Kings River Conservation District Peaking Plant

Application for:

Small Power Plant Exemption

Submitted to:

California Energy Commission

November 2003

Volume 2 - Appendices

KRCD

Kings River Conservation District

Reliable resources for the Valley

Appendix A

Appendix A List of Landowners in the Area of the KRCDPP		
Landowner	**Site Address**	**Mailing Address**
Faria Lena M., Trustee, Et Al	3035 South Chestnut Avenue Fresno, CA 93725	7351 West Sample Avenue Fresno, CA 93722
Seimandi, Sharon K.	3085 South Chestnut Avenue Fresno, CA 93725	No mailing address
Rodriguez, Francisco Javier and Teresa, Trustees, Et Al	3111 South Chestnut Avenue Fresno, CA 93725	1817 North Helm Avenue #106 Fresno, CA 93727
Loveland Industries, Inc.	3161 South Chestnut Avenue Fresno, CA 93725	1 Conagra Drive #CC241 Omaha, NE 68102
Norris, James A. and Sharon F.	3270 South Golden State Boulevard Fresno, CA 93725	757 North De Wolf Avenue Fresno, CA 93727
Norris, James A. and Sharon F.	No Site address	757 North De Wolf Avenue Fresno, CA 93727
Derrels Mini Storage, Ltd.	3245 South Chestnut Avenue Fresno, CA 93725	3265 West Ashlan Avenue Fresno, CA 93722
Loveland Industries, Inc.	3173 South Chestnut Avenue Fresno, CA 93725	PO Box 2357 Fresno, CA 93745
Fresno Irrigation District	No Site Address	No Mailing Address
Bugg, R.C. and Ila H.	3137 East North Avenue Fresno, CA 93725	PO Box 28400 Fresno, CA 93729
Rodriquez, Sam and Cecilia	3167 East North Avenue Fresno, CA 93725	3168 East North Avenue Fresno, CA 93725
Lambetecchio, Charles and Stella	3197 East North Avenue Fresno, CA 93725	455 North Cornelia Avenue Fresno, CA 93725
Partners LLC	3146 South Chestnut Avenue Fresno, CA 93725	PO Box 2396 Fresno, CA 93745
Wombat, F. A., Et Al	3046 South Chestnut Avenue Fresno, CA 93725	600 West Shaw Avenue #160 Fresno, CA 93704
PVO Foods (California), Inc.	3390 South Chestnut Avenue Fresno, CA 93725	PO Box 1470 Decatur, IL 62525
Pacific Salad Oil Company	3390 South Chestnut Avenue Fresno, CA 93725	229 Stockbridge Avenue Atherton, CA 94027
Pacheco, Pablo R. Sr. and Esperanza G.	3130 East North Avenue Fresno, CA 93725	3131 East North Avenue Fresno, CA 93725
Atsinger, Edward G III and Mona J., Trustees	3142 East North Avenue Fresno, CA 93725	2735 South Fruit Avenue Fresno, CA 93706
Morales, Raymond	3126 East North Avenue Fresno, CA 93725	3106 East North Avenue Fresno, CA 93725
Garcia, Theodore M. and Mary B.	3140 East North Avenue Fresno, CA 93725	2581 East Central Avenue #5 Fresno, CA 93725
Toscano, Cruz	3168 East North Avenue Fresno, CA 93725	3649 South Frank Avenue Fresno, CA 93725
Coulter, Wanda Lee	3196 East North Avenue	3234 East North Avenue

Appendix A List of Landowners in the Area of the KRCDPP		
Landowner	**Site Address**	**Mailing Address**
	Fresno, CA 93725	Fresno, CA 93725
East North Avenue Cottage Church	3212 East North Avenue Fresno, CA 93725	3234 East North Avenue Fresno, CA 93725
Wilson, Raymond O. and Rosemarie, Trustees, Et Al	2943 South Chestnut Avenue Fresno, CA 93725	2944 South Chestnut Avenue Fresno, CA 93725
Rivera, Miguel and Emilia	2967 South Chestnut Avenue Fresno, CA 93725	2968 South Chestnut Avenue Fresno, CA 93725
Rathman, Kenneth R.	No Site Address	PO Box 13 Tranquillity, CA 93668
Hovannisian, David B. and Linda R.	2933 South Chestnut Avenue Fresno, CA 93725	PO Box 3016 Pinedale, CA 93650
Hansen, Laurids T. and Grethe	3066 East Street Selma, CA 93662	No Mailing Address Rancho Saratoga CA 95070
Morales, Raymond M., Et Al	3106 East North Avenue Fresno CA 93725	3106 East North Avenue Fresno CA 93725
Cossette Invesment Company, Inc.	No Site Address	PO Box 9354 Fresno CA 93791
Commercial Investment Group	No Site Address	3373 South Chestnut Avenue Fresno CA 93725
Paranick, Bradly J. and Patricia A.	3373 South Chestnut Avenue Fresno CA 93725	3275 East Central Avenue Fresno CA 93725
Paranick, Bradly J. and Patricia A.	No Site Address	3275 East Central Avenue Fresno CA 93725
Barigian, Henry, Et Al	3276 East North Avenue Fresno CA 93725	PO Box 5341 Fresno CA 93755

Appendix 2.8-1

System Impact Study

Generation Interconnection

Kings River Conservation District

Kings River Conservation District Peaking Project

Pacific Gas and Electric Company

August 20, 2003

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1. Summary

Kings River Conservation District (KRCD) proposes to interconnect a new 97 MW generating facility to Pacific Gas & Electric's (PG&E's) Malaga 115 kV Substation in Fresno, California. The project is called the Kings River Conservation District Peaking Project (KRCDPP). The planned operational date of this project is December 31, 2004. KRCD has requested that PG&E conduct a System Impact Study (SIS) for this project. The SIS determined:

- The transmission system impacts caused solely by the interconnection of the KRCDPP.
- The system reinforcement necessary to mitigate any adverse impact of the KRCDPP under various system conditions.

To determine the system impacts caused by the addition of the KRCDPP, studies were performed using the following full loop base cases:

- 2005 Summer Peak
- 2005 Summer Off Peak
- 2005 Heavy Spring

The studies performed included:

- Steady State Power Flow
- Dynamic Stability Analysis
- System Protection

PG&E's evaluation has concluded that the addition of the KRCDPP would cause no normal or Category B contingency overloads during conditions studied for 2005. Following Category C contingencies, the project would exacerbate three existing overloads during 2005 Summer Peak condition, two existing overloads during 2005 Heavy Spring condition, and one existing overload during 2005 Summer Off-Peak condition. The project would also cause one new overload during 2005 Summer Off-Peak condition following a Category C contingency.

The Substation Evaluation identified that the addition of KRCDPP would overstress eight (8) 115 kV breakers in the Sanger Substation and exacerbate the overstressed condition of eight (8) 115 kV breakers in the McCall Substation.

Dynamic Stability Study results indicated that the transmission system's transient performance, relative to the CAISO reliability guidelines, would not be impacted by the KRCDPP following selected disturbances. It is recommended that KRCDPP install Out-of-Step relay protection to guard against generator loss of synchronism condition.

2. Project and Interconnection Information

The Kings River Conservation District Peaking Project (KRCDPP) consists of two (2) gas turbine generators. Each gas turbine generator is rated at 49.7 MW for a total output of 99.4 MW. The expected total plant load is 2.4 MW. Therefore, the maximum net output to the grid is 97.0 MW. Each generator will have a 13.8/115 kV step-up transformer. The proposed project will connect to PG&E's Malaga 115 kV Substation via a new 115 kV transmission line to be built by Kings River Conservation District (KRCD). A conceptual one-line diagram of the project is shown in Figure 2-1.

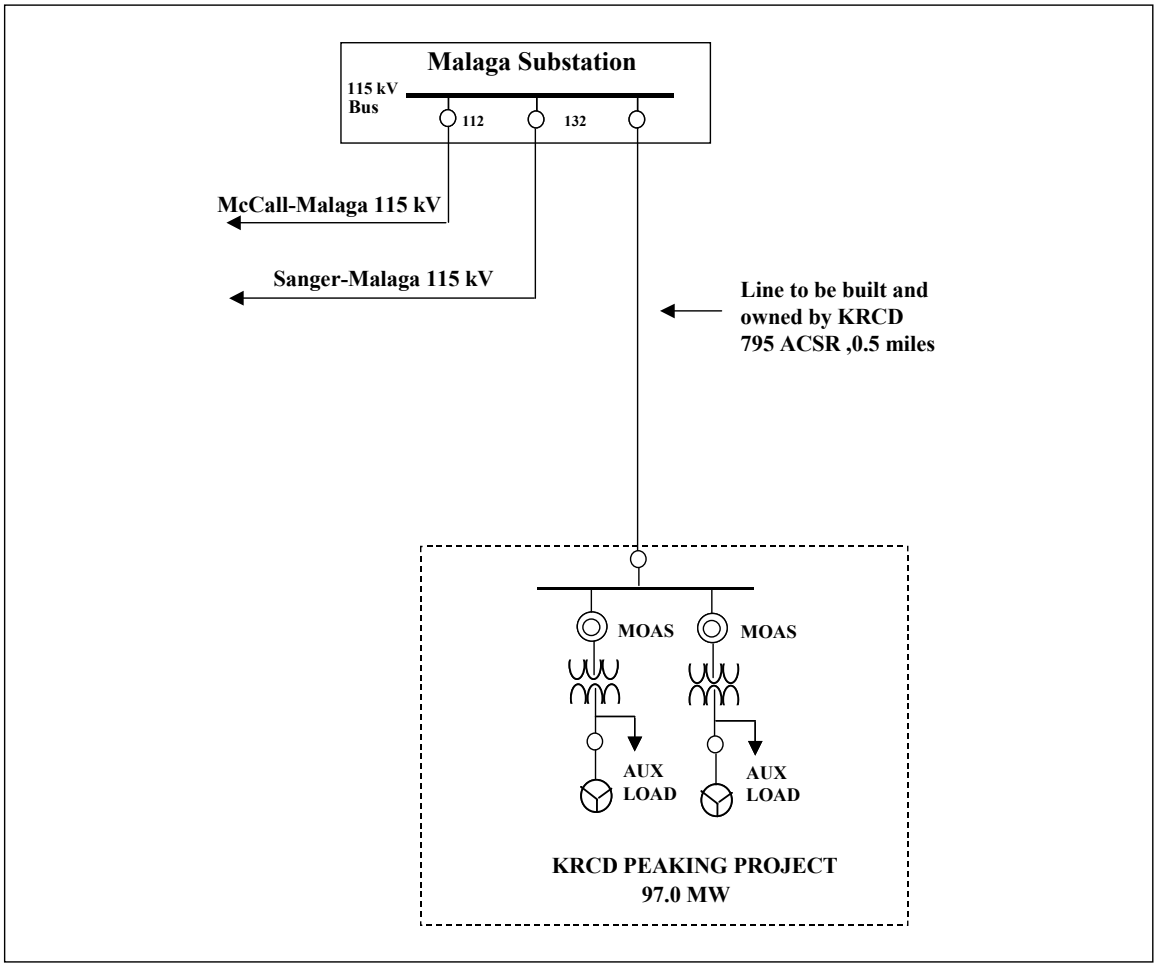

Figure 2-1: Conceptual one-line Diagram

A map showing the transmission facilities in the vicinity of the project is provided in Figure 2-2.

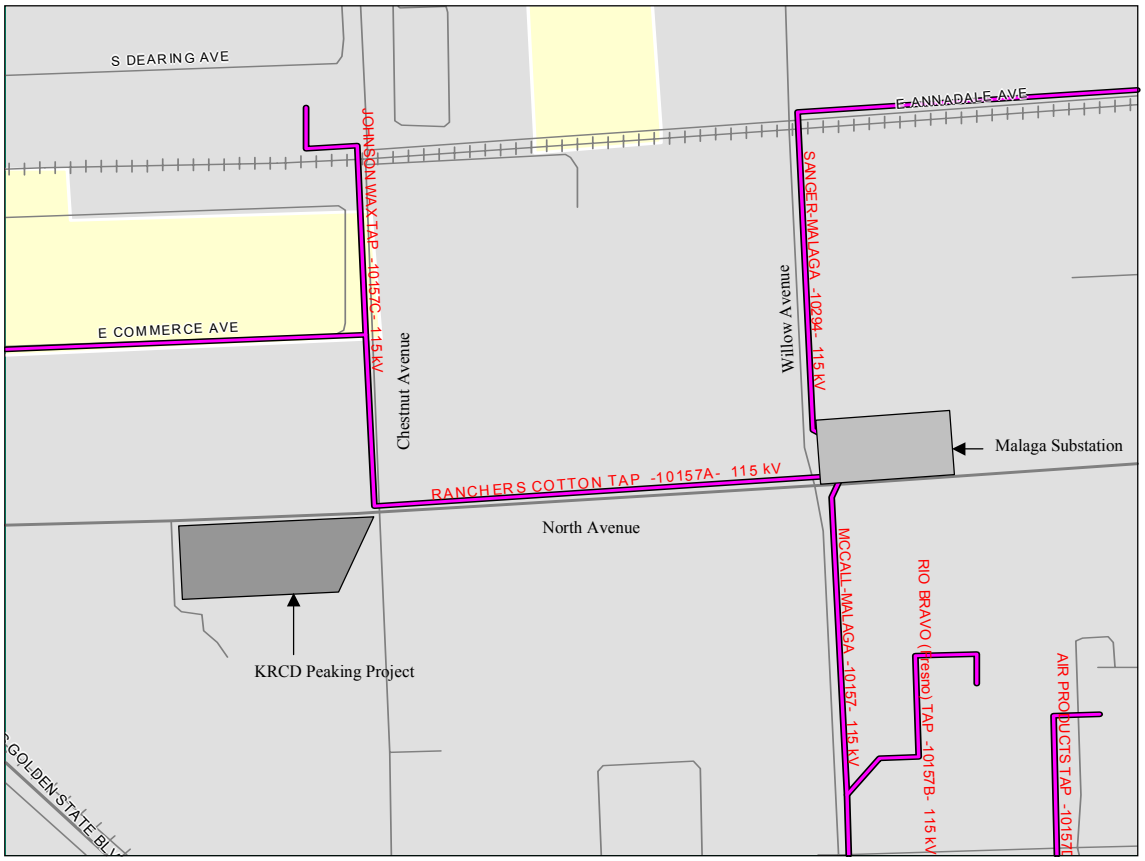

Figure 2-2: Vicinity Map

3. Study Assumptions

PG&E conducted the SIS using the following assumptions:

1) The maximum total output of the Kings River Conservation District Peaking Project will be 99.4 MW. The expected total plant load is 2.4 MW. The maximum net output to the grid is 97.0 MW.

2) The expected on-line date of the KRCDPP is December 31, 2004.

3) Each gas turbine generator will have a step-up transformer. Each transformer is a three phase, 13.8/115 kV transformer, rated 42/56/70 MVA (OA/FA/FA). The impedance is 8.5 % @ 42 MVA base.

4) KRCD will engineer, procure, construct, own, and maintain its project facility and the 115 kV generator tie line.

5) The study took into account the planned generating facilities in PG&E's service territory whose schedules are concurrent with or precede the KRCDPP's schedule.

6) The study took into account all the approved PG&E transmission reliability projects that will be operational by December 31, 2004.

4. Power Flow Study Base Case

Three power flow base cases were used to evaluate the transmission system impacts of the Kings River Conservation District Peaking Project. While it is impossible to study all combinations of system load and generation levels during all seasons and at all times of the day, these three base cases represent extreme loading and generation conditions for the study area.

PG&E cannot guarantee that the KRCDPP can operate at maximum rated output 24 hours a day, year round, without system impacts, nor can PG&E guarantee that the KRCDPP will not have system impacts during the times and seasons not studied in the SIS.

Power flow analysis and governor power flow analysis was conducted using all three base cases. The 2005 Summer Off-Peak Full Loop Base Case was used for dynamic stability analysis.

- **2005 Summer Peak Full Loop Base Case:**

  The 2005 Summer Peak Full Loop Base Case models the PG&E transmission system and expected operating conditions during the summer peak. This base case was developed from PG&E's 2003 base case series and has a 1-in-10 year heat wave load forecast for the Yosemite, Kern, and Fresno areas. Path 66 (California-Oregon Inter-tie) and Path 26 (Northern-Southern California Inter-tie) will not exceed the north-to-south transfer capabilities of 4,800 MW and 3,000 MW respectively. The Path 15 Project will be modeled with a south-to-north transfer capability of 1,182 MW. Helms PGP is in the generating mode with three generators at full output (1,200 MW).

- **2005 Summer Off-Peak Full Loop Base Case:**

  The 2005 Summer Off-Peak Full Loop Base Case models the PG&E transmission system when loads are at about 50% of summer peak load level at Stockton, Yosemite, Fresno, and Kern divisions. Hydro units are generating at summer off-peak dispatch level. Path 15 Project will be modeled with the south-to-north flow of 5,000 MW. Helms PGP is in the pumping mode with one pump at 310 MW load.

- **2005 Heavy Spring Full Loop Base Case:**

  The 2005 Spring Full Loop Base Case models the PG&E transmission system during a warm spring day when Hydro units are generating at full output. Path 26 (Northern - Southern California Inter-tie) typically does not exceed the north-to-south transfer capability of 3,000 MW. Half of the CDWR pumps in the Midway area are assumed to be offline. The Helms PGP is in the generating mode with two units generating (800 MW).

These three base cases modeled all the approved PG&E transmission reliability projects that will be operational by December 31, 2004.

Base Case Key Generation Assumptions

These three base cases modeled all the proposed generation projects that will be operational by December 31, 2004. The major generation projects included are shown in Attachment 1 of the Study Plan in Appendix A.

Generation projects that would be on-line by December 31, 2004 were modeled in the base cases used for the SIS. However, some generation projects that are electrically far from the proposed project were either turned off or modeled with reduced generation to balance the loads and resources in the power flow model.

5. Study Criteria Summary

The CAISO Controlled Grid Reliability Criteria, which incorporate the Western Electricity Coordinating Council (WECC) and the North American Electric Reliability Council (NERC) planning criteria, were used to evaluate the impact of the project on the PG&E transmission system.

5.1 Steady State Study Criteria – Normal Overloads

Normal overloads are those that exceed 100 percent of normal ratings. The CAISO Controlled Grid Reliability Criteria requires the loading of all transmission system facilities be within their normal summer ratings.

5.2 Steady State Study Criteria – Emergency Overloads

Emergency overloads are those that exceed 100 percent of emergency ratings. The emergency overloads refer to overloads that occur during single element contingencies (CAISO Category “B”) and multiple element contingencies (CAISO Category “C”).

5.3 Dynamic Stability Study Criteria

According to the WECC Disturbance-Performance Table of Allowable Effects on Other Systems[1], after a CAISO Category “B” disturbance, the transmission system performance should meet the following criteria:

- Transient voltage dip should not be below 25 percent at load buses or 30 percent at non-load buses at any time.
- The duration of the transient voltage dip greater than 20 percent should not exceed 20 cycles at load buses.

[1] Cited from Draft Western Electricity Coordinating Council (WECC) Planning Standards published in December 2, 1999.

- The minimum transient frequency should not fall below 59.6 Hz for more than 6 cycles at load buses.

After a CAISO Category "C" disturbance, the transmission system performance should meet the following criteria:

- Transient voltage dip should not be below 30 percent at any bus at any time.
- The duration of a transient voltage dip greater than 20 percent should not exceed 40 cycles at load buses.
- The minimum transient frequency should not fall below 59.0 Hz for more than 6 cycles at load buses.

6. Steady State Power Flow Study and Results

The SIS studied the impact of the Kings River Conservation District Peaking Project on the PG&E transmission system. Three base cases were used to simulate the impact of the new facility during normal operating conditions, as well as, single and multiple (ISO Categories "B" and "C") outages:

- 2005 Summer Peak
- 2005 Summer Off-Peak
- 2005 Heavy Spring

These base cases are described in Section 4 ("Base Case Information"). The SIS covered the transmission facilities within PG&E's Fresno Division.

PG&E cannot guarantee that the KRCDPP can operate at maximum rated output 24 hours a day, year round, without system impacts, nor can PG&E guarantee that the KRCDPP would not have system impacts during the times and seasons not studied in the SIS.

6.1 Contingencies

The CAISO Category "B" and "C" contingencies used in this analysis are provided in Appendix B. The single (ISO Category "B") and selected multiple (ISO Category "C") contingencies include the following outages:

6.1.1 CAISO Category "B"

- All single (60 - 500 kV) generator outages within the study area.
- All single (60 - 500 kV) transmission circuit outages within the study area.
- All single (60 - 500 kV) transformer outages within the study area.

- Selected overlapping single generator and transmission circuit outages for the transmission lines and generators within the study area.

6.1.2 CAISO Category "C"

- Selected bus outages within the study area.
- Selected outages caused by breaker failures (excluding bus tie and sectionalizing breakers) at the same bus section above.
- Selected combination of any two-generator/transmission line/transformer outages (except ones included above in Category "B") within the study area.
- Selected outages of double circuit tower lines within the study area.

6.2 Results

Appendix B provides a list of the contingencies studied. Appendix C shows the steady state power flow analysis results. Appendix D includes selected power flow plots.

