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WALNUT ENERGY CENTER (02-AFC-4C)

BACK-UP WATER SUPPLY AMENDMENT

Prepared for
WALNUT ENERGY CENTER AUTHORITY

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1.0 Introduction

1.1 Overview of Amendment

The Walnut Energy Center Authority[1] (the "Petitioner") hereby petitions to amend the certification for the Walnut Energy Center ("WEC" or the "Project") to modify conditions limiting the back-up water supply for the Project -- poor quality groundwater from WEC's on-site wells -- to 51 acre feet per year (afy). New information presented in the Alternative Water Supply Plan submitted pursuant to Soils & Water-6 and the Petitioner's operational experience with the City of Turlock's recycled water supply support the requested modification.

WEC is a natural gas-fired, 250-megawatt facility that is located in the City of Turlock, in Stanislaus County. The Project was certified by the Energy Commission on February 18, 2004 (hereinafter "2004 Decision") and began commercial operation on February 28, 2006. Operation of WEC requires up to 1,800 afy of water, approximately 98 percent of which is used for cooling purposes.

At the time of the 2004 Decision, the City of Turlock's Wastewater Treatment Plant ("WWTP") was undergoing improvements. Recycled water was not then available, but was expected to become available some time shortly after the Project was to commence commercial operations. Accordingly, the Commission approved the use of potable water from the City as an interim supply, or "bridge supply," for cooling, steam cycle make up and also as a back-up supply until the WWTP was able to produce recycled water. Once recycled water could be delivered, potable water was permitted for use as a back-up source of water in the event of a short-term interruption in recycled water delivery. The use of potable water as a back-up supply after the bridge supply period was limited to 51 afy, calculated using a 5-year rolling average.

Although the 2004 Decision allowed the use of potable water for cooling, steam cycle make up and back-up purposes, in 2005, the Petitioner requested that WEC's license be amended to forgo the use of potable water supply in favor of the use of poor quality groundwater from on-site wells constructed to capture degraded non-potable water from shallow aquifers. This amendment also resulted in conservation of the high quality potable water supplies that had originally been approved by the 2004 Decision. The Commission approved the use of poor quality groundwater from WEC's wells for both the bridge supply and to provide back-up for recycled water interruptions on January 19, 2005 ("2005 Order").[2]

The 51 afy limit on groundwater was maintained at the time of the 2005 amendment because "no new information or analysis is available to substantiate the request to remove the limit on groundwater use for back-up at this time."[3] However, Staff acknowledged that Petitioner may provide such information pursuant to Soils & Water-6, which would "address any alternative supplies that may be needed in the

[1] The Walnut Energy Center Authority is a public agency under the Joint Powers Act formed by Turlock Irrigation District (the original owner) and Modesto Irrigation District.

[2] Order Approving a Petition to Modify Bridge and Construction Water Supply, No. 05-0119-02, Jan. 19, 2005.

[3] Walnut Energy Center Project (02-AFC-4C) Notice of Receipt of Petition to Revise Soils & Water-5 (Bridge and Construction Water Supply) and Public Review of Staff Analysis, December 23, 2004, Attached Staff Analysis of Bridge and Construction Water Supply (hereinafter "December 2004 Staff Analysis"), p.5.

event that recycled water is not available as expected or in the event of a significant disruption in water supplies once the project starts using recycled water."[4]

On August 8, 2006, Petitioner submitted the Alternative Water Supply Plan ("AWSP") required by Condition of Certification Soils & Water-6. It was approved by the CEC on August 28, 2006. The AWSP is provided herewith as Attachment A.

The AWSP analyzed the impacts of the most extreme groundwater usage scenario: pumping 1,800 afy of groundwater for 50 years, although WEC only has a projected useful life of 30 years. The AWSP concluded that regional water supplies would not be affected by the use of groundwater as a permanent supply source for WEC. In addition, of the 43 neighboring wells only one well, the Ruble Road well, could potentially be impacted under the 50 year worst case scenario. The potential drawdown at that well location is 11.1 feet while the top of the well screen is at a depth of 60 feet and the well is drilled to a depth of 76 feet. It is unlikely that the drawdown from WEC pumping would affect the operation of this well. Indeed it has been previously documented that five years of pumping by the on-site wells would not affect the well.

The determination regarding the potential for impacts on neighboring wells from this hypothetical is highly "conservative"; that is, the AWSP over-predicts potential impacts by assuming pumping of groundwater to meet the WEC's entire water needs (as opposed to as a back-up supply only) and by relying on well data from October 1991, historically the month with the most severe drought conditions.

There have been changes in circumstances based on operating experience that prompted this Amendment. Since the City of Turlock has begun supplying recycled water to WEC, interruptions of this recycled supply have been more frequent than anticipated. Operational data from the WWTP, which shows a 14% decrease in effluent flow from year 2006 (when WEC was declared Commercial) to present day, is likely due, in part, to the economic downturn and the poor housing market in the Central Valley. This decreased in-flow to the WWTP facility may help explain why the City WWTP has not had adequate water for the needs of the Walnut Energy Center. Accordingly, Petitioner believes that WEC requires greater than 51 afy (over a 5-year rolling average) of poor quality groundwater to back-up the City's recycled water deliveries.

Significantly, the Project's primary source of water shall remain the recycled water from the City of Turlock's WWTP. In addition, TID has already taken several actions intended to address the potential interruption of recycled water supply from the City:

1. <u>WEC Operator Training</u>: TID has conducted a Training session with all of the WEC Operations personnel. The Training session discussed the CEC language in the Soils & Water-5 Condition of Certification. The following directive was provided to the Operations Supervisor at WEC:

   "A notification form has been prepared for your staff to use during any interruption of Recycled Water from the City of Turlock (whether we consume well water or not during the interruption). Please discuss this notification form with your staff during the training sessions. The CEC's Compliance Project Manager (CPM) must be notified within 24 hours every time there is an interruption in Recycled Water from the City of Turlock. Protocols for delivery of the form to the CEC's CPM are described in the form itself. In addition, each of these interruption events must also be recorded in the OPS log. Failure to provide the required notice to the CEC's CPM and record the event in the OPS log may result in sanctions."

