

STATEWIDE GEOTHERMAL REGULATIONS

TEXT OF PROPOSED REGULATIONS

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CALIFORNIA CODE OF REGULATIONS, TITLE 14. NATURAL RESOURCES

DIVISION 2. DEPARTMENT OF CONSERVATION

CHAPTER 4. GEOLOGIC ENERGY MANAGEMENT DIVISION

Subchapter 4. ~~State-wide~~ Statewide Geothermal Regulations

Article 1. General

§ 1900. Purpose.

It is the purpose of this subchapter to set forth the rules and regulations governing the geothermal ~~regulation~~ program of the Geologic Energy Management Division ~~of Oil, Gas, and Geothermal Resources~~ as provided for by Chapter 4 (Sections 3700-3776), Division 3, of the Public Resources Code.

Authority: Section 3712, Public Resources Code. Reference: Sections 3700 through 3776, Public Resources Code.

§ 1911. Scope of Regulations.

These regulations shall be statewide in application for geothermal well operations.

Authority: Section 3712, Public Resources Code. Reference: Sections 3700 and 3714, Public Resources Code.

§ 1914. Approval.

~~The approval of the Supervisor is required prior to commencing drilling, deepening, redrilling, or plugging and abandonment operations. The written approval shall list any and all requirements of the Division. In an emergency, the Supervisor or a designee may give verbal approval to the operator to start any operations covered by these regulations, provided the operator sends the Division a written notice of the emergency operations conducted within 5 days after receiving the verbal approval.~~

~~Authority: Section 3714, Public Resources Code. Reference: Sections 3712, 3714, and 3724, Public Resources Code.~~

Article 2. Definitions.

§ 1920.1. Definitions.

~~—(a) “Observation Well” means a well drilled strictly for monitoring purposes.~~

~~—(b) “Exploratory Geothermal Well” means a well other than a development well drilled to discover or evaluate the presence of either low-temperature or high-temperature geothermal fluids, including steam, where the surface location of the well is at least .8 km or one-half mile from the surface location of an existing well capable of producing geothermal fluids in commercial quantities.~~

~~—(c) “Development Well” means a well, other than an exploratory well, drilled for the purpose of producing either high-temperature or low-temperature geothermal fluids in commercial quantities.~~

~~—(d) “Abandoned Well” means a well the Supervisor so designates after it has been demonstrated that all steps have been taken to protect underground or surface water suitable for irrigation or other domestic uses from the infiltration or addition of any detrimental substance, and to prevent the escape of all fluids to the surface.~~

~~—(e) “Injection Well” is a service well drilled or converted for the purpose of injecting fluids.~~

~~—(f) “High-Temperature Geothermal Fluid” means a naturally heated subterranean fluid with a surface temperature equal to or higher than the boiling point of water.~~

~~—(g) “High Temperature Well” means a well drilled to discover, evaluate, produce, or utilize high-temperature geothermal fluids.~~

~~—(h) “High-Temperature Geothermal Field” means an area so designated by the Supervisor for administrative purposes. The area shall contain at least one well capable of producing high-temperature geothermal fluids in commercial quantities.~~

~~—(i) “Low Temperature Geothermal Fluid” means naturally heated subterranean fluid with a surface temperature below the boiling point of water at ambient atmospheric pressure.~~

~~—(j) “Low-Temperature Geothermal Well” means a well drilled to discover, evaluate, produce, or utilize low-temperature geothermal fluids where the fluids will be used for their heat value.~~

~~—(k) “Low-Temperature Geothermal Field” means an area the Supervisor so designates for administrative purposes. The area shall contain at least one well capable of producing low-temperature geothermal fluids in commercial quantities.~~

~~—(l) “Idle Well” means a well, other than a suspended well, that has not been officially plugged and abandoned, on which the operator has ceased all activity, including but not limited to drilling, production or injection.~~

~~—(m) “Production Tested” means a well that the operator has tested for temperature, flow rate, and pressure.~~

~~—(n) “A well capable of producing geothermal fluid in commercial quantities” means a well:~~

~~(1) Supplying geothermal fluid to an existing power plant or other facility for the purpose of generating electricity; or~~

~~(2) Production tested and scheduled to supply geothermal fluid to a power plant or other facility for the purpose of generating electricity for which:~~

~~(A) An application is pending before the California Energy Commission or the California Public Utilities Commission; or~~

~~(B) The California Energy Commission or California Public Utilities Commission has approved a site; or~~

~~(C) A contract has been executed between the supplier and a user and conditions have been fulfilled that commit the user to build a facility; or~~

~~—(3) Supplying geothermal fluid or completed and scheduled to supply geothermal fluid to facilities existing, under construction, or committed for construction, for any nonelectric use of geothermal resources, including but not limited to space heating or food processing; or~~

~~—(4) Production tested and, in the operator's opinion, able to supply sufficient geothermal energy to justify construction of a facility to utilize the energy, and designated capable of production by the Supervisor; or~~

~~—(5) Production tested and found by the Supervisor, after a public hearing, to be capable of producing sufficient geothermal energy to be a commercially viable geothermal development project.~~

~~—(o) “Usable Thermal Energy” means the usable heat energy contained in geothermal fluid, expressed in British Thermal Units or gigajoules.~~

~~—(p) “Notice” means an application for permission to do work on a well.~~

~~—(q) “Drilling Log” means the recorded description of the lithologic sequence encountered while drilling a well.~~

~~—(r) “Drilling Operations” means the actual drilling or redrilling of a well for exploration, production, observation, or injection, including the running and cementing of casing and the installation of wellhead equipment. “Drilling Operations” do not include perforating, logging, or related operations after all the casing has been cemented.~~

~~—(s) “Suspension” means the status assigned to a well that is temporarily abandoned pursuant to specified plugging requirements that are selected by the Division from the plugging and abandonment requirements contained in Sections 1980, 1981, 1981.1, and 1981.2 of this subchapter, and the operations necessary to cause temporary abandonment have been carried out by the operator and approved by this Division.~~

~~—(t) With respect to well depth:~~

~~——(1) “Shallow” means deeper than 25 feet (about 8 meters) but no deeper than 250 feet (about 76 meters);~~

~~——(2) “Intermediate” means deeper than 250 feet (about 76 meters) but no deeper than 1,000 feet (about 305 meters);~~

~~——(3) “Deep” means deeper than 1,000 feet (about 305 meters).~~

~~—(u) “BOPE” is an acronym for blowout prevention equipment.~~

~~—(v) “Mineral Extraction Well” means a well drilled, converted, or reworked for the purpose of discovering, evaluating, or producing minerals or other products in solution from naturally heated subterranean fluids. A low- or high-temperature geothermal well may also be a mineral extraction well.~~

Unless context requires otherwise, the definitions set forth in this section govern both the construction of this subchapter, and implement, interpret, or make specific these terms as used in Public Resources Code, division 3, chapter 4.

(a) “Abandoned Well” means a well that has been permanently plugged in accordance with the requirements of Article 8 of this subchapter, “Plugging and Abandonment.”

(b) “BOPE” is means blowout prevention equipment.

(c) "Drilling Operations" means the drilling or reworking of a well for production, injection, or observation, including the running and cementing of casing and the installation of wellhead equipment. "Drilling Operations" include perforating, logging, or related operations during the drilling of the well.

(d) "Freshwater" means water that contains 3,000 mg/l TDS or less

(e) "Geothermal Resources" means the natural heat of the earth, the energy, in whatever form, below the surface of the earth present in, resulting from, or created by, or which may be extracted from, such natural heat, and all minerals in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in whatever form, found below the surface of the earth, but excluding oil, hydrocarbon gas or other hydrocarbon substances.

(f) "High-Temperature Geothermal Field" means an area so designated by the Division for administrative purposes. The area shall contain at least one well capable of producing high-temperature geothermal resources.

(g) "High Temperature Well" means a geothermal well drilled for the purpose of exploring for, evaluating, or utilizing geothermal resources that have a temperature above the boiling point of water at the altitude of occurrence.

(h) "Idle Well" means a geothermal well, other than a low-temperature geothermal well or suspended well, on which the operator has ceased all activity, including but not limited to drilling, production, or injection and that has not been properly plugged and abandoned in accordance with the requirements found in Article 8 of this Subchapter. An observation well may become an idle well under the criteria described in Section 1931.4, subdivision (f).

(i) "Geothermal Injection Well" is a geothermal well drilled, converted, or reworked for the purpose of injecting fluids approved by the Division for disposal, subsidence abatement, reservoir pressure maintenance, or reservoir fluid

augmentation. High-temperature closed-loop heat extraction systems are geothermal injection wells.

(j) "Geothermal Well" means any hole where the depth exceeds the diameter, for the discovery of geothermal resources, or any well on lands producing geothermal resources or reasonably presumed to contain geothermal resources, or any service well, converted producing well, or reactivated or converted abandoned well employed for reinjecting geothermal resources or the residue thereof.

(k) "Low-Temperature Geothermal Field" means an area the Division so designates for administrative purposes. The area shall contain at least one well capable of producing low-temperature geothermal resources.

(l) "Low-Temperature Well" means a geothermal well drilled for the purpose of exploring for, evaluating, or producing geothermal resources that have a temperature below the boiling point of water at the altitude of occurrence.

(m) "Mineral Extraction Well" means a well drilled, converted, or reworked for the purpose of discovering, evaluating, or producing minerals or other products in solution. Both low- and high-temperature wells may be mineral extraction wells.

(n) "Mud Log" means the recorded description of the lithologic sequence encountered while drilling a well.

(o) "Observation Well" means a geothermal well that has been classified as an observation well pursuant to the procedures described in Section 1931.4.

(p) "Rework" means subsequent work that alters the casing of a geothermal well or changes the use including, but not limited to, redrilling or deepening.

(q) "Service Well" is a geothermal well, other than a temperature-gradient well, not designed primarily for the purpose of producing geothermal resources. Geothermal injection wells, and observation wells, are service wells.

(r) "Special Well" is a service well.

(s) "Subsidence" means sinking, lowering, collapsing, compaction, uplift or other movement of the land due to injection or withdrawal of geothermal fluids, whether the land is covered by water or not.

