URS

REPORT OF WASTE DISCHARGE
Unlined Wastewater Surface Impoundments
Panoche Energy Center
Fresno County, California

Prepared for:
Panoche Energy Center, LLC

September 21, 2009

URS Corporation – Fresno, California

URS

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Douglas K. Patteson
Senior Water Resource Control Engineer
Regional Water Quality Control Board
1685 "E" Street
Fresno, California 93707

Re: Report of Waste Discharge
Unlined Wastewater Surface Impoundments
Panoche Energy Center
Fresno County, California

Dear Mr. Patteson:

URS Corporation (URS) prepared the enclosed Report of Waste Discharge on behalf of Panoche Energy Center, LLC (PECL, Client). Appended to the report is the completed Form 200 signed by an authorized PECL representative.

We look forward to working with you in obtaining Waste Discharge Requirements from your Board for the project. A Petition to Amend is being submitted concurrently to the California Energy Commission (CEC) to propose amending the CEC's Final Decision to allow for use of the planned unlined wastewater surface impoundments.

Please do not hesitate to contact us if you have any questions or comments, or need any additional information.

Sincerely,
URS Corporation

Stuart B. St. Clair, PE
Project Civil Engineer

Margaret M. Fitzgerald
Program Manager

Enclosure

Distribution List:
Douglas Patteson, RWQCB (1 bound original, 1 bound copy)
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URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720
Tel: 559.256.1444
Fax: 559.256.1478

TABLE OF CONTENTS

REPORT OF WASTE DISCHARGE
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1.0 INTRODUCTION

URS Corporation (URS) prepared this Report of Waste Discharge (ROWD) for Panoche Energy Center, LLC (PECL, Client). PECL operates the Panoche Energy Center (PEC), which is a 400-megawatt electric generation facility in an unincorporated area of western Fresno County, California (Figures 1 and 2). The California Energy Commission (CEC) approved the PEC project with conditions in the Final Commission Decision dated December 19, 2007, which is available along with other pertinent documents at http://www.energy.ca.gov/sitingcases/panoche. The PEC attained full commercial status on July 1, 2009.

Wastewater from the PEC is currently discharged to four, onsite, Class 1, non-hazardous, deep injection wells under Permit Number CA10600001 issued by the United States Environmental Protection Agency, Region IX (USEPA) under the Underground Injection Control (UIC) Program. Each of the injection wells extends to a total depth of greater than 6,800 feet below ground surface (bgs). The wastewater-discharge capacity of the four injection wells has been found insufficient to handle the plant's full-load wastewater flow rate. While it is not clear why the injection wells have not achieved their predicted and designed functionality, their condition cannot be assured and they must be presumed to be unreliable in the future.

Due to the above circumstances, PECL conducted a careful evaluation of alternatives and is now urgently seeking approval for modifications to its operational effluent system. Specifically, PECL proposes to construct and operate unlined wastewater surface impoundments (UWSI). The purpose of this ROWD is to apply to the Regional Water Quality Control Board, Central Valley Region (RWQCB) for Waste Discharge Requirements (WDR) for the UWSI. A completed Form 200, signed by an authorized PECL representative, is provided in Appendix A. PECL is concurrently submitting a Petition to Amend (PTA) to the CEC for the proposed modifications to allow a better, permanent means of wastewater disposal. The PTA includes an extensive evaluation of wastewater-disposal alternatives and the environmental impacts of the proposed UWSI.

This ROWD pertains only to the wastewater generated by the PEC facility. Storm water management during construction and operation of the facility is not addressed by this ROWD. As required by CEC Condition of Certification SOIL & WATER-1, PECL will comply with the requirements of the General National Pollutant Discharge Elimination System (NPDES) permit for discharges of storm water associated with construction activity, and will develop and implement a storm water pollution prevention plan (SWPPP) for the construction of the UWSI. As required by CEC Condition of Certification SOIL & WATER-3, PECL will comply with the requirements of the general NPDES permit for discharges of storm water associated with industrial activity, and will develop and implement a SWPPP for the operation of the facility.

The remainder of this ROWD is organized as follows:

- Background information is provided in Section 2.0.
- A description of the facility is provided in Section 3.0.
- A description of the proposed waste discharge is provided in Section 4.0.
- UWSI design and construction are provided in Section 5.0.
- Operation of the UWSI is discussed in Section 6.0.
- An antidegradation analysis is presented in Section 7.0.
- Figures, tables, and appendices appear after Section 7.0.

2.0 BACKGROUND INFORMATION

Background information regarding the facility site is provided below. Much of this information was obtained from the Application for Certification that was submitted to the CEC in August 2006.

2.1 SITE LOCATION AND DESCRIPTION

The PEC is situated on approximately 12.82 acres of land within a 128-acre parcel. The proposed UWSI would be located on an additional 9.18 acres of land, which are immediately south of the 12.8 acres and are within the same parcel. The PEC is in the unincorporated area of western Fresno County, about 13 miles southwest of the City of Mendota (Figures 1 and 2). The site is on the south side of West Panoche Road, about 2.5 miles northeast of Interstate Highway 5. The site is in the southwest quarter of Section 5, Township 15 South, Range 13 East, Mount Diablo Base and Meridian. The Assessor's Parcel Number for the site and the approximate latitude/longitude of the proposed UWSI are provided on the Form 200 in Appendix A.

The site is owned by PAO Investments, LLC (PAO). PECL has entered an agreement with PAO whereby PECL will purchase the site prior to construction of the UWSI.

7.18 acres of the proposed UWSI area were used as an equipment/materials laydown area during construction of the PEC. The additional 2 acres for the UWSI is existing pomegranate orchard that will be cleared. The existing Pacific Gas & Electric Co. (PG&E) electrical substation is immediately northeast of the site (Figure 2). East of the PG&E substation are three existing "peaking" power plants (Calpeak Panoche, Starwood Midway, and Wellhead). Otherwise, area land use is primarily cropland (e.g., pomegranates, almonds, vineyards) with a few rural residences and farm buildings. The nearest residence is located about 1.5 miles northeast of the PEC site.

2.2 VICINITY TOPOGRAPHY AND GEOLOGY

The vicinity topography is generally flat, sloping gently downward to the northeast. The average ground surface elevation at the site is approximately 415 feet above mean sea level (amsl).

The site is located in the western San Joaquin Valley, which is part of California's Central Valley. The site is located southeast of Panoche Creek on the Panoche Creek alluvial fan. The site is situated on a thick section of Quaternary surficial sediments and older alluvium underlain by Tertiary sediments, Cretaceous marine deposits, and pre-Tertiary basement rocks.

2.3 SITE HYDROGEOLOGY

The Corcoran Clay is an extensive diatomaceous-lacustrine clay deposit of low permeability that divides the groundwater flow system into an upper semiconfined aquifer and a lower confined aquifer. The vertical gradient between the two aquifers is typically downward. The lower confined aquifer typically has substantially better quality groundwater than the upper semiconfined aquifer.

The Corcoran Clay was encountered in an onsite, confined-aquifer, monitoring-well boring at the depth interval of approximately 650 to 760 feet bgs.

An onsite groundwater monitoring well (MW-4) was completed in July 2009 in the semi-confined aquifer with a screened interval extending from about 150 to 210 feet bgs. First-encountered groundwater was present at approximately 170 feet bgs. Four groundwater samples were collected from the well in July and August 2009 and analyzed for metals and minerals. Laboratory reports are provided in Appendix B. The analytical results are summarized on Table 1, along with applicable water quality objectives (WQOs) found in the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan). The analytical results for the first-encountered groundwater indicate that many of the semi-confined aquifer background groundwater concentrations substantially exceed the municipal and/or agricultural WQOs in the Basin Plan.

For example, regarding municipal WQOs, the first-encountered groundwater contains:

- Nitrate concentration of about 393 milligrams per liter (mg/l), which is more than eight times the primary Maximum Contaminant Level (MCL) of 45 mg/l.
- Arsenic concentration of about 24 micrograms per liter (ug/l), which is more than twice the primary MCL of 10 ug/l.
- Selenium concentration of about 495 ug/l, which is more than nine times the primary MCL of 50 ug/l.
- TDS concentration of about 4,500 mg/l, which is more than four times the upper secondary MCL of 1,000 mg/l.
- Sulfate concentration of about 2,200 mg/l, which is more than four times the upper secondary MCL of 500 mg/l.

Regarding agricultural WQOs, the first encountered groundwater contains:

- TDS concentration of about 4,500 mg/l, which is more than twice the level of 2,000 mg/l, which is considered to be severely restricted for irrigation use (FAO Publication 29).
- Chloride concentration of about 403 mg/l, whereas the most sensitive crops show chloride impacts at a concentration of about 100 mg/l, and many crops, including grapes which are grown in the PEC vicinity, show impacts at a concentration of 250 mg/l.
- Boron concentration of about 3,230 ug/l, whereas the most sensitive crops, including grapes which are grown in the PEC vicinity, show boron impacts at concentrations of about 500 ug/l, and many crops show impacts at concentrations of 2,000 ug/l.
- Selenium concentration of about 495 ug/l, which is more than 24 times the FAO-recommended maximum irrigation-water concentration of 20 ug/l.

Thus, multiple constituents in the existing groundwater render the semi-confined aquifer unusable for municipal and agricultural purposes, unless the water is first treated to remove these constituents.

A few widely spaced irrigation wells are present in the general vicinity of PEC. Newer irrigation wells are supposed to be screened exclusively in the confined aquifer; older wells may be screened and/or

filter-packed across both aquifers. Local farmers use these wells when they are unable to obtain surface water for irrigation. The local farmers purposely do not have wells screened exclusively in the semi-confined aquifer, because groundwater from the semi-confined aquifer is detrimental to their crops.

Only two supply wells in the plant vicinity are known to be screened within the semi-confined aquifer. These are emergency backup supply wells for the Calpeak-Panoche and Starwood-Midway peaker power plants, located about 1,000 and 1,500 feet, respectively, northeast of PEC. The Starwood-Midway well is known to be screened from 400 to 500 feet bgs. The Calpeak-Panoche well is known to be 500 feet deep, and the top of the screen is assumed to be at a similar depth as the Starwood-Midway well, based on reported analytical results. Both of these plants have demineralizing water-treatment systems that would be used to treat the groundwater before use. The Calpeak-Panoche plant normally gets its source water by truck provided by a local farmer from either his surface water supply or his irrigation wells. The Starwood-Midway plant normally gets its source water by pipeline from a local farmer's surface water supply (sediment-filter backwash water).

2.4 SITE HYDROLOGY

The climate in the site vicinity is semi-arid, with long, hot, dry summers and mild winters. The average annual precipitation at the Five Points SSW weather station, located about 35 miles south of the site, is 6.92 inches, based on 58 years of data. The 100-year, 24-hour precipitation event at the site is estimated to be approximately 2.5 inches.

The average annual evaporation at the Little Panoche Detention Dam, located about 15 miles northwest of the site is 111 inches, based on 8 years of data. The average annual evaporation at the Los Banos Detention Reservoir, located about 30 miles northwest of the site is 108 inches, based on 38 years of data.

Except for agricultural impoundments and canals, the nearest natural or man-made surface water bodies to the site are Panoche Creek, located about 1.8 miles northwest of the site, and the California Aqueduct located about 2.6 miles northeast of the site.

According to the Federal Emergency Management Agency (FEMA), the site is outside the 500-year flood zone.

Based on the results of onsite percolation testing and geotechnical engineering analysis, it appears that soils in the proposed UWSI area are capable of supporting a long-term percolation rate of approximately 2 inches per day.

3.0 FACILITY DESCRIPTION

PEC uses four inter-cooled, natural-gas-fired, combustion turbine generators (CTGs) to provide up to 400 megawatts of much-needed electricity to power-consumers in California. A site plan of the facility is provided as Figure 3. The CTGs employ the latest-generation technology, enabling greater efficiency of power production using less natural gas and producing substantially less NO_x and greenhouse gas emissions than previous CTG designs. This technology, known as "inter-coolers," reduces temperatures in the combustion passes in the CTG. The use of air-cooled inter-coolers was considered by PEC, but the water-cooled design was chosen due to its superior energy efficiency over the air-cooled design.

The PEC is designed for cyclic applications with 10-minute starts to provide clean, flexible power generation for peaking and intermediate needs. It enables the electrical grid's reliance on renewable energy sources, namely, wind and solar, by meeting instantaneous variations in those sources' electrical output. The plant is expected to operate up to 5,000 hours per year (in contrast to typical "peaking plants" that operate less than 500 hours per year). This level of power generation would supply enough electricity for roughly 300,000 homes and one million people in California.

PEC process water is provided from two on-site supply wells that are screened exclusively in the confined-aquifer zone below the Corcoran Clay. A water flow diagram is provided in Appendix C. Process water uses include fire-protection water, plant service water, sanitary water, cooling tower makeup, combustion turbine NO_x injection (treated water), and combustion turbine inlet air evaporative cooler makeup (partly from treated water). Water treatment for a portion of the process water will consist of a two-stage, reverse osmosis (RO) system, followed by trailer-mounted demineralizers that are regenerated off-site. Almost all of the RO-reject water will result from treatment of water for use in highly reducing the NO_x air emissions from the plant. To conserve water, reject from the second-stage RO unit will be recycled as influent to the first-stage unit.

4.0 PROPOSED WASTE DISCHARGE

As shown in Appendix C, PEC wastewater will consist of approximately 74-percent cooling-tower blowdown, 25-percent RO reject, and 1-percent oil/water separator effluent (the influent to the oil/water separator is plant washdown water that is not treated in the RO system prior to use and ultrafiltration system backwash water). The location, volume, and character of the wastewater discharge are discussed below.

4.1 LOCATION

The UWSI will be located immediately south of the CTGs and associated equipment (Figure 3). The approximate latitude and longitude of the UWSI are provided on the Form 200 in Appendix A.

4.2 VOLUME

For 5,000 hours of operation, the plant is anticipated to produce at maximum approximately 387 acre-feet per year (afy) of wastewater that requires disposal. The second page of the Water Balance in Appendix C quantifies the plant's anticipated maximum water and wastewater flows. These flows assume that the plant would operate at full-load for the full 5,000 hours of operation. In practice, however, the plant would almost certainly not operate at full load for the full 5,000 hours. Therefore, the annual maximum wastewater volume of 387 afy is a very conservative upper estimate.

