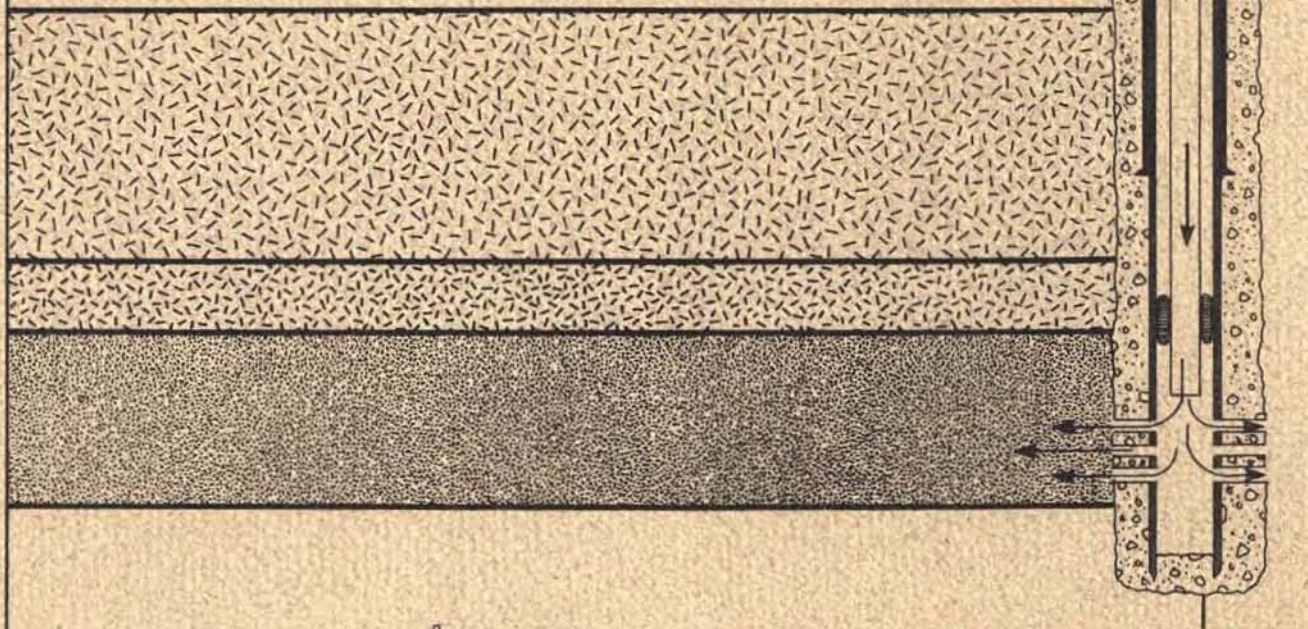


Application for Primacy in the Regulation of Class II Injection Wells Under Section 1425 of the Safe Drinking Water Act

APRIL 1981



State of California
Resources Agency
Department of Conservation
Division of Oil and Gas



State of California

GOVERNOR'S OFFICE
SACRAMENTO 95814

EDMUND G. BROWN JR.
GOVERNOR

916/445-2843

April 20, 1981

Administrator
United States Environmental
Protection Agency
Washington, D. C. 20460

Dear Sir:

The State of California supported the passage in 1980 of H. R. 8117, which added Section 1425 to the Safe Drinking Water Act. This section deals with underground injection wells related to the recovery and production of oil and natural gas (EPA's Class II wells). This recent addition to the Act allows states with programs that effectively protect drinking water sources through the regulation of Class II injection wells to continue their programs in full compatibility with the Safe Drinking Water Act.

The California Department of Conservation, Division of Oil and Gas, has effectively supervised and regulated underground injection activities related to oil and natural gas production for the past 37 years. I therefore request approval of the Division's application for primacy in the supervision of Class II well operations under the Underground Injection Control Program, filed pursuant to Section 1425 of the Safe Drinking Water Act.

The California Department of Conservation's Division of Oil and Gas with the cooperation of the State Water Resources Control Board is willing and able to continue to carry out the program described in the Division's application for primacy.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ed. G. Brown Jr.", with a large flourish at the end.

EDMUND G. BROWN JR.
Governor

APPLICATION FOR PRIMACY IN THE
REGULATION OF CLASS II INJECTION WELLS
UNDER SECTION 1425 OF THE
SAFE DRINKING WATER ACT

The preparation of this application was financed, in part, through an Underground Injection Control Program grant from the U. S. Environmental Protection Agency, Region IX, under the provisions of Section 1442(b)(3)(c) of the Safe Drinking Water Act as amended. The grant was administered by the California State Water Resources Control Board through Interagency Agreement No. 0-099-420-0 with the California Department of Conservation, Division of Oil and Gas.



State of California
Department of Justice
George Deukmejian
(PRONOUNCED DUKE-MAY-GIN)
Attorney General

3580 WILSHIRE BLVD.
LOS ANGELES 90010
(213) 736-2125

April 1, 1981

Administrator
United States Environmental
Protection Agency
Washington, D.C. 20460

Re: Legal Authority of California
Division of Oil and Gas to
Carry Out Class II Injection
Well Program

Gentlemen:

I am a Deputy Attorney General for the State of California whose responsibilities include advising and representing the California Division of Oil and Gas in legal matters. By virtue of these responsibilities I am familiar with Division 3 of the California Public Resources Code, which contains the statutory authority for all of the Division's functions. I am familiar also with Chapter 4 of Division 2 of Title 14 of the California Administrative Code, which contains the regulations adopted by the Division in furtherance of its functions set forth in the Public Resources Code.

I have reviewed the program description being submitted by the California Division of Oil and Gas as part of its application under section 1425 of the Safe Drinking Water Act for primary enforcement responsibility for the control of underground injection related to the production of oil and gas (Class II well injection program). I have concluded that the California Division of Oil and Gas has the legal authority to carry out all aspects of the program described in its application.

Very truly yours,

ALAN V. HAGER
Deputy Attorney General

AVH:mjp

MEMORANDUM OF AGREEMENT
BETWEEN THE ENVIRONMENTAL PROTECTION AGENCY AND
THE CALIFORNIA DIVISION OF OIL AND GAS

UIC PROGRAM
SECTION 1425 - SDWA

The California Division of Oil and Gas (CDOG) of the Department of Conservation and the Environmental Protection Agency (EPA) hereby agree to carry out the terms of the Underground Injection Control Program as listed below. These terms provide a commitment that the CDOG will carry out the program as authorized by Section 1425 of the Safe Drinking Water Act and the EPA will exercise its oversight authority consistent with procedures agreed upon by both agencies.

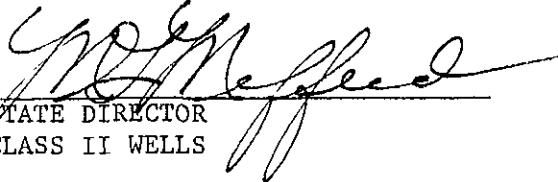
The terms are as follows:

1. The Division of Oil and Gas will carry out the program as described in the application for primacy of Class II wells, and will support the program by an appropriate level of staff and resources to assure that underground sources of drinking water are protected.
2. The Division of Oil and Gas will recognize the Environmental Protection Agency's right to examine any pertinent state files pertaining to underground injection control.
3. The Division of Oil and Gas will participate with the EPA in the inspection of wells or operator records to the fullest extent possible. EPA shall notify the division at least ten days prior to any proposed inspection and EPA shall describe the well(s) or record(s) to be inspected and the purpose of such inspection.
4. The Division of Oil and Gas recognizes EPA's authority to take federal enforcement action under Section 1423 of the Safe Drinking Water Act in cases where the state fails to take adequate enforcement action against a person violating the applicable requirements of the Underground Injection Control Program.
5. The Division of Oil and Gas agrees to provide the EPA an annual report on the operation of the state program, the content of which may be negotiated between the EPA and the Division of Oil and Gas from time to time.
6. Aquifer exemptions for Class II wells will be consistent with aquifer exemptions for the rest of the UIC program.
7. If appropriate and necessary, provisions for implementing a joint processing procedure may be negotiated between the EPA and CDOG for those facilities and activities which require permits from both agencies under different programs.

Memorandum of Agreement Between the
Environmental Protection Agency and
California Division of Oil and Gas
Page 2

8. For any mechanical integrity tests, other than those specified or justified in the program application, the CDOG will notify the appropriate regional administrator and provide enough information about the proposed test that a judgment about its usefulness and reliability may be made.

REGIONAL ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY
REGION IX



STATE DIRECTOR
CLASS II WELLS

Date

CALIFORNIA DIVISION OF OIL AND GAS PROGRAM DESCRIPTION

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Division of Oil & Gas
UIC Program Submittal
Under Section 1425
of the SDWA

3.3. CALIFORNIA CLASS II INJECTION WELL PROGRAM

A. STRUCTURE, COVERAGE, AND SCOPE OF THE PROGRAM

The underground injection of fluids related to Class II injection wells is administered by the Division of Oil and Gas hereafter referred to as the (division) of the Department of Conservation. Section 3106 of the Public Resources Code (PRC) mandates, in part, the division to supervise the drilling, operation, maintenance, and abandonment of all wells (Section 3008, PRC) drilled in California for the purpose of injecting fluids for stimulating oil or gas recovery, repressuring of oil or gas reservoirs, or disposing of waste fluids from an oil or gas field. The division's authority to supervise also covers those Class II wells drilled and operated on federally owned lands.

Furthermore, Section 3106 (PRC) states that the division must supervise in a manner that will prevent, as far as possible, damage to life, health, property, and natural resources; damage to oil and gas reservoirs; loss of oil, gas, or reservoir energy; and damage to underground and surface waters that are suitable for irrigation or domestic purposes.

The division has prepared comprehensive regulations, contained in Title 14, Division 2, Chapter 4 of the California Administrative Code (CAC), that specifically pertain to the requirements that an applicant must comply with before the division will grant approval to begin a subsurface

injection project. References to statutory and regulatory authority of the division are contained within the text of the program description.

A copy of the regulations are attached. However, the procedures and information required by the regulations for project approval are summarized as follows:

The operator requesting approval for an underground injection project must provide to the appropriate division district deputy detailed data that, in the judgment of the division, are pertinent and necessary for the evaluation of a proposed project (Sections 1724.6 and 1724.7, CAC). In addition, the division requires by regulation that the operator submit as part of his application a detailed engineering study that includes a statement of the primary purpose of the project, the reservoir and fluid characteristics of each injection zone, evidence that abandoned wells within the area of review will not have an adverse effect on the project, casing diagrams and plugging information of all wells within the area of review, and the proposed well-drilling and abandonment program that is necessary to complete the project (Section 1724.7 (a), CAC).

Along with the engineering study, a geologic study and injection plan must also be submitted. At a minimum, the geologic study must include a structural and isopach map, a cross section, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones (Section 1724.7(b), CAC).

An injection plan must include a map showing all wells within the area of review that penetrate the injection

interval, and schematics of surface and subsurface injection facilities; anticipated injection pressure and volumes; monitoring systems; method of injection; corrosion protective measures; and the source, analysis, and treatment of the injection fluid (Section 1724.7 (c), CAC).

Additional information can be requested for projects that may be hazardous, large, unusual, or particularly complex (Section 1724.7 (e), CAC).

In instances where an operator desires to change or modify any of the originally approved operating methods or conditions of a project, such as an increase in size, a change of the injection interval, or an increase of the injection pressure, the operator must obtain approval from the division (Section 1724.10 (a), CAC) before any change or modification is made. In addition to specific data required on division forms, sufficient information must be submitted by the operator upon request to properly evaluate the effects of the proposed change or modification (Section 1724.10(b) and (k), CAC).

B. DESCRIPTION OF THE STATE PERMITTING PROCESS

The operator of record is required to submit a complete project plan (as summarized in 3.3 A) to the division district office that has jurisdiction over the project area. Project plans must be signed by the owner or an officer or authorized agent of the company.

Before approving any project to inject fluids, wells within the area of review, including abandoned wells that

might be affected by the project, must be checked for proper casing and plugging to determine if the injected fluids will be confined to the intended zone of injection, and that adjoining operations will not be adversely affected by the project. Documentary evidence must also be provided that notification has been given to neighboring operators.

To perform the evaluations, it is incumbent upon the applicant to submit adequate engineering and geological data with an injection plan. This information will be used in conjunction with extensive geological and engineering data and well records already on file with the division to make the necessary evaluation.

Specifically, after evaluation of the data, projects that are approved by the division are subject to filing, notification, operating, and testing conditions that are required by Section 1724.10 of the regulations (CAC).

The general conditions for a project permit require the applicant to:

1. File notices of intention to drill, redrill, deepen, or rework on current division forms whenever a new well is to be drilled for use as an injection well, whenever an existing well is converted to an injection well (Section 1724.10(b), CAC), and whenever wells within the area of review require remedial work to assure that such wells will not serve as conduits to freshwater aquifers (Section 3203, PRC).

2. Notify the division of any anticipated changes in a project resulting in alteration of the conditions originally approved (Section 1724.10 (a) CAC).
3. File monthly injection reports listing the amount of fluid injected and the surface pressure required for each well (Section 1724.10(c), CAC).
4. Provide a chemical analysis of the fluid injected to the division whenever the source of injection fluid is changed, or whenever such analysis is requested by the division (Section 1724.10(d), CAC).
5. Maintain an accurate, operating pressure gauge or pressure recording chart for use on all injection wells (Section 1724.10(e), CAC).
6. Use injection piping, valves, and facilities that meet or exceed design standards for the maximum anticipated injection pressure and to maintain the equipment in a safe and leak-free condition (Section 1724.10(f), CAC).
7. Equip all injection wells, except steam, air, and pipeline quality gas wells, with tubing and a packer set immediately above the approved zone of injection. Exceptions are allowed based on documented evidence that fresh water will not be degraded (Section 1724.10(g), CAC).
8. Maintain data to show performance of the project to establish that no damage is occurring to life, health, property, and natural resources (Section 1724.10(h), CAC). The data shall be available

for periodic inspection by division personnel.

9. Cease injection if there is evidence of damage or upon written notice of the division (Section 1724.10(h), CAC).
10. Conduct a step-rate test to determine the fracture gradient of the formation before sustained injection occurs. This requirement can be waived if the division determines that injection pressure will be maintained considerably below the pressure estimated to fracture the zone (Section 1724.10(i)).
11. Confirm that the injection fluid is confined to the intended zone of injection by running fluid injection profile surveys within three months after injection begins, at least once each year thereafter, after any significant anomalous rate or pressure changes, or when requested by the division. Typical monitoring surveys include radioactive tracer, spinner, and static temperature. The monitoring schedule can be modified by the division if supported by documented evidence. The district office is to be notified before surveys are made, as they may be witnessed by a division inspector (Section 1724.10(j)).

Additional requirements or modifications of the above requirements may be necessary to fit specific circumstances and types of projects. Some of the example of such requirements are as follows (Section 1724.10(k), CAC):

1. Injectivity tests

2. Graphs of oil, water, and gas production vs. time.
3. Graphs of tubing pressure, casing pressure, and injection rate vs. time for each injection well.
4. Isobaric maps of the injection zone, submitted annually.
5. Notification of any change in waste disposal methods.

It is the duty of the applicant to comply with the permit conditions; however, the right to appeal any order of the division to the Director of the Department of Conservation is provided for in Section 3350 of the PRC. If the order is affirmed or modified by the director, and the applicant fails or refuses to comply with the order, such failure shall constitute a misdemeanor punishable by a fine and/or a jail sentence. Each day's further failure is considered a separate and distinct offense (Section 3359, PRC). Also, the Public Resources Code (Section 3226) provides that if within ten days following the affirmance of the order, the operator does not commence in good faith to perform and comply with the order, then the division will appoint necessary agents who will enter the property and perform the required work. Any expenditures by the division shall constitute a lien against real or personal property of the owner or operator.

C. COMPLIANCE SCHEDULES

Following approval of a project, the operator must submit notices to perform work (applications) on individual wells. Sections 3203 and 3229 of the Public Resources Code

state, in part, that "If operations have not commenced within one year of receipt of the notice, the notice will be considered cancelled." The applicant or operator may request a one year extension by submitting a supplementary notice (Section 1722(f), CAC); but the conditions for its approval are subject to change if geological, regulatory, or environmental factors warrant such change. The operator must also comply with a testing program to confirm that injected fluids are confined to the intended zones of injection. For new injection wells or wells converted to injection, a fluid injection profile survey must be performed and witnessed by a division engineer when the injection has stabilized; and a copy of the survey must be submitted to the division within three months from the start of injection (Section 1724.10(j), CAC). Following the initial survey, a survey must be run and filed with the division once a year thereafter, after any significant anomalous rate or pressure change, or when requested by the division (Section 1724.10(j), CAC).

A monthly injection report (Form OG110B) must be filed within thirty days following each month of injection. The reports list the amount of water or steam injected for each well, the number of days, the well injected, the source of water, the kind of water, and the surface injection pressure. Failure to file the injection report is a misdemeanor (Section 3236, PRC).

If the State Oil and Gas Supervisor orders tests or

remedial work that in his judgment are necessary to protect underground water, the owner or operator must, within thirty days of the order, commence the work ordered and continue it until completion (Section 3226, PRC).

Within 60 days following completion of the well, abandonment, remedial work, or suspension of operations, the operator is required to file a detailed report of all operations. (Section 3215, PRC).

D. TRANSFER OF PERMITS

Transfer of permits is allowed when the buyer of the permitted well or wells agrees to assume and perform the original work plan of the seller and meet conditions imposed by the division. If the buyer wishes to change or modify the work plan or conditions, the buyer (new operator) must submit a new application to the division for evaluation. If circumstances warrant, the division will issue a new permit reflecting the changes and resulting conditions.

The seller must also notify the division within thirty days of any sale, assignment, conveyance, or exchange of any well; and every person who acquires the ownership or operation of any well also must notify the division within thirty days of the transaction. Notification must include the names and addresses of the buyer and seller, name and location of the well, date of acquisition and sale, and a description of the land upon which the well is located (Sections 3201 and 3202, PRC; and Section 1722.1, CAC).

Before any work can be performed on any well and before the seller can be relieved of his obligation to secure the state against any losses, charges, and expenses caused by noncompliance with imposed conditions, the buyer must submit a bond to the division that will cover the obligations covered under the seller's bond. The seller's bond will then be released (Sections 3204 and 3205, PRC; and Section 1722.1, CAC).

E. TERMINATION OF PERMITS

Permits to perform work, such as to drill or abandon a well, as well as permits to redrill, plug, or alter the casing of any well, are automatically terminated if the proposed work has not started within one year of the receipt of the notice (Section 3203, PRC). However, an approval for proposed operations may be extended for one year if the operator submits a supplementary notice prior to the expiration of the one-year period and shows good cause (Section 1722(f), CAC).

Termination of an operating injection project will also occur if there is any evidence of damage occurring as a result of the project, or upon the written notice of the division (Section 1724.10(h), CAC). Resumption of the injection operations will not be allowed until it is demonstrated to the satisfaction of the division that damage will not occur to underground drinking water sources.

F. EMERGENCY PERMITS

Provisions are made to handle emergency situations as expeditiously as possible. For instance, in an emergency

operators are permitted to deviate from the approved basic program without prior written approval of the division (Section 1722(^g/~~f~~), CAC). Unless it is an extreme emergency where time is essential, operators normally obtain verbal approval from the division to perform emergency remedial work; however, a written notice must be submitted to the division as soon as possible to cover the work and conditions agreed upon. Additionally, if the division determines that an emergency exists, the division can order such actions as may be necessary to protect life, health, property, and natural resources (Section 3226, PRC). These actions include the order to repair, plug, or cease injection operations and to perform well tests.

G. AVAILABILITY AND USES OF VARIANCES AND OTHER DISCRETIONARY EXEMPTIONS TO PROGRAMMATIC REQUIREMENTS

Variations from standard freshwater protection measures can be approved when geologic or groundwater conditions dictate. Special plugging procedures are required to prevent the downward percolation of poor quality surface waters that could contaminate useable subsurface waters; to separate zones of varying water quality; and to isolate dry sands that are hydraulic continuity with groundwater aquifers (Section 1723.2(c), CAC).

The division may also set forth other plugging and abandonment requirements or may establish field rules for the plugging and abandonment of wells (Section 1723.8, CAC). When sufficient geologic and engineering information is available from previous drilling or operating history, plugging and abandonment requirements and operating

conditions that differ from those prescribed by regulation can be established as field rules for any oil or gas pool or zone in the field (Sections 1723.8 and 1722(m), CAC). Before establishing or changing a field rule, the division must distribute the rule or change to companies and persons affected by the rule or change and allow thirty days for comments (Section 1722(m), CAC).

Variations can also be granted to the surface casing setting depths and the casing cementing requirements for all casing strings, as long as the requirements are consistent with known geological and engineering conditions (Sections 1722.3(b) and 1722.4, CAC).

H. DESCRIPTION OF THE RULES USED BY THE STATE TO REGULATE CLASS II WELLS

As described in the previous subsection, special "field rules" can be established that deviate from the original requirements when sufficient geological and engineering information is available to indicate that a proposed rule will not cause damage to life, health, property, and natural resources.

Except for the field rules, all well operations must comply with the requirements set forth in the original project approval and to the permit conditions for individual wells, established pursuant to the regulations in Title 14, CAC.

I. TECHNICAL REQUIREMENTS APPLIED TO OPERATORS BY THE STATE PROGRAM

All wells, including Class II, are cased and cemented in a manner consistent with good oilfield practice. Each

well must be equipped with casing designed to provide anchorage to competent strata for the installation of blowout prevention equipment and to seal off formation fluids and segregate them for the protection of all oil, gas, and freshwater zones. All casing strings are required to be designed for the anticipated collapse, burst, and tension forces, with the appropriate design safety factor to allow for a safe operation. Casing setting depths are based upon geological and engineering factors that include the presence or absence of hydrocarbons, and lost circulation intervals; and upon formation pressures, fracture gradients, and depth to the base of fresh waters. (Section 3220, PRC and Section 1722.2, CAC).

For new wells, operators are required to cement conductor casing to a maximum depth of 100 feet, exceptions may be granted if special conditions require a deeper casing depth. As a general rule, surface casing is cemented at a depth of 10% of the proposed depth of the well, with a minimum of 200 feet and a maximum of 1,500 feet of casing. An intermediate string of casing may also be required, in addition to a production string, if it is necessary for the protection of oil, gas, and freshwater zones, or for protection against other drilling hazards (Section 1722.3(c), CAC).

Production casing is cemented and tested for mechanical integrity above the zone or zones to be produced or injected into, or through the zone or zones then selectively perforated. When the production casing is cemented above

the zone, a perforated liner is run and landed opposite the zone. When the production string does not extend to the surface, an overlap of at least 100 feet between the production string and the next larger string is required. The overlap must be cemented and pressure tested to assure there is a competent seal (Section 1722.3(d), CAC).

All the above casing strings are required to be cemented with a sufficient amount of cement to prevent the movement of injected fluids into underground sources of drinking water. Surface casing annular space is cemented from the setting depth to the surface and intermediate and production strings are cemented to at least 500 feet above oil and gas zones and to at least 100 feet above the base of the freshwater zones (Section 1722.4, CAC).

All wells, including newly converted Class II wells are required to have mechanical integrity demonstrated by performing fluid injection surveys to demonstrate that the injected fluids are confined to the zones of intended injection (Section 1724.10(j), CAC).

For the plugging and abandonment of wells, cement plugs are placed across specified intervals to protect oil and gas zones, to prevent the degradation of useable waters, to protect surface conditions, and to protect public health and safety. At the discretion of the division, cement may be mixed with or replaced by other substances having adequate physical properties to provide the required protection (Section 1723(a), CAC).

In addition to the cement plugs, mud fluids having the

proper weight and consistency to prevent movement of other fluids into the well bore must be placed across all intervals not covered by cement plugs (Section 1723(b), CAC). To prevent the degradation of useable waters in uncased wells, the division requires the placement of at least a 200-foot cement plug across all fresh-saltwater interfaces. For cased holes that are cemented across the fresh-saltwater interface, a 100-foot cement plug is required to be placed inside the casing opposite the interface. If there is no cement in the annular space opposite the interface, squeeze-cementing into the annulus is required prior to placing the 100-foot plug inside the case (Section 1723.2(b), CAC).

To establish maximum allowable surface injection pressures, operators are required to perform a rate-pressure test to determine the fracture gradient of the formation into which fluids are to be injected. This requirement can be waived or modified if the division determines that the injection pressure will be maintained considerably below the estimated pressure required to fracture the zone of injection (Section 1724.10(i), CAC).

J. AREA OF REVIEW

Prior to the approval of a project involving injection of fluids, the operator must submit an engineering study that includes casing diagrams indicating the location of cement plugs, and the actual or calculated cement fill behind the casings of all idle, abandoned, or deeper-zone producing wells within the area affected by the

project, and evidence that abandoned wells in the area will not have an adverse effect on the project or cause damage to life, health, property, and natural resources (Section 1724.7(a) (4), CAC). A flood pattern map showing all injection, production, and abandoned wells must also be included with the engineering study (Section 1724.7(a) (5), CAC).

The Division of Oil and Gas will utilize the one-quarter (1/4) mile fixed radius of review as set forth in 40 CFR 146.06(b); and if the appropriate data are available, a radial flow equation as shown in Section 40 CFR 146.06(a) may also be used to determine the zone of endangering influence.

Additionally, to provide the area of review concept a degree of flexibility, specifically known and documented geological features may limit the need to review all the wells within a 1/4-mile radius. This concept will be utilized in conjunction with the fixed radius method.

K. DESCRIPTION OF THE DIVISION PROCEDURES FOR MONITORING AND INSPECTION, AND REQUIRED REPORTING FROM OPERATORS

To detect and remedy injection system failures, all injection wells are monitored by division technical personnel utilizing engineering and geological expertise to provide close technical surveillance. The division's regulatory authority is used to take remedial or corrective measures when warranted.

Monthly injection reports must be filed with the division within thirty days following the month of injection. The

reports must be on an individual well basis and they must indicate the amount of fluid injected, the number of days injected, the surface injection pressure, the source and kind of water and if necessary, the reason why the well did not inject fluid (Section 3236, PRC and Section 1724.10 (c), CAC).

All injection wells must be tested and monitored to ensure that injected fluids are confined to the intended zones. Injection surveys must be submitted to the division within three months after injection begins and annually thereafter. Typical surveys used to monitor injection wells are the radioactive tracer, spinner, and static temperature. The monitoring schedule may be modified if supported by evidence indicating that fresh waters will not be degraded as a result of the modification.

Division inspectors witness the running of the initial survey, and if circumstances warrant, they will also witness the running of surveys that are conducted annually.