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[4] *Id.*; *see also* Report of Conversation between L. White and J. Harris, October 28, 2004 (acknowledging that the 51 afy limit "was established to restrict groundwater pumping of the overdrafted basin to historical amounts. In the event that additional alternatives need to be considered, these alternatives should appropriately be addressed in the alternative water supply plan to be submitted under [condition of certification Soils & Water-6]").

2. WEC Operator Reporting: TID has created a "Recycled Water Disruption Initial Call" form. TID personnel have been trained in the use of this form, and will use it to document interruptions in the Recycled Water flow from the City of Turlock Waste Water Treatment Plant. TID has attached this form for your convenience.

3. Improved City WWTP Operation Protocols: TID had several discussions with the management staff at the City of Turlock WWTP. TID has asked the City of Turlock to take all reasonable operating steps to reduce the frequency and duration of interruptions in Recycled Water flow by changing WWTP operating protocols. The WTTP has three pumps on site dedicated to serve WEC: a primary or "lead" pump that supplies the bulk of the WEC's water service and a secondary or "lag" pump that operates to supplement the lead pump, and a third pump to act as a spare. Under the former protocol, the WWTP typically operated lead and lag pumps simultaneously to deliver recycled water to the WEC's 500,000 gallon recycled water holding tank. Under this former protocol, when the City WWTP became concerned about the water "chemistry" of the WWTP effluent (i.e., the ability to meet the WWTP's discharge requirements), the City would shutdown both the lead and lag pump simultaneously. Under the new protocol, to the extent feasible, the WWTP operators will only trip one pump at a time, the lagging pump, allowing the lead pump to operate as long as the WWTP operator feels that the lead pump's operations will not adversely affect the chemistry of the WTTP's effluent. This new protocol increases the complexity of the WWTP's operations and, understandably, the WWTP is obligated to take actions to maintain water chemistry. Nevertheless, this new protocol and the City WWTP's awareness of the importance of not interrupting Recycled Water supply to the extent feasible may allow the City to avoid or minimize curtailments of Recycled Water, thus avoiding the use of degraded shallow ground water.

TID has been proactively and cooperatively working with the City to limit the frequency and duration of interruptions of recycled water supply. These measures have been effective in the short-term. In the long-term, the AWSP submitted and approved by the CEC pursuant to Soil&Water-6 provides information supporting this Petition, demonstrating that regional water supplies would not be affected by the hypothetical use of groundwater as a permanent supply source for WEC. Pursuant to Section 1769 of the Commission's Siting Regulations,[5] this Petition requests that WEC's license be amended to remove the 51 afy limit on the use of poor quality shallow ground water.

1.2 Summary of Environmental Impacts

Section 1769 (a)(1)(E) of the Commission Siting Regulations requires that an analysis be conducted that addresses the impacts a modification might have on the environment and proposed measures to mitigate any significant adverse impacts. In addition, Section 1769 (a)(1)(F) requires a discussion of the impacts a modification might have on the project's ability to comply with applicable laws, ordinances, regulations and standards (LORS). Section 3.0 of this Amendment addresses potential environmental impacts and consistency of the modification with LORS. Section 3.0 concludes that the amendment will not result in significant environmental impacts and that the Project, as amended, will comply with applicable LORS.

1.3 Consistency of Amendment with License

Section 1769 (a)(1)(D) of the Commission Siting Regulations requires a discussion of whether the proposed modifications are based upon new information that changes or undermines the assumptions,

[5] California Code of Regulations, tit. 20, §1769.

rationale, findings, or other bases of the final decision. This section also seeks an explanation of why the requested changes should be permitted.

The amendment requested herein is consistent with the 2004 Decision and subsequent amendment of that decision by the 2005 Order. The 2004 Decision's Conditions of Certification Soil and Water-5 through 8 were imposed in order to "appropriately ensure the use of recycled water is maximized while the use of potable water is minimized."[6] When the Commission approved WEC's switch to poor quality groundwater in the 2005 Order, it found that depending on poor quality groundwater from the WEC's wells limited the use of potable water from the City of Turlock. Similarly, Petitioner's requested amendment is consistent with efforts to maximize the use of available recycled water and minimize the use of valuable potable water.

In the Staff Analysis supporting the Commission's 2005 Order approving the switch to poor quality groundwater from WEC wells, Staff confirmed:

> [N]o new information or analysis is available to substantiate the request to remove the limit on groundwater use for back-up at this time. Rather the Energy Commission included Condition of Certification Soils & Water-6 to address any alternative supplies that may be needed in the event that recycled water is not available as expected or in the event of a significant disruption in water supplies once the project starts using recycled water.[7]

Because Petitioner had not yet completed the Alternative Water Supply Plan pursuant to Soils & Water-6, it withdrew its request to remove this limit. However, since the City of Turlock has begun supplying recycled water to WEC, interruptions of this recycled supply are more frequent than anticipated. Accordingly, Petitioner believes that WEC requires greater than 51 afy (over a 5-year rolling average) of poor quality groundwater to back-up the City's recycled water deliveries. The AWSP demonstrates no significant impacts associated with increased use of groundwater from WEC's wells. Given this, the Commission now has the information it needs to remove the 51 acre feet limitation.

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[6] 2004 Decision, p. 201.

[7] December 2004 Staff Analysis, p.5.

2.0 Description of Project Amendment

Consistent with California Energy Commission Siting Regulations Section 1769 (a)(1)(A) and 1769(a)(1)(B), this section includes a complete description of the project modification, as well as the necessity for the amendment.

2.1 Project Modification Description

Petitioner proposes to remove the 51 afy limit on the use of poor quality groundwater from the upper aquifer supplied by WEC's onsite wells specified in Condition Soil & Water-5. WEC depends on this groundwater to back-up the deliveries of recycled water from the City of Turlock's Wastewater Treatment Plant. The proposed amendment will not result in any physical alteration to the Project, and Petitioner will continue to maximize the use of recycled water provided by the City's WWTP. This amendment will require modification to Soils & Water-5 as set forth in Section 4.0.

2.2 Necessity of Proposed Changes

The proposed modification is necessary to facilitate a reliable back-up water source for the Project. At the time of certification, it was believed that the City of Turlock would be able to provide sufficient recycled water with few interruptions, and that WEC would not need to back-up this supply at a level greater than the 51 afy limit. However, since the WWTP began supplying recycled water, interruptions of recycled water have been more frequent than anticipated, and WEC's reliance on a back-up water supply needs to exceed an average 51 afy over a five-year period.

