SCC NO. 1455

AN ORDINANCE OF THE SACRAMENTO COUNTY CODE RELATING TO WELLS AND PUMPS

The Board of Supervisors of the County of Sacramento, State of California, ordains as follows:

SECTION 1. Section 6.28.000 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.000 Declaration of Purpose and General Provisions.

A. Purpose of Chapter. It is the purpose of this Chapter to protect the health, safety, and general welfare of the people of the County of Sacramento by ensuring that the groundwater of this County will not be polluted or contaminated by improper well construction, modification, repair, inactivation, or destruction, or by improper pump installation. To this end, minimum requirements are contained in this Chapter for construction, modification, repair, inactivation, and destruction of wells, as defined in this Chapter, and for installation of pumps.

B. Tense or Gender. Words used in the present tense include the future as well as the present. Words used in the masculine gender include the feminine and neuter. The singular number includes the plural, and the plural the singular.

C. Section Headings. When contained in this Chapter, section headings shall not be deemed to govern, limit, modify, or in any manner affect the scope, meaning, or intent of the provisions of any section.

D. Words as Defined in Other Documents. Except as otherwise required by the context of this Chapter, the terms used in this Chapter shall have the same meaning as in Chapter 10 of Division 7 of the California Water Code, and the Department of Water Resources Bulletin 74-81 and subsequent supplements or revisions.

E. Individual Wells Required. When individual water wells are the proposed domestic water supply, each lot or parcel shall have its own individually drilled well located on the subject lot or parcel. This provision shall not apply to lots or parcels served by an approved public water system.

F. Discovery of Contamination. Any person who, in the course of drilling any exploratory boring or well for which a permit is required pursuant to this Chapter, detects contamination or pollution as defined in Section 6.28.010(D) in soil or groundwater, or both, by analytical means, shall notify the Sacramento County Environmental Management Department, Environmental Compliance Division, within sixty days of such detection, unless the detection is in a supply well, in which case notification shall occur within two working days of detection. This requirement shall not apply to sites that are actively overseen by the California Department of Toxic

Substances Control, the California Regional Water Quality Control Board, Central Valley Region, or the Sacramento County Environmental Management Department.

G. Consultation Zone. Any application for a well permit within two thousand (2000) feet of a known groundwater contaminant plume is subject to special review by appropriate regulatory agencies, including but not limited to the Sacramento County Environmental Management Department and the California Regional Water Quality Control Board, Central Valley Region, to evaluate potential impacts to public health and groundwater quality.

H. Best Available Technology (BAT). The standards contained in this Chapter provide a minimum level of protection for groundwater resources of Sacramento County. New materials and techniques that are developed in the future shall be encouraged and allowed, contingent upon their approval by the Enforcement Agency, if they equal or exceed the standards in this Chapter in performance and level of protection.

I. Responsibility for Compliance. The well owner shall be responsible for compliance with all applicable provisions of this Chapter. In addition, the applicant for a permit to complete any activity regulated by this Chapter shall be responsible for compliance with all applicable provisions of this Chapter until the regulated activity has been completed.

SECTION 2. Section 6.28.010 of Chapter 6.28, Title 6, of the Sacramento County Code is amended to read as follows:

6.28.010 Definitions.

A. "Applicant" means (1) the legal owner(s) of the property on which the pump is to be installed or repaired, or on which the well is to be constructed, modified or repaired, inactivated or destroyed; or (2) a licensed contractor who shall perform the work on the well or pump; or (3) the owners' or contractors' agent authorized in writing to make an application on behalf of the principal.

B. "Board" means the County of Sacramento Board of Supervisors, which is the governing Board, within the unincorporated area of the County, with authority over well standards.

C. "Construction" means digging, boring, drilling, casing, perforating, screening, gravel packing and sealing of wells, or installing of a well pump, in accordance with all standards adopted by this Chapter.

D. "Contamination" and "pollution" shall have meanings ascribed to them by the California Water Code, Section 13050.

E. "Destruction of wells" means the proper decommissioning of wells to ensure that the groundwater supply is protected and preserved for future use and to eliminate potential physical hazards, in accordance with all standards adopted by this Chapter.

F. "Director" means the Director of the Sacramento County Environmental Management Department, or his designee.

G. "Emergency" means a stoppage, interruption or significant reduction of water supply to domestic, industrial or agricultural uses.

H. "Enforcement Agency" means the County of Sacramento, Environmental Management Department.

I. "Modification" or "repair" means the deepening, reperforation, sleeving, sealing or replacement of a well casing, or the repair or replacement of a well pump.

J. "Nuisance" means a well which contaminates or pollutes, or which threatens to contaminate or pollute, the groundwater of the County in a manner that jeopardizes the health and safety of the public. A "nuisance" also means an unsanitary or unsafe condition resulting from well construction, operation, modification, repair, inactivation, or destruction, or from pump installation, operation, repair, or replacement.

K. "Permit" means a printed document, issued by the Enforcement Agency, which permits the construction, modification, repair, inactivation, or destruction of a well, or the installation, repair, or replacement of a well pump.

L. "Person" means any individual, trust, firm, joint stock company, corporation, partnership or association. "Person" also includes any city, county, district, the state, the federal government or any agency thereof to the extent that such persons may lawfully be regulated under this Chapter.

M. "Public Agency" means any public agency of the State including, but not limited to, cities, counties, districts, agencies and authorities.

N. "Water table" means the top of the saturated zone where unconfined groundwater is under atmospheric pressure.

O. "Well" or "water well" means any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. In addition, for purposes of this Chapter, the following structures are also defined as wells: abandoned wells, agricultural wells, air conditioning wells, cathodic protection wells, community domestic wells, exploratory holes (borings), extraction wells, horizontal wells, inactive wells, individual domestic wells, industrial wells, injection wells, monitoring wells, test wells, vapor extraction wells, and water supply wells. It is not intended that potholes, drainage trenches or canals, waste water ponds, shallow root zone piezometers, stock ponds, leaching pits, or similar excavations be included within the definition of a well.

1. "Abandoned well" means any well that has not been used for a period of one year, unless the owner demonstrates intention to use the well again, by obtaining an inactivation permit.

2. "Agricultural well" means any well used to supply water only for irrigation or other agricultural purposes.

3. "Air conditioning well" means any well constructed to return to the ground water which has been used as a coolant in air conditioning processes.

4. "Cathodic protection well" means any artificial excavation constructed by any means for the purpose of installing equipment or facilities for the protection electrically of metallic equipment in contact with the ground.

5. "Community domestic well" means any water well used to supply water for domestic purposes to a public water system as defined by the California Health & Safety Code, Section 116275. Such wells are variously referred to as "municipal wells," "city wells," "public water supply wells" or "small water system wells."

6. "Exploratory hole (boring)" means an uncased temporary excavation or boring drilled to a depth within ten (10) feet of groundwater, or deeper, based on

available groundwater data, whose purpose is the immediate determination of hydrologic or geologic conditions at a site.

7. "Extraction well" means an artificial excavation constructed by any method for the purpose of removing groundwater to be used either for permanent dewatering, for use in an open-loop geothermal heat exchange system, or for removal of groundwater for cleanup of contamination.

8. "Geothermal heat exchange well" means any uncased artificial excavation constructed by any method for the purpose of using the heat exchange capacity of the earth for heating and cooling and in which the ambient ground temperature is 86° Fahrenheit (30° Celsius) or less and which uses a closed loop fluid system to prevent the discharge or escape of its fluid into the surrounding aquifers or geologic formations. Geothermal heat exchange wells are also known as ground source heat pump wells. (Water Code § 13713)

9. "Horizontal well" means a well drilled horizontally or at an angle different from vertical.

10. "Inactive well" means any well that is not routinely operated, but is intended to be reused in the future, and is capable of being made operable with a minimum of effort, and is not a nuisance, and for which an inactivation permit has been obtained.

11. "Individual domestic well" means any water well used to supply domestic water to one water connection, either residential or commercial, serving fewer than twenty-five (25) persons.

12. "Industrial well" means any water well used to supply industry on an individual basis (in contrast to supplies provided through community systems).

13. "Injection well" means an artificial excavation constructed by any method for the purpose of introducing water, nutrient solutions, treated water, or reclaimed water into the underground as a means of replenishing groundwater basins, or enhancing recovery of chemical constituents, or establishing hydraulic control over local groundwater, or as part of an open-loop geothermal heat exchange system.

14. "Monitoring well" means any artificial excavation constructed by any method for the purpose of monitoring fluctuations in groundwater levels, quality of underground waters, or the concentration of contaminants in underground waters.

15. "Test well" means a cased well constructed to obtain information needed for the design of other wells.

16. "Vapor extraction well" means an artificial excavation constructed by any method for the purpose of injection, monitoring or extraction of vapors, or liquids, or both, into or from the predominantly unsaturated zone above the water table. It is not intended that temporary soil vapor sample borings advanced to a depth of 5 feet or less be included within the definition of a vapor extraction well.

17. "Water supply well" means any well constructed for the purpose of water supply. This includes community and individual domestic wells, and agricultural or industrial water wells as defined by state well standards or by this Chapter.

18. "Exempt wells" means the following wells, which are exempt from the requirements of this Chapter: (1) any well constructed under the jurisdiction of the State Department of Conservation, except any such well which is converted to a use regulated by this Chapter; (2) any well used for the purpose of dewatering excavations

during construction or for stabilizing hillsides or earth embankments; or (3) other wells whose regulation is not necessary to fulfill the purpose of this Chapter, as determined by the Enforcement Agency.

P. "Well owner" means the owner of the property on which the well is located, unless the well has been installed in conjunction with an investigation of a known or suspected release of a hazardous material, or unless the well has been installed for geotechnical purposes by a person that does not own the property on which the well is located, or unless well ownership has been legally changed by a transfer of water rights or otherwise. If the well has been installed in conjunction with an investigation of a known or suspected release of a hazardous material, or for geotechnical purposes by a person that does not own the property on which the well is located, the well owner is the person responsible for conducting the environmental or geotechnical investigation.

SECTION 3. Section 6.28.030 of Chapter 6.28, Title 6, of the Sacramento County Code is amended to read as follows:

6.28.030 Permits.

A. Permit Required: No person shall dig, bore, drill, deepen, modify, repair, inactivate, or destroy a well, or install, repair, or replace a well pump without first applying for and receiving a permit as provided in this ordinance unless exempted by law. A separate permit and fee is required for each well or pump. The separate permit and fee requirement may be waived by the Enforcement Agency in cases where multiple wells or exploratory borings of similar construction will be drilled as a single project. Projects shall be given waiver consideration on a case-by-case basis, upon the request of the applicant. Separate permit and fee waivers must ensure full cost recovery by the Enforcement Agency. Where removal of a well pump or breaking of the well seal is not necessary, a pump permit shall not be required. It is not intended that a permit be obtained for the installation of a temporary pump.

1. Persons to Whom Permits Shall be Issued. Permits shall be issued pursuant to this Chapter only to the legal owner of the property on which the well is to be constructed, modified, repaired, or destroyed, or on which the pump is to be installed or repaired, or to a person holding a valid California C-57 contractor's license as described below, or to the owner's or driller's authorized representative. Permits for inactivation of wells shall be issued only to the legal owner of the property on which the wells are to be inactivated.

All construction, modification, repair, or destruction work on wells shall be performed by a person who possesses a valid C-57 contractor's license in accordance with the provisions of the California Business and Professions Code, Section 7000, et seq. and Water Code Section 13750.5. Installation, repair, or replacement of a well pump shall be performed by a person who possesses a valid C-57, C-61 or Class A contractor's license. Such license shall be in effect and in good standing with the State Contractors' Licensing Board.

In accordance with the California Labor Code, Section 3800, the Enforcement Agency shall confirm with the California Contractors State License Board that the applicant has signed a declaration under penalty of perjury verifying workers'

compensation coverage or exemption from coverage, as required by Section 19825 of the Health and Safety Code. The Enforcement Agency's confirmation shall take place by electronic means at the time of permit issuance.

2. Late Fee for Failure to Obtain Permit. Any person who commences any work for which a permit is required by this Chapter without having first obtained a permit shall be required to pay a late fee equal to twice the standard permit fee.

3. Emergency Work. The above provisions shall not apply to emergency work required to maintain drinking, agricultural, or industrial water supply systems, or to prevent an imminent and substantial threat to public health and safety. In such cases, the person responsible for the emergency work shall comply with the following:

a. Time Limit. Apply for a permit within three working days after commencement of the emergency work.

b. Urgency. Satisfy the Enforcement Agency that such work was urgently necessary. If the cause for urgency is not satisfactorily shown, penalties as described in Section 6.28.120 shall be imposed.

c. Conformance with Standards. Demonstrate that all work was performed in conformance with the technical standards set forth in this Chapter.

B. Application Procedure. Applications for permits shall be made to the Enforcement Agency and shall contain all such information the Enforcement Agency requires to accomplish the purposes of this Chapter. This application shall be made in writing and signed by the applicant on such forms as may be prescribed by the Enforcement Agency. The application shall be accompanied by the required application fee.

C. Application Fees. Application fees adopted and modified by the Board shall accompany the permit application. For activities regulated in this Chapter which occur at sites for which other cost recovery mechanisms are available, application fees may be deferred, at the approval of the Enforcement Agency, pending recovery of those costs incurred for oversight of such activities. The party responsible for payment of oversight costs incurred by the Department shall be responsible for payment of application fees if such fees are unable to be recovered through the alternative cost recovery mechanism.

D. Permit Approval. If the Enforcement Agency finds that the permit application contains all the necessary information and the proposed work is in compliance with all applicable well standards as defined in this Chapter, the Enforcement Agency shall issue the applicant a comprehensive permit containing such conditions as are necessary to fulfill the purposes of this Chapter. The permit approval received from the Enforcement Agency is separate from any other permit or clearance that may be required by another governmental agency or entity.

E. Permit Conditions.

1. Special Conditions. When the Enforcement Agency issues a permit pursuant to this Chapter, it may condition the permit in any manner necessary to carry out the purposes of this Chapter. Conditions may include, but are not limited to: special construction requirements, special destruction requirements, greater setback distance requirements, greater grout seal thickness, greater annular space, special wellhead construction, or demonstration of adequate water quantity, or quality, or both, after well completion.

2. Proper Disposal of Drilling Fluids and Soil Cuttings. The applicant is required to see that safe and appropriate measures are taken in the handling and disposal of drilling fluids, soil cuttings, and other materials used or generated in connection with the permitted work. All drilling wastes must be controlled so as not to create conditions which violate applicable local, State and federal regulations. Discharge of drilling wastes into the sanitary sewer or storm drain is prohibited unless authorized by the Sacramento County Department of Public Works. This provision does not modify the measures for proper handling, storage, and disposal of hazardous waste set forth in the California Health and Safety Code, Division 20, Chapter 6.5 (Hazardous Waste Control) and by the California Code of Regulations, Title 22, Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste).

3. Mud Pits. Mud pits created to confine drilling fluids shall be maintained during the well drilling operation so as not to be a nuisance. It shall be the applicant's responsibility to see that the mud pit is properly evacuated, or backfilled, or both evacuated and backfilled upon completion of the job.

4. Abandoned Wells. As a condition of well construction, modification, repair, inactivation, or destruction permits, and of pump installation, repair, or replacement permits, any abandoned wells on the property shall be destroyed or permitted for inactive status in accordance with standards provided in this Chapter.

5. Posting of Permit. Except in the case of an inactivation permit, it shall be the responsibility of the applicant to maintain a copy of this permit at the work site during all stages of permitted activities.

F. Permit Denial. The Enforcement Agency shall deny an application for a permit if:

1. The applicant is not a person authorized to perform the work as provided by this Chapter;

2. The permit application is incomplete;

3. The proposed work does not meet the standards adopted by this ordinance; ~~or~~

4. Issuance of a permit does not fulfill the purpose of this Chapter; or

5. The applicant is delinquent in payment of fees for any other project subject to regulation under this Chapter.

G. Permit Expiration. The applicant shall either complete the work authorized by the permit within one year of the date of issuance (except for well inactivation permits, which have a two-year term), or forfeit permission to complete the work specified in the permit. If there have been exceptional circumstances, the Enforcement Agency may grant the applicant an extension. A fee equal to twenty percent (20%) of the original permit fee shall be paid in connection with a one-time extension, for the term of the original permit, of any permit granted under this Chapter. Such an extension shall be in writing and may contain additional permit conditions. Upon the expiration of the permit, no further work shall be done unless and until the applicant has received an extension or a new permit.