Surveys that are not witnessed and reviewed on-site are reviewed by CDOG engineers when the survey is filed with the appropriate district office. If the CDOG reviewer determines the survey to be inconclusive a resurvey may be ordered or other remedial action taken as indicated by the survey review (Section 1724.10(j), CAC).

The operator of any well must keep and submit to the division an accurate record of each operation performed on each well showing chronologically the following data when applicable (Section 1724, CAC):

1. Character and depth of all formations, water-bearing strata, oil and gas zones, lost circulation zones, and abnormal pressure zones encountered.
2. Casing size, weight, grade, type, condition (new or used), top, bottom, and perforations; and any equipment attached to the casing.
3. Tubing size and depth, location of packers, safety devices, and other equipment.
4. Hole sizes.
5. Cementing and plugging operations including date, depth, slurry volume and composition, fluid displacement, pumping pressures, amount of cement fill, and downhole equipment.
6. Drill-stem or other formation tests, including date, duration, depth, pressures, and recovery.
7. Water shut-off, pressure, and lap tests of casings.
8. Sidetracked casing, tools, or other material in the hole.
9. Depth and type of all electrical, physical, or chemical logs, tests, or surveys made.
10. Production or injection method and equipment.
11. Core records showing depth, character, and fluid content.
12. Such other information that the division may require to carry out its mandates.

All the above information is retained by the division on a permanent basis.

Plugging and abandonment operations required for fresh-water

protection are witnessed by division inspectors to assure that the plugs are properly placed. Specifically, division inspectors may witness the placing of the plug in an open hole; however, they are required to witness the location and hardness of all freshwater-saltwater interface plugs (Section 1723.7(d) (1), CAC).

For cementing operations in a cased hole, division inspectors are required to witness all operations that require squeeze-cementing through perforations. If a cavity shot is required, for the purpose of providing a continuous seal behind and inside uncemented casing, inspectors may witness the shooting; however, as in the case of open hole, inspectors are required to witness the location and hardness of the plug across the cavity shot (Section 1723.7(d) (2) and (3), CAC).

Financial responsibility for the plugging of injection wells when abandonment is warranted is managed by several methods in California. An operator may demonstrate financial responsibility by filing an individual bond for each well drilled or a blanket bond covering all well operations.

Individual bonds are normally released after an operator demonstrates to the satisfaction of the division that a well is mechanically sound after the well has injected fluids for a six-month continuous period. Blanket bonds are not normally released until all the operator's wells are abandoned or until the operator specifically requests the release of a well from bond coverage. However, this

release can only occur after the well is demonstrated to be mechanically sound following six months of continuous injection (Sections 3204 & 3205, PRC).

After the release of a bond, the division still has the authority to order an operator to perform remedial or corrective work on a well. The order is issued if, in the judgment of the division, such work is necessary to prevent damage to life, health, property, and natural resources, or to prevent the infiltration of detrimental substances into underground or surface waters suitable for irrigation or domestic purposes (Section 3224, PRC).

If the operator fails to perform the required work, the division can appoint agents to enter the property and perform the necessary work. All expenditures constitute a lien against the real or personal property of the owner or operator (Section 3226, PRC).

The division may also order the abandonment of any well that has been deserted whether or not any damage is occurring or threatened. Removal of the production equipment or facilities is prima facie evidence of desertion (Section 3237, PRC).

A special well abandonment allotment is also available in California for the purpose of abandoning deserted wells when the last known operator is deceased, defunct, or no longer in business in California and the present surface and mineral estate owners did not receive a substantial financial gain from the wells (Section 3250 and 3251, PRC).

L. STATE'S ENFORCEMENT PROGRAM

When the division finds or determines that there is a compliance deficiency or a violation of its rules and regulations, the procedure is to inform the owner or operator immediately of the problem in order to arrive at an expeditious resolution.

If no action is obtained through this procedure within a reasonable time, the division can issue a formal order to the operator to perform the required work. In the absence of an appeal or within thirty days following denial of an appeal, the state can cause the work to be performed by agents of the state if the operator has not made a good faith effort to perform the required work.

Section 3224 (PRC) provides the division authority to order any remedial work that is necessary to prevent damage to life, health, property, and natural resources. And, in accordance with Section 3226, if an emergency situation exists, the division can take any action deemed necessary, which could include the severance of operations to protect life, health, property, and natural resources.

Failure or neglect on the part of any person to comply with any order of the division constitutes a misdemeanor, and each day's further failure or refusal, or neglect is a separate and distinct offense (Section 3359, PRC).

In addition, any owner, operator, or employee of the owner who hinders or refuses to permit the division to inspect a well, causes the delay of the enforcement of division rules and regulations, fails or neglects or re-

fuses to furnish any required report or record is guilty of a misdemeanor (Section 3236, PRC).

The misdemeanor is punishable by a fine of not less than one hundred dollars or more than five hundred dollars, or by imprisonment for not exceeding six months or by both fine and imprisonment (Section 3236, PRC).

The threat of severance or closure of any activity, including an associated production activity, that contributes to the degradation of fresh water is an effective incentive to an operator to correct the problem.

M. AQUIFER EXEMPTION PROCESS

After the division provides a public notice and the opportunity for public hearings, the division will identify and describe those aquifers or portions thereof which the division proposes to designate as an "exempt aquifer." To exempt an aquifer, the aquifer must meet the following criteria which is set forth in 40 CFR 146.04:

1. The aquifer does not currently serve as a source of drinking water; and
2. The aquifer cannot now and will not in the future serve as a source of drinking water because:
 - (a) It is mineral, hydrocarbon, or geothermal energy producing.
 - (b) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical.
 - (c) It is so contaminated that it would be economically

or technologically impractical to render that water fit for human consumption.

A list of the aquifers exempted by the above procedures is attached as part of the state submittal under Section 1425 of the SDWA.

Subsequent to program approval, identification of additional aquifers that qualify for exemption may be made by the division; however, any person who wishes to have an aquifer designated must submit to the division information including detailed maps and supportive data that would justify the proposed exemption. If there is sufficient evidence to indicate that an exemption may be justified, the division will provide notice and opportunity for a public hearing.

N. STATE STAFFING AND RESOURCES

In fiscal year 1981-82, a budget of \$5,328,136 and 133.3 authorized personnel years is proposed for the CDOG to conduct the Oil, Gas, and Geothermal Protection Program. This is an increase of 4 percent in funds and 2 percent in staff over the previous year. Well work is expected to increase about 5 percent (8,000 to 8,400) and the total number of wells to be regulated is expected to increase about 1 percent (78,400 to 79,500). Almost 90 percent of the total resources and staff (\$4,752,280 and 118.8 personnel years) are allocated for the regulation of oil and gas operations, approximately 11 percent of which (\$522,751 and 13.1 personnel years) will be expended for underground injection control associated with such operations. Regulation of oil and gas operations is carried out under the overall direction of the State Oil and Gas

Supervisor and the Chief Deputy. Localized direction is provided by six district deputies (see attached organization chart).

As required by PRC Sections 3103 and 3104, all deputies must be competent engineers or geologists, registered in the state, and experienced in the development and production of oil and gas. Deputies of large districts (Long Beach and Bakersfield offices) are Supervising Oil and Gas Engineers, while those of small districts are Senior Oil and Gas Engineers. Engineering unit supervisors in large districts are also Senior Oil and Gas Engineers.

Associate Oil and Gas Engineers in districts (designated as lead, area, operations, or project engineers on the organization chart) evaluate and permit all projects and operations proposed by oil and gas operators, monitor and study operations, prepare technical and legal directives, and coordinate field investigation. Energy and Mineral Resources Engineers (designated as field engineers on the organization chart) and Petroleum Technical Assistants or Junior Engineering Technicians (designated as field technicians) conduct required tests and inspections on a 24-hour basis, seven days per week. In calendar year 1980, the field staff performed 18,191 of 19,205 required tests and inspections statewide.

Minimum qualifications for oil and gas engineer positions include a degree in geology or petroleum engineering, and/or specific knowledges and abilities, education, and experience in the field of petroleum engineering or geology as follows:

	<u>Years of Work Experience</u>	<u>Years or Management Experience</u>	<u>Total</u>
Supervising Engr.	3+	2	5+
Senior Engr.	4	--	4
Associate Engr.	3(1)	--	3(1)
Energy & Mineral Resources Engr.	0-4	--	0-4

NOTE: (1) Years of required work experience depend upon years of college education completed.

O. OTHER AGENCY INVOLVEMENT

The CDOG has the primary responsibility for controlling Class II well operations in California. The State Water Resources Control Board (SWRCB) has broader responsibility for controlling the quality of California's water resources. An agreement exists between the two agencies, whereby the division provides copies of Class II injection project approval letters and well permits to Regional Water Quality Control Boards. This relationship also allows for unified enforcement action where appropriate.

P. INVENTORY OF CLASS II WELLS

An inventory of Class II wells in California has been completed and supplied to the EPA Regional Administrator through the SWRCB. An updated inventory will be supplied with each annual report to EPA.

Q. REVIEW OF EXISTING CLASS II WELLS

Section 1724.10(h) of the CAC requires periodic review of the performance and safety of existing underground injection projects. Current division policy requires that these project reviews be conducted at least annually. Within this current program practice, all existing Class II

projects in California will be reviewed within 12 months.

R. PUBLIC PARTICIPATION

The policy of the division will be to publish public notices in major California newspapers of wide circulation inviting public review and comment for proposed new underground injection projects, or for substantial changes in the permit conditions of existing projects. Public hearing may be held prior to the issuance of new permits or modifications of existing permits at the discretion of the State Oil and Gas Supervisor. Public response to the published notices will be the prime factor in determining whether a public hearing is warranted.

S. COMPLAINT RESPONSE PROCEDURES

Informal complaints concerning underground injection projects may be made by anyone and are usually made by telephone or in person. These complaints are investigated by the district deputy basically in the same manner as formal complaints. An attempt is made by the district deputy to resolve informal complaints in an expeditious and informal manner whenever possible; however, enforcement action is sometimes required.

Pursuant to PRC Section 3235, a formal complaint must be made in writing by a person owning land or operating wells within a radius of one mile of the well or wells complained against. Upon receipt of a formal complaint, the district deputy proceeds as follows:

1. Gathers and summarizes pertinent information about the subject well or wells from district records.

2. Outlines investigatory actions that will be taken to determine the condition of the well or wells, and the validity of the complaint. This may include interviewing complainant and the well operator(s), reviewing operator records, field inspecting wells and facilities, conducting specific field tests, or taking other surveillance action.
3. Sends the information summary and investigation outline, along with a copy of the complaint, to the State Oil and Gas Supervisor.
4. After consultation with the Supervisor or Chief Deputy, conducts the investigation and makes a written report, including official determination of any conditions to be remedied or repaired, and the procedure and method for such mitigation.
5. Sends a copy of the report to the complainant, the owner or operator of the well or wells, and the State Oil and Gas Supervisor.
6. Follows procedures for taking enforcement action to achieve required abatement of damaging conditions.

T. PAST PRACTICE IN THE USE OF ENFORCEMENT TOOLS

Following is a brief description of some of the CDOG's recent enforcement actions involving underground injection projects.

1. In July 1979, the division's district deputy in Santa Maria held a meeting of the operators of the San Ardo field in Monterey County, to discuss the potential and probability of subsurface contamination of aquifers above

the wastewater-disposal zone, the Santa Margarita sand. The meeting was scheduled because of the high gauge-pressures noted during radioactive tracer surveys of Santa Margarita disposal wells, and other indications of pressure increases in the Santa Margarita.

At the request of the division, the operators agreed to phase out injection into the Santa Margarita, equip two wells for continual pressure monitoring and, if necessary, to dewater the sand through former injection wells. As of February 1981, injection in the affected part of the field has ceased and zone pressures are monitored through the two observation wells. Dewatering is not considered necessary.

2. Although the following case does not pertain to a problem involving an USDW, it illustrates the effectiveness of the CDOG with regard to problems arising from underground injection operations.

In the spring of 1980, it was brought to the attention of the division that Monterey zone injection along the western edge of Cat Canyon field, Santa Barbara County, had a high degree of probability for affecting oil production and development drilling on leases just west of the injectors. The division brought this matter to the attention of the operators of Monterey zone injection wells with a request to show cause

for continued injection or arrange for alternate means of disposing of waste water.

The division's action resulted in: (a) Chevron's installation of a four-mile pipeline to divert the waste water to a waterflood project in another pool; (b) Mobil's shutting in of an injection well on the White lease; (c) Shell's substantiation that no damage was likely to result from injection into the Monterey because of wells nearby producing from the same zone; and (d) Shell's development of a wastewater regeneration project, which should be completed by mid-1981, and a diversion of some injection water to wells less critically located.

3. As a result of a review of injection pressures in wastewater disposal wells, in Cat Canyon field, Santa Barbara County, it was noted that Texaco Inc.'s well WD-3, which was injecting into the Slb sand, had an injection pressure in excess of estimated formation fracturing pressure. The operator was requested to run a pressure falloff survey to determine the approximate pressure conditions in the general area of the injection well. As the static gauge pressure failed to bleed off over a fairly extended period of time, it was concluded that zone pressure was considerably in excess of hydrostatic pressure and that a potential existed for migration of water-up fault planes and into freshwater-bearing strata, or into strata in hydraulic continuity therewith. Consequently, the injection permit was rescinded.

APPENDIX A

Summary Data on:

1. Compliance/noncompliance with the Current State Injection Program
2. Repeat Noncompliance by Operators
3. Well Failure Rates
4. USDW Contamination Cases

Noncompliance of any division requirements related to well injection operations is measured by the division in terms of deficiencies and violations. A deficiency is defined, but not limited to, the failure of a well's mechanical integrity, failure to perform required tests, failure to file data, and those problems caused by injection operations to adjacent wells.

A violation occurs when an operator fails to correct the deficiency within a specified period of time.

As indicated in Table 1, there were 124 deficiencies and 7 violations during 1980.

Of the 131 instances of noncompliance noted during 1980 in Table 2, 72 were either repeat instances at the same well or at different wells. Of the 72, 5 were at the same well and 67 were by the same operator at different wells.

Well failure, or mechanical integrity failure, is one of the primary problems addressed by division engineers during annual injection well reviews. In 1980, packer problems accounted for two-thirds of the mechanical failures. As indicated in Table 3, there were 36 total failures in 22,046 injection wells.

In the last 40 years, CDOG records indicate that 32 cases of possible USDW contamination have occurred as a result of Class II well operations. Discovery of these cases resulted mostly from CDOG surveillance work, but also resulted from citizen and well operator complaints. In all but one case, the elapsed time from discovery to correction was within one year. Information on the cases are summarized in Table 4. Detailed information can be obtained from district offices.

TABLE 1

NONCOMPLIANCE SUMMARY - 1980

TYPE OF NONCOMPLIANCE	NUMBER OF DEFICIENCIES AND VIOLATIONS						STATE TOTAL
	DISTRICTS						
	1	2	3	4	5	6	
Excessive Injection Pressure	52	--	2	--	--	--	54
Interference	--	--	3	--	--	--	3
No Packer	5	--	--	--	--	--	5
Mechanical Failure - Casing	1	--	--	2	1	1	5
Mechanical Failure - Tubing	--	--	--	3	1	--	4
Mechanical Failure - Packer	7	--	1	9	3	--	20
Mechanical Failure - Shoe	--	--	--	1	--	--	1
Mechanical Failure - Cement	3	--	--	--	2	--	5
Mechanical Failure - Inj. Line	--	--	--	1	--	--	1
No Injection Survey	--	26	6*	--	--	--	32
Data Filing	--	--	1*	--	--	--	1
TOTALS	68	26	13	16	7	1	131

* Violations

REPEAT DEFICIENCIES AND VIOLATIONS BY OPERATORS - 1980

NUMBER OF TIMES REPEATED

TYPE OF DEFICIENCY OR VIOLATION REPEATED	OPERATOR (EDP CODE)													STATE TOTAL	
	A2450	A4500	C5650	E3500	G1300	T0500	L2500	M6900	S3100	S7200	T1600	T2900	U0200		W1700
1. SAME WELL: Excessive Injection Pressure Faulty Tubing	1						2			1				1	4 1
TOTAL	1						2			1				1	5
2. DIFFERENT WELLS: Excessive Injection Pressure Interference	7		1 1	2			5		2	6	10	7			40 1
No Packer Faulty Packer	1	6							2				1		1 9
Faulty Cement No Injection Survey					4	2		2			1 2		5		1 15
TOTAL	8	6	2	2	4	2	5	2	4	6	13	7	6	0	67
GRAND TOTAL	9	6	2	2	4	2	7	2	4	7	13	7	6	1	72

WELL FAILURE SUMMARY - 1980

TYPE OF FAILURE	NUMBER OF WELL FAILURES						
	DISTRICTS						STATE TOTAL
	1	2	3	4	5	6	
Casing-----	1	--	--	2	1	1	5
Tubing-----	--	--	--	3	1	--	4
Packer-----	7	--	1	9	3	--	20
Shoe-----	--	--	--	1	--	--	1
Cement-----	3	--	--	--	2	--	5
Injection Line-----	--	--	--	1	--	--	1
TOTAL FAILURES	11	0	1	16	7	1	36
TOTAL INJECTION WELLS*	2,431	691	1,474	16,651	771	28	22,046
FAILURES PER 100 WELLS	0.5	0	0.1	0.1	0.9	3.6	0.2

* Active and shut down as of November 1980.

USDW CONTAMINATION CASES BY DISTRICT, 1940-1980

NOTE: Operators listed below are not necessarily the operators of the wells when the contamination incident occurred.

DIST. NO.	FIELD	OPERATOR(S)	WELL(S)	YR. DISCOVERED	CAUSE
1	El Segundo	Apex Petroleum Corp., Ltd. & Sovereign Oil Corporation	#2	1941	Improper practice
			#3	1941	Improper practice
	Long Beach	Hancock Oil Company	#1	1958	Cement failure
	Richfield	Texaco Inc.	#YW-9	1980	Cement failure
2	Placerita	Crown Central Petroleum Corporation	"KPM" #17	1979	Casing hole
3	Cat Canyon, East Area	Occidental Petroleum Corporation	"Williams B" 2	1973	Cement failure
	Cat Canyon, West Area	Mobil Oil Corporation	"Los Flores A" #3-21	1977	Casing failure
	San Ardo, North Area	Mobil Oil Corporation	"Rosenberg" #803X-35	1977	Casing failure
		Mobil Oil Corporation	"Rosenberg" #801-35, 802X-35, 803X-35, 828X-35, and 872X-35	1979	Excessive zone pressure
4	Canfield Ranch, East Gosford Area	Gulf Oil Corporation	"Statex-KCL" #7313	1970	Casing hole
	Greeley	Chevron U.S.A. Inc.	"KCL Lease 11" #59	1958	Casing and tubing holes
	Kern Bluff	Crestmont Oil & Gas Company	"Union-Miller" #4	1975	Casing hole
	Mountain View, Arvin Area	Buttes Resources Company	"George" #19	1971	Cement failure
	Tejon, Central Area	Gulf Oil Corporation	"OMB" #16 C-33 W.I.	1979	Casing hole
	Tejon, Western Area	Gulf Oil Corporation	"Tejon Ranch" #525-5	1978	Casing failure
	Ten Section, Main Area	Shell Oil Company	"KCL-A" #61-30	1968	Cement failure
			A-5		

TABLE 4 (CONTINUED)

APPENDIX A

USDW CONTAMINATION CASES BY DISTRICT, 1940-1980

NOTE: Operators listed below are not necessarily the operators of the wells when the contamination incident occurred.

DIST. NO.	FIELD	OPERATOR(S)	WELL(S)	YR. DISCOVERED	CAUSE
4	West Bellevue	Angora-Verde Corporation	#82-32	1970	Casing hole
5	Helm	Mobil Oil Corporation	"Noble" #56-5	1958	Casing split
		Mobil Oil Corporation	#868X-5	1969	Cement failure
		Samson Resources Compnay	"WR" D-1	1968	Casing hole
		Samson Resources Company	"California Lands, Inc." #D65-15	1969	Casing and tubing holes
		Samson Resources Company	"Helm Unit" #D8-36	1969	Tubing hole
		Samson Resources Company	"Steines" #D1-23	1979	Casing and tubing holes
	Raisin City	Crown Central Petroleum Corporation	"Eagle-Sunset" #10	1957	Cement failure
		Crown Central Petroleum Corporation	"Properties, Inc." #37-18	1980	Cement failure
	Riverdale	H. L. Cullivan	"Sunland-Brown" #2	1980	Packer failure and casing hole
		Samson Resources Company	"Young" #D74-16	1958	Casing hole
		Samson Resources Company	"Young" #D74-16	1971	Casing and tubing holes
		Samson Resources Company	"Young" #D74-16	1980	Casing and tubing holes
		West Side Rentals	"U.C.L." #D-5	1974	Packer leak and casing hole
	Southeast Burrel	Case & Schwabenland	"McCarthy" #D-1	1968	Casing hole
			A-6		

USDW CONTAMINATION CASES BY DISTRICT, 1940-1980

NOTE: Operators listed below are not necessarily the operators of the wells when the contamination incident occurred.

DIST NO.	FIELD	OPERATOR(S)	WELL(S)	YR. DISCOVERED	CAUSE
5	Southeast Burrel	Oakwood Petroleum Corporation	"U.C.L." #D-1-8	1978	Casing hole
6	Grimes Gas	Atlantic Oil Company	"NL&F" #1	1980	Casing failure

APPENDIX B

Exempted Aquifers

Table 1

Pages B-1 to B-10 - Nonhydrocarbon-Producing Aquifers

Pages B-11 to B-45 - Maps Indicating Lateral Limits of
the Nonhydrocarbon-Producing Aquifers

Table 2

Pages B-46 to B-47 - Hydrocarbon Producing

Pursuant to 40 CFR 122.35(b), the Division of Oil and Gas provided notice and opportunity for a public hearing to consider comments regarding the exemption of certain aquifers from the provisions of the Safe Drinking Water Act. In addition to publication in a journal specializing in legal affairs, the notice was published twice in each of five different newspapers that have wide circulation in the oil- and gas-producing areas of California.

The proposed aquifer exemptions, or portions thereof, are either hydrocarbon-bearing or are currently being used for underground injection of oil- or gas-field waste water.

Except for the interest shown by two oil companies in knowing which aquifers were being designated for exemption, no other comments were received during the 15-day comment period. Because of the lack of comments, the holding of a public hearing was considered to be not warranted.

Pursuant to the criteria in 40 CFR 146.04 and the provisions of 40 CFR 122.35, the Division of Oil and Gas has identified those aquifers which are hydrocarbon producing. The hydrocarbon-producing aquifers are shown in Volumes I and II of "California Oil and Gas Fields", published by the California Division of Oil and Gas. The two volumes are included as part of this application for primacy.

The aquifers, or the portions thereof, are identified in each volume by shading the exempted aquifers on the maps and cross sections. The exempted portions are also described in terms of the average depth, thickness, and geologic age on the page opposite each map under the heading of "PRODUCING ZONES".

For the fields discovered after December 1973, maps and cross sections are not included as part of the application. However, a separate list (Table 2, pages B-46 to B-47) has been included to indicate the hydrocarbon-producing zones of these new fields that should be exempted.

Other aquifers (nonhydrocarbon producing) which are currently being used for injection of oil- or gas-field waste water are identified in Table 1, pages B-1 to B-10. Each aquifer is described in terms of depth, thickness, lateral extent, and geologic age. The lateral extent of the exempted aquifers normally coincide with the oil- or gas-field administrative boundaries designated by the Division of Oil and Gas, as shown on the accompanying maps.

For additional information concerning the aquifer exemption, see page 22 of the Program Description.

TABLE 1

Exempted Aquifers

Nonhydrocarbon Producing Zones Being Used for
Waste Water Disposal

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Belmont Offshore	Repetto (Pliocene) BP, R, S, T, Fo and F sands	Extends throughout the field	2,670-2,850	340-640	The S and T sands are productive in the Tar Zone of Wilmington field to the northwest.
Huntington Beach	Lakewood (Pleistocene) Alpha I & II	Confined to northeast portion of field by the Newport-Inglewood fault and Santa Ana River channel fill	70-100	100	These zones appear to out- crop underneath the ocean to the southwest.
Sawtelle	Puente (Miocene)	Extends throughout field	3,120	988	This is a highly faulted area.
Seal Beach	Repetto (Pliocene)	The only known lateral limit is the Seal Beach fault to the northeast	3,860	620	
	Recent sands	These sands cover an extensive area along the coast and inland to the Central Basin	40-60	10-40	These sands outcrop under- neath the sea, or are thinly covered by sedi- ments.
Wilmington, Fault Block II, III, IV, V	River channel gravels (Holocene) Gaspar aquifer	Extends between Ford Avenue and the Los Angeles River	80	100	This zone has been degraded by seawater intrusion and by perco- lation of oil field brines. The water is now used only for industrial purposes.

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Ramona	Pico marine strata (Pliocene) basal sand	Extends throughout field	+ 153	200	Sand thickens to west
So. Tapo Canyon	Pico marine strata (Pliocene)	Covers southwest part of field	+ 829	70	
Oat Mountain	Undiff. marine strata (Miocene)	Covers Section 19 & Southwest 1/4 Section 20, T. 3N., R. 17W.	+1,143	2,200	
Simi	Sespe nonmarine strata (Oligocene)	Area north of C.D.L.B. Fault, Alamos Area	+ 347	400	Part of injection interval may be in first oil zone.

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Guadalupe	Knoxville (Cretaceous or older)	Extends throughout the field	-4,100	750	This formation is basement and is of regional extent.
Lompoc	Lospe (Miocene)	Extends throughout the field	-2,700	150	This formation is just above basement; might be of regional extent.
	Knoxville (Cretaceous or older)	Extends throughout the field	-1,500	250	This formation is basement and is of regional extent.
Russell Ranch	Branch Canyon (Miocene)	Extends over the southern 2/3 of the field	+ 100	400	
San Ardo	Santa Margarita (Miocene)	Extends throughout the field	- 900	100	There appears to be a permeability barrier between north and south portions of field
	Monterey (Miocene) "D" sand	Extends throughout the field	-1,200	30	
	Monterey (Miocene) "E" sand	Extends throughout the field	-1,300	100	
Santa Maria Valley	Lospe-Franciscan (Miocene)-(Cretaceous or older)	T. 10N., R. 33W., S.B.BM, Sections 19, 20, 21, 28, 29, 30, 32 & 33	-1,800	800	These formations are basement and are of regional extent
Monroe Swell	Santa Margarita (Miocene)	Extends throughout the field	- 800	150	
Point Conception	Camino Cielo (Eocene)	Extends throughout the field	-4,500	450	Formerly Matilija
Guadalupe	Franciscan (Cretaceous or older)	Extends throughout the field	-5,700	1,000	This formation is basement and is of regional extent.