There is also no preferable source of water to back-up the City's recycled water supply. Use of poor quality groundwater pumped from WEC's wells is preferable to the use of higher quality potable water from the City of Turlock. The Commission has also found that "higher-than-expected costs for the original supplies and infrastructure associated with potable water" supports the Project's use of lower quality groundwater.[8]

[8] Order Approving a Petition to Modify Bridge and Construction Water Supply, No. 05-0119-02, Jan. 19, 2005, p. 2.

3.0 Environmental Analysis of the Project Changes

The proposed modification would remove the 51 afy limit on the available source of back-up water. This Section explains that the proposed modification will not result in any significant environmental impacts.

The proposed modification does not require any additional construction or land use, nor does the modification result in an increase in the operation of the Project. This amendment will not result in any impacts to air quality, biological resources, cultural resources, land use, noise, the public health, worker safety and health, socioeconomic, traffic and transportation, visual resource, hazardous materials, waste management, geologic resources, paleontological resources or any other subject matter disciplines, other than water resources. Potential impacts to water resources are further addressed in this Section.

Removal of the 51 afy limit will not result in any adverse water resource impacts. This conclusion is based on the Alternative Water Supply Plan, which was submitted to the Commission on August 8, 2006 in compliance with condition of certification Soils & Water-6. The CEC approved the AWSP on August 28, 2006.

The AWSP studied the continued use of groundwater from WEC water wells when recycled water from the City of Turlock is interrupted. In support of this proposal, an analysis of the "worst-case scenario" was conducted for the AWSP. This hypothetical scenario involved supplying the full needs of the Project, 1,800 afy, with the groundwater pumped from different combinations of the three WEC wells for 50 years. This analysis considerably exceeds any reasonable demand for back-up supplies to serve the Project because the Project will rely on recycled water from the City of Turlock for the vast majority of its water needs.

Based on this extreme scenario, the AWSP concluded that WEC groundwater extractions under the worst-case scenario would not adversely impact regional water supplies. Well extractions from the aquifers intercept groundwater, which would otherwise flow past the site down gradient into the San Joaquin River. However, total flow to the San Joaquin River would not be affected because the total net outflow to the San Joaquin River from the groundwater basin, the water drains of TID, and the outfall of the City's Wastewater Treatment Plant would be the same regardless of whether the supply to the WEC comes from recycled water or from reliance on WEC's wells. This finding is consistent with previous conclusions drawn by Commission Staff. [9]

Use of the WEC wells also has beneficial drainage impacts. The use of the existing WEC wells would result in lowering the water levels in the shallow aquifer in the vicinity of the WEC and lessen the need for TID to dewater this aquifer with its existing system of drainage wells: "Groundwater in the shallow aquifer is of poor quality in the vicinity of the project and some dewatering wells have been installed to lower groundwater levels below the root zone of crops." (WEC Final Decision, p. 201.) This beneficial

[9] In the December 2004 Staff Analysis, Staff explained, "TID's irrigation deliveries contribute to ground water recharge within their district thereby increasing groundwater levels. Considering this current contribution to groundwater levels and that the use of groundwater for the bridge supply is only temporary, ultimately replaced with recycled water as soon as the city of Turlock can deliver the supply Staff finds that no additional mitigation is required." Similarly, in the July 13, 2005 Staff Analysis addressing a petition to modify the number and location of WEC's wells (ultimately approved by Order No. 05-0727-02, July 27, 2005), Staff concluded: [A]lthough this magnitude of well interference does represent a significant adverse impact, groundwater recharge has provided irrigation deliveries to the region that has increased groundwater levels over time by at least 10 feet (Bond 2003). Therefore, the changes requested in the current petition would not cause well interference impacts to exceed the increase in water levels provided by TID's irrigation activities. Based on staff's assessment of WECA analysis, TID irrigation activities would mitigate the proposed bridge and back-up supply pumping for the duration specified in Soils & Water-5.

impact is not taken into account in the worse-case scenario, which assumes WEC well pumping is in addition to, and not in lieu of, dewatering by TID.

The AWSP looked at 43 neighboring domestic and irrigation wells to determine the effects on other users of WEC's groundwater dependence under the worst-case scenario. Of the 43 wells considered, 42 of these wells would not be significantly impacted under the worse-case scenario. Moreover, this conclusion is based on October 1991 data, which is historically the month representing the most severe drawdown of the water table in the upper aquifer from drought conditions.

The well that could potentially have yields affected under a worse-case scenario is a domestic well located on Ruble Road. This well is older, has a narrow perforated interval, has been poorly maintained, and is considered shallow. The AWSP found, "[t]he potential drawdown at that well location is 11.1 feet while the top of the well screen is at a depth of 60 feet and the well is drilled to a depth of 76 feet." It has been previously determined that five years of pumping by the WEC wells would not effect this well. Similarly, the proposed modification is in conformance with all applicable LORS.

4.0 Proposed Modifications to the Conditions of Certification Related to the Requested Amendments

Consistent with the requirements of the Commission Siting Regulations Section 1769 (a)(1)(A), this section addresses the proposed modifications to the Project's condition Soil & Water-5. The proposed language modification is presented below.

SOILS&WATER-5: The project's water use shall be limited as described below. For purposes of this condition, the bridge period is defined as that period of time between the start of commissioning operations of the WEC and the earlier of December 31, 2006 or when recycled water from the City of Turlock's wastewater treatment plant (WWTP) is available to the WEC.

Water for construction purposes shall consist of groundwater provided from the existing TID well at the Walnut substation. Potable water may also be used for construction for the purpose of hydrostatic testing and flushing of equipment, pipes and tanks; provided however, the project owner shall minimize the use of potable water for this purpose to the maximum extent feasible.

During the bridge period, water used for cooling and steam cycle make-up shall consist of poor quality groundwater from the upper aquifer supplied from either one or more groundwater wells located on the 69-acre parcel that includes the 18-acre WEC project site (the "69-acre Acre Parcel") or two 100 percent wells located on the TID equipment storage area on South Washington Road (the "South Washington" site). Total combined groundwater production from all of the wells on both the 69 Acre Parcel and the South Washington site shall not exceed two million gallons per day or 1,800 afy.