H. Inactivation Permits. An inactivation permit must be obtained for any well which has not been used for a period of one year, but which the owner intends to use again. Any such well which has not been permitted for inactive status by the Enforcement Agency is considered to be abandoned or permanently inactive and must

be destroyed in accordance with applicable Department of Water Resources' standards, pursuant to the California Health & Safety Code, Section 115700(e). The term of a well inactivation permit shall be two years. Inactivation permits must be renewed until the well owner obtains a well repair or well destruction permit and completes the well repair or well destruction within the term of that permit. In addition to any conditions specified in the permit pursuant to Section 6.28.030(E)(1), the applicant must maintain the well in such a way that the following requirements are met:

1. The well shall not allow impairment of the quality of water within the well and groundwater encountered by the well.

2. The top of the well and the well casing shall be provided with watertight covers that are secured by locks or by other means to prevent their removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. A pump motor, angle drive, or other surface feature of the well, when in compliance with the above provisions, shall suffice as a cover.

3. The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well.

4. The area surrounding the well shall be kept clear of brush, debris, and waste materials.

SECTION 4. Section 6.28.040 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.040 Water Well Standards.

The following water well standards have been designed to meet or exceed the water well standards contained in the Department of Water Resources' Bulletins 74-81 and 74-90. All community domestic wells, as a minimum, shall be sited and constructed in accordance with the California Waterworks Standards (California Code of Regulations, Title 22, Division 4, Chapter 16), which are hereby incorporated by reference.

A. Well Construction

1. Well Location With Respect To Pollutants and Contaminants and Structures.

a. Separation. All wells must be located an adequate horizontal distance from known or potential sources of pollution or contamination, as specified in the following table:

POLLUTION SOURCE	SETBACK
Any sewer line (sanitary, industrial, or storm; main or lateral)	50'
Watertight septic tank	100'
Leach lines	100'
Deep trench	100'
Leaching pit	150'
Stream, ditch, drainage course	50'

Animal/fowl enclosure	100'
Pond or lake	50'
Hazardous materials tank	150'

Lesser separation distances may be approved by the Enforcement Agency on a case-by-case basis where physical conditions preclude compliance with the specified minimum separation distances and where special means of protection are provided.

b. Gradients. Where possible, a well shall be located up the groundwater gradient from potential sources of pollution or contamination. Consideration should be given to the fact that the gradient near a well can be reversed by pumping (see Bulletin 74-81, page 28, Figure 3) or by other influences.

c. Flooding and Drainage. New water wells and related appurtenances should be located above the Base Flood Elevation (BFE) as established by the Sacramento County Department of Water Resources. If the well must be installed below the BFE, the following conditions shall apply:

(1) The wellhead must be watertight. This includes chlorination ports, electrical connections, sounding tubes, and any other connections or devices that may provide an avenue for entry of flood water into the aquifer.

(2) The pressure tank, electrical box, air vent, and other devices subject to flood damage or flood water intrusion shall be located above the BFE.

(3) To prevent floodwater from entering the aquifer in the event of a water line break, an approved check valve shall be installed on the main water line within three feet of the wellhead. Surface drainage shall be directed away from the well.

d. Accessibility. All wells shall be located an adequate distance from buildings and other structures to allow access for well modification, maintenance, repair, and destruction, unless otherwise approved by the Enforcement Agency.

2. Sealing the Upper Annular Space.

a. Minimum Depth of Annular Surface Seal. The annular surface seal shall extend from ground surface to a depth of at least fifty (50) feet and shall anchor in a satisfactory, impervious stratum. This depth is hereafter referred to as the "minimum annular seal depth."

(1) Shallow Groundwater. Exceptions to the minimum seal depth may be made for shallow wells at the approval of the Enforcement Agency, where the water to be produced is at a depth less than fifty (50) feet. In no case shall an annular seal extend to a total depth less than ten (10) feet below land surface.

(2) Vaults. At the approval of the Enforcement Agency, the top of an annular surface seal and well casing may be below ground surface where traffic or other conditions require, if the seal and casing extend to a watertight and structurally sound subsurface vault, or equivalent feature. In no case shall the top of the annular surface seal be more than four feet below ground surface. The vault shall extend from the top of the annular seal to at least ground surface. Vaults are prohibited for community domestic wells.

b. Sealing Conditions. The following requirements are to be observed for sealing the annular space. (For wells situated in circumstances different from those described below, the sealing conditions shall be as prescribed by the Enforcement Agency.)

(1) Wells Drilled in Unconsolidated, Caving Material. An oversized hole, at least four inches greater in diameter than the outside diameter of the well casing, shall be drilled and a conductor casing (such as hollow stem augers) temporarily installed to at least the minimum annular seal depth. Permanent conductor casing may be used if it is installed in accordance with subsections (A)(2)(b)(3) [WELLS DRILLED IN SOFT CONSOLIDATED FORMATIONS] and (A)(2)(b)(5) [GRAVEL PACKED WELLS WITH CONDUCTOR CASING], below, and if it extends at least to the minimum annular seal depth.

Temporary conductor casing shall be withdrawn as sealing material is placed between the well casing and borehole wall (see Bulletin 74-81, page 31, Figure 4A). Sealing material shall be placed at least to the minimum annular seal depth. The sealing material shall be kept at a sufficient height above the bottom of the temporary conductor casing as it is withdrawn to prevent caving of the borehole wall.

Temporary conductor casing may be left in place in the borehole after the placement of the annular seal only at the approval of the Enforcement Agency on a case-by-case basis.

(2) Wells Drilled in Unconsolidated Material with Significant Clay Layers. An oversized hole, at least four inches greater in diameter than the outside diameter of the well casing, shall be drilled to at least the minimum annular seal depth, and the annular space between the borehole wall and the well casing shall be filled with sealing material in accordance with subsection (A)(2)(a) [MINIMUM DEPTH OF ANNULAR SURFACE SEAL], above (see Bulletin 74-81, page 31, Figure 4B). If a significant layer of clay or clay-rich deposits of low permeability is encountered within five feet of the minimum annular seal depth, the annular seal shall be extended at least five feet into the clay layer. If the clay layer is known to be less than five feet in total thickness, the clay layer shall not be fully penetrated.

If caving material is present within the minimum annular seal depth interval, a temporary conductor casing shall be installed to hold the borehole open during well drilling and placement of the casing and annular seal, in accordance with the requirements of subsection (A)(2)(b)(1) [WELLS DRILLED IN UNCONSOLIDATED CAVING MATERIAL], above. Permanent conductor casing may be used if it is installed in accordance with subsections (A)(2)(b)(3) [WELLS DRILLED IN SOFT CONSOLIDATED FORMATIONS] and (A)(2)(b)(5) [GRAVEL PACKED WELLS WITH CONDUCTOR CASING], below, and it extends to at least the minimum annular seal depth.

(3) Wells Drilled in Soft Consolidated Formations (Extensive Clays, Sandstones, etc.). An oversized hole, at least four inches greater in diameter than the outside diameter of the well casing, shall be drilled to at least the minimum annular seal depth. The space between the well casing and the borehole shall be filled with sealing material to at least the minimum annular seal depth (see Bulletin 74-81, page 31, Figure 4C).

If a permanent conductor casing is to be installed to facilitate the construction of the well, an oversized hole, at least four inches greater in diameter than the outside surface of the permanent conductor casing, shall be drilled to the bottom of the conductor casing or to at least the minimum annular seal depth, and the annular space between the conductor casing and the borehole wall shall be filled with sealing material.

In some cases, such as in cable tool drilling, it may be necessary to extend permanent conductor casing beyond the required depth of the annular surface seal in order to maintain the borehole. Sealing material is not required between conductor casing and the borehole wall other than the minimum annular seal depth or the depth specified in subsection (A)(6) [SEALING-OFF STRATA], below.

(4) Wells Situated in "Hard" Consolidated Formations (Crystalline or Metamorphic Rock). An oversized hole shall be drilled to the minimum annular seal depth and the annular space shall be filled with sealing material. If there is significant overburden, a conductor casing may be installed to retain it. If the well is to be open-bottomed (lower section uncased), the casing shall be seated in the sealing material (see Bulletin 74-81, page 33, Figure 5A).

(5) Gravel Packed Wells With Conductor Casing. An oversized hole, at least four inches greater in diameter than the conductor casing, shall be drilled to the minimum annular seal depth, and the annular space between the conductor casing and the borehole shall be filled with sealing material. In this case, the gravel pack may extend to the top of the well, but, to prevent contamination by surface drainage, a welded cover shall be installed over the top in the space between the conductor casing and the well casing (see Bulletin 74-81, page 33, Figure 5B).

(6) Gravel Packed Wells Without Conductor Casing. An oversized hole, at least four inches greater in diameter than the well casing, shall be drilled to the minimum annular seal depth, and the annular space between the well casing and the borehole shall be filled with sealing material. If gravel fill pipes are installed through the seal, the annular seal shall be of sufficient thickness to assure that there is a minimum of two inches between the gravel fill pipe and the borehole wall. The gravel pack shall terminate at the base of the seal (see Bulletin 74-81, page 33, Figure 5C). If a temporary conductor casing is used, it shall be removed as the sealing material is placed.

(7) Converted Wells. Wells converted from one use to another, particularly those constructed in prior years without annular seals, shall have annular seals installed to the minimum annular seal depth and at the thickness described in subsection (A)(2)(e) [RADIAL THICKNESS OF SEAL], below.

(8) Wells that Penetrate Zones Containing Poor-Quality Water, Pollutants, or Contaminants. If geologic units or fill known to contain poor-quality water, pollutants, or contaminants are penetrated during drilling, and the possibility exists that poor-quality water, pollutants, or contaminants could move through the borehole during drilling and well construction operations and significantly degrade groundwater quality in other units before sealing material can be installed, then precautions (e.g., conductor casing, borehole liners, special drilling equipment, etc.) shall be taken to isolate zones containing poor-quality water, pollutants, or contaminants during drilling and well construction operations.

c. Conductor Casing. For community water supply wells, the minimum thickness of steel conductor casing shall be 1/4 inch for single casing, or a minimum of No. 10 U.S. Standard Gage for double casing. Steel used for conductor casing shall conform to the specifications for steel casing described in subsection (A)(5) [CASING], below.

d. Sealing Material. Sealing material shall consist of neat cement, sand cement, bentonite or concrete. Cuttings from drilling, or drilling mud, shall not be used for any part of the sealing material.

(1) Water. Water used to prepare sealing mixtures should generally be of drinking water quality, shall be compatible with the type of sealing material used, be free of petroleum and petroleum products, and be free of suspended matter.

(2) Cement. Cement used in sealing mixtures shall meet the requirements of American Society for Testing and Materials C150, "Standard Specification for Portland Cement", including the latest revisions thereof. Special cement setting accelerators and retardants and other additives may be used in some cases. Special field additives for Portland cement mixtures shall meet the requirements of ASTM C494, "Standard Specification for Chemical Admixtures for Concrete," including the latest revisions thereof. Minimum times required for sealing materials containing Portland cement to set and begin curing before construction operations on a well can be resumed are:

Types I and II cement – 24 hours

Type III cement – 12 hours

Type V cement – 6 hours

Cement-based sealing materials shall be constituted as follows:

(a) Neat Cement. Neat cement shall be mixed at a ratio of one 94-pound sack of Portland cement to five to six gallons of clean water. Additional water may be required where special additives, such as bentonite, accelerators, or retardants are used.

(b) Sand Cement. Sand cement shall be mixed at ratio of not more than one hundred eighty-eight (188) pounds of sand to one 94-pound sack of Portland cement (two parts sand to one part cement, by weight) and about seven gallons of clean water. This is equivalent to a "10.3 sack mix." Less water shall be used if less sand than 2 parts sand per one part cement by weight is used. Additional water may be required when special additives, such as bentonite, accelerants, or retardants are used.

(c) Concrete. Concrete shall consist of Portland cement and aggregate mixed at a ratio of at least six 94-pound sacks of Portland cement per cubic yard of aggregate. In no case shall the size of the aggregate be greater than 1/5 the radial thickness of the annular seal. Water shall be added to concrete mixes to attain proper consistency for placement, setting, and curing.

(d) Mixing. Cement-based sealing materials shall be mixed thoroughly to provide uniformity and ensure that no lumps exist.

(e) Variations. Ratios of the components of cement-based sealing materials can be varied, depending upon the type of cement and additives used. Enforcement Agency approval of variations must be received prior to placement.

(3) Bentonite. Bentonite clay may only be used as a sealing material at the approval of the Enforcement Agency. Bentonite clay products used for sealing material must be specifically prepared for such use, and the preparation and placement of bentonite clay products shall follow the manufacturer's specifications. Bentonite used for annular seals shall be commercially prepared, powdered, granular, pelletized or chipped sodium montmorillonite clay. The largest dimension of pellets or chips shall be less than 1/5 the radial thickness of the annular space into which they are placed. Bentonite is allowed as an additive to cement-based sealing mixes, at a ratio of up to six (6%)

percent by weight of cement used, or as a foundation or transition seal, as described in subsection (A)(2)(f)(3) [FOUNDATION AND TRANSITION SEALS], below.

e. Radial Thickness of Seal. A minimum of two inches of sealing material shall be maintained between all casings and the borehole wall, within the interval to be sealed, except where temporary conductor casing can not be removed, as noted in subsection (A)(2)(b)(1) [WELLS DRILLED IN UNCONSOLIDATED CAVING MATERIAL], above. A minimum of two inches of sealing material shall also be maintained between each casing (such as permanent conductor casing, well casing, gravel fill pipes, etc.) in a borehole within the interval to be sealed, unless otherwise approved by the Enforcement Agency. Additional space shall be provided, where needed, for casings to be properly centralized and spaced and allow the use of a tremie device during well construction (if required), especially for deeper wells.

f. Placement of Seal.

(1) Obstructions. All loose cuttings, or other obstructions to sealing shall be removed from the annular space before placement of the annular seal.

(2) Centralizers. Well casing shall be equipped with centralizers to ensure the 2-inch minimum radial thickness of the annular space is maintained. Centralizers need not be used in cases where the well casing is centered in the borehole during well construction by use of removable tools, such as hollow-stem augers.

Centralizers shall be metal, plastic, or other non-degradable material. Centralizers must be positioned to allow the proper placement of sealing material around the casing within the interval to be sealed.

Any metallic component of a centralizer used with metallic casing shall consist of the same material as the casing. Metallic centralizer components shall meet the same metallurgical specifications and standards as the metallic casing to reduce the potential for galvanic corrosion of the casing.

(3) Foundation and Transition Seals. A packer or similar retaining device, or a small quantity of sealant that is allowed to set, may be placed at the bottom of the interval to be sealed before the final sealing operations begin to form a foundation for the seal.

A transition seal, up to five feet in length, consisting of bentonite or fine sand, must be placed in the annular space to separate filter pack (if present) and cement-based sealing materials.

Transition seals shall be installed by use of a tremie device, or equivalent. Water shall be added to the bentonite transition seal prior to placement of cement-based sealing materials where bentonite is dry in the borehole. Water shall be added to the bentonite at a ratio of one gallon for every two pounds of bentonite to allow for proper hydration. A minimum of 1/2 hour shall be allowed for bentonite transition seals to properly hydrate before cement-based sealing materials are placed.

(4) Timing and Method of Placement. The annular space shall be sealed as soon as practical after completion of drilling or a stage of drilling. In no case shall the annular space be left unsealed longer than fourteen (14) days following the installation of casing.

As a minimum, the uppermost fifty (50) feet of sealing material shall be placed in one continuous operation.

Sealing material shall be placed by methods (such as the use of a tremie device or equivalent) that prevent freefall, bridging, or dilution of the sealing material, or separation of sand or aggregate from the sealing material. Annular sealing materials shall not be installed by freefall unless the interval to be sealed is dry and no deeper than thirty (30) feet below ground surface. Annular sealing material shall be placed by mechanical pumping to maintain a positive displacement when there is water present in the interval to be sealed.

In cases where a tremie device is used, the tremie device shall be lowered to the bottom of the zone being sealed, and raised slowly as the material is introduced. The discharge end of the tremie device shall be continuously submerged in the sealing material until the zone to be sealed or filled is completed.

(5) Groundwater Flow. Special care shall be used to restrict the flow of groundwater into a well boring while placing material, where subsurface pressure causing the flow of water is significant.

(6) Verification. The applicant shall verify to the Enforcement Agency that the volume of sealing material placed at least equals or exceeds the volume to be sealed.

3. Surface Construction Features.

a. Openings. Openings into the top of the well which are designed to provide access to the well, i.e., for measuring, chlorinating, adding gravel, etc. shall be protected against entrance of surface waters or foreign matter by installation of watertight caps or plugs. Access openings designed to permit the entrance or egress of air or gas (air or casing vents) shall terminate above the ground and above the BFE and shall be protected against the entrance of foreign material by installation of downturned and screened "U" bends (see Bulletin 74-81, pages 37 and 38, Figures 6 and 7). All other openings (holes, crevices, cracks, etc.) shall be sealed.

A "sounding tube," taphole with plug, or similar access for the introduction of water level measuring devices shall be affixed to the casing of all wells. For wells fitted with a "well cap" the cap shall have a removable plug for this purpose.