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Bellevue	Etchegoin (Pliocene)	Extends throughout the field	3,474	128-477	
Bellevue, West	Tulare-Etchegoin (Pleistocene) (Pliocene)	Both aquifers extend throughout the field	2,725 (Tulare) 4,370 (Etchegoin)	75 (Tulare) 138-550 (Etchegoin)	
Blackwells Corner	Tumey (Oligocene)	Extends throughout the field	1,473	40	Truncated by angular unconformity about 1/2 mile northwest of field.
Buena Vista	Tulare (Pleistocene)	Extends throughout the field	538	190-1,111	
Cal Canal	Tulare-San Joaquin (Pleistocene)	Extends throughout the field	1,505	693	Gradual thinning trend toward the southwest.
Canfield Ranch	Etchegoin (Pliocene)	Extends throughout the field	3,212	613-1530	
Coles Levee, North	Tulare (Pleistocene)	Extends throughout the field	1,470	434	
	San Joaquin (Pliocene) Etchegoin (Pliocene)	Extends throughout the field	2,688	187-743	
Coles Levee, South	Tulare-San Joaquin (Pleistocene) (Pliocene)	Both aquifers extend throughout the field	2,189	1,171	
Greeley	Etchegoin (Pliocene)	Extends throughout the field	2,802	260-2,277	
Kern Bluff	Kern River (Plio-Pleistocene)	Extends throughout the field	200	150	
	Vedder (Oligocene)	Extends throughout the field	4,607	166	

NON-HYDROCARBON PRODUCING ZONES BEING USED FOR WASTE WATER DISPOSAL

TABLE 1

District 4

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Kern Front	Santa Margarita (Miocene)	Extends throughout the field	2,548	650	
Kern River	Chanac (Miocene to Pleistocene)	Extends throughout the field	1,100	568	
	Santa Margarita (Miocene)	Extends throughout the field	1,698±	325-515	
	Vedder (Miocene)	Extends throughout the field	4,850	136-375	
Lakeside	San Joaquin (Pliocene)	Extends throughout the field	3,360	30	
Los Lobos	Tulare (proposed) (Pleistocene)	Extends throughout the field	1,950±	1,550±	
Midway-Sunet	Alluvium (Holocene)	Extends throughout the field	399	125-252	
Mount Poso	Walker (Eocene-Oligocene)	Covers northeast half of field	1,939 (top of Vedder)	656-661	Injected only in combination with the laterally interfingered Vedder, which extends throughout the field.
Mountain View	Kern River (Pliocene)	Extends throughout the field	2,680	1,320±	
Pleito	Chanac (Pleistocene)	Extends throughout the field	2,756	634	
	Kern River (Pliocene)	Extends throughout the field	3,272	384	

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Poso Creek	Vedder (Oligocene)	Not penetrated in southwest portion of field but believed to extend throughout the field	3,640	95	
Rio Viejo	San Joaquin (proposed) (Pliocene)	Extends throughout the field	5,400	225	
Rosedale	Etchegoin (Pliocene)	Extends throughout the field	3,767	181	
Round Mountain	Olcese (Miocene)	Extends throughout the field	450	290-1050	Fault bounded 1 1/2 miles east of field limits, and pinches out 5 miles west of field limits,
	Walker (Eocene-Oligocene)	Extends throughout the field	2,300	270-702	
Seventh Standard	Etchegoin (Pliocene)	Extends throughout the field	3,580	1,101-1,353	
Strand	Etchegoin (Pliocene)	Extends throughout the field	3,015	70-355	
	San Joaquin (Pliocene)	Extends throughout the field	3,090	732	
Ten Section	San Joaquin (Pliocene)	Extends throughout the field	2,298	397-1,027	

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Burrel	Santa Margarita (Miocene)	Extends throughout field	4,500	575	
	Tulare-Kern River Undiff nonmarine strata (Pliocene)	Extends throughout field	1,650	4,700	BFW \pm 1,000'
Southeast Burrel	Tulare-Kern River Undiff nonmarine strata (Pliocene)	Extends throughout field	1,800	4,700	BFW \pm 1,300'
Coalinga	Santa Margarita (Miocene)	Extends throughout all but west edge of field	Sur to 1,500	0-150	No Class I water in field
	Etchegoin-Jacalitos Undiff (Pliocene)	Extends throughout all but west edge of field	Sur to +500	0-1,500	
Gill Ranch Gas	Zilch (Miocene)	Extends throughout field	2,700	550	BFW \pm 500'
Guijarral Hills	Etchegoin-Jacalitos Undiff (Pliocene)	Extends throughout field	1,400	3,300	BFW \pm 1400' Top of injection zone 3,100'
Helm	Santa Margarita (Miocene)	Extends throughout field	4,600	400-700	
	Tulare-Kern River Undiff nonmarine strata (Pliocene)	Extends throughout field	1,800	\pm 3,000	BFW \pm 1,100'
Jacalitos	Etchegoin-Jacalitos Undiff (Pliocene)	Extends throughout field	<1,000	<3,000	BFW \pm 550' Top of injection zone \pm 1,700
Kettleman North Dome	San Joaquin-Etchegoin (Pliocene)	Etchegoin extends throughout field; San Joaquin is limited to the outer edges	1,000	6,500	No fresh water present

NON-HYDROCARBON PRODUCING ZONES BEING USED FOR WASTE WATER DISPOSAL

TABLE 1

District 5

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Raisin City	Undiff. nonmarine strata (Pliocene)	Extends throughout field	1,800+	2,200+	Base of fresh water is 900'. Injection is into various sands at various depths.
	Santa Margarita (Miocene)				
Riverdale	Undiff. nonmarine strata (Pliocene)	Extends throughout field	1,625	4,000	Base of fresh water is 1,300'. Injection into various sands at various depth.
	Santa Margarita (Miocene)		4,500		
San Joaquin	Undiff. nonmarine strata (Pliocene)	Extends throughout field	1,300	800	Base of fresh water is 900'. Injection is into various sands at various depths.
San Joaquin Northwest	Basal McClure (Miocene)	Extends throughout field	5,000	40	Base of fresh water is 900'. Well was used only for testing, then shut-in and later abandoned.
Turk Anticline	San Joaquin (Pliocene)	Extends throughout field	2,650	400	Base of fresh water is 2,500'. Injection into separate sands at various depths.

Field	Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Bunker Gas	Undiff. nonmarine strata (post Eocene) lowermost sands	Extends throughout field	2,900-3,100	100	Base of fresh water approximately 2,350'.
Grimes Gas	Kione (Late Cretaceous) upper and middle sands	Extends throughout field	3,000-4,000	500	Kione is major producing formation in northern Sacramento Valley and con- tains gas in adjacent fields.
Grimes, West, Gas	Kione (Late Cretaceous) intermediate sand	Extends throughout field	3,300-3,800	600	Kione is major gas producing formation in northern Sacramento Valley and con- tains gas in adjacent field.
La Honda (South Area)	Vaqueros (Miocene) intermediate member	Covers southwestern portion of field	1,400-2,000	250	Portion of formation could be productive in field.
Lathrop Gas	Starkey (Lake Cretaceous) intermediate sand	Covers western quarter of field	4,000-4,500	100	Starkey is major gas pro- ducing formation in fields to the north.
River Break Gas	Capay (Eocene) Second Capay sand	Confined to middle por- tion of Section 24, T. 2N., R. 2E., M.D.B.&M.	4,900-5,000	150	
Roberts Island Gas	Undiff. nonmarine strata (post Eocene)	Extends throughout field	500-1,000	>500	Injection through surface string annuli with all shoes below 490'. No fresh water below 100'.
Sutter Buttes Gas	Kione (Late Cretaceous)	Confined to south- western portion of field	1,200-2,800	700	Kione is major gas producing formation in northern Sacramento Valley and con- tains gas in adjacent fields.

NON-HYDROCARBON PRODUCING ZONES BEING USED FOR WASTE WATER DISPOSAL

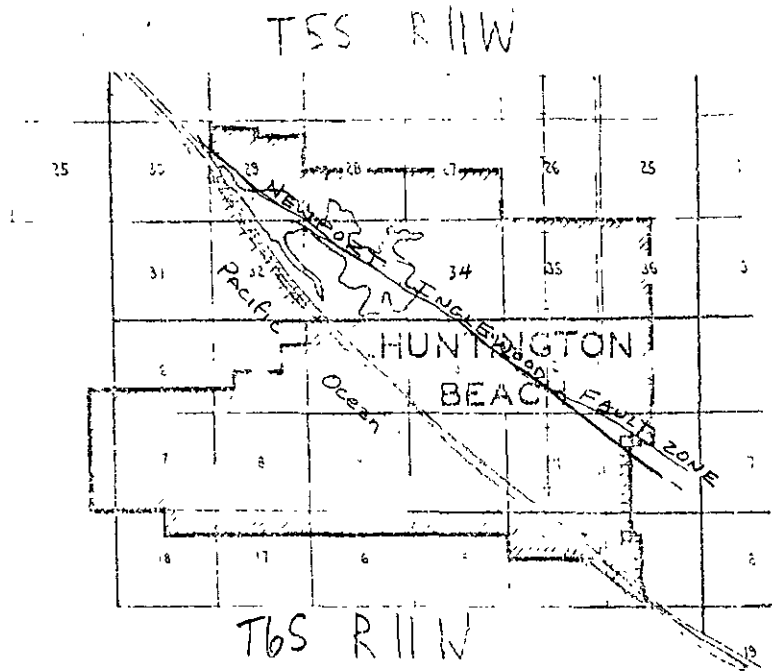
TABLE 1

Formation & Zone	Lateral Limits	Depth to Top (feet subsea)	Thickness (feet)	Remarks
Mokelumne River (Late Cretaceous) Third Massive zone	Confined to east side of Stockton Arch fault	4,500-5,300	500	Third Massive is major producing zone in fields to north and west.
Undiff marine and Ione (Eocene)	Extends throughout field	1,400-1,700	650	Domengine (Ione equivalent) is major gas producing for- mation in fields to south.

