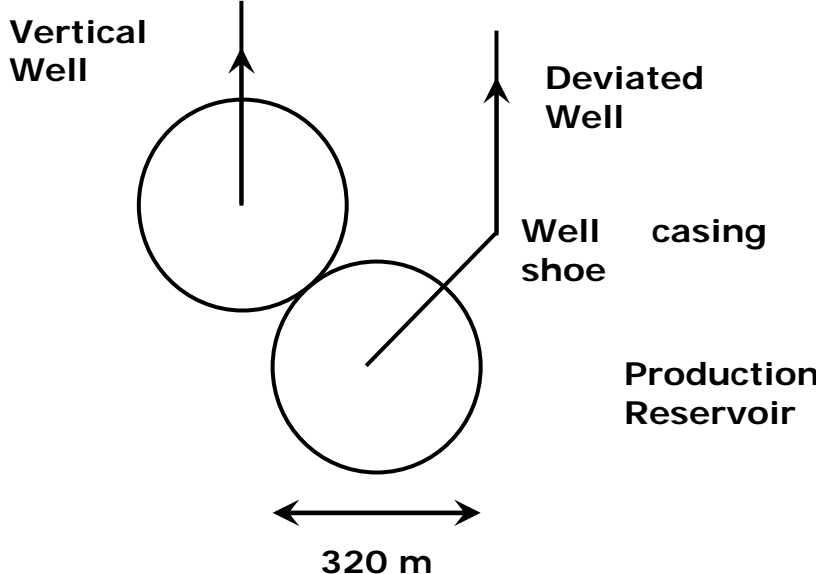
SCHEDULE 1

WELL SEPARATION DISTANCES IN ORDER TO COMPLY WITH
CONDITIONS 10.4 AND 11.5 OF THIS CONSENT

Plan View

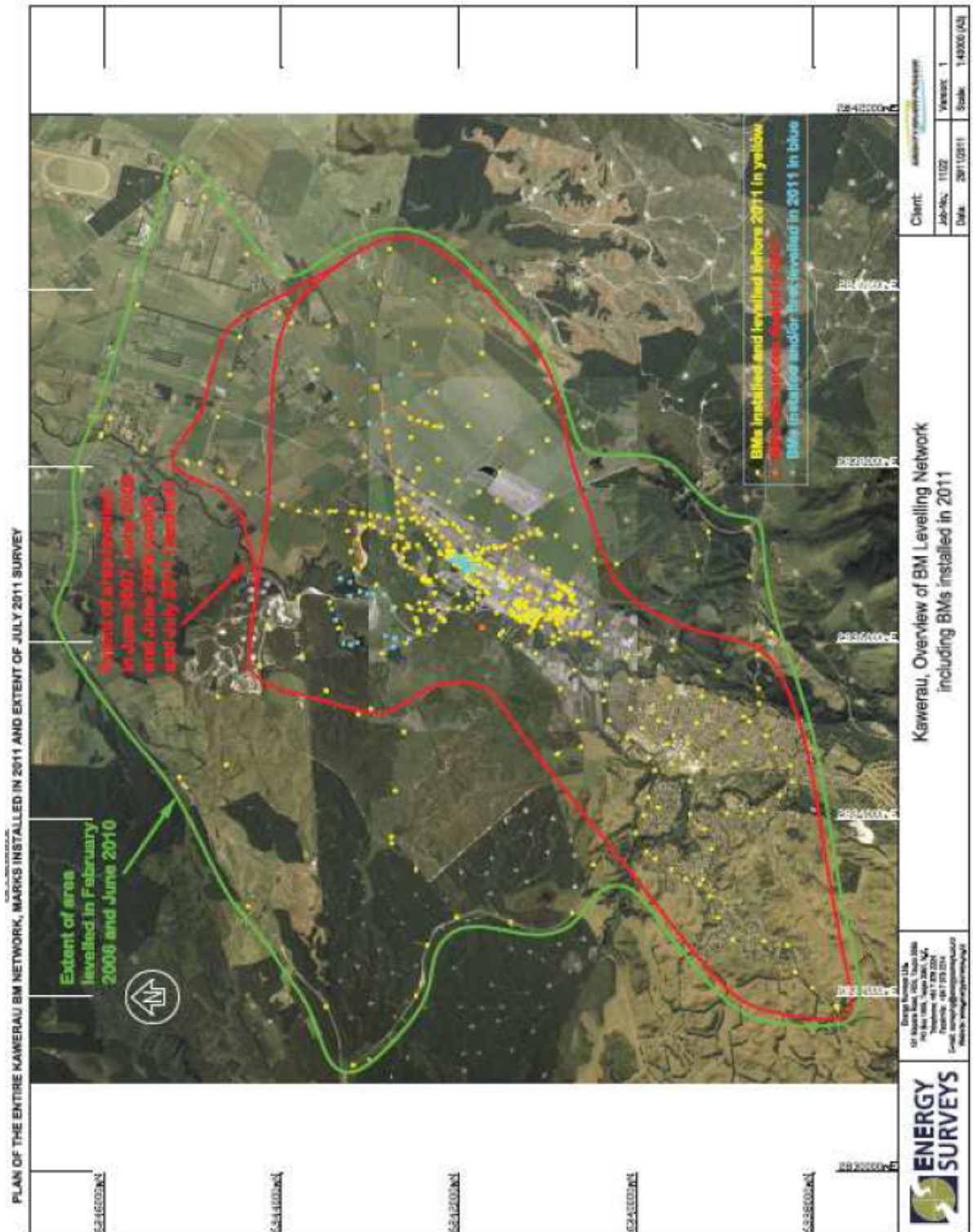


Cross Section View



SCHEDULE 2

SUBSIDENCE BENCHMARKS



SCHEDULE 3

ANTI-SCALANT – INHIBITORS – TRACERS

LIST OF CHEMICALS APPROVED UNDER THIS RESOURCE CONSENT

OPERATIONS		
Typical Name	Purpose/Use	Synonym
Nalco 71D5	Anti-foam	Anti-foam
Nalco 73385	Biogrowth inhibitor	Biocide
Nalco 73831	Biogrowth inhibitor	Biocide
Nalco 7614	Biogrowth inhibitor	Biocide
Nalco TX15060	Biogrowth inhibitor	Biocide
Spectrus BD 1550 or 1500	Biodispersant	Biodispersant
Spectrus NX1104 or X1103	Biogrowth inhibitor	Biocide
Nalco 73550	Biogrowth inhibitor	Biocide
Nalco 7648	Biogrowth inhibitor	Biocide
Drewperse 47	Biogrowth inhibitor	Biocide
Drewperse 767	Biogrowth inhibitor	Biocide
Biosperse 227	Biogrowth inhibitor	Biocide
Bulab 6001	Biogrowth inhibitor	Biocide
Bulab 6002	Biogrowth inhibitor	Biocide
Bulab 6013	Biogrowth inhibitor	Biocide
Bulab 9605	Biogrowth inhibitor	Biocide
Busperse 47F	Biogrowth inhibitor	Biocide
Bulab 9350	Corrosion inhibitor	
Sodium Hydroxide	Condensate pH control	
Bulab8054, Glutaraldehyde	Biogrowth inhibitor	Biocide
CleanTreat 4500	Antiscalant	
GWR2KM	Antiscalant	
Hydroflouric Acid	Antiscalant	
Hydrochloric Acid	Antiscalant	
Sulphuric Acid	Antiscalant	
Sodium Polyacrylate	Antiscalant	
Sulphonated acrylic co-polymer	Antiscalant	
TRACER DILUTION ADDITIVES (WELL TESTING)		
1,5 or 1,6 or 2,6, or 2,7 or 2-Naphthalenedisulfonic Acid Disodium Salt, Dihydrate, 98%	Well testing	
Sulphur Hexafluoride	Well testing	
fluorescein	Reservoir tracer	
¹³¹ I	Reservoir tracer	Radioactive isotope