(1) Where the pump is installed directly over the casing, a watertight seal or gasket shall be placed between the pump head and the pump base (slab), or between the pump base and the rim of the casing, or a "well cap" shall be installed to close the annular opening between the casing and the pump column pipe (see Bulletin 74-81, pages 37 and 38, Figures 6 and 7). The pump head may be mounted on a concrete pedestal that slopes away from the pump head.

(2) Where the pump is offset from the well or where a submersible pump is used, the opening between the well casing and any pipes or cables that enter the well shall be closed by a watertight seal or "well cap."

(3) If the pump is not installed immediately or if there is a prolonged interruption in construction of the well, a watertight cover shall be installed at the top of the casing.

(4) A watertight seal or gasket shall be placed between the pump discharge head and the discharge line; or, in the event of a below-ground discharge, between the discharge pipe and the discharge line (see Bulletin 74-81, pages 37 and 38, Figures 6 and 7).

(5) A concrete base or pad, sometimes called a pump block or pump pedestal, shall be constructed at ground surface around the top of the well casing and

contact the annular seal, unless the top of the casing is below ground surface, as provided by subsection (A)(3)(b) [WELL PITS OR VAULTS], below.

The base shall be free of cracks, voids, or other significant defects likely to prevent water tightness. Contacts between the base and the annular seal, and the base and the well casing, must be watertight and must not cause the failure of the annular seal or well casing. Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the Enforcement Agency.

The upper surface of the base shall slope away from the well casing. The base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the Enforcement Agency. The base shall be a minimum of four inches thick.

(6) Where the well is to be gravel packed and the pack extends to the surface, a watertight cover shall be installed between the conductor casing and the inner casing (see subsection (A)(2)(b)(5) [GRAVEL PACKED WELLS WITH CONDUCTOR CASING] and (A)(2)(b)(6) [GRAVEL PACKED WELLS WITHOUT CONDUCTOR CASING], above and Bulletin 74-81, page 33, Figure 5).

b. Well Pits or Vaults. Well pits or vaults may only be used if approval is obtained from the Enforcement Agency. If a pit or vault is used it shall be watertight and structurally sound. The vault shall extend from the top of the annular seal to at least ground surface.

The casing shall extend at least six inches above the top of the annular seal.

The vault shall contact the annular seal in a manner to form a watertight and structurally sound connection. Contacts between the vault and the annular seal, and the vault and the well casing, if any, shall not fail or cause the failure of the well casing or annular seal.

Where cement-based annular seal materials are used, the vault shall be set into or contact the annular seal material before it sets, unless otherwise approved by the Enforcement Agency.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation.

The sealing material surrounding a vault shall extend from the top of the annular seal to ground surface. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the cement-based sealing material shall be placed between the vault and excavation and contact the cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight. The lid shall be fitted with a security device to prevent unauthorized access. The outside of the lid shall be clearly and permanently labeled "WATER WELL." The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at, or above, grade so that drainage is away from the vault. The top of the well casing contained within the vault shall be covered in accordance with requirements under subsection (A)(3)(a) [OPENINGS], above, so that water, contaminants, and pollutants that may enter the vault will not enter the well casing. The cover shall be provided with a pressure relief or venting device for gases.

c. Enclosure of Well and Appurtenances. In community water supply wells, the well and pump shall be located in a locked enclosure to exclude access by unauthorized persons.

d. Pump Blowoff. When there is a blowoff or drain line from the pump discharge, it shall be located above any known flood levels and protected against the possibility of back-siphonage or back-pressure. The blowoff or drain line shall not be connected to any sewer or storm drain except when connected through an air gap.

e. Air Vents. In community water supply wells to minimize the possibility of contamination caused by the creation of a partial vacuum during pumping, a casing vent shall be installed (see Bulletin 74-81, page 38, Figure 7). In addition, to release air trapped in the pump column when the pump is not running, air release vents shall be installed (see Bulletin 74-81, page 38, Figure 7). Air vents are also recommended for other types of wells except those having jet pump installations requiring positive pressure (which can not have a vent).

f. Backflow Prevention. All pump discharge pipes not discharging or open to the atmosphere shall be equipped with an automatic device to prevent backflow and/or back-siphonage into a well. Specific backflow prevention measures are required for drinking water supply wells, as prescribed in Title 17, Public Health, California Code of Regulations (Sections 7583-7585 and 7601-7605, effective June 25, 1987).

Community domestic wells shall have a check valve installed between the wellhead and the connection to the distribution system or standpipe.

Irrigation well systems, including those used for landscape irrigation, and other well systems that employ, or which have been modified to employ, chemical feeders or injectors shall be equipped with a backflow prevention device approved by the Enforcement Agency.

All irrigation wells discharging to a standpipe shall be protected by air gap separation. Air gap separation shall mean a separation of at least two pipe diameters between the well discharge pipe and the rim of the standpipe.

4. Disinfection and Other Sanitary Requirements.

a. Disinfection. All wells producing water for domestic use, i.e., drinking or food processing, should be disinfected following construction, repair, or when work is done on the pump, before the well is placed in service (see Bulletin 74-81, Appendix C for a disinfection procedure).

b. Gravel. Gravel used in gravel-packed wells shall come from clean sources and shall be thoroughly washed before placement into the well. Gravel purchased from a supplier shall be washed at the pit or plant prior to delivery to the well site.

During placement of the gravel in the annular space, disinfectants (usually calcium hypochlorite in tablet or granular form) shall be added to the gravel at a uniform rate (two tablets per cubic foot or one pound of the granular form per cubic yard).

c. Lubricants. Mud and water used as a drilling lubricant shall be free from sewage contamination. Oil and water used for lubrication of the pump and pump bearing shall also be free from contamination.

5. Casing.

a. Casing Material. All casing material used in well construction shall be new. The following table is a minimum guideline for steel casing (the minimum gage pipe to be used in any well shall be 12 gage):

MINIMUM THICKNESS FOR STEEL WATER WELL CASING

Single Casing Depth of Casing (feet)	DIAMETER										
	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	30"
0-100	12	12	12	10	10	8	8	8	8	8	3/16
100-200	12	12	10	8	8	8	3/16	3/16	3/16	3/16	1/4
200-300	10	10	8	8	8	3/16	3/16	3/16	1/4	1/4	1/4
300-400	10	8	8	3/16	3/16	3/16	1/4	1/4	1/4	1/4	5/16
400-600	10	8	3/16	3/16	3/16	1/4	1/4	1/4	5/16	5/16	5/16
600-800	3/16	3/16	3/16	3/16	1/4	1/4	1/4	5/16	5/16	3/8	3/8
> 800	3/16	3/16	3/16	1/4	1/4	1/4	5/16	5/16	3/8	3/8	7/16

NOTE: Integers are United States standard gage; fractions are thickness, in inches

(1) Steel—Standard and Line Pipe. This material shall meet one of the following specifications, including the latest revision thereof:

(a) API Std. 5L, "Specification for Line Pipe"

(b) ASTM A53, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless"

(c) ASTM A134, "Standard Specification for Pipe, Steel Electric Fusion (Arc)-Welded (Sizes NPS 16 and over)"

(d) ASTM A135, "Standard Specification for Electric-Resistance-Welded Steel Pipe"

(e) ASTM A139, "Standard Specification for Electric Fusion (Arc)-Welded Steel Pipe (NPS 4 and over)"

(f) AWWA C200, "AWWA Standard for Steel Water Pipe 6 Inches and Larger"

(2) Structural Steel. This material shall meet one of the following specifications of the American Society of Testing and Materials (ASTM), including the latest revision thereof:

(a) ASTM A36, "Standard Specification for Carbon Structural Steel"

(b) ASTM A242, "Standard Specification for High Strength Low Alloy Structural Steel"

(c) ASTM A283, "Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plate"

(d) ASTM A572, "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel"

(e) ASTM A1011, "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra-High-Strength"

(3) High Strength Carbon Steel Sheets ("Well Casing Steel"). At present, there are no standard specifications concerning this material. However, the major steel

producers market products whose chemical and physical properties are quite similar. Each sheet of material shall contain mill markings, which will identify the manufacturer and specify that the material is well casing steel that complies with the chemical and physical properties published by the manufacturer.

(4) Stainless Steel. This casing shall meet the provisions of ASTM A409, "Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High Temperature Service."

(5) Plastic Casing.

(a) Thermoplastics. Thermoplastic well casing shall meet the requirements of ASTM F480, "Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80", including the latest revision thereof.

Pipe made in Schedule 40 and 80 wall thicknesses and pipe designated according to certain pressure classifications are listed in ASTM F480, as well as casing specials referencing the following ASTM specifications:

ABS PIPE: ASTM D1527, "Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80."

PVC PIPE: ASTM D1785, "Standard Specification for (Poly Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120."

PRESSURE-RATED PVC PIPE: ASTM D2241, "Standard Specifications for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)."

Thermoplastic well casing that may be subject to significant impact stress during or after installation shall meet or exceed the requirements for impact resistance classification set forth in Section 6.5 of ASTM F480. Casing that may be subject to significant impact forces includes, but is not limited to; casing that is installed in large diameter, deep boreholes; and casing through which drilling tools pass following installation of the casing in a borehole.

(b) Thermoset Plastics. Thermoset casing material shall meet the following specifications, as applicable, including the latest revisions thereof:

FILAMENT WOUND RESIN PIPE: ASTM D2996, "Standard Specification for Filament Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe."

CENTRIFUGALLY CAST RESIN PIPE: ASTM D2997, "Standard Specification for Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe."

REINFORCED PLASTIC MORTAR PRESSURE PIPE: ASTM D3517, "Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pressure Pipe."

GLASS FIBER REINFORCED RESIN PRESSURE PIPE: AWWA C950, "AWWA Standard for Fiberglass Pressure Pipe."

(c) Drinking Water Supply. All plastic casing used for drinking water supply wells, including community supply wells and individual domestic wells, shall meet the provisions of National Sanitation Foundation Standard No. 14, "Plastic Piping Components and Related Materials" and any revision thereof. The casing shall be marked or labeled following requirements in NSF Standard No. 14, which includes the requirements of ASTM F480.

(d) Storage, Handling, and Transportation. Plastic casing shall not be stored in direct sunlight or subjected to freezing temperatures for extended periods of time.

Plastic casing shall be stored, handled, and transported in a manner that prevents excessive mechanical stress. Casing shall be protected from sagging and bending, severe impacts and loads, and potentially harmful chemicals.

(e) Large Diameter Wells. Because large diameter plastic casing has not been used extensively at depths exceeding five hundred (500) feet, special care shall be exercised with its use in deep wells.

(6) Concrete Casing. Concrete pipe used for casing should conform to the following specifications, including the latest revision thereof:

(a) ASTM C14, "Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe"

(b) ASTM C76, "Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe"

(c) AWWA C300, "AWWA Standard for Reinforced Concrete Pressure Pipe Steel Cylinder Type"

(d) AWWA C301, "AWWA Standard for Prestressed Concrete Pressure Pipe, Steel Cylinder Type"

(7) Unacceptable Casing Materials. Galvanized sheet metal pipe such as "downspout," tile pipe, or natural wood shall not be used as well casing.

(8) Other Materials. Materials in addition to those described above may be used as well casing, subject to Enforcement Agency approval.

b. Casing Installation. All well casing shall be assembled and installed with sufficient care to prevent damage to casing sections and joints. All casing joints above intervals of perforations or screen shall be watertight. Any perforations shall be below the minimum annular seal depth.

Watertight construction of the cased portion of the well shall be carried into an impervious subsurface formation that caps the aquifer. The casing may penetrate more than one aquifer.

The casing shall extend a minimum distance of twelve (12) inches above grade or twelve (12) inches above the Base Flood Elevation, except on prior approval of the Enforcement Agency. Community domestic well casings shall extend a minimum of eighteen (18) inches above grade.

Casing shall be equipped with centering guides or "centralizers" to ensure the even radial thickness of the annular seal and filter pack.

(1) Metallic Casing. Metallic casing may be joined by welds, threads, or threaded couplings. Welding shall be accomplished in accordance with the standards of the American Welding Society or the most recent revision of the American Society of Mechanical Engineers Boiler Construction Code. Metallic casing shall be equipped with a "drive shoe" at the lower end if it is driven into place.

(2) Plastic Casing. Plastic casing may be joined by solvent welding or mechanically joined by threads or other means, depending on the type of material and its fabrication. Solvent cement used for solvent welding shall meet specifications for the type of plastic casing used. Solvent cement shall be applied in accordance with solvent and casing manufacturer instructions. Particular attention shall be given to instructions pertaining to required setting time for joints to develop strength. The following specifications for solvent cements and joints for PVC casing shall be met, including the latest revisions thereof:

(a) ASTM D2564, "Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems."

(b) ASTM D2855, "Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings."

Plastic casing or screen shall not be subjected to excessive stress during installation and shall not be driven into place. Care shall be taken to ensure that plastic casing and joints are not subjected to excessive heat from cement-based sealing material.

A specifically designed adapter shall be used to join plastic casing to metallic casing or screen.

6. Sealing-Off Strata. In areas where a well penetrates more than one aquifer, and one or more of the aquifers contains water that, if allowed to mix in sufficient quantity, will result in a significant deterioration of the quality of water in the other aquifer(s) or the quality of water produced, the strata producing such poor-quality water shall be sealed off to prevent entrance of the water into the well or its migration to other aquifer(s).

a. Strata producing the undesirable quality water shall be sealed off by placing impervious material opposite the strata and opposite the confining formation(s) (see Bulletin 74-81, page 47, Figure 8). The seal shall extend above and below the strata no less than ten (10) feet, even should the confining formation be less than ten (10) feet in thickness. In the case of "bottom" waters, the seal shall extend ten (10) feet in the upward direction. The sealing material shall fill the annular space between the casing and the well of the drilled hole in the interval to be sealed, and the surrounding void spaces that might absorb the sealing material. The sealing material shall be placed from the bottom to the top of the interval to be sealed.

In areas where deep subsidence may occur, provisions shall be made for maintaining the integrity of the annular seal in the event of subsidence. Such preventative measures may include the installation of a "sleeve" or a "slip joint" in the casing, which will allow vertical movement in the casing without its collapse.

b. Sealing material shall consist of neat cement, sand cement, or bentonite, as described in subsection (A)(2)(d) [SEALING MATERIAL], above.

c. Sealing shall be accomplished by a method approved by the Enforcement Agency (see Bulletin 74-81, Appendix B, for suggested methods).

7. Well Development. Development, redevelopment, or reconditioning of a well shall be performed with care, by methods that will not damage the well structure or destroy natural barriers to the movement of poor quality water, pollutants, and contaminants.

Acceptable well development, redevelopment, or reconditioning methods include:

a. Overpumping;
b. Surging or swabbing by use of plungers;
c. Surging with compressed air;
d. Backwashing or surging by alternately starting and stopping a pump;
e. Jetting with water;
f. Introducing specifically-formulated chemicals into a well; and
g. Combinations of the above.

Hydraulic fracturing (hydrofracturing) is sometimes an acceptable well development and redevelopment method when properly performed. Good quality water shall be used in hydrofracturing. The water shall be disinfected prior to introduction into a well. Material used as "propping" agents shall be free of pollutants and contaminants, shall be compatible with the use of the well, and shall be thoroughly washed and disinfected prior to placement in the well. Control of the hydraulic fracturing process shall be maintained to prevent breach of any annular well seals.

Development, redevelopment, or reconditioning by use of specially designed explosive charges is in some cases, another acceptable development method. Explosives shall be used with special care to prevent damage to the well structure and to any natural barriers to the movement of poor-quality water, pollutants, and contaminants. Explosives shall only be used by properly trained personnel. The design of the explosive treatment shall prevent breach of any annular well seals.

Wells subjected to chemicals or explosives during development, redevelopment, or reconditioning operations shall be thoroughly pumped to remove such agents and residues immediately after the completion of operations. Chemicals, water, and other wastes removed from the well shall be disposed of in accordance with applicable local, State, and federal requirements. The Enforcement Agency should be contacted regarding the proper disposal of waste.

8. Water Quality Sampling.

a. Community Water Supply Wells and Certain Industrial Wells. The water from all community water supply wells and industrial wells that provide water for use in food processing shall be sampled immediately following development and disinfection, and appropriate analysis made.

Rules and regulations governing the constituents to be tested, type of testing, etc., for community water supply systems are contained in Chapter 15, "Domestic Water Quality and Monitoring Regulations", of Title 22, California Code of Regulations. Water analysis shall be performed by a laboratory certified by the California Department of Public Health. A copy of the laboratory analysis shall be forwarded to the California Department of Public Health or to the Enforcement Agency. Approval of the Enforcement Agency must be obtained before the well is put into use.

A non-threaded down-turned sample tap shall be provided between the wellhead and the check valve.

b. Other Types of Wells. To determine the quality of water produced by a new well it should be sampled immediately following construction and development. Appropriate analyses should be made based upon the intended uses of the water.