It is anticipated that the injection wells' discharge capacity will decrease with time. Therefore, PECL desires that the WDR allow for discharge of all of the plant's wastewater to the UWSI. Upon finalization of the WDR, PECL may decide to discontinue use of the injection wells, or may decide to keep the injection wells for use only as a backup option in case discharge to the UWSI is temporarily unavailable due to maintenance or other reasons.

4.3 CHARACTER

The estimated quality of the wastewater to be discharged to the pond is provided on the final column (Stream V) of the third page of the Water Balance in Appendix C. The estimated TDS concentration for the wastewater is 4,247 mg/L. Estimated concentrations for specific constituents are provided in Appendix C.

5.0 UWSI DESIGN AND CONSTRUCTION

PECL proposes to use two smaller UWSI rather than a single large UWSI to afford good maintenance practices. A conceptual grading and drainage plan for the USWI is provided as Figure 4. Wastewater collected in the plant's wastewater storage tank will be conveyed by a pipeline to the UWSI for evaporation and percolation. The overall depth of the UWSI will be approximately 6 feet. The pond will be constructed by a cut-and-fill operation using mechanical excavators. Where fill material is required at the edges of the pond, the fill material will be placed in layers of uniform, specified thickness and compacted to at least 85-percent of the maximum dry density as determined by American Society for Testing and Materials (ASTM) Standard D-1557. Field density tests during construction will verify that the compaction standard is met. Extra excavated soil that is not needed to raise the edges of the pond will be used as fill material to raise other areas of the site, or will be discarded appropriately offsite.

The areas of the two UWSI will be approximately 2.90 and 2.93 acres, respectively, for a combined area of approximately 5.83 acres (Figure 4). Based on a long-term percolation rate of 2 inches per day, this pond area should be capable of percolating up to approximately 355 afy. The maximum wastewater production is estimated at 387 afy. Assuming that at least 10-percent of the wastewater in the UWSI would evaporate, the sizes of the two proposed UWSI appear capable of handling the annual maximum wastewater volume.

According to the Federal Emergency Management Agency (FEMA), the site is outside the 500-year flood plain. The UWSI will be designed, operated, and maintained in conformance with Fresno County Ordinance Title 15, Flood Hazard Areas to ensure that in the event of a 100-year storm, the UWSI are not subjected to any flood damage, inundation, or washout.

6.0 UWSI OPERATION

Wastewater will be discharged to the UWSI relatively continuously during and after periods when PEC is generating electricity. The water level in the UWSI will be maintained at least two feet below the top of the UWSI at all times. If one of the UWSI requires maintenance, such as grading to restore percolation capacity, wastewater will be discharged only to the other UWSI until the one requiring maintenance has dried sufficiently.

7.0 ANTIDEGRADATION ANALYSIS

PEC prepared this Antidegradation Analysis to evaluate the potential discharge to surface impoundments in light of State Water Resources Control Board (SWRCB) Resolution Number 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (Resolution). The Resolution directs that "existing high quality [water] will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in [State] policies" (emphasis added). The Resolution also directs that any activities that result in discharges to "existing high quality waters" are required to use "the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

The analysis herein demonstrates that groundwater in the upper semi-confined aquifer is not a "high quality" water and is not known to be used within several miles of the PEC facility, except for two emergency-backup supply wells. These wells serve two nearby peaking powerplants, but significant demineralization of the groundwater is needed prior to its use at those facilities. Vicinity irrigation wells are typically completed in the lower confined aquifer, because groundwater from the semi-confined aquifer is too salty for crops. PEC's proposed discharge of the facility's wastewater to two on-site, unlined surface impoundments will not unreasonably affect present or anticipated future beneficial uses of groundwater in the upper semi-confined aquifer.

Wastewater Disposal Alternatives

Following is a summary of the wastewater disposal alternatives that are analyzed in greater detail in the PTA:

- Pumping or trucking wastewater to a publicly-owner wastewater treatment plant (WWTP)
- Discharging wastewater to a brine line to Pacific Ocean
- Adding injection wells
- Changing the production water source – (i.e., WWTP effluent, aqueduct water, agricultural irrigation tail water)
- Discharging to a nearby water body
- Regenerating deionizer systems offsite
- Zero liquid discharge (ZLD)
- Double-lined evaporation pond(s)
- Onsite unlined wastewater surface impoundments (UWSI)

Of these alternatives, the use of onsite UWSI was found to be feasible and to afford the best balance between minimizing environmental impacts and optimizing energy efficiency, reliability and availability.

Fate & Transport Analysis

PEC performed vadose-zone geochemical modeling and groundwater modeling to estimate the potential impact of discharging the plant's wastewater to UWSI. The vadose-zone geochemical modeling used the PHREEQC software program to analyze potential geochemical reactions including complexation, cation-exchange, dissolution/precipitation, and oxidation-reduction processes. Chemical adsorption and desorption were not included in the model, because over the 20-year projected life of the project they would not likely be a substantial factor. Varied ranges of acidity (pH between 4.0 and 8.2) and oxidation-reduction potential (eH between 4 and 8 millivolts) were modeled. The modeling results indicate that there may be some short-term dissolution of minerals from the vadose-zone materials into the percolating wastewater. However, the modeling indicates that, over the long term, such dissolution should be relatively minimal. The results also indicate that there are several solid phases which potentially may precipitate from the percolating wastewater within the vadose zone. However, the mineral concentrations in the wastewater are not great enough to assure to a reasonable likelihood that such precipitation will in fact occur. Based on these results, it was judged reasonably conservative to assume for the groundwater modeling that the percolated wastewater at the bottom of the vadose zone will have the same chemical concentrations as at the ground surface.

The groundwater modeling used the MODFLOW software program to estimate the steady-state groundwater flow condition with the added recharge from the surface impoundments. Hydrogeologic parameters published by USGS for the semi-confined aquifer in the plant vicinity were used in the model. The transport model MT3D was used to estimate the advective/dispersive transport of dissolved chemical constituents in the semi-confined aquifer for a 20-year period after the surface-impoundment recharge begins mixing in with groundwater. Groundwater modeling figures are provided in Appendix D. The first three pages of the groundwater modeling figures illustrate the model discretization, key parameters, and predicted steady-state potentiometric surface contours after recharge begins. The surface impoundments are predicted to cause a moderate mounding of groundwater with a maximum increase in the water-table elevation of about 32 feet directly below the center of the impoundments, decreasing to a 20-foot increase at the edge of the impoundment, and decreasing further moving laterally away from the impoundment.

The mixing of percolated wastewater and native groundwater in the semi-confined aquifer was modeled using TDS as an indicator parameter. Pages 4 and 5 of the groundwater modeling figures show a cross-section view and plan view, respectively, of predicted TDS concentrations in the semi-confined aquifer at a simulated time of 20 years after the surface-impoundment recharge begins mixing in with groundwater. Since the wastewater is predicted to have a lesser TDS concentration than the baseline groundwater, the simulated TDS concentrations within the volume of groundwater affected by the recharge are lesser than the baseline value by up to 5.6 percent. Similarly, several other constituents such as calcium, magnesium, chloride, and nitrate are also predicted to have lesser than baseline concentrations within the volume of affected groundwater. Thus, the discharge will substantially improve the groundwater quality for these constituents. Some constituents such as sodium, sulfate, and silica are predicted to have greater than baseline concentrations within the volume of affected groundwater. This volume after 20 years of discharge is predicted to extend about 5,800 feet downgradient of the surface impoundment and 240 feet vertically below the water table – this

prediction is highly conservative in that it assumes that the plant would operate for 5,000 hours at maximum load per year for 20 years. Predicted maximum concentrations within this volume of groundwater are presented in Column J of Table 1.

For modeling purposes, two hypothetical wells (Wells A and B) were placed in the model at the downgradient edge of the surface impoundment. Well A was screened in the model from a depth of 400 to 500 feet bgs, which is consistent with the only known supply wells in the semi-confined aquifer within the facility vicinity. Any future wells would likely be screened at a similar depth to take advantage of the better water quality and production in the lower portion of the semi-confined aquifer. To provide a more conservative estimate of potential impacts to future supply wells, Well B was screened in the model from a depth of 300 to 500 feet bgs. Page 6 of the groundwater modeling figures provides a time-concentration graph for predicted TDS concentrations in these two wells. The results indicate that the TDS concentration in Well A would be virtually unchanged after 20 years of the proposed discharge, and in Well B would decrease about 1 percent from 4,470 mg/l to about 4,420 mg/l.

Analysis of Wastewater Constituents

Overall, the PEC discharge is predicted to cause a decrease in groundwater TDS concentrations and in concentrations of constituents such as calcium, magnesium, chloride, and nitrate. There are seven constituents, however, for which the predicted maximum concentrations within the volume of affected groundwater are greater than the baseline groundwater concentration and are also greater than the municipal and/or agricultural WQOs. These constituents are discussed in turn below:

- **Arsenic.** The background arsenic concentration is approximately 24 micrograms per liter (ug/l). The municipal WQO is 10 ug/l. The agricultural WQO is 100 ug/l. The predicted maximum groundwater concentration after PEC's proposed discharge is 94 ug/l. Since the background concentration is already greater than the municipal WQO, and since the discharge is not predicted to cause the groundwater concentration to exceed the agricultural WQO, the discharge will cause no further WQO exceedances. In terms of potential municipal uses, arsenic removal would be required even for the background groundwater. If the discharge occurred as proposed, the overall level of required water treatment would very likely decrease due to the substantial concentration decreases in other constituents such as nitrate and selenium.
- **Boron.** The background groundwater boron concentration is approximately 3,225 ug/l. There is no municipal WQO for boron, and the agricultural WQO based on actual crops in the PEC vicinity is 500 ug/l. The predicted maximum groundwater concentration of boron after PEC's proposed discharge is 10,600 ug/l. In terms of potential agricultural uses, boron removal would be required even for the background groundwater, because the background concentration of 3,225 ug/l is substantially greater than agricultural WQO of 500 ug/l. If the discharge occurred, the overall level of required water treatment would likely change very little because selenium is present in the background groundwater at a greater multiple of its agricultural WQO than would be the case for boron after discharge.

- **Fluoride.** The background fluoride concentration is approximately 0.07 mg/l. The municipal WQO is 2.0 mg/l. The agricultural WQO is 1.0 mg/l. The predicted maximum groundwater concentration after discharge is 1.24 mg/l. In terms of potential agricultural uses, if the discharge occurred, the overall level of required water treatment would likely change very little because another constituent, selenium, is present in the background groundwater at a greater multiple of its agricultural WQO than would be the case for fluoride after discharge.
- **Manganese.** The background manganese concentration is less than 10 ug/l. The municipal WQO is 50 ug/l, based on a secondary MCL due to taste and odor concerns, not on a primary MCL. The agricultural WQO is 200 ug/l. The predicted maximum groundwater concentration after discharge is 160 ug/l. In terms of potential municipal uses, if the discharge occurred, the overall level of required water treatment prior to municipal use would very likely decrease due to the substantial concentration decreases in other constituents such as nitrate and selenium.
- **Molybdenum.** The background molybdenum concentration is less than 10 ug/l. There is no municipal WQO. The agricultural WQO is 10 ug/l. The predicted maximum groundwater concentration after discharge is 154 ug/l in the affected portion of the semi-confined aquifer. In terms of potential agricultural uses, if the discharge occurred, the overall level of required water treatment would likely change very little because another constituent, selenium, is present in the background groundwater at a greater multiple of its agricultural WQO than would be the case for molybdenum after discharge.
- **Sodium.** The background sodium concentration is approximately 528 mg/l. There is no municipal WQO. The agricultural WQO is nominally 69 mg/l. The predicted maximum groundwater concentration after discharge is 1,330 mg/l. In terms of potential agricultural uses, if the discharge occurred, the overall level of required water treatment would likely change very little because another constituent, selenium, is present in the background groundwater at a greater multiple of its agricultural WQO than would be the case for sodium after discharge.
- **Sulfate**. The background sulfate concentration is approximately 2,200 mg/l. The municipal WQO is 500 mg/l. There is no agricultural WQO. The predicted maximum groundwater concentration after discharge is 2,380 mg/l. Since the background concentration is already greater than the municipal WQO, and since there is no agricultural WQO, the discharge will not cause further WQO exceedances. In terms of potential municipal uses, sulfate removal would be required even for the background groundwater. If the proposed discharge occurred, the overall level of required water treatment would very likely decrease due to the substantial concentration decreases in other constituents such as nitrate and selenium.

In summary, the discharge is predicted to cause only one new exceedance of a municipal WQO (for manganese, and that WQO is based only on a secondary MCL) and only two new exceedances of agricultural WQOs (for fluoride and molybdenum). The discharge is predicted to cause four other constituents (arsenic, boron, sodium, and sulfate) to exceed municipal or agricultural WQOs by a somewhat greater margin than the background groundwater already exceeds the WQOs. In terms of both potential municipal or agricultural uses, however, water treatment would be required even for the background groundwater. If the proposed discharge to UWSI occurred, the overall level of required

water treatment would likely change very little or actually decrease due to the substantial concentration decreases in other constituents such as TDS, chloride, nitrate, selenium, and strontium. Further, the scope of effect on new treatment requirements is limited by the fact that only a small portion of the aquifer is so affected.

Conclusions

The PEC provides substantial benefits to power-consumers in California by employing very high-efficiency CTGs to produce much-needed electricity with significantly lower environmental impacts than previous-generation CTGs. The water-treatment system includes internal recycling to minimize the amount of source water required, and most of the treated water is devoted to NO_x control.

Unfortunately, existing deep injection wells do not appear capable of handling the volume of wastewater that may be produced by the plant during peak operations. The only other alternative that appears reasonably feasible is discharge to on-site UWSI.