6.2.1 Normal Overloads (CAISO Category A)

The addition of the Kings River Conservation District Peaking Project causes no normal overloads in any of the 2005 base cases studied.

6.2.2 Emergency Overloads (CAISO Category B)

The addition of the Kings River Conservation District Peaking Project causes no Category B emergency overloads in any of the 2005 base cases studied.

6.2.3 Emergency Overloads (Category C)

During the 2005 Summer Peak, the addition of the Kings River Conservation District Peaking Project exacerbates emergency overloads on two (2) sections of one 70 kV line and one 115/70 kV transformer following one Category C contingency. During the 2005 Heavy Spring, the addition of the KRCDPP exacerbates emergency overloads on two (2) sections of one 70 kV line following two Category C contingencies. During the 2005 Summer Off-Peak, the addition of the KRCDPP exacerbates an emergency overload on a section of one (1) 230 kV line and causes an overload on one (1) 70 kV line and following Category C contingencies. These overloads are summarized in Table 6-2. Only one condition is new facility overload. Facilities with pre-project overloads are shown as shaded in the table.

Over Loaded Component	Contingency	Rating (Amps)	Pre- Project Loading (Amps |%Rating)		Post-Project Loading (Amps |%Rating)		% Change from Pre-Project Loading
2005 Summer Peak							
Sanger – Reedley 70 kV Line (Parlier – Reedley)	Reedley 115 kV Bus Outage	396	451	113%	457	115%	+2%
Sanger – Reedley 70 kV Line (Sanger Jct – Parlier)	Reedley 115 kV Bus Outage	396	561	142%	566	143%	+1%
Sanger 115/70 kV Bank 1	Reedley 115 kV Bus Outage	50 MVA	60 MVA	120%	61 MVA	122%	+2%
2005 Heavy Spring							
Helm – Kerman 70 kV Line (San Joaquin Tap – Agrico Jct)	Helm - McCall and Panoche - Kearney 230 kV Line	379	394	104%	414	109%	+5%
	Gates - Gregg and Panoche - Kearney 230 kV Line	379	381	100%	391	103%	+3%
Helm – Kerman 70 kV Line (San Joaquin Tap – Helm)	Helm - McCall and Panoche - Kearney 230 kV Line	379	394	104%	414	109%	+5%
	Gates - Gregg and Panoche - Kearney 230 kV Line	379	381	100%	391	103%	+3%
2005 Summer Off-Peak							
Gates – Gregg 230 kV Line (Gregg – Henrietta Tap 1)	Sanger 115 kV Bus Outage	975	1,164	119%	1,181	121%	+2%
Tivy Valley – Reedley 70 kV Line	Sanger 115 kV Bus Outage	298	273	92%	301	101%	+9%

Table 6-2: 2005 Summer Peak, Heavy Spring, & Summer Off-Peak – C Contingency Overloads

Unlike CAISO Category "B" outages, CAISO Category "C" outages (according to WECC reliability criteria) may be mitigated by load shedding or generation dropping. Therefore, the Applicant is not required to mitigate overloads caused by CAISO Category "C" outages by installing or upgrading physical facilities. The Applicant is not required to mitigate these types of problems at this time. However, PG&E or CAISO or both may require new generators to take part in and be responsible for the costs of operating procedures or special protection schemes or both that will eventually be planned to mitigate these rare occurrences.

7. Dynamic Stability Study and Results

Dynamic stability studies were conducted using the 2005 Summer Off-Peak Full Loop Base Case to ensure that the transmission system remains in operating equilibrium through abnormal operating conditions after the new facility begins operation. This full loop base case was developed from PG&E's 2003 base case series. The generator dynamic data used in shown in Appendix E.

7.1 Dynamic Stability Study Scenarios

Disturbance simulations were performed for a study period of up to 20 seconds to determine whether the new facility will create any system

instability during the following line and generator outages:

7.1.1 NERC/CAISO Category "B" Contingencies:

1) Full load rejection of the proposed KRCDPP.

2) A three-phase close-in fault on Malaga - Sanger 115 kV line at Malaga Substation with normal clearing time followed by loss of the Malaga - Sanger 115 kV line.

3) A three-phase close-in fault on McCall – Malaga 115 kV line at Malaga Substation with normal clearing time followed by loss of the McCall - Malaga 115 kV line.

4) A three-phase fault at the 115 kV side of the Malaga 115/12 kV Transformer #1 with normal clearing time followed by loss of the Malaga 115/12 kV Transformer #1.

7.1.2 NERC/CAISO Category "C" Contingencies:

1) A three-phase fault on the Malaga Substation 115 kV bus, Section D with normal clearing time.

2) A three-phase fault on the Malaga Substation 115 kV bus, Section E with normal clearing time.

3) A three-phase fault on the Sanger Substation 115 kV north bus with normal clearing time.

4) A three-phase fault on the Sanger Substation 115 kV south bus with normal clearing time.

7.2 Parameters Monitored to Evaluate System Stability Performance

7.2.1 Rotor Angle

The rotor angle plots shown in Appendix F provide a measure for determining how the proposed generation units would swing with respect to one another. The plots also provide a measure of how the units would swing with respect to other generation units in the area.

7.2.2 Bus Voltage

The bus voltage plots, in conjunction with the relative rotor angle plots, also shown in Appendix F, provide a means of detecting out-of-step conditions. The bus voltage plots are useful in assessing the magnitude and the duration of post disturbance voltage dips and peak-to-peak voltage oscillations. The bus voltage plots also give an indication of system damping and the level to which voltages are expected to recover in steady state conditions.

7.2.3 Bus Frequency

The bus frequency plots, also shown in Appendix F, provide information on the magnitude and the duration of post fault frequency swings with the Kings River Conservation District Peaking Project in service. These plots indicate the extent of possible over-frequency or under-frequency, which can occur because of the imbalance between the generation and load within an area.

7.2.4 Other Parameters

- Generator Terminal Power
- Generator Terminal Voltage
- Generator Rotor Speed
- Generator Field Voltage
- Bus Angle
- Line Flow
- Voltage Spread
- Frequency Spread

7.3 Results

Dynamic stability studies were conducted using the 2005 Summer Off-Peak base case described in Section 4 and the generator models shown in Appendix E to determine whether the transmission system would attain operating equilibrium following selected outages.

The results indicated that the transmission system performed within the CAISO/WECC reliability guidelines following the disturbances outlined above except Category “C” contingencies 3 and 4. It was determined that the Kings River Conservation District Peaking Project would have no adverse impact on the stable operation of the transmission system.

The results of the study are provided in the form of plots in Appendix F. A switch-deck script describing the switching sequence precedes each group of plots.

Dynamic stability studies indicated that there would be no system performance issues caused by the Kings River Conservation District Peaking Project. However, the simulation indicated that following a three-phase bus fault lasting for 17 cycles at the Sanger Substation 115 kV north or south bus, the KRCDPP generators will lose synchronism with the power system. To minimize the possibility of damage, the generators should be tripped,

preferably during the first half-slip cycle of a loss-of-synchronism condition. The KRCD should install generator Out-of-Step relays to protect the generators against this condition.

8. System Protection Study

Short circuit studies were performed to determine the impact of adding the Kings River Conservation District Peaking Project to the transmission system. The fault duties were calculated before and after the project.

8.1 System Protection Study Input Data

The following input data provided by the Applicant was used in this study:

LM 6000 Gas Turbine Generator

- Synchronous reactance (X_d) = 2.35 pu @ 71.2 MVA
- Transient reactance (X'_d) = 0.245 pu @ 71.2 MVA
- Sub-transient reactance (X''_d) = 0.181 pu @ 71.2 MVA
- Negative Sequence reactance (X_2) = 0.176 pu @ 71.2 MVA
- Zero Sequence reactance (X_0) = 0.095 pu @ 71.2 MVA

Step-up Transformers

- 13.8/115 kV, 42 MVA on OA, Z = 8.5 %

8.2 Results

Table 8-1 lists the available short circuit duty at the buses electrically adjacent to the Kings River Conservation District Peaking Project. This data was used to determine if any equipment would be overstressed by the addition of the KRCDPP.

Fault Location	Pre-Project		Post-Project (Phase 1)			
	3∅	L-G	3∅	% Increase	L-G	% Increase
Malaga 115 kV Bus	12, 200	10, 600	14,400	18%	13, 900	31%
McCall 115 kV Bus	26, 500	28,700	27,900	6%	29,900	4%
Sanger 70 kV Bus	10,400	10,900	10,500	1%	11,000	1%
Sanger 115 kV Bus	23,200	20,600	24,500	6%	21,500	5%

Table 8-1: Short circuit study results

8.3 Preliminary Protection Requirements

The 115 kV breaker to be installed on the Malaga 115 kV bus and at the

Kings River Conservation District Peaking Project facility must have two (2) sets of current transformers on each bushing. The current transformers for both 115 kV circuit breakers must be multi ratio with the highest ratio not less than 1200:5 and class C800.

For the new circuit breaker installed at the 115 kV bus:

1) Incorporate the current contribution from the new Circuit Breaker (CB) into the existing 115kV bus total overcurrent scheme. CT ratio of 1200/5 will be used.

2) The new CB must be tripped by the existing 115 kV bus total overcurrent scheme.

3) Protection for the dedicated transmission line will be a current differential scheme utilizing fiber optic cable as the communications medium. The relays to be installed at both ends of the 115 KV line will consist of a GE L90, and SEL 311L. Each relay will be connected to its own CT. These relays will provide tripping for faults on the short transmission line.

4) Provide one (1) single 115 kV phase potential device on the line side of the new Malaga CB for automatics.

Setting changes will be required on the line relays for Malaga CB 112 and CB 132.

The 115 kV fault duties cause the secondary currents on the 115 kV CT's on TB-1 and TB-3 to have values of 193 amps. The existing max ratio is 400/5 on TB-1 and TB-3 and 600/5 on TB-2; therefore slip-on CT's will have to be added with a minimum ratio of 800/5 to limit secondary fault current to <100 amps. The SEL 501-2 relays will be rewired to the new slip-on CT's along with the settings being changed.

Since Malaga is a looped station, a loss of either the McCall-Malaga or Sanger-Malaga 115 kV line has the potential to leave the KRCDPP generation on a radial feed. Under these conditions the generators cannot detect a phase fault near McCall or Sanger, therefore direct transfer trip from McCall CB 592 and Sanger CB 542 should be installed which trips the new Malaga 115 kV CB. This will also prevent inadvertent islanding of KRCDPP generation with Malaga sub when one of the 115 kV CB's on the lines into Malaga is out of service for maintenance. One (1) RFL 9745 transmitter will be installed at McCall CB 592 and one (1) on Sanger CB 542. Two (2) RFL 9745 receivers will be installed at Malaga to trip the new Malaga 115 kV CB.

Transfer trip bypass switch will be installed on Sanger CB 500 and McCall CB 602/702 to allow DTT operation during CB bypass configurations.

Reclose blocking will be installed at Sanger CB 542. The other 115 kV terminals have SEL-279 reclosing relays; therefore separate reclose blocking is not required.

9. Substation Evaluation

9.1 Overstressed Breakers

Using the results of the System Protection Study in Section 8, the substation evaluation identified eight (8) 115 kV breakers in the McCall Substation and eight (8) 115 kV breakers in the Sanger Substation that the addition of the Kings River Conservation District Peaking Project would overstress or exacerbate the overstressed condition.

Table 9-1 shows the breaker fault duties and the actual % increases for these breakers.

Substation & Breaker #	Interruptible Rating (Amps)	Before KRCDPP (Amps)	% Rating Before	After KRCDPP (Amps)	% Rating After	% Increase
McCall CB 512	22,969	27,891	121%	28,942	126%	5%
McCall CB 532	22,969	28,248	123%	29,347	128%	5%
McCall CB 542	22,969	28,248	123%	29,347	128%	5%
McCall CB 562	22,969	28,150	123%	29,326	128%	5%
McCall CB 592	22,969	28,135	123%	28,880	126%	3%
McCall CB 612	22,969	28,726	125%	29,893	130%	5%
McCall CB 622	22,969	28,732	125%	29,900	130%	5%
McCall CB 632	22,969	28,553	125%	29,711	130%	5%
Sanger CB 412	22,969	21,849	95%	23,158	101%	6%
Sanger CB 422	22,969	22,309	97%	23,621	103%	6%
Sanger CB 432	22,969	22,302	97%	23,251	102%	5%
Sanger CB 462	22,969	22,652	99%	23,944	105%	6%
Sanger CB 500	22,969	23,200	101%	24,512	107%	6%
Sanger CB 542	22,969	22,478	98%	23,091	101%	3%
Sanger CB 662	22,969	23,200	101%	24,512	107%	6%
Sanger CB 672	22,969	23,148	101%	24,460	107%	6%

Table 9-1: Overstressed Breaker Evaluations at McCall and Sanger Substation

PG&E is planning on replacing the eight (8) existing overstressed breakers at McCall Substation as part of PG&E's overstress breaker replacement program. PG&E may consider converting the McCall 115 kV bus to Breaker-And-a-Half (BAAH) configuration since at least eight (8) breakers there will be replaced due to overstress condition. If KRCDPP connects to the Malaga 115 kV bus as proposed, PG&E will attempt to accelerate the schedule the breaker replacement at McCall Substation to allow this project to interconnect to PG&E's grid.

The eight (8) breakers at Sanger Substation are not in PG&E's overstress breaker replacement program at this time because either they are not overstressed or are only marginally (1%) overstressed prior to KRCDPP.

PG&E uses the following policy to allocate breaker replacement responsibility for projects that overstress or increase the level of overstress[2] on existing circuit breakers:

- If a breaker is not overstressed and a project results in an overstressed condition of the breaker.
- If a breaker is already overstressed and a project increases the overstress by 5% or more, or the overstress level exceeds 25%.

The addition of this project will either push the eight (8) 115 kV breakers at Sanger to be overstressed or increase the marginally overstressed situation by 5% of more. PG&E has determined that it is reasonable to convert the Sanger 115 kV bus to BAAH configuration if eight (8) breakers are to be replaced due to overstress condition. Since the overall breaker overstressed level at Sanger is marginal and with the desire of converting the Sanger 115 kV bus to BAAH, PG&E is willing to consider including Sanger 115 kV bus as part of PG&E's overall overstressed breaker / BAAH conversion / Automation program. If this project connects to the Malaga 115 kV bus as proposed, PG&E will continue to evaluate the Sanger 115 kV situation and determine the timing of the breaker replacement and BAAH conversion.

9.2 Bus Loading Evaluation

Bus loading analysis was performed on Malaga Substation 115 kV bus to identify any overload that would occur with the addition of KRCDPP. During 2005 Summer Peak normal condition, the maximum current flowing through the bus is less than 600 Amps. Under the worst Category B contingency during 2005 summer peak (outage of the McCall-Sanger #3 115 kV line), the maximum current flowing through the bus is less than 650 Amps.

The Malaga 115 kV bus is made up of 2" Al tubing which has a rating of 1,180 A (Normal) and 1,455 A (Emergency). Therefore, Malaga 115 kV bus conductors are large enough to accommodate the addition of the KRCDPP.

10. Reactive Power Deficiency Analysis

The power flow studies of Category B and Category C contingencies indicated that the Kings River Conservation District Peaking Project did not cause voltage drops of 5% or more from the pre-project levels, or cause the PG&E system to fail to meet applicable voltage criteria.

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[2] Overstressed Circuit Breaker – The percent of overstress, or level of overstress, is the percent of maximum fault current above the breaker's nameplate rating. For example, a breaker rated at 40,000 amps symmetrical current interrupting a 44,000 amp symmetrical fault is overstressed by 10%.

11. Environmental Evaluation/ Permitting

11.1 CPUC General Order 131-D

Pacific Gas and Electric Company (PG&E) is subject to the jurisdiction of the California Public Utilities Commission (CPUC); and must comply with CPUC General Order 131-D (Order) on the construction, modification, alteration, or addition of all electric transmission facilities (i.e., lines, substations, switchyards, etc.). This includes 230 kV facilities to be constructed by others and deeded to PG&E. The Order requires PG&E to obtain a Certificate of Pubic Convenience and Necessity (CPCN) from the CPUC if the PG&E facilities being constructed are designed for immediate or eventual operation at 200 kV or more. Projects with 230 kV facilities that are excepted from obtaining a CPCN are those involving the replacement of existing power line facilities or supporting structures with equivalent facilities or structures, the minor relocation of existing facilities, the conversion of existing overhead lines (greater than 200 kV) to underground, or the placing of new or additional conductors, insulators, or their accessories on or replacement of supporting structures already built. Obtaining a CPCN can take as much as 18 months or more if the CPUC needs to conduct its own environmental evaluation pursuant to the California Environmental Quality Act (CEQA). PG&E recommends including PG&E's interconnection facilities in the local or CEC's CEQA process, which may allow a shortened CPCN process should a CPCN be necessary.

Please see Section III, B.1.(f) in General Order 131-D. This document can be found in the CPUC's web page at:

http://www.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/589.htm

11.2 CPUC Section 851

Pacific Gas and Electric Company (PG&E) is subject to the jurisdiction of the California Public Utilities Commission (CPUC) and must comply with Public Utilities Code Section 851, which among other things requires CPUC approval of leases and licenses to use PG&E property. This includes rights-of-way granted to third parties for interconnection facilities. Obtaining CPUC approval for a Section 851 application can take several months, and requires compliance with the California Environmental Quality Act (CEQA). PG&E recommends that Section 851 issues be identified as early as possible so that the necessary application can be prepared and processed.

12. Study Updates

This System Impact Study is performed according the to assumptions shown in the Sections titled "Study Assumptions" and "Power Flow Study Base Case". In the event such that these assumptions are changed, an updating study may be required to re-evaluate Kings River Conservation District Peaking Project's impact

on PG&E's transmission grid. Kings River Conservation District would be responsible for paying for any such updating study. Examples of changes that might prompt such a study are:

- Change in interconnection date.
- Change in Interconnection Queue position.
- Change in project's MW size
- Change in interconnection plan

13. Stand-by Power

This study does not address any requirements for stand-by power that the project may require. The Applicant should contact their Generation Interconnection Services Representative regarding this service.

Note: The Applicant is urged to contact their Generation Interconnection Services Representative promptly regarding stand-by service in order to ensure its availability for the project's start-up date.

