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GEOHERMAL RESOURCES ACT

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NO. 12 OF 1982

GEOHERMAL RESOURCES ACT

[Date of assent: 8th July, 1982.]

[Date of commencement: 1st May, 1990.]

An Act of Parliament to control the exploitation and use of geothermal resources and vest the resources in the Government and to provide for connected purposes

[Act No. 12 of 1982, L.N. 205/1990.]

PART I – PRELIMINARY

1. Short title

This Act may be cited as the Geothermal Resources Act, 1982.

2. Interpretation

In this Act, unless the context otherwise requires—

“**bore**” means a well, hole, pipe or excavation of any kind which is bored, drilled, sunk or made in the ground for the purpose of investigating, prospecting for, obtaining or providing geothermal resources; and includes any reactivated or converted bore previously capped and abandoned which is employed for re-injecting geothermal resources or their residues;

“**geothermal resources**” means any product derived from and produced within the earth by natural heat; and includes steam, water and water vapour and a mixture of any of them that has been heated by natural heat whether as a direct product or resulting from other material introduced artificially into an underground formation and heated by natural heat;

“**geothermal resources area**” means an area which is declared to be a geothermal resources area under section 4;

“**land**” includes land covered with water;

“**licence**” means a geothermal resources licence granted under section 7;

“**licensee**” means the public or local authority, company or body of persons to whom a licence is granted;

“**the Minister**” means the Minister for the time being responsible for matters connected with energy.

3. Geothermal resources vested in the Government

All un-extracted geothermal resources under or in any land shall be vested in the Government subject to any rights which, by or under any written law, have been or are granted or recognized as being vested in any other person.

4. Declaration of geothermal resources area

The Minister may, by notice in the *Gazette*, declare that any area of land where geothermal resources have been discovered or which is a source or is believed to be a source of geothermal resources shall be a geothermal resources area.

5. Unauthorised use of geothermal resources prohibited

Notwithstanding anything to the contrary in any written law or instrument of title, no person shall sink a bore, tap or take and use or apply geothermal resources for any purpose unless he is first granted an authority or licence under this Act.

PART II – EXPLOITATION OF GEOTHERMAL RESOURCES**6. Minister to authorise search of geothermal resources**

(1) For the purposes of and subject to this Act, the Minister may authorize any person (including a public officer), in writing, to make surveys, investigations, tests and measurements in search of geothermal resources and for that purpose the authorized person may—

- (a) enter upon any land specified in the authority with such assistants, gear, appliances, and equipment as he thinks fit;
- (b) sink any bore on the land;
- (c) make geological surveys and geophysical surveys on the land; and
- (d) generally do all things necessary in connection with the survey, investigation, test or measurement.

(2) When practicable, reasonable notice of the intention to enter upon any land shall be given to the owner or occupier of the land.

(3) Every person who is authorized in writing under subsection (1) to enter upon any land shall produce his authority when required to do so by the owner or occupier of the land on which he intends to enter or has entered.

(4) Every authority granted under this section shall be subject to—

- (a) the condition that every bore made pursuant to the authority shall be—
 - (i) kept under close supervision;
 - (ii) maintained in a safe condition;
 - (iii) finally left in a condition of lasting safety;
- (b) such other conditions as the Minister may impose either at the time of granting the authority or subsequently at the time of closure of the bore.

(5) An authority granted under this section shall not be transferable, and shall be in force for a period of one year from the date of issue, but may be renewed for a period of one year from the date of expiration thereof or from the expiration of any renewal.

(6) An authority granted under this section may be revoked by the Minister on any of the following grounds—

- (a) that the person to whom the authority is granted has not complied with any requirement or condition of his authority;

- (b) that operations being carried on under the authority are, in the opinion of the Minister, affecting detrimentally other specified bores or the supplies of geothermal resources for other specified purposes;
- (c) that it is in the public interest that operations being carried on under the authority should cease.

7. Minister may grant a geothermal resources licence

(1) The Minister may, on application being made to him in respect of any land, grant a licence (to be known as a "geothermal resources licence") over part or the whole of a geothermal resources area under such terms and conditions as he may determine.

(2) An application for a licence to be issued under this section shall be in the approved form and be accompanied by the prescribed fees.

(3) A licence may be granted under this section for such term, not exceeding thirty years, as the Minister may determine and shall be in the prescribed form.

8. Rights under licence

(1) A licence shall, subject to this Act, confer upon the licensee the right—

- (a) to enter upon the land being the subject of the licence to bore and to extract geothermal resources and to do all such things as are reasonably necessary for the conduct of those operations;
- (b) in so far as it may be necessary for and in connection with the operations referred to in paragraph (a)—
 - (i) to drill and construct all necessary boreholes;
 - (ii) to erect, construct and maintain houses and buildings for his own use and for use by his employees;
 - (iii) to erect, construct and maintain plant, machinery, buildings and other erections as may be necessary;
 - (iv) to utilize the geothermal resources;
 - (v) subject to the Water Act (Cap. 372), to reclaim and utilize any water; and
 - (vi) to construct and maintain roads and other means of communications and conveniences;
- (c) to take and use or apply the geothermal resources for any purpose specified in the licence.

(2) Where any by-product obtained in the production of geothermal resources may be reclaimed for further use or sale and is a mineral within the meaning of the Mining Act (Cap. 306), the licence may be modified so as to allow for the inclusion of a mining lease to enable recovery of that by-product.

9. Renewal and surrender of licence, etc.

The Minister may—

- (a) renew a licence for a term not exceeding five years subject to such terms and conditions as he thinks fit;

- (b) wholly or partly remit all or any of the terms and conditions contained in any licence where, owing to special circumstances, in his opinion, compliance therewith would be impossible or great hardship would be inflicted upon the licensee;
- (c) extend time to the licensee for complying with the terms and conditions of any licence upon such terms and conditions as he may think fit;
- (d) accept, whether with a view to the renewal or re-grant of any licence or otherwise the surrender of any licence or any part of the area comprised therein upon such terms and conditions as he may think fit, but so however that no such surrender shall affect any liability incurred by the licensee before the surrender shall have taken effect.

10. Transfer of licence

The licensee shall not transfer or assign his licence or any part thereof without the consent in writing of the Minister signified by endorsement thereon.

11. Forfeiture of licence

- (1) The Minister may, by notice to the licensee, declare a licence to be forfeited

- (a) if the licensee ceases work in or under the land the subject of the licence during a continuous period of six months, without the written consent of the Minister;
- (b) if the licensee commits a breach or is in default of any provision of this Act or of the regulations made thereunder or of any terms or conditions of the licence and the Minister has caused a notice to be served upon the licensee requiring him—
 - (i) in the case of a breach which, in the opinion of the Minister, is capable of being repaired or made good, to repair or make good the breach within a specified period;
 - (ii) in the case of a breach which, in the opinion of the Minister, is not capable of being repaired or made good, to show cause within a specified period why his licence should not be forfeited.

(2) The forfeiture of a licence under subsection (1) shall not affect any liability already incurred by the licensee.

(3) The forfeiture of a licence under subsection (1) shall be published in the *Gazette*.