(t) "Suspension" means the status assigned to a well that is temporarily plugged pursuant to specified plugging requirements in Section 1983, and the operations necessary to cause temporary plugging have been approved by the Division and carried out by the operator.

(u) "Temperature-Gradient Well" means a geothermal well used solely for the purpose of measuring the temperature change with depth.

(v) "Underground Injection Project" means sustained or recurring injection into one or more geothermal injection wells over an extended period into an approved injection zone for the purpose of sustaining geothermal operations, pressure maintenance, disposal, or subsidence mitigation.

(w) "Underground Source of Drinking Water" or "USDW" means an aquifer or its portion which has not been approved by the United States Environmental Protection Agency as an exempted aquifer pursuant to the Code of Federal Regulations, title 40, section 144.7, and which

(1) Supplies a public water system, as defined in Health and Safety Code section 116275; or

(2) Contains a sufficient quantity of groundwater to supply a public water system, as defined in Health and Safety Code section 116275; and

(i) Currently supplied drinking water for human consumption; or

(ii) Contains fewer than 10,000 mg/l TDS.

(x) With respect to well depth:

(1) "Shallow" means deeper than 25 feet but no deeper than 250 feet;

(2) "Intermediate" means deeper than 250 feet but no deeper than 1,000 feet;

(3) "Deep" means deeper than 1,000 feet.

Authority: Section 3712 and 3714, Public Resources Code. Reference: Section 3714, 3703, and 3703.1, Public Resources Code.

~~§ 1920.2. Field Designation~~

~~The Supervisor may designate geothermal fields for administrative purposes. A field shall contain at least one well capable of producing geothermal resources in commercial quantities. The Supervisor shall establish the boundaries by graphically constructing a one-mile square around each well capable of producing geothermal resources in commercial quantities. Each such well shall be at the center of a square.~~

~~Authority: Section 3714, Public Resources Code. Reference: Section 3712, Public Resources Code.~~

~~§ 1920.3 Field Rules.~~

~~When sufficient geologic and engineering information is available, the Supervisor may adopt or amend existing field rules for any geothermal resource field or area. Before adopting or amending field rules, the Supervisor shall notify affected persons, including but not limited to operators, landowners, and any utilities or other commercial users, and allow at least 30 days for them to comment on the proposed rules. The Supervisor shall notify affected persons in writing of the adoption of the rules.~~

~~Authority: Section 3714, Public Resources Code. Reference; Section 3712, Public Resources Code.~~

Article 3. Requirements.

§ 1921. Completion.

A geothermal well is completed 30 days after drilling operations have ceased and the well is capable of producing a geothermal resource or being utilized as a service well, unless drilling operations are resumed before the end of the 30-day period.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714 and 3737, Public Resources Code.

Article 3. Drilling

§ 1930. General.

(a) All geothermal wells shall be drilled in such a manner as to protect or minimize damage to the environment, usable ground waters (if any), USDW, freshwater, geothermal resources, life, health, and property, and natural resources.

(b) A copy of the operator's Notice of Intention and any subsequent written approval of proposed operations by the Division shall be posted at the geothermal well site throughout the operations.

(c) Operators shall give the appropriate Division district office advance notice of the time for inspections and tests requiring the presence of Division personnel as prescribed in the permit conditions.

(d) If a spill occurs in a reportable quantity, then it shall be immediately reported to the Division and the California Governor's Office of Emergency Services at (800) 852-7550.

(e) Blowouts, fires, serious accidents, and significant spills shall also be promptly reported to the appropriate Division district office.

(f) The use of radioactive materials in wells shall comply with the California Department of Public Health regulations in title 17, division 1, chapter 5, subchapter 4 of the California Code of Regulations.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1930.1. Well and Operator Identification.

Each geothermal well shall have posted in a conspicuous place near the wellhead, a clearly visible, legible, permanently affixed sign with the name of the operator, well name and API number, and the operator's emergency contact phone number. These signs shall be maintained on the premises from the time drilling operations cease until the geothermal well is properly plugged and abandoned.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1931. Notice of Intention to Drill.

(a) Written approval from the Division is required prior to an operator commencing drilling, redrilling, or reworking operations. Operators shall not deviate from the Division approved Notice of Intention without prior Division approval, except in an emergency that requires immediate action to protect life, health, property or natural resources. Temporary verbal approval to commence a change from the approved Notice of Intention may be granted by the Division when such operations are necessary to prevent a threat to life, health, property, or natural resources. Notwithstanding such verbal approval, the operator shall file, within 48 hours, a Notice of Intention to carry out such operations. To modify the operations approved under a Notice of Intention

when it is not an emergency, the operator shall submit a revised Notice of Intention that must be approved by the Division.

(b) Written approval of the Division is required prior to utilizing any well for anything other than its currently approved purpose, such as conversion to injection, production, or observation, or use as a sacrificial anode in a cathodic protection program.

(c) Before an owner or operator ~~can commence drilling a well~~ drills, reworks, converts to another well type, or performs any operation that will permanently alter the well casing of a geothermal well, an operator must file a Notice of Intention ~~to Drill must be filed with~~ on a Division form (OGG105-11/93) and ~~submitted to~~ the Division, accompanied by the appropriate fee and bond ~~(see Section 1932)~~. The operator shall not commence drilling, reworking, plugging, converting to another well type, or performing any operations that will permanently alter the well casing of a geothermal well until the Division approves the Notice of Intention to Drill. ~~The Notice shall include all information required on the Division form, and the following~~

~~(a) A map showing the parcel boundaries and location of the proposed well.~~

(d) The Notice of Intention shall include, if applicable:

1. The notice type and date;
2. Operator name, phone number, and email;
3. Contact name, phone, and email;
4. Supplementary notice information;
5. Description of proposed operations;
6. Well API number and name;
7. Bond number;
8. Well type;
9. If the well is a low-temperature well, identification if the well is commercial or non-commercial;

10. Information on the mineral and surface ownership and leases with legal description and a map showing the lease boundaries and the location of the proposed well, as well as a directional plat;
11. Confidentiality request;
12. UIC project code;
13. Depth measurements and elevation relative to mean sea level;
14. Proposed directional drilling survey electronic data including indication of the direction of the well;
15. Depth of freshwater and/or USDW;
16. Zones of significance including proposed measured depth, proposed vertical depth;
17. Proposed completion zones including zone name, measured depth, and pressure;
18. Any known significant geologic markers and estimated depths;
19. Information on BOPE including pressure rating and classification;
20. Drilling program information;
21. Mud system, mud disposal method, cuttings disposal;
22. For a new drill, surface location information including section, township, range, base and meridian, field, latitude and longitude (datum NAD 83), corner call, county, and location description;
23. Bottom hole location including section, township, range, base and meridian, field, latitude and longitude (datum NAD 83), corner call, and county;

~~(b) If a government agency has prepared an environmental document for the proposed well, the name and address of the agency or a copy of the final environmental documents. If operations on an exploratory well or observation well for which the Division is required to prepare environmental documents have not commenced within two years from the date the Notice of Intention to Drill~~

~~was approved, the Division shall cancel the notice unless, prior to the expiration date, the operator requests an extension on a Rework/Supplementary Notice.~~

~~If operations on a development well, exploratory well, or observation well for which the Division is not required to prepare environmental documents have not commenced one year from the date the notice is approved, the Division shall cancel the notice unless, prior to the expiration date, the operator requests a time extension on a Rework/Supplementary Notice. The Division may extend these time limits at its discretion.~~

~~—(c) Such other information as the Supervisor may require.~~

—(e) If operations have not commenced within 24 months of the Division receiving the Notice of Intention, the Notice of Intention shall be deemed canceled, the Notice of Intention shall not be extended, and the cancellation shall be noted in the Division's records.

Authority: Sections 3712 ~~and 3714~~, Public Resources Code. Reference: Sections 3712, 3714, 3724, and 3724.1, Public Resources Code.

~~§ 1931.1. Rework/Supplementary Notice of Intention to Rework.~~

~~If there is any change in the original Notice of Intention, or if the operator plans to deepen, redrill, plug, or perform any operation that will permanently alter the well casing, a Rework/Supplementary Notice must be filed with the Division. A fee and/or bond may be required if, for example, the proposal concerns entering a plugged and abandoned or suspended well.~~

~~If the drilling operations the Division approved on a Rework/Supplementary Notice have not commenced one year from the date the notice is approved, the Division shall cancel the notice unless, prior to the expiration date, the~~

~~operator requests a time extension on a Rework/Supplementary Notice. The Division may extend this time limit at its discretion.~~

~~Authority: Section 3714, Public Resources Code. Reference: Sections 3712 and 3724, Public Resources Code.~~

§ 1931.2. Notice to Convert to Injection

~~An operator planning to convert an existing well to an injection or disposal well, even if there will be no change in mechanical condition, must file a Rework/Supplementary Notice with the Division and the Division must approve the notice before injection is commenced.~~

~~Authority: Section 3714, Public Resources Code. Reference: Sections 3712 and 3724, Public Resources Code.~~

§ 1931.4. Classification as an Observation Well.

(a) The Division may approve a request for classification of a geothermal well as an observation well upon the operator's demonstration that the geothermal well will be used for the sole purpose of collecting reservoir data from or about a reservoir in which a geothermal resource is being utilized.

(b) A request for classification of a geothermal well as an observation well shall be made in writing to the local Division district deputy, and shall include all of the following information:

(1) Operator name;

(2) The API number of the well, if available;

(3) The field and county in which the well is located;

(4) Well identification including section, township, range, base and meridian;

(5) The name, title and contact information of the person submitting the form;

(6) A wellbore diagram with relevant geological markers;

(7) The top of reservoir and/or depth of anomalies that are being observed;

(8) A map and list describing the identity and the surface location of all other observation wells within a half-mile radius of the well;

(9) A description of the reservoir data that will be collected from the well;

(10) A description of the methods that will be used to collect the reservoir data; and

(11) An explanation of the purpose for collecting reservoir data from the geothermal well.