After the bridge period, ~~W~~water for operational and landscaping purposes ~~used after the bridge period~~ shall consist of recycled water from the City of Turlock WWTP and shall not exceed two million gallons per day or 1,800 afy. Water for domestic needs after the bridge period shall consist of potable water provided by the City of Turlock and shall not exceed 3 afy. Groundwater from the wells to be located either on the 69-Acre Parcel or the South Washington site may also be used for back-up to the recycled water supply in the event of a short-term disruption in service and shall not exceed ~~51 afy~~ two million gallons per day. Groundwater from the wells to be located either on the 69-Acre Parcel or the South Washington site may also be used in the event that recycled water is not available to the project subject to the provisions of SOILS&WATER-6. ~~Alternative water use shall be calculated using a five-year rolling average.~~

Verification: The project owner shall notify the Commission no later than May 31, 2006, and in monthly compliance reports thereafter, as to the status of recycled water production by the City of Turlock's WWTP until the WEC is using tertiary treated, recycled water for its non-potable operational and landscaping requirements. This notice shall include information on the issues related to recycled water production, DHS approval for recycled water service and the expected availability of recycled water supplies to WEC. After recycled water service is provided to WEC,

the project owner shall report water use to the Commission as required by SOILS&WATER-7. ~~Annual average water use shall be calculated using a 5-year rolling average of actual water use starting with the first year of operation.~~ In the event of an interruption or reduction in recycled water service that requires the use of groundwater from the wells to be located on the 69-Acre Parcel or the South Washington site, the project owner shall notify the CPM, in writing, within 24 hours.

5.0 Potential Effects on the Public Related to the Requested Amendment

Consistent with the requirements of the Commission Siting Regulations Section 1769 (a)(1)(G), this section addresses the proposed Amendment's effects on the public.

Because this amendment does not negatively impact the regional water supply, and there is no additional construction associated with the modification requested, there is no adverse effect on the public.

6.0 List of Property Owners

Commission Siting Regulations Section 1769(a)(1)(H) requests the names of property owners potentially affected by the proposed modifications. In this case, no property owners will be affected because all of the infrastructure associated with recycled water delivery as a primary water source and degraded shallow groundwater as a back-up source has been constructed and is operational. Accordingly, since no property owners will be affected by the proposed modifications, the Commission's regular practice of notifying interested parties regarding ongoing compliance matters will suffice.

7.0 Potential Effects on Property Owners

Consistent with the Commission Siting Regulations Section 1769(a)(1)(I), this section addresses potential effects of the proposed Amendment on nearby property owners, the public, and parties in the application proceeding. Changes to the Condition of Certification Soil&Water-5 will not have an adverse effect on property owners, the public or parties to the application proceeding.

Attachment A

Alternative Water Supply Plan ("AWSP")

Walnut Energy Center
Alternative Water Supply Plan
Condition Soils&Water-6

Background

The Commission's approval of the Walnut Energy Center (WEC) includes a condition that the project must provide a plan in the event that recycled water is not available to the project. Specifically, Condition Soils&Water-6 provides, in part, that "The project owner shall prepare an Alternative Water Supply Plan to address either: (1) Title 22 compliant recycled water not being available from the City of Turlock's [Waste Water Treatment Plant] [WWTP] by December 31, 2006; or (2) a force majeure event occurring after initiation of recycled water service."

The verification language for Soils&Water-6 also provides, in part, that the Alternative Water Supply Plan shall demonstrate no net increase in high quality water use by methods including, but not limited to the following: (1) the use of shallow, degraded groundwater from the unconfined aquifer in the vicinity of the project site; (2) the use of irrigation tailwater or return flows; and (3) the continued use of potable water supplied by the City of Turlock in conjunction with conservation measures. The following discussion presents the Walnut Energy Center Authority's (WECA's) Alternative Water Supply Plan.[1]

WECA has constructed facilities necessary to use recycled water from the City of Turlock WWTP at the WEC and has entered into an agreement to provide recycled water to meet all non-potable water requirements at the WEC. Once the WWTP has completed necessary facility improvements to supply recycled water and regulatory approvals are obtained, the WEC will use recycled water for all non-potable uses.

The WEC was licensed to use potable water from the City of Turlock as a "bridge supply" until recycled water became available and during outages of the recycled water system. However, in order to conserve high quality water supplies during the bridge period, WECA instead received Commission approval to construct shallow wells to capture degraded non-potable water from the shallow aquifers in the vicinity of the WEC and implemented use of this water supply in lieu of potable water.

These same, existing WEC water wells used during the bridge supply period are proposed as the alternative water supply in this Alternative Water Supply Plan, in the event recycled water is not available as set forth in Condition Soils&Water-6.

Worst Case Scenario Evaluation: 50 Years of Continuous Pumping

[1] The WEC project was originally licensed by the Turlock Irrigation District in February of 2004. Thereafter, the Turlock irrigation District and the Merced Irrigation District formed a public agency under the Joint Powers Act known as the "Walnut Energy Center Authority" or "WECA." The Commission approved a petition transferring ownership of the WEC project to WECA in September 2004,

In order to assess the impacts of use of groundwater on other water users and regional water supplies, a worst-case scenario was assumed in which the WEC must permanently rely upon the well water from the shallow wells. Although the WEC has a projected useful life of 30 years, the assessment of potential impacts assumed reliance on these wells for a 50-year period in order to ensure that the potential impacts were conservatively assessed.

In practice, there are almost no real-world scenarios which would cause the WEC to permanently lose the recycled water supply it has contracted to receive from the City's WWTP. Only a regulatory or other legal ban on the use of recycled water by WEC, which are currently not reasonably foreseeable, could cause this worst-case scenario to occur. Thus, this worst-case scenario is presented for purposes of analysis, but in reality, this scenario is exceptionally unlikely.

The worst-case scenario includes several conservative assumptions. For example, the WEC on-site wells are constructed nearly identically to the Turlock Irrigation District (TID) drainage wells that are presently used to dewater the unconfined surface aquifer in TID's service territory. Well construction details are described in the attached report. The use of the existing WEC wells constructed for the bridge period would result in the lowering of water levels in the shallow aquifer in the vicinity of the WEC and thus lessen the need for TID to dewater this aquifer with its existing system of drainage wells. Thus, the pumping of the WEC wells would in practice would reduce or even be in lieu of the pumping of TID drainage wells. Nevertheless, in order to provide a conservative analysis that will overstate the potential impacts, the worst-case scenario assumes that the WEC pumping is in addition to, and not in lieu of dewatering by TID or any other groundwater pumping in the region.