12. Rent and penalty for non-payment of rent

The licensee shall in respect of his licence pay yearly in advance such rent as may be prescribed by the Minister and, if the rent is not paid within three months of becoming due a penalty of ten *per centum* shall be payable as if it were part of the rent.

13. Licensee to re-enter under certain conditions

(1) Any licensee whose licence has expired or has been surrendered or forfeited may, within ninety days of the date of the expiry, surrender or forfeiture,

apply to the Minister to enter the land which was comprised in the licence to remove the plant, machinery, engines or tools installed or erected on the land.

(2) The Minister may require the licensee to remove the plant, machinery, engines or tools within a reasonable time, and if the plant, machinery, engines or tools are not removed within a reasonable time they may be sold by auction at the risk of the licensee.

(3) The net proceeds of the sale conducted pursuant to subsection (2) shall be held until applied for by the licensee but may be used in the repair of breaches or faults not made goods by the licensee and for the payment of the costs incurred in conducting the sale.

14. Power of licensee in respect of the generation of electricity

The holder of a licence under the Electric Power Act (Cap. 314), may for the purposes of generating, transmitting or supplying electrical power—

- (a) extract, take, use and apply geothermal resources on or under any land which is the subject of licence;
- (b) erect, construct, provide and use such works and appliances as may be necessary for the purpose of generating electricity, and in connection with the transmission, use, supply and sale of electricity.

15. Authorities, etc. to be registered

Every authority and licence issued under this Act shall be registered in the prescribed manner.

PART III – SAFETY AND ACCIDENTS

16. Safety of persons

A licensee shall be liable for any loss, damage or injury to any person or property resulting from his works or operations, whether as a result of negligence or otherwise.

17. Minister may require bore to be closed

(1) Notwithstanding any other provisions of this Act, the Minister may, at any time, order a bore to be closed after giving notice to any person in accordance with subsection (2) on any of the following grounds—

- (a) that the bore is a source of danger to persons or property in the vicinity;
- (b) that the bore is, in the opinion of the Minister, affecting detrimentally other specified bores or a specified tourist attraction or the supplies of geothermal resources for other specified purposes;
- (c) that the bore is a nuisance in law or that it is otherwise in the public interest that the bore should be closed;
- (d) that the bore is no longer necessary for operation in accordance with plans approved by him;

- (e) for the protection of the environment including ground water against contamination; or
- (f) in the interest of conservation of the geothermal resources.

(2) Notice to close a bore may be given under this section by the Minister to the licensee entitled to use or apply the geothermal resources from the bore for any purpose and if there is no licence granted under this Act the notice may be given to any of the following—

- (a) the person authorized by the Minister to make the bore;
- (b) a person who made or assisted to make the bore without any authority;
- (c) the owner of the land if he permitted the bore to be made without the authority of the Minister.

(3) No compensation resulting from the closure of any bore shall be payable by the Government but the Minister may consider the refund of part of the fees which may have been paid in respect of any authority or licence in relation to a bore which he has ordered to be closed under this section, except that no refund of any part of fees shall be made in respect of any bore made without the authority of the Minister.

PART IV – MISCELLANEOUS PROVISIONS

18. Compensation for injury or damage to land

(1) Except as otherwise provided in this Act every person who—

- (a) has an interest in any land injuriously affected by the exercise of any of the powers conferred by this Act or conferred by any authority or licence granted under this Act; or
 - (b) suffers any damage from the exercise of any powers so conferred,
- shall be entitled to compensation, determined by the Minister, for the loss, injury and damage suffered by him.

(2) Any person aggrieved by a determination of the Minister under subsection (1) may appeal against such determination to the High Court.

19. Payment of compensation to land owners and occupiers

(1) Whenever, in the course of searching or boring for geothermal resources, any disturbance of the rights of the owner or occupier of any land or a nuisance or damage to that land or to any crops, trees, buildings, stock or works thereon is caused, the holder of the authority or licence under which such operations are carried out shall pay to the owner or occupier a fair and reasonable compensation for such disturbance, nuisance or damage.

(2) If the person referred to in subsection (1) fails to pay compensation or if an owner or occupier is dissatisfied with the compensation offered to him, the owner or occupier may within one month of the demand having been made refer the matter to the High Court which shall assess and determine the amount of compensation to be paid.

20. Notice in respect of private land

(1) Where a licensee intends to occupy or disturb the surface of any particular area of private land or to disturb or otherwise interfere with any crops, trees, buildings or works thereon, he shall give not less than twenty-one days notice in writing of his intention to the person in visible and immediate occupation of the land affected thereby and, if practicable, to the owner of the land.

(2) When the occupation, disturbance or interference referred to in subsection (1) has continued for a period of thirty consecutive days, the owner or occupier of the land affected may require the licensee to give security, in such sum and by such means as the Minister may direct, for meeting any compensation payable under section 19 to the owner or occupier of the land.

(3) In this section “**owner**” means—

- (a) in case of trust land the county council in which the land is vested;
- (b) in the case of land owned by group representatives under the Land (Group Representatives) Act (Cap. 287), that group;
- (c) in the case of other land, the registered owner, lessee or grantee.

(4) In the case of land owned by group representative under the Land (Group Representatives) Act (Cap. 287), the notice required under subsection (1) to be given to the owner of the land may be sent by post addressed to the postal address of the group representatives or delivered personally to the office of that group.

21. Charges payable for extraction of geothermal resources for certain purposes

The Minister shall levy the prescribed fees, rentals and royalties for the extraction of geothermal resources for industrial or commercial purposes and for any other purposes which may be determined by the Minister.

22. Offences

(1) Every person who sinks any bore or who extracts, takes, uses or applies geothermal resources in contravention of this Act shall be guilty of an offence.

(2) Every person who removes, damages, destroys or otherwise interferes with any survey pegs or beacons placed on the ground in connection with any survey lawfully carried on under this Act or any valve or instrument being used in connection with any such survey or with any bore shall be guilty of an offence.

23. Penalties

Any person who is guilty of an offence under this Act shall be liable to a fine not exceeding ten thousand shillings and if the offence is a continuing one, to a further fine not exceeding one thousand shillings for every day or part of a day during which the offence continues.

24. Regulations

(1) The Minister may make regulations necessary for carrying into effect the provisions of this Act.