sheet 1

HUNTINGTON BEACH OIL FIELD - Dist 1

Orange County

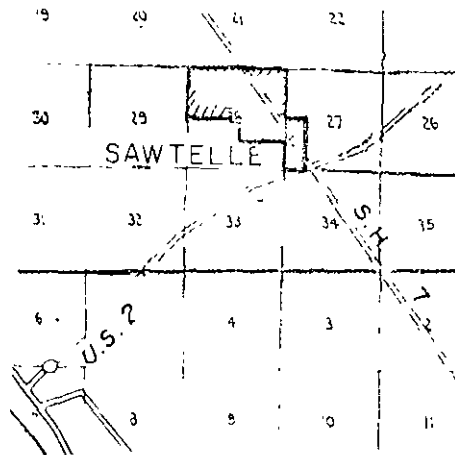


District 1

SAWTELLE OIL FIELD - Dist. 1

Los Angeles County

T1S R15W



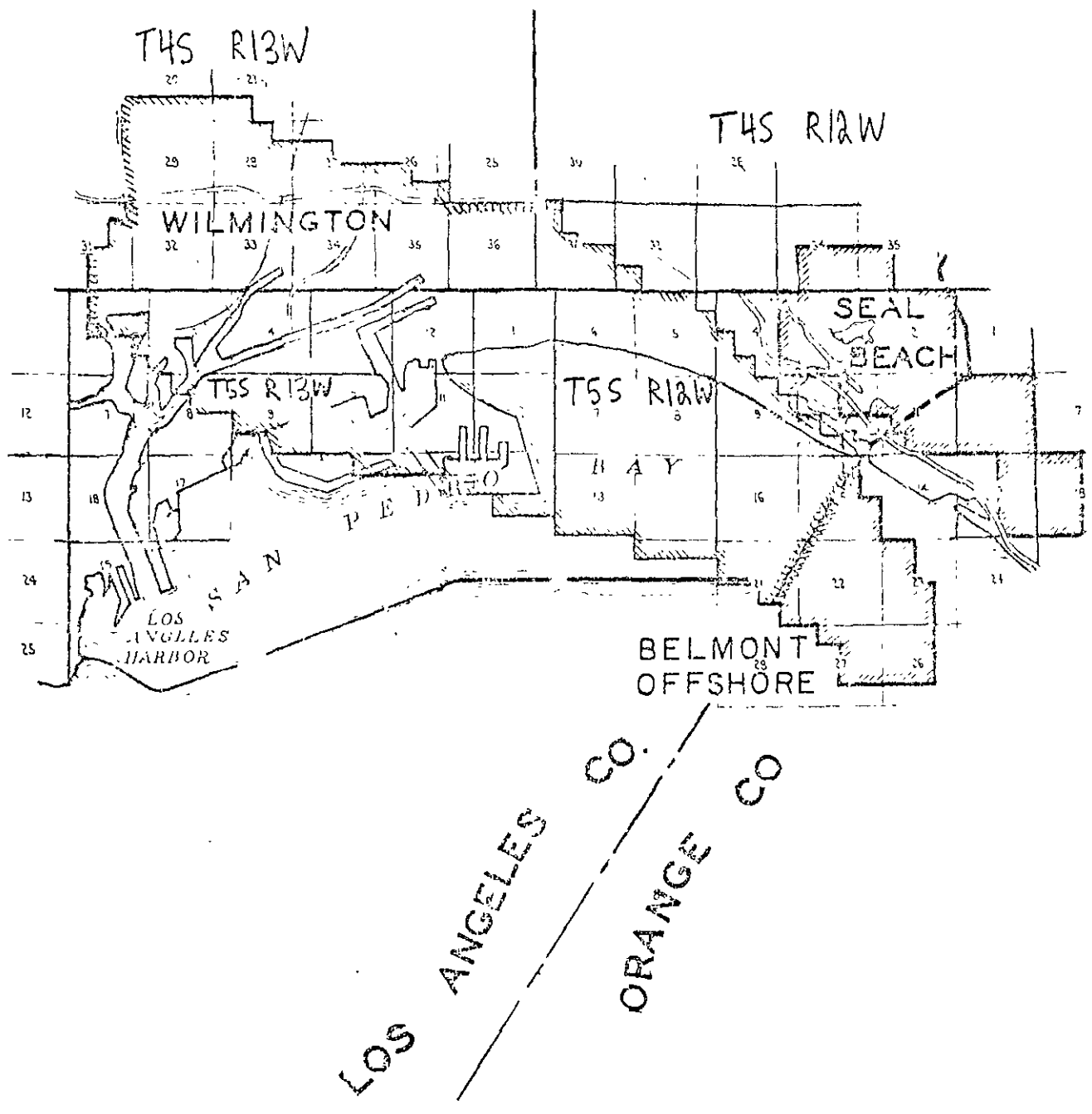
T2S R15W

Sheet 1

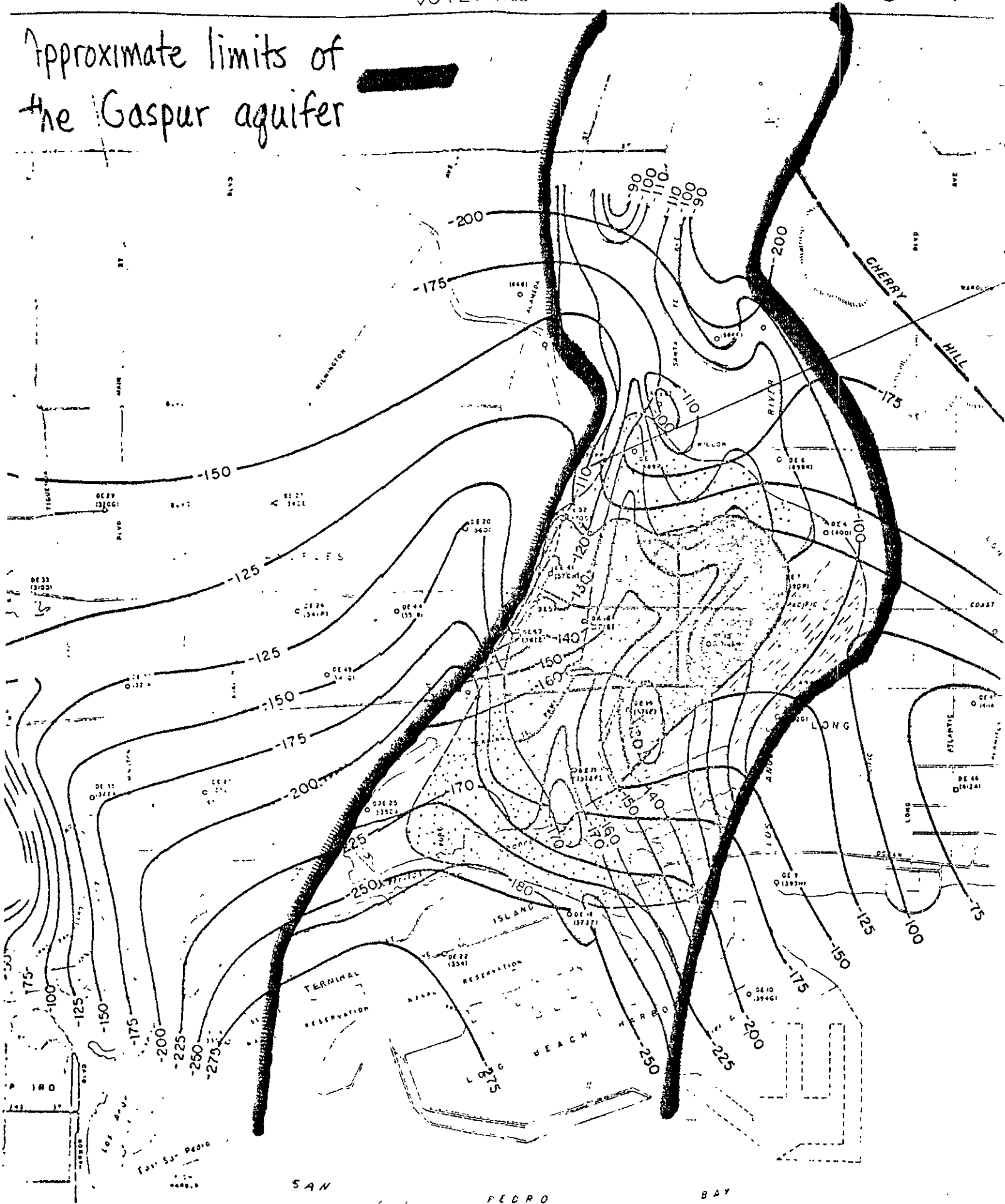
WILMINGTON, SEAL BEACH, and BELMONT OFFSHORE OIL FIELDS

Dist 1

Los Angeles and Orange Counties



Approximate limits of
the Gaspar aquifer

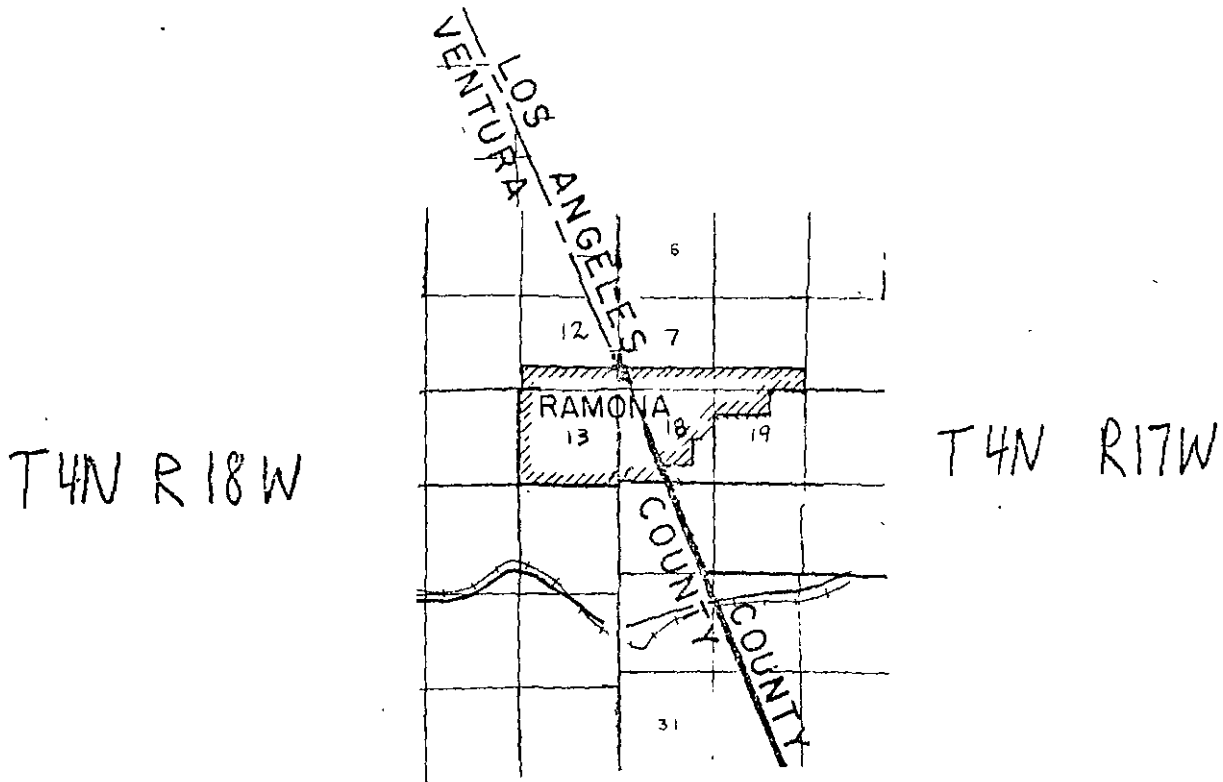


District 2

RAMONA OIL FIELD

Los Angeles and Ventura Counties

Dist 2

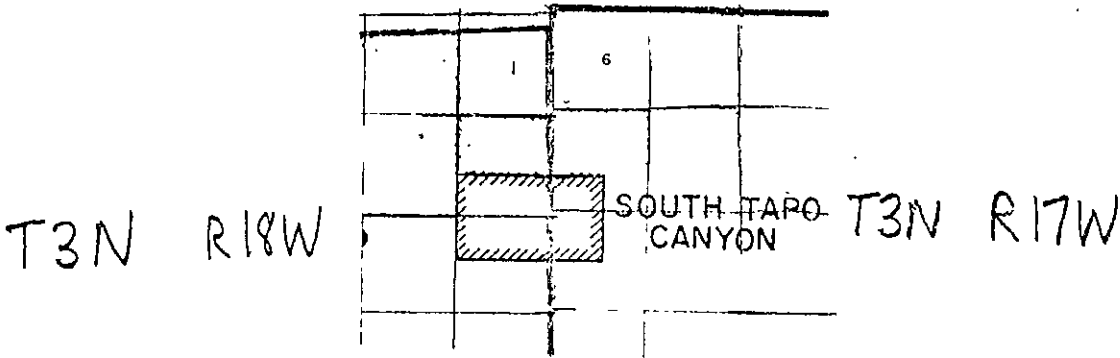


District 2

SOUTH TAPO CANYON OIL FIELD

Dist 2

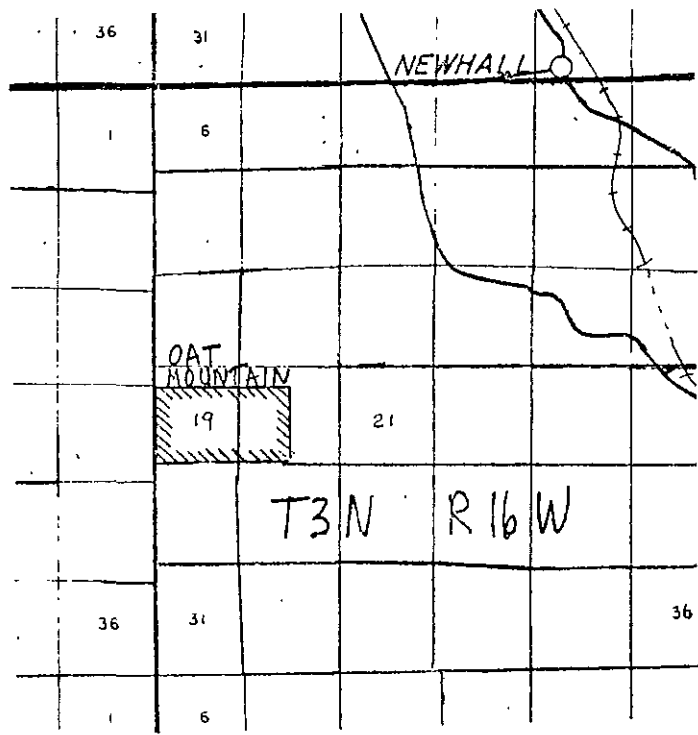
Ventura County



District 2

OAT MOUNTAIN OIL FIELD Ventura County

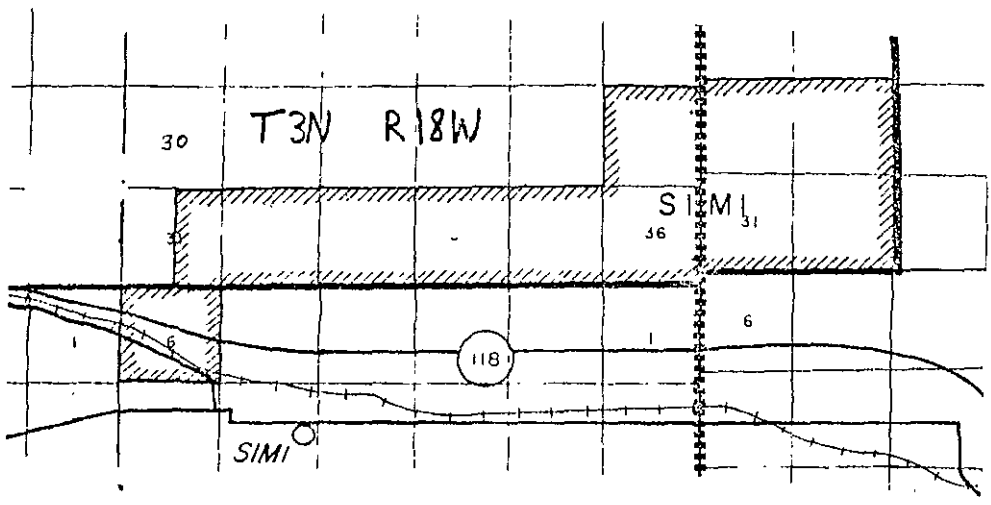
Dist. 2



District 2

SIMI OIL FIELD Ventura County

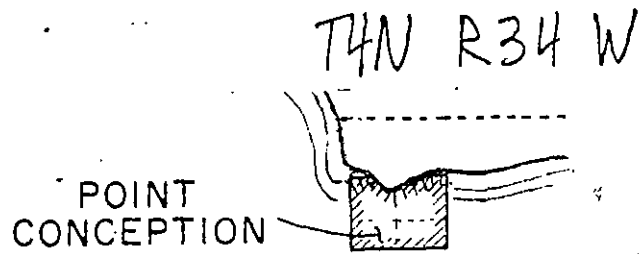
Dist 2



District 3

POINT CONCEPTION OIL FIELD Santa Barbara County

Dist. 3

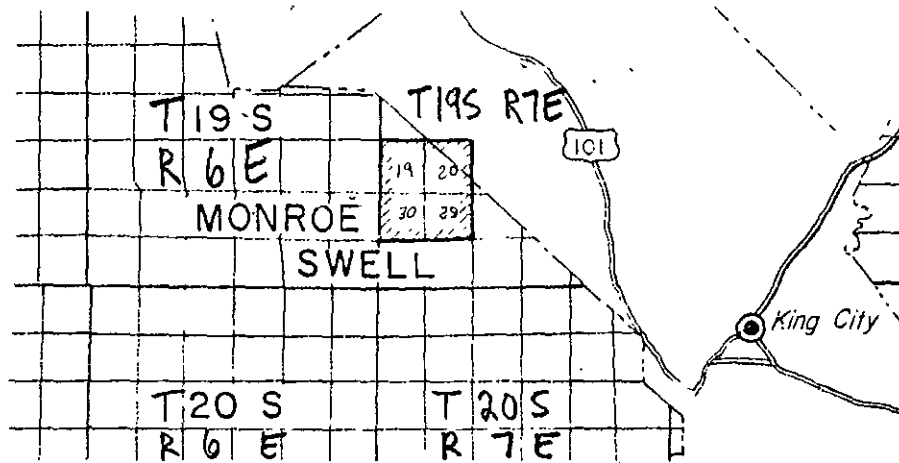


1 sheet 3

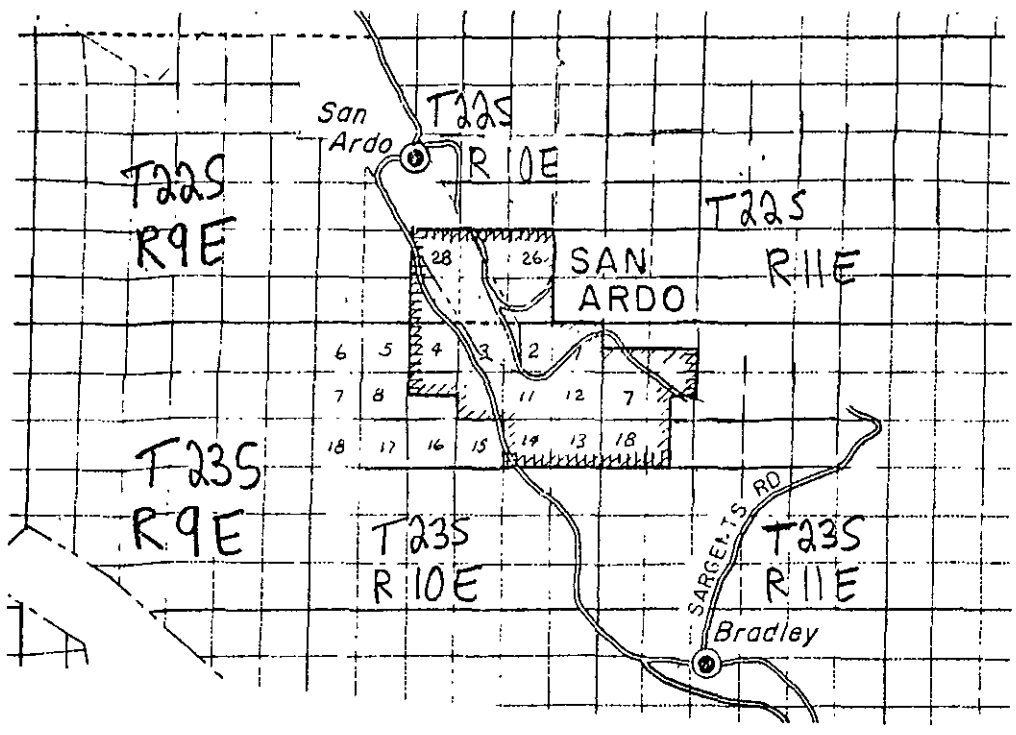
MONROE SWELL OIL FIELD

Dist 3

Monterey County

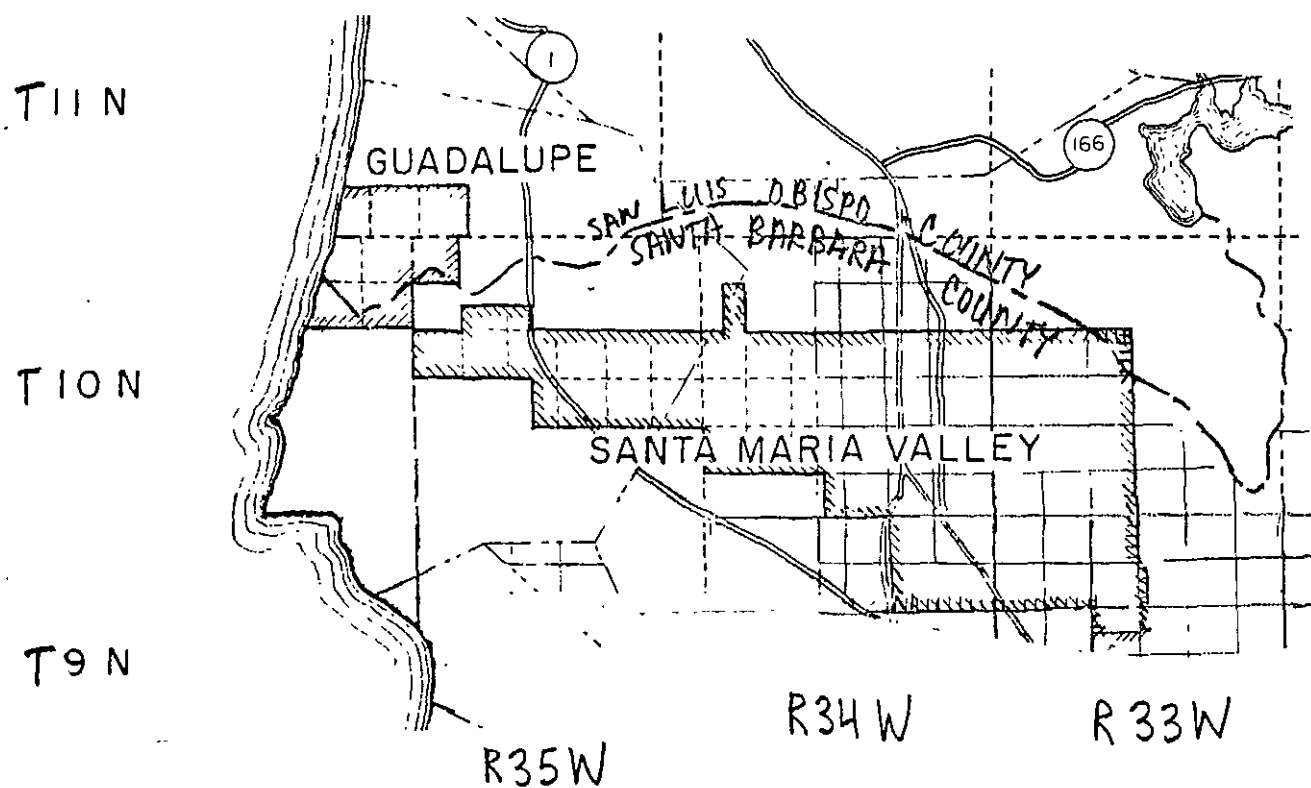


SAN ARDO OIL FIELD Monterey County



GUADALUPE and SANTA MARIA VALLEY OIL FIELDS

San Luis Obispo and Santa Barbara Counties

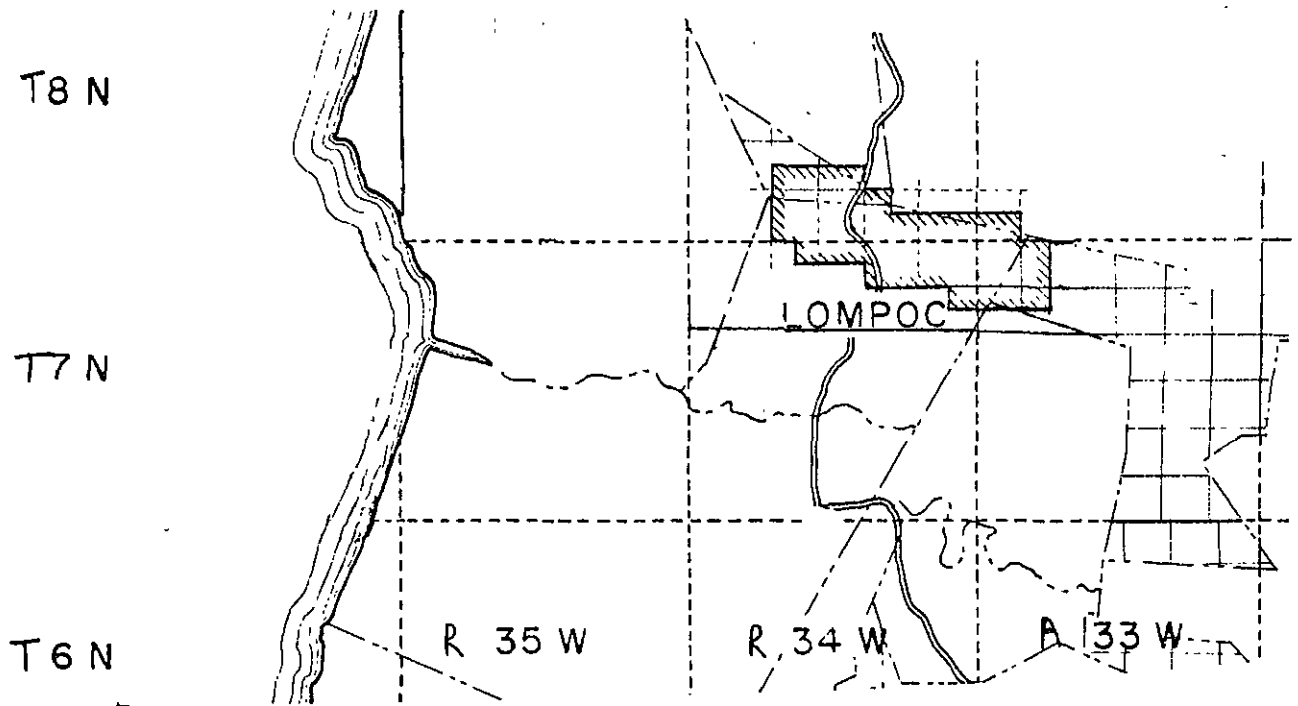


1 sheet 3

LOMPOC OIL FIELD

Santa Barbara County

Dist 3

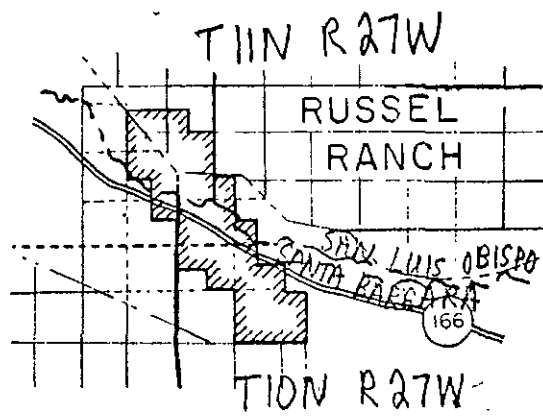


Dist 3

RUSSEL RANCH OIL FIELD

Dist 3

San Luis Obispo and Santa Barbara Counties

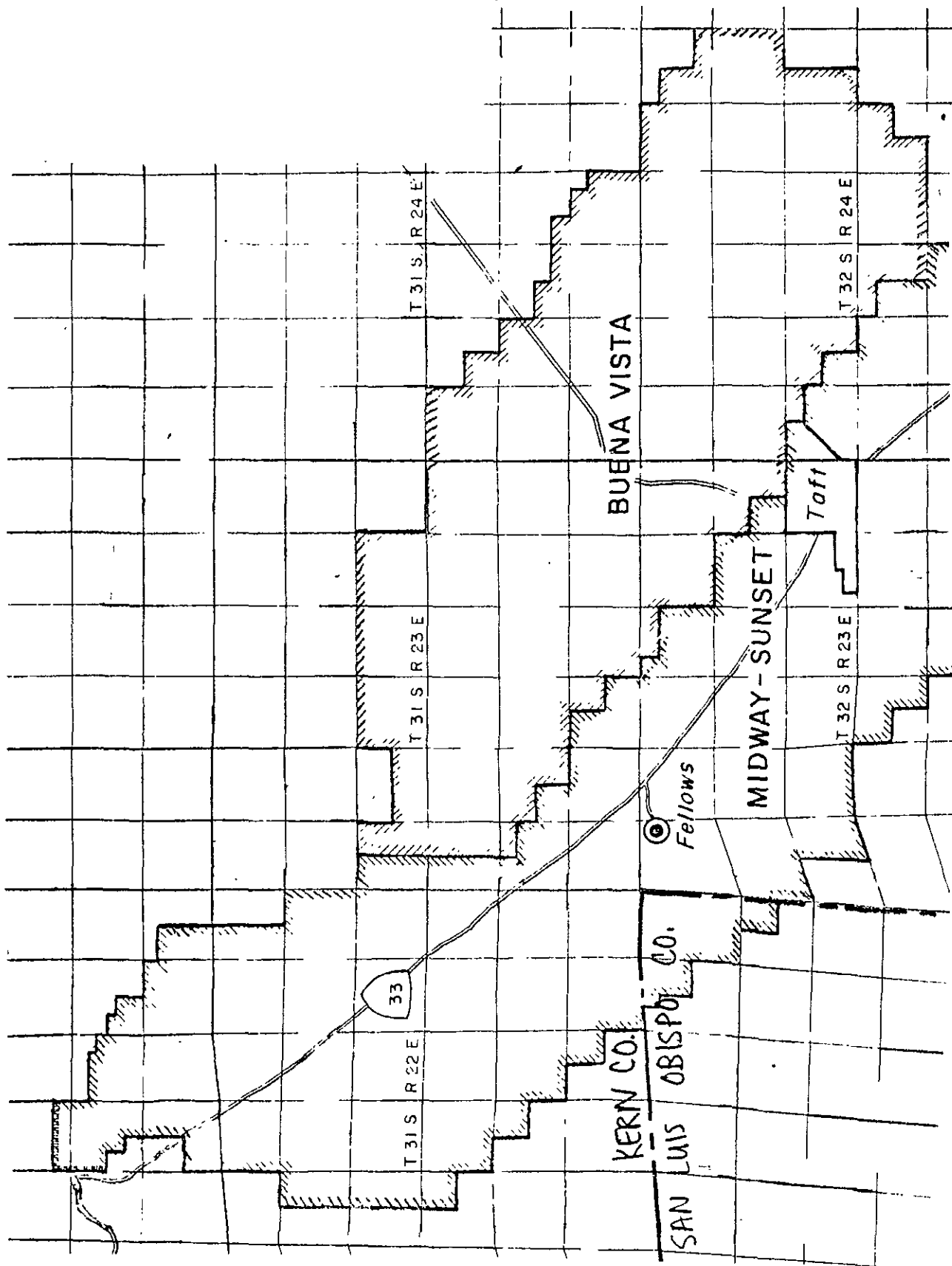


Sheet 4

BUENA VISTA and north MIDWAY SUNSET OIL FIELDS

Dist 4

Kern and San Luis Obispo Counties

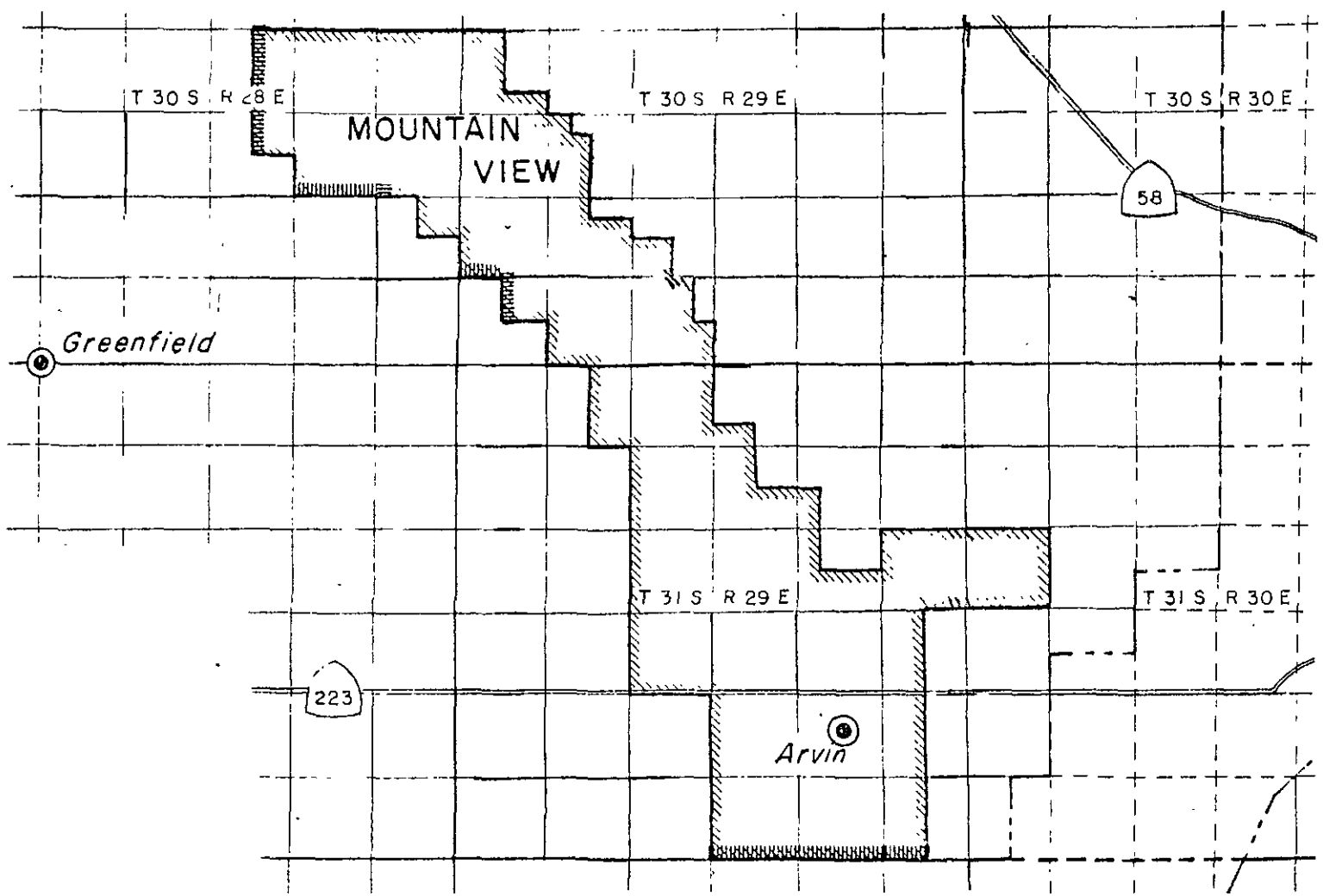


Sheet 4

MOUNTAIN VIEW OIL FIELD

Kern County

Dist 4

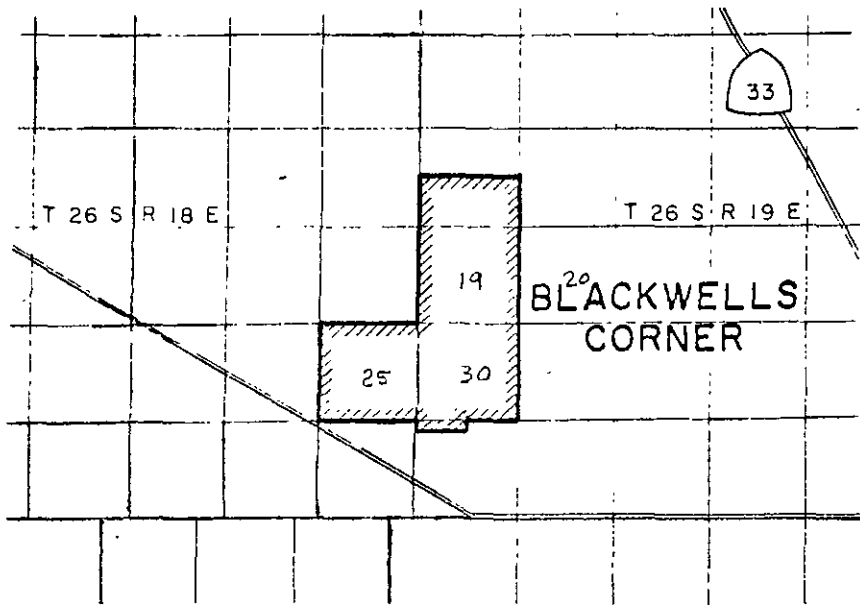


District 4

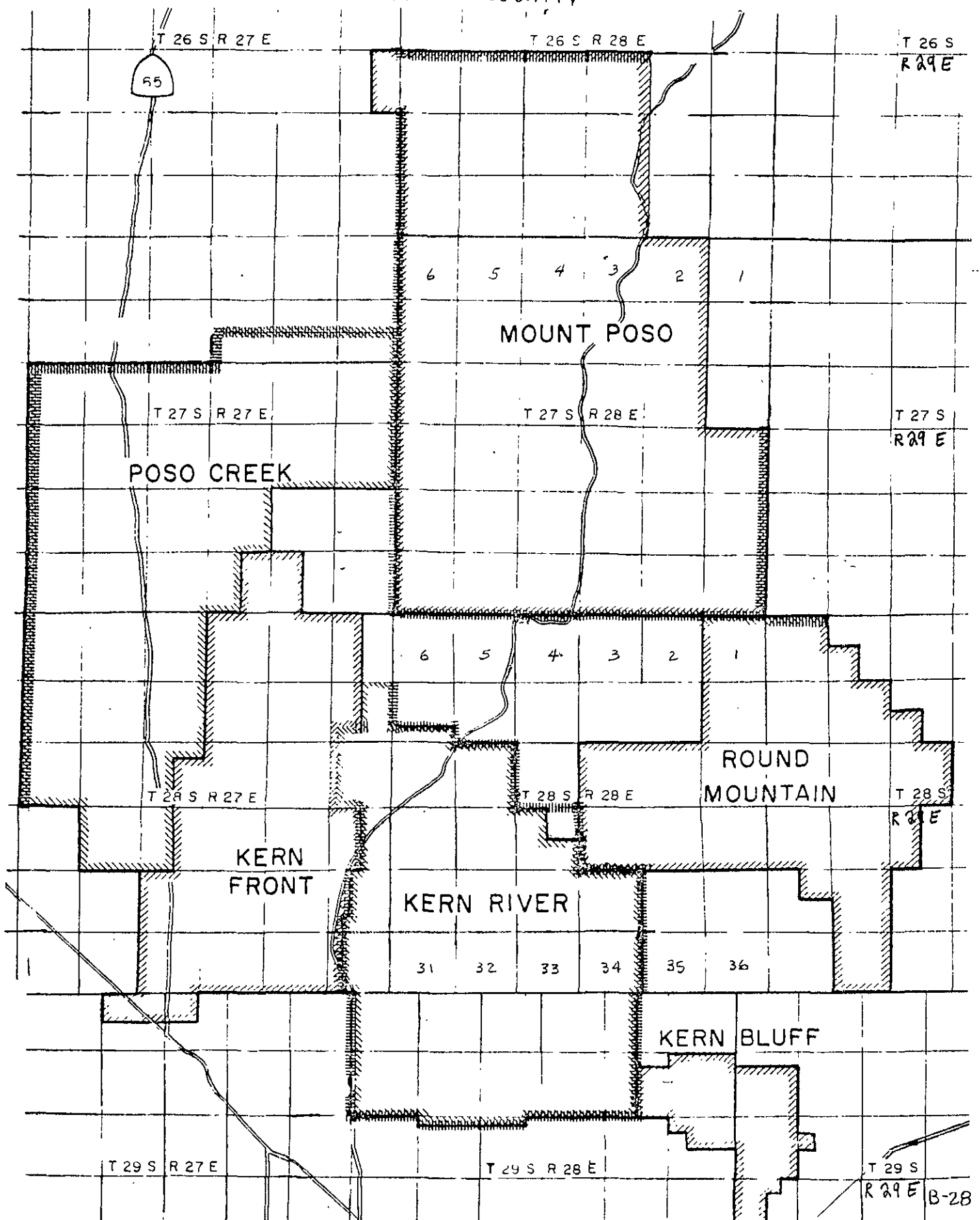
BLACKWELLS CORNER OIL FIELD

Dist 4

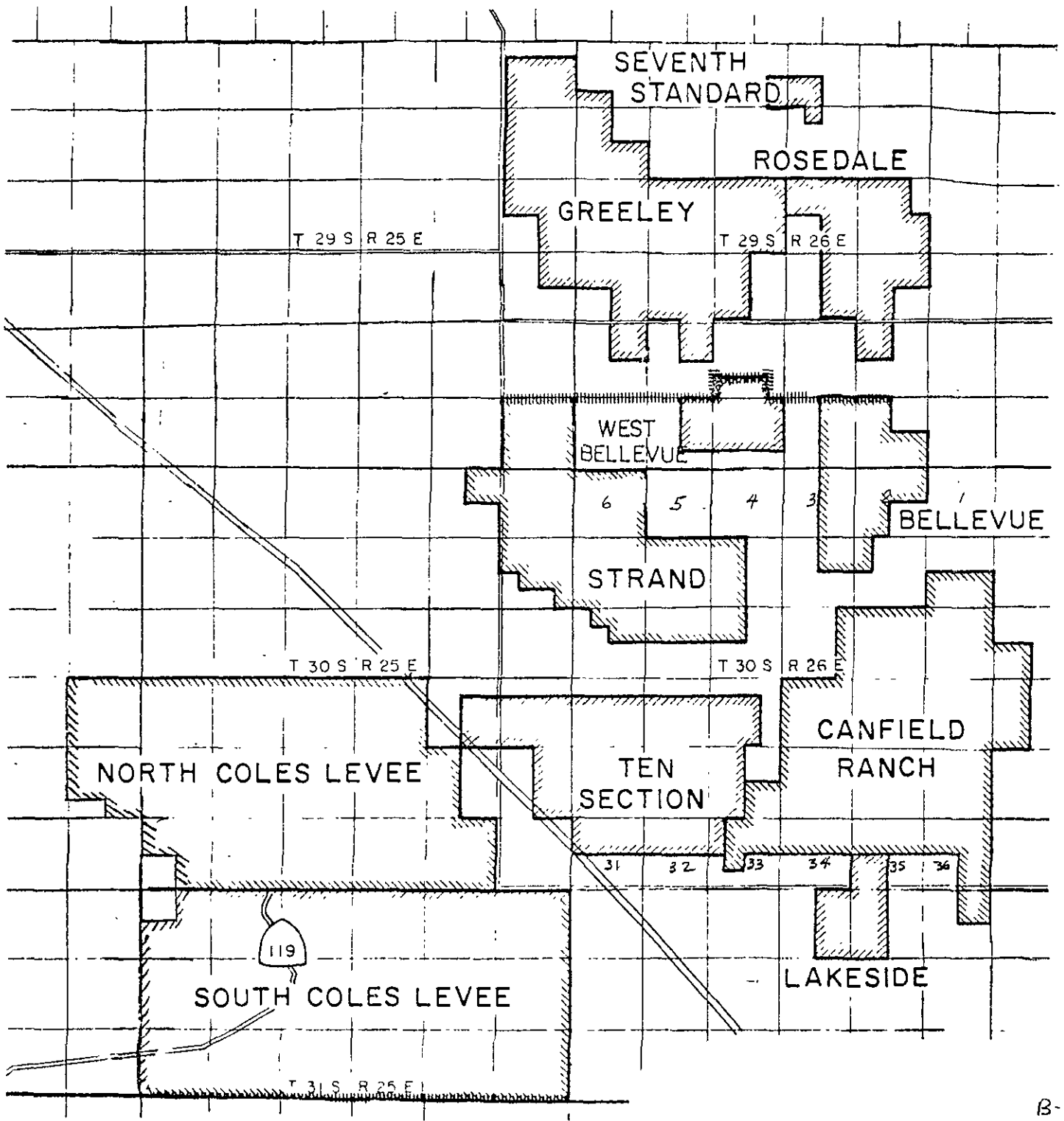
Kern County



Dist 4 KERN BLUFF, KERN FRONT, KERN RIVER, MOUNT POSO,
 POSO CREEK, and ROUND MOUNTAIN OIL FIELDS
 Kern County Dist 4



District 4
 BELLEVUE, WEST BELLEVUE, NORTH COLES LEVEE,
 SOUTH COLES LEVEE, CANFIELD RANCH, GREELEY,
 LAKESIDE, ROSEDALE, SEVENTH STANDARD, STRAND
 AND TEN SECTION OIL FIELDS
 Dist 4
 Kern County