9. Special Provisions for Large Diameter Shallow Wells.

a. Use as Community Water Supply Wells. Because shallow groundwaters are often of poor quality and because they are easily contaminated, the use of bored or dug wells, or wells less than fifty (50) feet deep, to provide community water supplies shall be avoided (unless there is no other feasible means for obtaining water). When used for this purpose, these wells shall be located at least two hundred fifty (250) feet from any underground sewage disposal facility.

b. Bored Wells. All bored wells shall be cased with concrete pipe or steel casing whose joints are watertight from six inches above the ground surface to the minimum annular seal depth. Except where corrugated steel pipe is used as casing, the

minimum thickness of the surrounding concrete seal shall be three inches. Where corrugated steel pipe is employed, the joints are not watertight and a thicker annular seal (no less than six inches) shall be installed.

c. Dug Wells. All dug wells shall be "curbed" with a watertight curbing extending from above the ground surface to the minimum annular seal depth. The curbing shall be of concrete poured in place or of casing (either precast concrete pipe or steel) surrounded on the outside by concrete.

If the curbing is to be made of concrete, poured-in-place, it shall not be less than six inches thick. If precast concrete pipe or steel casing is used as part of the curbing, the space between the wall of the hole and the casing shall be filled with concrete to the minimum annular seal depth. The minimum thickness of the surrounding concrete shall be three inches.

d. Casing Material. Either steel (including corrugated steel pipe) or concrete may be used for casing bored or dug wells.

(1) Steel used in the manufacture of casing for bored and dug wells should conform to the specifications for casing material described in subsection (A)(5) [CASING], above.

Minimum thickness of steel casing for bored and dug wells shall be:

DIAMETER, (inches)	U.S. STANDARD GAGE OR PLATE THICKNESS
18	8 gage
24	1/4 inch
30	1/4 inch
36	1/4 inch
42	1/4 inch
48	1/4 inch

Corrugated steel pipe used as casing shall meet the specifications (including the latest revision) of ASTM. A929, "Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe." The minimum thickness of sheet used shall be 0.109 inches.

(2) Concrete casing can consist of either poured-in-place concrete or precast concrete pipe. Poured-in-place concrete should be sufficiently strong to withstand the earth and water pressures imposed on it during, as well as after, construction. It should be properly reinforced with steel to furnish tensile strength and to resist cracking, and it should be free from honeycombing or other defects likely to impair the ability of the concrete structure to remain watertight. Aggregate small enough to place without bridging should be used. Poured-in-place concrete shall be "Class A" (six sacks of Portland cement per cubic yard) or "Class B" (five sacks per cubic yard).

Precast concrete pipe is usually composed of concrete rings from one to six feet in diameter and approximately three to eight feet long. To serve satisfactorily as casing, these rings should be free of blemishes that would impair their strength or serviceability. Concrete pipe shall conform to the specifications listed in subsection (A)(5)(a)(6) [CONCRETE CASING], above.

e. Covers. All bored or dug wells shall be provided with a structurally sound, watertight, cover made of concrete or steel.

10. Special Provisions for Driven Wells ("Well Points").

a. If the well is to be used as an individual domestic well, an oversize hole with a diameter at least three inches greater than the diameter of the pipe shall be constructed to a depth of six feet and the annular space around the pipe shall be filled with neat cement, or sand-cement.

b. The minimum wall thickness of steel drive pipe shall be not less than 0.140 inches.

c. Well points made of thermoplastic materials shall not be driven but jetted or washed into place.

11. Rehabilitation, Repair, and Deepening of Wells.

a. Rehabilitation is the treatment of a well by chemical or mechanical means (or both) to recover lost production caused by incrustation or clogging of screens or the formation immediately adjacent to the well. The following methods used for rehabilitating a well, when done with care, are acceptable: (1) introduction of chemicals designed for this purpose; (2) surging by use of compressed air; (3) backwashing or surging by alternately starting or stopping the pump; (4) jetting with water; (5) sonic cleaning; (6) vibratory explosives; and (7) combinations of these. Methods which produce an explosion (in addition to the use of vibratory explosives mentioned above) are also acceptable provided, however, that they are used with great care, particularly where aquifers are separated by distinct barriers to the movement of groundwater.

In those cases where chemicals or explosives have been used, the well shall be pumped until all traces of them have been removed.

b. In the repair of wells, material used for casing shall meet the requirements specified in subsection (A)(5) [CASING], above. In addition, the requirements contained in subsections (A)(4)(a) [DISINFECTION] and (A)(6). [SEALING-OFF STRATA], above shall be followed, when applicable.

c. Where wells are to be deepened, the requirements of subsections (A)(4) [DISINFECTION AND OTHER SANITARY REQUIREMENTS], (A)(5) [CASING], (A)(6) [SEALING-OFF STRATA], (A)(7) [WELL DEVELOPMENT], and (A)(8) [WATER QUALITY SAMPLING], above shall be followed.

12. Temporary Cover. Whenever there is an interruption in work on the well such as overnight shutdown, during inclement weather, or waiting periods required for the setting-up of sealing materials, for tests, for installation of the pump, etc., the well opening shall be closed with a cover to prevent the introduction of undesirable material into the well and to insure the public safety. The cover shall be held in place or "weighted-down" in such a manner that it can not be removed except with the aid of equipment or through the use of tools.

During prolonged interruptions (i.e., one week or more) a semipermanent cover shall be installed. For wells cased with steel, a steel cover, tack-welded to the top of the casing, is adequate.

B. Destruction of Wells.

1. Purpose of Destruction. A well that is no longer useful (including exploration and test holes) must be destroyed in order to: (1) assure that the

groundwater supply is protected and preserved for further use; and (2) eliminate the potential physical hazard.

2. Definition of Abandoned Well. A well is considered "abandoned" or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use the well again. In accordance with Section 115700 of the California Health and Safety Code, the well owner shall properly maintain an inactive well as evidence of intention for future use in such a way that the following requirements are met:

a. The well shall not allow impairment of the quality of water within the well and ground water encountered by the well.

b. The top of the well and the well casing shall be provided with watertight covers that are secured by locks or by other means to prevent their removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. A pump motor, angle drive, or other surface feature of the well, when in compliance with the above provisions, shall suffice as a cover.

c. The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well.

d. The area surrounding the well shall be kept clear of brush, debris, and waste materials.

If a pump has been temporarily removed for repair or replacement, the well shall not be considered "abandoned" if the above conditions are met. The well shall be adequately covered to prevent injury to people and animals and to prevent the entrance of foreign material, surface water, pollutants, or contaminants into the well during the pump repair period.

3. General Requirements.

a. All abandoned wells and exploratory holes (borings) shall be destroyed. Destruction shall consist of the complete filling of the well or exploratory hole in accordance with the procedures described in subsection (B)(4) [REQUIREMENTS FOR DESTROYING WELLS], below.

b. Upon determination that a well is polluted or contaminated, and if reasonable efforts to clear the contamination have been unsuccessful, the Enforcement Agency shall have the authority to require the permanent destruction of said well.

4. Requirements for Destroying Wells.

a. Preliminary Work.

(1) Before the well is sealed, it shall be investigated to determine its condition, the details of construction, and whether there are obstructions that will interfere with the sealing process.

(2) The well shall be cleaned, as needed, so that all undesirable materials, including obstructions to filling and sealing, debris, oil from oil-lubricated pumps, or pollutants and contaminants that could interfere with well destruction are removed for disposal.

The Enforcement Agency should be contacted to determine requirements for proper disposal of materials removed from a well to be destroyed.

If an obstruction is hardware that can not be removed, a tremie device must be passed below the obstruction to place sealing material to the full depth of the well, leaving the obstruction sealed inside the well.

(3) When necessary, to insure that sealing material also fills any voids in the annular space, the casing shall be perforated at the appropriate depth(s).

(4) A hole, at least one foot larger in diameter than the drilled hole, shall be excavated around the well casing to a depth of five feet below ground surface. The well casing shall be cut off, six inches above the bottom of the excavation, and removed. The sealing material shall spill over into the excavation, forming a cap. After the sealing material has set, the excavation shall be filled with compacted native soil.

(5) For dug wells, as much of the lining as possible (or safe) should be removed prior to filling.

(6) Alternatively, a water well may be destroyed by removing all material within the original borehole, including the well casing, filter pack, and annular seal, and the created hole completely filled with appropriate sealing material.

b. Filling and Sealing Conditions. All wells shall be sealed so as to prevent inter-aquifer flow, either through the well or around the outside of the casing. Following are additional requirements to be observed when certain conditions are encountered:

(1) Wells Situated in Unconsolidated Material in an Unconfined Groundwater Zone. In all cases the upper fifty (50) feet of the well shall be sealed with suitable sealing material and the remainder of the well shall be filled with suitable fill, or sealing material (see Bulletin 74-81, page 55, Figure 9A).

(2) Wells Penetrating Several Aquifers or Formations. In all cases the upper fifty (50) feet of the well shall be sealed with impervious material.

In areas where the interchange of water between aquifers will result in a significant deterioration of the quality of water in one or more aquifers, or will result in a loss of artesian pressure, the well shall be filled and sealed so as to prevent such interchange. Sand or other suitable inorganic material may be placed opposite the producing aquifers and other formations where impervious sealing material is not required. To prevent the vertical movement of water from the producing formation, impervious material must be placed opposite confining formations above and below the producing formations for a distance of ten (10) feet or more. The formation producing the deleterious water shall be sealed by placing impervious material opposite the formation, and opposite the confining formations for a sufficient vertical distance (but no less than ten (10) feet) in both directions, or in the case of "bottom waters", in the upward direction (see Bulletin 74-81, page 55, Figure 9B).

In locations where the interchange is in no way detrimental, suitable inorganic material may be placed opposite the formations penetrated. When the boundaries of the various formations are unknown, alternate layers of impervious and pervious material shall be placed in the well.

(3) Wells Penetrating Creviced or Fractured Rock. If creviced or fractured rock formations are encountered just below the surface, the portions of the well opposite this formation shall be sealed with neat cement, sand-cement grout, or concrete. If these formations extend to considerable depth, alternate layers of coarse stone (1/4 to four inches) and cement grout or concrete may be used to fill the well. Fine grained material shall not be used as fill material for creviced or fractured rock formations.

(4) Wells in Noncreviced, Consolidated Formations. The upper fifty (50) feet of a well in a noncreviced, consolidated formation shall be filled with impervious material. The remainder of the well may be filled with clay or other suitable inorganic material.

(5) Wells Penetrating Specific Aquifers, Local Conditions. Under certain local conditions, the Enforcement Agency may require that specific aquifers or formations be sealed off during destruction of the well.

c. Placement of Material.

(1) The well shall be filled with the appropriate material from the bottom of the well up.

(2) As a minimum, the uppermost fifty (50) feet of sealing material shall be placed in one continuous operation.

(3) Sealing material shall be placed in the interval to be sealed by methods (such as the use of a tremie device or equivalent) that prevent free fall, dilution, and/or separation of aggregates from cementing materials. Sealing material shall be placed by mechanical pumping to maintain a positive displacement when there is water present in the interval to be sealed.

In cases where a tremie device is used, the tremie device shall be lowered to the bottom of the zone being sealed and raised slowly as the material is introduced. The discharge end of the tremie device shall be continuously submerged in the sealing material until the zone to be sealed or filled is completed.

(4) Where the head (pressure) producing flow is great, special care must be used to restrict the flow while placing the sealing material. In such cases, the casing must be perforated opposite the area to be sealed and the sealing material forced out under pressure into the surrounding formation.

(5) In destroying gravel-packed wells, the casing shall be perforated or otherwise punctured opposite the area to be sealed. The sealing material shall then be placed within the casing, completely filling the portion adjacent to the area to be sealed and then forced out under pressure into the gravel envelope.

(6) When pressure is applied to force sealing material into the annular space, the pressure shall be maintained for a length of time sufficient for the cementing mixture to set.

(7) To assure that the well is filled and there has been no jamming or "bridging" of the material, the applicant shall verify that the volume of material placed in the well installation at least equals the volume of the empty hole.

d. Materials. Requirements for sealing and fill materials are as follows:

(1) Acceptable impervious sealing materials include neat cement, sand-cement grout, concrete, and bentonite, as described in subsection (A)(2)(d) [SEALING MATERIAL] above. Bentonite clay may only be used as a sealing material at the approval of the Enforcement Agency. Up to six percent (6%) (by weight of cement used) bentonite may be added to cement-based mixes.

(2) Acceptable filler materials include sand and pea gravel.

(3) Drill cuttings or drilling mud shall not be used for any part of the sealing process.

(4) Water shall be clean and free of suspended matter and contaminants.

(5) Cement shall meet ASTM C150, "Standard Specification for Portland Cement".

(6) Sand and pea gravel shall be washed and free of organic matter.

(7) Bentonite shall be naturally mined (non-pelletized) sodium montmorillonite, listed by NSF, and shall be contained within the original manufacturer's container or sack.

(8) Cement-based materials shall be constituted as described in subsection (A)(2)(d)(2) [CEMENT], above.

e. Temporary Cover. During periods when no work is being done on the well, such as overnight or while waiting for sealing material to set, the well and surrounding excavation, if any, shall be covered. The cover shall be sufficiently strong and well enough anchored to prevent the introduction of foreign material into the well and to protect the public from a potentially hazardous situation. During prolonged interruptions (i.e., one week or more) a semipermanent cover shall be installed.

SECTION 5. Section 6.28.050 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.050 Monitoring Well Standards.

A. General Requirements.

1. Application to Well Type. These standards apply to all types of monitoring wells, as well as to vapor extraction wells where applicable, and any other well installed in an area where special precautions are necessary to protect groundwater quality, except as prescribed in subsections (A)(2) [EXEMPTIONS FOR UNUSUAL CONDITIONS] AND (A)(3) [EXCLUSIONS], below. Before a change in use of a well is made, any standards for the new use must be complied with.

2. Exemptions for Unusual Conditions. Under certain circumstances the Enforcement Agency may waive compliance with these standards and prescribe alternate requirements. These standards may be waived where they are impractical or ineffective because of unusual conditions or would result in an unsatisfactory condition or well function.

3. Exclusions. Most standards in subsection (B) [MONITORING WELL CONSTRUCTION], below do not apply to "exploration holes." However, provisions of subsection (C) [DESTRUCTION OF MONITORING WELLS] and Section 6.28.110 [WELL COMPLETION REPORTS], below, do apply directly to exploration holes.

4. Special Standards. The Enforcement Agency may prescribe measures more stringent than standards presented here, where needed to protect public safety or protect water quality.

B. Monitoring Well Construction.

1. Well Location with Respect to Pollutants and Contaminants, and Structures.

a. Separation. Monitoring wells shall be located an adequate distance from known or potential sources of pollution and contamination, including those listed in Section 6.28.040(A)(1)(a) [SEPARATION] of the Water Well Standards, unless regulatory or legitimate data requirements necessitate they be located closer.

b. Flooding and Drainage. Monitoring wells should be located in areas protected from flooding, if possible. Provisions for locating monitoring wells in areas of flooding and drainage are contained in Section 6.28.040(A)(1) [FLOODING AND DRAINAGE] of the Water Well Standards.

c. Accessibility. All monitoring wells shall be located an adequate distance from buildings and other structures to allow access for well maintenance, modification, repair, and destruction, unless otherwise approved by the Enforcement Agency.

d. Disposal of Wastes When Drilling in Contaminated or Polluted Areas. Drill cuttings and wastewater from monitoring wells or exploration holes in areas of known or suspected contamination or pollution shall be disposed of in accordance with all applicable federal, State, and local requirements. The Enforcement Agency should be contacted to determine requirements for the proper disposal of cuttings and wastewater.

2. Sealing the Upper Annular Space. General discussion of sealing methods and requirements for monitoring wells is contained in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Special requirements for monitoring wells include the following:

a. Minimum Depth of Annular Seal.

(1) Water Quality Monitoring Wells and Monitoring Wells Constructed in Areas of Known or Suspected Pollution or Contamination. The annular space shall be sealed from the top of the filter pack or monitoring zone to ground surface, unless otherwise approved by the Enforcement Agency. The top of the filter pack or monitoring zone shall not extend into another water-bearing unit above the single water-bearing unit being monitored unless otherwise approved by the Enforcement Agency. The filter pack or monitoring zone shall not extend into any confining layers that overlie or underlie the unit to be monitored, unless otherwise approved by the Enforcement Agency. The annular surface seal shall be no less than fifty (50) feet in length.

Seal lengths less than fifty feet (50) are permissible only if shallow zones will be monitored and approval has been obtained from the Enforcement Agency.

(2) Other Monitoring Wells. The upper annular seal shall extend from ground surface to a minimum depth of fifty (50) feet. An annular seal less than fifty (50) feet in length is permissible if provisions in subsection (B)(2)(a)(1) [WATER QUALITY MONITORING WELLS AND MONITORING WELLS CONSTRUCTED IN AREAS OF KNOWN OR SUSPECTED POLLUTION OR CONTAMINATION], above, are followed.