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- (2) Regulations may be made under this section for the following purposes—
- (a) prescribing any forms that may be required for the purposes of this Act;
 - (b) prescribing conditions upon or subject to which authorities and licences may be applied for, granted or renewed;
 - (c) providing for the keeping of records and the furnishing of information and returns by persons authorized by or under this Act, and prescribing the nature of the records, information, and returns and the form, manner and time in which they shall be kept or furnished;
 - (d) prescribing matters in respect of which fees, rents and royalties are to be payable under this Act and the amount of fees and rents, and persons liable to pay them;
 - (e) authorizing the refund of fees, rents or remission, in such circumstances as the Minister thinks fit, of any fees or rentals payable under this Act;
 - (f) prescribing the responsibilities of licensees and persons to whom authorities are granted by or under this Act, and the operations to be carried out under licences;
 - (g) prescribing the qualifications of persons in charge of the making and closing of bores, and in particular, of persons employed as bore managers, and providing for the examination of any grant of certificates to qualified persons;
 - (h) preventing or abating nuisances in or about bores and industries using geothermal resources;
 - (i) prescribing safety precautions in the making and after the completion of bores, and the treatment of the ground above any bore and of water above and below the ground, and preventing waste or loss of geothermal resources;
 - (j) prescribing drilling machinery, materials, and casting to be used in making of bores and to be available to cope with any emergency in connection with any bore, and prohibiting the use of other classes of materials thereof;
 - (k) prohibiting or regulating the making of bores near other bores;
 - (l) regulating the cessation of boring operations and the abandonment and closing of bores and prescribing precautions against loosening the earth in the vicinity of any bore;
 - (m) providing for bores to be made with due diligence and by safe and satisfactory methods;
 - (n) generally regulating the making of bores;
 - (o) providing for the exemption of licensees and persons to whom authorities have been granted under this Act, either wholly or partially, and either absolutely or conditionally, from any of the requirements of their licences or authorities or of regulations made under this section.
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GEOTHERMAL RESOURCES REGULATIONS, 1990**GEOTHERMAL RESOURCES REGULATIONS, 1990**

[L.N. 206/1990, L.N. 130/2007.]

PART I – PRELIMINARY

1. Citation

These Regulations may be cited as the Geothermal Resources Regulations, 1990.

PART II – APPLICATION FOR AUTHORITY AND LICENCE

2. Application for authority to search for geothermal resources

(1) The application for an authority under section 6 of the Act shall be made to the Minister in writing in respect of any land and shall specify—

- (a) the name, nationality, nature of business and the principal place of business of the applicant;
- (b) the name and nationality of every director or equivalent officer where the applicant is a company, corporation or other body corporate; and, if the body corporate has a share capital the name of any person who is the beneficial owner of more than five per centum of the issued share capital;
- (c) the delineation of the area or areas proposed to be covered by the authority;
- (d) the particulars of work and minimum expenditure proposed to be carried out or expended in respect of the area over which the authority is sought, and a statement of any significant adverse effect which the proposed operations would have on the environment and proposals for controlling or eliminating that effect.

(2) The Minister may call for such additional information as he may require under this Regulation to enable him to assess the suitability of a grant of the authority to the applicant.

(3) The Minister may, when granting an authority to explore, also grant to the holder of that authority the right to be granted, on application, a geothermal resources licence in agreed terms in respect of all or part or parts of the area covered by that authority.

3. Geothermal resources licence

(1) A geothermal resources licence granted under section 7 of the Act, shall be negotiated on the basis of the model licence set out in the First Schedule.

(2) A geothermal resources licence shall be accompanied by, or be conditional upon, the execution of a contract (to be known as “geothermal resources contract”) between the licensee and the relevant Government department or other body designated by the Minister for the purpose of providing for the utilization of the geothermal resources.

(3) The Minister shall in granting a geothermal resources licence, allow an exploration phase of a period not exceeding five years and if at the end of that period no geothermal resources of a potential commercial interest is discovered the Minister may require the licensee to surrender the licensed area.

(4) Where the licensee, during the exploration phase, discovers geothermal resources which is of potential commercial interest, he shall within a period of sixty days after the discovery submit an appraisal programme to the Minister for his approval.

(5) If the appraisal programmed results into the declaration by the Minister and the licensee of a visible commercial geothermal resources, the licensee shall, within twelve months from the date of the declaration, submit to the Minister a development and production programme which shall include—

- (a) the date by which the applicant intends to commence production;

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- (b) the capacity of production and scale of operations;
- (c) the estimated overall production;
- (d) the marketing arrangements made for disposal of the geothermal energy, including details of all contracts or arrangements made with proposed users;
- (e) proposals for the prevention of pollution, the treatment of wastes, the safeguarding of natural resources, the progressive reclamation and rehabilitation of lands disturbed by prospecting or production operations and for the minimization of the effect of such operations on adjoining or neighbouring lands; and
- (f) a statement of any significant adverse effect which the carrying out of production operations would be likely to have on the environment and proposals for controlling or eliminating that effect;
- (g) a technical report on the production possibilities and the intention of the applicant in relation thereto; and
- (h) a detailed forecast of capital investment, operating costs and sales reserves and the anticipated type and source of financing.

(6) The development and production phase shall commence upon the approval by the Minister of the development and production programme.

4. Application for geothermal resources licence

(1) The application for the grant of a geothermal resources licence may be made to the Minister in respect of any geothermal resources area and shall specify—

- (a) the name and nationality, nature of business and the principal place of business of the applicant;
- (b) the name and nationality of every director or equivalent officer where the applicant is a company, corporation or other body corporate and if the body corporate has a share capital, the name of any person who is the beneficial owner of more than five per centum of the issued share capital;
- (c) a full statement giving the applicant's financial status, technical competence and experience;
- (d) the delineation of the area proposed to be covered by the geothermal resources licence together with a plan of the area;
- (e) a general statement of the proposed programme of exploration of the geothermal resources, including a comprehensive report on the location, nature and characteristics of the source of geothermal energy to be explored;
- (f) the terms on which the applicant proposes to negotiate;
- (g) proposals with respect to the employment and training of citizens of Kenya;
- (h) the goods and services required for the production operations which can be obtained within Kenya and the applicant's intention in relation thereto; and
- (i) details of expected infrastructure requirements.

(2) The Minister may call for such additional information as he may require under this Regulation to enable him to assess the suitability of the grant of a geothermal resources licence.

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5. Renewal of licence

(1) An application for the renewal of a geothermal resources licence under section 9 of the Act—

- (a) shall, subject to regulation 3(4), be made not later than twelve months before the day on which the licence is due to expire; and
- (b) shall be accompanied by—
 - (i) particulars of work carried out, and the amounts expended in respect of the geothermal resources area up to and including a date not earlier than one month immediately preceding the date of the application; and
 - (ii) proposals of the applicant for work and minimum expenditure in respect of the geothermal resource area during the renewal period being applied for;
- (c) may set out other matter that the applicant wishes the Minister to consider.

(2) The Minister may accept an application for the renewal of a geothermal licence later than twelve months before, but not in any case after, the date of expiry of the licence.

6. Exemptions

(1) Neither an authority nor a geothermal resources licence issued under the Act shall authorize the applicant to enter upon or exercise any rights in—

- (a) any burial ground or land in the vicinity or precincts or any church, mosque or other sacred building or place of worship;
- (b) any area situated within fifty metres of any building in use, or any reservoir or dam;
- (c) any public road within the meaning of the Public Roads and Roads of Access Act (Cap. 399), railways or street within the meaning of the Streets Adoption Act (Cap. 406);
- (d) any area situated within a municipality or township within the meaning of the Local Government Act (Cap. 265);
- (e) any land within one thousand metres of the boundaries or any aerodrome under the Civil Aviation Act (Cap. 394);
- (f) any area of land declared to be a national park or natural reserve under the Wildlife (Conservation and Management) Act (Cap. 376),

but nothing in this Regulation shall be construed as preventing directional drilling into the sub-surface of the areas of land and places specified under this paragraph from adjacent land.