(c) In addition to the information described in subdivision (b) of this section, the Division may require that the operator of the geothermal well provide other information as necessary to demonstrate that the well will serve the sole purpose of collecting reservoir data from or about a reservoir in which a geothermal resource is being utilized.

(d) After evaluating a request for classification as an observation well, including any additional information the Division may require in order to make its determination, the Division will provide the operator a written response approving or denying the request for classification as an observation well.

(e) A well that has not received written approval from the Division for classification as an observation well is not an observation well, and shall be a "chargeable well," as described in Section 1933.1.

(f) An observation well from which reservoir data has not been collected and reported to the Division in the manner prescribed by Section 1938, subdivision (e), for a total of six or more months during the prior calendar year is an idle well and shall be a "chargeable well," as described in Section 1933.1. The well shall continue to be a chargeable idle well until either the well has been properly abandoned in accordance with all applicable requirements, or until reservoir data has been collected from the well and reported to the Division in the

manner prescribed by Section 1938, subdivision (e), for a total of at least seven months during the calendar year.

(g) An observation well that has become an idle well shall be converted to use as a production or service well or plugged and abandoned within one year of becoming idle.

(h) For each well an operator is using for the sole purpose of collecting reservoir data from or about a reservoir in which a geothermal resource is being utilized as of the effective date of this section, the operator must within 30 days of the effective date of this section submit for Division approval a request for classification of a well as an observation well in accordance with subdivision (b). If the operator does not submit the request within 30 days, the well will be classified as a "chargeable well" under Section 1933.1.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3716, 3724.5, and 3741, Public Resources Code.

§ 1931.5. Unstable Terrain.

(a) If the construction of drilling sites, ~~and access roads, sumps, steam transmission lines, and other construction attendant to geothermal operations~~ could cause or could be affected by slumping, landslides, surface expression, or unstable ~~earth~~ geologic conditions, the ~~Supervisor shall require that the~~ operator shall submit a written report analysis of the proposed work prior to the commencement of any construction ~~and prior to approving a permit to drill. The report shall also contain any mitigation measures that will be utilized to mitigate any impacts from slumping, landslides, surface expressions, or unstable geologic conditions.~~

(b) ~~At the request of the Supervisor~~ The report shall be prepared by competent professionals and in accordance with the Board for Professional Engineers, Land Surveyors, and Geologists' licensing requirements under the

Professional Engineers Act (Business and Professions Code §§ 6700-6799), the Professional Land Surveyors' Act (Business and Professions Code §§ 8700-8805), and the Geologist and geophysicist Act (Business and Professions Code §§ 7800-7887).

~~a civil engineer, licensed in the state and experienced in soils engineering; and if slumping or landsliding could be involved, the requested report shall also be prepared by an engineering geologist certified in the state and experienced in slope stability and related problems.~~

~~(c) No~~ The Division will not approve a permit to drill shall be approved unless the mitigation measures in the report indicates demonstrate that the work is planned in such a manner as to reasonably mitigate any impacts from slumping, landslides, surface expressions, or unstable geologic conditions the problem throughout the life of the geothermal well project.

~~Upon completion of any construction authorized by the Supervisor pursuant to this section, the operator shall certify in writing to the Supervisor that the work was carried out according to the approved plans subject only to changes approved by the Supervisor.~~

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3724, 3739, 3740, and 3741 Public Resources Code.

§ 1932. Fees.

The operator of a geothermal well shall pay the appropriate fee, as listed below, shall be paid when filing a the Notice of Intention to drill, to Drill is filed. (Refer to Section 1920.1 for definitions of terms and depth limitations.)

(a) \$25 Fee: A shallow depth geothermal well.

~~(1) Shallow low-temperature geothermal well.~~

~~(2) Shallow observation well.~~

(b) ~~\$200 Fee.:~~ Shallow temperature gradient well program of up to and including 25 such wells, if \$200 is the lesser fee.

~~(1) Shallow observation well program of up to and including 25 such wells, (except as provided in PRC Section 3724.1).~~

~~——(2) Intermediate depth low temperature geothermal well.~~

~~——(3) Intermediate depth observation well.~~

(c) ~~\$500 Fee.:~~ Intermediate depth geothermal well.

~~(1) Intermediate depth observation well program of up to and including 5 such wells.~~

~~——(2) Development well, other than low temperature, to any depth.~~

~~——(3) Deep low temperature geothermal well.~~

~~——(4) Injection well.~~

~~(5) Deep observation well.~~

(d) ~~\$1,000 Fee.:~~ Exploratory well, other than low temperature, to any depth. Deep depth geothermal well.

~~(e) If a Notice of Intention to Drill is cancelled, the Division shall refund the fee paid by the operator, minus the Division's administrative costs for processing and reviewing the notice.~~

Authority: Sections 3712 and 3714, Public Resources Code. Reference: Sections 3724, 3724.1 and 3724.35, Public Resources Code.

§ 1933.1. Establishment of Annual Well Fees.

To establish the annual fee that must be charged to each geothermal well operator, the department, on or before the statewide fee-assessment date shall:

(a) Make an estimate of the sum of the well drilling fees that will be filed by operators during the fiscal year following the fee assessment date.

(b) Establish the appropriation for the supervision of geothermal resource wells from the amount proposed in the Governor's Budget. The appropriation

shall be adjusted by any changes that have occurred during the legislative review process.

(c) Establish the estimated surplus or deficit from the current and prior fiscal year by calculating the cost of the supervision of geothermal resource wells and the actual revenues therefrom.

(d) Estimate the amount assessable to geothermal operators by taking the appropriation amount (paragraph b), deducting the well drilling fees (paragraph a), and adding or deducting the current year and prior year adjustments (paragraph c).

(e) Determine the total number of chargeable wells by identifying the total number of producing, service, and idle wells that existed at any time during the preceding calendar year in the state. A well that has changed ownership one or more times during the preceding calendar year shall be counted only once, and assignment of charges shall be made to the operator of record on December 31 of that year. "Chargeable wells" shall not include:

(1) Any geothermal well ~~used for observation purposes approved as an observation well pursuant to Section 1931.4 that has submitted at least seven months of required data during the calendar year.~~

(2) Any geothermal well for which the Supervisor Division has approved a suspension. However, a well must be suspended for the entire calendar year to be nonchargeable.

(3) Any low-temperature geothermal well.

(f) Determine the annual well fee by dividing the amount assessable by the total number of chargeable wells.

(g) Determine the amount to be charged to each operator by multiplying the total number of chargeable wells of record on the previous December 31 by the annual well fee.

Authority: Section ~~3724.5~~ 3712, Public Resources Code. Reference: Sections 3724, 3724.1 and 3724.5, Public Resources Code.

§ 1935. Casing Requirements.

~~___(a) All wells shall be cased in such a manner as to protect or minimize damage to the environment, usable ground waters and surface waters (if any), USDW, freshwater, geothermal resources, life, health, and property and natural resources. The permanent wellhead completion equipment shall be attached to the production casing or to the intermediate casing if production casing does not reach to the surface. Division specifications for casing strings shall be determined on a well to well basis. All casing strings reaching the surface shall provide adequate anchorage for blowout prevention equipment, hole pressure control and protection for all natural resources. The following casing requirements are general but should be used as guidelines in submitting proposals to drill.~~

~~___(b) All casing strings shall be designed to provide anchorage for BOPE and to withstand anticipated collapse, burst, and tension forces with the appropriate design factor provided to obtain a safe operation.~~

~~___(c) Casing setting depths required in sections 1935.1 through 1935.4 shall be based upon geological and engineering factors, including but not limited to formation pressures, fracture gradients, lost circulation intervals, and the degree of formation compaction or consolidation. All casing set depths refer to true vertical depth below ground level.~~

~~___(d) All cements in geothermal wells shall be designed to maintain strength over time at the temperatures of the well. The cement in high-temperature wells shall include additives to prevent thermal and chemical degradation of the cement over time and shall possess adequate strength, soundness, resistance to thermal and chemical degradation, setting time, and other properties suitable~~

to achieving a competent and permanent connective barrier against infiltration of fluids within the applicable subsurface environment.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3739, and 3740, Public Resources Code.

§ 1935.1. Conductor Pipe.

~~Conductor pipe shall be cemented with sufficient cement to fill the annular space from the shoe to the surface. Where used, conductor pipe shall be cemented at or driven to a depth not greater than 100 feet below ground surface. An annular blowout preventer, or its equivalent, approved by the Division, shall be installed on the conductor pipe for exploratory wells and development wells on the conductor pipe when shallow geothermal resources or gas is expected to be encountered when deemed necessary by the Division. Exceptions may be granted by the Division if the operator provides sufficient data to show the risk is minimal and when conditions, such as a slope, require deeper casing depth. The Division may waive this requirement for low-temperature geothermal wells.~~

Authority: Section ~~3714~~ 3712, Public Resources Code. Reference: Sections 3714, 3739, and 3740, Public Resources Code.

§ 1935.2. Surface Casing.

~~___(a)~~ Surface casing shall provide for control of formation fluids, for protection of ~~shallow usable groundwater~~ USDW and freshwater zones, and for adequate anchorage for blowout prevention equipment. Surface casing shall be cemented into or through a competent bed and at a depth that will allow complete well shut-in without fracturing the formation immediately below the casing shoe. All surface casing shall be cemented with sufficient cement to fill

the annular space from the shoe to the surface. ~~The following requirements may be modified or waived by the Division for low-temperature geothermal wells.~~

~~___(b) (a)~~ Length of Surface Casing.