(3) Sealing-Off Strata. Additional annular sealing material shall be placed below the minimum depth of the upper annular seal, as is needed, to prevent the movement of poor-quality water, pollutants, and contaminants through the well to zones of good-quality water. Requirements for sealing off zones are in Section 6.28.040(A)(6) [SEALING-OFF STRATA] of the Water Well Standards.

(4) Vaults. At the approval of the Enforcement Agency, the top of the annular seal and well casing can be below ground surface where traffic or other conditions require. In no case shall the top of the annular seal be more than four feet below ground surface.

The top of the annular seal shall contact a suitable, watertight, structurally sound subsurface vault, or equivalent feature, that encloses the top of the well casing in accordance with subsection (B)(3)(e) [VAULTS], below. The vault shall extend from the top of the annular seal to at least ground surface.

b. Sealing Conditions.

(1) Temporary Conductor Casing. If temporary conductor casing is used during drilling, it shall be removed during the placement of the casing and annular seal materials, as described in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. If the temporary conductor casing can not be removed, as defined in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards, sealing material shall be placed between the conductor casing and borehole wall, and between the well casing and conductor casing, in accordance with methods described in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Sealing material shall extend to at least the depths specified in subsection (B)(2)(a) [MINIMUM DEPTH OF ANNULAR SEAL], above.

(2) Permanent Conductor Casing. If a permanent conductor casing is to be installed, the monitoring well borehole diameter shall be at least four inches greater than the outside diameter of the conductor casing. The inner diameter of the permanent conductor casing shall in turn be at least four inches greater than the outside diameter of the well casing.

Sealing material shall be placed between the permanent conductor casing and the borehole wall, and the conductor casing and the well casing. The sealing material shall extend to at least the depths specified in subsection (B)(2)(a) [MINIMUM DEPTH OF ANNULAR SEAL], above.

c. Radial Thickness of Seal. A minimum of two inches of sealing material shall be maintained between all casings and the borehole wall, within the interval to be sealed, except as noted in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. At least two inches of sealing material shall also be maintained between all casings in a borehole, within the interval to be sealed unless otherwise approved by the Enforcement Agency. Additional space shall be provided, where needed, to allow casings to be properly centralized and spaced and allow the use of a tremie device during well construction (if required), especially for deeper wells.

d. Sealing Material. Sealing material shall consist of neat cement, sand-cement, concrete, or bentonite. Concrete or bentonite shall be used only with the approval of the Enforcement Agency.

Sealing material shall be selected based on required structural, handling, and sealing properties, and the chemical environment into which it is placed. Used drilling mud or cuttings from drilling shall not be used for any part of the sealing material.

(1) Water. Water used for sealing mixtures should generally be of drinking water quality, shall be compatible with the type of sealing material used, shall be free of petroleum and petroleum products, and shall be free of suspended matter. Only drinking-quality water of known composition should be used for preparing sealing mixtures for monitoring wells to be used for sensitive water-quality determinations.

(2) Cement-Based Sealing Materials. Standards for cement-based sealing materials are contained in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Special considerations that apply to monitoring wells are:

(a) Additives. Care should be exercised in the use of special additives for cement-based sealing materials, such as those used for modifying cement setting times. Some additives could interfere with sensitive water quality determinations.

(b) Cooling Water. In the case of water quality monitoring wells, care should be exercised in the use of circulating cooling water to protect plastic casing from heat build-up during setting of cement-based sealing materials. Water introduced and/or circulated in a well for cooling could interfere with water quality determinations.

e. Transition Seal. A bentonite-based or fine sand transition seal, up to five feet in length, must be placed in the annular space to separate filter pack and cement-based sealing materials, as described in Section 6.28.040(A)(2)(f)(3) [FOUNDATION AND TRANSITION SEALS] of the Water Well Standards.

f. Placement of Annular Seal Material. All loose cuttings and other obstructions shall be removed from the annular space before sealing materials are placed. Sealing may be accomplished by using pressure grouting techniques, a tremie device, or equivalent. Sealing materials shall be installed as soon as possible during well construction operations. In no case shall the annular space be left unsealed longer than fourteen (14) days following the installation of casing. Sealing materials shall not be installed by "free-fall" from the surface unless the interval to be sealed is dry and less than thirty (30) feet deep. Annular sealing materials shall be placed by mechanical pumping to maintain a positive displacement when there is water present in the interval to be sealed.

In cases where a tremie device is used, the tremie device shall be lowered to the bottom of the zone being sealed, and raised slowly as the material is introduced. The discharge end of the tremie device shall be continuously submerged in the sealing material until the zone to be sealed or filled is completed.

Casing spacers shall be used within the interval(s) to be sealed to separate individual well casing strings from one another in a borehole of a nested monitoring well. The spacers shall be placed at intervals along the casing to ensure a minimum separation of two inches between individual casing strings. Spacers shall be constructed of corrosion-resistant metal, plastic, or other non-degradable material. Wood shall not be used as spacer material.

Any metallic component of a spacer used with metallic casing shall consist of the same material as the casing. Metallic spacer components shall meet the same metallurgical specifications and standards as the casing to reduce the potential for galvanic corrosion of the casing.

The spacing of casing spacers is normally dictated by casing materials used, the orientation and straightness of the borehole, and the method used to install the casing. Spacers shall not be more than twelve (12) inches in length and shall not be placed closer than ten (10) feet apart along a casing string within the interval to be sealed, unless otherwise approved by the Enforcement Agency.

Casing spacers shall be designed to allow the proper passage of a tremie and distribution of sealing material around casing(s) within the interval(s) to be sealed.

Additional discussion and standards for placement of the annular seal are contained in Sections 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] and 6.28.040(A)(6) [SEALING-OFF STRATA] of the Water Well Standards, and Appendix B of Bulletin 74-81.

3. Surface Construction Features. Additional requirements for surface construction features are in Section 6.28.040(A)(3) [SURFACE CONSTRUCTION FEATURES] of the Water Well Standards.

a. Locking Cover. The top of a monitoring well shall be protected by a locking cover or equivalent level of protection to prevent unauthorized access.

b. Casing Cap. The top of a monitoring well casing shall be fitted with a cap or "sanitary seal" to prevent surface water, pollutants, or contaminants from entering the well bore. Openings or passages for water level measurement, venting, pump power cables, discharge tubing, and other access shall be protected against entry of surface water, pollutants, and contaminants.

c. Flooding. The top of the well casing shall terminate above ground surface and above the Base Flood Elevation, except where site conditions, such as vehicular traffic, will not allow.

d. Bases. Unless otherwise approved by the Enforcement Agency, a concrete base or pad shall be constructed around the top of a monitoring well casing at ground surface and contact the annular seal, unless the top of the casing is below ground surface as provided by subsection (B)(3)(e) [VAULTS], below. The base shall be at least four inches thick and shall slope to drain away from the well casing. The base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the Enforcement Agency.

The base shall be free of cracks, voids, and other significant defects likely to prevent watertightness. Contacts between the base and the annular seal, and the base and the well casing must be watertight and must not cause the failure of the well casing or annular seal.

Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the Enforcement Agency.

e. Vaults. At the approval of the Enforcement Agency, the top of the well casing may be below ground surface because of traffic or other critical considerations. A structurally sound watertight vault, or equivalent feature, shall be installed to house the top of a monitoring well that is below ground surface. The vault shall extend from the top of the annular seal to at least ground surface. In no case shall the top of the annular seal be more than four feet below ground surface.

The casing shall extend at least six inches above the top of the annular seal.

The vault shall contact the annular seal in a manner to form a watertight and structurally sound connection. Contacts between the vault and the annular seal, and the vault and the well casing, if any, shall not fail or cause the failure of the well casing or annular seal.

The vault shall be set into or contact the annular seal material before it sets, unless otherwise approved by the Enforcement Agency.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation.

Sealing material surrounding a vault shall extend from the top of the annular seal to ground surface. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the sealing material shall be placed

between the vault and excavation and contact the cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight. Any vents shall meet the specifications contained in Section 6.28.040(A)(3)(a) [OPENINGS] of the Water Well Standards. The lid shall be fitted with a security device to prevent unauthorized access. The lid shall be clearly and permanently marked "MONITORING WELL." The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at or above grade so drainage is away from the vault. The top of the well casing contained within the vault shall be covered in accordance with requirements under subsections (B)(3)(a) [LOCKING COVER] and (B)(3)(b) [CASING CAP], above, so that water, contaminants, or pollutants that may enter the vault will not enter the well casing.

f. Protection from Vehicles. Protective steel posts, or the equivalent, shall be installed around a monitoring well casing where it is terminated above ground surface in areas of vehicular traffic. The posts shall be easily seen and shall protect the well from vehicular impact.

4. Filter Pack. Monitoring well filter pack material shall consist of nonreactive, smooth, rounded, spherical, granular material of highly uniform size and known composition. Filter pack material shall not degrade or consolidate after placement. The grain-size of the filter pack shall be matched to the grain size of the aquifer, so that aquifer materials do not enter the filter pack, and the slot size of the screen shall then be matched to the grain size of the filter pack so the filter pack materials do not enter the well.

Filter pack material shall be obtained from clean sources. Filter pack material should be washed and properly packaged for handling, delivery, and storage, if used in monitoring wells constructed for sensitive water quality determinations.

Care should be exercised in the storage of filter pack materials at a drilling site to ensure the material does not come into contact with pollutants or contaminants. Care should also be exercised to prevent the introduction of foreign substances, such as clay or vegetative matter that might interfere with the placement and function of the filter pack.

Filter pack material shall be placed in the well boring by use of a tremie device or equivalent. The depth of the top of the filter pack shall be carefully checked and the volume of emplaced filter pack material verified to determine that filter pack materials have not bridged during installation.

5. Casing. For the purpose of these standards, the term "casing" applies to screens, collars, risers, and blank casing, and other specialized products used to maintain the well bore. Additional standards for casing materials are contained in Section 6.28.040(A)(5) [CASING] of the Water Well Standards. Special considerations that apply to monitoring well casing are described below:

a. Casing Material.

(1) Chemical Compatibility. Special consideration shall be given to the selection of casing materials for monitoring wells installed in environments that are chemically "hostile". The selected casing shall resist chemical attack and corrosion.

Special consideration should be given to the selection of casing materials for wells to be used for sensitive water-quality determinations.

(2) Plastic and Steel Casing. Standards for thermoplastic well casing are in Section 6.28.040(A)(5) [CASING] of the Water Well Standards. Fluorocarbon casing materials include fluorinated ethylene propylene (FEP) and polytetrafluoroethylene (PTFE). Fluorocarbon casing materials shall meet the following specifications, including the latest revisions thereof:

(a) ASTM D3296, "Standard Specification for FEP-Fluorocarbon Tube."

(b) ASTM D3295, "Standard Specifications for PTFE Tubing, Miniature Beading and Spiral Cut Tubing." Stainless steel casing shall meet the provisions of ASTM A312,"Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes," and shall meet general requirements for tubular steel products in Section 6.28.040(A)(5) [CASING] of the Water Well Standards.

b. Multiple Screens. Monitoring well casing strings shall not have openings in multiple water-bearing units (multi-level monitoring wells), if poor-quality water, pollutants, or contaminants in units penetrated by the well could pass through the openings and move to other units penetrated by the well and degrade ground water quality, unless otherwise approved by the Enforcement Agency.

c. Bottom Plugs. The bottom of a monitoring well casing shall be plugged or capped to prevent sediment or rock from entering the well.

d. Casing Installation. Discussion and standards for the installation of casing materials are in Section 6.28.040(A)(5) [CASING] of the Water Well Standards. Special considerations for monitoring wells are:

(1) Cleanliness. Casing, couplings, centralizers, and other components of well casing shall be clean and free of pollutants and contaminants at the time of installation.

(2) Joining Plastic Casing. Plastic casing shall be joined (threaded or otherwise coupled) in a manner that ensures its water tightness. Organic solvent welding cements or glues should not be used for joining plastic casing if glues or cement compounds could interfere with water-quality determinations.

(3) Impact. Casing shall not be subjected to significant impact during installation that may damage or weaken the casing.

6. Well Development. Monitoring well development, redevelopment, and reconditioning shall be performed with care so as to prevent damage to the well and any strata surrounding the well that serve to restrict the movement of poor-quality water, pollutants, and contaminants. Development, redevelopment, and reconditioning operations shall be performed with special care where a well has been constructed in an area of known or suspected pollution or contamination.

Water, sediment, and other waste removed from a monitoring well for development operations shall be disposed of in accordance with applicable federal, State, and local requirements. The Enforcement Agency should be contacted concerning the proper disposal of waste from development operations.

Development methods that may be acceptable under certain circumstances include mechanical surging, overpumping and pump surging, air development, water jetting, and chemical development. The following standards shall be followed where applicable:

a. Mechanical Surging. Plungers, bailers, surge blocks, and other surging devices shall incorporate safety valves or vents to prevent excessive pressure differentials that could damage casing or screen.

b. Water Jetting. Water used in jetting operations shall be free of pollutants and contaminants.

c. Chemical Development. Extreme care shall be exercised in the use of chemicals for monitoring well development. It is often unacceptable to use chemicals for developing monitoring wells to be used for water-quality determinations. Chemicals introduced for development shall be completely removed from the well, filter pack, and water-bearing strata accessed by the well immediately after development operations are completed.

The various methods described above are sometimes used in combination.

7. Rehabilitation and Repair of Monitoring Wells. For the purpose of these standards, "well rehabilitation" includes the treatment of a well to recover loss in yield caused by incrustation or clogging of the screen, filter pack, and/or water-bearing strata adjoining the well. Well rehabilitation methods that may, in certain cases, be acceptable for monitoring wells include mechanical surging, backwashing or surging by alternately starting or stopping a pump, surging with air, water jetting, sonic cleaning, chemical treatment, or combinations of these.

Rehabilitation methods shall be performed with care to prevent damage to the well and any barriers that serve to restrict the movement of poor-quality water, pollutants, or contaminants. Chemicals used for rehabilitation shall be completely removed from the well, filter pack, and water-bearing strata accessed by the well immediately after rehabilitation operations are completed. Chemicals, water, and other waste shall be disposed of in accordance with applicable federal, State, and local requirements. The Enforcement Agency should be contacted regarding the proper disposal of waste from rehabilitation operations.

Rehabilitation methods should be compatible with the use of the monitoring well. Special care should be given to the selection of rehabilitation methods for water-quality monitoring wells.

Materials used for repairing well casing shall meet the requirements of Section 6.28.040(A)(5) [CASING] of the Water Well Standards.

8. Temporary Cover. The well or borehole opening and any associated excavations shall be covered at the surface to ensure public safety and to prevent the entry of foreign material, water, contaminants, and pollutants whenever work is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

During prolonged interruptions (i.e., one week or more) a semipermanent cover shall be installed. For wells cased with steel, a steel cover, tack-welded to the top of the casing, is adequate.

C. Destruction of Monitoring Wells.

1. General Requirements. All permanently inactive or "abandoned" monitoring wells and exploration holes subject to these requirements shall be properly destroyed.

2. Requirements for Destroying Monitoring Wells and Exploration Holes. General requirements for destroying monitoring wells and exploration holes are contained in Section 6.28.040(B) [DESTRUCTION OF WELLS] of the Water Well

Standards. Special considerations for monitoring wells and exploration holes are as follows.

a. Monitoring Wells. Monitoring wells shall be destroyed in accordance with the following requirements and Section 6.28.040(B) [DESTRUCTION OF WELLS] of the Water Well Standards, irrespective of their original date of construction.

(1) The monitoring well casing, and any other significant voids within the well, shall, at a minimum, be completely filled, under pressure, with sealing material, if the following conditions exist:

(a) The monitoring well is located in an area of known or potential pollution or contamination; and,

(b) The well was constructed and maintained in accordance with these standards.

Casing left in place may require perforation or puncturing to allow proper placement of sealing materials.

(2) A monitoring well shall be destroyed by removing all material within the original borehole, including the well casing, filter pack, and annular seal, and the created hole completely filled with appropriate sealing material, if the following conditions exist:

(a) The well is located in an area of known or potential pollution or contamination; and

(b) The well's annular seal, casing, screen, filter pack, or other components were not constructed or maintained according to these standards.

(3) Monitoring wells shall, at a minimum, be destroyed in accordance with the requirements of Section 6.28.040(B) [DESTRUCTION OF WELLS] of the Water Well Standards, if located in an area free of any known or potential contamination or pollution.

b. Exploratory Borings. Exploratory borings shall be completely filled with appropriate sealing material from bottom to top.