Appendix 5.1-1

APPENDIX 5.1-1

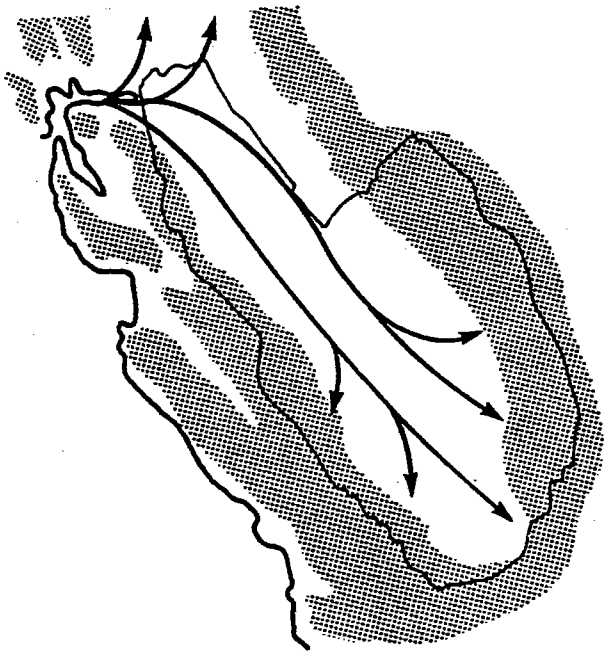
AIR QUALITY MODELING DATA

1. **Figure 1 – San Joaquin Valley Air Flow Pattern types**
2. **Figures 2 through 6 – Quarterly and Annual Windrose Data for Fresno 1989**
3. **Figure 7 – Receptor Network**
4. **List of Modeling Input Files**
5. **Sample ISCST3 Input Files**

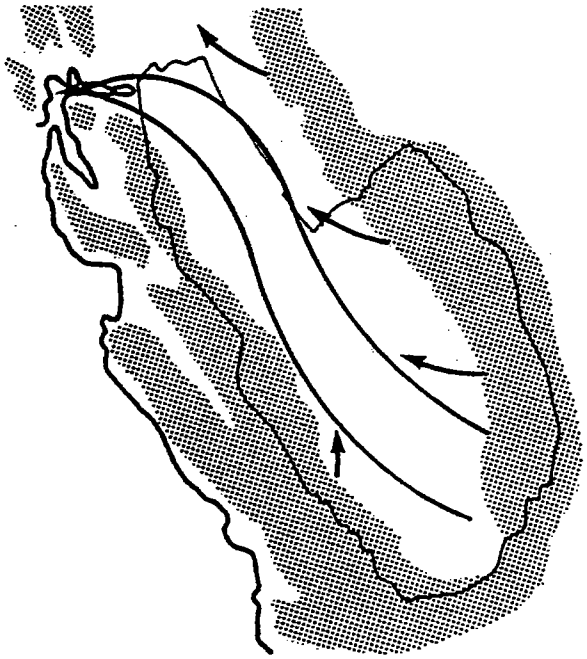
Figure 1

San Joaquin Valley Air Flow Pattern types

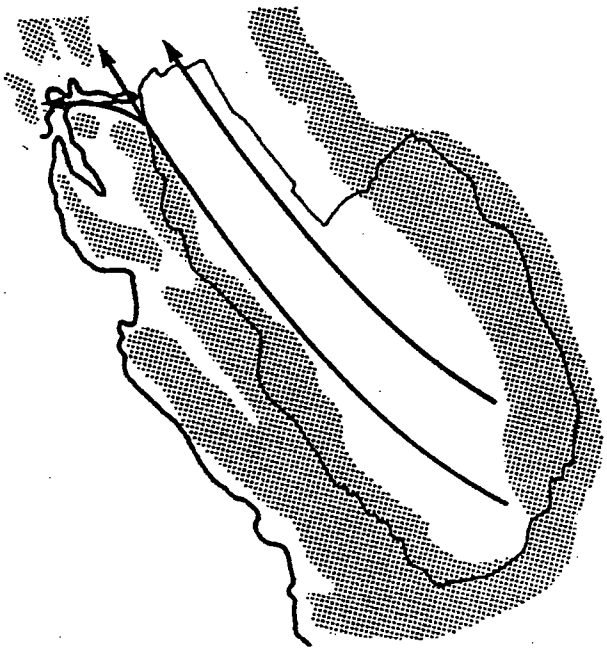
SAN JOAQUIN VALLEY AIR FLOW PATTERN TYPES



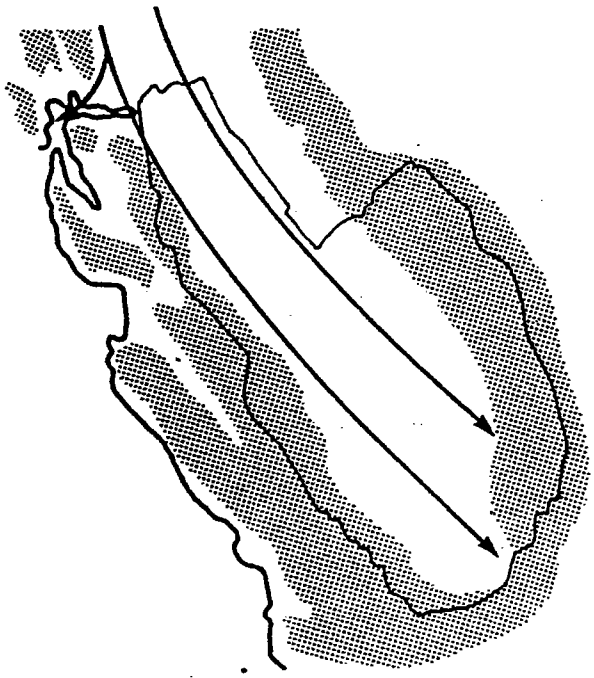
I Upvalley



II Downvalley / Drainage



III Southerly



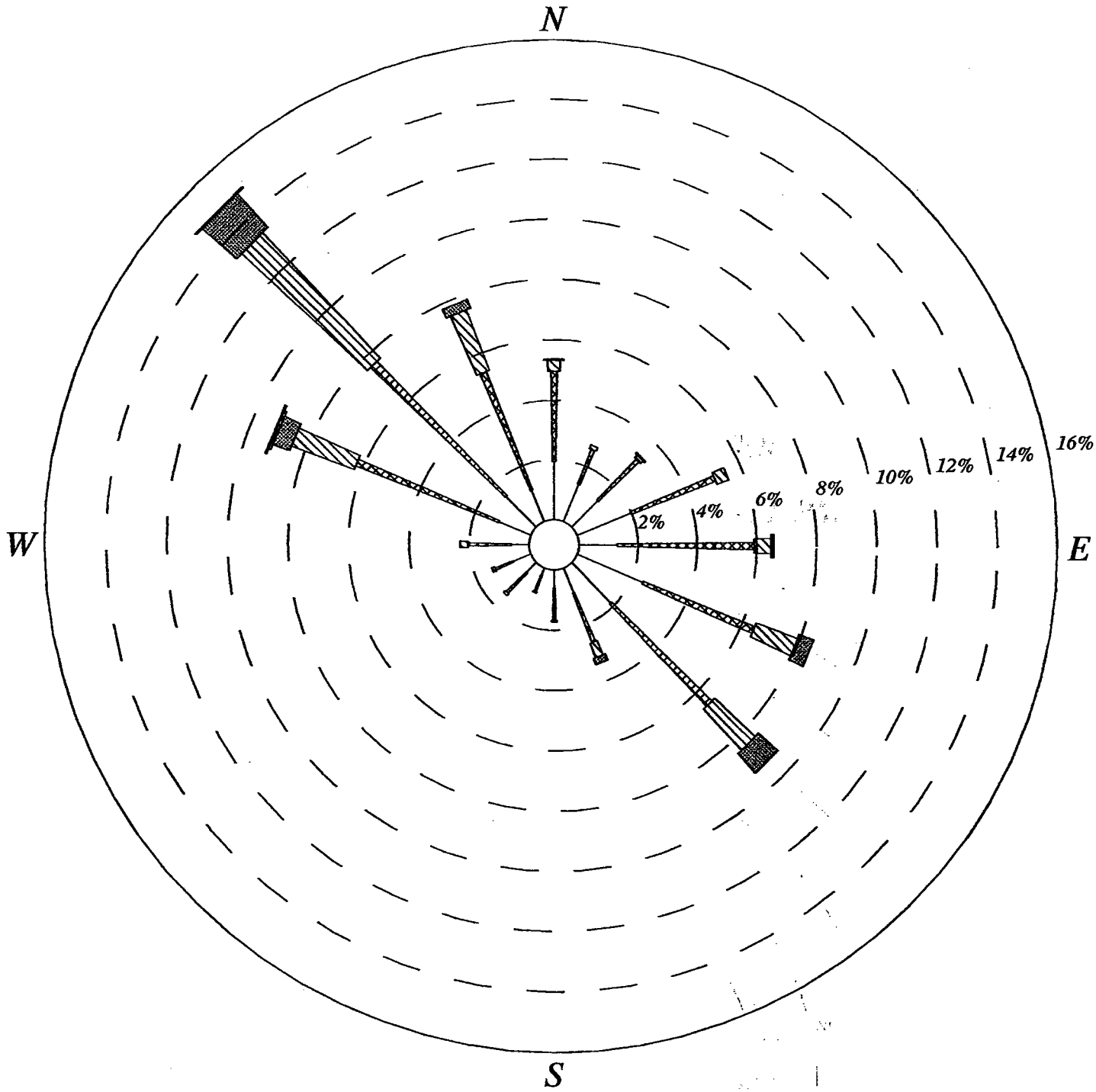
IV Northerly (No Marine Air)

Figures 2 through 6

Quarterly and Annual Windrose Data for Fresno 1989

FRESNO 1989 1ST QUARTER

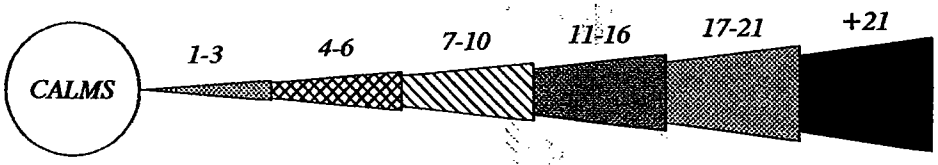
January 1-March 31; Midnight-11 PM



CALM WINDS 15.69%

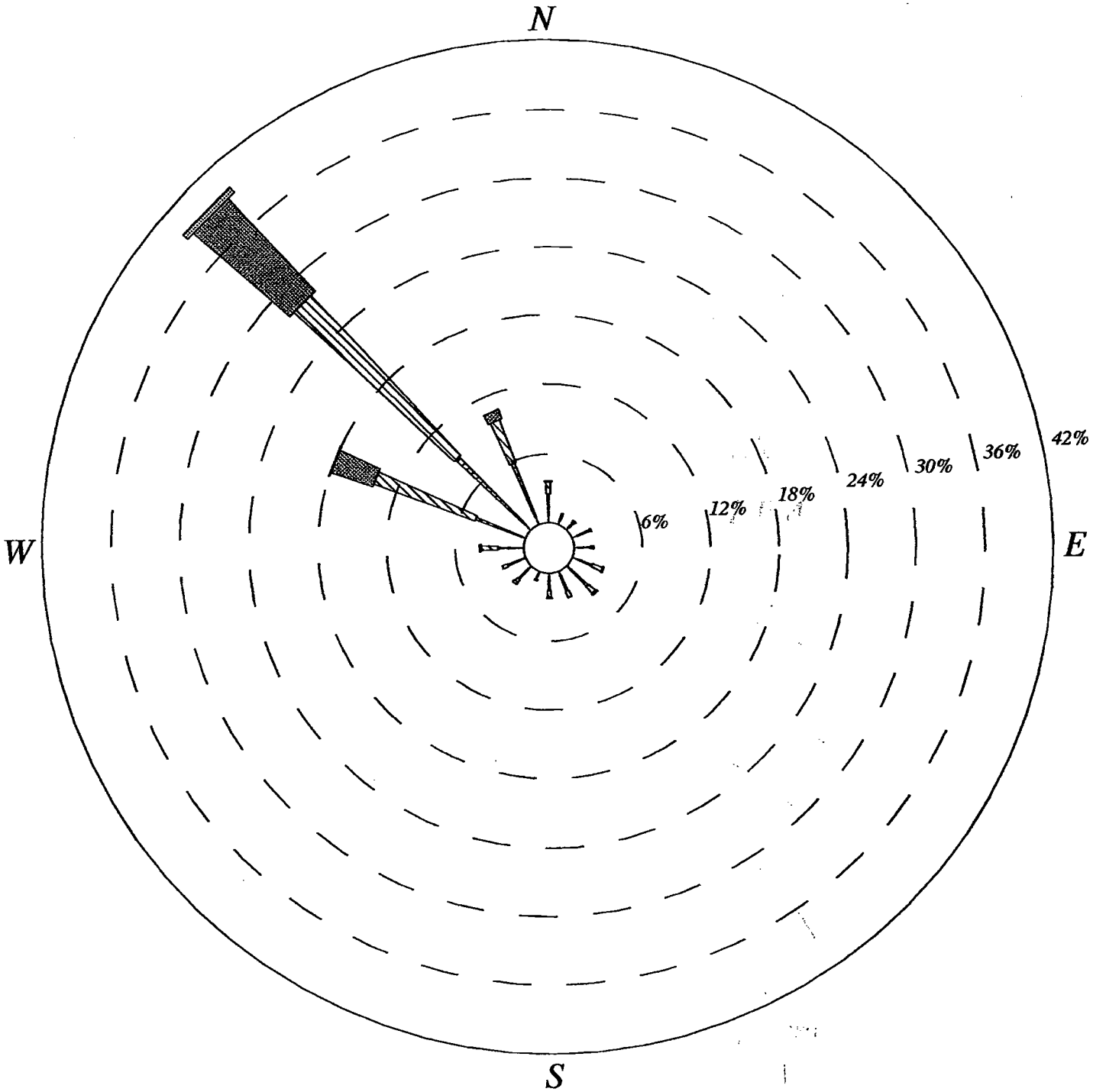
WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



FRESNO 1989 2nd QUARTER

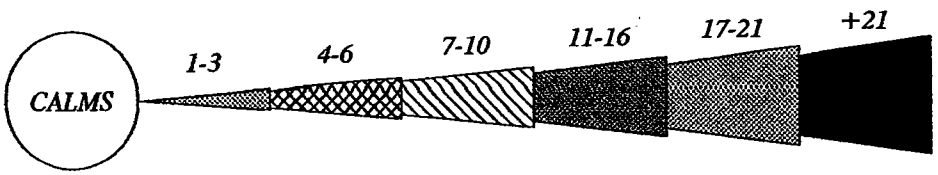
April 1-June 30; Midnight-11 PM



CALM WINDS 2.47%

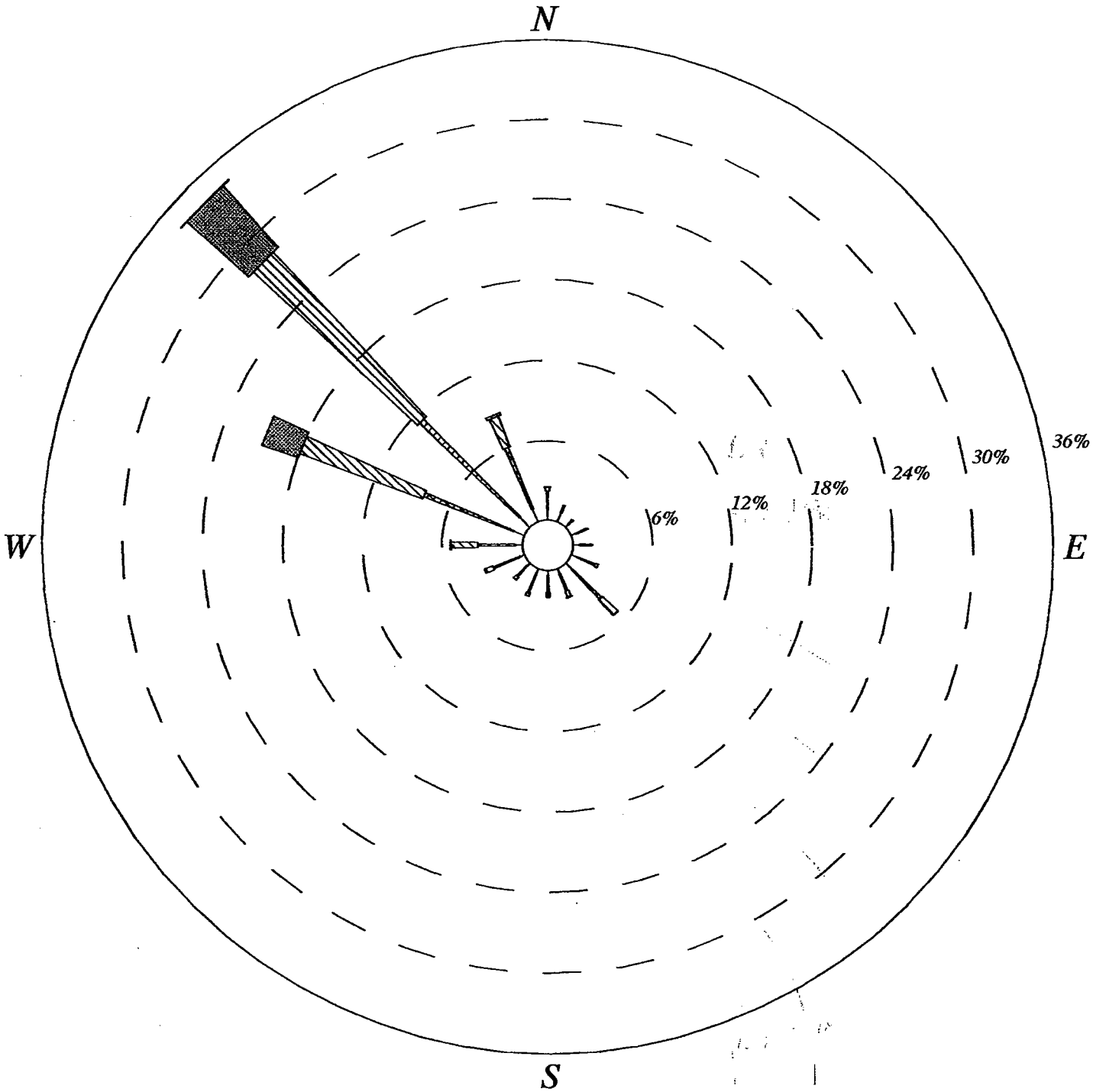
NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)



FRESNO 1989 3rd QUARTER

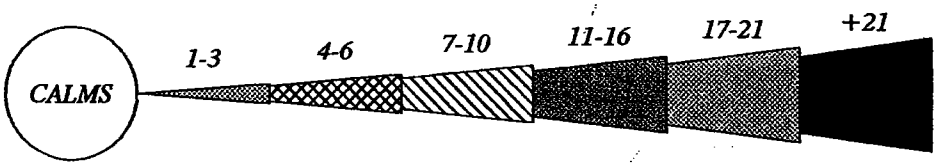
July 1-September 30; Midnight-11 PM



CALM WINDS 4.57%

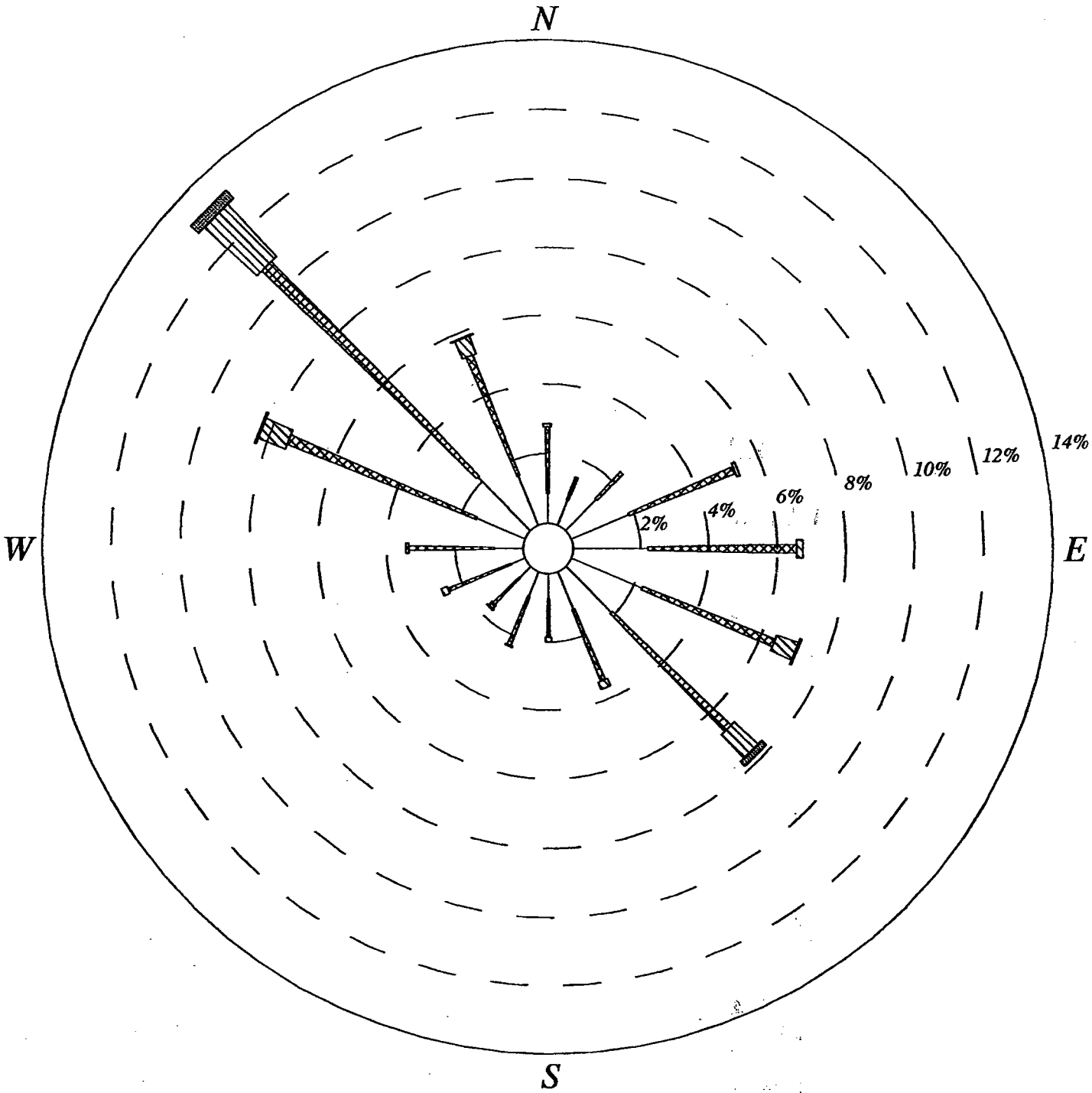
WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