Assessment of Potential Impacts

Under these worst-case assumptions, implementation of the Alternative Water Supply Plan could potentially affect regional water supplies for other existing or potential future uses. Specifically, the pumping of the WEC wells would draw down water levels in the shallow and upper aquifers in the vicinity of the WEC. While the lowering of water levels in the shallow aquifer is a benefit to the dewatering objectives of TID, the drawdown of water levels in the upper aquifer could impact the operation of neighboring wells which rely upon the upper aquifer for irrigation or domestic water supply. If the drawdown of the aquifer was significant at any neighboring well, it could impact either the water supply or the operating efficiency of the well, requiring some form of mitigation.

In order to assess the potential for the WEC's long-term use of groundwater to possibly affect either regional water supplies or to the operation of neighboring wells, groundwater simulations of the effects of pumping the existing WEC wells to meet the plant's water needs were performed using the USGS computer program WTAQ. The baseline conditions within the groundwater basin and the methodology for the analyses was identical to the methods used in WEC Amendment to Soil & Water-5, which assess

the use of groundwater as the bridge supply in-lieu of the use of potable water from the City of Turlock. That Amendment was submitted to the CEC on September 3, 2004 and approved on January 19, 2005. A new modeling report based on the worst-case assumption that the WEC uses groundwater for a 50 year period is attached hereto. The results of this new 50-year usage report are summarized below.

Results of the Alternative Water Supply Plan's 50-Year Worst Case Scenario

In the groundwater simulations included in the attached report, pumping was simulated from the three WEC groundwater wells. Moreover, pumping of 1,800 acre-feet per year was simulated to occur continuously for 50 years. In these simulations, the drawdown effects are shown as maximum possible impacts based upon the possible combinations of pumping of the three on-site wells. The drawdown of water levels after 50 years of pumping is not much greater than the drawdown which occurs from 5 years of pumping as simulated in the bridge-supply analysis previously submitted. The modeled impacts of the 50-year supply scenario evaluated in this Alternative Water Supply Plan are presented below.

Water levels in the vicinity of the WEC will fluctuate over time with hydrologic conditions and varying pumping of other wells in the area, but the net drawdown compared to the no-pumping condition is stable. Figure 1 shows the general pattern of simulated drawdown in the shallow aquifer after 50 years of pumping. This figure illustrates the lateral and vertical extent by which water levels in the shallow aquifer are lowered by 50 years of pumping by the WEC wells. Figure 2 shows the general pattern of simulated drawdown in the upper aquifer after 50 years of pumping. This figure illustrates the lateral and vertical extent by which water levels in the upper aquifer are lowered by 50 years of pumping by the WEC wells. Details on the methodology utilized to derive these figures are contained in the attached report. The figures are identical to figures 10 and 11 from the attached report.

Effects on Regional Water Supplies

The discussion below examines the potential for the WEC groundwater extractions to adversely impact regional water supplies. The analysis demonstrates that the extractions will not cause such an adverse impact. Presently, groundwater supplies from the surface and upper aquifer exceed uses from the aquifers and excess water flows from the aquifers into the San Joaquin River. Implementation of this Alternative Water Supply Plan would slightly reduce this net outflow from the groundwater aquifers but would increase by an offsetting amount the flow to the river of WWTP effluent which otherwise would have been used by WEC.

The pumping of groundwater in support of the WEC's demands over 50 years results in a dynamic equilibrium within the upper and shallow aquifers. The extractions from the aquifers intercept groundwater, which would otherwise flow past the site down gradient into the San Joaquin River. In some periods the stream flow in the river will be reduced

due to increases in recharge of these aquifers from the river bottom, but on balance the reduction will occur via a net reduction in outflow from the aquifers into the river. In this regard it is worth noting that the simulations assume that extractions of groundwater to supply the WEC demands are in addition to all extractions that would otherwise occur.

In actual practice, the extractions would be offset by a reduction of groundwater pumping by the TID dewatering wells since the need to dewater the shallow aquifer will be lessened by the operation of the WEC wells. Thus, as drainage water pumping is reduced, surface water inflows to the San Joaquin River are also reduced. In either event over the 50-year period of simulated extractions, the total net flow of drainage water plus outflow from the aquifers into the San Joaquin River will be reduced by an amount equal to the extractions at the WEC.

Total flow to the San Joaquin River will not be affected by the implementation of the Alternative Water Supply Plan, however. This is because of the offset in the use of recycled water from the WWTP. If the WEC cannot use recycled water and thus must implement the Alternative Water Supply Plan, then the WWTP effluent, which would otherwise be consumed by the WEC, would instead flow to the San Joaquin River. Thus the total net outflow to the San Joaquin River from the groundwater basin, the water drains of TID and the outfall of the WWTP would be the same over the 50-year scenario regardless of whether the supply to the WEC comes from recycled water or from implementation of the Alternative Water Supply Plan.

Effects on other Users

As noted in the two sections above, the extractions of groundwater under this Alternative Water Supply plan results in a relatively minor dewatering of a wide area of the shallow and upper aquifers creating a stable net inflow of groundwater into the area of influence from the extractions. The aerial extent of the zone of influence is minimally affected by which well is actually pumping to supply the WEC's needs. However, within the zone of influence the water levels in close proximity to the wells are affected depending upon which well is pumping. Thus at an individual well in close proximity to the WEC, the drawdown at that individual well will be greater if it is closer to the well that is actually pumping than if the extractions for WEC are made through a well that is further away. The locations of the existing WEC wells and the existing irrigation and domestic wells within the area of influence are shown in Figures 1 and 2. In order to assess the maximum potential effect on any individual well, five different scenarios were simulated in which pumping from each of the three wells was maximized over the 50 year period.

The scenarios are as follows:

1. Well 2 pumping at 1,800 acre-ft/yr;
2. Well 1 pumping at capacity (970 acre-feet per year) and Well 2 making up the difference to total 1,800 acre-ft/yr;
3. Well 1 pumping at capacity (970 acre-feet per year) and Well 3 making up the difference to total 1,800 acre-ft/yr;

4. Well 3 pumping at capacity (1,130 acre-feet per year) and Well 1 making up the difference to total 1,800 acre-ft/yr;
5. Well 3 pumping at capacity (1,130 acre-feet per year) and Well 2 making up the difference to total 1,800 acre-ft/yr.