The boring shall be inspected immediately prior to filling and sealing operations. All obstructions and pollutants and contaminants that could interfere with filling and sealing operations shall be removed prior to filling and sealing. The Enforcement Agency shall be notified as soon as possible if pollutants or contaminants are known or suspected to be in a boring to be destroyed. Well destruction operations may then proceed only at the approval of the Enforcement Agency. The Enforcement Agency should be contacted to determine requirements for proper disposal of removed materials.

c. Placement of Material. The placement of sealing material for monitoring wells and exploratory borings is generally described in Section 6.28.040(B)(4)(c) [PLACEMENT OF MATERIAL] of the Water Well Standards. The following additional requirements shall be observed when placing sealing material for monitoring well or exploratory boring destruction.

(1) Placement Method. The well or exploratory boring shall be filled with appropriate sealing material using a tremie device or equivalent, proceeding upward from the bottom of the well or boring.

Sealing material shall be placed by methods (such as the use of a tremie device or equivalent) that prevent freefall, bridging, and dilution of sealing materials, and/or

prevent separation of aggregate from sealants. Sealing material may be placed by free-fall only where the interval to be sealed is dry and no more than thirty (30) feet in depth. Sealing material shall be placed by mechanical pumping to maintain a positive displacement when there is water present in the interval to be sealed.

In cases where a tremie device is used, the tremie device shall be lowered to the bottom of the zone being sealed, and raised slowly as the material is introduced. The discharge end of the tremie device shall be continuously submerged in the sealing material until the zone to be sealed or filled is completed.

(2) Timing of Placement. Sealing material shall be placed in one continuous operation (or "pour") from the bottom to the top of the well or boring, unless conditions in the well or boring dictate that sealing operations be conducted in a staged manner, and prior approval is obtained from the Enforcement Agency. In no case shall an exploratory boring be left unsealed longer than fourteen (14) days following its advancement to total depth.

(3) Groundwater Flow. Special care shall be used to restrict the flow of groundwater into a well or boring while placing sealing material, if subsurface pressure producing the flow is significant.

(4) Sealing Pressure. Pressure required for the placement of cement-based sealing materials shall be maintained long enough for cement-based sealing materials to properly set.

(5) Verification. It shall be verified that the volume of sealing material placed during destruction operations equals or exceeds the volume to be sealed.

d. Sealing Materials. Materials used for sealing exploratory borings and monitoring wells shall have low permeabilities so that the volume of water and possible pollutants and contaminants passing through them will be of minimal consequence. Sealing material shall be compatible with the chemical environment into which it is placed, and shall have mechanical properties consistent with present and future site uses.

Suitable sealing materials include neat cement, sand-cement, concrete, and bentonite, as described in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Drilling mud or drill cuttings are not acceptable as any part of sealing material for well destruction. Concrete and bentonite may be used as a sealing material only at the approval of the Enforcement Agency.

e. Additional Requirements for Monitoring Wells and Exploratory Borings in Urban Areas. The following additional requirements shall be met for destroying monitoring wells and exploratory borings in urban areas, unless otherwise approved by the Enforcement Agency:

(1) The upper surface of the sealing material shall end at a depth of five feet below ground surface; and

(2) If the well casing was not extracted during destruction and sealing operations, a hole shall be excavated around the well casing to a depth of five feet below ground surface after sealing operations have been completed and the sealing material has adequately set and cured. The exposed well casing shall then be removed by cutting the casing at the bottom of the excavation. The excavation shall be backfilled with clean, native soil or other suitable material.

f. Temporary Cover. The well or borehole opening and any associated excavations shall be covered at the surface to ensure public safety and to prevent the entry of foreign material, water, pollutants, and contaminants whenever work is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed, except by equipment or tools.

During prolonged interruptions (i.e., one week or more) a semipermanent cover shall be installed. For wells cased with steel, a steel cover, tack-welded to the top of the casing, is adequate.

D. Recovery Well Pumps. All permanent recovery well pumps shall be constructed and installed so as to provide protection against contamination and pollution of the aquifers. Applicable provisions of Section 6.28.040 [WATER WELL STANDARDS] shall be followed.

SECTION 6. Section 6.28.060 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.060 Cathodic Protection Well Standards.

A. General Requirements.

1. Exemptions Due to Unusual Conditions. Under certain circumstances the Enforcement Agency may waive compliance with these standards and prescribe alternate requirements. These standards may be waived only where they are impractical or ineffective because of unusual conditions, or would result in unsatisfactory condition or well function.

2. Special Standards. The Enforcement Agency may prescribe measures more stringent than standards described here, where needed to protect public safety or protect water quality.

3. Responsible Parties. Corrosion control engineers are normally responsible for the design and supervision of corrosion control facilities incorporating cathodic protection wells. Pursuant to Section 13750.5 (Division 7, Chapter 10, Article 3) of the California Water Code, construction, alteration, and destruction of cathodic protection wells shall be performed by contractors licensed in accordance with the California Contractors' License Law (Division 3, Chapter 9, California Business and Professions Code), except where exempted by law. Aboveground electrical facilities for cathodic protection wells should be installed by an appropriately licensed contractor.

B. Cathodic Protection Well Construction.

1. Well Location with Respect to Pollutants and Contaminants, and Structures. The standards contained in Sections 6.28.050(B)(1)(a) [SEPARATION], 6.28.050(B)(1)(b) [FLOODING AND DRAINAGE], and 6.28.050(B)(1)(c) [ACCESSIBILITY] of the Monitoring Well Standards, shall apply to all cathodic protection wells, unless otherwise approved by the Enforcement Agency.

2. Sealing the Upper Annular Space. General discussion of sealing requirements and methods is contained in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] and Section 6.28.040(A)(6) [SEALING-OFF STRATA] of

the Water Well Standards. Special requirements for sealing cathodic protection wells are:

a. Minimum Depth of Annular Seal.

(1) Minimum Depth. The annular space shall be filled with appropriate sealing material from ground surface to a depth of at least fifty (50) feet below land surface. The annular space shall be sealed to a depth of at least fifty (50) feet below land surface in congested urban areas, or where a cathodic protection well is within one hundred (100) feet of any potential source of pollution or contamination. Additional annular sealing material shall be installed to greater depths where adverse conditions exist that increase the risk of pollution or contamination of groundwater.

(2) Fill. Any annular space existing between the base of the annular surface seal and the top of the anode and conductive fill interval shall be filled with appropriate fill or sealing material. Fill material should consist of washed granular material such as sand, pea gravel, or sealing material. Fill material shall not be subject to decomposition or consolidation after placement and shall be free of pollutants and contaminants. Fill material shall not contain drill cuttings or drilling mud.

(3) Sealing-Off Strata. Additional annular sealing material shall be placed below the minimum depth of the annular surface seal, as needed, to prevent the movement of poor-quality water, pollutants, and contaminants through the well to zones of good quality water. Requirements for sealing off zones are in subsection (B)(5) [SEALING-OFF STRATA], below.

b. Sealing Conditions. Requirements for sealing the annular space under varied conditions are detailed in Section 6.28.040(A)(2)(b) [SEALING CONDITIONS] of the Water Well Standards.

c. Radial Thickness of Seal. A minimum of two inches of sealing material shall be maintained between all casings and the borehole wall within the interval to be sealed, except where temporary conductor casing cannot be removed as noted in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. At least two inches of sealing material shall be maintained between all casings in a borehole, within the interval to be sealed unless otherwise approved by the Enforcement Agency. Additional space shall be provided, where needed, to allow casings to be properly centralized and spaced and allow the use of a tremie device during well construction (if required), especially for deeper wells.

d. Sealing Material. Sealing material shall consist of neat cement, sand-cement, concrete, or bentonite, as discussed in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Concrete and bentonite shall only be used at the approval of the Enforcement Agency. Drill cuttings and used drilling mud shall not be used as any part of sealing material.

e. Placement of Seal. Standards for the placement of annular seals are described in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. In no case shall a cathodic protection well be left unsealed longer than fourteen (14) days following its advancement to total depth.

3. Surface Construction Features. Surface construction features of a cathodic protection well shall serve to prevent physical damage to the well; prevent the entry of surface water, pollutants, and contaminants; and prevent unauthorized access.

a. Locking Cover. The top of a cathodic protection well shall be protected by a locking cover or equivalent level of protection to prevent unauthorized access. All such covers shall allow the venting of gases.

b. Casing Cap. The top of a cathodic protection well casing shall be fitted with a watertight cap, cover, "U" bend, or equivalent device to prevent the entry of water, pollutants, and contaminants into the well bore. All such covers shall allow venting of gases from the well.

c. Flooding. The top of the well casing shall terminate above ground surface and above the Base Flood Elevation, except where site conditions, such as vehicular traffic, will not allow.

d. Bases. A concrete base or pad shall be constructed around the top of a cathodic protection well casing at ground surface and contact the annular seal, unless the top of the casing is to be below ground surface as provided by subsection (B)(3)(e) [VAULTS], below. The base shall be at least four inches thick and shall slope to drain away from the well casing. The base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the Enforcement Agency. The base shall be free of cracks, voids, and other significant defects likely to prevent water tightness. Contacts between the base and the annular seal, and the base and the well casing must be water tight and must not cause the failure of the well casing or annular seal.

Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the Enforcement Agency.

e. Vaults. At the approval of the Enforcement Agency, the top of a cathodic protection well may be below ground surface because of traffic or other critical considerations. A watertight, structurally sound vault, or equivalent feature, shall be installed to house the top of the well casing if it terminates below ground surface.

The vault shall extend from the top of the annular seal to at least ground surface. In no case shall the top of the annular seal be more than four feet below ground surface.

The vault shall contact the annular seal in a manner to form a watertight and structurally sound connection. Contacts between the vault and the annular seal, and the vault and the well casing (if any), shall not fail, or cause the failure of the well casing or annular seal.

Where cement-based annular sealing materials are used, the vault shall be set into or contact the annular sealing material before it sets, unless otherwise approved by the Enforcement Agency.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation.

Sealing material surrounding the vault shall extend from the top of the annular seal to ground surface, unless precluded in areas of freezing. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the sealing material shall be emplaced between the vault and excavation and contact a cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight and venting of gases is required. Vent openings must be above the Base Flood Elevation and must meet the specifications contained in Section 6.28.040(A)(3)(a) [OPENINGS] of the Water Well Standards The lid shall be fitted with a security device to prevent unauthorized access and shall be clearly and permanently labeled "CATHODIC PROTECTION WELL." The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at grade, or above, so that drainage is away from the vault. The top of the casing contained within the vault shall be capped in accordance with requirements of subsection (B)(3)(b) [CASING CAP], above so that water, contaminants, and pollutants that may enter the vault will not enter the well casing.

f. Protection from Vehicles. Protective steel posts, or the equivalent, shall be installed around a cathodic protection well casing where it is terminated above ground surface in areas of vehicular traffic. The posts shall be easily seen and shall protect the well from vehicular impact.

Additional requirements for surface construction features are contained in Section 6.28.040(A)(3) [SURFACE CONSTRUCTION FEATURES] of the Water Well Standards.

4. Casing. Vent pipe, anode access tubing, and any other tubular materials that pass through the interval to be filled and sealed are all considered casing for the purpose of these standards. Materials used for cathodic protection well casing generally shall meet the requirements for casing materials and their installation in Section 6.28.040 (A)(5) [CASING] of the Water Well Standards. Variance from the standards shall be at the approval of the Enforcement Agency. It is recommended that practices prescribed by the National Association of Corrosion Engineers also be followed in the design and installation of gas vents and electrical conduit.

Cathodic protection well casing should be at least two inches in internal diameter to facilitate eventual well destruction.

5. Sealing-Off Strata. If a cathodic protection well penetrates a stratum or strata below the minimum required annular surface seal depth specified in subsection (B)(2)(a) [MINIMUM DEPTH OF ANNULAR SEAL], above and that stratum contains poor-quality water, pollutants, or contaminants that could mix with and degrade water contained in other strata penetrated by the well, additional annular sealing material shall be placed below the minimum required annular surface seal to prevent mixing and water quality degradation.

The following minimum requirements shall be observed for isolating zones containing poor-quality water, pollutants, or contaminants for various cases:

a. If a stratum containing poor-quality water, pollutants, or contaminants lies above a stratum to be protected, annular seal material shall extend from the top of the stratum containing the poor-quality water, pollutants, or contaminants down to at least ten (10) feet into the confining layer separating the two strata, or through the entire thickness of the confining layer, whichever is least.

b. If a stratum containing poor-quality water, pollutants, or contaminants lies below a stratum to be protected, the annular space opposite the stratum to be protected shall be sealed along its full length. The seal shall extend at least ten (10) feet into the confining layer separating the two strata, or through the entire thickness of the confining layer, whichever is least.

c. Where two or more strata containing poor-quality water, pollutants, or contaminants are adjacent to one another and overlie a stratum to be protected, the annular space opposite the strata containing poor-quality water, pollutants, or contaminants and opposite all interbedded confining layers shall be sealed. The annular seal shall extend at least ten (10) feet down into, or completely through, whichever is least, the confining layer separating the strata containing poor-quality water, pollutants, or contaminants and the underlying stratum to be protected.

d. Where two or more strata containing poor-quality water, pollutants, or contaminants underlie a stratum to be protected, the annular space opposite the stratum to be protected shall be sealed. The seal shall continue down at least ten (10) feet into, or completely through, whichever is least, the confining layer separating the stratum to be protected and the underlying strata containing poor-quality water, pollutants or contaminants.

e. Where two strata containing poor-quality water, pollutants, or contaminants are separated by a stratum to be protected, the annular space opposite the stratum to be protected, the confining strata underlying and overlying the stratum to be protected, and the upper stratum containing poor-quality water, pollutants, or contaminants shall be sealed off.

The supplementary seals described in the cases above shall be extended up to and contact the base of the required minimum annular surface seal described in subsection (B)(2)(a) [MINIMUM DEPTH OF ANNULAR SEAL], above, if they are otherwise required to be within ten (10) feet of the surface seal. Sealing the entire annulus above the anode interval will often economically fulfill the conditions outlined above.

Requirements for sealing materials and their placement are described in subsection (B)(2)(a) [MINIMUM DEPTH OF ANNULAR SEAL], above.

6. Repair of Cathodic Protection Wells. Materials used for repairing cathodic protection well casing shall meet the requirements of subsection (B)(4) [CASING], above.

7. Temporary Cover. The well or borehole opening and any associated excavations shall be covered at the surface to prevent the entry of foreign material, water, pollutants, and contaminants, and to ensure public safety whenever work is interrupted by such events as overnight shutdown, poor weather and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

C. Destruction of Cathodic Protection Wells. General requirements for well destruction are contained in Section 6.28.040 (B) [DESTRUCTION OF WELLS] of the Water Well Standards. Special considerations for cathodic protection wells are as follows:

1. Filling and Sealing Conditions.

a. Wells that Only Penetrate Unconsolidated Material and a Single "Zone" of Groundwater. At a minimum, the upper fifty (50) feet of the well casing and the annulus between the well casing and borehole wall (if not already sealed) shall be completely sealed with suitable material. Sealing material shall extend to a minimum depth of fifty (50) feet below land surface if the well to be destroyed is located in an urban area, or is

within one hundred (100) feet of any potential source of pollution or contamination. Additional sealing material may be needed if adverse conditions exist. The remainder of the well below the minimum surface seal shall be filled with suitable granular fill material, such as clean sand or pea gravel, or with sealing material.

b. Wells that Penetrate Several Water-Bearing Strata. The upper portion of the well casing and annular space shall be filled with sealing material as described in Section 6.28.060(C)(1)(a) [WELLS THAT ONLY PENETRATE UNCONSOLIDATED MATERIAL AND A SINGLE "ZONE" OF GROUNDWATER], above. Strata encountered below the surface seal that contain poor-quality water, pollutants, or contaminants that could mix with and degrade water in other strata penetrated by the well, shall be effectively isolated by sealing the well bore and annulus within intervals specified in subsection (B)(5) [SEALING-OFF STRATA], above. The remainder of the well shall be filled with suitable granular fill or sealing material.

c. Wells Penetrating Fractured Rock. Sealing material shall be installed as outlined in subsections (C)(1)(a) and (C)(1)(b), above. Cement-based sealing material shall be used opposite fractured rock. The remainder of the well shall be filled with fill or sealing material, as appropriate.

d. Wells in Nonfractured Consolidated Strata. Sealing material shall be installed as outlined in subsections (C)(1)(a) and (C)(1)(b), above. The remainder of the well shall be filled with fill or sealing material, as appropriate.

e. Wells Penetrating Water-Bearing Zones or Aquifers of Special Significance. The Enforcement Agency may require that specific water-bearing zones be sealed off for well destruction.

2. Placement of Material. The placement of sealing materials for cathodic protection well destruction is generally described in Section 6.28.040 (B) [DESTRUCTION OF WELLS] and Appendix B of the Water Well Standards. The following additional requirements shall be observed in destroying cathodic protection wells.