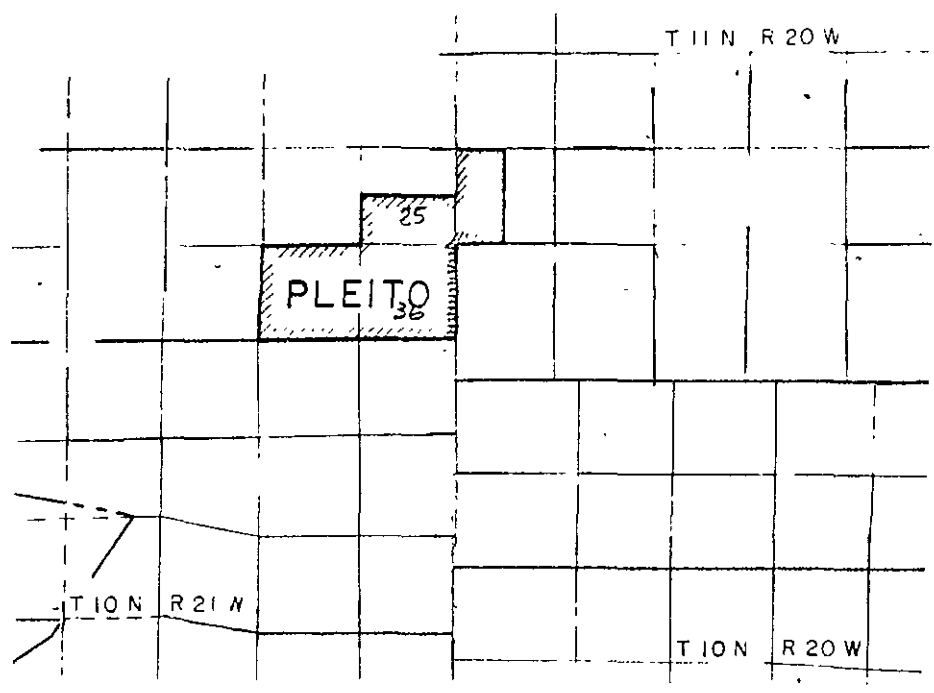


Tract 4

PLEITO OIL FIELD

Dist. 4

Kern County

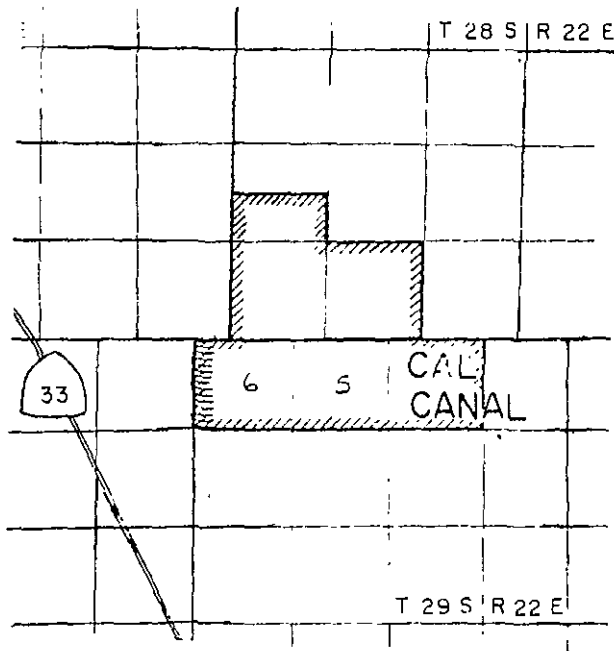


1. lot 4

CAL CANAL OIL FIELD

Dist 4.

Kern County

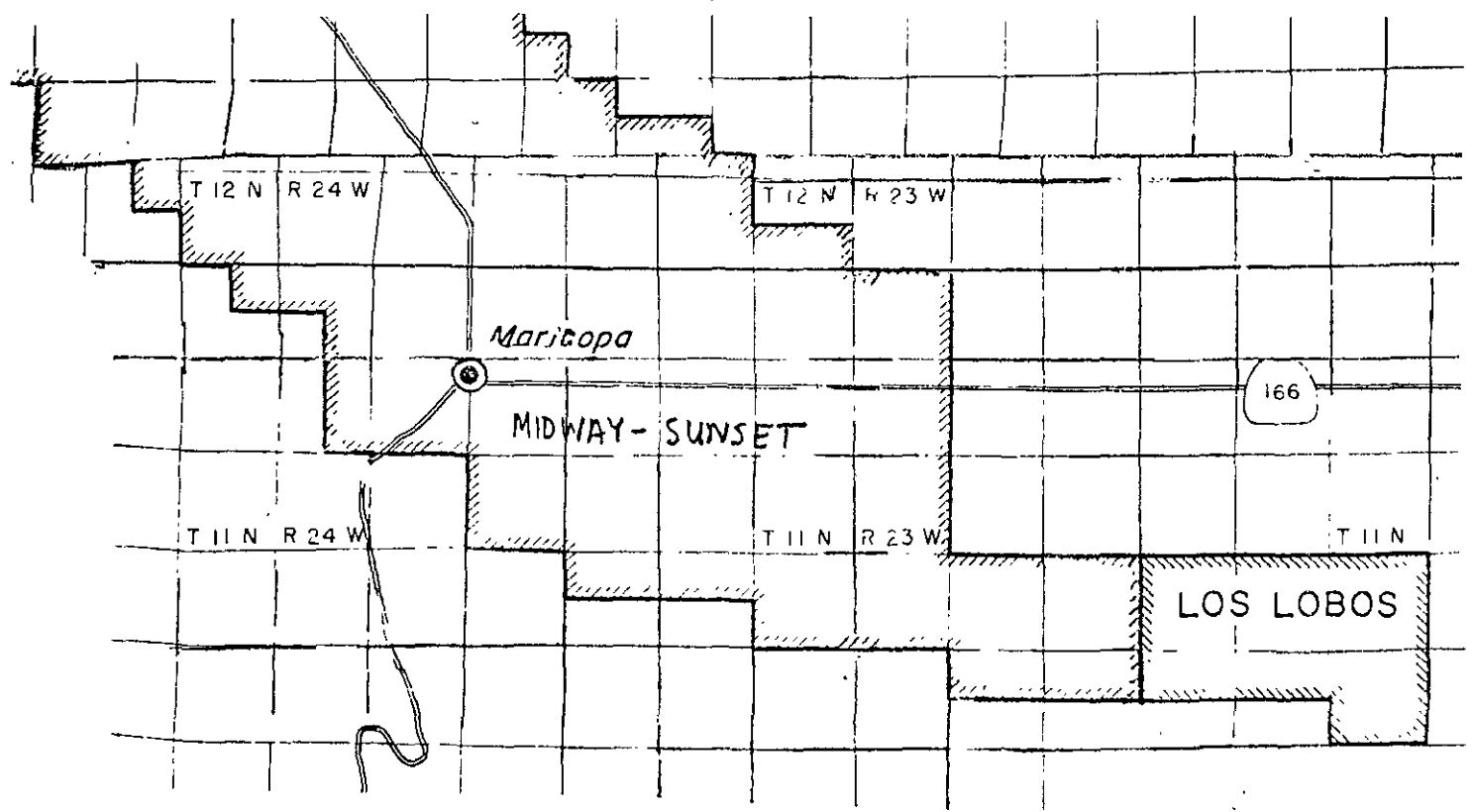


4 south MIDWAY-SUNSET and LOS LOBOS.

DIST 4

OIL FIELDS

Kern County

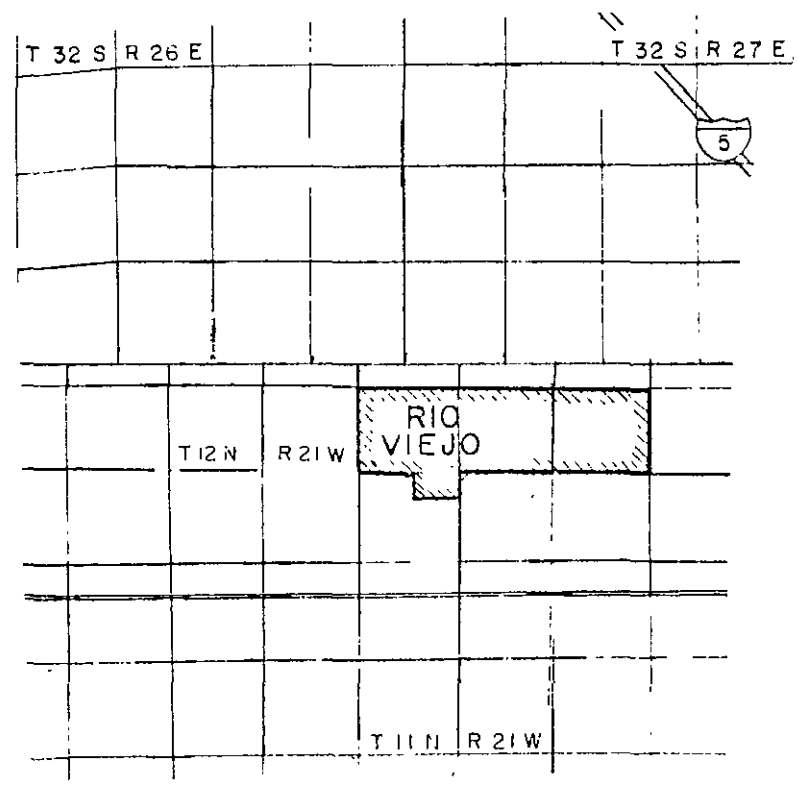


Dist 4

RIO VIEJO OIL FIELD

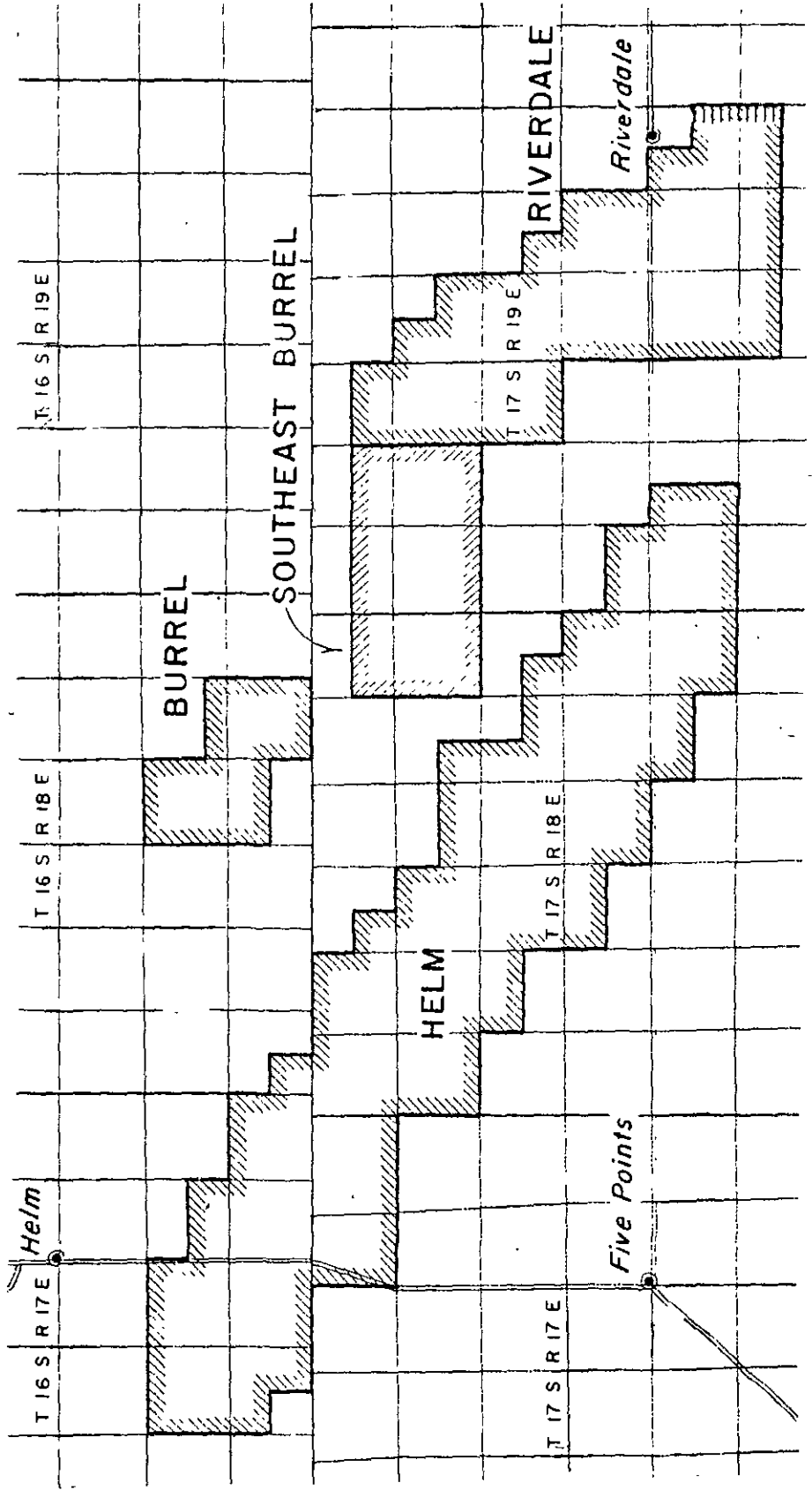
Dist 4

Kern County



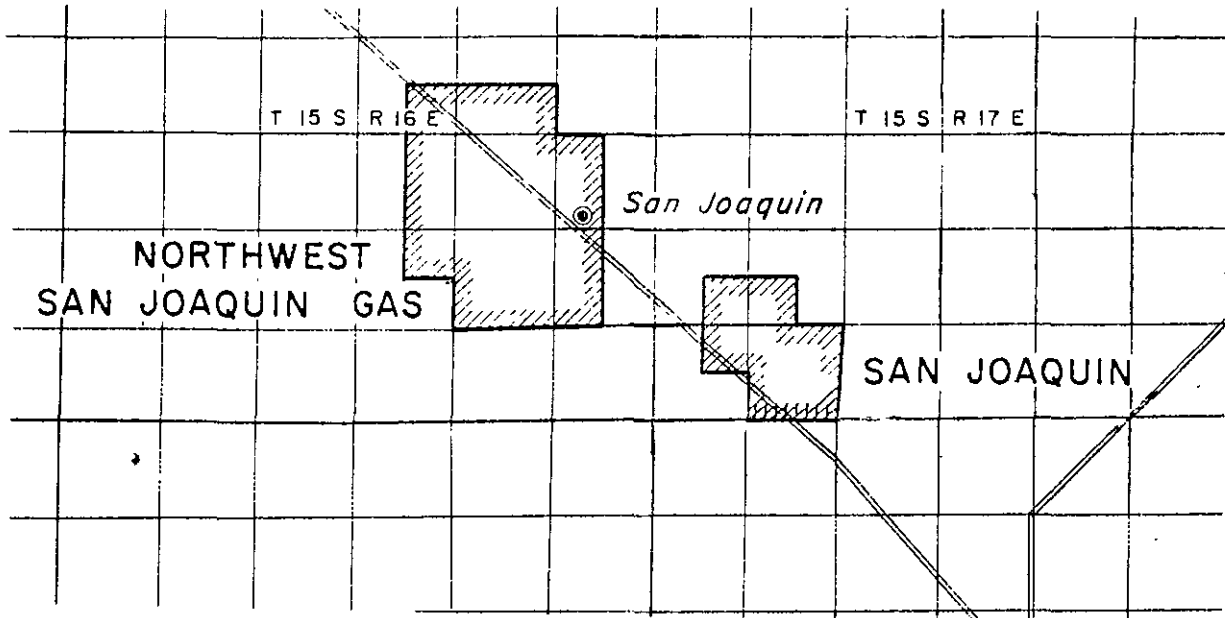
BURREL, SOUTH EAST BURREL, HELM, and RIVERDALE
OIL FIELDS