~~_____ (1) In areas where subsurface geologic conditions are known, the depth the surface casing is set shall be determined on the basis of the geologic and engineering factors identified in section 1935, subdivision (c).~~

~~(21) In areas where subsurface geological conditions are variable or unknown, surface casing in general shall be set at a depth equaling or exceeding 10 percent of the proposed total depths of wells drilled in such areas. A minimum of 60 meters (about 200 feet) 200 feet and a maximum of 400 meters (about 1,300 feet) 1500 feet of surface casing shall be set.~~

~~(23) In areas of known high formation pressure, surface casing shall be set at a depth determined by the Division after a careful study of geological conditions.~~

~~_____ (3) Within the confines of designated geothermal fields, the depth at which surface casing shall be set shall be determined by the Division on the basis of known field conditions.~~

~~___(c) (b)~~ Cementing Point for Surface Casing. ¶ Surface casing shall be cemented through a sufficient series of low permeability, competent lithologic units ~~(such as claystone or siltstone)~~ to ensure a solid anchor for ~~blowout prevention equipment~~ BOPE and to protect usable ~~groundwater and surface water, USDW, and freshwater~~ from contamination. A second string of surface casing may be required if the first string has not been cemented through a sufficient series of low permeability, competent lithologic units, and either a rapidly increasing thermal gradient or rapidly increasing formation pressures are encountered.

~~___(d) If the Division determines that the requirements are not necessary to protect life, health, property, and natural resources, the Division may modify or waive the requirements in this Section for low-temperature geothermal wells.~~

~~(c) Drilling Fluid Return Temperatures. The temperature of the return drilling fluid shall be monitored continuously during the drilling of the surface casing hole. Either a continuous temperature monitoring device shall be installed and maintained in working condition, or the temperature shall be read manually. In either case, return drilling fluid temperatures shall be entered into the log book after each joint of pipe has been drilled down (every 10 meters, about 30 feet).~~

Authority: Section ~~3714~~ 3712, Public Resources Code. Reference: Sections 3714, 3724, 3739, 3740, and 3741 Public Resources Code.

§ 1935.3. Intermediate Casing.

~~The operator of a geothermal well shall place intermediate casing shall be required~~ for protection against anomalous pressure zones, cave-ins, washouts, abnormal temperature zones, uncontrollable lost circulation zones or other drilling hazards. Intermediate casing strings shall be, ~~if possible~~, cemented solid to the surface.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3739, and 3740, Public Resources Code.

§ 1935.4. Production Casing.

~~The operator of a geothermal well may set p~~Production casing ~~may be set~~ above or through the producing or injection zone and cemented above the objective zones. Sufficient cement shall be used to exclude overlying formation fluids from the zone, to segregate zones, and to prevent movement of fluids behind the casing into zones that contain usable groundwater. Production casing shall either be cemented with sufficient cement to fill the annular space from the shoe to the surface or lapped into intermediate casing, if run.

~~Production casing lapped into an intermediate string, shall overlap at least 15 meters (about 50 feet); the lap shall be cemented solidly; and shall be pressure tested to ensure its integrity. When the production string does not extend to the surface, at least 100 feet of overlap between the production string and next larger casing string is required. This overlap shall be cemented and tested by a fluid-entry test or other method approved by the Division to determine whether there is a competent seal between the two casing strings.~~

Authority: Section ~~3714~~ 3712, Public Resources Code. Reference: Sections 3714, 3739, ~~and~~ 3740, ~~and~~ 3741. Public Resources Code.

~~§ 1936. Electric Logging.~~

~~All wells, except observation wells and low-temperature thermal wells, shall be logged with an induction electrical log, or equivalent, from total depth to the bottom of the conductor pipe, except in the case where air is used as the drilling medium. This requirement may be waived by the Supervisor and may vary depending on geologic conditions as stated in Section 1935.2(a)(2).~~

§ 1937. Lost Radioactive Tool.

(a) If a radioactive tool cannot be retrieved from the wellbore, the operator shall do all of the following:

(1) Immediately notify the Division; and

(2) Comply with the California Department of Public Health requirements in California Code of Regulations, title 17, section 30346, including abandoning the portion of the well containing the tool by doing the following:

(A) Placing a 100-foot standard color dyed (red iron oxide or equivalent red cement dye) cement plug on top of the radioactive tool; and

(B) Placing a whipstock or other approved deflection device on top of the cement plug to prevent accidental or intentional mechanical disintegration of the radioactive source.

(b) Radioactive tracer tools and the tracers used in injection surveys are not considered radioactive tools for the purposes of this section.

Authority: Section 3712 Public Resources Code. Reference: Section 3714, 3715, 3716, 3729, and 3746, Public Resources Code.

§ ~~1937.1~~ 1938. Records Required to be Filed with the Division.

(a) The operator of any geothermal well drilled, reworked, or plugged and abandoned shall file with the Division an accurate record of each operation on each well including, but not limited to, the following:

~~—— (a) Drilling Log and Core Record. The drilling log shall show the lithologic characteristics and depths of formations encountered, the depths and temperatures of water bearing and steam bearing strata, the temperatures, chemical compositions, and other chemical and physical characteristics of fluids encountered from time to time, so far as ascertained.~~

(1) Core Record. If a core is taken, a core record shall showing the depth, lithologic character including porosity and permeability, and fluid content of cores obtained, shall be submitted within one year or less of the core being taken, so far as determined.

~~(b)(2) Well History. The A well history shall describe~~ describing in detail in chronological order a summary of daily operations carried out on a daily basis ~~all significant operations carried out~~ and equipment used during all phases of drilling, testing, completion, recompletion and plugging and abandonment of the well, including:

(A) Character and depth of all formations, water-bearing strata, water or steam entries, lost circulation zones, all USDW and freshwater zones, and abnormal pressure zones encountered.

(B) Casing size, weight, grade, type, condition (new or used), top, bottom, and perforations; and any equipment attached to the casing.

(C) Casing pressure tests, including date, duration, and continuous test pressures.

(D) Hole sizes.

(E) Cementing and plugging operations, including date, depth, slurry volume and composition, fluid displacement, pressures, calculated or actual fill, and down-hole equipment.

(F) Drill-stem, leak-off, or other formation tests, including date, duration, depth, pressures, and recovery (volume and description).

(G) BOPE installation, inspections, and pressure/function tests.

(H) Depths of sidetracked casing, tools or other material, damaged casing, holes in casing, and stuck drill pipe, tubing, or other junk in casing or open hole.

(I) Depth and type of all electrical, physical, or chemical logs, tests, directional or other surveys made.

(J) Production or injection method and equipment.

(K) Wellbore Diagram. A wellbore diagram including all the information required in section 1938.1.

~~_____ (c)(3) Well Summary Report. The A well summary report shall accompany the core record and well history reports. It is designed to showing data pertinent to the condition of a well at the time of completion of work done.~~

_____ (b) The well summary and well history shall be filed in a digital format within the Division within 60 days after the completion, plugging and abandonment, or suspension of operations on a well, including, if run: core records; mud logs; electrical, physical, and chemical logs (Log ASCII Standard (LAS) format is

preferred); production, injection and other tests; and all surveys, including temperature surveys, directional surveys, and all surveys run during drilling operations. Dipmeter surveys shall be submitted in a form indicating the computed direction and amount of dip. For the purpose of filing these records the 60-day time limit for filing such records shall begin when the rig is released.

~~(d)(c)~~ Production Records. Monthly production records shall be filed with the Division in a digital format on or before the 30th day of each month, for the ~~last~~ preceding calendar month.

~~(e)(d)~~ Injection Records. Monthly injection records shall be filed with the Division in a digital format on or before the 30th day of each month, for the ~~last~~ preceding calendar month.

(e) Observation Well Records. On or before the 30th day of each month, for the last preceding calendar month, in a digital format, the reservoir data collected from each observation well, including:

(1) An average of the temperature data collected during the month, expressed in degrees Fahrenheit; and/or

(2) An average of the pressure data collected during the month, expressed in pounds per square inch.

If no reservoir data were collected from the observation well during the month, the statement shall so indicate and provide an explanation for why data were not collected.

(f) Other Records. ~~Any other records such as: The following shall also be filed with the Division, if run: electric logs, physical or chemical logs, geologic and reservoir models, all tests, liquid analysis water analyses, and surveys (including temperature surveys and directional surveys) and any analysis derived from those records shall be filed in a digital format with the Division within 60 days of the data becoming available to the operator.~~

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3716, 3724.5, 3730, 3731, 3733, 3741, and 3745, Public Resources Code.

§ 1938.1. Wellbore Diagrams.

(a) Wellbore diagrams submitted under the requirements of Section 1938, subdivision (a)(2)(k), shall include all of the following data:

(1) Operator name, lease name, well number, and API number of the well;

(2) Date the well was spudded;

(3) Ground elevation from sea level;

(4) Reference elevation (i.e., rig floor or Kelly bushing);

(5) Base of freshwater, if any;

(6) Base of the lowermost USDW penetrated by the well, if any;

(7) Sizes, grades, connection type, and weights of casing;

(8) Depths of shoes, stubs, and liner tops;

(9) Depths of perforation intervals, open-hole completions, cement ports, type and extent of casing damage, type and extent of junk or fish, and any other feature that influences flow in the well or may compromise the mechanical integrity of the well;

(10) Diameter and depth of hole for all drilled intervals;

(11) Location of cement plugs, including locations of the top and bottom of cement plugs;

(12) Location of cement fill behind casings, including locations of the top and bottom of cement fill;

(13) Depths and names of the formations, zones, and markers penetrated by the well, including the top of the injection zone and confining layer(s) for the underground injection project(s), if applicable.

(b) Each wellbore diagram submitted to the Division shall be accompanied by documentation of the following:

(1) All information used to calculate the cement slurry (volume, density,

yield), including but not limited to, cement type and additives, for each cement job completed in each well;

(2) All steps of cement yield and cement calculations performed; and

(3) The wellbore path, providing measured and vertical depth and both inclination and azimuth measurements, northings and eastings.

(c) When multiple boreholes are drilled in a well, all of the information listed in this section is required for both the original hole and for any additional redrilled, lateral, or sidetracked wellbores.

(d) Measured depth and true vertical depth shall be provided for all depths required under subdivision (a).

(e) An operator may satisfy the requirements of section 1938, subdivision (a)(5), by submitting graphical casing diagrams or a flat file data set containing all of the information described in this section.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1938.2 Mud Logging.