(2) Entry into any area of land or place specified in paragraph (1) shall be subject to the consent of the competent authority.

(3) For the purpose of paragraph (2), “**competent authority**” means the person or body for the time being empowered under the relevant written law or custom to authorize access to the area of land or place.

(4) Where the Minister is satisfied that entry into any area of land or place in a geothermal resources area is necessary for the carrying out of operations by the applicant for an authority or a geothermal resources licence, he shall produce the consent to such entry of the competent authority or other owner or occupier thereof as the case may be.

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7. Fees, etc.

(1) The following fees payable on applications for an authority under section 6 of the Act and for a geothermal resources licence under section 7 of the Act shall be—

	<i>KSh.</i>
(a) in respect of an authority	50,000
(b) in respect of a geothermal resource licence	120,000

(2) The rents payable under or by virtue of an authority or a geothermal resources licence issued under the Act shall be as set out in the authority or the licence.

(3) The royalties, and other payments payable under or by virtue of a geothermal resources licence shall be as set out in the licence.

8. Register of authorities, etc.

The Minister shall maintain registers of—

- (a) geothermal resources areas;
- (b) every authority issued under the Act;
- (c) geothermal resources licences;
- (d) renewals, extensions, surrenders and forfeitures of authorities and licences; and
- (e) open geothermal resources areas.

9. Notification to the Minister

The licensee shall give the Minister thirty days notice of any proposed geophysical survey and drilling, which notice shall contain complete details of the programme to be conducted.

PART III – DRILLING

10. Drilling

- (1) Every bore shall be supervised by a competent representative of the licensee.
- (2) The licensee shall maintain a driller's log for each bore.

11. Notice prior to drilling, etc.

(1) The licensee shall not drill a bore or recommence drilling after a six months' cessation without thirty days' prior notification to the Minister, which notice shall set out the reasons for undertaking such bore and shall contain a copy of the drilling programme for the bore.

(2) No bore shall, without the consent in writing of the Minister, be drilled so that any part thereof is less than five hundred metres from a boundary of the area covered by an authority.

(3) No licensee shall, except where there is danger or a risk of significant economic loss—

- (a) abandon a bore or remove any permanent form of casing therefrom, without giving forty-eight hours prior notification to the Minister; or
- (b) commence drilling, re-enter or plug any bore unless a representative of the Minister has been given a reasonable opportunity to be present.

(4) The licensee shall state, in any application to abandon a bore whether that bore is capable of providing a water supply.

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12. Drilling conditions

All bores drilled shall, unless otherwise authorized by the Minister, comply with the conditions specified in the Second Schedule.

13. Requirements and conditions for geothermal operations

All geothermal operations shall be conducted in a workmanlike manner and comply with the following requirements—

- (a) as far as reasonably practicable to—
 - (i) prevent the unnecessary waste of or damage to geothermal or other energy and mineral resources;
 - (ii) protect the quality of surface waters, air, and other natural resources, including wildlife, soil, vegetation and natural history;
 - (iii) protect the quality of cultural resources, including archeological, historical, scenic and recreational resources;
 - (iv) accommodate other land users;
 - (v) protect human and wildlife resources from unacceptable levels of noise;
 - (vi) prevent injury to life; and
 - (vii) prevent damage to property;
- (b) sites selected for the construction of drilling sites, roads, sumps, steam transmission lines and other construction attendant to geothermal operations shall be evaluated for stability and in unstable earth conditions shall be avoided where they could affect the integrity of the facility;
- (c) operations shall be conducted in a manner which minimizes erosion and disturbances to natural drainage;
- (d) the licensee shall conduct all operations in such manner as to afford reasonable protection of fish, wildlife, and natural habitat.

14. Confidentiality

(1) Subject to this Regulation, all information supplied to the Minister by the licensee shall be kept confidential and shall not be disclosed except with the consent of the licensee, which consent shall not be unreasonably withheld.

(2) Notwithstanding the provisions of paragraph (1), the Minister may use any such information for the purpose of preparing and publishing reports and returns required by law, and for the purposes of preparing and publishing reports and surveys of a general nature.

(3) The Minister may publish any such information which relates to a surrendered area at any time after the surrender; and in any other case three years after giving notice to and hearing representations from the licensee that longer period shall apply.

(4) The Minister shall not disclose, without the written consent of the person supplying it, to any person other than the Government advisers, financial institution or donor agencies from which Government may wish to seek funding assistance for geothermal development, and persons employed by or on behalf of the Government any know-how or proprietary technology.

15. Land exemption for public use

If the Government acquires part of the area covered by an authority or a geothermal resources licence for the public purpose other than for exploring for or exploiting geothermal resources—

- (a) such acquired part shall not include any area on which operations are in progress under such authority or licence;

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- (b) the licensee shall not carry out operations on such acquired part, but may—
 - (i) enter upon that part but not materially interfere with the public purpose; and
 - (ii) carry out directional drilling from an adjacent part.

16. Power to the Minister to inspect geothermal operations

The Minister, or a person authorized by him in writing, may at all reasonable times inspect any geothermal operations and any records of a licensee relating thereto, and the licensee shall provide, where available, facilities similar to those applicable to its own or to its subcontractors' staff for transport to the geothermal operations, subsistence and accommodation expenses and shall pay all reasonable expenses directly connected with the inspection.

17. Report to the Minister

- (1) The holder of an authority to explore shall transmit to the Minister—
 - (a) once a year, a report in respect of the previous year, specifying—
 - (i) the progress of operations, the results obtained, events of significance, occurrences, accidents and like matters; and
 - (ii) the number of persons employed indicating each category; and
 - (b) at the end of each stage of geological or geophysical operations and at the end of every boring operation, a report on that stage of operations together with a copy of the logs relating to the bore.
- (2) The holder of a geothermal resources licence shall transmit to the Minister within the first fifteen days of every year, a report in respect of the preceding year, specifying in respect of each month in the year—
 - (a) the quantities of geothermal fluids extracted and any subsequent variations of their physical characteristics;
 - (b) the quantities of geothermal fluids delivered for consumption;
 - (c) the amount of energy transmitted to cables from power stations;
 - (d) the quantities of commercial products, if any, extracted from geothermal fluid, the quantities delivered for consumption and the end of month stocks;
 - (e) all occurrences and accidents; and
 - (f) the number of persons employed indicating each category.
- (3) The holder of a geothermal resources licence, being a body corporate, shall transmit to the Minister, in triplicate, and within the month following every annual general meeting, the report of the Board and that of the auditors, the complete statement of accounts relating to the last financial year, and copies of the resolutions, if any, adopted at the meeting.

[L.N. 130/2007, s. 2.]