Fresno County



District 5 SAN JOAQUIN OIL FIELD and NORTHWEST SAN JOAQUIN GAS FIELD

Fresno County

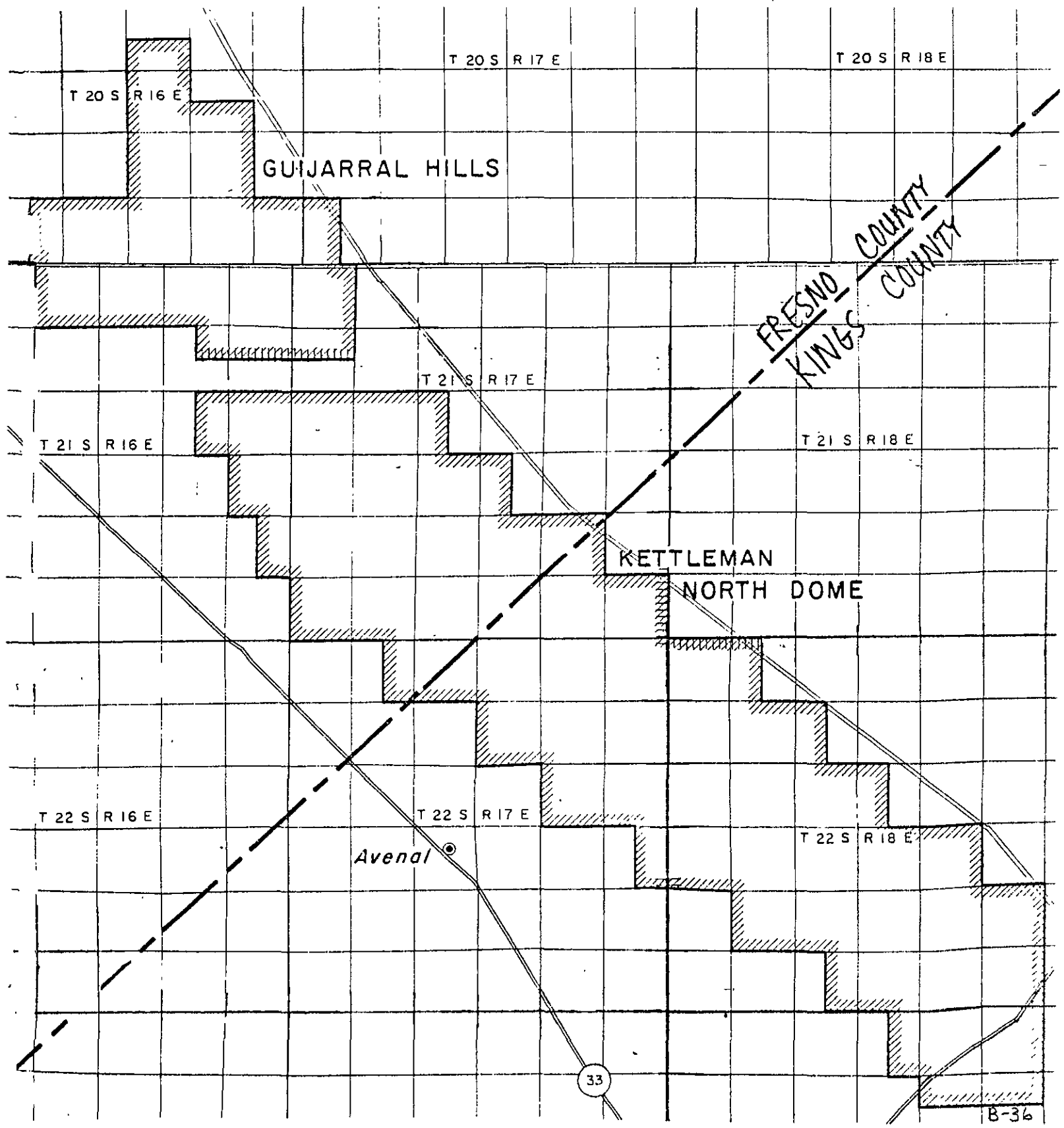


Sheet 5

GUIJARRAL HILLS and KETTLEMAN NORTH DOME OIL FIELDS

DIST 5

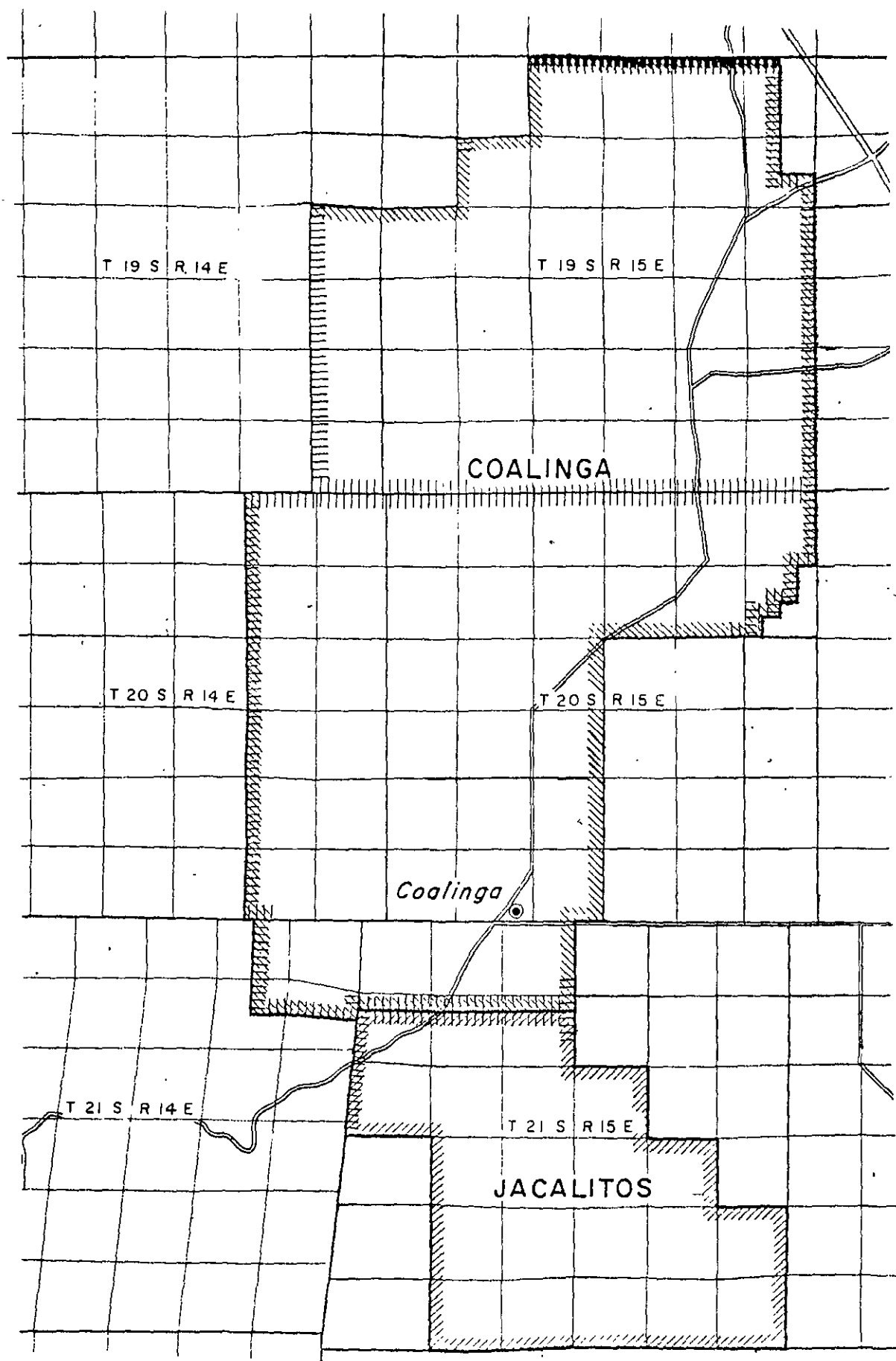
Fresno and Kings County



Dist 5

COALINGA and JACALITOS OIL FIELDS

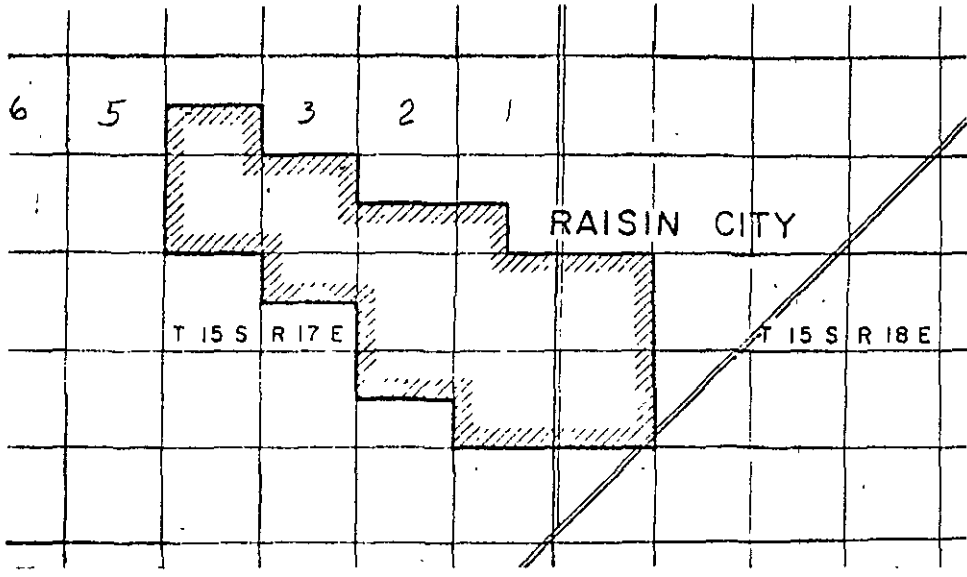
Fresno County



Sheet 5

RAISIN CITY OIL FIELD

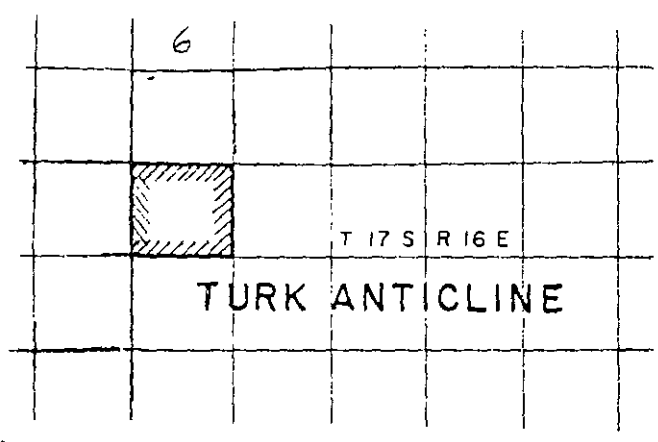
Fresno County



tract 5

TURK ANTICLINE OIL FIELD

Fresno County

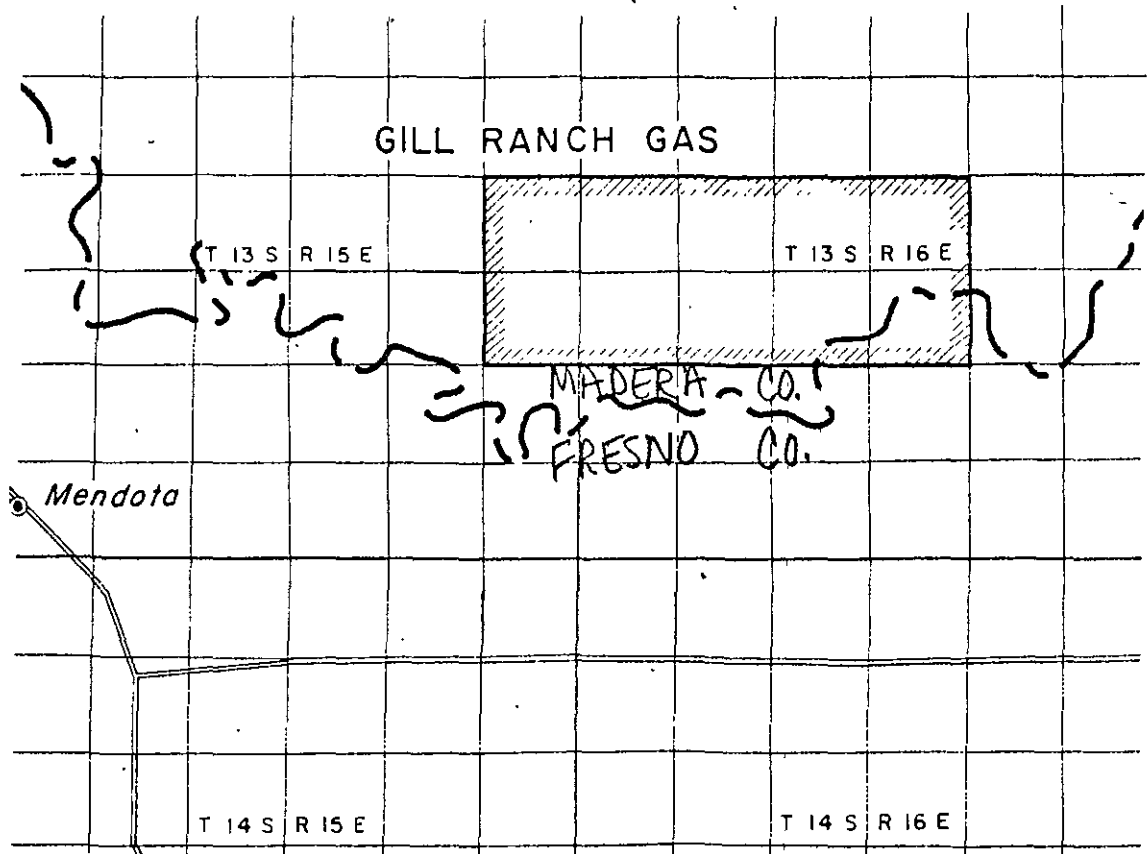


Sheet 5

GILL RANCH GAS FIELD

DIST 5

Fresno and Madera Counties

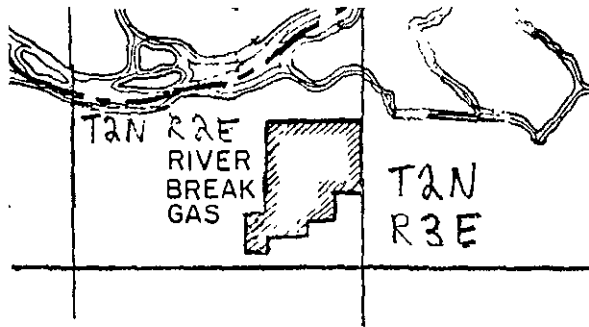


Sheet 6

RIVER BREAK GAS FIELD

Contra Costa County

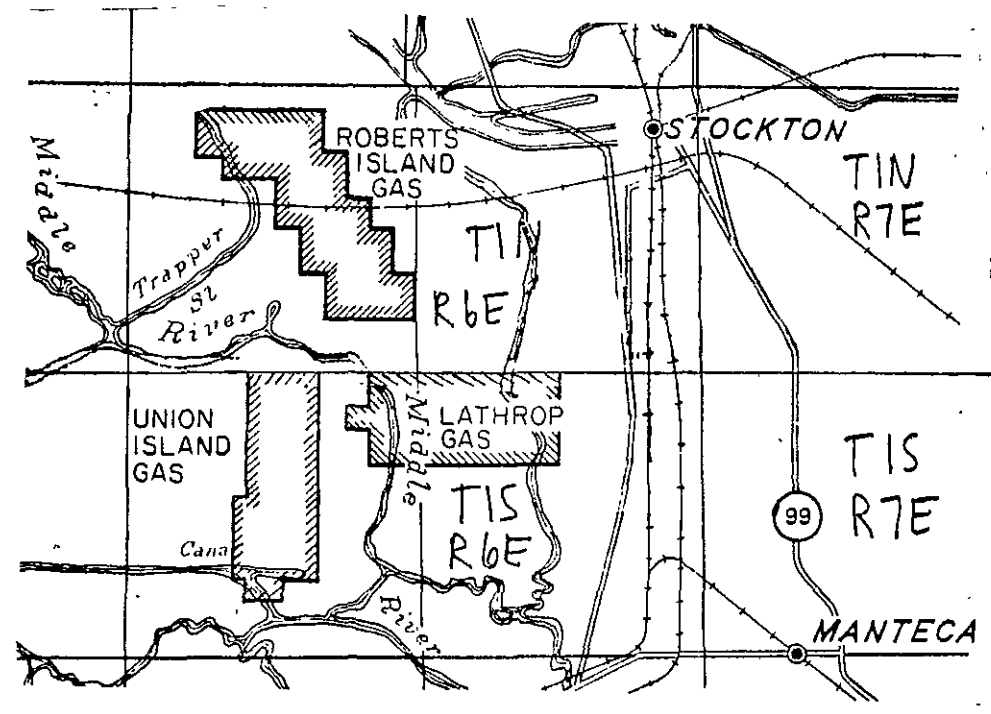
Dist 6



District 6

LATHROP, ROBERTS ISLAND, and UNION ISLAND GAS FIELDS

San Joaquin County



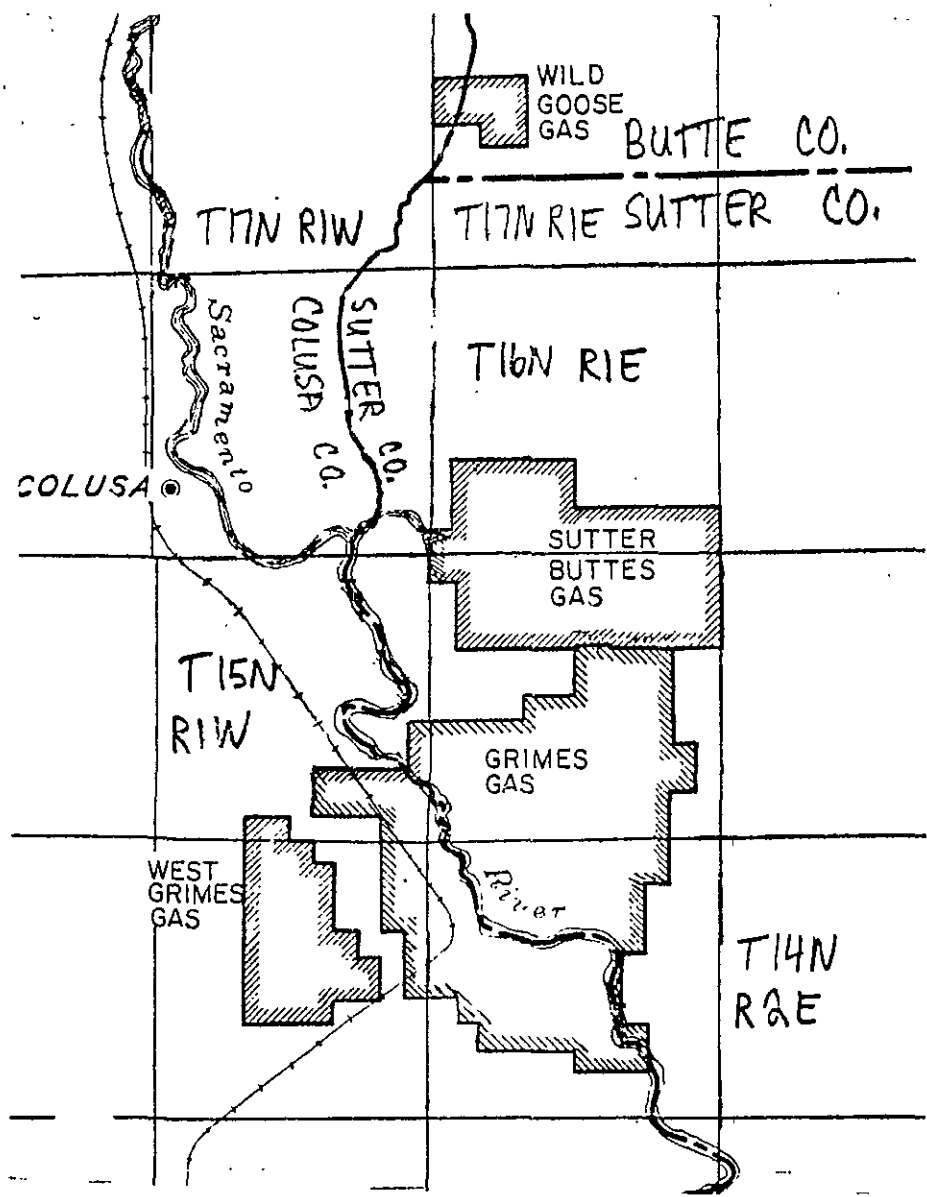
Sheet 6

DIST 6

GRIMES, WEST GRIMES, SUTTER BUTTES,

and WILD GOOSE GAS FIELDS

Butte, Colusa, and Sutter Counties



Sheet 6

BUNKER GAS FIELD

Solano County

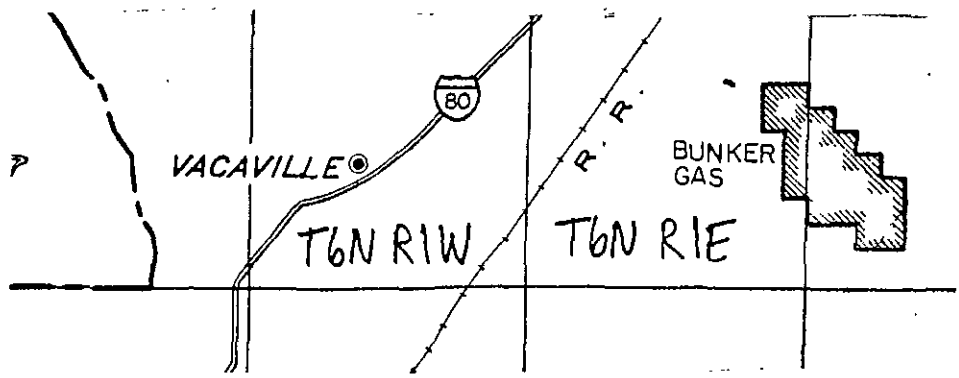


TABLE 2

Exempted Aquifers

Hydrocarbon Producing

(Supplement to aquifers exempted in Volumes 1 and 2 of
"California Oil and Gas Fields")

TABLE 2

Field	Formation	Location of discovery well (M.D.B.&M. unless noted)	Producing interval (drilled depth)	Discovery Date
Mokelumne	Stevens (Miocene)	14 11N 22W (S.B.)	11,305 - 11,465	January 1974
Stone Lake Gas	Winters (Late Cretaceous)	1 6N 4E	7,062 - 7,103	November 1974
Four Gas	Starkey and Winters (Late Cretaceous)	28 11N 1E	3,704 - 4,401	January 1974
Merritt Gas	Winters (Late Cretaceous)	15 9N 2E	5,527 - 5,542	November 1974
San Joaquin Viejo	Stevens (Miocene)	34 12N 21W (S.B.)	14,060 - 14,136	October 1975
San Joaquin Anticline	Temblor (Miocene)	18 17S 16E	10,081	June 1975
San Joaquin Gas	Mokelumne River (Late Cretaceous)	4 2N 6E	4,401 - 4,403	Sept. 1975
Woodpark West	Sespe (Oligocene)	36 3N 20W (S.B.)	5,515 - 5,897	August 1976
San Joaquin Creek	Wygol (Miocene)	29 28S 20E	2,840 - 2,862	March 1976
Temblor Hills	Agua (Miocene) and Point of Rocks (Eocene)	25 30S 20E	3,850 - 4,116	November 1976
Lodi Airport Gas	Capay (Eocene)	28 3N 6E	4,439 - 4,447	July 1976
San Joaquin Canyon	Monterey (Miocene)	21 8N 33W (S.B.)	8,024 - 9,570	August 1976
San Joaquin Canal	Stevens (Miocene)	31 28S 22E	11,049 - 11,822	Sept. 1977
Greenwood Gas	Undiff. Marine (Eocene)	35 22N 3W	1,634 - 1,644	August 1977
Florin Gas	Winters (Late Cretaceous)	35 8N 5E	3,882 - 3,908	December 1977
Watlett Gas	Starkey (Late Cretaceous)	35 12N 3E	2,249 - 2,251	December 1977
Peace Valley Gas	Kione (Late Cretaceous)	34 17N 1E	3,092 - 3,182	July 1977
Cache Creek Gas	Starkey (Late Cretaceous)	11 10N 2E	3,918 - 3,927	August 1977

TABLE 2

Field	Formation	Location of discovery well (M.D.B.&M. unless noted)	Producing interval (drilled depth)	Discovery Date
Westhaven	Temblor (Miocene)	11 20S 18E	10,984 - 10,990	February 1978
Williams Gas	Forbes (Late Cretaceous)	12 16N 2W	5,305 - 5,317	Sept. 1978
Oakley, South, Gas	Mokelumne River (Late Cretaceous)	12 1N 2E	7,447 - 7,502	November 1972
Greenwood, South, Gas	Undiff. Marine (Eocene)	14 21N 3W	1,414 - 1,429	October 1977
East Collegeville Gas	Forbes (Late Cretaceous)	33 1N 8E	7,455 - 7,478	Sept. 1978
Lone Tree Creek Gas	Lathrop (Late Cretaceous)	17 1S 8E	6,804 - 6,810	May 1978
East Rice Creek Gas	Forbes (Late Cretaceous)	28 23N 2W	4,946 - 4,954	December 1978
Dry Slough Gas	Winters (Late Cretaceous)	9 8N 1E	5,026 - 5,030	February 1978
East Brentwood Gas	Mokelumne River (Late Cretaceous)	7 1N 3E	8,152 - 8,162	April 1979
East Dixon Gas	Mokelumne River (Lt. Cretaceous)	7 7N 2E	4,496 - 4,508	June 1979
Robbins Gas	Confidential	32 13N 3E	6,710 - 6,739	February 1979
Verona Gas	Markley Canyon fill (Miocene-Oligocene)	14 11N 3E	1,833 - 1,846	June 1979
Black Butte Dam Gas	Forbes (Late Cretaceous)	21 23N 4W	644 - 938	October 1979
Knightesen Gas	Mokelumne River (Late Cretaceous)	5 1N 3E	8,678 - 8,708	March 1980
Grays Bend Gas	Winters	31 11N 3E	4,460 - 4,490	January 1980
Harlan Ranch Gas	Confidential	13 9N 1E	Confidential	October 1980
Howells Point Gas	Confidential	5 12N 1E	Confidential	December 1980

APPENDIX C

Forms Used by the Division of Oil and Gas in Administering
the Current Injection Program:

Page

C-1, C-2	Form OG105	Notice of Intention to Drill New Well
C-3	Form OG100	Well Summary Report
C-4	Form OG107	Notice of Intention to Rework Well
C-5	Form OG108	Notice of Intention to Abandon Well
C-6	Form OG123	Supplementary Notice
C-7, C-8	Form OG111	Report on Proposed Operations (Example of a conditional approval)
C-9, C-10	Form OG160A	Individual Oil and Gas Well Indemnity Bond
C-11, C-12	Form OG111B	Monthly Injection Report

DIVISION OF OIL AND GAS
Notice of Intention to Drill New Well

C.E.Q.A. INFORMATION				FOR DIVISION USE ONLY					
EXEMPT <input type="checkbox"/>	NEG. DEC. <input type="checkbox"/>	E.I.R. <input type="checkbox"/>	DOCUMENT NOT REQUIRED BY LOCAL JURISDICTION <input type="checkbox"/>	MAP	MAP BOOK	CARDS	LOGS	FORMS	
CLASS _____	S.C.H. NO. _____	S.C.H. NO. _____						114	121
See Reverse Side									

In compliance with Section 3203, Division 3, Public Resources Code, notice is hereby given that it is our intention to commence drilling well _____, API No. _____ (Assigned by Division)
 Sec _____, T _____, R _____, B. & M., _____ Field, _____ County.
 Legal description of mineral-right lease, consisting of _____ acres, is as follows: _____ (Attach map or plat to scale)

Do mineral and surface leases coincide? Yes _____ No _____. If answer is no, attach legal description of both surface and mineral leases, and map or plat to scale.

Location of well _____ feet _____ along section/property line and _____ feet _____ (Direction) (Cross out one) (Direction)
 at right angles to said line from the _____ corner of section/property _____ or (Cross out one)

Is this a critical well according to the definition on the reverse side of this form? Yes No

If well is to be directionally drilled, show proposed coordinates (from surface location) at total depth: _____ feet _____ and _____ feet _____ (Direction) (Direction)

Elevation of ground above sea level _____ feet.

All depth measurements taken from top of _____ that is _____ feet above ground. (Datum Floor, Rotary Table, or Kelly Bushing)

PROPOSED CASING PROGRAM

SIZE OF CASING (INCHES API)	WEIGHT	GRADE AND TYPE	TOP	BOTTOM	CEMENTING DEPTHS	CALCULATED FILL BEHIND CASING

(A complete drilling program is preferred and may be submitted in lieu of the above program.)

Intended zone(s) of completion _____ Estimated total depth _____ (Name, depth, and expected pressure)

It is understood that if changes in this plan become necessary we are to notify you immediately.

Name of Operator _____		Type of Organization (Corporation, Partnership, Individual, etc.) _____	
Address _____		City _____	Zip Code _____
Telephone Number _____	Name of Person Filing Notice _____	Signature _____	Date _____

This notice and indemnity or cash bond shall be filed, and approval given, before drilling begins. If operations have not commenced within one year of receipt of the notice, this notice will be considered cancelled.

OG105 (10-78-65R1-10M)

Information for compliance with the California Environmental Quality Act of 1970 (C.E.Q.A.).

If an environmental document has been prepared by the lead agency, please submit a copy of the document with this notice or supply the following information:

Lead Agency: _____

Contact Person: _____

Address: _____

Phone: () _____

FOR DIVISION USE ONLY	
District review of environmental document (if applicable)?	Yes - <input type="checkbox"/> No <input type="checkbox"/>
Remarks:	_____ _____ _____

CRITICAL WELL

As defined in the California Administrative Code, Title 14, Section 1720(a), "Critical well" means a well within:

- (1) 300 feet of the following:
 - (A) Any building intended for human occupancy that is not necessary to the operation of the well; or
 - (B) Any airport runway.
- (2) 100 feet of the following:
 - (A) Any dedicated public street, highway, or nearest rail of an operating railway that is in general use;
 - (B) Any navigable body of water or watercourse perennially covered by water;
 - (C) Any public recreational facility such as a golf course, amusement park, picnic ground, campground, or any other area of periodic high-density population; or
 - (D) Any officially recognized wildlife preserve.

Exceptions or additions to this definition may be established by the supervisor upon his own judgment or upon written request of an operator. This written request shall contain justification for such an exception.

Reverse side of
form 06105

Form OG100 (7/79)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

API No. _____

WELL SUMMARY REPORT

Operator		Well			
Field		County	Sec.	T.	R. B.&M.
Location (Give surface location from property or section corner, street center line and/or California coordinates)					Elevation of ground above sea level
Commenced drilling (date)	Total depth			Depth measurements taken from top of:	
	(1st hole)	(2nd)	(3rd)	<input type="checkbox"/> Derrick Floor <input type="checkbox"/> Rotary Table <input type="checkbox"/> Kelly Bushing	
Completed drilling (date)	Present effective depth			Which is _____ feet above ground	
Commenced producing (date)	Junk			GEOLOGICAL MARKERS	DEPTH
<input type="checkbox"/> Flowing <input type="checkbox"/> Pumping <input type="checkbox"/> Gas lift					
Name of producing zone(s)					
Formation and age at total depth					

	Clean Oil (bbl per day)	Gravity Clean Oil	Percent Water including emulsion	Gas (Mcf per day)	Tubing Pressure	Casing Pressure
Initial Production						
Production After 30 days						

CASING RECORD (Present Hole)								
Size of Casing (API)	Top of Casing	Depth of Shoe	Weight of Casing	Grade and Type of Casing	New or Second Hand	Size of Hole Drilled	Number of Sacks or Cubic Feet of Cement	Depth of Cementing (if through perforations)

PERFORATED CASING (Size, top, bottom, perforated intervals, size and spacing of perforation and method.)

Was the well directionally drilled? If yes, show coordinates at total depth
 Yes No

Electrical log depths

Other surveys

In compliance with Sec. 3215, Division 3 of the Public Resources Code, the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Name		Title	
Address		City	Zip Code
Telephone Number	Signature	Date	

SUBMIT IN DUPLICATE

OG 107 (8/76)

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION

DIVISION OF OIL AND GAS

Notice of Intention to Rework Well

This notice and indemnity or cash bond shall be filed, and approval given, before rework begins. If operations have not commenced within one year of receipt of the notice, this notice will be considered cancelled.

FOR DIVISION USE ONLY		
BOND	FORMS	
	OGD 114	OGD 121

DIVISION OF OIL AND GAS

In compliance with Section 3203, Division 3, Public Resources Code, notice is hereby given that it is our intention to rework well _____, API No. _____
(Well designation)

Sec. _____, T. _____, R. _____, B. & M., _____ Field, _____ County.

The present condition of the well is as follows:

- Total depth _____
- Complete casing record, including plugs and perforations _____
- Present producing zone name _____; Zone in which well is to be recompleted _____
- Present zone pressure _____; New zone pressure _____
- Last produced _____ (Date) _____ (Oil, B/D) _____ (Water, B/D) _____ (Gas, Mcl/D)
(or)
Last injected _____ (Date) _____ (Water, B/D) _____ (Gas, Mcl/D) _____ (Surface pressure, psig)

The proposed work is as follows:

It is understood that if changes in this plan become necessary, we are to notify you immediately.

Address _____ (Street) _____ (Name of Operator)
 _____ (City) _____ (State) _____ (Zip) By _____ (Print Name)
 Telephone Number _____ (Signature) _____ (Date)

DIVISION OF OIL AND GAS

Notice of Intention to Abandon Well
This notice must be given at least five days before work is to begin.

FOR DIVISION USE ONLY			
CARDS	BOND	FORMS	
		OGD114	OGD121

DIVISION OF OIL AND GAS

In compliance with Section 3229, Division 3, Public Resources Code, notice is hereby given that it is our intention to abandon well _____, API No. _____, Sec. _____, T. _____, R. _____, B. & M., _____ Field, _____ County, commencing work on _____, 19_____.

The present condition of the well is:

1. Total depth
2. Complete casing record, including plugs and perforations
3. Last produced _____
(Date) (Oil, B/D) (Gas, Mcf/D) (Water, B/D)
- or
4. Last injected _____
(Date) (Water, B/D) (Gas, Mcf/D) (Surface pressure)

Additional data for dry hole (show depths):

5. Oil or gas shows
6. Stratigraphic markers
7. Formation and age at total depth
8. Base of fresh water sands _____

The proposed work is as follows:

It is understood that if changes in this plan become necessary, we are to notify you immediately.

Address _____
(Street)

(City) (State) (Zip)
Telephone Number _____
(Area Code) (Number)

By _____
(Name of Operator)

(Print Name)

(Signature) (Date)

DIVISION OF OIL AND GAS

SUPPLEMENTARY NOTICE

FOR DIVISION USE ONLY			
BOND	FORMS		EOP WELL FILE
	OGD114	OGD121	

DIVISION OF OIL AND GAS

_____ Calif.

A notice to you dated _____, 19____, stating the intention to

_____, API No. _____
(Drill, rework, abandon) (Well name and number)

Sec. _____, T. _____, R. _____, B. & M., _____ Field,

_____ County, should be amended because of changed conditions.

The present condition of the well is as follows:

Total depth

Complete casing record including plugs and perforations

We now propose

It is understood that if changes in this plan become necessary we are to notify you immediately.