(a) All geothermal wells, except temperature-gradient and low-temperature geothermal wells, shall have recorded a complete and accurate mud log. The log shall show the lithologic characteristics and depths of formations encountered, the depths and temperatures of water-bearing or steam-bearing strata, the temperatures, chemical compositions, and other chemical and physical characteristics of fluids encountered, so far as ascertained.

(b) For all high-temperature geothermal wells, the operator shall monitor and record continuously the temperature of the return drilling fluid using a continuous temperature monitoring device that is maintained in working condition.

(c) For temperature-gradient wells a copy of a temperature log run after the well has stabilized shall be submitted with the well history.

(d) The mud log shall be submitted to the Division in accordance with Section 1938, subdivision (b).

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3730, and 3731, Public Resources Code.

Article 4. Blowout Prevention

§ 1941. General.

(a) BOPE and related well control equipment shall be installed, tested, used, and maintained to prevent an uncontrolled release from a geothermal well, and Blowout Prevention Equipment (BOPE) installations shall include high temperature-rated packing units and ram rubbers, if available, and shall have a minimum working-pressure rating equal to or greater than the lesser of:

(a1) A pressure equal to the product of the true vertical depth of the BOPE anchor string in meters times 0.2 bar per meter. (Feet times one (1) psi per foot) feet times one psi per foot.

(b2) A pressure equal to the rated burst pressure of the BOPE anchor string.

(c) A pressure equal to 138 bars (2,000 psi).

Specific inspections and tests of the BOPE shall be made by the Division. The requirements for such tests will be included in the Division's answer to the notice of intention to drill.

(3) The formation fracture pressure at the shoe of the BOPE anchor string.

(4) The reservoir pressure of the formation, if a geothermal well will be drilled with air.

(b) The operator, while drilling, shall continuously monitor and record the following:

- (1) Drilling fluid pit level;
- (2) Drilling fluid pump volume;
- (3) Drilling fluid weight; and
- (4) Drilling rate.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714, 3739 and 3741. Public Resources Code.

§ 1942. BOPE Guide.

~~The Division shall prepare a guide for establishing the blowout prevention equipment requirements specified in the Division's approval of proposed operations.~~

~~Authority: Section 3714, Public Resources Code. Reference: Section 3739, Public Resources Code.~~

§ 1942. Diverters.

Before drilling out the shoe of the conductor pipe, the operator of the geothermal well shall use diverter-system equipment, unless the operator can demonstrate that such equipment is not necessary to protect life, health, property, and natural resources. The diverter system shall consist of one or more of the following devices:

- (a) At least one diverter that has:
 - (1) A rotating stripper head; or
 - (2) A remote-controlled, hydraulically operated annular preventer; or
 - (3) A substitute device approved in advance by the Division.

(b) A large-diameter vent line into the wellbore below the diverter. The vent line shall be attached to an outlet on the conductor casing, itself, or to a spool mounted between the conductor casing and the diverter. This line shall be directed to a safe area.

(c) A device in a vent line designed to prevent the flow of well fluids through the line during normal well operations, but able to permit flow in an emergency. This requirement shall be satisfied by either of the following methods:

(1) A riser installed in the vent line with an outlet above the level of the flow line. This would provide an open-flow diverter system.

(2) A full-opening control valve, or rupture disk assembly, with a throughbore at least equal to the internal diameter of the vent line, mounted in the line near the conductor casing. If a manual valve is used, it shall be readily accessible and of an easy-opening design. If a remotely operated valve is used, the system shall be designed so the valve opens automatically as the diverter is closed. In a system where the diverter is an annular preventer, a remotely controlled, hydraulically operated valve shall be installed so that the opening chamber of the valve is connected to the closing line of the annular preventer. The valve shall be pressured open each time the preventer is closed.

Authority: Section 3712, Public Resources Code. Reference: Sections 3714 and 3739. Public Resources Code.

~~§ 1942.1. Unstable Areas.~~

~~Drilling any wells, including water wells, is prohibited in areas containing fumaroles, geysers, hot springs, mud pots, etc. (unstable areas), unless the Division determines, after a thorough geological investigation, that drilling in an unstable area is feasible. In this case, a special permit may be issued. The following may be required for a well drilled in an unstable area:~~

~~(a) A Division engineer shall be present at the well at all times during the initial phases of drilling until the surface casing has been cemented and the BOPE has been pressure tested satisfactorily. The Division engineer may observe all drilling operations at the well and if, in his or her opinion, conditions warrant, may order a second or third string of surface casing to be run.~~

~~(b) The operator, while drilling the surface casing hole, shall continuously monitor and record the following:~~

- ~~(1) Drilling fluid temperature (in and out),~~
- ~~(2) Drilling fluid pit level,~~
- ~~(3) Drilling fluid pump volume,~~
- ~~(4) Drilling fluid weight, and~~
- ~~(5) Drilling rate.~~

~~(c) A drilling fee in addition to the fee specified in Section 1932, up to the maximum of \$1,000 per well, depending on the geologic conditions in the area.~~

~~Authority: Section 3714, Public Resources Code. Reference: Sections 3724, 3739, 3740, and 3741, Public Resources Code.~~

~~§ 1942.2. Cable Tool Drilling.~~

~~This method of drilling, or any other method of drilling, will be allowed, at the discretion of the Supervisor, with certain stipulations in the following cases only:~~

~~(a) Areas where formation pressures are known to be hydrostatic and are known to contain geothermal fluids at shallow depths, and where down-hole temperatures are less than 100° C (212° F).~~

~~(b) Areas where geothermal fluids have been produced from shallow wells, less than 150 meters (500 feet) true vertical depth, over a number of years with no known history of a blowout or geyser.~~

Authority: Section 3714, Public Resources Code. Reference: Sections 3712 and 3715, Public Resources Code.

Article 5. Completion and Production Environmental Protection

~~§ 1950. Official Completion.~~

~~A well is considered to be completed 30 days after drilling operations have ceased and the well is capable of producing a geothermal resource, or 30 days after the well has commenced to produce a geothermal resource, unless drilling operations are resumed before the end of the 30-day period.~~

Authority: Section 3714, Public Resources Code. Reference: Section 3737, Public Resources Code.

~~§ 1950.1 Time Limits.~~

~~For the purpose of filing drilling records pursuant to Section 3735, Public Resources Code, the 60 day time limit for filing such records shall begin when the Division determines that a well is completed, idle, or plugged and abandoned.~~

Authority: Section 3714, Public Resources Code. Reference: Section 3735, Public Resources Code.

§ 1952. Maintenance.

(a) All geothermal wells and wellheads, separators, pumps, mufflers, manifolds, valves, pipelines and other equipment appurtenant to the well, used for involved in the production utilization of geothermal resources, shall be maintained in good condition in order to prevent loss of or damage to life, health, property and natural resources.

(b) Well cellars shall be covered and kept drained as practicable. Grating or flooring shall be installed and maintained in good condition so as to exclude people and animals.

(c) Public access to geothermal well equipment shall be controlled by use of individual enclosures, perimeter fencing, or any other means necessary to protect life, health, property, and natural resources.

Authority: Section 3712, Public Resources Code. Reference: Section 3714 Public Resources Code.

§ 1953. Corrosion.

~~All surface wellhead equipment and pipelines and subsurface casing and tubing will be subject to periodic corrosion surveillance in order to safeguard life, health, property and natural resources.~~ (a) Operators shall provide a corrosion risk assessment that includes prevention measures to minimize internal and external corrosion to the Division within one year of a new high-temperature geothermal well commencing production, or an injection well commencing injection, and then at least once every five (5) years.

(b) The corrosion risk assessment shall include consideration of at least the following:

- (1) Evaluation of tubular integrity and identification of defects caused by corrosion or other chemical or mechanical damage;
- (2) Corrosion potential of wellbore produced fluids and solids, including the impact of operating pressures, temperatures, and compositions on the corrosion potential of wellbore fluids; and
- (3) Corrosion potential of uncemented tubulars.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1954. Tests.

~~—(a) Requirements. The Supervisor shall require such tests or remedial work as in his or her judgment are necessary to prevent damage to life, health, property, and natural resources, to protect geothermal reservoirs from damage or to prevent the infiltration of detrimental substances into underground or surface water suitable for agricultural, industrial, municipal, or domestic purposes, to the best interest of the neighboring property owners and the public.~~

~~—(b) Types of Tests.~~

~~——(1) Casing Tests~~

~~(A) Spinner surveys~~

~~(B) Wall thickness~~

~~(C) Lap~~

~~(D) Pressure~~

~~(E) Radioactive tracer surveys~~

~~——(2) Cementing Tests~~

~~(A) Cementing of casing~~

~~(B) Pumping of plugs~~

~~(C) Hardness of plugs~~

~~(D) Depths of plugs~~

~~——(3) Equipment Tests~~

~~(A) Gauges~~

~~(B) Thermometers~~

~~(C) Surface facilities, lines, vessels, etc.~~

~~(D) Blowout prevention equipment. BOPE inspections and/or tests are normally performed on all drilling wells. The Supervisor requires that the blowout prevention equipment be tested prior to drilling out the shoe of the surface casing. A Division engineer must be contacted to witness a pressure test of each preventer of the well prior to drilling out the shoe of the surface casing.~~

§ 1956. Geothermal Wastes and Refuse.

(a) The operator of a geothermal well shall dispose of all liquid wastes, including but not limited to water, chemicals, mud, and cement, in a manner that does not cause damage to life, health, property, USDW, freshwater zones, surface waters, or natural resources. Disposal sites for such wastes shall also conform to all applicable state law including State Water Resources Control Board and appropriate Regional Water Quality Control Board regulations.

(b) Cement slurry or dry cement shall not be disposed of on the surface.

(c) Unused equipment and scrap attendant to geothermal well operations shall be removed or stored in a manner that does not cause damage to life, health, property, or natural resources. Trash and other waste materials attendant to geothermal well operations shall be removed and disposed of in a licensed waste disposal facility.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1958. Well Site and Lease Restoration.