Table 1 shows, the maximum drawdown impact to each neighboring well from the potential implementation of the Alternative Water Supply Plan. In practice these maximum impacts to all wells cannot occur simultaneously because the total extractions from the three on-site wells will not exceed the demands of the WEC. Thus when one WEC well is pumping at its maximum rate, other on-site wells must produce at lower rates than their maximums.

As depicted in Table 1, the lowering of water levels in each neighboring well is relatively minor. With the possible exception of one well, discussed below, the WEC groundwater extractions would not significantly affect the operation of any neighboring well. This is true even when considering the cumulative effects of pumping by WEC and a general drawdown of water levels due to drought conditions. The most severe historical drawdown of the water table in the upper aquifer occurred in October of 1991. The depth to groundwater at each of the neighboring wells in these severe drought conditions is shown on Table 1 for reference.

The well that has the greatest potential to be impacted by the worst-case pumping scenario is the domestic well at 3800 Ruble Road. The potential drawdown at that well location is 11.1 feet while the top of the well screen is at a depth of 60 feet and the well is drilled to a depth of 76 feet. It is unlikely that the drawdown from WEC pumping would affect the operation of this well. Indeed it has been previously documented that five years of pumping by the on-site wells would not affect the well.

While it is unlikely that this well would be impacted by 50 years of pumping of the WEC wells under this worst-case scenario, not enough is known about the well to be certain that the well's operation would not be adversely impacted. The well is quite shallow and has a narrow perforated interval compared to other wells in the area, and it is quite old. If it has been poorly maintained it is possible that its drawdown during normal operation is nearing the top of the well screen. With an additional 11 feet of drawdown caused by the WEC wells, it is unlikely but possible that the dynamic water elevation could be low enough to reduce the effective yield of the well.

In order to resolve this uncertainty, it is proposed that if the Alternative Water Supply Plan was to be implemented for more than five years, WECA would perform additional analyses to determine the potential for the Ruble Road well to be adversely impacted. These analyses would include test pumping of the well to determine the actual drawdown caused by operation at maximum pumping rates. The analyses might also include video logs of the well to determine its condition and the potential for the well to operate at maximum rates with the potential impacts from the worst-case scenario. If those future analyses determine that the well could in fact be impacted, then additional remedial actions could be taken, including, but limited to, additional treatment at the wellhead,

improvements to the well such as re-drilling and/or re-equipping the well, or the property could be connected to the City of Turlock's water system.

Except for the issues associated with the Ruble Road well, in all other cases the modeling simulations show that the surrounding wells' operations would be unaffected by the implementation of the Alternative Water Supply Plan. The other surrounding wells are relatively deep compared to the potential drawdown impacts, and the impacts from WEC pumping are less than the natural fluctuations in water levels from varying hydrologic conditions. (Additional details on the methodology and the bases for these conclusions are contained in the attached report.)

Summary

If recycled water was not available, then pursuant to this Alternative Water Supply, WEC would utilize the existing WECA wells to pump degraded groundwater in-lieu of the use of recycled water. Prior evaluations reviewed and approved by the Commission have confirmed that use of this water for up to a five year period would not affect regional water supplies or other users of groundwater. It is highly unlikely that use of the Alternative Water Supply Plan would be needed for such an extended period of time since the recycled water is being designed to be highly reliable. However, in order to address the potential that recycled water was not available to the WEC, this Alternative Water Supply Plan has analyzed the use of WEC wells as a permanent supply source for WEC.

The analysis has determined that regional water supplies would not be affected by the use of the Alternative Water Supply plan and that with one possible exception of the Ruble Road well, no neighboring wells would be significantly impacted by the implementation of the Plan. If groundwater pumping under this Alternative Water Supply Plan were necessary for more than five years, then additional detailed evaluations would be performed. If those future analyses determine that the Ruble Road well could in fact be impacted, then additional remedial actions could be taken, as described in this Plan. Finally, while it is prudent to have prepared this Alternative Water Supply Plan, WECA reiterates that it remains committed to the use of recycled water to meet the demands of the WEC.