18. Site registers

- (1) All licenses shall maintain, at the site of works, and present on demand by any person authorized by the Minister—
 - (a) a register of the progress of operations specifying all important matters relating to operations and, in particular, the characteristics of casing, the cementation effected, production tests and like matters as well as all occurrences and accidents;
 - (b) geological and geophysical records and logs of all past and current bores; and

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- (c) record of the physical and chemical characteristics of fluids emitted from past and current bores;
- (d) a register giving the names of all persons employed; and
- (e) such other matters as may be prescribed.

(2) The holder of a geothermal resources licence shall, in addition to the matters provided in subregulation (1), maintain, at the site of works, and present on demand by any inspector, a register of production in which daily entries shall be made of—

- (a) the quantity of geothermal fluids extracted and their physical characteristics including their temperature, pressure, degree of saturation and other characteristics at the well-head;
- (b) the quantities and characteristics of geothermal fluids delivered for consumption;
- (c) the amount of energy transmitted to cables from the power station; and
- (d) the quantities of commercial products, if any, extracted from geothermal fluids.

(3) A licence shall cause all borehole cores to be carefully labelled and kept safe from all adverse weather conditions.

FIRST SCHEDULE

[Regulation 3(1).]

MODEL GEOTHERMAL RESOURCES LICENCE

GEOTHERMAL RESOURCES ACT, 1982 (Cap. 314A)

AND

GEOTHERMAL RESOURCES REGULATIONS, 1990

This geothermal resources licence is granted this
 day of, 20 by the Minister of Energy to

 of
 (hereinafter referred to as "the licensee").

1. The licensee is hereby granted the following exclusive rights:

(1) The right to enter upon the land specified in the Appendix 1 ("the licence area") to bore and to extract geothermal resources and to do all such things as are reasonably necessary for the conduct of those operations.

(2) In so far as it may be necessary for and in connection with the said operations, the exclusive rights to—

- (a) drill and construct all necessary boreholes;
- (b) erect, construct and maintain houses and buildings for the licensee's own use and for use by the licensee's employees;
- (c) erect, construct and maintain plant, machinery, buildings and other erections as may be necessary;
- (d) utilize the geothermal resources;
- (e) subject to the Water Act (Cap. 372), reclaim and utilise any water; and

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- (f) construct and maintain roads and other means of communication and conveniences.

(3) The exclusive right to take and use or apply the geothermal resources (in accordance with the geothermal contract made between the licensee and dated the day of, 20 ("the geothermal contract")).

2. The rights granted shall be for a term of thirty years from the date hereof and such term may be renewed at the option of the licensee, for two further periods of five years each; provided the licensee has complied with all the terms hereof.

3. The licensee shall apply to the Minister:

(1) Yearly in advance a rental of Ksh. per hectare for each and every year or part thereof for which this licence is in effect and, if such rent is not paid within three months of becoming due, a penalty of ten percent shall be payable as if it were part of the rent.

(2) A royalty of a percentage of the value of each kilowatt hour sold by the licensee, such percentage to be negotiated taking into account the expenses incurred by the licensee during the exploration phase.

4. The licensee shall comply with the provisions of the Geothermal Resources Regulations, 1990 and drilling conditions as specified in the Second Schedule thereto.

5. The licensee shall not transfer or assign this licence or any part thereof without the consent of the Minister signified by the endorsement hereon, which consent shall not be unreasonably withheld.

6. The Minister may accept the surrender of this licence or any part of the licence area upon such terms and conditions as he may think fit but so, however, that no such surrender shall affect any liability incurred by the licensee before the surrender shall have taken effect.

(1) The Minister may, by notice to the licensee, declare this licence to be forfeited—

- (a) if the licensee wholly ceases work in or under the licence area during a continuous period of six months, without the written consent of the Minister;
- (b) if the licensee commits a breach or is in default of any provision of the Geothermal Resources Act (Cap. 314A), or of the Geothermal Resources Regulations, 1990 or of any terms or conditions of the licence and the Minister has caused a notice to be served on the licensee requiring the licensee—
- (i) in the case of a breach which, in the opinion of the Minister, is capable of being repaired or made good, to repair or make good the breach within a specified period;
- (ii) in the case of a breach which, in the opinion of the Minister, is not capable of being repaired or made good, to show cause why this licence should not be forfeited.

(2) The forfeiture of this licence under paragraph (1) shall not affect any liability already incurred by the licensee.

(1) Within ninety days of the expiry, surrender or forfeiture of this licence, the licensee may apply to the Minister to enter the licence area to remove plant, machinery, engine or tools installed or erected thereon.

(2) The Minister may require the licensee to remove the plant, machinery, engines or tools within a reasonable time and if the same are not so removed they may be sold by auction at the risk of the licensee.

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(3) The net proceeds of the sale conducted pursuant to paragraph (2) shall be held until applied for by the licensee but may be used in the repair of breaches or faults not made good by the licensee and for payment of the costs incurred in conducting the sale.

9. The licensee shall provide the Minister with periodic written reports of the progress of operations under this licence as follows—

- (1) on drilling operations, daily;
- (2) on production operations, daily;
- (3) on geophysical operations, monthly;
- (4) on geothermal operations—
 - (a) within one month of the last day of March, June, September, and December covering the previous three months;
 - (b) within three months of the last day of December covering the previous year;
 - (c) within three months of the date of expiry or surrender of this licence.

(5) Each report under paragraph (4) shall contain, in respect of the period which it covers

-
- (a) details of the geothermal operations carried out and the factual information obtained;
 - (b) a description of the area in which the licensee has operated;
 - (c) an account of the licensee's expenditure on geothermal operations;
 - (d) a map indicating all bores and other geothermal operations.

10. The licensee shall pay compensation as required by section 19 of the Act.

11. Where the licensee intends to occupy or disturb the surface of any particular are of private land or to disturb or otherwise interfere with any crops, trees, buildings or works thereon, the licensee shall give not less than twenty-one days notice in writing of his intention to the person in visible and immediate occupation of the land affected thereby and, if practicable to the owner of the land, and shall comply with section 20 of the Act.

12. The Minister shall obtain on behalf of the licensee any permit necessary to enable the licensee to use the water in the licence area for the purpose of operations under this licence but the licensee shall not unreasonably deprive the users of land, domestic settlement or cattle watering place of the water supply to which they are accustomed.

(1) The Minister may, at the request of the licensee, make available to the licensee such land as the licensee may reasonably require for the conduct of operations under this licence and—

- (a) where such land is trust land, the Minister shall procure that Government shall, subject to paragraph (2) of this clause set apart such trust land in the licence area in accordance with the Trust Land Act (Cap. 288), and chapter IX of the Constitution;
- (b) where such land is private land, the Minister shall procure that Government acquires the land in accordance with the applicable laws;
- (c) the licensee shall pay or reimburse to the Minister any reasonable compensation that may be required for the setting apart, use or acquisition of any land for such operations.

(2) Where the licensee has occupied trust land for the purpose of such operations before the land has been set apart, the licensee shall notify the Minister in writing of the need to set apart such land before the end of the two year period referred to in section 115 of the Constitution.

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(3) The Minister shall procure that the Government shall grant or cause to be granted to the licensee and its contractors and subcontractors such way-leaves, easements, temporary occupation or other permissions within and without the licence area as are necessary to conduct such operations and in particular for the purpose of laying, operating and maintaining pipelines and cables.