(a) Well Site Restoration. Within 60 days following well plugging and abandonment operations of any geothermal well, the operator shall restore the well site as follows:

(1) Fill with earth and properly compact any auxiliary holes, such as rat holes;

(2) Remove all cellars, flow lines, equipment and construction materials associated with the well;

(3) Fill any resulting excavations with properly compacted earth to prevent settling;

(4) Grade and clear all well pads of equipment, trash, and other waste materials;

- (5) Mitigate unstable slope conditions; and
- (6) Undertake any additional activities required by the Division as a condition of the permit to plug and abandon the well.
- (b) The Division may approve a different well site restoration completion date if the operator demonstrates good cause.
- (c) Lease Restoration Plan. Prior to the plugging and abandonment of the last geothermal well or group of geothermal wells on a lease, the operator shall submit a schedule and plan for lease restoration for approval by the Division.
- (d) Lease Restoration. The operator shall restore the lease as follows
- (1) Clear all equipment, trash, and other waste materials from the lease;
 - (2) Remove all well pads if practicable;
 - (3) Return the well site to as near a natural state as practicable.
- (e) Lease restoration shall begin within three (3) months and be completed within one year after the plugging and abandonment of the last well on the lease. The Division may approve a different lease restoration completion date if the operator can demonstrate good cause.

Authority: Section 3712, Public Resource Code. Reference: Sections 3714, 3729, 3748, 3750.

Article 6. Injection

§ 1960. Definition Approval of an Underground Injection Project.

~~Injection wells are those used for the disposal of waste fluids, the augmentation of reservoir fluids, pressure maintenance of reservoirs or for any other purpose authorized by the Supervisor. New wells may be drilled and/or old wells may be converted for water injection or disposal service. Notices, bonds and fees are required for drilling or conversion as stated in Article 3.~~

(a) Operators shall obtain a Project Approval Letter from the Division for each underground injection project before any injection occurs as part of the underground injection project. The Division may specify a limited duration of approval in the Project Approval Letter.

(b) Geothermal injection wells shall only inject three types of fluid:

(1) Geothermal fluids

(2) Steam condensate, cooling tower blow down fluids, and other fluids utilized in power plant operations approved by the Division.

(3) Other Division-approved supplemental fluids, such as treated wastewater.

Authority: Section 3712, Public Resources Code. Reference; Sections 3714, 3724, 3725, and 3726, Public Resources Code.

§ 1961. Projects Data Requirements.

Following is an outline which sets forth the requirements for initiating an injection project. ~~Data and exhibits need only extend or cover the injection zone and zones which will possibly be affected by an injection project:~~

~~(a) Letter setting forth the entire plan of operations, which should include:~~

~~(1) Reservoir conditions.~~

~~(2) Method of injection: through casing, tubing, or tubing with a packer.~~

~~(3) Source of injection fluid.~~

~~(4) Estimates of daily amount of water to be injected.~~

~~(b) Map showing contours on a geologic marker at or near the intended zone of injection.~~

~~(c) One or more cross sections showing the wells involved.~~

~~(d) Analyses of fluid to be injected and of fluid from intended zone of injection.~~

~~(e) Copies of letter or notification sent to neighboring operators if deemed advisable by the Supervisor.~~

(a) An injection project shall be supported by data specified in this section and any data that, in the judgment of the Division, are pertinent and necessary for the proper evaluation of the proposed project. The operator shall provide a narrative or explanation as to why the data submitted is current and accurately reflects the project setting and operation. The data filed with the Division shall include, at a minimum:

(1) An engineering study, including but not limited to:

(A) Statement of primary purpose of the project.

(B) Reservoir characteristics of each injection zone, such as porosity, permeability, average thickness, areal extent, fracture gradient, original and present temperature and pressure.

(C) Reservoir fluid data, including a chemical analysis from the injection zone.

(D) Wellbore diagrams, including cement plugs, and actual or calculated cement fill behind casing of all idle, plugged and abandoned, or deeper-zone producing wells within the area of review and evidence that plugged and abandoned wells in the area will not have an adverse effect on the project or cause damage to life, health, property, or natural resources, such as freshwater or USDW.

(E) The planned well-drilling and plugging and abandonment program to complete the project showing all injection, production, and plugged and abandoned wells, and lease boundaries.

(F) Any reservoir model or simulation model results.

(G) Any other data that, in the judgment of the Division, are pertinent and necessary for the proper evaluation of the underground injection project.

(2) A geologic study, including but not limited to:

_____ (A) Structural contour map drawn on a geologic marker or temperature horizon at or near the top of the injection zone in the project area.

_____ (B) Isopach map of each injection zone and/or subzone in the project area.

_____ (C) At least one geologic cross section through at least one geothermal injection well in the project area.

_____ (D) Representative electric log (or other acceptable geophysical log) to a depth below the deepest producing zone (If not already shown on the cross section), identifying all geologic units, formations, USDW, and freshwater zones.

_____ (E) Any available three-dimensional geologic models.

_____ (3) An injection plan, including but not limited to:

_____ (A) A map showing injection facilities unless located at a power plant.

_____ (B) Maximum allowable surface injection pressure (pump pressure) and daily rate of injection by well. The maximum allowable surface injection pressure shall be a calculated pressure value equal to the true vertical depth of the shallowest portion of the well open to the injection zone multiplied by the difference between the injection gradient and the injection fluid gradient ($MASIP = (IG - IFG) * TVD$). The injection gradient used for this calculation shall be the product of the fracture gradient, multiplied by 0.95, or other multiplier subject to Division approval on a well-specific basis.

_____ (C) Monitoring system or method to be utilized to ensure that no damage is occurring and that the injectate is confined to the approved zone or zones of injection. High temperature geothermal injection projects shall utilize a data acquisition system which collects flow rate, pressure, and temperature at least once every hour.

_____ (D) Method of injection.

_____ (E) List of proposed cathodic protection measures for the wells, if such measures are warranted.

_____ (F) Treatment of water to be injected.

_____ (G) Source and liquid analysis of the injectate.

_____ (H) Location and depth of each freshwater well that is within the project area.

____ (4) Copies of letters of notification sent to offset operators if applicable.

____ (5) All maps, diagrams, and exhibits must be submitted in a digital format acceptable to the Division, must be clearly labeled as to scale and purpose, and shall clearly identify wells, boundaries, zones, contacts, and other relevant data.

____ (6) The operator is responsible for ensuring that the data are current and accurately reflect the project setting and operation throughout the operating life of the project.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, Public Resources Code.

§ 1962. Project Approval.

~~A written approval of a project will be sent to the operator and such approval will contain those provisions specified by the Division as necessary for safe operations. Injection shall not commence until approval has been obtained from the Division.~~

§ 1962. Liquid Analysis.

____ (a) Liquid analysis required under this article shall include testing for all of the following: total dissolved solids; major cations (B, Ca, K, Mg, Na, Fe, Mn); major anions (Br, Cl As HCO₃, As CO₃⁻, As HCO₃⁻, SO₄, OH⁻); total alkalinity and hydroxide; electrical conductance; pH; and temperature.

____ (b) The Division may require testing for additional constituents on a project-specific basis. Any additional constituents shall be listed in the Project Approval Letter for the project.

(c) Liquid analysis required under this article shall be performed by a laboratory that is certified to perform the specific tests required by the State Water Resources Control Board environmental laboratory accreditation program. The performing laboratory shall submit the data and analysis to the Division directly, using a digital format.

~~§ 1963. Notice to Drill New Well or Convert Existing Well.~~

~~Prior to the operator doing work on a well, the appropriate notices must be approved by the Division. Proposals to drill new wells for injection purposes shall be filed on the Division form entitled Notice of Intention to Drill New Well (OGG 105). Proposals to convert existing wells shall be filed on the Division form entitled Rework/Supplementary Notice.~~

~~Bonds and fees are required for all proposed wells. The bonds and fees for an injection well are the same as those required for a development well.~~

~~Injection wells shall conform to the Division's spacing regulations.~~

~~Authority: Section 3714 Public Resources Code. Reference: Sections 3712, 3723, 3724, and 3725 Public Resources Code.~~

~~§ 1964. Subsequent Work.~~

~~A Rework/Supplementary Notice is required for any subsequent work that alters the well casing(s) or changes the use of the well as provided in Section 1966(f).~~

~~Authority: Section 3714, Public Resources Code. Reference: Sections 3724, 3724.2, 3724.3, Public Resources Code.~~

§ 1966. Surveillance Notification, and Testing Requirements.

~~(a) Surveillance of waste water disposal or injection projects is necessary on a continuing basis to establish to the satisfaction of the Supervisor that all water is confined to the intended zone of injection.~~

(a) No geothermal well shall inject above the maximum allowable surface injection pressure, as described in Section 1961, unless the operator demonstrates, and the Division concurs in writing, that a higher maximum allowable surface injection pressure will not cause damage to life, health, property, or natural resources.