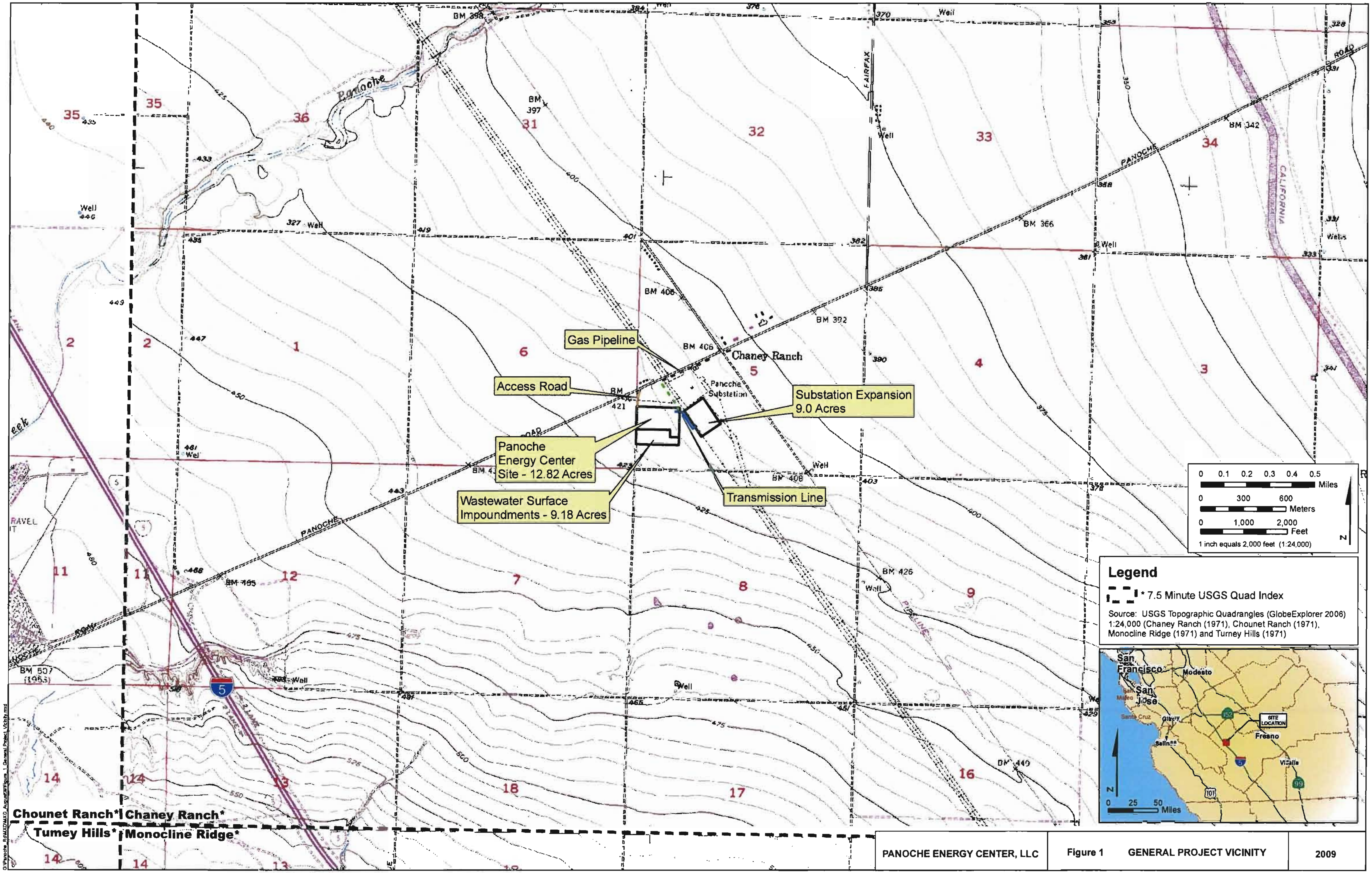
The groundwater in the semi-confined aquifer is of extremely poor quality with several minerals and metals at background concentrations that substantially exceed WQOs. Without treatment, this groundwater is unsuitable for beneficial uses. This is validated by the fact that this water source has not historically been used, nor is it presently used, for potable or agricultural purposes. The only two known supply wells in the plant vicinity that are screened in the semi-confined aquifer are screened relatively deep (400 to 500 feet bgs) to take advantage of somewhat-better water quality and production. Further, these wells are solely emergency backup supply wells connected to demineralizing water treatment systems at nearby peaking powerplants. Future supply wells screened in the semi-confined aquifer are considered unlikely given the poor groundwater quality, but if installed, would likely be screened relatively deep similar to these two existing wells.

The wastewater discharge to UWSI is unlikely to affect the usability of the groundwater. The baseline groundwater requires treatment for almost any conceivable use. The affected volume of groundwater will also require treatment for almost any conceivable use. However, treatment of the affected volume of groundwater will be easier than treatment of the baseline groundwater, because the affected volume will have a lower TDS concentration than the baseline groundwater.

Overall, the proposed discharge to two U would have - at worst - only a relatively minimal impact on the current and future usability of groundwater. The existing groundwater in the semi-confined aquifer is not a "high quality" water that is to be maintained under SWRCB Resolution Number 68-16. The proposed discharge would not unreasonably affect present and anticipated beneficial uses of the groundwater, because the groundwater will require treatment for almost any conceivable use regardless of whether the discharge occurs. If the discharge does occur, the level of required treatment will likely be less than without the proposed discharge, because the concentration of TDS and other constituents in the groundwater for which extensive treatment is required will be less than background levels of such constituents. Moreover, any potential minimal impact is overcome by the increased overall benefit to the people of California that the use of the two surface impoundments would provide.

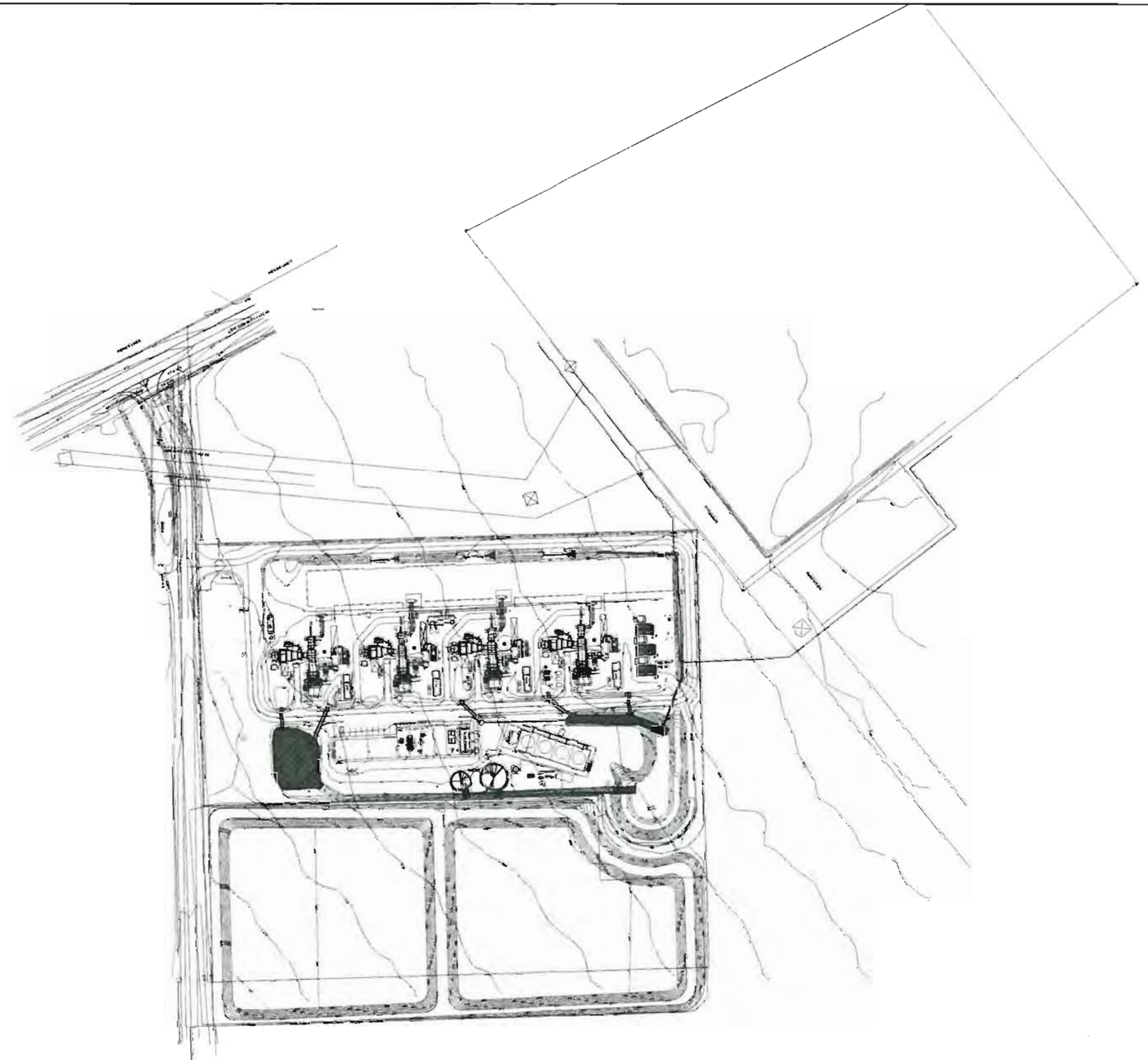
Notwithstanding the foregoing, if the semi-confined aquifer is considered a "high quality water," no treatment method exists to make salts disappear – any treatment method will only cause the salts to be concentrated into a smaller volume. However, the analysis summarized herein indicates that the proposed discharge would not create a condition of pollution or nuisance, and would maintain the highest water quality consistent with maximum benefit to the people of the State. The best practicable control method for the discharge appears to be a wastewater and groundwater monitoring program to verify the quantity/quality of the discharged wastewater and to assess whether impacts to groundwater are relatively similar to the predicted impacts.

Based on the information provided herein, any de minimus groundwater degradation from the proposed PEC unlined wastewater surface impoundments is in the best interest of, and is consistent with, the maximum benefit to the citizens of the State of California. Operation of PEC will supply a cleaner, more reliable electrical supply to the State during periods of intermediate and peak use, PEC provides increased employment in the area, and any groundwater degradation anticipated by constituents such as fluoride, manganese, and molybdenum is de minimus compared to the anticipated improvement of groundwater quality by constituents such as calcium, magnesium, chloride, and nitrate. Moreover, the proposed discharge will not unreasonably affect present and anticipated future beneficial uses of the upper semi-confined aquifer.



PANOCHE ENERGY CENTER, LLC | Figure 1 GENERAL PROJECT VICINITY | 2009

PANOCHE ENERGY CENTER, LLC	Figure 2	AERIAL OF IMMEDIATE PROJECT VICINITY	2009



N 0 250 500 Feet

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PANOCHE ENERGY CENTER, LLC	Figure 3 PROJECT SITE PLAN	2009

PANOCHE ENERGY CENTER, LLC	Figure 4	GRADING AND DRAINAGE PLAN	2009

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TABLE 1

BASELINE & PREDICTED GROUNDWATER QUALITY

Panoche Energy Center

26-Aug-09

			Panoche Energy Center*					RWQCB Water Quality Objectives (WQOs)		Receiving Groundwater Quality Estimates			
	Parameter	Units	MW-4 7/16/09 (LF)	MW-4 7/16/09 (LF)	MW-4 8/7/09 (FF)	MW-4 8/7/09 (LF)	Average**	Municipal	Agricultural	Predicted Maximum Concentration in First Encountered Groundwater Downgradient of the Pond***	Concentration Greater Than Baseline Concentration?	Concentration Greater Than WQO(s) ?	Baseline Concentration Was Already Greater Than WQO(s) ?
	Calcium	mg/L	360	380	440	440	405	n/a	n/a	48			
	Magnesium	mg/L	280	300	330	340	313	n/a	n/a	12			
	Sodium	mg/L	510	500	560	540	528	n/a	69	1,330	Yes	Yes	Yes
	Potassium	mg/L	10	10	12	11	11	n/a	n/a	8.0			
	Sulfate	mg/L	2,000	2,100	2,300	2,400	2,200	250 - 500	n/a	2,380	Yes	Yes	Yes
	Chloride	mg/L	360	360	450	440	403	250 - 500	250	302			
	Nitrate	mg/L	360	370	420	420	393	45	n/a	< 10			
	Silica (SiO2)	mg/L	45	47	47	45	46	n/a	n/a	157	Yes		
	Bicarbonate (as CaCO3)	mg/L	130	140	130	130	133	n/a	n/a	150	Yes		
	Total Dissolved Solids	mg/L	4,300	4,000	4,800	4,900	4,500	500 - 1,000	450 - 2,000	4,250			
	pH	std.	7.9	7.9	7.9	7.9	7.9	6.5 - 8.5	6.5 - 8.4	8.0			
	Fluoride	mg/L	0.26	0.32	0.32	0.30	0.30	2.0	1.0	1.24	Yes	Yes	
	Ammonia	mg/L	< 0.1	< 0.1	0.12	< 0.1	0.07	1.5	n/a	1.1	Yes		
	Trace Metals -- Dissolved												
	Aluminum	ug/L	< 50	< 50	< 50	< 50	< 50	1,000	5,000	< 50			
	Antimony	ug/L	< 2	< 2	< 2	< 2	< 2	6	n/a	< 2			
	Arsenic	ug/L	18	21	32	26	24	10	100	94	Yes	Yes	Yes
	Barium	ug/L	< 50	< 50	< 50	< 50	< 50	1,000	n/a	< 50			
	Beryllium	ug/L	< 1	< 1	< 1	< 1	< 1	4	100	< 1			
	Boron	ug/L	3,200	3,300	3,200	3,200	3,225	n/a	500	10,600	Yes	Yes	Yes
	Cadmium	ug/L	< 1	< 1	< 1	< 1	< 1	5	10	< 1			
	Chromium -- Total	ug/L	21	20	19	14	19	50	100	< 10			
	Copper	ug/L	< 50	< 50	< 50	< 50	< 50	1,000	200	< 50			
	Cyanide	ug/L	< 20	< 20	< 10	< 10	< 15	150	n/a	< 10			
	Iron	ug/L	< 50	< 50	< 50	< 50	< 50	300	5,000	238	Yes		
	Lead	ug/L	< 5	< 5	< 5	< 5	< 5	15	5,000	< 5			
	Manganese	ug/L	< 10	< 10	< 10	< 10	< 10	50	200	160	Yes	Yes	
	Mercury	ug/L	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	2	n/a	< 0.4			
	Molybdenum	ug/L	< 10	< 10	< 10	< 10	< 10	n/a	10	154	Yes	Yes	
	Nickel	ug/L	< 10	< 10	18	12	10	100	200	< 10			
	Phosphorous -- Total	ug/L	< 1000	< 1000	< 100	< 100	< 550	n/a	n/a	408	Yes		
	Selenium -- Total	ug/L	370	390	700	520	495	50	20	11			
	Silver	ug/L	< 10	< 10	< 10	< 10	< 10	100	n/a	< 10			
	Strontium	ug/L	4,900	5,200	5,600	5,500	5,300	n/a	n/a	453			
	Thallium	ug/L	< 1	< 1	< 1	< 1	< 1	2	n/a	< 1			
	Tin	ug/L	< 5	< 5	< 25	< 5	< 5	n/a	n/a	< 5			
	Titanium	ug/L	< 50	< 50	< 50	< 50	< 50	n/a	n/a	< 50			
	Vanadium	ug/L	< 10	< 10	< 10	< 10	< 10	50	100	< 10			
	Zinc	ug/L	< 50	< 50	< 50	< 50	< 50	5,000	2,000	< 50			

* Panoche Energy Center's baseline first-encountered groundwater monitoring results (screen from 150' to 210' bgs).