(4) The Minister shall procure that the Government shall at all times give the licensee and its contractors and subcontractors the right of ingress to and egress from the licence area to and from, in particular, the facilities whenever located for the conduct of operations under this licence.

14. Subject to the usual national security requirements and the Immigration Act (Cap. 172), and regulations of Kenya in particular, the Minister shall procure that Government shall not unreasonably refuse to issue and/or renew entry permits for technicians and managers employed in operations under this licence.

(1) The Minister shall procure that the licensee and its contractors and subcontractors engaged in carrying out operations under this licence (or the geothermal resources contract) shall be permitted import into Kenya all materials, equipment and supplies including but not limited to machinery, vehicles, consumable items, movable property and any other articles, to be used solely in carrying out operations under this licence (or the geothermal resources contract).

(2) The Minister shall procure that such materials, equipment and supplies shall be exempt from all customs duties. However, the licensee and its contractors and subcontractors shall give preference to Kenyan goods and services as long as their prices, quality, quantities and the timeliness of delivery are comparable to prices, quality, quantities and timeliness of delivery of non-Kenyan materials, equipment and supplies.

(3) In relation to materials, equipment and supplies imported or to be imported pursuant to subclause (1) of this clause, when a responsible representative of the Ministry has certified that they are to be used solely in carrying out operations under this licence (or geothermal resources contract), the Minister shall procure that the licensee and its contractors and subcontractors shall be entitled to make such imports without having to obtain—

- (a) any approval of import licence, provided, however, that an application has been duly made;
- (b) any exchange control approval, subject to the provisions of clause 16 hereof; or
- (c) any inspection outside Kenya by General Superintendence or other inspecting body, acting for the time being, appointed by the Government.

(4) The Minister shall procure that each expatriate employee of the licensee and its contractors and subcontractors shall be permitted to import and shall be exempt from all customs duties with respect to the reasonable importation of household goods and personal effects, including one automobile, provided, however, that such properties are imported within three (3) months of their arrival or such longer period as the Government may in writing determine.

(5) The Minister shall procure that the licensee and its contractors and subcontractors and their expatriate employees may sell in Kenya all imported items which are no longer needed for operations under this licence (or geothermal resources contract). However, if such imports were exempt from custom duties, the seller shall fulfil all formalities required in connection with the payment of duties, taxes, fees and charges imposed on such sales.

(6) The Minister shall procure that the licensee and its contractors and subcontractors and their expatriate employees may export from Kenya, exempt of all

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export duties, taxes, fees and charges, all previously imported items which are no longer required for the conduct of operations under this licence (or geothermal resource contract).

(7) “**Customs duties**”, as that term is used herein, shall include all duties and taxes on imports (except those charges paid to the Government for actual services rendered) which are payable as a result of the importation of the item or items under consideration.

(1) As long as the licensee meets its obligations to the Government in terms of tax payments or any other payments contemplated by this licence, and as long as the licensee complies with paragraph (2) of this clause and is not in a material breach of this licence, the Minister shall procure that the Government shall by appropriate legal notice grant, effective upon the date of this licence, the licensee freedom to—

- (a) open and freely maintain external accounts inside Kenya and foreign bank accounts outside Kenya in accordance with the Exchange Control Notice No. 3 issued under the Exchange Control Act, Chapter 113 of the laws of Kenya;
- (b) receive, retain outside Kenya and freely dispose of foreign currencies received by it outside Kenya, and the licensee shall not be obligated to remit such proceeds to Kenya with the exception of those proceeds as may be needed to meet in Kenya its expenses and payments to the Government;
- (c) pay directly outside Kenya for purchases of goods and services necessary to carry out operations under this licence (or the geothermal resources contract);
- (d) pay its expatriate employees working in Kenya in foreign currencies outside Kenya. Such expatriate employees shall be only required to bring into Kenya such foreign exchange as required to meet their personal living expenses and to meet payments of Kenyan taxes;
- (e) freely repatriate abroad all proceeds from the licensee’s geothermal operations in Kenya, including but not limited to proceeds from the sale of assets (proceeds of the geothermal resources contract);
- (f) have rates of exchange for purchase or sale of currency in Kenya, not less favourable to the licensee than those granted to any investor in Kenya.

(2) In order to keep the Minister and the Central Bank of Kenya informed of its prospective and actual foreign exchange transactions the licensee shall inform the Minister and the Bank in writing and in such form and detail as the Minister or the Bank may request—

- (a) of the location of the licensee’s bank accounts in Kenya and abroad, which later accounts shall be opened in banks approved by the Central Bank of Kenya;
- (b) annually, before the commencement of each calendar year, of the licensee’s estimated receipts and disbursements of foreign exchange by principal headings during the year (which statement may be amended from time to time if this appears necessary); and
- (c) quarterly, within thirty days of the end of each calendar quarter, of licensee’s actual receipts and disbursements of foreign exchange by principal headings during the preceding quarter.

(3) Subject to the obligation to give preference to Kenyan goods as stipulated in this licence, the Minister shall procure that the licensee shall have the right to enter all contracts and subcontracts necessary to carry out operations under this licence (or under the geothermal resources contract), without prior approval by the Central Bank of Kenya or any other Government agency. The Minister reserves the right to inspect the records or documentation related to such contracts and subcontracts. The licensee shall provide a copy of such contracts within thirty days after their execution.

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(4) The Minister shall procure that Government shall issue to the licensee a "certificate of approval enterprise" in accordance with the Foreign Investments Protection Act (Chapter 518 of the laws of Kenya). The amount recognized by the certificate as having been invested shall be the actual amount for the time being invested by the licensee as set forth in its books of account.

(1) The licensee shall notify the Minister, before operations begin, of the name and address of the person resident in Kenya who will survive the operations under this licence and prior notice of any subsequent change shall be given to the Minister.

(2) The licensee shall appoint an attorney resident in Kenya with power of representation in all matters relating to this licence of which appointment the Minister shall be notified before the operations begin, and prior notice of any subsequent change shall be given to the Minister.

(1) Where the Minister or the licensee is prevented from complying with this licence by force majeure, the party affected shall promptly give written notice to the other and the obligations of the affected party shall be suspended, provided that that party shall do all things reasonably within its power to remove such cause of force majeure. Upon cessation of the force majeure event, the party no longer affected shall promptly notify the other party.

(2) In this clause, "**force majeure**" means an occurrence beyond the reasonable control of the Minister or of the licensee which prevents either of them from performing their obligations under this licence.

(3) Where the party not affected disputes the existence of *force majeure*, that dispute shall be referred to arbitration in accordance with the provisions for arbitration contained in this licence.

(4) Where an obligation is suspended by *force majeure* for more than one year, the parties may agree to terminate this licence by notice in writing without further obligations.

(5) Subject to paragraph (4) of this clause, the term of the licence shall be automatically extended for the period of the *force majeure*.

(1) Except as otherwise provided in this licence, any question or dispute arising out of or in, relation to or in connection with this licence shall, as far as possible, be settled amicably. Where no settlement is reached within thirty days from the date of the dispute, such dispute shall be referred to arbitration in accordance with the provisions hereinafter contained.