FRESNO 1989 4th QUARTER

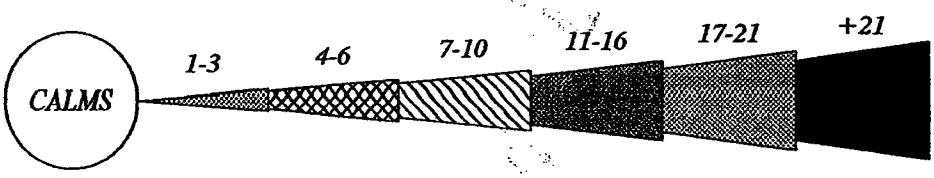
October 1-December 31; Midnight-11 PM



CALM WINDS 23.05%

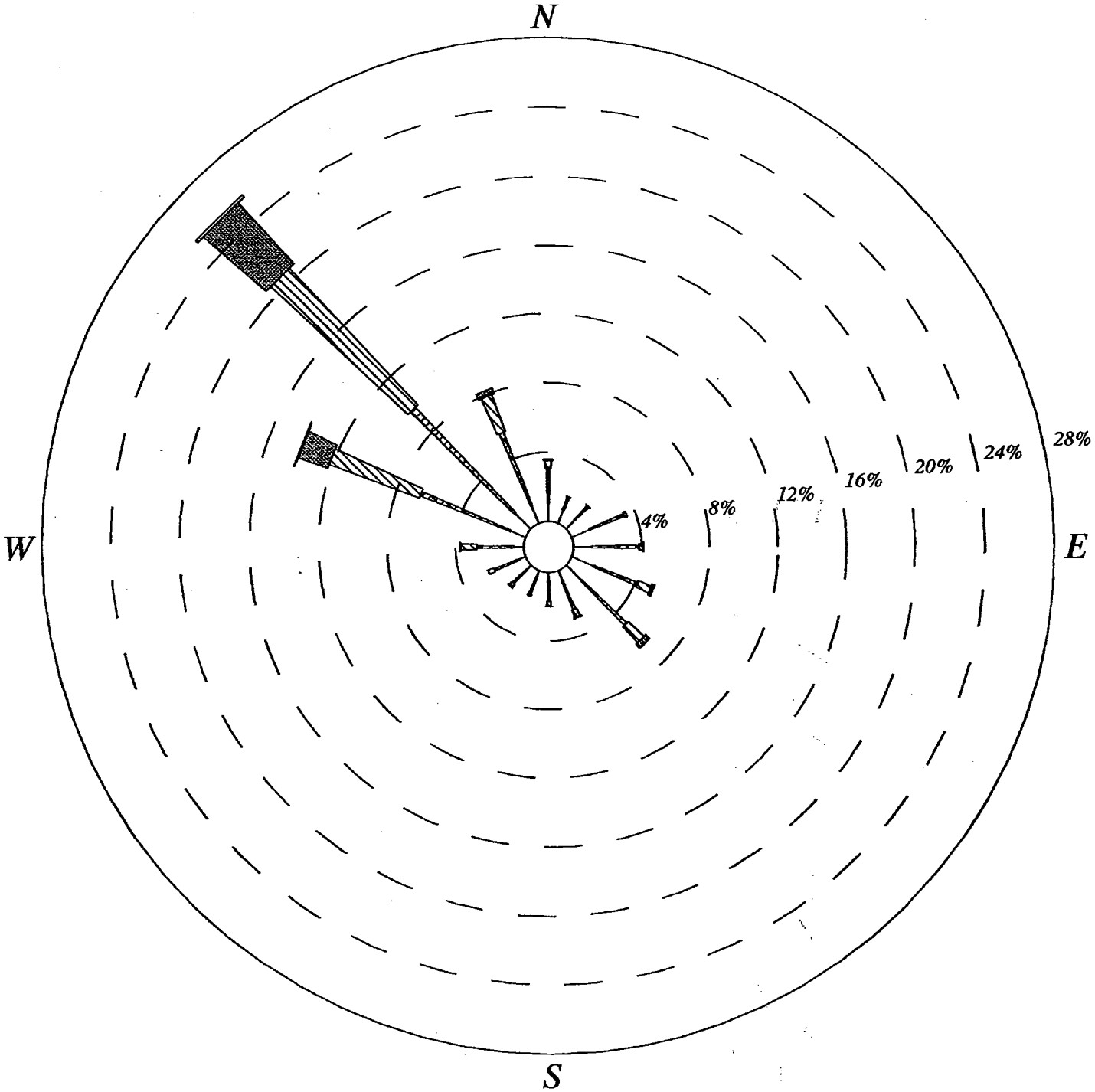
WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



FRESNO 1989

January 1-December 31; Midnight-11 PM



CALM WINDS 11.45%

WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.

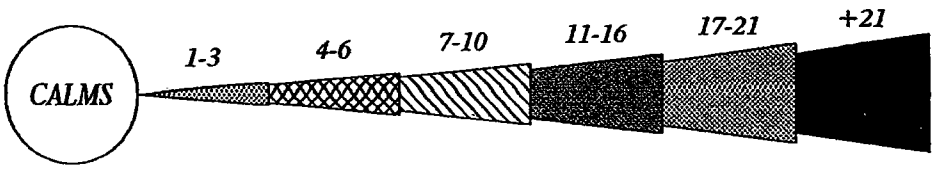
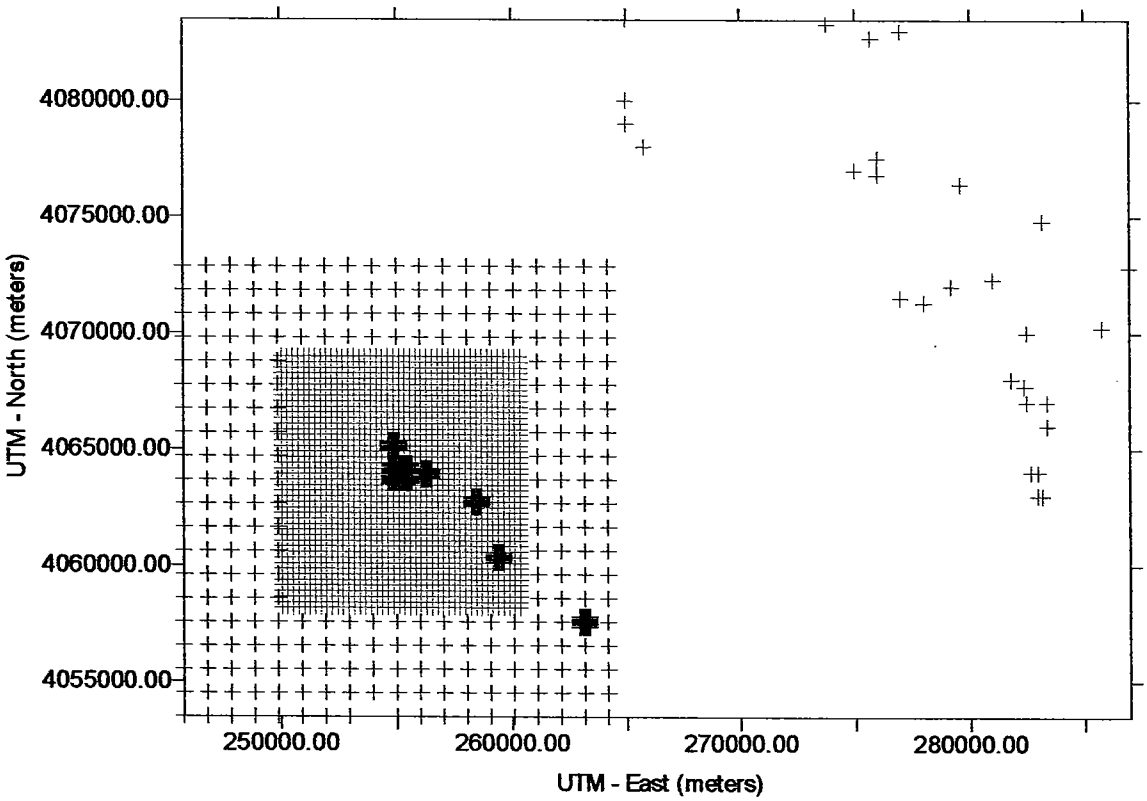


Figure 7

Receptor Network



RECEPTOR NETWORK

List of Modeling Input Files

File Name	Scenario	Averaging Time	Pollutant	
03cofdof.inp	Case 9: turbines only, 103 deg, Chillers off, dilution air off	1,3,8,24-hr, annual	normalized	
03cofdon.inp	Case 10: turbines only,103 deg, Chillers off, dilution air on	1,3,8,24-hr, annual	normalized	
03condof.inp	Case 7: turbines only, 103 deg, Chillers on, dilution air off	1,3,8,24-hr, annual	normalized	
03condon.inp	Case 8: turbines only, 103 deg, Chillers on, dilution air on	1,3,8,24-hr, annual	normalized	
25cofdof.inp	Case 1: turbines only, 25 deg, Chillers off, dilution air off	1,3,8,24-hr, annual	normalized	
25cofdon.inp	Case 2: turbines only, 25 deg, Chillers off, dilution air on	1,3,8,24-hr, annual	normalized	
62cofdof.inp	Case 5: turbines only, 62 deg, Chillers off, dilution air off	1,3,8,24-hr, annual	normalized	
62cofdon.inp	Case 6: turbines only, 62 deg, Chillers off, dilution air on	1,3,8,24-hr, annual	normalized	
62condof.inp	Case 3: turbines only, 62 deg, Chillers on, dilution air off	1,3,8,24-hr, annual	normalized	
62condon.inp	Case 4: turbines only, 62 deg, Chillers on, dilution air on	1,3,8,24-hr, annual	normalized	
c9pm10 .inp	Case 9: turbines short-term emissions, 103 deg, Chillers off, dilution air off, + cooling towers + ZLD	24-hr, annual	PM10	
c9pman .inp	Case 9: turbines annual emissions, 103 deg, Chillers off, dilution air off, + cooling towers + ZLD	24-hr, annual	PM10	
c9ref .inp	Case 9: turbines only, 103 deg, Chillers off, dilution air off, refined receptors	1,3,8,24-hr, annual	normalized	
krc1bpip.inp	BPIP RUN			
krcdbpip.inp	BPIP RUN			
refc1 .inp	Case 1: turbines only, 25 deg, Chillers off, dilution air off, refined receptors	1,3,8,24-hr, annual	normalized	
refc2 .inp	Case 1: turbines only, 25 deg, Chillers off, dilution air off, refined receptors	1,3,8,24-hr, annual	normalized	
conco .inp	Construction impacts	1,8-hr	CO	
conno1.inp	Construction impacts, with OLM	1-hr	NO2	
connoan .inp	Construction impacts	Annual	NO2	
conpm24 .inp	Construction impacts	24-hr	PM10	
conpman .inp	Construction impacts	Annual	PM10	
conpmex .inp	Construction impacts, exhaust only	Annual	PM10	
conso .inp	Construction impacts	1,3,24-hr	SO2	
consoan .inp	Construction impacts	Annual	SO2	
acutect .inp	Case 9: turbines only, 103 deg, Chillers off, dilution air off	1-, 6-hr	normalized	
hazoral .inp	Cooling towers & zld, hazard index - oral	Annual	Oral REL emissions	
krcdcool.inp	Cooling towers	Annual	normalized	
krcdzld .inp	ZLD	Annual	normalized	

Sample ISCST3 Input Files

SAMPLE ISCST3 INPUT FILES

TURBINE MODELING INPUT

```
CO STARTING
CO TITLEONE KRCD CASE 9: 103 deg F, CHILLERS OFF, DILUTION AIR OFF
CO TITLETWO FRESNO 1989, NORMALIZED CONCENTRATIONS COMBUSTION TURBINES
CO MODELOPT CONC   RURAL   DFAULT
CO AVERTIME 1 3 8 24 PERIOD
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO TERRHGTS ELEV
CO RUNORNOT RUN
CO ERRORFIL ERRORS.OUT
CO FINISHED


SO STARTING
SO ELEVUNIT FEET
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

** NORMALIZED EMISSION RATES
**  KRCD combustion turbines

**  10/26/03

** Source Location Cards:
**          SRCID SRCTYP        XS       YS            ZS

SO LOCATION  CTW    POINT   255157.59 4063966.55      295.
SO LOCATION  CTE    POINT   255205.76 4063965.86      295.

** Source Parameter Cards:
** POINT:   SRCID       QS     HS         TS          VS         DS
** VOLUME:  SRCID       QS     HS       SYINIT      SZINIT
** AREA:    SRCID       QS     HS        XINIT


SO SRCPARAM  CTW     1.0       32.00   723.16      22.84        3.66
SO SRCPARAM  CTE     1.0       32.00   723.16      22.84        3.66

NO ECHO
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDWID CTW        12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID CTW        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID CTW        31.94   28.19   23.57   18.24   12.36    6.10
SO BUILDWID CTW        12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID CTW        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID CTW        31.94   28.19   23.57   18.24   12.36    6.10
```

```
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTE        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDWID CTE        12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID CTE        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID CTE        31.94   28.19   23.57   18.24   12.36    6.10
SO BUILDWID CTE        12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID CTE        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID CTE        31.94   28.19   23.57   18.24   12.36    6.10

SO SRCGROUP ALL
SO FINISHED


RE STARTING
RE ELEVUNIT FEET

RE INCLUDED FENCREC.DAT
RE INCLUDED ISC30B.REC
RE INCLUDED ISC240A.REC
RE INCLUDED ISC1020A.REC
RE INCLUDED ELEV.REC
RE INCLUDED 1hr30m.rec
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RE INCLUDED 24hr30m.REC
RE INCLUDED an30m.rec
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ME ANEMHGHT   10.000 METERS
ME SURFDATA  93193  1989            FRESNO
ME UAIRDATA  23230  1989            OAKLAND
ME STARTEND 89 01 01  89 12 31
ME FINISHED


OU STARTING
OU RECTABLE  ALLAVE FIRST SECOND
** OU PLOTFILE  PERIOD ALL C:\PROJECTS\KRCD\ISC\AN.DAT
** OU PLOTFILE  24 ALL FIRST C:\PROJECTS\KRCD\ISC\24.DAT
** OU PLOTFILE  8 ALL FIRST C:\PROJECTS\KRCD\ISC\8.DAT
** OU PLOTFILE  3 ALL FIRST C:\PROJECTS\KRCD\ISC\3.DAT
** OU PLOTFILE  1 ALL FIRST C:\PROJECTS\KRCD\ISC\1.DAT
OU FINISHED
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PM_{10}, TURBINES + COOLING TOWERS + ZLD INPUT

```
CO STARTING
CO TITLEONE KRCD CASE 9: 103 deg F, CHILLERS OFF, DILUTION AIR OFF, pm10
CO TITLETWO FRESNO 1989, COMBUSTION TURBINES (ann er),COOL TOWERS, & ZLD
CO MODELOPT CONC   RURAL   DFAULT
CO AVERTIME PERIOD
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO TERRHGTS ELEV
CO RUNORNOT RUN
CO ERRORFIL ERRORS.OUT
CO FINISHED


SO STARTING
SO ELEVUNIT FEET
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

** NORMALIZED EMISSION RATES
**  KRCD combustion turbines

**  10/26/03

** Source Location Cards:
**          SRCID SRCTYP        XS       YS            ZS

SO LOCATION  CTW    POINT   255157.59 4063966.55      295.
SO LOCATION  CTE    POINT   255205.76 4063965.86      295.
SO LOCATION  COOLWN POINT  255172.53 4063963.65      295.
SO LOCATION  COOLWS POINT  255172.53 4063956.34      295.
SO LOCATION  COOLEN POINT  255190.71 4063963.65      295.
SO LOCATION  COOLES POINT  255190.71 4063956.34      295.
SO LOCATION  ZLD     POINT  255135.75 4063993.79      295.


** Source Parameter Cards:
** POINT:   SRCID       QS     HS        TS          VS          DS
** VOLUME:  SRCID       QS     HS      SYINIT      SZINIT
** AREA:    SRCID       QS     HS       XINIT


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SO SRCPARAM  CTE     0.153     32.00   723.16      22.84        3.66
SO SRCPARAM  COOLWN 0.0022    10.67   301.49      12.23        3.66
SO SRCPARAM  COOLWS 0.0022    10.67   301.49      12.23        3.66
SO SRCPARAM  COOLEN 0.0022    10.67   301.49      12.23        3.66
SO SRCPARAM  COOLES 0.0022    10.67   301.49      12.23        3.66
SO SRCPARAM  ZLD     0.0076    21.34   463.72       8.02        0.30

NO ECHO
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SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT CTW        15.24   15.24   15.24   15.24   15.24   15.24
```

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SO BUILDWID CTW	12.36	18.24	23.57	28.19	31.94	34.73
SO BUILDWID CTW	36.46	37.08	36.58	37.08	36.46	34.73
SO BUILDWID CTW	31.94	28.19	23.57	18.24	12.36	6.10
SO BUILDWID CTW	12.36	18.24	23.57	28.19	31.94	34.73
SO BUILDWID CTW	36.46	37.08	36.58	37.08	36.46	34.73
SO BUILDWID CTW	31.94	28.19	23.57	18.24	12.36	6.10
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT CTE	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDWID CTE	12.36	18.24	23.57	28.19	31.94	34.73
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SO BUILDWID CTE	36.46	37.08	36.58	37.08	36.46	34.73
SO BUILDWID CTE	31.94	28.19	23.57	18.24	12.36	6.10
SO BUILDHGT COOLWN	10.67	10.67	15.24	15.24	15.24	15.24
SO BUILDHGT COOLWN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLWN	15.24	15.24	15.24	15.24	15.24	10.67
SO BUILDHGT COOLWN	10.67	10.67	15.24	15.24	15.24	15.24
SO BUILDHGT COOLWN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLWN	15.24	15.24	15.24	15.24	15.24	10.67
SO BUILDWID COOLWN	10.95	13.94	23.57	28.19	31.94	34.73
SO BUILDWID COOLWN	36.46	37.08	36.58	37.08	36.46	34.73
SO BUILDWID COOLWN	31.94	28.19	23.57	18.24	12.36	7.62
SO BUILDWID COOLWN	10.95	13.94	23.57	28.19	31.94	34.73
SO BUILDWID COOLWN	36.46	37.08	36.58	37.08	36.46	34.73
SO BUILDWID COOLWN	31.94	28.19	23.57	18.24	12.36	7.62
SO BUILDHGT COOLWS	10.67	10.67	15.24	15.24	15.24	10.67
SO BUILDHGT COOLWS	10.67	10.67	10.67	10.67	15.24	15.24
SO BUILDHGT COOLWS	15.24	15.24	15.24	15.24	15.24	10.67
SO BUILDHGT COOLWS	10.67	10.67	15.24	15.24	15.24	15.24
SO BUILDHGT COOLWS	15.24	15.24	10.67	10.67	15.24	15.24
SO BUILDHGT COOLWS	15.24	15.24	15.24	15.24	15.24	10.67
SO BUILDWID COOLWS	10.95	13.94	23.57	28.19	31.94	20.97
SO BUILDWID COOLWS	21.23	20.84	19.82	11.31	36.46	34.73
SO BUILDWID COOLWS	31.94	28.19	23.57	18.24	12.36	7.62
SO BUILDWID COOLWS	10.95	13.94	23.57	28.19	31.94	34.73
SO BUILDWID COOLWS	36.46	37.08	19.82	20.84	36.46	34.73
SO BUILDWID COOLWS	31.94	28.19	23.57	18.24	12.36	7.62
SO BUILDHGT COOLEN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLEN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLEN	15.24	15.24	15.24	10.67	10.67	10.67
SO BUILDHGT COOLEN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLEN	15.24	15.24	15.24	15.24	15.24	15.24
SO BUILDHGT COOLEN	15.24	15.24	15.24	10.67	10.67	10.67
SO BUILDWID COOLEN	12.36	18.24	23.57	28.19	31.94	34.73

```
SO BUILDWID COOLEN    36.46   37.08   36.58   37.08   36.46   34.73

SO BUILDWID COOLEN    31.94   28.19   23.57   13.94   10.95    7.62
SO BUILDWID COOLEN    12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID COOLEN    36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID COOLEN    31.94   28.19   23.57   13.94   10.95    7.62


SO BUILDHGT COOLES    15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT COOLES    15.24   10.67   10.67   15.24   15.24   15.24
SO BUILDHGT COOLES    15.24   15.24   15.24   10.67   10.67   10.67
SO BUILDHGT COOLES    15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT COOLES    15.24   10.67   10.67   10.67   10.67   10.67
SO BUILDHGT COOLES    10.67   15.24   15.24   10.67   10.67   10.67
SO BUILDWID COOLES    12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID COOLES    36.46   20.84   19.82   37.08   36.46   34.73
SO BUILDWID COOLES    31.94   28.19   23.57   13.94   10.95    7.62
SO BUILDWID COOLES    12.36   18.24   23.57   28.19   31.94   34.73
SO BUILDWID COOLES    36.46   20.84   19.82   20.84   21.23   20.97
SO BUILDWID COOLES    20.08   28.19   23.57   13.94   10.95    7.62


SO BUILDHGT ZLD        10.67   10.67   10.67   15.24   15.24   15.24
SO BUILDHGT ZLD        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT ZLD        15.24   15.24   15.24   10.67   10.67   10.67
SO BUILDHGT ZLD        10.67   10.67   10.67   15.24   15.24   15.24
SO BUILDHGT ZLD        15.24   15.24   15.24   15.24   15.24   15.24
SO BUILDHGT ZLD        15.24   15.24   15.24   10.67   10.67   10.67
SO BUILDWID ZLD        11.31   12.51   10.41   28.19   31.94   34.73
SO BUILDWID ZLD        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID ZLD        31.94   28.19   23.57   12.51    8.83    7.62
SO BUILDWID ZLD         8.83   12.51   10.41   28.19   31.94   34.73
SO BUILDWID ZLD        36.46   37.08   36.58   37.08   36.46   34.73
SO BUILDWID ZLD        31.94   28.19   23.57   12.51   11.31    9.76

SO SRCGROUP ALL
SO FINISHED


RE STARTING
RE ELEVUNIT FEET

RE INCLUDED FENCREC.DAT
RE INCLUDED ISC30B.REC
RE INCLUDED ISC240A.REC
RE INCLUDED ISC1020A.REC
RE INCLUDED ELEV.REC
RE INCLUDED 1hr30m.rec
RE INCLUDED 3hr30m.REC
RE INCLUDED 8hr30m.REC
RE INCLUDED 24hr30m.REC
RE INCLUDED an30m.rec
RE INCLUDED REF930M.REC
RE FINISHED


ME STARTING
```

```
ME INPUTFIL  c:\projects\KRCD\isc\FAT89.ASC
ME ANEMHGHT   10.000 METERS
ME SURFDATA  93193  1989            FRESNO
ME UAIRDATA  23230  1989            OAKLAND
ME STARTEND 89 01 01  89 12 31
ME FINISHED


OU STARTING
OU RECTABLE  ALLAVE FIRST SECOND
OU PLOTFILE  PERIOD ALL C:\PROJECTS\KRCD\ISC\ANPM.DAT
OU FINISHED
```

ISCST3 MODEL RESULTS, ANNUAL PM10 – PARTIAL OUTPUT

```
*** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                   *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE   1
CONC                    RURAL ELEV         DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY
***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates PERIOD Averages Only

**This Run Includes:     7 Source(s);      1 Source Group(s); and    5733
Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
```

```
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
        Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing
Hours
                                                                b for Both Calm
and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;
Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                                ;
Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.4 MB of RAM.