~~(b) All new, reworked, or converted geothermal injection wells or wells that have lost their approval to inject, shall demonstrate casing integrity to the Division. When an operator proposes to drill an injection well, convert a producing or idle well to an injection well, or rework an injection well and return it to injection service, the operator shall be required to demonstrate complete casing integrity to the Division by means of a specific test.~~

~~(c) To establish the integrity of the casing, unless already established by testing prior to starting injection or during a workover, and the annular cement above the shoe of the casing, within 30 days after injection is started into a well, the operator shall make sufficient surveys perform a radioactive tracer survey or casing pressure test to demonstrate that all injected fluid injectate is confined to the intended approved zone of injection. Thereafter, such surveys testing shall be made at least performed every two years or more often if ordered by the Supervisor or his or her representative. Alternative testing methods, such as a pressure-temperature spinner survey, may be approved by the Division provided the test method demonstrates that the injectate is confined to the approved zone of injection. All such surveys may shall be witnessed by a Division engineer as defined in the Project Approval Letter.~~

~~(d) After the well has been placed on injection, a Division inspector shall visit the well site periodically. At these times, surface conditions shall be noted~~

~~and, if any unsatisfactory conditions exist, the operator shall be notified of required remedial work. If this required work is not performed within 90 days, the approval issued by the Division shall be rescinded. The Supervisor may order that the repair work be done immediately if it is determined that damage is occurring at a rapid rate. All geothermal injection wells shall be equipped for installation and operation of accurate gauges or recording devices which can indicate and/or record pressure and volume.~~

~~(e) Injection pressures shall be recorded and compared with the pressures reported on the monthly injection reports. Any discrepancies shall be rectified immediately by the operator. A graph of pressures and rates versus time shall be maintained by the operator. Reasons for anomalies shall be promptly ascertained. If these reasons are such that it appears damage is being done, approval by the Division may be rescinded, and injection shall cease. When a need is identified by the Division, the operator shall be notified of required remedial work. Should this work not be performed within the time specified, the operator shall immediately shut in the well until the required remedial work can be completed, or it is determined by the Division that damage is not occurring.~~

~~(f) When an injection well has been idle for two years, the Division may inform the operator, by letter, that approval for use of the well for injection purposes is rescinded. If the operator intends to reclaim the well for injection purposes, a Rework/Supplementary Notice shall be filed proposing to demonstrate by specified tests that the injected fluid will be confined to the intended zone of injection. Injection pressures shall be reported on the monthly injection reports. Any pressure exceeding maximum allowable surface pressure and its suspected cause shall be reported immediately by the operator.~~

~~(g) Approval for use of a geothermal injection well may be suspended by the Division for such reasons, including but not limited to:~~

- ~~(1) Exceeding maximum allowable surface injection pressure.~~
- ~~(2) Failure to perform and submit required injection profile surveys.~~

(3) Failure to demonstrate the mechanical integrity of the well.

(4) If injected fluids surface.

(5) If the Division determines there is risk to life, health, property, or natural resources.

(h) The operator shall cease injection into the affected injection well and immediately notify the Division if any of the following occur:

(1) operator has not performed mechanical integrity testing on the well as required by this Section;

(2) the well failed a mechanical integrity test required by this Section or there is any other indication that the well lacks mechanical integrity or is otherwise incapable of performing as approved by the Division;

(3) There is any indication of a failure, breach, or hole in the tubing, packer, cement, or well casing;

(4) There is visible surface damage or erosion of the well location caused by injection.

Authority: Section ~~3714~~ 3712, Public Resources Code. Reference: Sections ~~3712~~ 3714 and 3741, Public Resources Code.

Article 7. Subsidence.

~~§ 1970. Responsibility.~~

~~The prime responsibility for subsidence detection and abatement in geothermal areas in the State of California lies with the Division of Oil, Gas, and Geothermal Resources.~~

~~§ 1971. Imperial Valley Subsidence Regulations. Subsidence Monitoring Plan.~~

~~(a) Surveys and Bench Marks.~~

- ~~—(1) Subsidence bench marks, at wellsites, tied to existing first- and/or second-order networks, are required for all wells that will be tested or produced. These bench marks shall be the responsibility of and at the expense of the operator. Surveys shall precede extensive production testing of the well.~~
- ~~—(2) All survey work shall be coordinated with the County Surveyor.~~
- ~~—(3) All work shall be done under the direct supervision of a Registered Civil Engineer or Licensed Land Surveyor.~~
- ~~—(4) An adequate series of bench marks shall be set as required by the Division and shall be tied to existing survey nets.~~
- ~~—(5) All field work, computations, etc., shall conform to National Geodetic Survey (N.G.S.) standards. Refer to "Manual of Geodetic Leveling" (1948).~~
- ~~—(6) All surveys shall be second order or better.~~
- ~~—(7) All single point tie-ins shall be double-run. Survey loops between two points on existing surveys may be single-run.~~
- ~~—(8) Equipment shall be equal to or better than that accepted by the N.G.S. for second order surveys. The N.G.S. procedures shall be followed.~~
- ~~—(9) Types of acceptable bench marks are:
 - ~~—(A) Brass rod driven to refusal or 9 meters (about 30 feet) and fitted with an acceptable brass plate.~~
 - ~~—(B) Permanent structure (head walls, bridges, etc.) with installed plate.~~~~
- ~~—(10) Bench marks at wellsites shall be situated so as to minimize the possibility of being destroyed during any subsequent work over activity at the wells. Each bench mark shall be well marked so as to be plainly visible to work over crews.~~
- ~~—(11) Between the wellsite and the network, bench marks shall be set at one-half mile intervals or as specified by the Division.~~
- ~~—(12) Surveys shall be run annually by and at the expense of the operator while well(s) are being produced unless otherwise specified by the Division.~~
- ~~—(13) The adjusted data from all surveys shall be submitted to the Division within 60 days after leveling is completed.~~

~~—(14) Resurveys of the first- and second-order networks shall be coordinated by the Division.~~

~~(b) Reservoir Engineering.~~

~~—(1) Initial bottom hole pressures and temperatures (allowing a minimum of one month static time) shall be submitted to the Division within thirty (30) days of completion of work.~~

~~—(2) All preliminary test data shall be submitted to the Division within 30 days of completion of the tests.~~

~~—(3) Monthly surface recordings of production, injection, temperature, and pressure shall be reported to the Division on the appropriate forms.~~

~~—(4) Periodic development and review meetings between operators and the Division shall be required (at least one per year).~~

—(a) Each operator with a power plant project shall have a subsidence monitoring plan or plans approved by the Division that cover all of the operator's geothermal wells. The subsidence monitoring plan shall:

—(1) describe the benchmarks, methods, and technology to be employed;

—(2) provide for employment of InSAR, or other subsidence survey methods comparable to InSAR approved by the Division, that can detect small-scale surface level changes; and

—(3) provide for monitoring surveys to be performed at least annually.

—(b) The operator shall provide a report to the Division annually, which shall include data collected through the subsidence monitoring surveys and analysis of the surface level changes, if any, including the probable causes of the surface level changes. The monitoring data shall be provided in digital format. The Division may review the data and meet annually with the operator and may revise the subsidence monitoring plan to improve the protection of life, health, property, and natural resources. The Division may prescribe particular actions, such as discontinuing or modifying production or injection, in the event subsidence is detected.

(c) Subsidence monitoring plans for projects existing as of December 1, 2022 shall be submitted to the Division for review and approval no later than December 1, 2023, and for new projects, prior to the commencement of production or injection. If the Division identifies any deficiency in the subsidence monitoring plan, then the Division will consult with the operator and identify an appropriate timeframe for correcting the deficiency.

(d) The operator may submit a subsidence monitoring plan that has been approved by a local permitting agency to comply with the requirements of this section if the Division determines the plan meets the requirements of this section. If the Division determines the plan does not meet the requirements of this section, the Division will consult with the operator and identify an appropriate timeframe for correcting the deficiency.

(e) All work to develop and implement the monitoring plan shall be done by competent professionals and in accordance with the Board for Professional Engineers, Land Surveyors, and Geologists' licensing requirements under the Professional Engineers Act (Business and Professions Code §§ 6700-6799), the Professional Land Surveyors' Act (Business and Professions Code §§ 8700-8805), and the Geologist and Geophysicist Act (Business and Professions Code §§ 7800-7887).

(f) This requirement does not apply to projects that do not utilize geothermal fluids.

Authority: Section 3712 Public Resources Code. Reference: Section 3714, Public Resources Code.

Article 8. Plugging & Abandonment.

§ 1980. Objectives.

The objectives of ~~the plugging and abandonment requirements set forth in this article~~ ~~abandonment plugging~~ ~~are~~ is to block interzonal migration of fluids so as to:

- (a) Prevent contamination of ~~the fresh waters~~ freshwater, USDW, or other natural resources;
- (b) Prevent damage to geothermal ~~reservoirs.~~resources;
- (c) Prevent loss of reservoir energy;
- (d) Protect integrity of geothermal reservoirs; and
- (e) Protect life, health, ~~environment and property,~~ and natural resources.

Authority: Section 3712 Public Resources Code. Reference: Section 3714, 3729, and 3746, Public Resources Code.

§ 1981. Permit to Plug and Abandon. General Requirements.

~~The following are general requirements which are subject to review and modification for individual wells or field conditions. The Division may require the witnessing of any or all of the field operations listed below.~~

(a) ~~Notice of Intention to plug and abandon Geothermal Resources Well, is required for all wells.~~ Plugging and abandonment of a geothermal well shall not commence until the operator has submitted a Notice of Intention to Plug and Abandon to the Division and the Division has either approved the Notice of Intention to Plug and Abandon by issuing a permit to plug and abandon or failed to respond to the Notice of Intention to Plug and Abandon within 10 days of receipt.

(b) ~~History of Geothermal Resources Well shall be filed within 60 days after completion of the plugging and abandonment.~~ Notice of Intention. The

information submitted on the Notice of Intention to Plug and Abandon shall include, if applicable:

_____ (1) The API number of the well;

_____ (2) The field and county in which the well is located;

_____ (3) The operator's name;

_____ (4) The name, title and contact information for the person submitting the Notice of Intention;

_____ (5) The surface location of the well including section, township, range, and base and meridian;

_____ (6) The designation of the well;

_____ (7) A description of the present condition of the well, including

 (A) Total and effective depth;

 (B) Base of USDW, if known;

 (C) Base of freshwater, if known;

 (D) Date of last production or injection;

 (E) Production or injection rate, and well head temperature and pressure as of the date of last production; and

 (F) Complete casing record including plugs, perforations, cementing information, junk-in-hole, casing damage, and well schematic; and

_____ (8) A proposed work plan for the plugging and abandonment, including a description of the cement mixture that will be used.

(c) The Division's Report of Well plugging and abandonment, will not be issued until all records have been filed and the site inspected for final cleanup by a Division engineer. Temporary verbal approval to commence such operations may be granted by the Division when such operations are necessary to prevent a threat to life, health, property, or natural resources. Notwithstanding such verbal approval, the operator shall file, within 48 hours, a Notice of Intention to carry out such operations.