(2) The Minister on behalf of the Government of Kenya and the licensee hereby consent to submit to the International Centre for the Settlement of the Investment Disputes all disputes arising out of this licence or relating to any investment made under it for settlement by arbitration pursuant to the Convention on the Settlement of Investment Disputes between States and Nation of other States ("the Convention").

(3) It is hereby stipulated that the licensee is a national of and that this licence is an investment within the meaning of the Convention.

(4) Any such arbitration proceeding shall be conducted in accordance with the Rules of Procedure for Arbitration Proceedings in effect on the date on which the proceeding is instituted.

APPENDIX I
DELINEATION OF LICENCE AREA

The licence area shall be all those certain lands more particularly described in Appendix I and shown on the map set forth in Appendix II.

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SECOND SCHEDULE

[Regulation 12.]

CONDITIONS FOR DRILLING OF BORES

The following conditions are intended as guidelines to ensure safety and environmental integrity. If these conditions would prove too restrictive for economical geothermal energy recovery, the licensee may propose an alternative.

1. All casing strings reaching the surface shall be cemented at a sufficient depth to provide adequate anchorage and support for the casing and any blowout prevention equipment required thereon. The several casing strings in order of installation are—

- (a) surface;
- (b) intermediate;
- (c) anchor;
- (d) production strings.

2. The following casing setting depth requirements are general in nature and subject to variation to permit the casing (if any) to be set and cemented in competent formation. Casing setting depths shall be based upon all geologic and engineering factors including apparent geothermal gradients, depths and pressures of the various formations to be penetrated and all other pertinent information about the area. All depths in these Regulations referred to True Vertical Depth (T.V.D.) below ground level unless otherwise specified—

- (a) *Surface Casing.*—This casing shall be set at a minimum depth of 30 metres and a maximum depth of 60 metres before drilling into shallow formation suspected or known to contain geothermal resources, non-condensable gases, or other mineral resources or upon encountering such formations;
- (b) *Intermediate Casing.*—This casing shall be set at any time when required by bore conditions encountered in drilling below the surface casing such as anomalous pressure zones, uncased fresh water aquifers, caveins, washouts, lost circulation zones, rapidly increasing thermal gradients or other drilling hazards;
- (c) *Anchor Casing.*—This casing shall be set at a depth equivalent to or in excess of 10 percent of the proposed total depth of the bore provided, however, that such setting depth shall be not less than 250 metres nor more than 400 metres;
- (d) *Production Casing.*—This casing may be set at the top of or through the potential producing zone and shall be set before completing the bore for production. Production casing shall be run to the surface or lapped into the next larger casing string. If a liner is used, the lap shall be tested by a fluid entry or pressure test to determine whether a seal between the liner top and the next larger casing string has been achieved. The liner overlap shall be a minimum of 30 metres. The test shall be recorded on the driller's log. In the event of lap or casing failure during the test, the lap or casing must be repaired or recemented and successfully retested as required. Production casing shall normally be of consistent nominal outside diameter from the surface or from the top of the lap to the casing shoe. The surface casing shall not be used as production casing.

3. Cementing of casing

(1) The surface, intermediate and anchor casing strings shall be cemented with a quantity of cement sufficient to fill the annular space back to the surface. Production casing shall be cemented a high temperature resistant admix and shall be cemented in a manner necessary to exclude with, isolate or segregate overlying formation fluids from the

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geothermal resources zone and to prevent the movement of fluids into possible fresh water zones. The first stage of all cementing operations must be carried out by circulating cement from the surface to the bottom of the casings and back up the annulus.

(2) Before any backfill cementing is carried out the casing annulus must be tested to prove cement can pass below the outer casing shoe so as not trap water or explosive fluid in the annulus.

(3) Production casing shall be cemented back to the surface or, if lapped, to the top of the lap. A temperature or cement bond log may be required by the Minister after setting and cementing the production casing and after all primary cementing operations if an unsatisfactory cementing job is indicated.

4. Pressure testing of casing

(1) Prior to drilling out the casing shoe after cementing all casing strings set to a depth of 152 metres or greater, shall be pressure tested to a minimum pressure of 69 bars (1,000 p.s.i.) or 0.045 bars/metres (0.2 p.s.i./ft.) whichever is greater.

(2) All casing strings set at a depth less than 152 metres (500 feet) shall be pressure tested to a minimum pressure of 20 bars (300 p.s.i.).

(3) The tests under paragraphs (1) and (2) shall not exceed the rated working pressure of the casing or the blowout preventer stack assembly, whichever is lesser and in the event of casing failure during the test, the casing must be repaired or recemented until a satisfactory test is obtained.

(4) A pressure decline of 10 percent or less in 30 minutes shall be considered satisfactory.

(5) Casing test results shall be recorded on the driller's log. Advance notice of all casing and lap tests shall be given in sufficient time to enable the Minister or his representative to be present to witness such tests. The casing and lap tests shall give a detailed description of the test, including mud and cement volumes, lapse of time between running and cementing casing and testing, method of testing and test results.

5. Well survey

(1) Deviation surveys (inclination from vertical or single shot) shall be taken on all bores during the normal course of drilling at intervals not exceeding 152 metres and in calculating all surveys, a correction from true north to Lambert-Grid north shall be made after making the magnetic to true north correction.

(2) Bores are considered vertical if inclination does not exceed an average of five degrees from the vertical.

(3) Bores are considered directional if inclination exceeds an average of five degrees from the vertical. Directional surveys giving both inclination and azimuth shall be obtained at intervals not exceeding 30 metres between stations prior to, or upon, setting any casing string or liner (except conductor casing) and at total depth.

6. Safety equipment and procedures

All necessary precautions shall be taken to keep all bores under control at all times, utilize trained and competent personnel, and utilize properly maintained equipment and materials. Blowout preventers and related bore control equipment shall be installed, tested immediately thereafter and maintained ready for use until drilling operations are completed. Certain components, such as packing elements and ram rubbers, shall be of high temperature resistant materials as necessary. All kill lines, blown down lines, manifolds and fittings shall be steel and shall have a temperature derated minimum working pressure rating equivalent to the maximum anticipated wellhead surface pressure. Except as otherwise provided by these Regulations, blowout prevention equipment shall have manually operated gates and hydraulic actuating systems and accumulators of sufficient capacity to close all of the hydraulically-operated equipment and have a

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minimum pressure of 69 bars (1,000 p.s.i.) remaining on the accumulator. Dual control stations shall be installed with a high pressure backup system. One control panel shall be located at the driller's station and one control panel shall be located on the ground at least 15 metres away from the wellhead or rotary table. Air or other gaseous fluids drilling systems shall have blowout prevention assemblies. Such assemblies may include, but are not limited to, a rotating head, a double ram blowout preventer or equivalent, a banjobox or approved substitute therefor and a blind ram blowout preventer or gate valve, respectively.