**Input Runstream File:          c9pman.inp
**Output Print File:             c9pman.out
**Detailed Error/Message File:   ERRORS.OUT

 *** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                  *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE   2
CONC                     RURAL ELEV         DFAULT
```

*** POINT SOURCE DATA ***

```
            NUMBER EMISSION RATE                                BASE     STACK   STACK
STACK     STACK    BUILDING EMISSION RATE
   SOURCE     PART. (USER UNITS)     X        Y      ELEV.    HEIGHT  TEMP.
EXIT VEL. DIAMETER   EXISTS   SCALAR VARY
     ID       CATS.                (METERS) (METERS) (METERS) (METERS) (DEG.K)
(M/SEC)  (METERS)                BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - -

  CTW           0   0.15300E+00  255157.6 4063966.5    89.9    32.00   723.16
22.84     3.66      YES
  CTE           0   0.15300E+00  255205.8 4063965.8    89.9    32.00   723.16
22.84     3.66      YES
  COOLWN        0   0.22000E-02  255172.5 4063963.8    89.9    10.67   301.49
12.23     3.66      YES
  COOLWS        0   0.22000E-02  255172.5 4063956.3    89.9    10.67   301.49
12.23     3.66      YES
  COOLEN        0   0.22000E-02  255190.7 4063963.8    89.9    10.67   301.49
12.23     3.66      YES
  COOLES        0   0.22000E-02  255190.7 4063956.3    89.9    10.67   301.49
12.23     3.66      YES
  ZLD           0   0.76000E-02  255135.8 4063993.8    89.9    21.34   463.72
8.02     0.30      YES
*** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                     *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE   3
CONC                    RURAL ELEV         DFAULT


                                         *** SOURCE IDs DEFINING SOURCE GROUPS
***

GROUP ID                                                   SOURCE IDs


 ALL       CTW     , CTE     , COOLWN  , COOLWS  , COOLEN  , COOLES  , ZLD     ,

 *** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                     *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE   4
CONC                    RURAL ELEV         DFAULT

                                        *** DIRECTION SPECIFIC BUILDING
DIMENSIONS ***
```

SOURCE ID: CTW

```
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,
18.2, 0    17  15.2,  12.4, 0    18  15.2,   6.1, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,
37.1, 0    29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,
18.2, 0    35  15.2,  12.4, 0    36  15.2,   6.1, 0
```

SOURCE ID: CTE

```
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,
18.2, 0    17  15.2,  12.4, 0    18  15.2,   6.1, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,
37.1, 0    29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,
18.2, 0    35  15.2,  12.4, 0    36  15.2,   6.1, 0
```

SOURCE ID: COOLWN

```
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  10.7,  10.9, 0     2  10.7,  13.9, 0     3  15.2,  23.6, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,
18.2, 0    17  15.2,  12.4, 0    18  10.7,   7.6, 0
  19  10.7,  10.9, 0    20  10.7,  13.9, 0    21  15.2,  23.6, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,
37.1, 0    29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,
18.2, 0    35  15.2,  12.4, 0    36  10.7,   7.6, 0
```

SOURCE ID: COOLWS

IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK	IFV	BH	BW	WAK
1	10.7,	10.9,	0	2	10.7,	13.9,	0	3	15.2,	23.6,	0	4	15.2,	28.2,	0
5	15.2,	31.9,	0	6	10.7,	21.0,	0	7	10.7,	21.2,	0	8	10.7,	20.8,	0
9	10.7,	19.8,	0	10	10.7,	11.3,	0	11	15.2,	36.5,	0	12	15.2,	34.7,	0
13	15.2,	31.9,	0	14	15.2,	28.2,	0	15	15.2,	23.6,	0	16	15.2,	18.2,	0
17	15.2,	12.4,	0	18	10.7,	7.6,	0	19	10.7,	10.9,	0	20	10.7,	13.9,	0
21	15.2,	23.6,	0	22	15.2,	28.2,	0	23	15.2,	31.9,	0	24	15.2,	34.7,	0
25	15.2,	36.5,	0	26	15.2,	37.1,	0	27	10.7,	19.8,	0	28	10.7,	20.8,	0
29	15.2,	36.5,	0	30	15.2,	34.7,	0	31	15.2,	31.9,	0	32	15.2,	28.2,	0
33	15.2,	23.6,	0	34	15.2,	18.2,	0	35	15.2,	12.4,	0	36	10.7,	7.6,	0

```
 *** ISCST3 - VERSION 02035 ***     *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10          ***         10/28/03
                                    *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD          ***         09:08:00
**MODELOPTs:
PAGE   5
CONC                     RURAL ELEV         DFAULT

                                         *** DIRECTION SPECIFIC BUILDING
DIMENSIONS ***


SOURCE ID: COOLEN
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,
13.9, 0    17  10.7,  10.9, 0    18  10.7,   7.6, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,
37.1, 0    29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,
13.9, 0    35  10.7,  10.9, 0    36  10.7,   7.6, 0


SOURCE ID: COOLES
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  10.7,  20.8, 0     9  10.7,  19.8, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,
13.9, 0    17  10.7,  10.9, 0    18  10.7,   7.6, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  10.7,  20.8, 0    27  10.7,  19.8, 0    28  10.7,
20.8, 0    29  10.7,  21.2, 0    30  10.7,  21.0, 0
  31  10.7,  20.1, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,
13.9, 0    35  10.7,  10.9, 0    36  10.7,   7.6, 0


SOURCE ID: ZLD
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH
BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  10.7,  11.3, 0     2  10.7,  12.5, 0     3  10.7,  10.4, 0     4  15.2,
28.2, 0     5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,
37.1, 0    11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,
12.5, 0    17  10.7,   8.8, 0    18  10.7,   7.6, 0
```

```
  19  10.7,   8.8, 0    20  10.7,  12.5, 0    21  10.7,  10.4, 0    22  15.2,
28.2, 0    23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,
37.1, 0    29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,
12.5, 0    35  10.7,  11.3, 0    36  10.7,   9.8, 0
```

BREAK IN TEXT.....

```
*** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                   *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE  70
CONC                    RURAL ELEV         DFAULT


                                          *** METEOROLOGICAL DAYS SELECTED FOR
PROCESSING ***
                                                                (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1

          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1
1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

                    METEOROLOGICAL DATA PROCESSED BETWEEN START DATE: 1989   1
1  0
                                                          AND END DATE: 1989  12
31 24

              NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON
WHAT IS INCLUDED IN THE DATA FILE.


                                   *** UPPER BOUND OF FIRST THROUGH FIFTH WIND
SPEED CATEGORIES ***
                                                                (METERS/SEC)

                                                  1.54,   3.09,   5.14,   8.23,
10.80,
```

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
B	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
C	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
D	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
E	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00
F	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***

(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** ISCST3 - VERSION 02035 *** *** KRCD CASE 9: 103 deg F, CHILLERS OFF, DILUTION AIR OFF, pm10 *** 10/28/03
*** FRESNO 1989, COMBUSTION TURBINES (ann er),COOL TOWERS, & ZLD *** 09:08:00
**MODELOPTs:
PAGE 71
CONC RURAL ELEV DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: c:\projects\KRCD\isc\FAT89.ASC
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)

SURFACE STATION NO.: 93193 UPPER AIR STATION NO.: 23230

NAME: FRESNO NAME: OAKLAND

YEAR: 1989 YEAR: 1989

YR	MN	DY	HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
89	01	01	01	121.0	3.09	278.2	4	533.9	533.9	0.0000	0.0	0.0000	0	0.00
89	01	01	02	138.0	2.06	278.2	4	569.3	569.3	0.0000	0.0	0.0000	0	0.00
89	01	01	03	144.0	2.06	277.6	4	604.8	604.8	0.0000	0.0	0.0000	0	0.00
89	01	01	04	123.0	2.57	277.6	4	640.3	640.3	0.0000	0.0	0.0000	0	0.00
89	01	01	05	113.0	1.54	277.0	4	675.8	675.8	0.0000	0.0	0.0000	0	0.00
89	01	01	06	122.0	1.54	277.0	4	711.2	711.2	0.0000	0.0	0.0000	0	0.00
89	01	01	07	115.0	1.54	277.0	4	746.7	746.7	0.0000	0.0	0.0000	0	0.00
89	01	01	08	163.0	1.54	277.0	4	782.2	782.2	0.0000	0.0	0.0000	0	0.00
89	01	01	09	127.0	1.54	277.0	4	817.6	817.6	0.0000	0.0	0.0000	0	0.00
89	01	01	10	131.0	0.00	277.6	4	853.1	853.1	0.0000	0.0	0.0000	0	0.00
89	01	01	11	94.0	1.54	277.6	4	888.6	888.6	0.0000	0.0	0.0000	0	0.00
89	01	01	12	306.0	2.57	277.6	4	924.1	924.1	0.0000	0.0	0.0000	0	0.00
89	01	01	13	43.0	2.57	277.6	4	959.5	959.5	0.0000	0.0	0.0000	0	0.00
89	01	01	14	349.0	2.06	278.2	4	995.0	995.0	0.0000	0.0	0.0000	0	0.00
89	01	01	15	302.0	2.57	278.7	4	995.0	995.0	0.0000	0.0	0.0000	0	0.00
89	01	01	16	274.0	2.57	278.7	4	995.0	995.0	0.0000	0.0	0.0000	0	0.00
89	01	01	17	301.0	1.54	278.2	4	991.7	991.7	0.0000	0.0	0.0000	0	0.00
89	01	01	18	307.0	1.03	278.2	4	975.2	975.2	0.0000	0.0	0.0000	0	0.00
89	01	01	19	4.0	1.03	277.0	5	958.7	779.6	0.0000	0.0	0.0000	0	0.00
89	01	01	20	357.0	0.00	276.5	6	942.2	681.6	0.0000	0.0	0.0000	0	0.00
89	01	01	21	330.0	1.54	276.5	6	925.7	583.7	0.0000	0.0	0.0000	0	0.00

```
89 01 01 22  332.0   1.54  276.5   5     909.1   485.8    0.0000       0.0
0.0000   0   0.00
89 01 01 23  330.0   0.00  275.4   6     892.6   387.9    0.0000       0.0
0.0000   0   0.00
89 01 01 24   90.0   1.54  275.4   5     876.1   290.0    0.0000       0.0
0.0000   0   0.00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
```

BREAK IN TEXT...

```
 *** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                  *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE 144
CONC                    RURAL ELEV         DFAULT

                                           *** THE SUMMARY OF MAXIMUM PERIOD (
8760 HRS) RESULTS ***


                                       ** CONC OF OTHER    IN (MICROGRAMS/CUBIC-
METER)                 **


NETWORK
GROUP ID                        AVERAGE CONC                RECEPTOR  (XR, YR,
ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.25596 AT (  255247.00,  4063900.00,
89.92,       0.00)  DC      NA
          2ND HIGHEST VALUE IS       0.23101 AT (  255270.00,  4063890.00,
89.61,       0.00)  DC      NA
          3RD HIGHEST VALUE IS       0.19761 AT (  255240.00,  4063890.00,
89.61,       0.00)  DC      NA
          4TH HIGHEST VALUE IS       0.19459 AT (  255300.00,  4063860.00,
89.61,       0.00)  DC      NA
          5TH HIGHEST VALUE IS       0.18593 AT (  255261.00,  4063920.00,
89.92,       0.00)  DC      NA
          6TH HIGHEST VALUE IS       0.17790 AT (  255237.69,  4063883.75,
89.92,       0.00)  DC      NA
          7TH HIGHEST VALUE IS       0.17790 AT (  255237.69,  4063883.75,
89.92,       0.00)  DC      NA
          8TH HIGHEST VALUE IS       0.17490 AT (  255270.00,  4063860.00,
89.61,       0.00)  DC      NA
          9TH HIGHEST VALUE IS       0.16758 AT (  255300.00,  4063890.00,
89.61,       0.00)  DC      NA
         10TH HIGHEST VALUE IS       0.16373 AT (  255330.00,  4063830.00,
89.61,       0.00)  DC      NA
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

 *** ISCST3 - VERSION 02035 ***    *** KRCD CASE 9: 103 deg F, CHILLERS OFF,
DILUTION AIR OFF, pm10         ***        10/28/03
                                  *** FRESNO 1989, COMBUSTION TURBINES (ann
er),COOL TOWERS, & ZLD         ***        09:08:00
**MODELOPTs:
PAGE 145
CONC                     RURAL ELEV         DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of        11395 Informational Message(s)

A Total of         1003 Calm Hours Identified

A Total of        10392 Cases Identified with HE > ZI


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
RE W282   163 CHK_EL:RecElev < SrcBase; See non-DFAULT HE>ZI option in  MCB#9

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

Appendix 5.1-2

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

1.0 Introduction

Through its Best Available Control Technology (BACT) Policy and its Rule 2201, the San Joaquin Valley Air Pollution Control District (SJVAPCD) requires the application of BACT to all emissions units, which are subject to its New Source Review (NSR) rule and result in a potential to emit greater than the applicable BACT threshold levels. For the Kings River Conservation District Peaking Plant (KRCDPP), the applicable BACT threshold levels are:

- Nitrogen oxides (NOx) – 2 pounds per day (lbs/day)
- Carbon Monoxide (CO) – 200,000 pounds per year (lbs/yr)
- Volatile Organic Compounds (VOCs) – 2 lbs/day
- Particulate Matter less than 10 microns in diameter (PM10) – 2 lbs/day
- Sulfur Dioxide (SO2) – 2 lbs/day

Given the relatively low BACT threshold levels for all of the above but CO, the KRCDPP will trigger BACT for NOx, VOCs, PM10 and SO2. Conversely, the KRCDPP's CO emissions, which will be less than 100 tons per year (200,000 lbs/yr), do not trigger BACT for CO. Nevertheless, the KRCDPP will include an oxidation catalyst system that will reduce CO emissions by at least 80%. Since CO BACT has not been triggered for the KRCDPP, the BACT analyses, which follow, do not include a discussion of CO. However, it is worth noting that the installation of oxidation catalysts for the KRCDPP's two combustion turbines (CTs) will reduce the (uncontrolled) CO emissions, which are already less than 100 tons per year, by a factor of five or more.

For those pollutants for which BACT is triggered, a BACT analysis is performed to ensure that the appropriate level of emissions control is applied to the source. The SJVAPCD defines this appropriate level of emissions control (i.e., BACT) as the most stringent limitation or control technique of the following:

- Achieved in practice for such emissions unit and class of source; or
- Contained in any State Implementation Plan (SIP) approved by the United States Environmental Protection Agency (USEPA) for such emissions unit category and class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed emissions unit demonstrates to the satisfaction

of the Air Pollution Control Officer (APCO) that such limitation or control technique is not presently achievable; or

- Contained in an applicable federal New Source Performance Standard; or
- Any other emission limitation or control technique, including process and equipment changes of basic or control equipment, found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source.

The general method for performing a BACT analysis is based on the USEPA's top-down approach. This approach, which is described in the USEPA's *New Source Review Workshop Manual* (October 1990), includes the following:

- Identify the possible emissions control technology options.
- Eliminate options, which are not technically feasible.
- Rank the technically feasible options by their control effectiveness.
- In descending order of effectiveness, assess the technically feasible options, based on energy, environmental and economic impacts.
- Determine the proposed BACT approach.

Identification of possible control technology options is generally accomplished through a review of the USEPA's Reasonably Available Control Technology (RACT)/BACT/ Lowest Achievable Emission Rate (LAER) Clearinghouse (or RBLC) and/or other BACT Clearinghouses, in this case, the SJVAPCD's BACT Guidelines and the California Air Resources Board (CARB) BACT Clearinghouse. Once the possible options have been determined, they are screened to remove from further consideration those, which have not been achieved in practice, are not as yet commercially available or are not applicable to KRCDPP operations. The (technically feasible) control options that remain are ranked in order of their capacity to reduce emissions.

If the most effective control option, which is technically feasible, is determined as the proposed BACT, the process is complete. However, a second level of assessment, involving the option's cost effectiveness, can be employed. This cost effectiveness determination calculates the annualized cost on a dollars per ton ($/ton) of pollutant removed basis for the control technology. If the cost effectiveness number calculated is high enough, the control option can be eliminated as being not cost effective, and the next most effective control option is either determined as BACT or not cost effective. This sequential process continues until the first cost effective control option is determined. The SJVAPCD's BACT Policy provides the following cost effectiveness thresholds:

- VOC - $5,000/ton;
- NOx - $9,700/ton;
- PM10 - $5,700/ton;
- SOx - $3,900/ton; and
- CO - $300/ton.

In the BACT analyses, which follow, the SJVAPCD's BACT Guidelines were used as the primary BACT determinant with the CARB BACT Clearinghouse used as a secondary source of BACT determinations to assess recent BACT determinations for simple cycle natural gas-fired CTs. The most stringent technologically feasible BACT option was identified and either selected as BACT or subjected to a cost effectiveness assessment. If this option was determined as cost effective, it was selected as BACT. If the option proved not to be cost effective, it was removed from consideration and the next most stringent BACT option was evaluated. This process continued, as necessary, until an appropriate BACT was found.

The applicable federal New Source Performance Standard (NSPS) and SJVAPCD (prohibitory) rules were also reviewed. However, neither of these reviews uncovered any emissions limits, which are more stringent than those promulgated in the BACT Guideline and Clearinghouse data. For CTs the applicable NSPS is found in the Code of Federal Regulations, 40 CFR Part 60 Subpart GG, which contains limits for NOx and SO2 emissions, but not for VOCs and PM10 (or CO). The NSPS limits are significantly less restrictive than current SJVAPCD requirements, e.g., the NSPS NOx limit is over 100 parts per million (ppm) as compared with a single digit ppm levels per the BACT Guideline and Clearinghouse data. The SJVAPCD has rules (e.g., 4201, Particulate Matter – Concentration; 4301, Fuel Burning Equipment; 4703, Stationary Gas Turbines; 4801, Sulfur Compounds), which apply to the KRCDPP. However, none of the restrictions imposed by these rules are more stringent than those resulting from the BACT Guideline and Clearinghouse information, e.g., SJVAPCD Rule 4201 limits emissions of particulate matter to no more than 0.1 grains/100 dry standard cubic foot and this level is more than an order of magnitude larger than the PM10 emissions that result from implementation of the BACT Guideline and Clearinghouse requirements for PM10.

2.0 BACT Analysis for NOx

In reviewing the BACT Guideline and Clearinghouse data for NOx, the most stringent control level was found to be 2.5 ppm @ 15% O2 (SCONOx system). This BACT appears in the SJVAPCD's BACT Guidelines (Guideline 3.4.8) and, although it is not

classified as having been achieved in practice or contained within a SIP, it is designated as technically feasible. Therefore, SCONOx to 2.5 ppm was considered as the most effective BACT that is technically feasible. Because SCONOx is significantly more expensive than other NOx emissions control technologies a cost effectiveness assessment was performed.

The annualized cost of SCONOx for the KRCDPP CTs was estimated using techniques developed by the USEPA (EPA. *Control Cost Manual*, Fourth Edition, Office of Air Quality Management and Standards, USEPA Document 450/3-93/006, January, 1990.). The USEPA approach requires an estimate of the capital cost of the basic equipment, the capital recovery factor, and various inputs such as ammonia costs, hourly labor rates, and the cost of fuel or electricity. Other cost elements are calculated as fractions of the basic equipment cost, total direct cost, or total capital cost of the equipment.

Table 1 summarizes the estimated capital costs for a SCONOx system on a per CT basis. Table 2 summarizes the estimated annualized costs on a per CT basis.