Address _____
(Street)

(City) (State) (Zip)

Telephone Number _____

(Name of Operator)

Type of Organization _____
(Corporation, Partnership, Individual, etc.)

By _____
(Name) (Date)

Signature _____

RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS

No. P179-418

REPORT ON PROPOSED OPERATIONS

048
(field code)
03
(area code)
00
(pool code)

WATER DISPOSAL PROJECT
BELMONT OFFSHORE FIELD
OLD AREA
"BP" AND "R" SANDS

Los Angeles, CA Long Beach, California
March 12, 1979

Your _____ proposal to rework and convert/ to water disposal well "State PRC 186" 1
A.P.I. No. 259-07894, Section 11, T. 5S, R. 12W, S.B. B. & M.,
Belmont Offshore field, _____ area, _____ pool,
Orange County, dated 3/7/79, received 3/10/79 has been examined in conjunction with records
filed in this office.

NOTE: 8-5/8" cem 4000', cp 2480'. TD (present hole) 8050'. Plugged with cem 7760'-7710'
and with 50 sacks of cem below 7641' and 7585'.

THE PROPOSAL IS APPROVED PROVIDED:

1. Blowout prevention equipment, equivalent to this division's Class III-A, or better, shall be installed and maintained in operating condition.
2. Injection shall cease if any evidence of damage is observed or upon written notice from this division.
3. Within 30 days after injection is started, and annually thereafter, this division shall be furnished with sufficient data to confirm that the injected fluid is confined to the intended zone of injection.
4. Injection shall be through tubing and packer.
5. THIS DIVISION SHALL BE NOTIFIED:
 - a. To inspect the installed blowout prevention equipment prior to commencing down-hole operations.
 - b. To witness the running of a profile survey to confirm that the injection fluid is confined to the intended zone.

NOTE:

1. Well records listed in Sec. 3215 of the Public Resources Code are due within 60 days after recompletion of the well
2. The base of the fresh water sands is at 2375' (1889' vertical depth). The fresh water is protected by the 6-5/8" casing cemented at 5915' with sufficient cement to fill to 5000'+.
3. The water to be injected tests about 28,900 ppm sodium chloride and is oilfield brine from oil wells.
4. The water is to be injected into the R & BP Sands which extend from 5500' to 6300' and contains salt water. The formation water tests approx. 20,000 ppm sodium chloride.
5. Approx. surface location of well: 1812' N. and 540' E. fr SW cor. Sec.

(continued on page 2)

RKB:d

A copy of this report must be posted at the well site prior to commencing operations.

M. G. MEFFERD, State Oil and Gas Supervisor

By _____
Deputy Supervisor

cc: Update Center
Regional Water Quality Control Board
Project File
State Lands Division

Blanket Bond

(Type this continuation page on plain white, such as this.)

INDIVIDUAL OIL AND GAS WELL INDEMNITY BOND

(SEE INSTRUCTIONS ON REVERSE SIDE FOR APPLICABLE AMOUNT)

Know All Men by These Presents:

WE

That I,

as principal, and

a corporation

organized and existing under and by virtue of the laws of the STATE OF
and authorized to transact surety business in the STATE OF CALIFORNIA, as surety, are held and firmly bound
unto the STATE OF CALIFORNIA in the sum of THOUSAND AND NO/100 DOLLARS
(\$.....000.00) lawful money of the United States of America, to be paid to the said State of California, for
which payment, well and truly to be made, we bind ourselves, our heirs, executors and successors, jointly and
severally, firmly by these presents.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT,

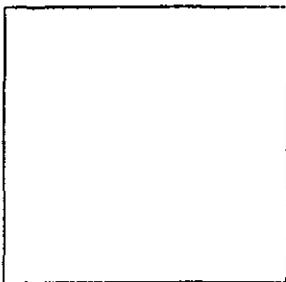
WHEREAS, said principal is about to drill, redrill, deepen, or permanently alter an oil or gas well designated
as, Sec. T. R. B. & M., and is required to
file this bond in connection therewith in accordance with Sections 3204 to 3209, inclusive, of Chapter 1 of Division
3 of the Public Resources Code of the State of California.

NOW, THEREFORE, if said

the above bounden principal, shall well and truly comply with all the provisions of Division 3 (commencing with
Section 3000) of the Public Resources Code and shall obey all lawful orders of the State Oil and Gas Supervisor,
or his district deputy or deputies, subject to subsequent appeal as provided in that division, and shall pay all
charges, costs, and expenses incurred by the supervisor or his district deputy or deputies in respect of such well
or the property of said principal, or assessed against such well or the property of such principal, in pursuance of
the provisions of said division, then this obligation shall be void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of the said principal is hereto affixed and the corporate seal and
name of the said surety is hereto affixed and attested by its duly authorized at

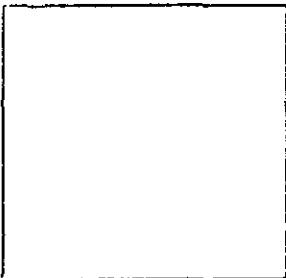
California, this day of 19



(SEAL OF PRINCIPAL)

[Principal]

By



(SEAL OF SURETY)

[Surety]

By

Office of surety to which correspondence relating to this bond should be
addressed:

.....
.....

NOTARIZATION OF THE SURETY:

STATE OF CALIFORNIA }
 COUNTY OF } ss.

On this day of in the year 19.....
 before me,
 a Notary Public in and for said County and State, personally appeared

 known to me to be the person whose name is subscribed to the within instrument
 as the of
 , and acknowledged to me that he subscribed the name
 of thereto and his own name as

.....
 Notary Public in and for said County and State

INSTRUCTIONS

1. The surety on the bond may be any surety company licensed in California.
2. The signature of the surety must be notarized.
3. If the principal is a corporation the corporate seal must be affixed.
4. If the principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, and naming said firm.
5. The name of the principal as well as the designation and number of the well on the bond must agree exactly with that shown on the notice of intention to drill, redrill, deepen, or permanently alter the casing.
6. A bond containing a cancellation clause at the option of the surety is not acceptable.

7. Applicable amount:

Coverage for onshore well. . .	
less than 5,000 feet total depth.....	\$10,000
at least 5,000 feet but less than 10,000 feet total depth.....	\$15,000
at least 10,000 feet or greater total depth.....	\$25,000
Supplemental coverage for deepening onshore well	
from less than 5,000 feet to less than 10,000 feet total depth.....	\$ 5,000
from less than 5,000 feet to at least 10,000 feet or greater total depth.....	\$15,000
from at least 5,000 feet but less than 10,000 feet to at least 10,000 feet or greater total depth.....	\$10,000

8. Individual coverage for an offshore well is not acceptable

NOTE: In lieu of an individual indemnity bond, a person may, with the written approval of the Supervisor, file a cash bond or securities in the appropriate amount, as prescribed in Section 3205.5, Division 3 of the Public Resources Code.

Reverse side
 of OG-160A

CODE KEY

WELL TYPE CODES	SOURCE OF WATER CODES
<p>SF Steam flood</p> <p>WD Water disposal</p> <p>WF Water flood</p> <p>AI Air injection</p> <p>SC Cyclic steam injection</p> <p>GS Gas storage injection</p> <p>PM Pressure maintenance (gas injection)</p> <p>LG Liquefied petroleum gas storage injection (propane, butane, olefin, etc.)</p>	<p>1 Oil or gas well</p> <p>2 Water source well</p> <p>3 Domestic water system</p> <p>4 Ocean</p> <p>5 Industrial waste</p> <p>6 Domestic waste</p> <p>7 Other</p>
KIND OF WATER CODES	REASON WELL NOT INJECTING CODES
<p>1 Saline</p> <p>2 Fresh</p> <p>3 Chemical mixture</p> <p>4 Other</p>	<p>1 Standing (incapable of injection in its present condition.)</p> <p>4 Uncompleted</p> <p>5 Abandoned or converted to another well type (DOG approved)</p> <p>6 Shut-down (capable of injection in its present condition.)</p> <p>8 Other</p> <p>9 Operator change (report injection occurring before change)</p>

PLEASE CORRECT ANY INFORMATION THAT HAS BEEN INCORRECTLY REPRINTED BY OUR COMPUTER

Reverse of 06-1108

0-12

APPENDIX D

Statutes and Regulations That Relate to Well
Injection Operations

Pages D-1 to D-9 - Statutes (Division 3 of
the Public Resources Code)

Pages D-10 to D-19 - Regulations (Title 14,
Division 2, Chapter 4 of the California
Administrative Code)

STATUTES

DIVISION 3. OIL AND GAS

Chapter 1. Oil and Gas Conservation

Article 1. Definitions and General Provisions

3000. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of this division.

3001. "Department," in reference to the government of this State, means the Department of Conservation.

3002. "Division," in reference to the government of this State, means the Division of Oil and Gas in the Department of Conservation, otherwise "division" means Division 3 (commencing with Section 3000) of this Public Resources Code.

3003. "Director" means the Director of Conservation.

3004. "Supervisor" means the State Oil and Gas Supervisor.

3005. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

3006. "Oil" includes petroleum, and "petroleum" includes oil.

3007. "Gas" means any natural hydrocarbon gas coming from the earth.

3008. (a) "Well" means any oil or gas well or well for the discovery of oil or gas; any well on lands producing or reasonably presumed to contain oil or gas; any well drilled for the purpose of injecting fluids or gas for stimulating oil or gas recovery, repressuring or pressure maintenance of oil or gas reservoirs, or disposing of waste fluids from an oil or gas field; any well used to inject or withdraw gas from an underground storage facility; or any well drilled within or adjacent to an oil or gas pool for the purpose of obtaining water to be used in production stimulation or repressuring operations.

(b) "Prospect well" means any well drilled to extend a field or explore a new, potentially productive reservoir.

3009. "Operator" means any person drilling, maintaining, operating, pumping, or in control of any well.

3010. "Owner" includes "operator" when any well is operated or has been operated or is about to be operated by any person other than the owner.

3011. "Operator" includes "owner" when any well is or has been or is about to be operated by or under the direction of the owner.

3012. The provisions of this division apply to any land or well situated within the boundaries of an incorporated city in which the drilling of oil wells is now or may hereafter be prohibited, until all wells therein have been abandoned as provided in this chapter.

3013. This division shall be liberally construed to meet its purposes, and the director and the supervisor shall have all powers which may be necessary to carry out the purposes of this division.

3014. "District" means an oil and gas district as provided for in Section 3100.

3015. For the purpose of implementing Section 503 of the Natural Gas Policy Act of 1978, the supervisor may make the determinations entrusted to state agencies having regulatory jurisdiction with respect to the production of natural gas. Such determinations shall be made pursuant to procedures prescribed in guidelines adopted by the supervisor.

Article 2. Administration

3100. For the purposes of this chapter, the state is divided into six districts, the boundaries of which shall be fixed by the director.

3101. The supervisor shall appoint one chief deputy and at least one district deputy for each of the districts provided for in this chapter, and shall prescribe their duties.

3102. The Attorney General shall be the legal advisor for the division and shall perform or provide such legal services for the division as it may require. The cost of all such legal services shall be a charge against and shall be paid from the money or funds appropriated or made available by law for the support of the division. All money so paid shall be deposited in the State treasury to the credit and in augmentation of the current appropriation for the support of the Attorney General's office, to be expended in accordance with law, for the support of that office.

3103. The chief deputy shall be a competent engineer or geologist, registered in the state, and experienced in the development and production of oil and gas.

3104. Each district deputy shall be a competent engineer or geologist, registered in the state, and experienced in the development and production of oil and gas. At the time any district deputy is appointed, notice of his appointment shall be transmitted in writing to the director.

3105. An office under the supervision of a district deputy may be maintained in each district. The office shall be conveniently accessible to the oil and gas operators in the district, and it shall be open and a district deputy shall be present at certain specified times, which times shall be posted at the office. Office of Deputies

3106. The supervisor shall so supervise the drilling, operation, maintenance, and abandonment of wells as to prevent, as far as possible, damage to life, health, property, and natural resources; damage to underground oil and gas deposits from infiltrating water and other causes; loss of oil, gas, or reservoir energy, and damage to underground and surface waters suitable for irrigation or domestic purposes by the infiltration of, or the addition of, detrimental substances, by reason of the drilling, operation, maintenance, or abandonment of wells. Duties of Supervisor

The supervisor shall also supervise the drilling, operation, maintenance, and abandonment of wells so as to permit the owners or operators of such wells to utilize all methods and practices known to the oil industry for the purpose of increasing the ultimate recovery of underground hydrocarbons and which, in the opinion of the supervisor, are suitable for such purpose in each proposed case. In order to further the elimination of waste by increasing the recovery of underground hydrocarbons it is hereby declared as a policy of this state that the grant in an oil and gas lease or contract to a lessee or operator of the right or power, in substance, to explore for and remove all hydrocarbons from any lands in the State of California, in the absence of an express provision to the contrary contained in such lease or contract, is deemed to allow the lessee or contractor or his successors or assigns, to do what a prudent operator using reasonable diligence would do, having in mind the best interests of the lessor, lessee and the state, in producing and removing hydrocarbons, including but not limited to the injection of air, gas, water or other fluids into the productive strata, the application of pressure, heat or other means for the reduction of viscosity of the hydrocarbons, the supplying of additional motive force or creating of enlarged or new channels for the underground movement of hydrocarbons into production wells, when such methods or processes employed have been approved by the supervisor; provided, however, nothing contained in this section imposes a legal duty upon such lessee or contractor, his successors or assigns, to conduct such operations.

In order to best meet oil and gas needs in California, the supervisor shall administer this division so as to encourage the wise development of the oil and gas resources.

3107. A district deputy in each district, designated by the supervisor, shall collect all necessary information regarding the oil and gas wells in the district, with a view to determining the presence and source of water in the oil sands and the location and extent of strata bearing water suitable for irrigation or domestic purposes that might be affected. He shall prepare maps and other accessories necessary to determine the presence and source of water in the oil sands and the location and extent of strata bearing water suitable for irrigation or domestic purposes or surface water suitable for such purposes. This work shall be done with the view to advising the operators as to the best means of protecting the oil and gas sands and the water-bearing strata and surface water, and with a view to aiding the supervisor in ordering tests or repair work at wells. All this data shall be kept on file in the office of the district deputy of the respective district. Well data

3201. The owner or operator of any well shall notify the supervisor or the district deputy, in writing, in such form as the supervisor or the district deputy may direct, of the sale, assignment, transfer, conveyance, or exchange by the owner or operator of such well, and the land, owned or leased, upon which the well is located, within 30 days after such sale, assignment, transfer, conveyance, or exchange. The notice shall contain the following: Transfer by seller

- (a) The name and address of the person to whom such well was sold, assigned, transferred, conveyed, or exchanged.
- (b) The name and location of the well.
- (c) The date of the sale, assignment, transfer, conveyance or exchange.
- (d) The date when possession was relinquished by the owner or operator.

(e) A description of the land upon which the well is situated.

3202. Every person who acquires the ownership or operation of any well, whether by purchase, transfer, assignment, conveyance, exchange, or otherwise, shall, within 30 days after acquiring the well and the land, owned or leased, upon which it is located, notify the supervisor or the district deputy, in writing, of his ownership or operation. The notice shall contain the following: Transfer by buyer

- (a) The name and address of the person from whom the well was acquired.
- (b) The name and location of the well.
- (c) The date of acquisition.
- (d) The date when possession was acquired.
- (e) A description of the land upon which the well is situated.

3203. The owner or operator of any well shall, before commencing the work of drilling the well, file with the supervisor or the district deputy a written notice of intention to commence drilling. Drilling shall not commence until approval is given by the supervisor or the district deputy; if the supervisor or the district deputy fails to give the owner or operator written response to the notice within 10 working days, such failure shall be considered as an approval of the notice and the notice shall, for the purposes and intents of this chapter, be deemed a written report of the supervisor. If operations have not commenced within one year of receipt of the notice, the notice will be considered canceled. The notice shall contain the following: Notice of intention to drill

- (a) The location and elevation above sea level of the floor of the proposed derrick and drill rig.
- (b) The number or other designation by which the well shall be known. Such number or designation shall be subject to the approval of the supervisor.
- (c) The owner's or operator's estimate of the depths between which production will be attempted.

(d) Such other pertinent data as the supervisor may require on the printed forms to be supplied by the Division of Oil and Gas, or on forms acceptable to the supervisor.

Subsequent work After the completion of any well, the provisions of this section shall also apply, as far as may be, to the deepening or redrilling of the well, or any operation involving the plugging of the well, or any operations permanently altering in any manner the casing of the well.

Designation of well The number or designation by which any well heretofore drilled has been known, and the number or designation specified for any well in a notice filed as required by this section, shall not be changed without first obtaining a written consent of the supervisor.

Single bond 3204. Every person who engages in the drilling, redrilling, deepening, or in any operation permanently altering the casing, of any well shall file with the supervisor an individual indemnity bond in the specified sum for each well so drilled, redrilled, deepened, or permanently altered. Such sum shall be ten thousand dollars (\$10,000) for each well less than 5,000 feet deep, fifteen thousand dollars (\$15,000) for each well at least 5,000 feet but less than 10,000 feet deep, and twenty-five thousand dollars (\$25,000) for each well 10,000 or more feet deep. The bond shall be filed with the supervisor at the time of the filing of the notice of intention to perform work on the well, as provided in Section 3203. The bond shall be executed by such person, as principal, and by an authorized surety company, as surety, conditioned that the principal named in the bond shall faithfully comply with all the provisions of this chapter, in drilling, redrilling, deepening, or permanently altering the casing in any well or wells covered by the bond, and shall secure the state against all losses, charges, and expenses incurred by it to obtain such compliance by the principal named in the bond.

The conditions of the bond shall be stated in substantially the following language: "If said _____, the above bounden principal, shall well and truly comply with all the provisions of Division 3 (commencing with Section 3000) of the Public Resources Code and shall obey all lawful orders of the State Oil and Gas Supervisor or his district deputy or deputies, subject to subsequent appeal as provided in that division, and shall pay all charges, costs, and expenses incurred by the supervisor or his district deputy or deputies in respect of such well or wells or the property or properties of said principal, or assessed against such well or wells or the property or properties of such principal, in pursuance of the provisions of said division, then this obligation shall be void; otherwise, it shall remain in full force and effect."

Blanket bond 3205. Any person who engages in the drilling, redrilling, deepening, or in any operation permanently altering the casing, of one or more wells at any time, may file with the supervisor one blanket indemnity bond for one hundred thousand dollars (\$100,000) to cover all his operations in drilling, redrilling, deepening, or

3215. Upon the completion or abandonment of any well or upon the suspension of operations upon any well, true copies of the log, core record, and history in duplicate, and if made, true and reproducible copies of all electrical, physical, or chemical logs, tests, or surveys in duplicate and in such form as the supervisor may approve shall be filed with the district deputy within 60 days after such completion, suspension, or abandonment. Like copies shall be filed upon the completion of additional work in any well. Upon a showing of hardship, the supervisor may extend the time within which to comply with the provisions of this section for a period not to exceed 60 additional days.

Filing of records

3220. The owner or operator of any well on lands producing or reasonably presumed to contain oil or gas shall properly case it with water-tight and adequate casing, in accordance with methods approved by the supervisor or the district deputy, and shall, under his direction, shut off all water overlying and underlying oil-bearing or gas-bearing strata and prevent any water from penetrating such strata. The owner or operator shall also use every effort and endeavor to prevent damage to life, health, property, and natural resources; to shut out detrimental substances from strata containing water suitable for irrigation or domestic purposes and from surface water suitable for such purposes; and to prevent the infiltration of detrimental substances into such strata and into such surface water.

Adequate casing

3224. The supervisor shall order such tests or remedial work as in his judgment are necessary to prevent damage to life, health, property, and natural resources; to protect oil and gas deposits from damage by underground water, or to prevent the escape of water into underground formations, or to prevent the infiltration of detrimental substances into underground or surface water suitable for irrigation or domestic purposes, to the best interests of the neighboring property owners and the public. The order shall be in writing, signed by the supervisor. It shall be served upon the owner of the well, or his local agent, either personally or by mailing a copy of the order to the post office address given at the time the local agent is designated. If no local agent has been designated, the order shall be served by mailing a copy to the last known post office address of the owner, or if the owner is unknown, by posting a copy in a conspicuous place upon the property, and publishing it once a week for two successive weeks in some newspaper of general circulation throughout the county in which the well is located. The order shall specify the conditions sought to be remedied and the work necessary to protect such deposits from damage from underground water.

Order for repair

Final order 3225. Whenever the supervisor or a district deputy, makes or gives any written direction concerning any operations, and the operator, owner, or representative of either, serves written notice, either personally or by mail, addressed to the supervisor or to the district deputy at his office in the district, requesting that a definite order be made upon such subject, the supervisor or the district deputy shall, within five days after receipt of the notice, deliver a final written order on the subject matter in such manner and form that an appeal therefrom may be taken at once to the director.

Performance of work and lien against property 3226. Within 30 days after service of an order, pursuant to Sections 3224 and 3225, or Section 3237, or if there has been an appeal from the order to the director, within 30 days after service of the decision of the director, or if a review has been taken of the order of the director, within 10 days after affirmance of the order, the owner or operator shall commence in good faith the work ordered and continue it until completion. If the work has not been commenced and continued to completion, the supervisor shall appoint necessary agents who shall enter the premises and perform the work. An accurate account of the expenditures shall be kept. Any amount so expended shall constitute a lien against real or personal property of the owner or operator pursuant to the provisions of Section 3423.

Emergency powers of Supervisor Notwithstanding any other provisions of Section 3224, 3225, or 3237, if the supervisor determines that an emergency exists, he may order or undertake such actions as he deems necessary to protect life, health, property, or natural resources.

Monthly
production
reports

3227. The owner of any well producing or capable of producing oil or gas shall file with the district deputy, on or before the 30th day of each month, for the last preceding calendar month, a statement, in such form as the supervisor may designate, showing:

(a)
↓
(e)

(f) What disposition was made of the water produced from each well, including designations of injection or disposal wells and such other information regarding the water and the disposition thereof as the supervisor may require.

Disposition
of water

3228. Before abandoning any well in accordance with methods approved by the supervisor or the district deputy, and under his direction, the owner or operator shall shut off and exclude all water from entering oil-bearing or gas-bearing strata encountered in the well and shall use every effort and endeavor to protect any underground or surface water suitable for irrigation or domestic purposes from the infiltration or addition of any detrimental substances.

Abandon-
ment of wells

3229. Before commencing any work to abandon any well, the owner or operator shall file with the supervisor or the district deputy a written notice of intention to abandon the well. Abandonment shall not proceed until approval is given by the supervisor or the district deputy. If the supervisor or the district deputy does not give the owner or operator a written response to the notice of intention within 10 working days, the proposed abandonment shall be deemed to have been approved and the notice of intention shall for the purposes of this chapter be deemed a written report of the supervisor. If abandonment operations have not commenced within one year of receipt of the notice of intention, the notice of intention shall be deemed canceled.

Notice to
abandon

3235. The supervisor may upon his own initiative or shall upon receipt of a written complaint from a person owning land or operating wells within a radius of one mile of any well or group of wells complained against make an investigation of the well or wells involved. The supervisor shall make a written report and order, stating the work required to repair the damage complained of, or stating that no work is required.

Complaint

A copy of the order shall be delivered to the complainant, or if more than one, to each complainant, and, if the supervisor orders the damage repaired, a copy of the order shall be delivered to each of the owners, operators, or agents having in charge the well or wells upon which the work is to be done.

The order shall contain a statement of the conditions sought to be remedied or repaired and a statement of the work required by the supervisor to repair the condition. Service shall be made by mailing copies to such persons at the post office address given.

3236. Any owner or operator, or employee thereof, who refuses to permit the supervisor or the district deputy, or his inspector, to inspect a well, or who wilfully hinders or delays the enforcement of the provisions of this chapter, and every person, whether as principal, agent, servant, employee, or otherwise, who violates, fails, neglects, or refuses to comply with any of the provisions of this chapter, or who fails or neglects or refuses to furnish any report or record which may be required pursuant to the provisions of this chapter, or who wilfully renders a false or fraudulent report, is guilty of a misdemeanor, punishable by a fine of not less than one hundred dollars, nor more than five hundred dollars, or by imprisonment for not exceeding six months, or by both such fine and imprisonment, for each such offense.

Penalty

3237. The supervisor or his deputy may order the abandonment of any well that has been deserted whether or not any damage is occurring or threatened by reason of such well. Suspension of drilling operations and removal of drilling machinery is prima facie evidence of desertion after the elapse of six months unless a request for an extension of time for a period not to exceed an additional six months is theretofore filed. Removal of production equipment or facilities is prima facie evidence of desertion after the elapse of two years after April 1, 1973. At any time, the supervisor may, for good cause shown, extend these periods. Such order may be appealed to the director.

Deserted
wells

Article 4.2. Hazardous Wells

Source of
funds for
abatement

3250. The Legislature hereby finds and declares that certain idle deserted and hazardous oil and gas wells, as defined in this article, are public nuisances and that it is essential, in order to protect life, health, and natural resources that such oil and gas wells be abandoned, reabandoned, produced, or otherwise remedied to mitigate, minimize, or eliminate their danger to life, health, and natural resources.

The Legislature further finds and declares that, although the abatement of such public nuisances could be accomplished by means of an exercise of the regulatory power of the state, such regulatory abatement would result in unfairness and financial hardship for certain landowners, while also resulting in benefits to the public. The Legislature, therefore, finds and declares that the expenditure of funds to abate such nuisances as provided in this article is for a public purpose and finds and declares it to be the policy of this state that the cost of carrying out such abatement be charged to this state's producers of oil and gas as provided in Article 7 (commencing with Section 3400) of this chapter.

Hazardous
wells

3251. For the purposes of this article, an oil or gas well is a "hazardous well" if the well has been determined by the supervisor to presently pose a danger to life, health, or natural resources; and the provisions of subdivisions (a) and (b) of this section apply. Also, for the purposes of this article, an oil or gas well is an "idle deserted well" if the provisions of Section 3237 and subdivisions (a) and (b) of this section apply.

(a) Regulatory abatement of such a public nuisance is not possible because the last operator that had an economic interest in, or received any benefit from, the well is deceased, defunct, or no longer in business in this state.

(b) The present surface owner and mineral estate owners derived no substantial financial gain from the well. In making the determination respecting financial gain, the supervisor may seek such information and require such proof of these matters as may be desirable or necessary.