7. Requirement for drilling

(1) *Surface Casing*.—Before drilling below this string, at least—

- (a) one remotely controlled hydraulically-operated expansion type preventer; and
- (b) a manual and remotely controlled complete shut-off single ram blowout preventer or equivalent having a temperature derated minimum working pressure rating which exceeds the maximum anticipated surface pressure at the anticipated reservoir fluid temperature. At least one ram set shall be for complete shut off. A drilling spool with side outlets or equivalent, shall be installed. A kill line and blowdown line with appropriate fittings shall be connected to the drilling spool.

(2) *Anchor, Intermediate and Production Casings*.—Before drilling below the blowout prevention equipment shall include a minimum of—

- (a) one expansion-type preventer and accumulator;
- (b) a manual and remotely controlled hydraulically-operated double ram blowout preventer or equivalent having a temperature derated minimum working pressure rating which exceeds the maximum anticipated surface pressure at the anticipated reservoir fluid temperature;
- (c) a drilling spool with side outlets or equivalent;
- (d) a kill line equipped with at least one valve; and
- (e) a choke line equipped with at least one valve and securely anchored at all bends and at the end.

(3) *Testing and maintenance*.—Ram-type blowout preventer and auxiliary equipment shall be tested to a minimum of 69 bars (1,000 p.s.i.) or to the working pressure of the casing or assembly, whichever is the lesser. Expansion-type blowout preventer shall be tested to 70 percent of the above pressure testing requirements; and the blowout prevention equipment shall be pressure tested—

- (a) when installed;
- (b) prior to drilling out plugs and casing shoes;
- (c) not less than once each week, alternating the control stations; and
- (d) following repairs that require disconnecting a pressure seal in the assembly.

(4) During drilling operations, blowout prevention equipment shall be actuated to test proper functioning as follows—

- (a) once each trip for blind and pipe rams but not less than once each day for pipe rams; and
- (b) at least once each week on the drill pipe for expansion type preventers.

(5) All flange bolts shall be inspected at least weekly and retightened as necessary during drilling operations. The auxiliary control systems shall be inspected daily to check the mechanic condition and effectiveness and to ensure personnel acquaintance with the method of operation. Blowout prevention and auxiliary control equipment shall be cleaned, inspected and repaired, if necessary prior to installation to assure proper functioning. Blowout prevention controls shall be plainly labelled, and all crew members shall be

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instructed on the function and operation of such equipment. A blow-out prevention drill shall be conducted weekly for each drilling crew. All blowout prevention tests and crew drills shall be recorded on the driller's log.

(6) *Related Well Control Equipment.*—At least one non-return valve shall be installed in the drill string at all times.

8. Drilling fluid

(1) The properties, use and testing of drilling fluids and the conduct of related drilling procedures shall be such as are reasonably necessary to guard against the blowout of any bore. Sufficient drilling fluid materials to ensure bore control shall be maintained in the field area readily accessible for use at all times; and—

- (a) before pulling drill pipe, the drilling fluid shall be properly conditioned or displaced. The hole shall be kept reasonably full at all times. Mud cooling techniques shall be utilized when necessary to maintain mud characteristics for proper bore control and hole conditioning;
- (b) mud testing and treatment consistent with food operating practice shall be performed daily or more frequently as conditions warrant. Mud testing equipment shall be maintained on the drilling rig at all times.

(2) The following drilling fluid system monitoring or recording devices shall be installed and operated continuously during drilling operations with mud, occurring below the shoe of the conductor casing—

- (a) high-low level mud pit indicator including visual audio-warning device;
- (b) desilters and desanders;
- (c) a mechanical, electrical or manual surface drilling fluid temperature monitoring device. The temperature of the drilling fluid going into and coming out of the hole shall be monitored, read and recorded on the driller's or mud log for a minimum of every 9 metres of hole drilled below the conductor casing; and
- (d) a hydrogen sulphide indicator and alarm shall be installed in areas suspected or known to contain hydrogen sulphide gas which may reach levels considered to be dangerous to the health and safety of personnel in the area.

(3) From the time drilling operations are initiated and until the bore is completed or abandoned, a member of the drilling crew or the tool pusher shall monitor the rig floor at all times for surveillance purposes, unless the bore is secured with blowout preventers or cement plugs.

9. Bore logging

All bores shall be logged from total depth to the shoe of the conductor casing.

10. Wellhead equipment and testing

(1) All wellhead connections shall be fluid pressure tested to the appropriate working pressure rating. Cold water is recommended as the testing fluid. Welding of wellhead connections shall be performed using materials in conformity with industrial standards.

(2) All completed bores shall be equipped with a minimum of one casing head with side outlets, one master valve and one production valve.

(3) All casing heads, Christmas trees, fittings and connections shall have all temperature derated working pressure equal to or greater than the pressure of saturated steam at reservoir temperature.

(4) Packing, sealing mediums and lubricants shall consist of materials or substances that function effectively at, and are resistant to high temperatures. Casing head connections shall be made such that fluid can be pumped between casing strings.

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(5) Any bores showing sustained casing head pressure or leaking of geothermal fluids between casing strings shall be tested to determine the origin of the failure, when such failure point is not otherwise determined, and corrective measures shall be taken.

11. Bore spacing, plugging and permanent abandonment

(1) No producing interval of any bore shall be located within 30 metres or the outer boundaries of the licence area.

(2) All bores not in use or demonstrated to be potentially useful shall be promptly plugged in the following manner—

- (a) cement used to plug any geothermal resources bore, except that cement or concrete used for surface plugging, shall be placed in the hole by pumping through drill pipe or tubing, and the cement shall consist of a high temperature resistant admix;
- (i) in uncased portions of bores, cement plugs shall be placed to protect all subsurface mineral resources including fresh water aquifers; and plugs shall extend a minimum of 30 metres below, if possible, and 30 metres above such aforementioned zones. Cement plugs shall be placed in a manner necessary to isolate formations and to protect the fluids in such formations from interzonal migration or contamination—
- (ii) where there is an open hole (uncased and open into the casing string above) a cement plug shall be placed in the deepest casing string by either (a) or (b) below. In the event that lost circulation conditions exist or are anticipated, or if the well has been drilled with air or other gaseous substance, the plug shall be placed in accordance with (c) below;
- (iii) a cement plug shall be placed across the shoe extending a minimum of 30 metres above and 30 metres (100 feet) below; or
- (iv) a cement retainer with effective back pressure control set approximately 30 metres above the casing shoe with at least 61 metres of cement below the retainer and 30 metres above;
- (v) a permanent bridge plug set at the casing shoe and capped with a minimum of 61 metres of cement;

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12. Waste

- (a) the licence shall remove or store, in an orderly manner, all materials not in use, and shall provide and use pits and sumps of adequate capacity and designed to retain materials and fluids necessary for drilling, production, or other operations. When no longer needed, pits and sumps are to be properly abandoned and the land restored;
 - (b) liquid well effluent or the liquid residue thereof containing substances, including heat, which may be harmful or injurious to persons or property shall be dealt with in such a way as to minimize such possible harm or injury;
 - (c) drill cuttings, sand, precipitates and other similar solids shall be disposed of in a suitable manner.
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