Table 1
Estimated Capital Costs of SCONOx - (On a Per CT Basis)
KCRCDPP

Item	**Cost**
Direct Costs	
Purchased Equipment	
a. Basic Equipment (A)	$ 2,975,000
b. Auxiliary Equipment (0.06 A)	Included in (A)
c. Instrumentation (0.10 A)	Included in (A)
d. Taxes and Freight (0.08 A)	$ 238,000
Total Purchased Equipment Cost (B)	$ 3,213,000
Direct Installation (0.30 B)	$ 963,900
TOTAL DIRECT COST (TDC) (B+0.30 B)	**$ 4,176,900**
Indirect Costs	
Indirect Installation Cost	
a. Engineering and Supervision (0.10 TDC)	$ 417,690
b. Construction and Field Expenses (0.05 TDC)	$ 208,845
c. Construction Fee (0.10 TDC)	$ 417,690
d. Contingencies (0.03 TDC)	$ 125,307

Other Indirect Costs	
a. Startup and Performance Testing (0.03 TDC)	$ 125,307
TOTAL INDIRECT COST (TIC)	**$ 1,294.839**
TOTAL CAPITAL COST (TCC) (TDC+TIC)	**$ 5,471,739**
Costs, which are estimated for an LM6000 operating in simple cycle mode with 90% NOx reduction from SCONOx, are based on the 11/5/99 report of Onsite Sycom Energy for the United States Department of Energy (USDOE) (Contract # DE-FC02-97CHIO877).	

Table 2
Estimated Annualized Cost of Control and Cost Effectiveness of SCONOx
(On a Per CT Basis)
KRCDPP

Item	**Cost**
Direct Operating Costs	
a. Operating Labor (C) ($25/man-hr)	$ 13,125
b. Supervisory Labor (0.15 C)	$ 1,969
c. Maintenance (2.0 C)	$ 26,250
d. Replacement Parts	
1. Catalyst Replacement	$ 226,454
2. Catalyst Salvage (1/3 of Catalyst Replacement)	$ (75,485)
e. Utilities	
1. Performance Loss (0.5% @ $0.06/kWh)	$ 45,864
2. H2 Costs (Carrier Fluid, Reforming, Skid Demand)	$ 266,849
TOTAL DIRECT OPERATING COSTS (TDOC; a. through e.)	**$ 505,026**
Indirect Operating Costs	
f. Overhead (1.89 C)	$ 24,806
g. Property Tax (0.01 TCC)	$ 54,717
h. Insurance (0.01 TCC)	$ 54,717
i. Administration (0.02 TCC)	$ 109,435
j. Capital Recovery (0.1175 TCC; n = 20, i = 10)	$ 642,929
Annualized Cost ($/yr) - (a. through j.)	**$ 1,391,630**
Costs, which are estimated for an LM6000 operating in simple cycle mode with 90% NOx reduction from SCONOx, are based on the 11/5/99 report of Onsite Sycom Energy for the U.S. DOE (Contract # DE-FC02-97CHIO877).	

Since SCONOx reduces the emissions of more than one pollutant, i.e., in addition to NOx, SCONOx reduces VOC emissions, the calculation of cost effectiveness is based on the Multi-Pollutant Cost Effectiveness Threshold (MCET) approach, which is defined in the SJVAPCD's BACT Policy.

The total cost effectiveness threshold ($593,300) in Table 3 must be compared with the total annualized cost of SCONOx ($1,391,630), as calculated in Table 2. Because the latter is more than the former, SCONOx is not cost effective.

Table 3
MCET for SCONOx (On a Per CT Basis)
KRCDPP

	Tons Removed By SCONOx	Pollutant Cost Effectiveness Threshold ($/ton)	Cost Effectiveness ($)
NOx	59.0[1]	9,700	$572,300
VOCs	4.2[2]	5,000	$21,000
Total Cost Effectiveness Threshold			$593,300

Notes:

1. Based on a baseline NOx level of 25 ppm and 90% reduction by SCONOx to 2.5 ppm (from 42 pounds per hour (lbs/hr) to 4.2 lbs/hr and 3,120 horsepower per year (hpy) of operation). The two CTs being supplied for the KRCDPP come equipped with water injection, which is considered part of the standard CT package. Therefore, the emissions associated with the water injected CTs are considered to be baseline emissions levels.
2. Based on a 90% reduction in VOC emissions by SCONOx from an assumed level of 3.0 lbs/hr to 0.3 lbs/hr and 3,120 hpy of operation.

The next most stringent BACT for NOx, which was also found in the SJVAPCD's BACT Guidelines, is 3.0 ppm based on the use of Selective Catalytic Reduction (SCR). Therefore, BACT for NOx emissions from the KRCDPP's's two natural gas-fired simple cycle CTs is no more than 3.0 parts per million by volume dry (ppmdv) @ 15% O2.

3.0 BACT Analysis for VOCs

In reviewing the BACT Guideline and Clearinghouse data for VOCs, the most stringent control level was found to be a 90% reduction (SCONOx system). This BACT appears in the SJVAPCD's BACT Guidelines (Guideline 3.4.8) and, although it is not classified as having been achieved in practice or contained within a SIP, it is designated as technically feasible. Therefore, a 90% reduction in VOC emissions via SCONOx was considered as the most effective BACT that is technically feasible.

As discussed in Section 2.0, the use of SCONOx has been determined as not cost effective for both NOx and VOC emissions control. The next most stringent BACT for VOCs, which was also found in the SJVAPCD's BACT Guidelines, is 2.0 ppm based on the use of an oxidation catalyst. Therefore, BACT for VOC emissions from the KRCDPP's two natural gas-fired simple cycle CTs is no more than 2.0 ppmdv @ 15% O2.

4.0 BACT Analysis for PM10

In reviewing the BACT Guideline and Clearinghouse data for PM10, the most stringent control level was found to be the use of Public Utility Commission (PUC) regulated natural gas. This BACT appears in the SJVAPCD's BACT Guidelines (Guideline 3.4.8) as having been achieved in practice or contained in a SIP. In addition, the SJVAPCD also defines PM10 BACT for this class of emissions source as including an air inlet cooler/filter and a lube oil vent coalescer. Therefore, PUC regulated natural gas in combination with an air inlet cooler/filter and a lube oil vent coalescer was considered as the most effective BACT for PM10 emissions from the KRCDPP's CTs.

In addition to PM10 emissions from the CTs, the Project's two small cooling towers and the Zero Liquid Discharge (ZLD) system evaporative tower will emit relatively minor amounts of PM10. Each of the two Project cooling towers has a circulating water flow rate of approximately 4,000 gallons per minute (gpm). SJVAPCD Rule 2020 (Permit) Exemptions, Part 6.2, exempts cooling towers with circulating water flow rates of less than 10,000 gpm from permitting (and BACT) requirements. (Additionally, each of the two cooling towers is estimated to have a PM10 emissions rate of no more than 0.035 lbs/hr (0.84 lbs/day) and this emissions rate is less than the SJVAPCD's PM10 BACT threshold of 2 lbs/day.)

The ZLD evaporative tower will include a baghouse filter to reduce PM10 emissions to no more than 0.06 lbs/hr (1.44 lbs/day). The baghouse will have a capture efficiency of more than 99.9%. Therefore, while the controlled emissions rate of PM10 from the ZLD tower is less than the BACT threshold of 2 lbs/day, the uncontrolled emissions rate is well above this level, and on an uncontrolled basis, BACT for PM10 is triggered. The Project did not find any other BACT with a better control efficiency than the baghouse. Consequently, a limit of no more than 0.06 lbs/hr, based on a baghouse filter, is BACT for ZLD evaporative tower PM10 emissions.

5.0 BACT Analysis for SO2

In reviewing the BACT Guideline and Clearinghouse data for SO2, the most stringent control level was found to be the use of PUC regulated natural gas. This BACT appears

in the SJVAPCD's BACT Guidelines (Guideline 3.4.8) as having been achieved in practice or contained in a SIP. Therefore, PUC regulated natural gas was considered as the most effective BACT for SO2 emissions and will be used as the fuel for the KRCDPP's CTs.

6.0 Summary of BACT

Table 4 summarizes the proposed BACT and associated emissions limits for the KRCDPP.

Table 4
Summary of Proposed BACT
KRCDPP

	Proposed BACT	Proposed Emission Limitation
NOx	SCR	3.0 ppmdv[1]
VOCs	Oxidation Catalyst	2.0 ppmdv[1]
PM10[2]	Use of Natural Gas Fuel	0.0073 lbs/MMBtu (HHV)
SO2	Use of Natural Gas Fuel	0.00114 lbs/MMBtu (HHV)[3]
CO	NA[4]	6.0 ppmdv[1]

Notes:

1. ppmdv referenced at 15% oxygen.
2. BACT for the ZLD evaporative tower will be a baghouse filter, limiting PM10 emissions to no more than 0.06 lbs/hr.
3. Based on a fuel sulfur content of 0.41 grains/100 standard cubic feet (scf).
4. Although the Project does not trigger BACT for CO, these emissions will be controlled through the use of an oxidation catalyst.

Acronyms:

MMBtu/HHV - million British thermal units per hour higher heating value

Appendix 5.1-3

TABLE 1
MAXIMUM HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION
AMBIENT/OPERATIONAL CASES 1 & 2[1]

	One CT	Both CTs	One Cooling Tower[2]	Both Cooling Towers[2]	ZLD Evap. Tower[2]	Totals
NOx[3]	5.1	10.2	NA	NA	NA	10.2
CO[4]	6.2	12.4	NA	NA	NA	12.4
VOCs[5]	1.6	3.2	NA	NA	NA	3.2
PM10	3.4[6]	6.8	0.035	0.07	0.06	6.93
SO2	0.53[7]	1.05	NA	NA	NA	1.05

Notes:

1. Based on an ambient temperature of 25 degrees F and the CT air inlet chillers off.
2. PM10 is the only emission from this equipment. Cooling Tower and ZLD PM10 emissions rates from Tables 5.8-6 & 5.8-7, respectively, of the Pbulic Health Section.
3. CT NOx emissions are based on water injection to 25 ppmdv @ 15% O2 and an approximately 88% effective SCR system to 3.0 ppmdv @ 15% O2.
4. CT CO emissions are based on a pre-oxidation catalyst level of 49 ppmdv @ 15% O2 and an approximately 87-88% effective oxidation catalyst to 6.0 ppmdv @ 15% O2.
5. Based on an HC emissions rate of 8.0 lbs/hr for the 25 degree F ambient case and VOC = 0.20 HC.
6. Based a total PM_{10} factor of is 0.0073 lbs/MMBtu (filterable – front half = 0.0019 lbs/MMBtu (HHV); condensable – back half = 0.0047 lbs/MMBtu (HHV) and a safety margin of 10%) and a fuel input of 466.3 MMBtu/hr - HHV (420.1 MMBtu/hr – LHV).
7. Based on 0.41 grains S/100 scf (from a typical fuel sulfur content of 5 ppmv, which is equivalent to 0.3 grains/100 scf, and a 35% safety margin), 1025.9 Btu (HHV)/scf and 466.3 MMBtu (HHV)/hr.

TABLE 2
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION
AMBIENT OPERATIONAL CASES 3 & 4[1]

	One CT	Both CTs	One Cooling Tower[2]	Both Cooling Towers[2]	ZLD Evap. Tower[2]	Totals
NOx[3]	5.1	10.2	NA	NA	NA	10.2
CO[4]	5.1	10.2	NA	NA	NA	10.2
VOCs[5]	1.4	2.8	NA	NA	NA	2.8
PM10	3.4[6]	6.8	0.035	0.07	0.06	6.93
SO2[7]	0.53	1.05	NA	NA	NA	1.05

Notes:

1. Based on an ambient temperature of 62 degrees F and the CT air inlet chillers on.
2. PM10 is the only emission from this equipment. Cooling Tower and ZLD PM10 emissions rates from Tables 5.8-6 & 5.8-7, respectively, of the Public Health Section.
3. CT NOx emissions are based on water injection to 25 ppmdv @ 15% O2 and an approximately 88% effective SCR system to 3.0 ppmdv @ 15% O2.
4. CT CO emissions are based on a pre-oxidation catalyst level of 41 ppmdv @ 15% O2 and an approximately 87-88% effective oxidation catalyst to apprx. 5.0 ppmdv @ 15% O2.
5. Based on an HC emissions rate of 7.0 lbs/hr for the 62 degree F ambient case and VOC = 0.20 HC.
6. Based a total PM_{10} factor of is 0.0073 lbs/MMBtu (filterable – front half = 0.0019 lbs/MMBtu (HHV); condensable – back half = 0.0047 lbs/MMBtu (HHV) and a safety margin of 10%) and a fuel input of 464.8 MMBtu/hr - HHV (418.7 MMBtu/hr – LHV).
7. Based on 0.41 grains S/100 scf (from a typical fuel sulfur content of 5 ppmv, which is equivalent to 0.3 grains/100 scf, and a 35% safety margin). Note the value given is based on max. fuel input (25 degree F ambient).

TABLE 3
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION
AMBIENT/OPERATIONAL CASES 5 & 6[1]

	One CT	Both CTs	One Cooling Tower[2]	Both Cooling Towers[2]	ZLD Evap. Tower[2]	Totals
NOx[3]	5.0	10.0	NA	NA	NA	10.0
CO[4]	4.0	8.0	NA	NA	NA	8.0
VOCs[5]	1.4	2.8	NA	NA	NA	2.8
PM10	3.3[6]	6.6	0.035	0.07	0.06	6.73
SO2[7]	0.53	1.05	NA	NA	NA	1.05

Notes:

1. Based on an ambient temperature of 62 degrees F and the CT air inlet chillers off.
2. PM10 is the only emission from this equipment. Cooling Tower and ZLD PM10 emissions rates from Tables 5.8-6 & 5.8-7, respectively, of the Public Health Section.
3. CT NOx emissions are based on water injection to 25 ppmdv @ 15% O2 and an approximately 88% effective SCR system to 3.0 ppmdv @ 15% O2.
4. CT CO emissions are based on a pre-oxidation catalyst level of 32 ppmdv @ 15% O2 and an approximately 87-88% effective oxidation catalyst to apprx. 4.0 ppmdv @ 15% O2.
5. Based on an HC emissions rate of 7.0 lbs/hr for the 62 degree F ambient case and VOC = 0.20 HC.
6. Based a total PM_{10} factor of is 0.0073 lbs/MMBtu (filterable – front half = 0.0019 lbs/MMBtu (HHV); condensable – back half = 0.0047 lbs/MMBtu (HHV) and a safety margin of 10%) and a fuel input of 450.7 MMBtu/hr - HHV (406.0 MMBtu/hr – LHV).
7. Based on 0.41 grains S/100 scf (from a typical fuel sulfur content of 5 ppmv, which is equivalent to 0.3 grains/100 scf, and a 35% safety margin). Note the value given is based on max. fuel input (25 degree F ambient).

TABLE 4
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION
AMBIENT/OPERATIONAL CASES 7 & 8[1]

	One CT	Both CTs	One Cooling Tower[2]	Both Cooling Towers[2]	ZLD Evap. Tower[2]	Totals
NOx[3]	5.1	10.2	NA	NA	NA	10.2
CO[4]	5.1	10.2	NA	NA	NA	10.2
VOCs[5]	1.4	2.8	NA	NA	NA	2.8
PM10	3.4[6]	6.8	0.035	0.07	0.06	6.93
SO2[7]	0.53	1.05	NA	NA	NA	1.05

Notes:

1. Based on an ambient temperature of 103 degrees F and the CT air inlet chillers on.
2. PM10 is the only emission from this equipment. Cooling Tower and ZLD PM10 emissions rates from Tables 5.8-6 & 5.8-7, respectively, of the Public Health Section.
3. CT NOx emissions are based on water injection to 25 ppmdv @ 15% O2 and an approximately 88% effective SCR system to 3.0 ppmdv @ 15% O2.
4. CT CO emissions are based on a pre-oxidation catalyst level of 41 ppmdv @ 15% O2 and an approximately 87-88% effective oxidation catalyst to apprx. 5.0 ppmdv @ 15% O2.
5. Based on an HC emissions rate of 7.0 lbs/hr for the 103 degree F ambient case and VOC = 0.20 HC.
6. Based a total PM_{10} factor of is 0.0073 lbs/MMBtu (filterable – front half = 0.0019 lbs/MMBtu (HHV); condensable – back half = 0.0047 lbs/MMBtu (HHV) and a safety margin of 10%) and a fuel input of 464.8 MMBtu/hr - HHV (418.7 MMBtu/hr – LHV).
7. Based on 0.41 grains S/100 scf (from a typical fuel sulfur content of 5 ppmv, which is equivalent to 0.3 grains/100 scf, and a 35% safety margin). Note the value given is based on max. fuel input (25 degree F ambient).

TABLE 5
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION
AMBIENT/OPERATIONAL CASES 9 & 10[1]

	One CT	Both CTs	One Cooling Tower[2]	Both Cooling Towers[2]	ZLD Evap. Tower[2]	Totals
NOx[3]	4.1	8.2	NA	NA	NA	8.2
CO[4]	1.5	3.0	NA	NA	NA	3.0
VOCs[5]	1.0	2.0	NA	NA	NA	2.0
PM10	2.8[6]	5.6	0.035	0.07	0.06	5.73
SO2[7]	0.53	1.05	NA	NA	NA	1.05

Notes:

1. Based on an ambient temperature of 103 degrees F and the CT air inlet chillers off.
2. PM10 is the only emission from this equipment. Cooling Tower and ZLD PM10 emissions rates from Tables 5.8-6 & 5.8-7, respectively, of the Public Health Section.
3. CT NOx emissions are based on water injection to 25 ppmdv @ 15% O2 and an approximately 88% effective SCR system to 3.0 ppmdv @ 15% O2.
4. CT CO emissions are based on a pre-oxidation catalyst level of 15 ppmdv @ 15% O2 and an approximately 87-88% effective oxidation catalyst to apprx. 2.0 ppmdv @ 15% O2.
5. Based on an HC emissions rate of 5.0 lbs/hr for the 103 degree F ambient case and VOC = 0.20 HC.
6. Based a total PM_{10} factor of is 0.0073 lbs/MMBtu (filterable – front half = 0.0019 lbs/MMBtu (HHV); condensable – back half = 0.0047 lbs/MMBtu (HHV) and a safety margin of 10%) and a fuel input of 371.9 MMBtu/hr - HHV (335.0 MMBtu/hr – LHV).
7. Based on 0.41 grains S/100 scf (from a typical fuel sulfur content of 5 ppmv, which is equivalent to 0.3 grains/100 scf, and a 35% safety margin). Note the value given is based on max. fuel input (25 degree F ambient).