~~(d) Subsequent to the plugging and abandonment of the hole, all casings shall be cut off at least 2 meters (6 feet) below the surface of the ground, all concrete cellars and other structures shall be removed, and the surface location restored, as near as practicable, to original conditions. The landowner has the option to assume legal responsibility for a well; however, to do so he or she must have legal clearance from the Division. Written approval of the Division is required prior to utilizing any well, including a plugged and abandoned well, for anything other than its currently approved purpose, such as conversion to injection, production, or observation, or use as a sacrificial anode in a cathodic protection program.~~

~~(e) Good quality, heavy drilling fluid approved by the Supervisor shall be used to replace any water in the hole and to fill all portions of the hole not plugged with cement. The Division may request additional information about the geothermal well if needed to evaluate the work plan and may require modifications of the proposed work plan as needed to prevent damage to life, health, property, and natural resources. The Division will provide such requests to the operator in writing.~~

~~(f) All cement plugs, with the possible exception of the surface plug, shall be pumped into the hole through drill pipe or tubing. Permit to Plug and Abandon. The operator shall meet all of the conditions listed in the permit to obtain final approval of plugging and abandonment, including completion of activities listed in the Notice of Intention. The operator shall provide the notice specified in the permit to facilitate witnessing as required by permit conditions. The operator shall immediately notify the Division of any change in circumstance or condition that may require a modification to the work plan described in the approved Notice of Intention. The operator shall give the appropriate district office sufficient prior notice as specified in the permit to allow the Division the opportunity to witness these activities.~~

~~(g) All open annuli shall be filled solid with cement to the surface. Expiration of Permit. If operations have not commenced within 24 months of receipt of the Notice of Intention, the Notice of Intention shall be deemed cancelled, the notice shall not be extended, and the cancellation shall be noted in the Division's records.~~

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3716, 3724, 3729, 3747, 3748, and 3749 Public Resources Code.

~~§ 1981.1. Exploratory Well Requirements (No Production Casing).~~

~~(a) Base of fresh waters—a minimum of 30 meters (about 100 feet) of cement straddling the interface or transition zone whether behind casing or uncased.~~

~~(b) Shoe plug (all casing, including conductor pipe) straddle with 30 meters (about 100 feet) of cement.~~

~~(c) Where the well has been drilled with air, a bridge plug shall be placed at the shoe of the surface casing and the bridge plug shall be capped with at least 60 meters (about 200 feet) of cement.~~

~~(d) Surface plug—15 meters (about 50 feet) minimum. May be either neat cement or concrete mix.~~

~~§ 1981.2. Cased Wells.~~

~~Cased exploratory, uncompleted development, former producing and injection wells.~~

~~(a) Geothermal zones—uncased or perforated. Cement plugs shall extend from the bottom of the zone or perforations to 30 meters (about 100 feet) over the top of the zone or perforations.~~

~~(b) Liners. Cement plugs shall be placed from 15 meters (about 50 feet) below to 15 meters (about 50 feet) above liner tops.~~

~~(c) Casing may be salvaged within protection, if first approved by the Division. A minimum overlap of 15 meters (about 50 feet) is required.~~

~~(d) Casing stubs and laps. Cement plugs shall be placed, if possible, from 15 meters (about 50 feet) below to 15 meters (about 50 feet) above top of casing. If unable to enter stub or lap, 30 meters (about 100 feet) of cement shall be placed on the top of the stub or lap.~~

~~(e) Fish, collapsed pipe, etc. Cement plugs shall be squeezed, with the use of a retainer or bradenhead, with sufficient cement to fill across the production zone or perforations and to 30 meters (about 100 feet) above the zone or perforations.~~

~~(f) Base of fresh waters a minimum of 30 meters (about 100 feet) of cement straddling the interface or transition zone, whether behind casing or uncased.~~

~~(g) Shoe plug (all casing, including conductor pipe) straddle with 30 meters (about 100 feet) of cement.~~

~~(h) Where the well has been drilled with air, a bridge plug shall be placed at the shoe of the surface casing and the bridge plug shall be capped with at least 60 meters (about 200 feet) of cement.~~

~~(i) Surface plug 15 meters (about 50 feet) minimum. May be either neat cement or concrete mix.~~

§ 1982. Plugging and Abandonment Operational Requirements.

Operators shall adhere to the following general requirements when engaged in the plugging and abandonment of a geothermal well. The Division may modify these general requirements on a case-by-case basis as needed to achieve the objective of this article.

(a) Blowout Prevention Equipment. Blowout prevention equipment shall be used during plugging and abandonment operations. An inspection by the Division of the blowout prevention equipment will be required as a condition of the permit to plug and abandon. Temperature-gradient wells are exempt from

this requirement, and other wells may be exempted by the Division on a case-by-case basis if the Division determines that the geology and subsurface conditions of the well site make blowout prevention equipment unnecessary.

(b) Cement mixtures used for plugging and abandonment of all geothermal wells, are subject to approval by the Division. All cements used in plugging and abandonment of high temperature wells shall include additive(s) to prevent thermal and chemical degradation of the cement over time and shall possess adequate strength, soundness, resistance to thermal and chemical degradation, and other properties suitable to achieving a competent and permanent connective barrier against infiltration of fluids within the applicable subsurface environment.

(c) Subject to approval by the Division, materials other than cement may be mixed with or replace cement for plugging and abandonment of low-temperature geothermal wells if the materials will prevent the infiltration of detrimental substances across strata.

(d) Lost Radioactive Tool. In the event that during plugging and abandonment a radioactive tool cannot be retrieved from a geothermal well, the operator shall comply with the requirements of Section 1937.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3729, 3739, 3746, and 3748, Public Resources Code.

§ 1983. Specific Plugging and Abandonment Requirements.

Operators shall adhere to all of the applicable requirements of this section when plugging and abandoning a geothermal well. The Division may modify these requirements on a case-by-case basis as needed to achieve the objective of this article.

(a) Plugging of a High-Temperature Geothermal Well. A bridge plug shall be placed at the lowermost casing shoe and the well shall be cemented to surface.

(b) Plugging of a Low-Temperature Geothermal Well. Low-temperature wells shall be plugged from total depth to surface with cement or other material as approved by the Division.

(c) Plugging at Surface. For all geothermal wells, all annuli shall be plugged with cement from the surface to at least 50 feet below the final cut-off depth.

(1) All well casings shall be cut off at least 5 feet but no more than 10 feet below the surface of the ground. As conditions warrant, the Division may approve a different cut-off depth.

(2) A steel plate at least as thick as the surface casing shall be spot welded to the top of the surface casing. The steel plate shall be inscribed with the last five digits of the API well number.

(d) Suspension. A bridge plug shall be placed at the shoe of the production casing and the bridge plug shall be capped with at least 200 feet of cement.

(e) Special Requirements. Where conditions warrant, the Division may set forth additional requirements for the plugging of geothermal wells as needed to achieve the objective of this article. Such conditions may include, but are not limited to:

(1) The plugging of a high-pressure water zone.

(2) The plugging of a USDW zone.

(3) Perforating and squeeze cementing previously uncemented casing within and above a geothermal zone.

(4) The plugging of particular zones or specifying cleanout intervals within a wellbore.

(5) The plugging of casing holes and damaged casing.

(e) After the surface plug has been placed and well casings cut off, the operator shall notify the Division, so the Division may inspect the plugging for

compliance with the requirements of this article and the conditions of the permit to plug and abandon.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3729, 3746, and 3748, Public Resources Code.

§ 1983.1. Junk-in-Hole.

(a) For the purposes of this section “junk” means an object that does not belong in a wellbore at the time of the proposed operation.

(b) The operator shall make efforts to recover junk or pass through damaged casing when such junk or damaged casing may prevent isolation of the production zone and proper plugging and abandonment. The operator shall continue efforts until the Division determines that the risk of continuing to remove the junk or pass through the casing exceeds the benefit.

(c) If the operator demonstrates that removal of junk from a well is infeasible, but the continued presence of the junk unacceptably hinders the safe operation or proper plugging and abandonment of the well, the operator shall:

(1) Down-squeeze cement through or past the junk as necessary to complete plugging below the junk and place a 100-foot cement plug on top of the junk. If cement cannot be down-squeezed through or past the junk, the operator shall place a 100-foot cement plug on top of the junk and complete such other plugging as the Division determines is necessary in order to prevent damage to life, health, property, and natural resources, or

(2) A bridge plug shall be placed at the top of the junk and the remainder of the well filled with cement as described in section 1983, subdivision (a).

(d) Operational and/or surface restrictions, as well as bonding, may be imposed, and a final letter of incomplete abandonment issued, if the well cannot be isolated from geothermal resources and the production zone is not properly isolated below the junk or damaged casing.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3729, 3739, 3746, and 3748, Public Resources Code.

§ 1984. Temperature-Gradient Wells.

(a) The operator of a geothermal project shall notify the Division of the API number (if known) and the surface location of all known temperature-gradient wells drilled prior to the effective date of this section situated within the boundaries of the geothermal lease.

(b) The operator of a temperature-gradient well drilled after the effective date of this section shall plug and abandon the temperature-gradient well within one year from the date that the well is completed.

(c) The Division may, on a case-by-case basis, allow the operator of a temperature-gradient well to postpone plugging and abandonment of the temperature-gradient well if the operator demonstrates a compelling need for continued use of the well.

(d) Temperature-gradient wells shall be plugged from total depth to surface with cement or other material as approved by the Division.

Authority: Section 3712, Public Resources Code. Reference: Section 3714 and 3724.35, Public Resources Code.

§ 1985. Report of Abandonment.

(a) Within 60 days of completion of the plugging and abandonment approved under Section 1981 the operator shall submit to the Division a report of abandonment. The information submitted shall include:

(1) The API number of the well;

(2) The operator's name;

(3) The name, title and contact information for the person submitting the Report of Abandonment;

(4) All operations taken in connection with the plugging and abandonment, including, but not limited to the volume and type of cement, top and bottom of plugs, any junk-in-hole, and damaged casing.

(5) A wellbore diagram showing the final condition of the well.

(b) The Division's final approval of the plugging and abandonment will not be issued until the Division-approved work plan is complete, all applicable requirements of Subchapter 4 have been fulfilled and approved by the Division, and all records have been filed.

Authority: Section 3712, Public Resources Code. Reference: Section 3714, 3716, 3729, 3733, 3735, and 3750, Public Resources Code.