** For averaging, non-detect results were replaced with 1/2 the laboratory reporting limit.

*** Based on Kiewit's wastewater quality estimate that assumes non-detect source-water results are still non-detect after cycling up source water (further testing is in progress to verify this assumption).

bgs = below ground surface

FF = field filtered

LF = laboratory filtered

APPENDIX A

Completed, Signed Form 200

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: Panoche Energy Center			
Address: 43883 West Panoche Road			
City: Firebaugh	County: Fresno	State: CA	Zip Code: 93622
Contact Person: Don Burkard		Telephone Number: 925-759-0457	

B. Facility Owner:

Name: Panoche Energy Center, LLC			Owner Type (Check One) 1. ☐ Individual 2. ☑ Corporation
Address: 43883 West Panoche Road			3. ☐ Governmental Agency 4. ☐ Partnership
City: Firebaugh	State: CA	Zip Code: 93622	5. ☐ Other:
Contact Person: Don Burkard		Telephone Number: 925-759-0457	Federal Tax ID: 20-55522298

C. Facility Operator (The agency or business, not the person):

Name: Wood Group, LLC			Operator Type (Check One) 1. ☐ Individual 2. ☑ Corporation
Address: 43883 West Panoche Road			3. ☐ Governmental Agency 4. ☐ Partnership
City: Firebaugh	State: CA	Zip Code: 93622	5. ☐ Other:
Contact Person: Roy Campbell		Telephone Number: 559-659-2270	

D. Owner of the Land:

Name: PAO Investments, LLC			Owner Type (Check One) 1. ☐ Individual 2. ☑ Corporation
Address: 45499 West Panoche Road			3. ☐ Governmental Agency 4. ☐ Partnership
City: Firebaugh	State: CA	Zip Code: 93622	5. ☐ Other:
Contact Person: Barry Baker		Telephone Number: 559-659-3942	

E. Address Where Legal Notice May Be Served:

Address: 43883 West Panoche Road		
City: Firebaugh	State: CA	Zip Code: 93622
Contact Person: Don Burkard		Telephone Number: 925-759-0457

F. Billing Address:

Address: 43883 West Panoche Road		
City: Firebaugh	State: CA	Zip Code: 93622
Contact Person: Don Burkard		Telephone Number: 925-759-0457

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☑ **A. WASTE DISCHARGE TO LAND** ☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☑ Cooling Water
- ☐ Mining
- ☐ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Other, please describe: _____
- ☐ Animal Waste Solids
- ☐ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☑ Surface Impoundment
- ☑ Industrial Process Wastewater
- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☐ Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)	2. Latitude	3. Longitude
Facility: 027-060-78S	**Facility:** 36.65126 degrees N	**Facility:** 120.58412 degrees W
Discharge Point: 027-060-78S	**Discharge Point:** 35.65021 deg N	**Discharge Point:** 120.58412 deg W

IV. REASON FOR FILING

- ☑ New Discharge or Facility
- ☐ Changes in Ownership/Operator (see instructions)
- ☐ Change in Design or Operation
- ☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Change in Quantity/Type of Discharge
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: California Energy Commission

Has a public agency determined that the proposed project is exempt from CEQA? ☐ **Yes** ☑ **No**

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ **Yes** ☑ **No**

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration** **Expected CEQA Completion Date:** CEQA equiv. March 2010

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

Please see accompanying Report of Waste Discharge, dated September 21, 2009.

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: DON BURKARD Title: OPERATIONS MGR

Signature: [signature] Date: 9-21-09

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

Form 200(6/97)

APPENDIX B

Groundwater Laboratory Reports

BSK Analytical Laboratories
Engineers & Laboratories

1414 Stanislaus Street
Fresno, California 93706
(559) 497-2888
Fax (559) 485-6935

Certificate of Analysis

NELAP Certificate #04227CA
ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009071303
BSK Sample ID #: 1137689

Report Issue Date: 07/29/2009

Project ID: Project Desc: Panoche Energy Center
Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW-4A
Sample Comments:

Date Sampled: 07/16/2009
Time Sampled: 1229
Date Received: 07/16/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
Aggressive Index		13			1	N/A	07/23/09	07/23/09
Alkalinity (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	07/17/09	07/17/09
Aluminum (Al) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Ammonia (NH3-N)	SM 4500-NH3 G	ND	mg/L	0.1	1	0.10	07/20/09	07/20/09
Antimony (Sb) - Dissolved	EPA 200.8	ND	µg/L	2	1	2.0	07/16/09	07/21/09
Arsenic (As) - Dissolved	EPA 200.8	18	µg/L	2	1	2.0	07/16/09	07/21/09
Barium (Ba) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Beryllium (Be) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Bicarbonate (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	07/17/09	07/17/09
Boron (B) - Dissolved	EPA 200.7	3.2	mg/L	0.10	1	0.10	07/16/09	07/20/09
Cadmium (Cd) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Calcium (Ca) - Dissolved	EPA 200.7	360	mg/L	0.10	1	0.10	07/16/09	07/20/09
Carbon Dioxide - Free	SM 4500-CO2 D	3.1	mg/L	1.0	1	1.0	07/23/09	07/23/09
Carbon Dioxide - Total	SM 4500-CO2 D	120	mg/L	1.0	1	1.0	07/23/09	07/23/09
Carbonate (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Chloride (Cl)	EPA 300.0	360	mg/L	1.0	20	20	07/16/09	07/16/09
Chromium - Total (Cr) - Dissolved	EPA 200.8	21	µg/L	10	1	10	07/16/09	07/21/09
Conductivity - Specific (EC) @25°C	SM 2510 B	4900	µmho/cm	1.0	1	1.0	07/17/09	07/17/09
Copper (Cu) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Cyanide (CN)	SM 4500-CN-F	ND	mg/L	0.02	1	0.020	07/17/09	07/17/09
Fluoride	SM 4500-F C	0.26	mg/L	0.10	1	0.10	07/19/09	07/19/09
Hardness (as CaCO3)	SM 2340 B	2000	mg/L	1.0	1	1.0	07/23/09	07/23/09
Hydroxide (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Iron (Fe)	EPA 200.7	ND	mg/L	0.050	1	0.050	07/27/09	07/27/09
Iron (Fe) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Langelier Index (Saturation Index)	SM 2330 B	5.6	-	-	1	N/A	07/23/09	07/23/09
Lead (Pb) - Dissolved	EPA 200.8	ND	µg/L	5.0	1	5.0	07/16/09	07/21/09
Magnesium (Mg) - Dissolved	EPA 200.7	280	mg/L	0.10	1	0.10	07/16/09	07/20/09
Manganese (Mn)	EPA 200.7	ND	mg/L	0.010	1	0.010	07/27/09	07/27/09
Manganese (Mn) - Dissolved	EPA 200.7	ND	mg/L	0.010	1	0.010	07/16/09	07/20/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Case Narrative for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

Report Authentication Code:

BSK Analytical Laboratories
Engineers & Laboratories

1414 Stanislaus Street
Fresno, California 93706
(559) 497-2888
Fax (559) 485-6935

Certificate of Analysis

NELAP Certificate #04227CA
ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009071303
BSK Sample ID #: 1137689

Report Issue Date: 07/29/2009

Project ID: Project Desc: Panoche Energy Center
Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW-4A
Sample Comments:

Date Sampled: 07/16/2009
Time Sampled: 1229
Date Received: 07/16/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	mg/L	0.050	1	0.050	07/16/09 19:00	07/16/09 19:00
Mercury (Hg) - Dissolved	EPA 200.8	ND	µg/L	0.40	1	0.40	07/16/09	07/21/09
Molybdenum (Mo) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/21/09
Nickel (Ni) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/23/09
Nitrate (NO3)	EPA 300.0	360	mg/L	1.0	20	20	07/16/09 23:27	07/16/09 23:27
Nitrite (NO2-N)	EPA 300.0	ND	mg/L	0.050	20	1.0	07/16/09 23:27	07/16/09 23:27
o-Phosphate as PO4	EPA 300.0	ND	mg/L	0.60	20	12	07/16/09 23:27	07/16/09 23:27
pH at 22.96°C	SM 4500-H+ B	7.9	Std. Unit	-	1	N/A	07/17/09 01:17	07/17/09 01:17
Phosphorus - Total (P)	EPA 365.4	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Potassium (K) - Dissolved	EPA 200.7	10	mg/L	2	1	2.0	07/16/09	07/20/09
Selenium (Se) - Total - Dissolved	EPA 200.8	370	µg/L	2	1	2.0	07/16/09	07/21/09
Silica - Total (SiO2) - Dissolved	EPA 200.7	45	mg/L	0.20	1	0.20	07/16/09	07/20/09
Silver (Ag) - Dissolved	EPA 200.7	ND	mg/L	0.010	1	0.010	07/16/09	07/20/09
Sodium (Na) - Dissolved	EPA 200.7	510	mg/L	1.0	2	2.0	07/16/09	07/21/09
Strontium (Sr) - Dissolved	EPA 200.8	4900	µg/L	1.0	5	5.0	07/16/09	07/22/09
Sulfate (SO4)	EPA 300.0	2000	mg/L	2	50	100	07/18/09	07/18/09
Thallium (Tl) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Tin (Sn)	EPA 200.8	ND	µg/L	5.0	1	5.0	07/16/09	07/22/09
Titanium (Ti) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Total Dissolved Solids (TDS)	SM 2540 C	4300	mg/L	5.0	1	5.0	07/17/09	07/20/09
Total Suspended (TSS)	SM 2540 D	23	mg/L	5.0	1	5.0	07/17/09	07/20/09
Vanadium (V) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/21/09
Zinc (Zn) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Case Narrative for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

Report Authentication Code:

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Certificate of Analysis

NELAP Certificate #04227CA
ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009071303
BSK Sample ID #: 1137690

Report Issue Date: 07/29/2009

Project ID: Project Desc: Panoche Energy Center

Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW-4B
Sample Comments:

Date Sampled: 07/16/2009
Time Sampled: 1326
Date Received: 07/16/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
Aggressive Index		13	-		1	N/A	07/23/09	07/23/09
Alkalinity (as CaCO3)	SM 2320 B	140	mg/L	3.0	1	3.0	07/17/09	07/17/09
Aluminum (Al) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Ammonia (NH3-N)	SM 4500-NH3 G	ND	mg/L	0.1	1	0.10	07/20/09	07/20/09
Antimony (Sb) - Dissolved	EPA 200.8	ND	µg/L	2	1	2.0	07/16/09	07/21/09
Arsenic (As) - Dissolved	EPA 200.8	21	µg/L	2	1	2.0	07/16/09	07/21/09
Barium (Ba) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Beryllium (Be) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Bicarbonate (as CaCO3)	SM 2320 B	140	mg/L	3.0	1	3.0	07/17/09	07/17/09
Boron (B) - Dissolved	EPA 200.7	3.3	mg/L	0.10	1	0.10	07/16/09	07/20/09
Cadmium (Cd) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Calcium (Ca) - Dissolved	EPA 200.7	380	mg/L	0.10	1	0.10	07/16/09	07/20/09
Carbon Dioxide - Free	SM 4500-CO2 D	3.2	mg/L	1.0	1	1.0	07/23/09	07/23/09
Carbon Dioxide - Total	SM 4500-CO2 D	120	mg/L	1.0	1	1.0	07/23/09	07/23/09
Carbonate (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Chloride (Cl)	EPA 300.0	360	mg/L	1.0	20	20	07/16/09	07/16/09
Chromium - Total (Cr) - Dissolved	EPA 200.8	20	µg/L	10	1	10	07/16/09	07/21/09
Conductivity - Specific (EC) @25°C	SM 2510 B	5000	µmho/cm	1.0	1	1.0	07/17/09	07/17/09
Copper (Cu) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Cyanide (CN)	SM 4500-CN-F	ND	mg/L	0.02	1	0.020	07/17/09	07/17/09
Fluoride	SM 4500-F C	0.32	mg/L	0.10	1	0.10	07/19/09	07/19/09
Hardness (as CaCO3)	SM 2340 B	2200	mg/L	1.0	1	1.0	07/23/09	07/23/09
Hydroxide (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Iron (Fe)	EPA 200.7	ND	mg/L	0.050	1	0.050	07/27/09	07/27/09
Iron (Fe) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Langelier Index (Saturation Index)	SM 2330 B	5.0		-	1	N/A	07/23/09	07/23/09
Lead (Pb) - Dissolved	EPA 200.8	ND	µg/L	5.0	1	5.0	07/16/09	07/21/09
Magnesium (Mg) - Dissolved	EPA 200.7	300	mg/L	0.10	1	0.10	07/16/09	07/20/09
Manganese (Mn)	EPA 200.7	ND	mg/L	0.010	1	0.010	07/27/09	07/27/09
Manganese (Mn) - Dissolved	EPA 200.7	ND	mg/L	0.010	1	0.010	07/16/09	07/20/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Case Narrative for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

Report Authentication Code:

BSK Analytical Laboratories
Engineers & Laboratories

1414 Stanislaus Street
Fresno, California 93706
(559) 497-2888
Fax (559) 485-6935

Certificate of Analysis

NELAP Certificate #04227CA
ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009071303
BSK Sample ID #: 1137690

Report Issue Date: 07/29/2009

Project ID: Project Desc: Panoche Energy Center

Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW-4B
Sample Comments:

Date Sampled: 07/16/2009
Time Sampled: 1326
Date Received: 07/16/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	mg/L	0.050	1	0.050	07/16/09 19:00	07/16/09 19:00
Mercury (Hg) - Dissolved	EPA 200.8	ND	µg/L	0.40	1	0.40	07/16/09	07/21/09
Molybdenum (Mo) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/21/09
Nickel (Ni) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/23/09
Nitrate (NO3)	EPA 300.0	370	mg/L	1.0	20	20	07/16/09 23:35	07/16/09 23:35
Nitrite (NO2-N)	EPA 300.0	ND	mg/L	0.050	20	1.0	07/16/09 23:35	07/16/09 23:35
o-Phosphate as PO4	EPA 300.0	ND	mg/L	0.60	20	12	07/16/09 23:35	07/16/09 23:35
pH at 22.72°C	SM 4500-H+ B	7.9	Std. Unit	-	1	N/A	07/17/09 01:26	07/17/09 01:26
Phosphorus - Total (P)	EPA 365.4	ND	mg/L	1.0	1	1.0	07/17/09	07/17/09
Potassium (K) - Dissolved	EPA 200.7	10	mg/L	2	1	2.0	07/16/09	07/20/09
Selenium (Se) - Total - Dissolved	EPA 200.8	390	µg/L	2	1	2.0	07/16/09	07/21/09
Silica - Total (SiO2) - Dissolved	EPA 200.7	47	mg/L	0.20	1	0.20	07/16/09	07/20/09
Silver (Ag) - Dissolved	EPA 200.7	ND	mg/L	0.010	1	0.010	07/16/09	07/20/09
Sodium (Na) - Dissolved	EPA 200.7	500	mg/L	1.0	2	2.0	07/16/09	07/21/09
Strontium (Sr) - Dissolved	EPA 200.8	5200	µg/L	1.0	5	5.0	07/16/09	07/22/09
Sulfate (SO4)	EPA 300.0	2100	mg/L	2	50	100	07/18/09	07/18/09
Thallium (Tl) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	07/16/09	07/21/09
Tin (Sn)	EPA 200.8	ND	µg/L	5.0	1	5.0	07/16/09	07/22/09
Titanium (Ti) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09
Total Dissolved Solids (TDS)	SM 2540 C	4000	mg/L	5.0	1	5.0	07/17/09	07/20/09
Total Suspended (TSS)	SM 2540 D	33	mg/L	5.0	1	5.0	07/17/09	07/20/09
Vanadium (V) - Dissolved	EPA 200.8	ND	µg/L	10	1	10	07/16/09	07/21/09
Zinc (Zn) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	07/16/09	07/20/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
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E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

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Certificate of Analysis

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ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009080177
BSK Sample ID #: 1144470

Report Issue Date: 08/07/2009

Project ID: Project Desc: Panoche Energy Center Production Well-West

Submission Comments:

Sample Type: Liquid — Date Sampled: 08/04/2009
Sample Description: PEC-MW4 A — Time Sampled: 1200
Sample Comments: Metals are on a dissolved basis due to field filtration — Date Received: 08/04/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
Aggressive Index		13	-		1	N/A	08/07/09	08/07/09
Alkalinity (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	08/05/09	08/05/09
Aluminum (Al)	EPA 200.7	ND	mg/L	0.050	1	0.050	08/05/09	08/05/09
Ammonia (NH3-N)	SM 4500-NH3 G	0.12	mg/L	0.1	1	0.10	08/06/09	08/06/09
Antimony (Sb)	EPA 200.8	ND	µg/L	2	1	2.0	08/05/09	08/05/09
Arsenic (As)	EPA 200.8	32	µg/L	2	1	2.0	08/05/09	08/05/09
Barium (Ba)	EPA 200.7	ND	mg/L	0.050	1	0.050	08/05/09	08/05/09
Beryllium (Be)	EPA 200.8	ND	µg/L	1.0	1	1.0	08/05/09	08/05/09
Bicarbonate (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	08/05/09	08/05/09
Boron (B)	EPA 200.7	3.2	mg/L	0.10	1	0.10	08/05/09	08/05/09
Cadmium (Cd)	EPA 200.8	ND	µg/L	1.0	1	1.0	08/05/09	08/05/09
Calcium (Ca)	EPA 200.7	440	mg/L	0.10	1	0.10	08/05/09	08/05/09
Carbon Dioxide - Free	SM 4500-CO2 D	3.6	mg/L	1.0	1	1.0	08/06/09	08/06/09
Carbon Dioxide - Total	SM 4500-CO2 D	120	mg/L	1.0	1	1.0	08/06/09	08/06/09
Carbonate (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	08/05/09	08/05/09
Chloride (Cl)	EPA 300.0	450	mg/L	1.0	50	50	08/05/09	08/05/09
Chlorine - Residual (Cl2)	SM 4500-Cl-B	ND	mg/L	0.10	1	0.10	08/04/09 20:15	08/04/09 20:15
Chromium - Total (Cr)	EPA 200.8	19	µg/L	10	1	10	08/05/09	08/05/09
Cobalt (Co)	EPA 200.8	ND	µg/L	50	1	50	08/05/09	08/05/09
Conductivity - Specific (EC) @25°C	SM 2510 B	5700	µmho/cm	1.0	1	1.0	08/05/09	08/05/09
Copper (Cu)	EPA 200.7	ND	mg/L	0.050	1	0.050	08/05/09	08/05/09
Cyanide (CN)	SM 4500-CN E	ND	mg/L	0.01	1	0.010	08/06/09	08/06/09
Fluoride	SM 4500-F C	0.32	mg/L	0.10	1	0.10	08/05/09	08/05/09
Hardness (as CaCO3)	SM 2340 B	2400	mg/L	1.0	1	1.0	08/06/09	08/06/09
Hydroxide (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	08/05/09	08/05/09
Iron (Fe)	EPA 200.7	ND	mg/L	0.050	1	0.050	08/05/09	08/05/09
Langelier Index (Saturation Index)	SM 2330 B	7.0	-	-	1	N/A	08/07/09	08/07/09
Lead (Pb)	EPA 200.8	ND	µg/L	5.0	1	5.0	08/05/09	08/05/09
Magnesium (Mg)	EPA 200.7	330	mg/L	0.10	1	0.10	08/05/09	08/05/09
Manganese (Mn)	EPA 200.7	ND	mg/L	0.010	1	0.010	08/05/09	08/05/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
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E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

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Certificate of Analysis

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ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009080177
BSK Sample ID #: 1144470

Report Issue Date: 08/07/2009

Project ID: Project Desc: Panoche Energy Center Production Well-West

Submission Comments:

Sample Type: Liquid
Sample Description: PEC-MW4 A
Sample Comments: Metals are on a dissolved basis due to field filtration

Date Sampled: 08/04/2009
Time Sampled: 1200
Date Received: 08/04/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	**0.058**	mg/L	0.050	1	0.050	08/05/09 0710	08/05/09 0710
Mercury (Hg)	EPA 200.8	**ND**	µg/L	0.40	1	0.40	08/05/09	08/05/09
Molybdenum (Mo)	EPA 200.8	**ND**	µg/L	10	1	10	08/05/09	08/05/09
Nickel (Ni)	EPA 200.8	**18**	µg/L	10	1	10	08/05/09	08/05/09
Nitrate (NO3)	EPA 300.0	**420**	mg/L	1.0	50	50	08/05/09 00:49	08/05/09 00:49
Nitrite (NO2-N)	EPA 300.0	**ND**	mg/L	0.050	50	2.5	08/06/09 00:55	08/06/09 00:55
o-Phosphate as PO4	EPA 300.0	**ND**	mg/L	0.60	50	30	08/05/09 00:49	08/05/09 00:49
pH at 22.31°C	SM 4500-H+ B	**7.9**	Std. Unit	-	1	N/A	08/05/09 01:56	08/05/09 01:56
Phosphorus - Total (P)	EPA 365.4	**ND**	mg/L	0.1	1	0.10	08/05/09	08/06/09
Potassium (K)	EPA 200.7	**12**	mg/L	2	1	2.0	08/05/09	08/05/09
Selenium (Se) - Total	EPA 200.8	**700**	µg/L	2	1	2.0	08/05/09	08/05/09
Silica - Total (SiO2)	EPA 200.7	**47**	mg/L	0.20	1	0.20	08/05/09	08/05/09
Silver (Ag)	EPA 200.7	**ND**	mg/L	0.010	1	0.010	08/05/09	08/05/09
Sodium (Na)	EPA 200.7	**560**	mg/L	1.0	5	5.0	08/05/09	08/05/09
Strontium (Sr)	EPA 200.8	**5600**	µg/L	1.0	5	5.0	08/05/09	08/06/09
Sulfate (SO4)	EPA 300.0	**2300**	mg/L	2	50	100	08/05/09	08/05/09
Thallium (Tl)	EPA 200.8	**ND**	µg/L	1.0	1	1.0	08/05/09	08/05/09
Tin (Sn)	EPA 200.8	**ND**	µg/L	5.0	5	25	08/05/09	08/06/09
Titanium (Ti)	EPA 200.7	**ND**	mg/L	0.050	1	0.050	08/05/09	08/05/09
Total Dissolved Solids (TDS)	SM 2540 C	**4800**	mg/L	5.0	1	5.0	08/05/09	08/07/09
Total Suspended (TSS)	SM 2540 D	**37**	mg/L	5.0	1	5.0	08/05/09	08/07/09
Vanadium (V)	EPA 200.8	**ND**	µg/L	10	1	10	08/05/09	08/05/09
Zinc (Zn)	EPA 200.7	**ND**	mg/L	0.050	1	0.050	08/05/09	08/05/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Case Narrative for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

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Certificate of Analysis

NELAP Certificate #04227CA
ELAP Certificate #1180

Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009080177
BSK Sample ID #: 1144471

Report Issue Date: 08/07/2009

Project ID: Project Desc: Panoche Energy Center Production Well-West

Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW4 B
Sample Comments:

Date Sampled: 08/04/2009
Time Sampled: 1205
Date Received: 08/04/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
Aggressive Index		13	-		1	N/A	08/07/09	08/07/09
Alkalinity (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	08/05/09	08/05/09
Aluminum (Al) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	08/04/09	08/06/09
Ammonia (NH3-N)	SM 4500-NH3 G	ND	mg/L	0.1	1	0.10	08/06/09	08/06/09
Antimony (Sb) - Dissolved	EPA 200.8	ND	µg/L	2	1	2.0	08/04/09	08/06/09
Arsenic (As) - Dissolved	EPA 200.8	26	µg/L	2	1	2.0	08/04/09	08/06/09
Barium (Ba) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	08/04/09	08/06/09
Beryllium (Be) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	08/04/09	08/06/09
Bicarbonate (as CaCO3)	SM 2320 B	130	mg/L	3.0	1	3.0	08/05/09	08/05/09
Boron (B) - Dissolved	EPA 200.7	3.2	mg/L	0.10	1	0.10	08/04/09	08/06/09
Cadmium (Cd) - Dissolved	EPA 200.8	ND	µg/L	1.0	1	1.0	08/04/09	08/06/09
Calcium (Ca) - Dissolved	EPA 200.7	440	mg/L	0.10	1	0.10	08/04/09	08/06/09
Carbon Dioxide - Free	SM 4500-CO2 D	3.6	mg/L	1.0	1	1.0	08/06/09	08/06/09
Carbon Dioxide - Total	SM 4500-CO2 D	120	mg/L	1.0	1	1.0	08/06/09	08/06/09
Carbonate (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	08/05/09	08/05/09
Chloride (Cl)	EPA 300.0	440	mg/L	1.0	50	50	08/05/09	08/05/09
Chlorine - Residual (Cl2)	SM 4500-Cl-B	ND	mg/L	0.10	1	0.10	08/04/09 20:16	08/04/09 20:16
Chromium - Total (Cr) - Dissolved	EPA 200.8	14	µg/L	10	1	10	08/04/09	08/06/09
Cobalt (Co) - Dissolved	EPA 200.8	ND	µg/L	50	1	50	08/04/09	08/06/09
Conductivity - Specific (EC) @25°C	SM 2510 B	5700	µmho/cm	1.0	1	1.0	08/05/09	08/05/09
Copper (Cu) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	08/04/09	08/06/09
Cyanide (CN)	SM 4500-CN E	ND	mg/L	0.01	1	0.010	08/06/09	08/06/09
Fluoride	SM 4500-F C	0.30	mg/L	0.10	1	0.10	08/05/09	08/05/09
Hardness (as CaCO3)	SM 2340 B	2500	mg/L	1.0	1	1.0	08/07/09	08/07/09
Hydroxide (as CaCO3)	SM 2320 B	ND	mg/L	1.0	1	1.0	08/05/09	08/05/09
Iron (Fe) - Dissolved	EPA 200.7	ND	mg/L	0.050	1	0.050	08/04/09	08/06/09
Langelier Index (Saturation Index)	SM 2330 B	7.3	-	-	1	N/A	08/07/09	08/07/09
Lead (Pb) - Dissolved	EPA 200.8	ND	µg/L	5.0	1	5.0	08/04/09	08/06/09
Magnesium (Mg) - Dissolved	EPA 200.7	340	mg/L	0.10	1	0.10	08/04/09	08/06/09
Manganese (Mn) - Dissolved	EPA 200.7	ND	mg/L	0.010	1	0.010	08/04/09	08/06/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
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H: Analyzed outside of hold time
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Jason Moore
URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720

BSK Submission #: 2009080177
BSK Sample ID #: 1144471

Report Issue Date: 08/07/2009

Project ID: Project Desc: Panoche Energy Center Production Well-West

Submission Comments:
Sample Type: Liquid
Sample Description: PEC-MW4 B
Sample Comments:

Date Sampled: 08/04/2009
Time Sampled: 1205
Date Received: 08/04/2009

Inorganics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date/Time	Analysis Date/Time
Mercury (Hg) - Dissolved	EPA 200.8	**ND**	µg/L	0.40	1	0.40	08/04/09	08/06/09
Molybdenum (Mo) - Dissolved	EPA 200.8	**ND**	µg/L	10	1	10	08/04/09	08/06/09
Nickel (Ni) - Dissolved	EPA 200.8	**12**	µg/L	10	1	10	08/04/09	08/06/09
Nitrate (NO3)	EPA 300.0	**420**	mg/L	1.0	50	50	08/05/09 01:00	08/05/09 01:00
Nitrite (NO2-N)	EPA 300.0	**ND**	mg/L	0.050	50	2.5	08/06/09 01:05	08/06/09 01:05
o-Phosphate as PO4	EPA 300.0	**ND**	mg/L	0.60	50	30	08/05/09 01:00	08/05/09 01:00
pH at 22.54°C	SM 4500-H+ B	**7.9**	Std. Unit	-	1	N/A	08/05/09 02:05	08/05/09 02:05
Phosphorus - Total (P)	EPA 365.4	**ND**	mg/L	0.1	1	0.10	08/05/09	08/06/09
Potassium (K) - Dissolved	EPA 200.7	**11**	mg/L	2	1	2.0	08/04/09	08/06/09
Selenium (Se) - Total - Dissolved	EPA 200.8	**520**	µg/L	2	1	2.0	08/04/09	08/06/09
Silica - Total (SiO2) - Dissolved	EPA 200.7	**45**	mg/L	0.20	1	0.20	08/04/09	08/06/09
Silver (Ag) - Dissolved	EPA 200.7	**ND**	mg/L	0.010	1	0.010	08/04/09	08/06/09
Sodium (Na) - Dissolved	EPA 200.7	**540**	mg/L	1.0	10	10	08/04/09	08/06/09
Strontium (Sr) - Dissolved	EPA 200.8	**5500**	µg/L	1.0	5	5.0	08/04/09	08/06/09
Sulfate (SO4)	EPA 300.0	**2400**	mg/L	2	50	100	08/05/09	08/05/09
Sulfide (S) - Total	SM 4500-S E	**ND**	mg/L	0.10	1	0.10	08/05/09	08/05/09
Thallium (Tl) - Dissolved	EPA 200.8	**ND**	µg/L	1.0	1	1.0	08/04/09	08/06/09
Tin (Sn)	EPA 200.8	**ND**	µg/L	5.0	1	5.0	08/04/09	08/06/09
Titanium (Ti) - Dissolved	EPA 200.7	**ND**	mg/L	0.050	1	0.050	08/04/09	08/06/09
Total Dissolved Solids (TDS)	SM 2540 C	**4900**	mg/L	5.0	1	5.0	08/05/09	08/07/09
Total Organic Carbon (TOC)	SM 5310-C	**1.5**	mg/L	0.20	1	0.20	08/06/09	08/06/09
Total Suspended (TSS)	SM 2540 D	**13**	mg/L	5.0	1	5.0	08/05/09	08/07/09
Vanadium (V) - Dissolved	EPA 200.8	**ND**	µg/L	10	1	10	08/04/09	08/06/09
Zinc (Zn) - Dissolved	EPA 200.7	**ND**	mg/L	0.050	1	0.050	08/04/09	08/06/09

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

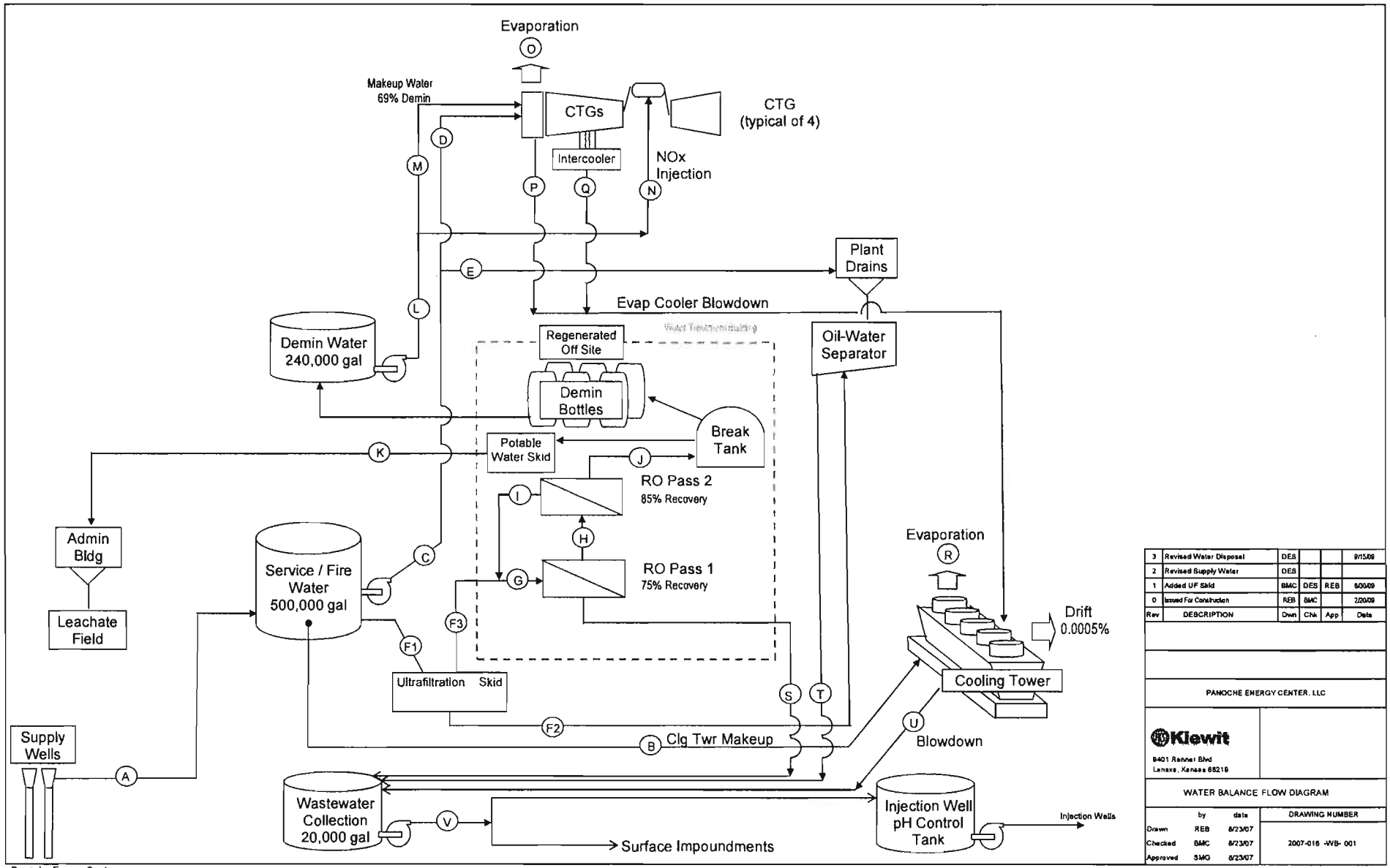
PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR
pCi/L: Picocurie per Liter

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Case Narrative for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.
MDC: Min Detectable Concentration

Report Authentication Code:

APPENDIX C

Water Balance



Rev	DESCRIPTION	Dwn	Chk	App	Date
3	Revised Water Disposal	DES			9/15/09
2	Revised Supply Water	DES			
1	Added UF Skid	BMC	DES	REB	6/30/09
0	Issued For Construction	REB	BMC		2/20/09

PANOCHE ENERGY CENTER, LLC

Klewit
8401 Renner Blvd
Lenexa, Kansas 66219

WATER BALANCE FLOW DIAGRAM

	by	date	DRAWING NUMBER
Drawn	REB	8/23/07	2007-016 -WB- 001
Checked	BMC	8/23/07	
Approved	SMO	8/23/07	

		NORMAL OPERATION						PEAK DAY OPERATION			
	Case Number	1	2	3	4	5		6	7	8	9
	Case ID	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Wtd Avg		High	Low	Avg	Wtd Avg
	Ambient Temperature	52	68	80	56	65		114	80	97	97
	Wet Bulb Temperature	48	57	64	49	55		74	64	69	69
	Relative Humidity	73.6	51.5	41.9	66.2	56.8		14.6	41.8	23.7	26.0
	Ambient Pressure	14.500	14.500	14.500	14.500	14.500		14.500	14.500	14.500	14.500
	Inlet Air Cooler Status	N/A	N/A	N/A	N/A	N/A		On	On	On	On
	Description CTs in service	4	4	4	4	4		4	4	4	4
	Flow from SW Tank	1157.0	1297.3	1375.5	1190.5	1265.8		1658.1	1379.1	1520.1	1519.4
	SW Tank Net Flow	643.0	502.7	424.5	609.5	534.2		141.9	420.9	279.9	280.6
	Supply Well Use	64%	72%	76%	66%	70%		92%	77%	84%	84%
A	Supply Wells to SW Tank	1800.0	1800.0	1800.0	1800.0	1800.0		1800.0	1800.0	1800.0	1800.0
B	Cooling Tower Makeup	790.1	923.4	994.5	823.5	892.9		1257.7	998.1	1129.2	1128.6
C	Service Water Flow	5.0	11.9	19.0	5.0	11.0		38.5	19.0	29.0	28.8
D	Service water to evap coolers	0.0	6.9	14.0	0.0	6.0		33.5	14.0	24.0	23.8
E	Washdown hose use	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0
F1	UF System Feed	379.9	379.9	379.9	379.9	379.9		379.9	379.9	379.9	379.9
F2	UF System Backwash	17.9	17.9	17.9	17.9	17.9		17.9	17.9	17.9	17.9
F3	RO System Feed	362.0	362.0	362.0	362.0	362.0		362.0	362.0	362.0	362.0
G	RO Pass 1 Inlet Flow	407.8	407.8	407.8	407.8	407.8		407.8	407.8	407.8	407.8
H	RO Pass 2 Inlet Flow	305.9	305.9	305.9	305.9	305.9		305.9	305.9	305.9	305.9
I	RO Pass 2 Reject to Pass 1	45.9	45.9	45.9	45.9	45.9		45.9	45.9	45.9	45.9
J	RO Product Water	260.0	260.0	260.0	260.0	260.0		260.0	260.0	260.0	260.0
K	Potable water to admin bldg	2.6	2.6	2.6	2.6	2.6		2.6	2.6	2.6	2.6
	Demin Tank Net Flow	17.1	8.7	4.7	17.1	11.3		[illegible]	4.6	[illegible]	[illegible]
	Water Treatment System Use	93%	97%	98%	93%	96%		[illegible]	98%	[illegible]	[illegible]
L	Demineralized Water Flow	240.3	248.7	252.7	240.3	246.1		283.3	252.8	268.6	268.3
M	Demin water to evap coolers	0.0	15.4	31.2	0.0	13.4		74.5	31.1	53.3	53.1
N	NOx injection	240.3	233.3	221.5	240.3	232.8		208.8	221.7	215.3	215.3
O	Evap cooler evaporation	0.0	18.9	38.3	0.0	16.4		91.4	38.2	65.4	65.1
P	Evaporative cooler blowdown	0.0	3.4	7.0	0.0	3.0		16.6	6.9	11.9	11.8
Q	Intercooler condensation	0.0	0.0	10.6	0.0	3.4		57.6	8.6	31.7	32.4
R	Cooling Tower Evaporation	526.7	617.9	674.7	549.0	599.5		887.9	675.8	781.9	781.9
S	RO rejects	102.0	102.0	102.0	102.0	102.0		102.0	102.0	102.0	102.0
T	Oil/Water Sep Effluent	22.9	22.9	22.9	22.9	22.9		22.9	22.9	22.9	22.9
U	Cooling Tower Blowdown	263.4	308.9	337.4	274.5	299.7		444.0	337.9	390.9	390.9
V	Wastewater Flow - WT Operating	388.2	433.8	462.2	399.4	424.6		568.8	462.8	515.8	515.8
	Wastewater Flow - Average	381.5	430.4	460.4	392.6	420.2		568.8	461.0	515.8	515.8

		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Wtd Avg		High	Low	Avg	Total
Daily Operation	hours	18	18	24	18	20		6	6	12	24
Water Used	1000 gal	1,250	1,401	1,981	1,286	1,526		597	496	1095	2188
Wastewater Made	1000 gal	412	465	663	424	507		205	166	371	742

						Total
Annual Operation	hours	1,100	1,100	1,600	1,200	5,000
Water Use	1000 gal	76,364	85,621	132,050	85,716	379,751
	Acre-ft	234	263	405	263	1,166
Wastewater	1000 gal	25,177	28,406	44,197	28,269	126,049
Creation	Acre-ft	77	87	136	87	387

Notes:

1) All Flows are displayed in GPM
2) Based on GE APPS performance
3) RO 1st Pass Recovery Rate 75%
4) RO 2nd Pass Recovery Rate 85%
5) Overall RO Recovery Rate 72%
6) Cooling Tower Drift 0.0005%
   gpm 0.14
7) Cooling Twr Cycles of Conc. 3.00
8) Evap Cooler Cycles of Conc. 6.50
9) Evap Cooler demin split 69%
10) Service Water Use, gpm 5
11) Potable water demand 2.6
12) Annual Capacity Factor 57%
13) Weighted averages based on hours at the different operating conditions

3	Revised Supply Water	DES			
2	Revised Supply Water	DES			
1	Added UF Skid	BMC	DES	REB	8/30/09
0	Issued For Construction	REB	BMC		2/20/09

PANOCHE ENERGY CENTER, LLC

Klewit
9401 Renner Blvd
Lenexa, Kansas 66219

WATER BALANCE FLOW VALUES

	by	date	DRAWING NUMBER
Drawn	REB	8/23/07	2007-018 -WB- 002
Checked	BMC	8/23/07	
Approved	SMG	8/23/07	