TABLE 6

GE LM6000 PC-SPRINT

PERFORMANCE DATA

Estimated Average Engine Performance

GE Aero Energy Products
A GE Power Systems Business

Performance By: **MWALENCI**
Project Info: **Kings River Conservation District**

Engine: **LM6000 PC-SPRINT w/o VIGVs**
Deck Info: **GE125M - 7tt.scp (PC) / 81m.scp (SPRINT)**
Generator: **290ERT 60Hz, 13.8kV, 0.9PF (14839)**
Fuel: **Site Gas Fuel#900-19T, 20744 Btu/lb,LHV**

Date: **9/22/2003**
Time: **3:33:09 PM**
Version: **2.4.0**

Case #	100	101	102	103	104
Ambient Conditions					
Dry Bulb, °F	25.0	62.0	62.0	103.0	103.0
Wet Bulb, °F	24.0	54.0	54.0	73.0	73.0
RH, %	87.2	60.2	60.2	24.2	24.2
Altitude, ft	295.0	295.0	295.0	295.0	295.0
Engine Inlet					
Temperature, °F	35.0	48.0	62.0	48.0	103.0
RH, %	55.9	95.0	60.2	95.0	24.2
Conditioning	HEAT	CHILL	NONE	CHILL	NONE
Tons or kBtu	2487	334	0	1573	0
Pressure Losses					
Inlet Loss, inH20	5.00	5.00	5.00	5.00	5.00
Volute Loss, inH20	4.00	4.00	4.00	4.00	4.00
Exhaust Loss, inH20	10.00	10.00	10.00	10.00	10.00
kW, Gen Terms	49742	49088	47203	49088	36828
Est. Btu/kW-hr, LHV	8446	8531	8602	8531	9095
Fuel Flow					
MMBtu/hr, LHV	420.1	418.7	406.0	418.7	335.0
lb/hr	20252	20186	19573	20186	16147
Water Injection					
lb/hr	24034	22698	21983	22698	16486
Temperature, °F	100	100	100	100	100
Steam Injection					
lb/hr	0	0	0	0	0
Temperature, °F	0	0	0	0	0
SPRINT	OFF	LPC	LPC	LPC	LPC
lb/hr	0	4074	5599	4074	8303
Control Parameters					
HP Speed, RPM	10477	10515	10558	10515	10490
LP Speed, RPM	3600	3600	3600	3600	3600
CDP, psia	459.6	451.9	439.7	451.9	381.0
CDT, °F	1001	996	1001	996	1001
T48, °R	2026	2040	2039	2040	1993
Exhaust Parameters					
Temperature, °F	815	831	837	831	842
lb/sec	300.5	293.6	285.6	293.6	250.4
lb/hr	1081800.0	1056960.0	1028160.0	1056960.0	901440.0
Energy, Btu/s- ref 0 °R	98477	98108	96097	98108	84736
Cp, Btu/lb-R	0.2741	0.2767	0.2773	0.2767	0.2778
Emissions					
NOx, ppmvd	25	25	25	25	25
NOx, lb/hr	42	42	41	42	34
CO, ppmvd	41	30	27	30	15
CO, lb/hr	42	30	27	30	12
HC, ppmvd	5	3	3	3	2
HC, lb/hr	3	2	2	2	1
Maximum Emissions					
CO, ppmvd	49	41	32	41	15
CO, lb/hr	50	41	32	41	12
HC, ppmvd	13	10	10	10	10
HC, lb/hr	8	7	7	7	5

Estimated Average Engine Performance

GE Aero Energy Products
A GE Power Systems Business

Performance By: **MWALENCI**
Project Info: **Kings River Conservation District**

Engine: **LM6000 PC-SPRINT w/o VIGVs**
Deck Info: **GE125M - 7tt.scp (PC) / 81m.scp (SPRINT)**
Generator: **290ERT 60Hz, 13.8kV, 0.9PF (14839)**
Fuel: **Site Gas Fuel#900-19T, 20744 Btu/lb,LHV**

Date: **9/22/2003**
Time: **3:33:09 PM**
Version: **2.4.0**

Case #	100	101	102	103	104
Exh Wght % Wet					
AR	1.2323	1.2272	1.2269	1.2272	1.2275
N2	72.2851	71.9873	71.9666	71.9873	72.0032
O2	14.9551	14.6901	14.6937	14.6901	15.1168
CO2	5.0594	5.1816	5.1749	5.1816	4.8891
H20	6.4613	6.9080	6.9324	6.9080	6.7593
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0039	0.0029	0.0026	0.0029	0.0014
HC	0.0003	0.0002	0.0002	0.0002	0.0001
NOX	0.0027	0.0027	0.0027	0.0027	0.0026
Exh Mole % Dry					
AR	0.9659	0.9668	0.9668	0.9668	0.9649
N2	80.7929	80.8728	80.8699	80.8728	80.7078
O2	14.6341	14.4485	14.4557	14.4485	14.8346
CO2	3.5996	3.7055	3.7016	3.7055	3.4884
H20	0.0000	0.0000	0.0000	0.0000	0.0000
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0043	0.0032	0.0029	0.0032	0.0016
HC	0.0005	0.0004	0.0003	0.0004	0.0002
NOX	0.0027	0.0027	0.0027	0.0027	0.0026
Exh Mole % Wet					
AR	0.8684	0.8627	0.8623	0.8627	0.8632
N2	72.6358	72.1641	72.1319	72.1641	72.2013
O2	13.1566	12.8926	12.8938	12.8926	13.2711
CO2	3.2362	3.3064	3.3017	3.3064	3.1207
H20	10.0963	10.7685	10.8050	10.7685	10.5398
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0039	0.0029	0.0026	0.0029	0.0014
HC	0.0005	0.0003	0.0003	0.0003	0.0002
NOX	0.0024	0.0024	0.0024	0.0024	0.0023

GE Aero Energy Products Fuel #

	Volume%		Volume%	Weight%
Hydrogen	0.0000	Cyclopentane	0.0000	0.0000
Methane	94.9600	Hexane	0.0000	0.0000
Ethane	3.2800	Heptane	0.0000	0.0000
Ethylene	0.0000	Carbon Monoxide	0.0000	0.0000
Propane	0.1100	Carbon Dioxide	0.6800	1.7758
Propylene	0.0000	Nitrogen	0.9300	1.5459
Butane	0.0300	Water Vapor	0.0000	0.0000
Butylene	0.0000	Oxygen	0.0000	0.0000
Butadiene	0.0000	Hydrogen Sulfide	0.0000	0
Pentane	0.0100	Ammonia	0.0000	0.0000
Argon	0.0000			
		Btu/lb, LHV	20744	
	Btu/scf, LHV		1023.89	
	Fuel Temp, °F		22994.4	

TABLE 7

DILUTION AIR CALCULATIONS

TABLE 7
DILUTION AIR CALCULATIONS
KRCDPP

CASE NUMBER	1	2	3	4	5	6	7	8	9	10
AMBIENT TEMPERATURE	25	25	62	62	62	62	103	103	103	103
AMBIENT HUMIDITY	87.2	87.2	60.2	60.2	60.2	60.2	24.2	24.2	24.2	24.2
CHILLING	off	off	on	on	off	off	on	on	off	off
DILLUTION AIR	off	on	off	on	off	on	off	on	off	on
STACK										
TEMPERATURE	815	750	831	750	837	750	831	750	842	750
EXHAUST FLOW (LBS/HR)	1,081,800	1,189,716	1,056,960	1,195,960	1,028,160	1,173,482	1,056,960	1,204,546	901,440	1,044,287
EXHAUST FLOW (ACFM)	596,281	620,746	591,314	624,854	577,965	613,110	591,314	629,207	508,454	545,157
EXIT VELOCITY(fps)	87.87	91.48	87.14	92.08	85.17	90.35	87.14	92.72	74.93	80.34
TURBINE EXHAUST										
TEMPERATURE	815	815	831	831	837	837	831	831	842	842
EXHAUST FLOW (LBS/HR)	1,081,800	1,081,800	1,056,960	1,056,960	1,028,160	1,028,160	1,056,960	1,056,960	901,440	901,440
EXHAUST FLOW (ACFM)	596,281	596,281	591,314	591,314	577,965	577,965	591,314	591,314	508,454	508,454
DILUTION AIR										
TEMPERATURE	-	25	-	62	-	62	-	103	-	103
FLOW (LBS/HR)	-	107,916	-	139,000	-	145,322	-	147,586	-	142,847
FLOW (ACFM)	-	21,980	-	30,471	-	31,857	-	34,895	-	33,774

Case 1 - Cold Ambient with no dilution air
Case 2 - Cold ambient with dilution air.
Case 3 - Average ambient, chillers on with no dilution air
Case 4 - aveage ambient, chillers on with dilution air
Case 5 - Average ambient, chillers off, with no dilution air
Case 6 - Average ambient, chillers off with dillution air
Case 7 - Peak ambient, chillers on with no dilution air
Case 8 - Peak ambient, chillers on with dilution air
Case 9 - Peak Ambient, chillers off with no dilution air
Case 10 - Peak ambient, chillers off with dilution air
Stack Diameter 12 ft.

Appendix 5.1-4

1.0 On-site Construction

As shown in Table 1, construction of the KRCDPP is expected to require approximately 150 days, lasting over a 6-month period (6 days per week over 26 weeks). On-site construction will include of the following five main phases:

- Site preparation - clearing, grading, excavation of footings and foundations, and backfilling operations;
- Foundation work - construction of the foundations and structures;
- Installation of major equipment;
- Construction/installation of major structures; and
- Start up and commissioning.

Air emissions resulting from on-site construction will consist of fugitive dust and tailpipe emissions from construction and associated equipment. Fugitive dust emissions will include dust created as a result of:

- Site preparation, grading, excavation, soil/aggregate loading & unloading and backfilling;
- On-site vehicle travel on unpaved and gravel surfaces; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions will include exhaust from:

- On-site diesel and gasoline powered construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Diesel and gasoline powered delivery vehicles bringing materials to the site; and
- Automobiles and trucks used by workers to commute to the construction site.

Combustion exhaust and fugitive dust (PM10) emission rates have been estimated for each source of emissions to determine the potential worst-case daily construction impacts. Worst-case daily emissions are expected to occur during Weeks 3 through 6 of the construction schedule. Annual emissions are based on the average equipment mix and use during the overall 6-month construction period.

2.0 Natural Gas/Water Pipelines and Transmission Lines

The KRCDPP includes the installation of three off-site interconnections:

- Water supply and wastewater discharge pipelines run together for an off-site distance of up to approximately 2,000 feet;

TABLE 1

CONSTRUCTION EQUIPMENT SCHEDULE

KRCDPP

Week No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Totals	Av. # of Units over 6 month const sch	Av. # of Units over 12 months (Annual Average)
Scaper		1	1																								2	0.077	0.038
Bulldozer D6		1	1	1																							3	0.115	0.058
Bulldozer D4		1	1	1	1	1																1	1	1			8	0.308	0.154
Grader		1	1	1															1	1							5	0.192	0.096
Backhoe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												15	0.577	0.288
Loader	1	1	1	1	1	1	1	1																			8	0.308	0.154
Vib Roller	1	1	1	1	1	1	1	1																			8	0.308	0.154
Dump Truck	1	2	2	2	2	1	1	1	1	0.5	0.5										1	1	1				17	0.654	0.327
Water Truck	1	1	1	1	1	1	1	1																			8	0.308	0.154
Trencher		1	1	1									1	1	1												6	0.231	0.115
Forklift					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		21	0.808	0.404
Concrete Truck		1	2	2	2	1	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			19.5	0.750	0.375
PU Truck	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2		70	2.692	1.346
Concrete Pump		1	1	1	1	1	1	1	1	1	1																10	0.385	0.192
Service Truck	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			24	0.923	0.462
3Ton Flatbead			1	1	2	2	2	2	2	2	2	1	1	1	1	1	1										22	0.846	0.423
																											0	0.000	0.000
Crane 35T			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					20	0.769	0.385
Crane 200T									2	2	1	1				1	1	1	1	1	1	1	1				14	0.538	0.269
Crane 85T									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				15	0.577	0.288
Crane 45T													1	1	1	1	1	1	1								7	0.269	0.135
Air Compressor		1	1	1	1	1	1	1	1	1	1	1	1	1	1												14	0.538	0.269
Air compressor-750 cfm						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							15	0.577	0.288
Welders			1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1					32	1.231	0.615
Tractor truck 5th wheel													1	1	1												3	0.115	0.058
Portable compaction-vibratory plate			1	1	1	1																					4	0.154	0.077
Portable compaction-vibratory ram			1	1	1	1																					4	0.154	0.077
Articulating boom platforms			1	1	1	1																					4	0.154	0.077
Concrete vibrators			1	1	1	1	1	1																			6	0.231	0.115
Concrete trowel machine			1	1	1	1	1	1																			6	0.231	0.115
Portable power generators	1	1	1	2	2	2	2																				12	0.462	0.231
Portable compaction roller			1	1	1	1	1	1	1	1	1	1															10	0.385	0.192

- Natural gas fuel supply pipeline run for an off-site distance of up to approximately 700 feet; and
- Electrical transmission line, which required the replacement of approximately 15 off-site transmission line poles.

These off-site interconnection facilities will generate short-term construction impacts, including fugitive dust and construction equipment combustion emissions, from the same types of sources as those causing on-site construction impacts. However, the duration and magnitude of these off-site impacts will be considerably less than those resulting from on-site construction activities. For the pipelines, construction activities will be performed in approximately 500-foot long sections to minimize fugitive dust and construction equipment combustion emissions. The transmission pole replacements, approximately 4-6 daily, will not disturb significant square footage.

3.0 Available Mitigation Measures

The following mitigation measures are proposed to control combustion exhaust emissions from the diesel heavy duty equipment used during construction of the KRCDPP:

- Operational measures, such as limiting engine idling time and shutting down equipment when not in use;
- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of ultra-low sulfur and low aromatic fuel meeting California standards for motor vehicle diesel fuel; and
- Use of low-emitting diesel engines meeting federal emissions standards for construction equipment, if available.

The following mitigation measures are proposed to control fugitive dust emissions during construction of the KRCDPP:

- Use either water application or chemical dust suppressant application to control dust emissions from unpaved surface travel and unpaved parking areas;
- Use vacuum sweeping and/or water flushing of paved road surface to remove buildup of loose material to control dust emissions from travel on paved access roads (including adjacent public streets impacted by construction activities) and paved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;
- Limit traffic speeds on unpaved surfaces to no more than 25 miles per hour;
- Install sandbags or other erosion control measures to prevent silt runoff to

roadways;

- Re-plant vegetation in disturbed areas as quickly as practicable;
- As needed, use gravel pads along with wheel washers or wash tires of all trucks exiting construction site that carry track-out dirt from unpaved surfaces; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant and/or use of wind-breaks.

4.0 Construction Emissions (with Mitigation Measures)

4.1 On-site Construction

Tables 2 and 3 show the estimated maximum daily and annual equipment exhaust and fugitive dust emissions with recommended mitigation measures for on-site construction activities. Detailed emission calculations are included in Tables CE1 - CE10 at the end of this appendix.

4.2 Off-site (Pipeline/Transmission Line) Construction

Table 4 shows the estimated maximum daily equipment exhaust and fugitive dust emissions with recommended mitigation measures for the water/wastewater pipelines, natural gas pipeline and the transmission line interconnect construction activities. The following is the expected construction period for each pipeline/transmission line route:

- Water/wastewater pipelines – 3 weeks
- Natural gas pipeline – 2 weeks
- Transmission line interconnection – 2 weeks

Because of the temporary nature of these off-site construction activities, annual emissions are not shown in the following emission summary tables for these construction activities. Detailed emission calculations are included in Tables CE11 - CE22 at the end of this appendix.

Table 2 Maximum Daily Emissions On-Site During Construction Weeks 3 through 6 - Maximum Dust Emissions (lbs/day) KRCDPP					
	NOx	**CO**	**POC**	**SOx**	**PM10**
Construction Equipment	136.44	72.34	14.11	0.14	8.24
Fugitive Dust	--	--	--	--	26.68
Worker Travel, Truck Deliveries	35.43	199.53	16.49	0.85	1.48
Total Emissions					
Total	171.87	271.87	30.6	0.99	36.4

Table 3 Annual Emissions On-Site During Construction (tons/yr) KRCDPP					
	NOx	**CO**	**VOC**	**SOx**	**PM10**
Construction Equipment	3.98	2.78	0.51	0.004	0.26
Fugitive Dust	--	--	--	--	0.66
Worker Travel, Truck Deliveries	2.27	10.34	0.87	0.06	0.16
Total Emissions					
Total	6.25	13.12	1.38	0.06	1.08

Table 4 Maximum Daily Emissions During Pipeline/Transmission Line Interconnect Construction (lbs/day)					
	NOx	CO	VOC	SOx	PM10
Water Supply and Wastewater Discharge Pipelines					
Construction Equipment	70.50	23.84	5.35	2.43	3.54
Fugitive Dust	--	--	--	--	3.50
Truck Deliveries and Worker Travel	12.42	21.4	2.13	0.48	0.66
Total Emissions	82.92	45.24	7.48	2.91	7.7
Natural Gas Fuel Pipeline					
Construction Equipment	70.50	23.84	5.35	2.43	3.54
Fugitive Dust	--	--	--	--	2.51
Truck Deliveries and Worker Travel	12.42	21.4	2.13	0.48	0.66
Total Emissions	82.92	45.24	7.48	2.91	6.71
Transmission Line Interconnect					
Construction Equipment	66.7	14.21	4.29	1.94	3.06
Fugitive Dust	--	--	--	--	0.97
Truck Deliveries and Worker Travel	35.43	42.61	4.7	1.44	1.96
Total Emissions	102.13	56.82	8.99	3.38	5.99

5.0 Potential Air Quality Impacts Resulting from Construction

5.1 On-Site Construction

Ambient air quality impacts from emissions during construction of the KRCDPP were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including on-site vehicle and equipment exhaust emissions and fugitive dust.

5.1.1 Dispersion Modeling Methodology

As in the analysis of potential air quality impacts from KRCDPP operations, the EPA-approved Industrial Source Complex Short Term (ISCST3) model was used to estimate ambient impacts from construction activities. A more detailed discussion of the inputs to the ISCST3 dispersion model is included in Section 5.1 of the Small Power Plant Exemption (SPPE) application.

For the purpose of estimating potential impacts, the emission sources for the construction site were grouped into three categories: exhaust emissions, construction dust emissions, and wind blown dust emissions. The exhaust and construction dust emissions were modeled as volume sources. The wind blown dust emissions were modeled as an area source. For the volume sources, the vertical dimension was set to 6 meters. An effective plume height of 0.5 meters was used in the modeling analysis for the area sources. The KRCDPP project area was further divided into two areas, the temporary construction laydown area and the project site. For short-term impacts (24-hours and less), the maximum emissions could occur during a 2-week period out of a 26 week period. Fugitive dust generated from construction equipment and exhaust emissions were evenly divided between these two construction areas. For annual impacts, the construction dust and exhaust emissions in the laydown area were assumed to only occur during the 2-week period, and the construction emissions from the project site would be those that would occur during the 2-week period plus those that would occur during the remaining 24-week period. To determine the construction impacts on short-term ambient standards (24 hours and less), the worst-case daily onsite construction emission levels shown in Table 2 were used. For pollutants with annual average ambient standards, the annual onsite emission levels shown in Table 3 were used. Table 5 lists the parameters input to the ISCST3 model for short-term and annual average construction emissions calculations.

The construction impacts modeling analysis used the same receptor locations as used for the Project operating impact analysis. A detailed discussion of the receptor locations is included in Section 5.1 of the SPPE.

The same meteorological data set (1989 Fresno data) and background ambient levels (Fresno-Drummond Street monitor), used for the modeling analysis of the KRCDPP's operational emissions, were used for the construction emissions impact analysis.

The one-hour and annual average concentrations of NO2 were computed following the revised EPA guidance for computing these concentrations (August 9, 1995 *Federal Register,* 60 FR 40465). The OLM_ISC model was used for the one-hour average NO2 impacts. The annual average was calculated assuming all NO_x emissions were emitted as

NO2. Concurrent ozone data were provided by the SJVAPCD from the Fresno Drummond Street monitoring station (SJVAPCD, 2003).

5.1.2 Modeling Results

Based on the emission rates of NOx, SO2, CO, and PM10 and the meteorological data, the ISCST3 model calculates hourly and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour, 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NOx, SO2, CO, and PM10. The annual impacts are based on the annual emission rates of these pollutants.

Table 5
Construction – ISCST3 Source Parameters
KRCDPP

Source name	Purpose	Type	Release Height (meters)	Initial Lateral Dimension (meters)	Initial Vertical Dimension meters	Length of Side (meters)
TEMPWND	Wind-blown dust, temporary laydown area	AREA	.5	n/a	n/a	121.0
PROJWND	Wind-blown dust, project site	AREA	.5	n/a	n/a	207.3 short-term 150.5 annual
TEMPFUG	Equipment fugitive dust, temporary laydown area	VOLUME	0	28.1	6	n/a
PROJFUG	Equipment fugitive dust, project site	VOLUME	0	48.2 short-term 35 annual	6	n/a
TEMPEX	Exhaust emissions, temporary laydown area	VOLUME	0	28.1	6	n/a
PROJEX	Exhaust emissions, project site	VOLUME	0	48.2 short-term 35 annual	6	n/a

The one-hour and annual average concentrations of NO2 were computed following the revised EPA guidance for computing these concentrations (August 9, 1995 *Federal Register,* 60 FR 40465). The OLM_ISC model was used for the one-hour average NO2 impacts. The annual average was calculated using the ambient ratio method (ARM) with the EPA default value of 0.75 for the annual average NO2/NOx ratio.

The modeling analysis results are shown in Table 6. Also included in this table are the maximum background levels that have occurred during the past three years and the resulting total ambient impacts. As shown in Table 6, with the exception of PM10 impacts, construction impacts for all modeled pollutants are expected to be below the state and national AAQS. PM10 impacts from Project construction activities will not exceed either the 24-hour or annual standards. However, the state and federal 24-hour and annual average PM10 standards are exceeded by ambient background levels in the absence of the Project's construction emissions.

Table 6
Modeled Maximum Construction Impacts
KRCDPP

Pollutant	Averaging Time	Maximum Construction Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO2[a]	1-Hour	177	169	346	470	--
	Annual	13	43	56	--	100
SO2	1-Hour	0.7	78	79	650	--
	3-Hour	0.3	78	78	--	1300
	24-Hour	0.2	16	16	105	365
	Annual	0.01	8	8	--	80
CO	1-Hour	344	10285	10629	23,000	40,000
	8-Hour	153	4880	5033	10,000	10,000
PM10	24-Hour	44	186	230	50	150
	Annual[b]	3	52	55	20	50

Notes:
a. OLM_ISC used for 1-hr average impact.
b. Annual Arithmetic Mean.

The total impacts shown in Table 6 assume that the maximum background levels occur simultaneously with the maximum KRCDPP impacts. This conservative assumption, while useful for estimating the worst-case total impact that is possible, is not realistic and the actual total impacts will almost certainly be considerably less than those shown. PM10 impacts resulting from construction will be relatively short in duration, e.g., the

maximum KRCDPP impacts are scheduled to occur for 1-2 weeks, and confined to a small area.

Figures 1 & 2 show the extent of the modeled impacts from construction PM10 for the 24-hour and annual averaging periods. As shown on these isopleths, while maximum impacts occur along the southeastern KRCDPP site fence line, concentrations decrease rapidly at locations only a couple of hundred meters away from the project site. For example, as shown on Figure 1 for 24-hr average PM10 impacts along the southeastern fence line, PM_{10} impacts are approximately 40 $\mu g/m^3$. However, at locations 200 to 450 meters way from the fence line PM10 impacts decrease to approximately 10 $\mu g/m^3$ (only 25% of the level at the fence line). There are no sensitive receptors or residences in this area.

Emissions impacts due to fugitive dust and equipment tailpipe emissions during KRCDPP construction are similar to those for the construction of other power projects, and presumably significantly less than those associated with larger scale (i.e., both land area and duration) land development activities. While fugitive dust and other PM10 emissions impacts from KRCDPP construction are unavoidable, the PM10 mitigation measures proposed for the KRCDPP have been included to minimize fugitive dust emissions during construction.