Casing, cables, anodes, granular backfill, conductive backfill, and sealing material shall be removed as needed, by redrilling, if necessary, to the point needed to allow proper placement of sealing materials within required sealing intervals. Removal of some or all well materials will likely be required for cathodic protection wells that were not constructed in accordance with these standards, or standards adopted by the Southern California Cathodic Protection Committee in December 1969.

Casing that cannot be removed shall be adequately perforated or punctured at specific intervals to allow pressure injection of sealing materials into granular backfill and all other voids that require sealing.

The following requirements shall be observed in placing fill and sealing material in cathodic protection wells to be destroyed.

a. Placement Method. The well shall be filled and sealed with appropriate material upward from the bottom of the well using a tremie device or equivalent.

Sealing material shall be placed by methods (such as by the use of a tremie device or equivalent) that prevent freefall, bridging, or dilution of the sealing materials, or separation of aggregates from sealants. Sealing materials shall not be installed by freefall unless the interval to be sealed is dry and no deeper than thirty (30) feet below ground surface.

b. Timing of Placement. Sealing material shall be placed in one continuous operation (or "pour") from the bottom to the top of the well unless conditions in the well dictate that sealing operations be conducted in a staged manner and prior approval is obtained from the Enforcement Agency.

c. Groundwater Flow. Special care shall be used to restrict the flow of ground water into a well while fill and sealing material is being placed, if subsurface pressure causing the flow of water is significant.

d. Sealing Pressure. Pressure required for placement of cement-based sealing material shall be maintained long enough for the cement-based sealing material to set.

e. Verification. Verification shall be made that the volume of sealing and fill material placed in a well during destruction operations equals or exceeds the volume to be filled and sealed.

3. Sealing Materials. Materials used for sealing cathodic protection wells for destruction shall have low permeabilities so that the volume of water and possible pollutants and contaminants passing through them will be of minimal consequence. Sealing material shall be compatible with the chemical environment into which it is placed and shall have mechanical properties compatible with present and future site uses.

Suitable sealing materials include neat cement, sand-cement, concrete, and bentonite, as described in Section 6.28.040(A)(2) [SEALING THE UPPER ANNULAR SPACE] of the Water Well Standards. Sealing materials used for isolating zones of fractured rock shall be cement-based; as described in subsection (C)(1) [FILLING AND SEALING CONDITIONS], above. Drilling mud or drill cuttings shall not be used as any part of a sealing material for well destruction. Concrete and bentonite may be used as a sealing material only at the approval of the Enforcement Agency.

4. Additional Requirements for Destruction of Cathodic Protection Wells in Urban Areas. The following additional requirements shall be met at each well site in urban areas, unless otherwise approved by the Enforcement Agency:

a. The upper surface of the sealing material shall end at a depth of five feet below ground surface; and,

b. If the casing was not extracted during destruction and sealing operations, a hole shall be excavated around the well casing to a depth of five feet below ground surface after sealing operations have been completed and sealing materials have adequately set and cured. The exposed well casing shall then be removed by cutting the casing at the bottom of the excavation. The excavation shall then be backfilled with clean, native soil or other suitable material.

5. Temporary Cover. The well borehole and any associated excavations shall be covered at the surface to prevent the entry of foreign material, water, pollutants, and contaminants and to ensure public safety whenever work on the well is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

SECTION 7. Section 6.28.065 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.065 Geothermal Heat Exchange Well Standards.

A. Application to type of well. These standards shall apply to all geothermal heat exchange wells using a closed loop circulating fluid ground source heat exchange system.

In all geothermal heat exchange wells that use a groundwater source heat exchange system with either an open or a closed loop, well construction and destruction shall conform to the applicable water well standards.

B. Exclusions. The geothermal heat exchange well standards prescribed herein do not apply to trench construction systems as defined by the California Department of Water Resources (DWR). The Enforcement Agency may prescribe additional regulations when the fluid is circulated in a loop in a trench construction system. To prevent groundwater contamination, the Enforcement Agency shall prescribe additional regulations for the destruction of geothermal heat exchange trench construction systems.

C. DWR Standards and Best Available Technology. These standards are based upon DWR's Geothermal Heat Exchange Wells—Well Standards—Final Draft, dated June 24, 1998. In the event that these standards are modified by a subsequent DWR Bulletin, the Enforcement Agency may adopt and enforce the new standards on an interim basis until such time as they are incorporated into this Chapter. New materials and techniques that are developed in the future that are approved and adopted by the International Ground Source Heat Pump Association shall be allowed, contingent upon their approval by the Enforcement Agency, if they equal or exceed the standards herein in performance and level of protection.

D. Geothermal Heat Exchange Well Construction.

1. Well Location. Geothermal heat exchange wells that are sealed their entire length may be installed closer to contaminant or pollutant sources or structures than the distances specified previously in this Chapter. Iron markers, trace tapes, or wire shall be installed at each well to facilitate locating the buried wells.

2. Diameter of borehole. The borehole diameter of a geothermal heat exchange well shall be sufficient to allow placement of a 2-inch tremie device or hose, in addition to the loop pipes, to emplace material in the borehole that surrounds the loop.

Such material includes the sealing material and any thermal conductive material that is placed in the borehole in lieu of sealing material to enhance heat exchange. Both sealing material and thermal conductive material shall fill the hole and surround all loop pipes. Gravity installation or free fall of sealing material or fill materials without use of a tremie device is not permitted. Any clean fill placed between seals shall be chlorinated.

3. Sealing geothermal heat exchange wells.

a. Depth of seal. The sealing of a geothermal heat exchange well shall be completed within twenty-four (24) hours after the borehole is drilled. Full-length sealing material placed by tremie device or hose is required to prevent contamination from surface infiltration or to prevent contaminated water from one aquifer from mixing with water of another aquifer. The Enforcement Agency may waive the requirement for full-

length sealing in vertical borehole systems provided the agency prescribes alternative sealing methods that meet the minimum standards as noted in subsection (D)(5).

b. Sealing materials. The following sealing materials are approved for use in geothermal heat exchange wells:

(1) Bentonite slurry. The seal shall consist of high solids sodium bentonite slurry made from bentonite grout or an 8 mesh granulated bentonite polymer slurry meeting NSF Standard 61 (National Sanitation Foundation) with a minimum of twenty (20%) percent by weight solids (9.4 pounds per gallon grout weight) mixed according to the manufacturer's specification. Drilling mud or cuttings shall not be used as sealing materials. Water used in preparing bentonite slurry shall meet the standards in this section. It is recommended that high solids sodium bentonite slurry be used in all geothermal heat exchange wells.

(2) Other grout. Other types of grout may be used if they are contained herein in the Water Well Standards, or if the grout is considered a BAT and is approved by the International Ground Source Heat Pump Association. Cement is not permitted as a sealing material because of the expansion of the polyethylene loop pipe caused by the heat of hydration of the cement, and subsequent contraction of the pipe after cooling. Such expansion and contraction does not provide an effective seal.

c. Placement of sealing material. Before placing the sealing material, all loose cuttings or other obstructions shall be removed from the borehole. A two-inch tremie device or hose shall be used to emplace sealing materials. The sealing material shall be placed by pressure pumping through a tremie. The tremie device shall be lowered to the bottom of the zone being sealed, and raised slowly as the material is introduced. All sealing material shall be placed in a continuous operation from the bottom of the geothermal heat exchange well to the top. The discharge end of the tremie device shall be continuously submerged in the sealing material until the zone to be sealed or filled is completed. The sealing material shall fill the hole and surround all pipes. In no case shall a geothermal heat exchange well be left unsealed longer than fourteen (14) days following its advancement to total depth.

If the heat exchange loop pipe can not be emplaced to the total depth of the borehole, the contractor shall ensure that the borehole is sealed from the ground surface to the total depth. The tremie device may be left in place provided the tremie is completely filled with the sealing material. Gravity installation or free fall of sealing materials without use of a tremie device is not permitted.

4. Construction materials.

a. Casing. Temporary casing may be used to install geothermal heat exchange wells. Such casing shall be removed upon completion of the well. If a permanent casing must be used, the casing material and installation methods and sealing shall comply with the applicable provisions for casing materials, installation and sealing as specified for water wells herein.

b. Heat exchange loop materials.

(1) Type of material. In a geothermal heat exchange well, the material used to make up the heat exchange loop must meet industry standards for this application as specified by the International Ground Source Heat Pump Association (IGSHPA). PVC (polyvinyl chloride) pipe shall not be used as loop materials in geothermal heat exchange wells. Generally closed loop materials are composed of high density

polyethylene pipe. Other materials that conform to IGSHPA standards may be used in geothermal heat exchange wells.

(2) Connections. All heat exchange loop pipe connections to be placed in the borehole shall be thermally fused according to manufacturer's instructions and shall be leak-tested after assembly. Only fused fittings or non-metallic mechanical stab fittings that meet ASTM D-2513, "Standard Specification for Polyethylene (PE) as Pressure Pipe, Tubing, and Fittings," Section 6.10.1, Category 1, may be used in the header manifold.

(3) Installation. Heat exchange loop materials shall be installed and sealed within twenty-four (24) hours after the completion of the drilling of each geothermal heat exchange well borehole.

(4) Metal pipe and fittings. If metal pipe or fittings are to be installed underground, cathodic protection shall be provided. Such a cathodic protection system shall be maintained in operating condition.

c. Loop fluids. Fluids circulated in the loop as the heat exchange medium in geothermal heat exchange wells shall have low toxicity as defined below.

Any additives used in the loop fluid for freeze protection or rust or scale protection shall biodegrade to less toxic compounds. The loop fluid is typically water, or water plus a freeze protection additive. Pure water should be used whenever possible. Any water used in the fluid shall be from a potable source.

The loop fluid, including the water and any additives, shall have an LD_{50} for humans of greater than 25,000 mg/kg. LD_{50} is the dose that will be lethal to fifty (50%) percent of the population who ingests the fluid. Undiluted freeze protection additives shall have an LD_{50} for humans of greater than 5,000 mg/kg. If the LD_{50} for humans is known for a specific additive, that LD_{50} shall be used when calculating the toxicity of the loop fluid. In the absence of human toxicity data, the estimated LD_{50} shall be based on the toxicity data of the most sensitive species, using uncertainty factors as appropriate and in accordance with standard practices in toxicology. Commonly used and acceptable freeze protection additives include propylene glycol and ethanol.

d. Final testing. If pressure testing with water or air to one hundred fifty (150%) percent above the manufacturer's heat pump operating specifications for a period of thirty (30) minutes shows that any geothermal heat exchange loop leaks, the leaking loop shall be repaired or replaced. If the loop can not be repaired, the loop shall be replaced. If the loop can not be repaired or replaced, the loop and the borehole shall be destroyed in accordance with subsections (E) and (F).

5. Minimum requirements for non-fully sealed geothermal heat exchange systems.

a. Hydrogeology and groundwater quality. Construction of non-fully sealed geothermal heat exchange wells shall require knowledge about the site hydrogeology and groundwater quality sufficient to ensure that construction of non-fully sealed wells does not degrade groundwater quality. If such knowledge about the site is not available, only fully sealed geothermal heat exchange wells shall be permitted.

Where groundwater quality meets drinking water standards, no additional action is necessary. Where poor quality water is present as determined by site exploration, the strata containing poor quality water shall be sealed in accordance with subsection (D)(5)(d) below.

b. Borehole size requirements. The borehole diameter of a geothermal heat exchange well shall be sufficient to allow placement of a 2-inch tremie device or hose, in addition to the loop pipes, to emplace material in the borehole that surrounds the loop.

Such material includes the sealing material and any thermal conductive material that is placed in the borehole in lieu of sealing material to enhance heat exchange. Both sealing material and thermal conductive material shall fill the hole and surround all loop pipes. Gravity installation or free fall of sealing material or fill materials without use of a tremie device is not permitted. Any clean fill placed between seals shall be chlorinated.

c. Minimum depth of seals. If a borehole is not sealed throughout its entire length, the minimum depth of surface annular seal shall be the same as specified for domestic water wells herein.

d. Sealing between aquifers. If full-length sealing is not done and the geothermal heat exchange well penetrates more than one aquifer and one or more of the aquifers contains water that, if allowed to mix in sufficient quantity, may result in a significant deterioration of the quality of the water in the other aquifer(s), the strata producing such poor-quality water shall be sealed off to prevent mixing of this water with other aquifers. The seal shall extend no less than ten feet (10') above and below the strata to be sealed off, even if the strata to be sealed are less than ten feet (10') in thickness. In case the strata to be sealed are at the bottom of the well, the seal need extend only in the upward direction. The sealing material shall fill the borehole and any surrounding void spaces in the interval to be sealed. The seal shall be placed by a 2-inch tremie device or hose from the bottom to the top of the interval to be sealed. Gravity installation or free fall of sealing materials without use of a tremie device is not permitted.

e. Fill material. Any fill materials used in non-fully sealed wells shall meet the standards contained in this section and shall have appropriate thermal characteristics for the intended heat exchange purpose. Any clean fill placed between seals shall be chlorinated.

f. Placement of fill. Fill material shall be emplaced by use of a 2-inch tremie device. The tremie device shall be lowered to the bottom of the zone being filled, and raised slowly as the material is introduced. All fill shall be emplaced in one continuous operation upward from the bottom of the borehole. When using the tremie device method to install fill material, the bottom of the tremie shall be maintained as close as possible to, but not inside of, the emplaced fill. Gravity installation or free fall of fill materials without the use of a tremie device is not permitted.

g. Sealing materials. Sealing materials shall meet the standards prescribed in subsection (D)(3)(b).

E. Destruction of a closed loop ground source heat exchange system.

To destroy a geothermal heat exchange well using a closed loop, ground source heat exchange system, the following procedures shall be completed:

1. Fluid removal. All fluid in the heat exchange loop shall be displaced and disposed of properly.

2. Near surface excavation. A hole shall be excavated at least five feet below the surface around the borehole. The loop pipe in this excavation shall be removed.

3. Sealing the loop in the borehole. The remaining loop shall be completely filled with a high solids bentonite slurry as specified in subsection (D)(3)(b)(1). The

slurry shall be allowed to spill into the excavation to provide a cap at least one foot thick above the loop pipe. The remainder of the excavation shall be filled with compacted earth or pavement.

F. Destruction of an open loop or closed loop, groundwater source heat exchange system. Destruction of an open loop or closed loop groundwater source heat exchange system shall be completed in conformance with the destruction standards for water wells contained in this Chapter.

SECTION 8. Section 6.28.070 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.070 Variances.

The Enforcement Agency shall have the power under the following specified conditions to grant a variance from any provision of this Chapter that is not mandated by the State of California, and to prescribe alternative requirements in their place.

A. Special Circumstances. The Enforcement Agency may, under special circumstances, allow a variance from strict interpretation and enforcement of any provision where practical difficulties or unnecessary hardship would result from the strict interpretation and enforcement of any provision. Written evidence must be submitted showing that the proposed variance will not impair, contaminate or pollute the groundwater or endanger the health and safety of the public and that strict compliance with the Chapter would be unreasonable in light of all circumstances.

B. Purpose of Chapter Not Compromised. The granting of such a variance must be consistent with the purposes of this chapter.

SECTION 9. Section 6.28.080 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.080 Special Groundwater Protection.

The Enforcement Agency may designate areas where groundwater quality problems are known to exist, and where a well will penetrate more than one aquifer. The Enforcement Agency may require in these designated areas special well seal(s) to prevent mixing of water from several aquifers. Where an applicant proposes well construction, modification, repair, or destruction work in such an area, the Enforcement Agency may require the applicant to provide a report prepared by a Professional Geologist or Professional Civil Engineer (California Business and Professions Code Sections 7850 and 6762 respectively) that identifies all strata containing poor quality water and recommends the location and specifications of the seal or seals needed to prevent the entrance of poor-quality water or its migration into other aquifers.

SECTION 10. Section 6.28.090 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.090 Inspections.

The Enforcement Agency shall make an inspection of the annular seal construction work. The Enforcement Agency may also make an initial inspection of each proposed drilling site, an inspection at the completion of the work, and inspections at such other times as it deems appropriate. In cases where the interval to be sealed is less than 5 (five) feet in depth, the seal inspection for wells or exploratory borings may be waived, with Enforcement Agency approval.

A. Initial Inspection. Upon receipt of an application, the Enforcement Agency may make an inspection of the drilling site prior to the issuance of a well permit. The purpose of this inspection is to determine whether there are any site conditions such that the Enforcement Agency shall require the following:

1. Relocation of Drilling Site. Require relocation of the drilling site should the location shown on the permit application be too close to known or potential sources of pollution or contamination.

2. Additional Conditions. Set additional conditions, if needed to remediate any previously unknown groundwater quality protection problems.

3. Prohibition of Drilling. If the proposed well location will create a hazard or nuisance, drilling will be prohibited.

B. Inspection of Well Seal and Other Operations. The Enforcement Agency shall inspect the annular space grout depth prior to the sealing of the well. The Enforcement Agency may also inspect the placement of the well seal, the destruction of a well, or any other operation necessary to fulfill the provisions of the permit or this Chapter.