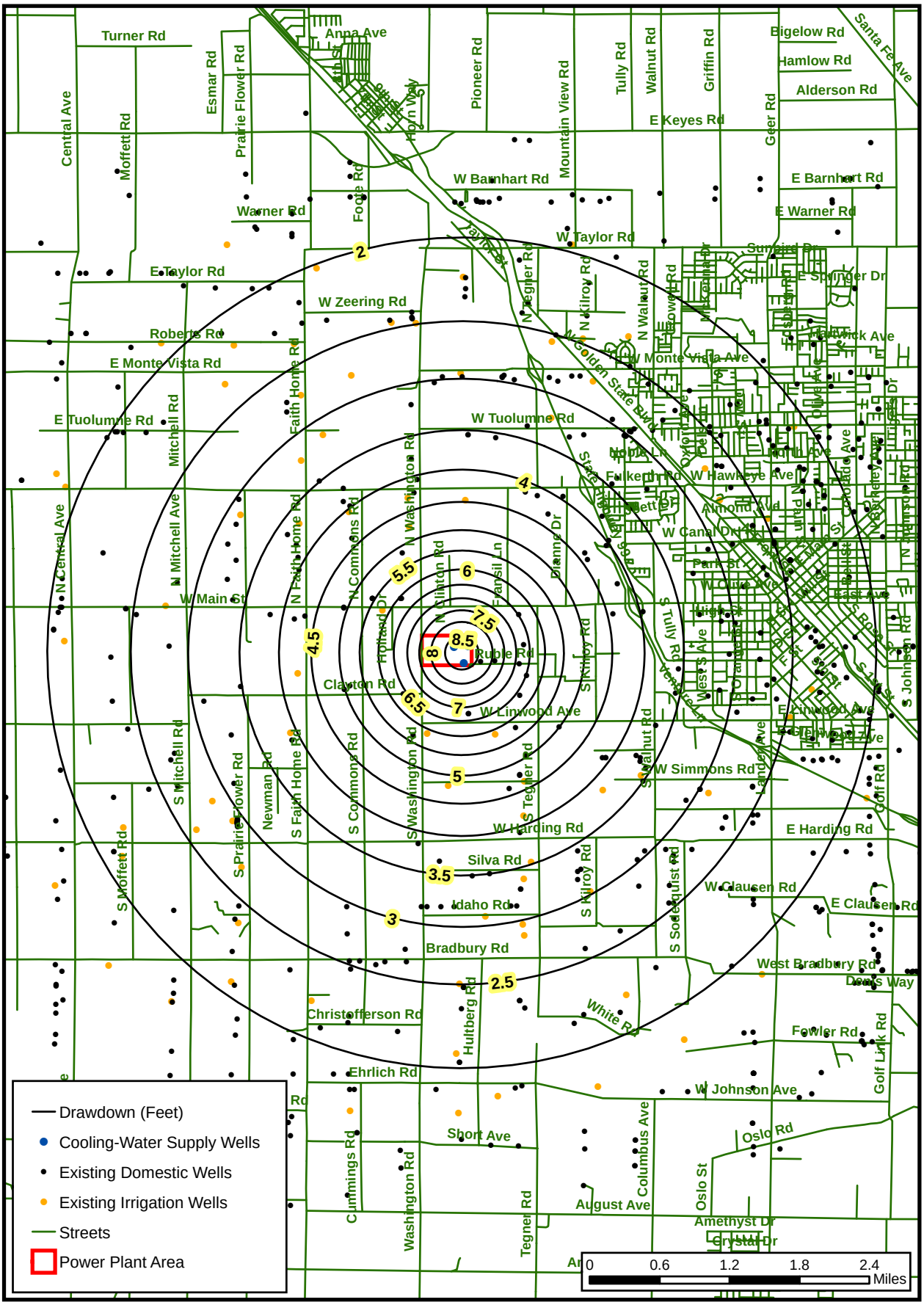

Figure 1 Potential Drawdown in Shallow Aquifer after 50 years

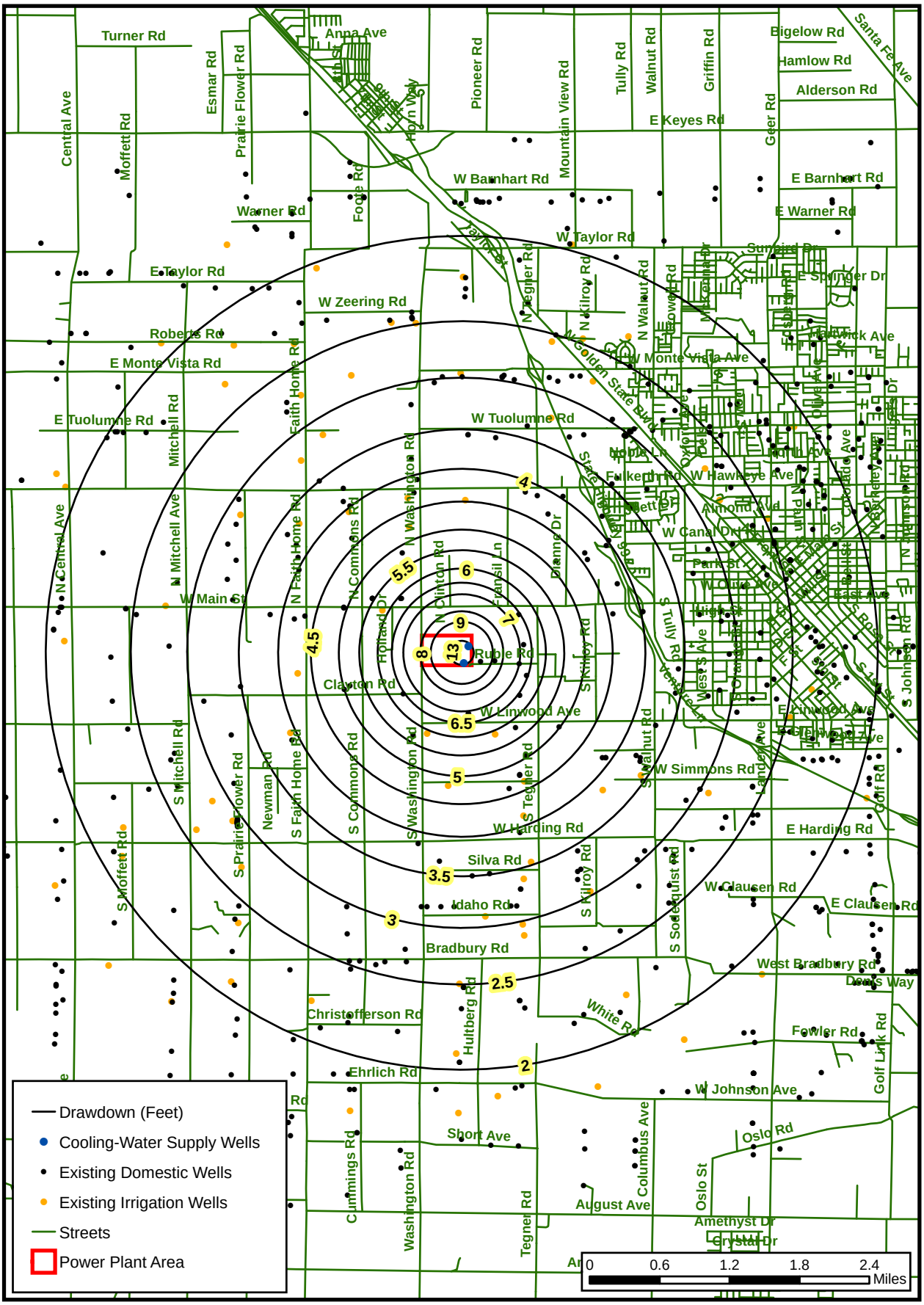

Figure 2 Potential Drawdown in Upper Aquifer after 50 years

Table 1 Potential Drawdown in Existing Private Wells in Immediate Area after 50 Years (Feet)