WATER QUALITIES

Stream		Supply / Svc Wtr		Demin Water		Evap Clr Blwdwn		RO Rejects		OWS Effluent		Circulating Water		Wastewater	
Diagram ID		A to F		J		P		S		T		U		V	
CATIONS		as such	as CaCO3	as such	as CaCO3	as such	as CaCO3	as such	as CaCO3	as such	as CaCO3	as such	as CaCO3	as such	as CaCO3
Ca	2.50	16.0	40	0.16	0.40	32	81	57	142	16.0	40	48	120	48	121
Mg	4.12	3.9	16	0.04	0.16	8	32	14	57	3.9	16	12	48	12	48
Na	2.17	439	953	0.80	1.74	885	1920	1558	3382	439	953	1317	2858	1325	2876
K	t.28	2.5	3	0.01	0.01	5	6	9	11	2.5	3	8	10	8	10
Total			1012		2.31		2039		3592		1012		3036		3054
ANIONS															
M Alk		190	200		1.00		403		710		200		150		150
SO4	1.04	645	671	0.65	0.67	1300	1352	2290	2381	645	671	2368	2462	2383	2479
Cl	1.41	100	141	0.40	0.56	202	284	355	501	100	141	300	423	302	426
NO3	0.81	0.0	0	0.00	0.00	0	0	0	0	0.0	0	0	0	0	0
CO2	1.14	2				3	3								
SiO2	0.84	52.0		0.10		105		185		52.0		156		157	
Total			1012		2.23		2039		3592		1012		3035		3054
HCO3	0.82		180								180				
pH		8.4		6.0 - 8.0		8.0		8.5		8.4		8.0		7.0	
Total Hardness			56		0.56		113		199		56		168		169
Spec Cond		2100		<1.0		3962		6949		2100		6564		6606	
TDS		1350		2		2547		4467		1258		4220		4247	
TSS		0.0				50.0				0.0		50.0		35.7	
Turbidity	NTU							0.0		0.0		100.0		71.3	
Ortho Phosphate		0.0		0.0		0.0		0.0		0.0		0.5		0.3	
Chlorine Residual		0.0		0.0		0.0		0.0		0.0		1.0		0.7	
Oil/Grease						0.0		0.0		0.0					
BOD5								18		0					
COD								18		0					
F		0.41				0.83		1.46		0.41		1.23		1.24	
NH3		0.36				0.73		1.28		0.36		1.08		1.09	
Trace Metals, ppb															
Aluminum	Al	0		0.00		0		0		0					
Antimony	Sb	0		0.00		0		0		0					
Arsenic	As	31		0.09		62		110		31		93		94	
Ba	Ba	0		0.00		0		0		0					
Beryllium	Be	0		0.00		0		0		0					
Boron	B	3500		10.50		7053		12425		3500		10500		10565	
Cadmium	Cd	0		0.00		0		0		0					
Chromium	Cr	0		0.00		0		0		0					
Copper	Cu	0		0.00		0		0		0					
Cyanide	Cn	0		0.00		0		0		0					
Iron	Fe	79		0.24		159		280		79		237		238	
Lead	Pb	0		0.00		0		0		0					
Manganese	Mn	53		0.16		107		188		53		159		160	
Mercury	Hg	0.00		0.00		0		0		0					
Molybdenum	Mo	51		0.15		103		181		51		153		154	
Nickel	Ni	0		0.00		0		0		0					
Phosphorous	P	135		0.41		272		479		135		405		408	
Selenium	Se	3.8		0.01		8		13		4		11		11	
Silver	Ag	0		0.00		0		0		0					
Strontium	Sr	150		0.45		302		533		150		450		453	
Thalium	Tl	0		0.00		0		0		0					
Tin	Sn	0		0.00		0		0		0					
Titanium	Ti	0		0.00		0		0		0					
Vanadium	V	0		0.00		0		0		0					
Zinc	Zn	0		0.00		0		0		0					

Notes:

1) Values are expressed as mg/l (ppm) or standard units except as noted.
2) Sodium was added to provide a balance of cations and anions.
3) RO Reject Concentration 3.6
4) Supply water based upon a combination of samples received on 8/11/08 and 10/6/08.
5) Wastewatter pH is controlled with acid injection
6) Evap cooler blowdown and intercooler condensate (P&Q) are added to the circ water system. Their water quality impacts are negligible.

3	Revised Supply Water Quality	DES			
2	Revised Supply Water	DES			
1	Updated Supply Water	BMC	DES	REB	8/30/09
0	Issued For Construction	REB	BMC		2/20/09

PANOCHE ENERGY CENTER, LLC

Klewit

9401 Renner Blvd
Lenexa, Kansas 66219

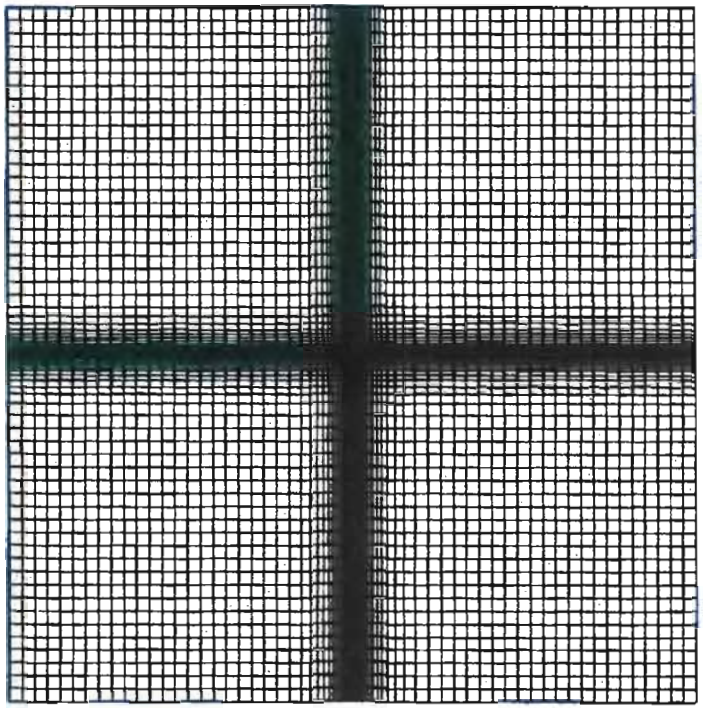
WATER BALANCE WATER QUALITIES

	by	date	DRAWING NUMBER
Drawn	REB	8/23/07	2007-018 -WB- 003
Checked	BMC	8/23/07	
Approved	SMG	8/23/07	

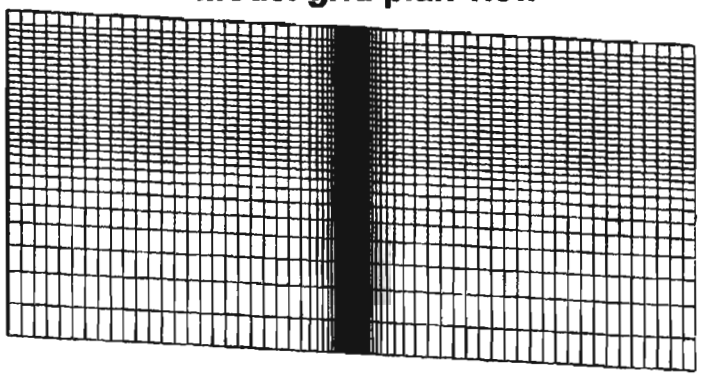
APPENDIX D

Groundwater Modeling Figures

Groundwater Model
Panoche Energy Center



Model grid plan view



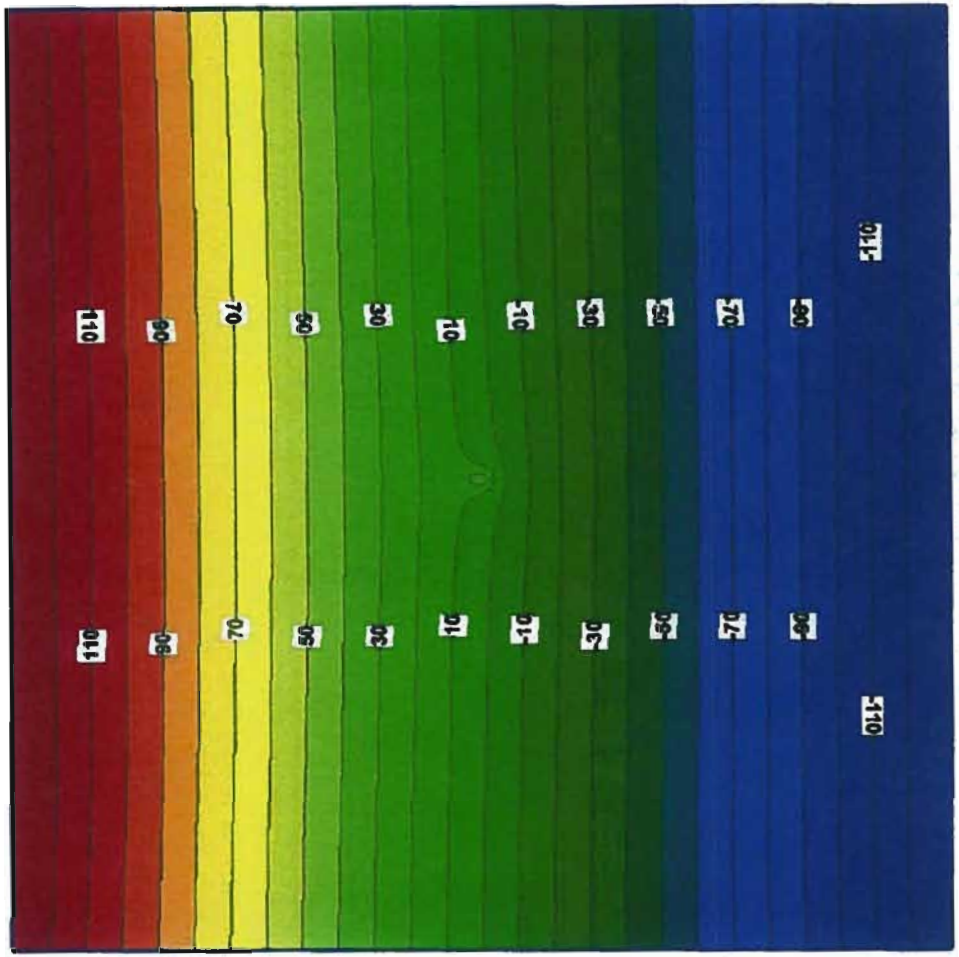
Model grid (Cross-section, vertical exaggeration = 50)

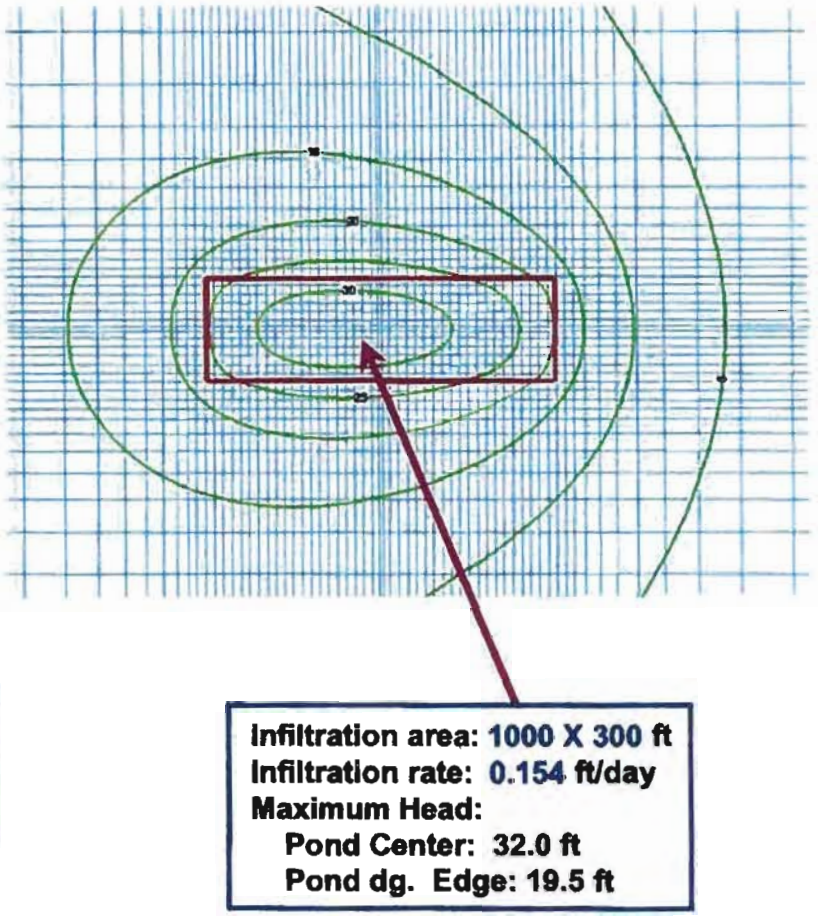
Model Domain:
- **Length=10.0 miles = 52,800 ft**
- **Width = 10.0 Miles = 52,800 ft**
- **Thickness = 490 ft**

Model Grid:
- **Pond area: 25X25 ft**
- **Model edge: 1,000X1,000 ft**
- **Rows = 95**
- **Columns = 121**
- **Layers = 30**