Article 6. Appeals and Review

Appeal from order	<p>3350. The lessor, lessee, or any operator or any well owner, or the owner of any rig, derrick, or other operating structure, or his local agent, shall within five days from the date of the service of any order from the supervisor or a district deputy, other than the order contemplated by Section 3308, either comply with the order or file with the supervisor or the district deputy a written statement that the order is not acceptable, and that appeal from the order is taken to the director under the provisions of this chapter.</p>
Hearing on appeal	<p>Any lessor, lessee, or operator affected by an order made pursuant to Section 3308 may, within five days from the posting of the copy of the order, file with the supervisor a written appeal therefrom to the director under the provisions of this chapter.</p> <p>3351. Immediately upon filing of a notice of appeal, the director shall call for a public hearing upon the appeal.</p>
Notice of hearing, continuance	<p>The hearing upon the appeal before the director shall be de novo and at such place in the district as the director may designate.</p> <p>3352. Within 10 days from the taking of the appeal, five days' notice in writing shall be given to the appellant of the time and place of the hearing. For good cause, the director may postpone the hearing, on the application of the appellant, the supervisor, or the district deputy, for not exceeding five days.</p>
Decision of director; review of certiorari	<p>3353. The director, after hearing, shall affirm, set aside, or modify the order from which the appeal is taken.</p> <p>Within 10 days after hearing the evidence, the director shall make a written decision with respect to the order appealed from. The decision of the director shall forthwith be filed with the supervisor and upon such filing shall be final. In case the order is affirmed or modified, the director shall retain jurisdiction until such time as the work ordered to be done by the order is finally completed.</p>
Time for review; hearing; continuance	<p>The written decision shall be served upon the owner or his agent and shall supersede the previous order of the supervisor. In case no written decision is made by the director within 30 days after the date of notice of hearing as provided in Section 3352, the order of the supervisor shall be effective and subject only to review by writ of certiorari from the superior court as provided in this article.</p> <p>3354. The decision of the director may be reviewed by writ of certiorari from the superior court of the county in which the district is situated, if taken within 10 days after the service of the decision upon the owner, operator, or agent of the owner or operator, as provided in Section 3353, or within 10 days after the decision by the director upon a petition by the supervisor. The writ shall be made returnable not later than 10 days after its issuance, and it shall direct the director to certify the record in the cause to the court. On the return day, the cause shall be heard by the court, unless for good cause it is continued, but no continuance shall be permitted for a longer period than 30 days.</p>
Procedure on review	<p>3355. No new or additional evidence shall be introduced in the court, but the cause shall be heard upon the record of the director. The review shall not be extended further than to determine whether or not:</p> <ol style="list-style-type: none">(a) The director acted without or in excess of his jurisdiction.(b) The order, decision, or award was procured by fraud.(c) The order, decision, rule, or regulation is unreasonable.(d) The order, decision, regulation, or award is clearly unsupported by the evidence.

3356. If a review is not taken within 10 days, or if taken, in case the decision of the director is affirmed, any charge, including penalty and interest thereon, imposed by the director shall constitute a lien which upon recordation or filing pursuant to subdivision (c) or (d) of Section 3423, attaches to real or personal property. The lien upon the property shall be enforced in the same manner as are other liens on real property and personal property of the debtor. Upon the request of the supervisor, the State Controller shall bring an action for the enforcement of the lien in the manner provided in this chapter.

Enforcement
of lien

3357. In any proceeding before the director, and in any proceeding instituted by the supervisor for the purpose of enforcing or carrying out the provisions of this division, or for the purpose of holding an investigation to ascertain the condition of any well or wells complained of, or which in the opinion of the supervisor may reasonably be presumed to be improperly located, drilled, operated, maintained, or conducted, the supervisor and the director shall have the power to administer oaths and may apply to a judge of the superior court of the county in which the proceeding or investigation is pending for a subpoena for witnesses to attend the proceeding or investigation. Upon the application of the supervisor or the director, the judge of the superior court shall issue a subpoena directing the witness to attend the proceeding or investigation, and such person shall be required to produce, when directed, all records, surveys, documents, books, or accounts in his custody or under his control; except that no person shall be required to attend upon such proceeding unless he resides within the same county or within 100 miles of the place of attendance. The supervisor or the director may in such case cause the depositions of witnesses residing within or without the state to be taken in the manner prescribed by law for like depositions in civil actions in superior courts of this state, and may, upon application to a judge of the superior court of the county within which the proceeding or investigation is pending, obtain a subpoena compelling the attendance of witnesses and the production of records, surveys, documents, books, or accounts at such places as the judge may designate within the limits prescribed in this section.

Subpoena of
witnesses

3358. Witnesses shall be entitled to receive the fees and mileage fixed by law in civil causes, payable from the General Fund.

Fees and
mileage

3359. In case of the failure or neglect on the part of any person to comply with any order of the supervisor or the director, or any subpoena, or upon the refusal of any witness to testify to any matter regarding which he may lawfully be interrogated, or upon refusal or neglect to appear and attend at any proceeding or hearing on the day specified, after having received a written notice of not less than 10 days prior to such proceedings or hearing, or upon his failure, refusal, or neglect to produce books, papers, or documents as demanded in the order or subpoena upon such day, such failure, refusal, or neglect shall constitute a misdemeanor. Each day's further failure, refusal, or neglect is a separate and distinct offense.

Penalty

The district attorney of the county in which the proceeding, hearing, or investigation is to be held, shall prosecute any person guilty of violating this section by continuous prosecution until the person appears or attends or produces such books, papers, or documents, or complies with the subpoena or order of the supervisor or the director.

Prosecuting
by District
Attorney

REGULATIONS

1722. General.

(a) This division's approval of operations is contingent upon the fulfillment of all pollution control and environmental requirements established by the State of California, including the requirements of the California Environmental Quality Act of 1970 (Public Resources Code Sections 21000 et seq.) and associated regulations of the Resources Agency and Department of Conservation.

(b) All operations shall be conducted in accordance with good oilfield practice.

(c) Compliance periods specified in these regulations may be extended by the appropriate division district deputy if good cause is shown by the operator.

(d) An oil spill contingency plan or spill plan for an installation or group of related installations shall be developed by the operator, and a copy of the plan shall be on file in the local office of the operator and subject to the inspection of the supervisor or his representatives during regular business hours. Plans prepared pursuant to Federal Environmental Protection Agency regulations (SPCC Plans) may fulfill the provisions of this subsection if such plans are determined to be adequate by the appropriate division district deputy.

(e) A blowout prevention and control plan, including provisions for duties, training, supervision, and schedules for testing equipment and performing personnel drills, shall be submitted by the operator to the appropriate division district deputy for approval, and an approved plan shall be filed with said deputy prior to commencing operations on certain critical or high-pressure wells designated by the supervisor.

(f) Notices of intention to drill, deepen, redrill, rework, or abandon wells shall be completed on current division forms and submitted, in duplicate, to the appropriate division district office for approval. Such notices shall include all information required on the forms, and such other pertinent data as the supervisor may require. Notices of intention and approvals will be cancelled if the proposed operations have not commenced within one year of receipt of the notice. However, an approval for proposed operations may be extended for one year if the operator submits a supplementary notice prior to the expiration of the one-year period and can show good cause for such an extension. For the purpose of interpretation and enforcement of provisions of this section, operations, when commenced, must be completed in a timely and orderly manner.

(g) 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 well site throughout the operations.

(h) Operators shall give the appropriate division district office sufficient advance notice of the time for inspections and tests requiring the presence of division personnel.

(i) Operations shall not deviate from the approved basic program without prior approval of the division, except in an emergency.

(j) Oil spills shall be promptly reported to those agencies specified in the California Oil Spill Contingency Plan either by calling the toll-free telephone number (800) 852-7550 or by contacting the specified agencies directly.

(k) Blowouts, fires, and hazardous gas leaks resulting from or associated with an oil or gas drilling or producing operation, or related facility, shall be promptly reported to the appropriate division district office.

(l) The use of radioactive materials in wells shall comply with the State Department of Health regulations in Title 17, Chapter 5, Subchapter 4 of the California Administrative Code. With the exception of radioactive tracers used in injection surveys, the loss of radioactive materials in a well shall be promptly reported to the State Department of Health pursuant to Section 30295 of the above-referenced regulations and to the appropriate division district office.

(m) When sufficient geologic and engineering information is available from previous drilling, the supervisor may establish field rules or change established field rules for any oil or gas pool or zone in a field. Before establishing or changing a field rule, the supervisor shall distribute the proposed rule or change to affected persons and allow at least thirty (30) days for comments from said affected persons. The supervisor shall notify affected persons in writing of the establishment or change of field rules.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

HISTORY:

1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1722.1. Acquiring Ownership or Operation of a Well.

Every person who acquires the ownership or operation of any well, whether by purchase, transfer, assignment, conveyance, exchange, or otherwise, shall, within 30 days after acquiring the well and the land, owned or leased, upon which it is located, notify the supervisor or the district deputy, in writing, of his ownership or operation, pursuant to Section 3202 of the Public Resources Code, and shall file an indemnity or cash bond, with his own name or company as principal, in the appropriate amount to cover obligations covered under the previous operator's bond.

NOTE: Authority cited: Section 3106, Public Resources Code. Reference: Sections 3204 through 3207, Public Resources Code.

1722.2. Casing Program.

All wells shall be cased and cemented in a manner consistent with good oilfield practice. Each well shall have casing designed to provide anchorage for blowout prevention equipment and to seal off fluids and segregate them for the protection of all oil, gas, and freshwater zones. Casing, tubing, and annuli shall be sealed off or equipped with a device to provide full closure at the surface, unless in the judgment of the supervisor, available data justify an exception. All casing strings shall be designed to withstand anticipated collapse, burst, and tension forces with the appropriate design factor provided to obtain a safe operation.

Casing setting depths shall be based upon geological and engineering factors, including but not limited to the presence or absence of hydrocarbons, formation pressures, fracture gradients, lost circulation intervals, and the degree of formation compaction or consolidation. All depths refer to true vertical depth (TVD) below ground level.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

HISTORY:

1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1722.3. Description of Casing Strings.

(a) Conductor casing. This casing shall be cemented at or driven to a maximum depth of 100 feet. Exceptions may be granted by the appropriate division district deputy if conditions require deeper casing depth.

(b) Surface casing. As a general rule for prospect wells, this casing shall be cemented at a depth which is at least 10 percent of the proposed total depth, with a minimum of 200 feet and a maximum of 1,500 feet of casing. A second string of surface casing shall be required in prospect wells if the first string has not been cemented in a competent bed or if unusual drilling hazards exist. The second string shall be cemented into or through a competent bed. The appropriate division district deputy may vary these general surface casing depth requirements, consistent with known geological and engineering factors, to permit maximum utilization of the casing in a specific well. In development wells, casing string length shall be determined on the basis of known field conditions.

(c) Intermediate casing. This casing may be required for protection of oil, gas, and freshwater zones, and to seal off anomalous pressure zones, lost circulation zones, and other drilling hazards.

(d) Production casing. This casing shall be cemented and, when required by the division, tested for fluid shutoff above the zone or zones to be produced. The test may be witnessed by a division inspector. 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 shall be required. This overlap shall be cemented and tested by a fluid-entry test to determine whether there is a competent seal between the two casing strings. A pressure test may be allowed only when such test is conducted pursuant to an established field rule. The test may be witnessed by a division inspector.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

HISTORY:

1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1722.4. Cementing Casing.

Surface casing shall be cemented with sufficient cement to fill the annular space from the shoe to the surface. Intermediate and production casings shall be cemented so that all freshwater zones, oil or gas zones, and anomalous pressure intervals are covered or isolated. Sufficient cement shall be used to fill the annular space to at least 500 feet above oil and gas zones and anomalous pressure intervals, and to at least 100 feet above the base of the freshwater zone. The appropriate division district deputy may require a cement bond log, temperature survey, or other survey to determine cement fill behind casing. If it is determined that the casing is not adequately cemented by the primary cementing operation, the operator shall recement in such a manner as to comply with the above requirements. If supported by known geologic conditions, an exception to the cement placement requirements of this section may be allowed by the appropriate division district deputy.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

HISTORY:

1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1723. Plugging and Abandonment—General Requirements.

(a) **Cement Plugs.** In general, cement plugs will be placed across specified intervals to protect oil and gas zones, to prevent degradation of usable waters, to protect surface conditions, and for public health and safety purposes. At the discretion of the district deputy, cement may be mixed with or replaced by other substances with adequate physical properties.

(b) **Hole Fluid.** Mud fluid having the proper weight and consistency to prevent movement of other fluids into the well bore shall be placed across all intervals not plugged with cement, and shall be surface poured into all open annuli.

(c) **Plugging by Bailer.** Placing of a cement plug by bailer shall not be permitted at a depth greater than 3,000 feet. Water is the only permissible hole fluid in which a cement plug shall be placed by bailer.

(d) **Surface Pours.** A surface cement-pour shall be permitted in an empty hole with a diameter of not less than 5 inches. Depth limitations shall be determined on an individual well basis by the district deputy.

(e) **Blowout Prevention Equipment.** Blowout prevention equipment may be required during plugging and abandonment operations. Any blowout prevention equipment and inspection requirements determined necessary by the district deputy shall appear on the approval to abandon issued by the division.

(f) **Junk in Hole.** Diligent effort shall be made to recover junk when such junk may prevent proper abandonment either in open hole or inside casing. In the event that junk cannot be removed from the hole and fresh-saltwater contacts or oil or gas zones penetrated below cannot therefore be properly abandoned, cement shall be down-squeezed through or past the junk and a 100-foot cement plug shall be placed on top of the junk. If it is not possible to down-squeeze through the junk, a 100-foot cement plug shall be placed on top of the junk.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

1723.2. Freshwater Protection. (a) Open Hole.

(1) A minimum 200-foot cement plug shall be placed across all fresh-saltwater interfaces.

(2) An interface plug may be placed wholly within a thick shale if such shale separates the freshwater sands from the brackish or saltwater sands.

(b) Cased Hole.

(1) If there is cement behind the casing across the fresh-saltwater interface, a 100-foot cement plug shall be placed inside the casing across the interface.

(2) If the top of the cement behind the casing is below the top of the highest saltwater sands, squeeze-cementing shall be required through perforations to protect the freshwater deposits. In addition, a 100-foot cement plug shall be placed inside the casing across the fresh-saltwater interface. Notwithstanding other provisions of this section, the district deputy may approve a cavity shot followed by cementing operations at the base of the freshwater sands. The cavity shall be filled with cement and capped with a cement plug extending 100 feet above the cavity shot.

(c) Special Requirements. Where geologic or groundwater conditions dictate, special plugging procedures shall be required to prevent contamination of useable waters by downward percolation of poor quality surface waters, to separate water zones of varying quality, and to isolate dry sands that are in hydraulic continuity with groundwater aquifers.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

1723.3. Casing Shoe. If the hole is open below the shoe, a cement plug shall extend from at least 50 feet below to at least 50 feet above the shoe of any cemented casing. If the hole cannot be cleaned out to 50 feet below the shoe, a 100-foot cement plug shall be placed as deep as possible.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

1723.4. Casing Stub. When casing is recovered from inside another casing string (or strings), and the outer string (or strings) is cemented opposite the casing stub, a 100-foot cement plug shall be required on the casing stub. A plug on the casing stub will generally not be required when casing is recovered in open hole or from inside another casing string that is not cemented opposite the casing stub.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

1723.5. Surface Plugging.

The hole and all annuli shall be plugged at the surface with at least a 25-foot cement plug. The district deputy may require, particularly in urban areas, that inner strings of uncemented casing be removed to at least the base of the surface plug prior to placement of the plug.

All well casing shall be cut off at least 5 feet below the surface of the ground. In urban areas, a steel plate at least as thick as the outer well casing shall be welded around the circumference of the outer casing at the top of said casing, after division approval of the surface plug.

NOTE: Authority cited: Section 3106, Public Resources Code. Reference: Section 3228, Public Resources Code.

HISTORY:

1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).
2. Amendment filed 6-30-80; effective thirtieth day thereafter (Register 80, No. 27).

1723.6. Recovery of Casing. (a) Approval to recover all casing possible will be given in the abandonment of wells where subsurface plugging can be done to the satisfaction of the district deputy.

(b) The hole shall be full of fluid prior to the detonation of any explosives in the hole. Such explosives shall be utilized only by a licensed handler with the required permits.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

1723.7. Inspection of Plugging and Abandonment Operations. Plugging and abandonment operations that require witnessing by the division shall be witnessed and approved by a division employee. When discretion is indicated by these regulations, the district deputy shall determine which operations are to be witnessed.

(a) Blowout prevention equipment—may inspect and test equipment and installation.

(b) Oil and gas zone plug—may witness placing and shall witness location and hardness.

(c) Mudding of hole—may witness mudding operations and determine that specified physical characteristics of mud fluid are met.

(d) Freshwater protection:

(1) Plug in open hole—may witness placing and shall witness location and hardness. Plug in cased hole—shall witness placing or location and hardness.

(2) Cementing through perforations—shall witness cementing operation.

(3) Cavity shot—may witness shooting and shall witness placing or location and hardness of required plug.

(e) Casing shoe plug—shall witness placing or location and hardness.

(f) Casing stub plug—shall witness placing or location and hardness.

(g) Surface plug—may witness emplacement and shall witness or verify location.

(h) Environmental inspection—shall determine that division environmental regulations (California Administrative Code, Title 14, Subchapter 2) have been adhered to.

History: 1. Amendment filed 9-21-76; effective thirtieth day thereafter (Register 76, No. 39).

2. Amendment of subsection (d) (1) filed 10-11-79; effective thirtieth day thereafter (Register 79, No. 41).

1723.8. Special Requirements. The supervisor, in special cases, may set forth other plugging and abandonment requirements or may establish field rules for the plugging and abandonment of wells. Such cases include, but are not limited to:

(a) The plugging of a high-pressure saltwater zone.

(b) Perforating and squeeze-cementing previously uncemented casing within and above a hydrocarbon zone.

History: 1. Amendment filed 9-21-76; effective thirteenth day thereafter (Register 76, No. 39).

1724. Required Well Records. The operator of any well drilled, redrilled, deepened, or reworked on or after the effective date of this subchapter shall keep, or cause to be kept, an accurate record of each operation on each well including, but not limited to, the following, when applicable:

(a) Log and history showing chronologically the following data:

(1) Character and depth of all formations, water-bearing strata, oil- and gas-bearing zones, lost circulation zones, and abnormal pressure zones encountered.

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

(3) Tubing size and depth, type and location of packers, safety devices, and other tubing equipment.

(4) Hole sizes.

(5) Cementing and plugging operations, including date, depth, slurry volume and composition, fluid displacement, pressures, fill, and downhole equipment.

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

(7) BOPE installation, inspections, and pressure tests.

(8) Shutoff, pressure, and lap tests of casing, including date, duration, depth, and results.

(9) Sidetracked casing, tools, or other material.

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

(11) Production or injection method and equipment.

(b) Core record showing the depth, character, and fluid content, so far as determined, of all cores, including sidewall samples.

(c) Such other information as the supervisor may require for the performance of his statutory duties.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

History: 1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7). For history of former section, see Register 76, No. 39.

1724.1. Filing Records. Legible copies, in duplicate, of the complete and accurate well summary, core records, and history on current division forms or on forms previously approved by the supervisor, and two true and reproducible copies of all electrical, physical or chemical logs, tests, or surveys run, shall be filed with the division within 60 days after the completion, abandonment, or suspension of operations of a well, or upon written request of the supervisor. Dipmeter surveys shall be in a form indicating the computed direction and amount of dip. Submittal of hole caliper logs, if run, on development wells may be waived by the appropriate division district deputy.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

History: 1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1724.6. Underground Injection and Disposal Projects. Approval must be obtained from this division before any subsurface injection or disposal project can begin. The operator requesting approval for such a project must provide to the appropriate division district deputy any data that, in the judgment of the supervisor, are pertinent and necessary for the proper evaluation of the proposed project.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

History: 1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1724.7. Enhanced Recovery, Disposal, and Related Projects. The data required by the division prior to approval of enhanced recovery, disposal, and related projects include the following, where applicable:

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

(1) Statement of primary purpose of the project.

(2) Reservoir characteristics of each injection zone, such as porosity, permeability, average thickness, areal extent, fracture gradient, original and present temperature and pressure, and residual oil, gas, and water saturations.

(3) Reservoir fluid data for each injection zone, such as oil gravity and viscosity, water quality, and specific gravity of gas.

(4) Casing diagrams, including cement plugs, and actual, or calculated cement fill behind casing, of all idle, abandoned, or deeper-zone producing wells within the area affected by the project, and evidence that abandoned wells in the area will not have an adverse effect on the project or cause damage to life, health, property, or natural resources.

(5) The planned well-drilling and abandonment program to complete the project, including a flood-pattern map showing all injection, production, and abandoned wells, and unit boundaries.

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

(1) Structural contour map drawn on a geologic marker at or near the top of each injection zone in the project area.

(2) Isopachous map of each injection zone or subzone in the project area.

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

(4) Representative electric log to a depth below the deepest producing zone (if not already shown on the cross section), identifying all geologic units, formations, freshwater aquifers, and oil or gas zones.

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

(1) A map showing injection facilities.

(2) Maximum anticipated surface injection pressure (pump pressure) and daily rate of injection, by well.

(3) Monitoring system or method to be utilized to ensure that no damage is occurring and that the injection fluid is confined to the intended zone or zones of injection.

(4) Method of injection.

(5) List of proposed cathodic protection measures for plant, lines, and wells, if such measures are warranted.

(6) Treatment of water to be injected.

(7) Source and analysis of the injection liquid.

(8) Location and depth of each water-source well that will be used in conjunction with the project.

(d) Copies of letters of notification sent to offset operators.

(e) Other data as required for large, unusual, or hazardous projects; for unusual or complex structures; or for critical wells. Examples of such data are: isogor maps, water-oil ratio maps; isobar maps; equipment diagrams; and safety programs.

(f) All maps, diagrams and exhibits required in Section 1724.7(a) through (e) shall be clearly labeled as to scale and purpose and shall clearly identify wells, boundaries, zones, contacts, and other relevant data.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

History: 1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).

1724.8. Cyclic Steam Injection.

The data required by the division prior to approval of a cyclic steam (steam soak) project include, but are not limited to, the following:

(a) A letter from the operator notifying the division of the intention to conduct cyclic steam injection operations on a specific lease, in a specific reservoir, or in a particular well.

(b) If cyclic steam injection is to be in wells adjacent to a lease boundary, a copy of a letter notifying each offset operator of the proposed project.

NOTE: Authority cited: Sections 3106 and 3107, Public Resources Code. Reference: Sections 3106, 3107, 3203, 3210-3215, 3219, 3220 and 3222-3224, Public Resources Code.

HISTORY:

1724.10. Filing, Notification, Operating, and Testing Requirements for Underground Injection Projects.

(a) The appropriate division district deputy shall be notified of any anticipated changes in a project resulting in alteration of conditions originally approved, such as: increase in size, change of injection interval, or increase in injection pressure. Such changes shall not be carried out without division approval.

(b) Notices of intention to drill, redrill, deepen, or rework, on current division forms, shall be completed and submitted to the division for approval whenever a new well is to be drilled for use as an injection well and whenever an existing well is converted to an injection well, even if no work is required on the well.

(c) An injection report on a current division form or in a computerized format acceptable to the division shall be filed with the division on or before the 30th day of each month, for the preceding month.

(d) A chemical analysis of the liquid being injected shall be made and filed with the division whenever the source of injection liquid is changed, or as requested by the supervisor.

(e) An accurate, operating pressure gauge or pressure recording device shall be available at all times, and all injection wells shall be equipped for installation and operation of such gauge or device. A gauge or device used for injection-pressure testing, which is permanently affixed to the well or any part of the injection system, shall be calibrated at least every six months. Portable gauges shall be calibrated at least every two months. Evidence of such calibration shall be available to the division upon request.

(f) All injection piping, valves, and facilities shall meet or exceed design standards for the maximum anticipated injection pressure, and shall be maintained in a safe and leak-free condition.

(g) All injection wells, except steam, air, and pipeline-quality gas injection wells, shall be equipped with tubing and packer set immediately above the approved zone of injection within one year after the effective date of this act. New or recompleted injection wells shall be equipped with tubing and packer upon completion or recompletion. Exceptions may be made when there is:

- (1) No evidence of freshwater-bearing strata.
- (2) More than one string of casing cemented below the base of fresh water.
- (3) Other justification, as determined by the district deputy, based on documented evidence that freshwater and oil zones can be protected without the use of tubing and packer.

(h) Data shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the division. Project data shall be available for periodic inspection by division personnel.

(i) To determine the maximum allowable surface injection pressure, a step-rate test shall be conducted prior to sustained liquid injection. Test pressure shall be from hydrostatic to the pressure required to fracture the injection zone or the proposed injection pressure, whichever occurs first. Maximum allowable surface injection pressure shall be less than the fracture pressure. The appropriate district office shall be notified prior to conducting the test so that it may be witnessed by a division inspector. The district deputy may waive or modify the requirement for a step-rate test if he determines that surface injection pressure for a particular well will be maintained considerably below the estimated pressure required to fracture the zone of injection.

(j) All injection wells will be monitored to ensure that the injected fluid is confined to the intended zone or zones. Except for steam and air injection wells, sufficient surveys shall be filed with the division within three (3) months after injection has commenced, once every year thereafter, after any significant anomalous rate or pressure change, or as requested by the division, to confirm that the injection fluid is confined to the proper zone or zones. Typical surveys used to monitor injection wells are the radioactive tracer, spinner, and static temperature. The monitoring schedule may be modified by the district deputy if supported by documented evidence showing good cause. The appropriate district office shall be notified before such surveys are made, as they may be witnessed by a division inspector.

(k) Additional requirements or modifications of the above requirements may be necessary to fit specific circumstances and types of projects. Examples of such additional requirements or modifications are:

- (1) Injectivity tests.
- (2) Graphs of time vs. oil, water, and gas production rates, maintained for each pool in the project and available for periodic inspection by division personnel.

Continued

(3) Graphs of time vs. tubing pressure, casing pressure, and injection rate maintained for each injection well and available for periodic inspection by division personnel.

(4) List of all observation wells used to monitor the project, indicating what parameter each well is monitoring (i.e., pressure, temperature, etc.), submitted to the division annually.

(5) List of all injection-withdrawal wells in a gas storage project, showing casing-integrity test methods and dates, the types of safety valves used, submitted to the division annually.

(6) Isobaric maps of the injection zone, submitted to the division annually.

(7) Notification of any change in waste disposal methods.

NOTE: Authority cited: Section 3106, Public Resources Code. Reference: Section 3106 Public Resources Code.

HISTORY:

1. New section filed 2-17-78; effective thirtieth day thereafter (Register 78, No. 7).
2. Amendment filed 6-30-80; effective thirtieth day thereafter (Register 80, No. 27).

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