Well Address	DWR File Number	X	Y	Certainty of Location	Completed Depth	Depth to Bottom of Lowest Screen	Depth to Top of Highest Screen	Completion Date	Depth to Groundwater in Upper Aquifer in October, 1991	Distance from Well 1 (Feet)	Distance from Well 2 (Feet)	Distance from Well 3 (Feet)	Maximum Drawdown
Domestic Wells													
Turlock	21031	6451343	1996898	Approx	105	nd	nd	5/14/1969	16	5502.97	5990.17	5191.99	5.13
PO Box 625	21345	6451202	2004405	Approx	128	128	108	3/7/1977	20	5544.46	6040.23	6240.42	4.92
PO Box 1867	21483	6439829	2001920	Certain	73	73	63	9/10/1976	24	7519.82	6888.41	7504.34	4.48
Turlock	23000	6449737	2000611	Approx	127	124	113	7/15/1977	19	2515.95	3164.01	2843.40	6.96
3800 Ruble Rd	28121	6447786	1999865	Certain	76	75	60	2/18/1969	13	883.91	1379.26	771.55	11.10
1031 S Tegner Rd	29307	6449540	1999764	Certain	173	173	161	1/7/1978	16	2446.30	3061.58	2520.22	7.17
5213 W Main St	52841	6442879	2002712	Certain	83	nd	nd	3/3/1970	21	4854.00	4295.22	5077.91	5.69
5213 W Main St	53667	6442879	2002712	Certain	250	250	220	10/8/1979	21	4854.00	4295.22	5077.91	5.69
3515 Linwood Ave	64886	6449370	1996865	Certain	220	220	200	5/1/1987	10	4260.92	4604.16	3739.23	5.91
230 S Commons Rd	66757	6441586	2002301	Certain	73	73	63	4/12/1971	22	5903.74	5296.09	5993.34	5.13
Turlock	71008	6444719	1996553	Approx	250	250	225	1/26/1980	11	4711.68	4382.29	3957.81	5.79
836 N Faith Home Rd	83970	6439033	2005597	Certain	75	75	65	5/3/1973	34	9621.67	9088.88	9884.13	3.78
1307 N Commons Rd	90552	6441565	2007106	Certain	145	145	135	11/1/1973	30	8662.91	8271.80	9138.86	4.01
1500 Commons Rd	112000	6441564	2007681	Certain	190	140	120	7/7/1975	30	9106.87	8737.01	9607.01	3.88
5213 W Main St	153473	6442879	2002712	Certain	157	20	nd	2/23/1985	21	4854.00	4295.22	5077.91	5.69
5324 Clayton Ave	153475	6442510	1998784	Certain	nd	nd	nd	2/25/1985	14	5030.62	4421.16	4617.29	5.62
5525 Clayton Rd	191181	6441863	1998775	Certain	95	95	75	6/16/1986	15	5643.73	5025.23	5252.51	5.28
4800 W Main St	219045	6444197	2002719	Certain	118	118	98	9/4/1984	20	3724.55	3235.47	4079.07	6.45
PO Box 1803	226551	6439438	2005142	Approx	125	125	105	10/6/1981	33	9039.80	8500.25	9289.77	3.95
1230 S Commons Rd	227714	6441604	1998594	Certain	91	91	71	10/21/1981	15	5947.17	5331.67	5542.74	5.11
3928 W Linwood Ave	243208	6447226	1997510	Certain	145	145	85	9/29/1982	10	3035.82	3083.66	2273.61	7.12
1001 Dianne Rd	243225	6450845	2006532	Certain	113	113	93	10/28/1982	20	6997.45	7371.35	7765.51	4.37
1101 Commons Rd	245936	6441955	2005432	Certain	112	112	97	8/27/1982	27	7185.40	6740.79	7594.52	4.54
424 S Tegner Rd	245992	6449512	2001985	Certain	175	175	155	5/5/1982	20	2704.78	3280.94	3331.55	6.67
3631 Buble Rd	250458	6448421	1999914	Certain	245	245	225	5/24/1988	14	1355.00	1944.58	1407.84	8.98
1318 S Washington Rd	284295	6444276	1998398	Certain	228	228	208	9/20/1988	13	3645.83	3130.90	3069.68	6.56
601 N Washington Rd	326842	6444231	2004767	Certain	235	235	215	8/16/1989	23	5174.15	4847.71	5719.55	5.38
5326 Clayton Ave	346760	6442504	1998784	Certain	174	174	154	8/15/1990	14	5036.71	4427.14	4623.63	5.62
3925 W Linwood Ave	475261	6447239	1997510	Certain	265	265	nd	11/3/1995	10	3035.69	3086.23	2274.63	7.12
4813 W Main St	498316	6444161	2002718	Certain	237	237	nd	9/22/1992	20	3754.53	3262.60	4104.60	6.42
1100 N Faith Home Rd	516467	6439507	2004561	Certain	180	180	nd	12/12/1997	31	8698.12	8139.81	8908.98	4.05
3800 S Kilroy Rd	580313	6452185	1990370	Certain	250	250	nd	6/13/1995	17	11321.31	11600.85	10729.10	3.29
1424 S Tegner Rd	704833	6449552	1998327	Certain	220	220	nd	5/29/1998	13	3216.69	3699.79	2915.86	6.62
Turlock	718337	6441866	2006901	Approx	240	240	nd	7/23/1999	29	8311.63	7927.20	8795.49	4.11
Irrigation Wells													
5213 W Main St	10124	6443324.58	2002187.33	Approximate	300	300	108	//0	20	4229.38	3651.00	4413.76	6.11
4800 Fulkerth Rd	22995	6444478.73	2007252.22	Approximate	294	294	180	7/11/1977	23	7246.28	7047.38	7898.38	4.42
2419 Tegner Rd	33816	6449759.55	1994438.95	Approximate	399	389	160	6/15/1977	11	6612.60	6867.93	5997.17	4.74
	35522	6447083.84	2007160.05	Approximate	205	nd	nd	5/25/1977	20	6616.12	6655.88	7386.48	4.58
4207 W Simmons Rd	46290	6446316.17	1994242.21	Approximate	492	492	80	2/7/1978	11	6367.96	6286.79	5576.24	4.89
1105 S Faith Home Rd	66746	6439499.33	1999330.72	Approximate	nd	nd	nd	5/6/1971	19	7817.83	7175.06	7533.76	4.37
5672 Almaden Express	125355	6439564.77	2006090.83	Approximate	165	165	45	1/14/1975	34	9454.56	8951.52	9771.67	3.82
PO Box 1803	226552	6444531.18	2005978.33	Approximate	162	162	112	10/13/1981	22	6062.89	5824.81	6685.06	4.90
1419 N Commons Rd	433901	6441813.07	2006615.78	Approximate	395	395	nd	10/31/1991	29	8130.72	7732.08	8597.94	4.16

nd indicates data not available from well driller's report