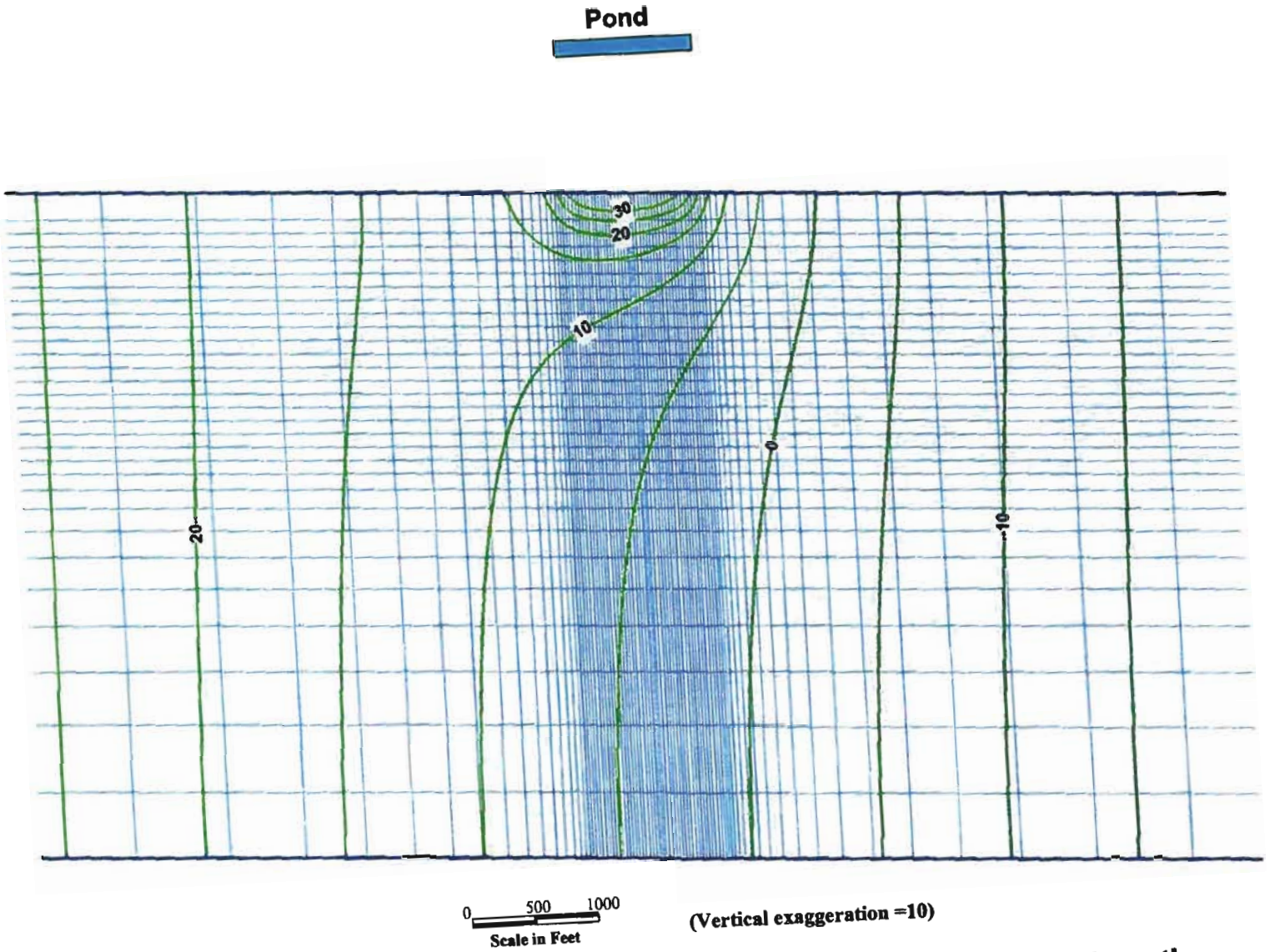
Aquifer Parameters:
- **K_h = 10 feet/day**
- **K_v = 0.1 foot/day**
- **natural gradient = 0.005**

Layer Thickness (ft)	
10	First 20 layers
12	Layer 21
14	Layer 22
17	Layer 23
20	Layer 24
24	Layer 25
28	Layer 26
35	Layer 27
40	Layer 28
50	Layer 29
50	Layer 30

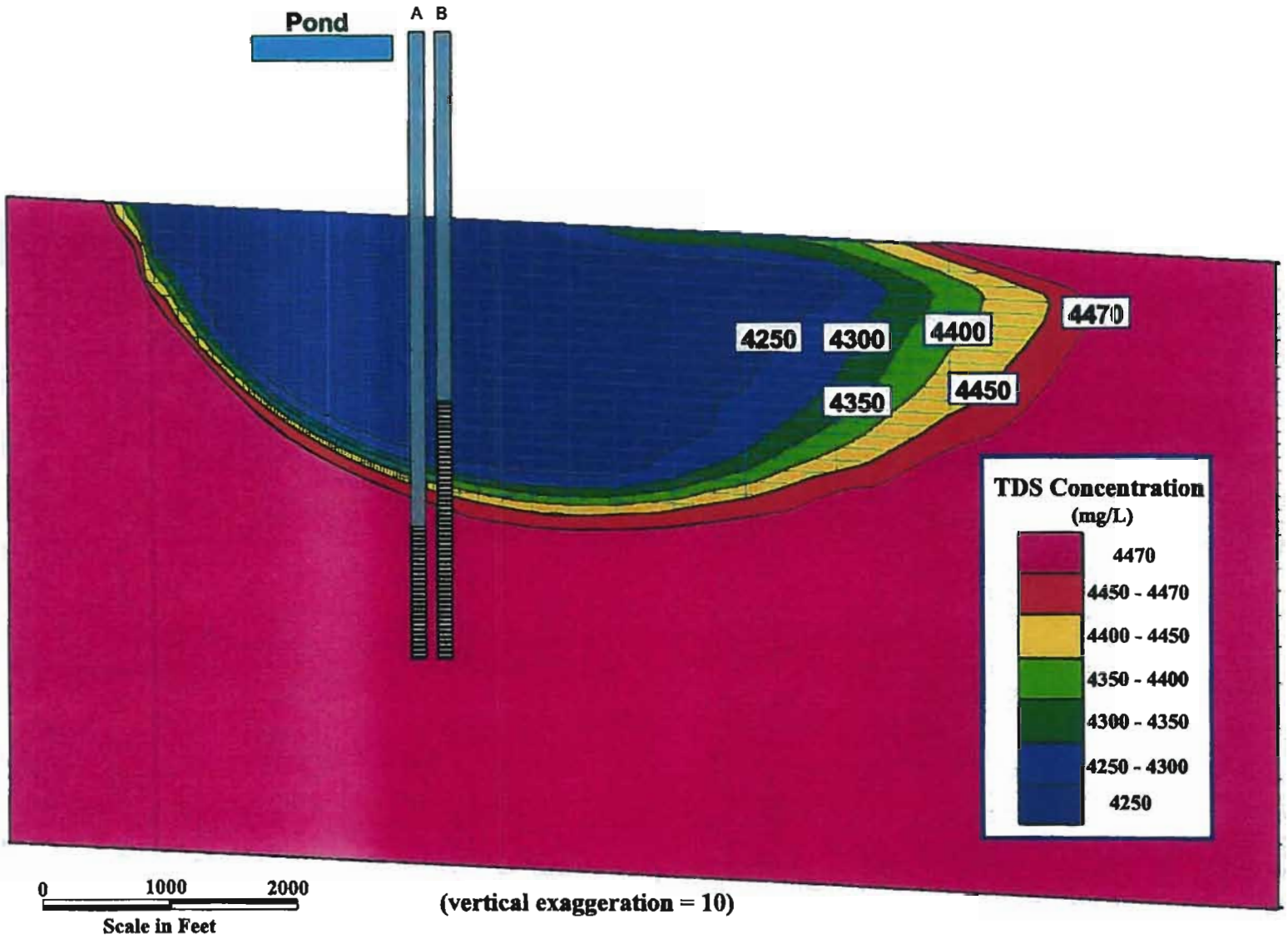




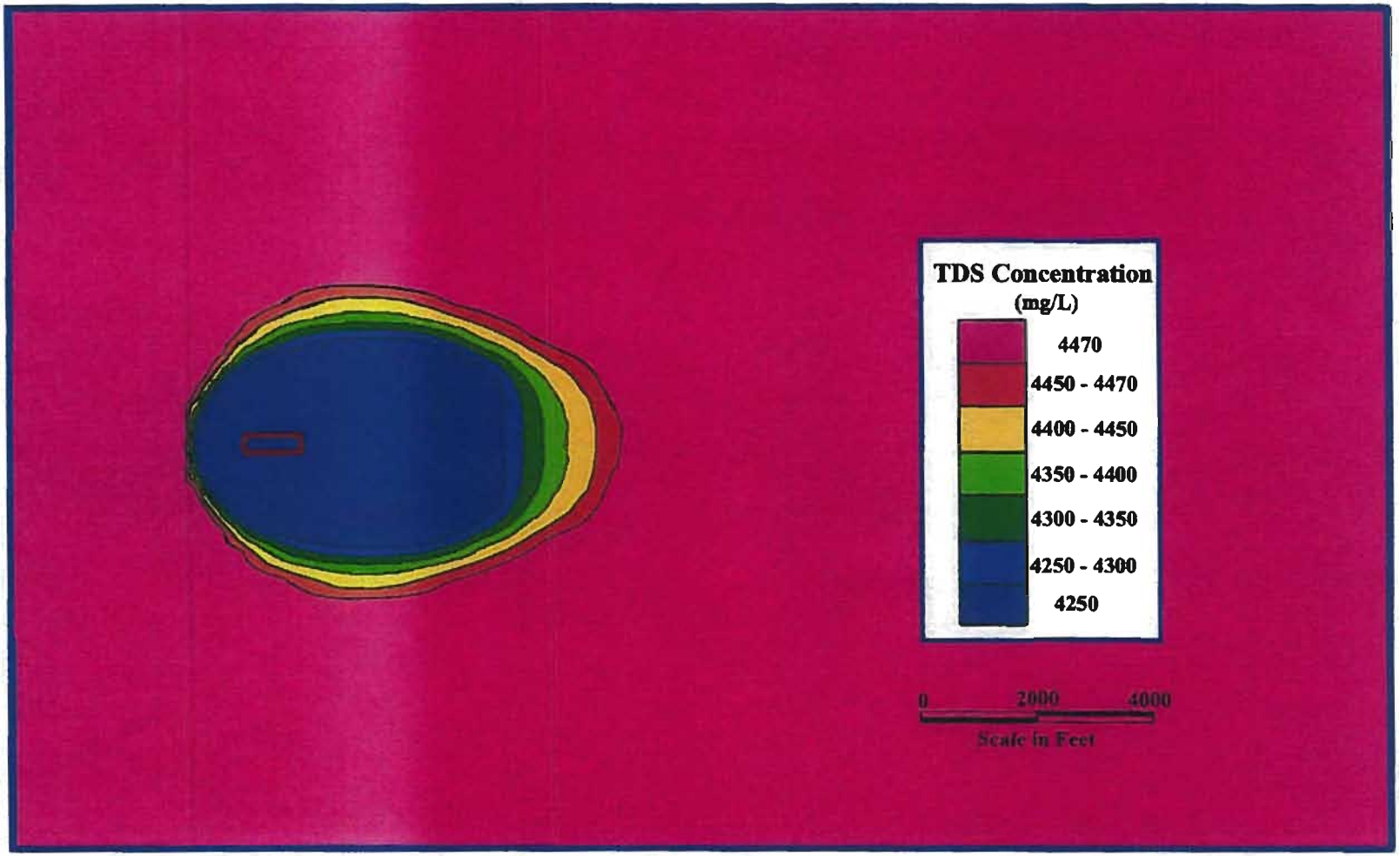
Plan view simulated head in 3D model



Cross-section view contour map of simulated hydraulic head distribution along the pond centerline

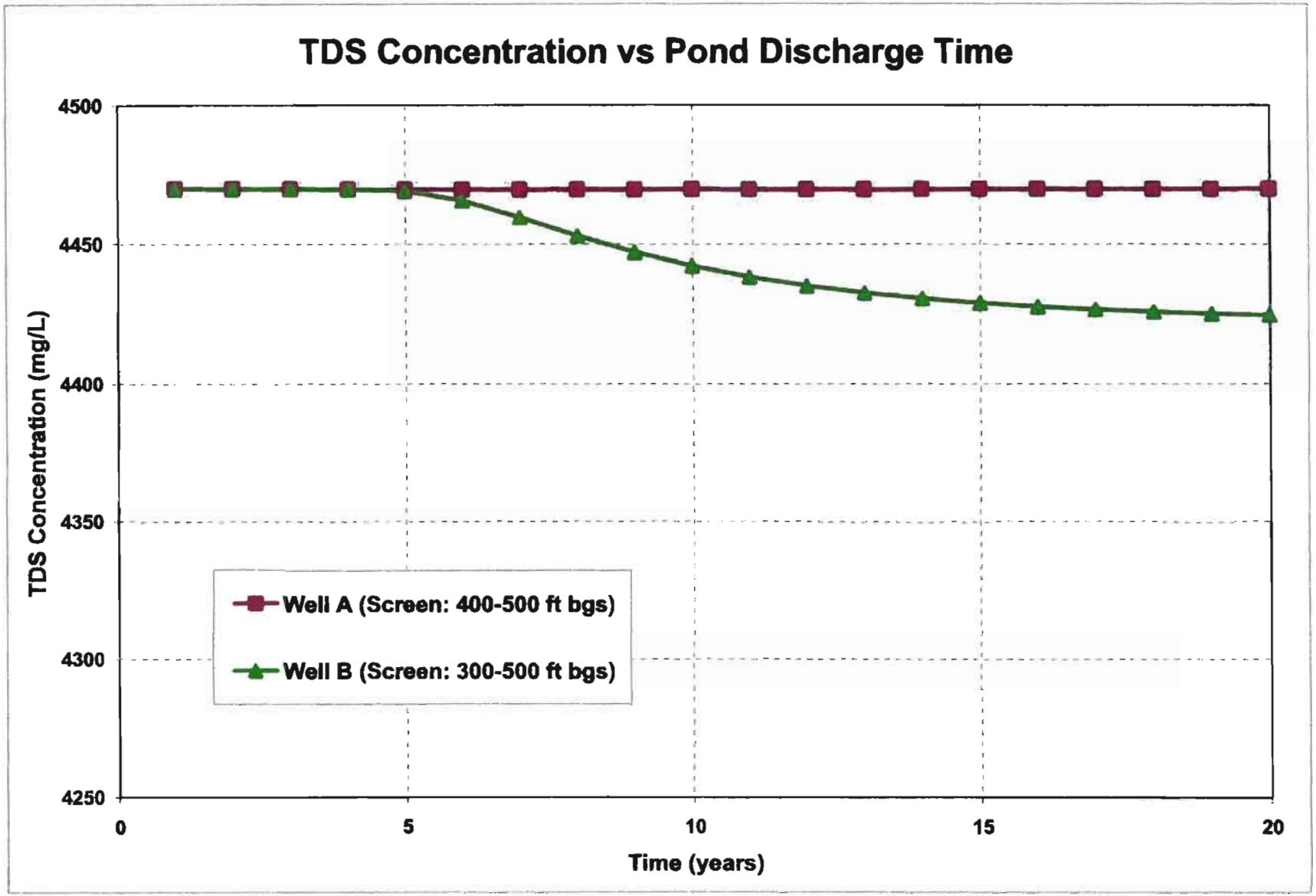


Cross-section view contour map of simulated TDS concentration (mg/L) along the pond centerline (T=20 years)



Plan view contour map of simulated TDS concentration along the pond centerline (T=20 years)

(Contour level = 4250, 4300, 4350, 4400, 4450, and 4470 mg/L)


TDS Concentration vs Pond Discharge Time
TDS Concentration (mg/L)
4500
4450
4400
4350
4300
4250
0
5
10
15
20
Time (years)
Well A (Screen: 400-500 ft bgs)
Well B (Screen: 300-500 ft bgs)