1. Required Notice. The Enforcement Agency shall be notified by the applicant, during normal business hours, a minimum of forty-eight (48) hours prior to seal placement, well destruction, or completion of other operations imposed by special permit condition, and an inspection shall be scheduled by the applicant at that time. The Enforcement Agency shall allow twenty-four (24) hours (one working day) notice if the applicant can be reasonably accommodated. These inspections shall be scheduled to be conducted during normal business hours, unless otherwise negotiated.

2. Should Enforcement Agency Fail to be Present. No grout seal shall be placed until permission to proceed is given by the Enforcement Agency. The Enforcement Agency may allow a grout seal to be placed in their absence provided that the placement of the seal is performed under the supervision of a Professional Geologist, a Professional Engineer [in the appropriate discipline(s) as defined by the California Business and Professions Code], or a State Registered Environmental Health Specialist, who submits within thirty (30) days from the date of sealing a statement, signed under penalty of perjury, detailing the seal depth, thickness, material and method of placement.

C. Final Inspection and Well Completion.

1. The applicant shall notify the Enforcement Agency within five working days of the completion of the work so that the Enforcement Agency may make a final

inspection to determine whether the work was completed in accordance with this Chapter. No applicant shall be deemed to have complied with this Chapter until such inspection has been performed.

2. Upon completion of the drilling process, the applicant shall be responsible for placement of the casing, grouting of the annular space, and either the installation of a pump, or the securing of a watertight cap or plug on the casing.

3. No well shall be placed into use until final approval is granted by the Enforcement Agency. This provision shall not apply to monitoring wells.

SECTION 11. Section 6.28.100 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.100 Right of Entry and Inspection.

If the Enforcement Agency, with reasonable cause, believes that a well is causing a nuisance, or that a violation of this Chapter has occurred, he may investigate the situation to determine whether such a nuisance or violation does in fact exist. The Enforcement Agency shall have the power, as described in this section, to enter the premises to inspect for any violation or condition that may cause or constitute a nuisance. The Enforcement Agency is authorized to collect samples and perform testing as needed, and the Enforcement Agency may take any other steps reasonably necessary for determination of whether a violation or nuisance exists.

SECTION 12. Section 6.28.110 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.110 Well Completion Reports.

A. Submittal of State "Well Completion Report". A copy of the "Well Completion Report" (Water Well Driller's Report, Department of Water Resources Form 188) required by California Water Code Section 13751 shall be submitted by the applicant to the Enforcement Agency within sixty (60) days of construction, modification, repair, or destruction of any well. This report shall document that the work was completed in accordance with the standards in this Chapter and all additional permit conditions. This Section shall not be deemed to release any person from the requirement to file said report with the Department of Water Resources.

B. Confidentiality of Report. In accordance with California Water Code Section 13752, reports shall not be made available for inspection by the public but shall be made available for inspection by governmental agencies for use in making studies. Reports shall be made available to any person who obtains written authorization from the owner of the well. A report associated with a well located within two miles of an area affected or potentially affected by a known unauthorized release of a contaminant shall be made available to any person performing an environmental cleanup study associated with the unauthorized release, if the study is conducted under the order of a regulatory agency. A report released to a person conducting an environmental cleanup study shall not be used for any purpose other than for the purpose of conducting the study.

C. Other Requirements. Nothing in this ordinance shall be deemed to excuse any person from compliance with the provisions of California Water Code Section 13750 through 13755 relating to notices and reports of completion or any other federal, state, or local reporting regulations.

SECTION 13. Section 6.28.120 of Chapter 6.28, Title 6, of the Sacramento County Code is hereby amended to read as follows:

6.28.120 Enforcement.

A. Administrative Enforcement Policy. By written policy the Enforcement Agency shall adopt procedures for the enforcement of this Chapter. Such procedures shall contain those elements required by, and shall be consistent with the provisions stated in, California Health & Safety Code Section 25187, or any successor statute thereto. The administrative enforcement procedures adopted shall not be exclusive, but are cumulative with all other remedies available by law and under this Chapter. The maximum penalty for violation of any provision of this Chapter shall be ten thousand dollars ($10,000.00) per well per day of violation.

B. Injunctions and Other Orders. When any person has engaged in, is engaged in, or is about to engage in any acts or practices which violate this Chapter, or any resolution, rule, or regulation adopted pursuant to this Chapter, the Office of the County Counsel for Sacramento County may apply to any court of competent jurisdiction for an order enjoining those acts or practices, or for an order directing compliance.

C. Grounds for Revocation, Modification or Suspension of Permit. Any permit issued pursuant to this Chapter may be revoked, modified or suspended during its term, upon one or more of the following grounds:

1. Violation of any of the terms or conditions of the permit, including nonpayment of fees;

2. Obtaining the permit by misrepresentation or intentional failure to fully disclose all relevant facts; or

3. Violation of any provision of this Chapter.

D. Method of Revocation, Modification, or Suspension. The Director may revoke, modify, or suspend a permit by issuing a written notice stating the reasons therefore, and serving same together with a copy of the provisions of this Chapter, upon the holder of the permit. The revocation, modification, or suspension shall become effective fifteen (15) days after service of the notice, unless the holder of the permit enters into a settlement agreement with the Director or appeals the notice in accordance with Section 6.28.120(**F**). If such an appeal is filed, the revocation, modification or suspension shall not become effective until a final decision on the appeal is issued.

E. Hearings.

1. A person requesting a hearing on an order issued by the Director and/or his or her designee under this section may select the hearing Authority specified in either subparagraph 1 or 2 below by indicating this preference in the Notice of Defense filed with the Director and/or his or her designee. If a Notice of Defense is filed but no

hearing Authority is selected, the Director and/or his or her designee may select the hearing Authority. Within 90 days of receipt of the Notice of Defense by the Director and/or his or her designee, the hearing shall be scheduled as follows:

a. An Administrative Law Judge of the Office of Administrative Hearings of the Department of General Services, who shall conduct the hearing in accordance with Chapter 4.5 (commencing with Section 11400) of Part 1 of Division 3 of Title 2 of the Government Code, and the Director and/or his or her designee shall have all the authority granted to an agency by those provisions.

b. A hearing Authority designated by the Director and/or his or her designee, who shall conduct the hearing in accordance with Chapter 4.5 (commencing with Section 11400) of Part 1 of Division 3 of Title 2 of the Government Code, and the Director and/or his or her designee shall have all the authority granted to an agency by those provisions. When a hearing is conducted by a Director and/or his or her designee selected hearing Authority pursuant to this paragraph, the hearing Authority shall issue a decision within 60 days after the hearing is conducted. Each hearing Authority designated by the Director and/or his or her designee shall meet the requirements of Section 11425.30 of the Government Code and any other applicable restriction.

2. The hearing decision issued pursuant to Section 6.28.120.E.1.b shall be effective and final upon issuance by the Director and/or his or her designee. A copy of the decision shall be served by personal service or by certified mail upon the party served with the order, or their representative, if any.

3. Any provision of an order issued under Section 6.28.120, except the imposition of an administrative penalty, shall take effect upon issuance by the Director and/or his or her designee if the Director and/or his or her designee finds that the violation or violations of law associated with that provision may pose an imminent and substantial endangerment to the public health or safety or the environment. A request for a hearing shall not stay the effect of that provision of the order pending a hearing decision. However, if the Director and/or his or her designee determines that any or all provisions of the order are so related that the public health or safety or the environment can be protected only by immediate compliance with the order as a whole, the order as a whole, except the imposition of an administrative penalty, shall take effect upon issuance by the Director and/or his or her designee. A request for a hearing shall not stay the effect of the order as a whole pending a hearing decision.

4. A decision issued pursuant to Section 6.28.120(E)(1)(b) of this Chapter may be reviewed by a court pursuant to Section 11523 of the Government Code. In all proceedings pursuant to this section, the court shall uphold the decision of the Director and/or his or her designee if the decision is based upon substantial evidence in the record as a whole. The filing of a petition for writ of mandate shall not stay any action required pursuant to this Chapter or the accrual of any penalties assessed pursuant to this Chapter. This subdivision does not prohibit the court from granting any appropriate relief within its jurisdiction.

5. When a cease and desist order is issued pursuant to this Chapter, the hearing shall be scheduled by the Director and/or his or her designee with a Hearing Authority within fifteen (15) calendar days of receipt by the Director and/or his or her designee of the request for hearing. The Hearing Authority shall issue a decision within fifteen (15) calendar days after the completion of any hearing conducted pursuant to this

subsection.

The hearing date shall be no more than forty-five (45) days from the date of the notice.

6. Alternative dates for the hearing may be established by mutual consent of the person and the Director and/or his or her designee, or as ordered by the Hearing Authority.

7. Conduct of Administrative Hearings - Generally.

a. General. At the time set for hearing, the Hearing Authority shall state what the prima facie case is, what the burden of proof is, and what the range of penalties is. The Hearing Authority shall proceed to hear the testimony of the Director and/or his or her designee, the person, and other competent persons respecting the circumstances of the violation, and other relevant facts concerning the matter. The Hearing Authority shall follow the rules of procedure for conducting hearings established by this Code.

b. Record of Oral Evidence at Hearing. A record of the entire hearing proceedings shall be made by either a certified court reporter or any other means of permanent recording determined to be appropriate by the Hearing Authority. A transcript of the proceedings shall be made available to all parties upon request and upon payment of the fee prescribed therefore. Such fees may be established and revised from time-to-time by the Director and/or his or her designee.

c. Continuances. The Hearing Authority may, upon request of the person, a party in interest, or the Director, grant continuances from time to time for good cause shown, or upon his/her own motion. Any continuance granted shall in no way diminish the responsibility of the person and/or parties in interest for maintaining the premises, nor affect other requirements of this Chapter regarding time for challenging any decisions made or actions taken.

d. Oaths-Certification. The Hearing Authority or certified shorthand reporter shall administer the oath or affirmation.

e. Evidence Rules. Government Code of the State of California, Section 11513, as presently written, or hereinafter amended, shall apply to hearings conducted under this Chapter.

f. Rights of Parties. Each party may represent themselves, or be represented by anyone of their choice. Each party may appear at the hearing and offer evidence in this matter and cross examine witnesses.

g. Official Notice. In reaching a decision, official notice may be taken, either before or after submission of the case for decision, of any fact which may be judicially noticed by the courts of this state.

h. Inspection of Premises. The Hearing Authority may inspect the premises involved in the hearing prior to, during or after the hearing, provided that:

(1) Notice of such inspection shall be given to the parties before the inspection is made;

(2) The parties are given an opportunity to be present during the inspection;

(3) The Hearing Authority shall state for the record during the hearing, or file a written statement after the hearing for inclusion in the hearing record, upon completion of the inspection, the material facts observed and the conclusion drawn as a result of the inspection; and

(4) Each party then shall have a right to rebut or explain the matters so stated

by the Hearing Authority either for the record during the hearing or by filing a written statement after the hearing for inclusion in the hearing record.

i. Burden of Proof. The burden of proof in hearings held pursuant to this Chapter shall be as follows:

(1) In the case of an administrative enforcement order, including that which includes penalties, the Director and/or his or her designee shall bear the burden of proof, by a preponderance of evidence, to show that a violation of this Chapter has occurred.

(2) In the case of a cease and desist order, the Director and/or his or her designee shall bear the burden of proof, by a preponderance of evidence, to show that a violation(s) of this Chapter has occurred and that such violation(s) require an immediate discontinuation of any prohibited discharge to the storm drain system and/or any other ongoing violation of this Chapter and/or the satisfactory remediation of the area affected by the violation.

8. Form and Contents of Decision - Finality of Decision.

a. Following the hearing, the Hearing Authority shall issue an order in writing no later than thirty (30) days from the date of the hearing, unless the time is waived by the parties. The order shall contain findings of fact and rationale appropriate to the violation and result, and a resolution of the essential issues raised, including the following:

(1) Confirmation or denial of the occurrence of violations of this Chapter that are alleged by the Director and/or his or her designee;

(2) Confirmation or rejection of any administrative civil penalty sought by the Director and/or his or her designee, and establishment of the monetary amount of any administrative civil penalty to be enforced.

(3) Confirmation, amendment, or rejection of required corrective actions related to compliance with this Chapter that are imposed by the Director, but only if those requirements are appealed by the person.

b. The Hearing Authority's order concerning any administrative civil penalty shall be guided by factors including, but not limited to the following: the danger or harm to public health and safety or the environment created by the violation; actions by the person to prevent, correct, or conceal the violation; negligence; intent; recidivism; and any economic benefit associated with non-compliance.

c. The Hearing Authority's order shall uphold required corrective actions if the person fails to show clear and convincing evidence that the required corrective actions are unreasonable or unnecessary for achieving or demonstrating ongoing compliance with this Chapter. The Hearing Authority's order may amend, or reject required corrective actions, provided that compliance with this Chapter will be achieved.

d. The Hearing Authority's order shall inform the person of the following:

(1) If the violation is not corrected, or if any required corrective actions are not met within the time(s) required, that the violation may be abated by the County, without further notice or consent of the person or any party in interest, in such manner as may be ordered by the Hearing Authority, and the expense thereof, including all costs of enforcement, incurred by the County as a result of the person's failure to comply, shall be recoverable by the County, and may be made a lien on the subject premises pursuant to the provisions of Government Code section 25845.

(2) The time and manner by which a person may file a challenge to the Hearing Authority's order is governed by Government Code Section 53069.4 or any successor provision thereto.

(3) Failure to comply with the Hearing Authority's order shall constitute a misdemeanor and is subject to additional enforcement action, including criminal penalties and additional civil and administrative penalties.

e. Preparation of a record of the administrative proceeding shall be governed by the provisions of Sacramento County Code, Chapter 1.06, as presently written or hereinafter amended.

f. The provisions of Sacramento County Code, Chapter 1.06 notwithstanding, any challenge to the order of the Hearing Authority concerning any appeal or administrative civil penalty shall be governed by Government Code section 53069.4 or any successor provision thereto. Service of the notice of appeal authorized by Government Code section 53069.4 on the County shall be served upon the Clerk of the Board.

g. After any notice or order made pursuant to this Chapter shall have become final, no person to whom any such order is directed shall fail, neglect or refuse to obey such order. The Director and/or his or her designee may pursue, through Sacramento County Counsel or the Sacramento County District Attorney, appropriate judicial action against any person who fails to comply with any such notice or order, including charging that person with a misdemeanor offense.

F. Appeals. Any decision of the Director may be appealed to the Hearing Authority. Any such appeal shall be in writing, shall state the specific reasons therefore and grounds asserted for relief, and shall be filed with the Director not later than fifteen (15) days after the date of service of any such decision. If an appeal is not filed within the time or in the manner prescribed above, the right to review of the action against which the complaint is made shall be deemed to have been waived. Specific procedures pertaining to the appeal process shall be documented by written policy as described in Section 6.28.120(A) of this Chapter.

G. Finality of Determination. The decision by the Hearing Authority shall become final upon the date of filing and service.

H. Administration. Except as otherwise provided, the Director, or his/her designee, is charged with the responsibility of administering this Chapter, and shall be authorized from time to time to promulgate and enforce such rules or regulations consistent with the purposes, intent, and express terms of this Chapter as he or she deems necessary to implement such purposes, intent, and express terms. No rules or regulations promulgated by the Director or amendments thereof shall be enforced or become effective until thirty (30) calendar days following the date on which the proposed rules or regulations are filed with the Clerk of the Board of Supervisors.

SECTION 14. This ordinance was introduced and the title thereof read at the regular meeting of the Board of Supervisors on April 6, 2010, and on April 6, 2010, further reading was waived by the unanimous vote of the Supervisors present.

This ordinance shall take effect and be in full force on and after thirty (30) days from the date of its passage, and before the expiration of fifteen (15) days from the date of its passage it shall be published once with the names of the members of the Board of Supervisors voting for and against the same, said publication to be made in a newspaper of general circulation published in the County of Sacramento.

On a motion by Supervisor Nottoli, seconded by Supervisor MacGlashan, the foregoing ordinance was passed and adopted by the Board of Supervisors of the County of Sacramento, State of California, this 13th day of April 2010, by the following vote:

AYES:	Supervisors,	MacGlashan, Nottoli, Yee, Peters, Dickinson
NOES:	Supervisors,	None
ABSENT:	Supervisors,	None
ABSTAIN:	Supervisors,	None

Chair of the Board of Supervisors
of Sacramento County, California

FILED
BOARD OF SUPERVISORS
APR 13 2010
BY CLERK OF THE BOARD

ATTEST: Clerk, Board of Supervisors

In accordance with Section 25103 of the Government Code of the State of California a copy of the document has been delivered to the Chairman of the Board of Supervisors, County of Sacramento on 4/13/10
By Deputy Clerk, Board of Supervisors