The input and output modeling files for construction impacts are being provided electronically and under separate cover.

5.1.3 Health Risk from Diesel Exhaust

The combustion portion of annual PM10 emissions from Table 3 was modeled separately to determine the annual average Diesel PM10 exhaust concentration. This was used with the ARB-approved unit risk value of 300 in one million for a 70-year lifetime to determine the potential carcinogenic risk from diesel exhaust during construction. The exposure was also adjusted by a factor of 0.5/70, or 0.007, to correct for the 6-month exposure during the construction period.

The maximum modeled annual average concentration of diesel exhaust PM10 was 0.59 ug/m^3. Using the unit risk value and adjustment factors described above, the carcinogenic risk due to exposure to diesel exhaust during construction activities is expected to be approximately 1.25 in one million. Therefore, the impacts at all receptors are below the 10 in one million level considered to be significant under the SJVAPCD's CEQA guidelines. These receptors were located adjacent to the southeastern fence line and extended less than 100 meters from the property boundary. Figure 3 shows the

location of these receptors. (Review of the model output shows that only 15 receptors in this area would have annual concentrations over 0.476 $\mu g/m^3$, the concentration at which the excess cancer risk could exceed 1 in one million.)

5.2 Analysis of Ambient Impacts from Pipeline/Transmission Line Interconnect Construction

Construction of the water and natural gas pipelines and the transmission line interconnect will be of short duration and require minimal equipment. This construction will generally occur along public roads and utility rights-of-way. Therefore, the potential ambient air quality impacts associated with these construction activities are expected to be minimal.

5.3 References

SJVAPCD. 2003. E-mail from Leland Villavalzo, Supervising Air Quality Specialist. November 13.

CONSTRUCTION EMISSIONS TABLES

CE1 – CE22

TABLE CE1
KRCDPP
CONSTRUCTION EQUIPMENT
EMISSIONS FACTORS

				Base Factors g/bhp-hr, if Tier 1 >50 hp (Note 1)					In Use Adjustment Factors (Note 2)						Adj Factor (Note 3)	Adjusted Emissions Factors (g/bhp-hr)					
Equipment	HP Cat.	Tier	BSFC lb/hp-hr	NOx	CO	POC	SOx	PM10	Adj. Type	NOx	CO	POC	SOx	PM10	PM10 Fuel S	BSFC	NOx	CO	POC	SOx	PM10
Crawler Crane- Greater than 300 ton	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Crawler Crane- Greater than 200 ton	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Crane - Mobile 65 ton	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Cranes -Mobile 45 ton	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	None	1	1	1	1	1	-0.086	0.367	5.65	0.87	0.34	0.0049	0.19
Cranes - Mobile 35 ton	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	None	1	1	1	1	1	-0.086	0.367	5.66	0.87	0.34	0.0049	0.19
Bulldozer D6H	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Bulldozer D4C	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Excavator- Trencher	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Excavator- Earth Scraper	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Excavator-Motor Grader	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Excavator- Backhoe/loader	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	6.16	6.08	1.19	0.0064	0.82
Excavator - loader	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Vibratory Roller	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Portable Compaction roller	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Truck- Water	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Forklift	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Dump Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Concrete Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Truck- Fuel/Lube	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Concrete Pumper Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Tractor Truck 5th Wheel	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Trucks- Pickup 3/4 ton	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Trucks- 3 ton	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Diesel Powered Welder	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.094	0.40	7.59	12.85	4.12	0.0052	1.48
Light Plants	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.094	0.40	6.90	5.00	1.80	0.0053	0.71
Portable Compaction- Vibratory Plate	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.095	0.408	6.90	5.00	1.80	0.0054	0.70
Portable Compaction- Vibratory Ram	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.095	0.408	6.90	5.00	1.80	0.0054	0.70
Articulating Boom Platforms	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	7.59	12.85	4.12	0.0063	1.46
Pumps	Gasoline	na	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Air Compressor 185 CFM	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.094	0.40	6.90	5.00	1.80	0.0053	0.71
Air Compressor 750 CFM	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.094	0.40	6.90	5.00	1.80	0.0053	0.71
Concrete Vibrators	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	6.56	7.65	1.89	0.0054	0.89
Concrete Trowel Machine	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	6.56	7.65	1.89	0.0054	0.89
Fusion Welder	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	7.59	12.85	4.12	0.0063	1.46
Portable Power Generators	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	None	1	1	1	1	1	-0.095	0.408	6.90	5.00	1.80	0.0054	0.70

Notes:
(1) - Steady State Emission Factors from Table A2 of EPA November 2002 NR-009b Publication.
(2) - In use adjustment factors per Table A3 EPA November 2002 NR-009b Publication.
(3) - PM10 and SO2 adjustments due to Equation 5 and Equation 7 on pages 18 and 19, Respectively of EPA Report No. NR-009b

TABLE CE2
KRCDPP
CONSTRUCTION EQUIPMENT
EMISSIONS RATES

Equipment	Tier	Adjusted Emissions Factors (lbs/1000 gallons) (Note 4) NOx	CO	POC	SOx	PM10	Total Fuel Use (gal/day) (Note 5)	Daily Emissions (lbs/day) NOx	CO	POC	SOx	PM10	Total Fuel Use (gal/yr) (Note 6)	Annualized Emissions (lbs/yr) NOx	CO	POC	SOx	PM10
Crawler Crane- Greater than 300 ton	1	237.87	31.88	13.16	0.21	7.09	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Crawler Crane- Greater than 200 ton	1	237.87	31.88	13.16	0.21	7.09	0	0.00	0.00	0.00	0.00	0.00	1614	383.92	51.46	21.24	0.34	11.44
Crane - Mobile 65 ton	1	237.87	31.88	13.16	0.21	7.09	0	0.00	0.00	0.00	0.00	0.00	1384.8	329.40	44.15	18.22	0.29	9.82
Cranes -Mobile 45 ton	1	241.07	36.96	14.43	0.21	8.28	16	3.86	0.59	0.23	0.00	0.13	645.6	155.64	23.86	9.32	0.13	5.34
Cranes - Mobile 35 ton	1	241.07	36.96	14.43	0.21	8.28	16	3.86	0.59	0.23	0.00	0.13	1845.6	444.92	68.22	26.64	0.38	15.27
Buildozer D6H	1	226.75	56.00	15.00	0.21	10.88	44	9.98	2.46	0.66	0.01	0.48	759.0	172.10	42.50	11.39	0.16	8.26
Buildozer D4C	1	202.03	137.47	20.79	0.21	18.44	24	4.85	3.30	0.50	0.00	0.44	1108.8	224.01	152.43	23.05	0.23	20.44
Excavator- Trencher	1	202.03	137.47	20.79	0.21	18.44	16	3.23	2.20	0.33	0.00	0.29	554.4	112.01	76.22	11.53	0.12	10.22
Excavator- Earth Scraper	1	223.74	48.29	13.68	0.21	9.43	72	16.11	3.48	0.98	0.01	0.68	831.6	186.06	40.16	11.38	0.17	7.84
Excavator-Motor Grader	1	226.75	56.00	15.00	0.21	10.88	40	9.07	2.24	0.60	0.01	0.44	1152.0	261.22	64.51	17.29	0.24	12.53
Excavator- Backhoe/loader	1	200.23	197.65	38.81	0.21	26.63	20	4.00	3.95	0.78	0.00	0.53	1731.0	346.60	342.13	67.18	0.36	46.10
Excavator - loader	1	202.03	137.47	20.79	0.21	18.44	20	4.04	2.75	0.42	0.00	0.37	924.0	186.68	127.03	19.21	0.19	17.04
Vibratory Roller	1	226.75	56.00	15.00	0.21	10.88	80	18.14	4.48	1.20	0.02	0.87	3696.0	838.07	206.96	55.46	0.77	40.20
Portable Compaction roller	1	223.74	48.29	13.68	0.21	9.43	80	17.90	3.86	1.09	0.02	0.75	4620.0	1033.66	223.12	63.20	0.96	43.58
Truck- Water	na	170.68	106.79	15.33	0.21	9.59	25.04	4.27	2.67	0.38	0.01	0.24	1156.8	197.44	123.53	17.73	0.24	11.10
Forklift	1	202.03	137.47	20.79	0.21	18.44	0	0.00	0.00	0.00	0.00	0.00	1212.0	244.86	166.62	25.20	0.25	22.35
Dump Truck	na	170.68	106.79	15.33	0.21	9.59	50.08	8.55	5.35	0.77	0.01	0.48	2456.4	419.26	262.31	37.66	0.52	23.56
Concrete Truck	na	170.68	106.79	15.33	0.21	9.59	50.08	8.55	5.35	0.77	0.01	0.48	2817	480.81	300.82	43.17	0.59	27.02
Truck- Fuel/Lube	na	170.68	106.79	15.33	0.21	9.59	12.52	2.14	1.34	0.19	0.00	0.12	1733.4	295.86	185.10	26.57	0.36	16.63
Concrete Pumper Truck	na	170.68	106.79	15.33	0.21	9.59	25.04	4.27	2.67	0.38	0.01	0.24	1446.1	246.82	154.42	22.16	0.30	13.87
Tractor Truck 5th Wheel	na	170.68	106.79	15.33	0.21	9.59	0	0.00	0.00	0.00	0.00	0.00	431.9	73.72	46.12	6.62	0.09	4.14
Trucks- Pickup 3/4 ton	na	62.81	677.30	46.28	0.27	1.56	18.72	1.18	12.68	0.87	0.01	0.03	2519.7	158.26	1706.59	116.61	0.68	3.93
Trucks- 3 ton	na	74.40	59.47	5.57	0.21	4.83	12.48	0.93	0.74	0.07	0.00	0.06	1583.7	117.84	94.18	8.81	0.33	7.65
Diesel Powered Welder	0	297.01	502.84	161.30	0.20	58.01	5.08	1.51	2.55	0.82	0.00	0.29	472.4	140.31	237.54	76.20	0.10	27.40
Light Plants	0	270.01	195.66	70.44	0.21	27.64	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Portable Compaction- Vibratory Plate	0	264.71	191.82	69.06	0.21	27.03	2	0.53	0.38	0.14	0.00	0.05	46.2	12.23	8.86	3.19	0.01	1.25
Portable Compaction- Vibratory Ram	0	264.71	191.82	69.06	0.21	27.03	2	0.53	0.38	0.14	0.00	0.05	46.2	12.23	8.86	3.19	0.01	1.25
Articulating Boom Platforms	0	246.77	417.78	134.01	0.20	47.58	2	0.49	0.84	0.27	0.00	0.10	46.2	11.40	19.30	6.19	0.01	2.20
Pumps	na	79.44	13813.38	748.58	0.27	2.35	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Air Compressor 185 CFM	0	270.01	195.66	70.44	0.21	27.64	10.16	2.74	1.99	0.72	0.00	0.28	819.9	221.38	160.42	57.75	0.17	22.66
Air Compressor 750 CFM	0	270.01	195.66	70.44	0.21	27.64	0	0.00	0.00	0.00	0.00	0.00	879.3	237.42	172.04	61.93	0.18	24.31
Concrete Vibrators	0	248.99	290.58	71.79	0.21	33.71	2	0.50	0.58	0.14	0.00	0.07	69.3	17.25	20.14	4.98	0.01	2.34
Concrete Trowel Machine	0	248.99	290.58	71.79	0.21	33.71	10.16	2.53	2.95	0.73	0.00	0.34	352	87.64	102.28	25.27	0.07	11.87
Fusion Welder	0	246.77	417.78	134.01	0.20	47.58	0	0.00	0.00	0.00	0.00	0.00	472.4	116.57	197.36	63.31	0.10	22.48
Portable Power Generators	0	264.71	191.82	69.06	0.21	27.03	10.16	2.69	1.95	0.70	0.00	0.27	704.1	186.38	135.06	48.62	0.15	19.03
							665.5						40132					
							Totals	136.44	72.34	14.11	0.14	8.24		7951.98	5564.31	1010.24	8.51	513.12
													Tons/yr	3.98	2.78	0.51	0.004	0.26

(4) - Calculation uses adjusted BSFC and assumed 7.1 lbs/gallon. The onroad and gasoline powered pump emission factors are not adjusted, except for SO2 adjusted for pumps per the gasoline powered 3/4 ton pickup value.
(5) - Based on Week 4 of the construction schedule.
(6) - Based on 150 days of construction within a 6 month period.

TABLE CE3					
KRCDPP					
Const Equip Daily Fuel Use					
Weeks 3-6					
					Total Fuel
	Gasoline/	Number of	Unit-hrs	gallons	Use
Equipment	Diesel	Units	per day	per Unit-hr	(gal/day)
Crawler Crane-Greater than 300 Tons	D	0	4	7.5	0
Crawler Crane-Greater than 200 Tons	D	0	4	5	0
Crane-Mobil 65 Ton	D	0	4	4	0
Crane-Mobil 45 Ton	D	1	4	4	16
Crane-Mobil 35 Ton	D	1	4	4	16
Bulldozer D6H	D	1	8	5.5	44
Bulldozer D4C	D	1	8	3	24
Excavator-Trencher	D	1	8	2	16
Excavator-Earth Scraper	D	1	8	9	72
Excavator-Motor Grader	D	1	8	5	40
Excavator-Backhoe/Loader	D	1	8	2.5	20
Excavator-Loader	D	1	8	2.5	20
Vibratory Roller	D	1	8	10	80
Portable Compaction Roller	D	1	8	10	80
Truck-Water	D	1	8	3.13	25.04
Forklift	D	0	4	2.5	0
Dump Truck	D	2	8	3.13	50.08
Concrete Truck	D	2	8	3.13	50.08
Service Truck-Fuel/Lube	D	1	4	3.13	12.52
Concrete Pumper	D	1	8	3.13	25.04
Tractor Truck 5th Wheel	D	0	8	3.13	0
Truck-Pickup 3/4 Ton	G	3	8	0.78	18.72
Truck-3 Ton	D	1	8	1.56	12.48
Welders-Diesel Powered	D	1	4	1.27	5.08
Light Plants	D	0	8	1.27	0
Portable Compaction-Vibratory Plate	D	1	8	0.25	2
Portable Compaction-Vibratory Ram	D	1	8	0.25	2
Articulating Boom Platforms	D	1	8	0.25	2
Pumps	D	0	8	0.13	0
Air Compressor-185 cfm	D	1	8	1.27	10.16
Air Compressor-750 cfm	D	0	8	1.27	0
Concrete Vibrators	D	1	8	0.25	2
Concrete Trowel Machine	D	1	8	1.27	10.16
Fusion Welder	D	0	4	1.27	0
Portable Power Generators	D	1	8	1.27	10.16
TOTAL					665.52
Notes:					
Number of units/day based on Week 4 of the construction schedule					

TABLE CE4
KRCDPP
Const Equip Annual Fuel Use
Based 6 Month (150 Day) Const Sch

Equipment	Gasoline/ Diesel	Av. # of Units over 6 month const sch	Av. # of Units over 12 months (Annual Average)	Unit-hrs per day	gallons per Unit-hr	Total Fuel Use (gal/day)	Operating days per year	Annualized Fuel Use (gal/yr)
Crawler Crane-Greater than 300 Tons	D	0	0.00	4	7.5	0.00	150	0.0
Crawler Crane-Greater than 200 Tons	D	0.54	0.27	4	5	10.76	150	1614.0
Crane-Mobil 65 Ton	D	0.58	0.29	4	4	9.23	150	1384.8
Crane-Mobil 45 Ton	D	0.27	0.13	4	4	4.30	150	645.6
Crane-Mobil 35 Ton	D	0.77	0.38	4	4	12.30	150	1845.6
Bulldozer D6H	D	0.12	0.06	8	5.5	5.06	150	759.0
Bulldozer D4C	D	0.31	0.15	8	3	7.39	150	1108.8
Excavator-Trencher	D	0.23	0.12	8	2	3.70	150	554.4
Excavator-Earth Scraper	D	0.08	0.04	8	9	5.54	150	831.6
Excavator-Motor Grader	D	0.19	0.10	8	5	7.68	150	1152.0
Excavator-Backhoe/Loader	D	0.58	0.29	8	2.5	11.54	150	1731.0
Excavator-Loader	D	0.31	0.15	8	2.5	6.16	150	924.0
Vibratory Roller	D	0.31	0.15	8	10	24.64	150	3696.0
Portable Compaction Roller	D	0.39	0.19	8	10	30.80	150	4620.0
Truck-Water	D	0.31	0.15	8	3.13	7.71	150	1156.8
Forklift	D	0.81	0.40	4	2.5	8.08	150	1212.0
Dump Truck	D	0.65	0.33	8	3.13	16.38	150	2456.4
Concrete Truck	D	0.75	0.38	8	3.13	18.78	150	2817.0
Service Truck-Fuel/Lube	D	0.92	0.46	4	3.13	11.56	150	1733.4
Concrete Pumper	D	0.39	0.19	8	3.13	9.64	150	1446.1
Tractor Truck 5th Wheel	D	0.12	0.06	8	3.13	2.88	150	431.9
Truck-Pickup 3/4 Ton	G	2.69	1.35	8	0.78	16.80	150	2519.7
Truck-3 Ton	D	0.85	0.42	8	1.56	10.56	150	1583.7
Welders-Diesel Powered	D	0.62	0.31	4	1.27	3.15	150	472.4
Light Plants	D	0.00	0.00	8	1.27	0.00	150	0.0
Portable Compaction-Vibratory Plate	D	0.15	0.08	8	0.25	0.31	150	46.2
Portable Compaction-Vibratory Ram	D	0.15	0.08	8	0.25	0.31	150	46.2
Articulating Boom Platforms	D	0.15	0.08	8	0.25	0.31	150	46.2
Pumps	D	0.00	0.00	8	0.13	0.00	150	0.0
Air Compressor-185 cfm	D	0.54	0.27	8	1.27	5.47	150	819.9
Air Compressor-750 cfm	D	0.58	0.29	8	1.27	5.86	150	879.3
Concrete Vibrators	D	0.23	0.12	8	0.25	0.46	150	69.3
Concrete Trowel Machine	D	0.23	0.12	8	1.27	2.35	150	352.0
Fusion Welder	D	0.62	0.31	4	1.27	3.15	150	472.4
Portable Power Generators	D	0.46	0.23	8	1.27	4.69	150	704.1
Subtotal - Diesel								37612.4
Subtotal - Gasoline								2519.7
TOTAL								40132.1

TABLE CE5							
KRCDPP							
Const Site Fugitive Dust Emissions							
Daily Emissions Based On Weeks 3-6							
					PM10		
		Daily			Emissions	Control	
	Number of	Process	Total	Process	Rate	Factor	PM10
	Vehicles	Rate per	Process	Rate	(lbs/unit)	(%)	Emissions
Equipment	(Note 1)	Vehicle	Rate	Units	(Note 2)	(Note 2)	(lbs/day)
Bulldozer D6H	1.00	8.00	8.00	hours	0.42	0.00	3.36
Bulldozer D4C	1.00	8.00	8.00	hours	0.42	0.00	3.36
Trencher Excavation	1.00	8.00	8.00	hours	0.30	0.00	2.42
Scraper Excavation	1.00	8.00	8.00	hours	0.42	0.00	3.36
Excavator-Scraper Unpaved Road Travel	1.00	12.00	12.00	VMT	1.17	90.00	1.40
Excavator-Motor Grader	1.00	24.00	24.00	VMT	0.28	90.00	0.66
Backhoe/Loader Excavation	1.00	8.00	8.00	hours	0.08	0.00	0.60
Loader Excavation	1.00	882.00	882.00	tons	9.20E-05	0.00	0.08
Loader Unpaved Road Travel	1.00	18.20	18.20	VMT	0.69	90.00	1.26
Water Truck Unpaved Road Travel	1.00	20.00	20.00	VMT	0.98	90.00	1.96
Forklift Unpaved Road Travel	0.00	12.00	0.00	VMT	0.62	90.00	0.00
Dump Truck Unpaved Road Travel	2.00	11.40	22.80	VMT	1.02	90.00	2.33
Dump Truck Unloading	2.00	500.00	1000.00	tons	9.20E-05	0.00	0.09
Concrete Truck Unpaved Road Travel	2.00	11.40	22.80	VMT	1.02	90.00	2.33
Fuel/Lube Truck Unpaved Road Travel	1.00	3.00	3.00	VMT	0.76	90.00	0.23
Concrete Pumper Truck Unpaved Road Travel	1.00	0.95	0.95	VMT	1.02	90.00	0.10
Tractor Truck 5th Wheel Unpaved Road Travel	0.00	0.76	0.00	VMT	1.02	90.00	0.00
Pickup Truck Unpaved Road Travel	3.00	1.90	5.70	VMT	0.39	90.00	0.22
3 Ton Truck Unpaved Road Travel	1.00	3.80	3.80	VMT	0.68	90.00	0.26
Windblown Dust (Active Const Area)	NA	618552.00	618552.00	sq. ft.-day	1.68E-05	90.00	1.04
Worker Gravel Road Travel	77.70	0.50	38.85	VMT	0.31	90.00	1.19
Delivery Truck Gravel Road Travel	10.00	0.19	1.90	VMT	0.82	90.00	0.15
Delivery Truck Unpaved Road Travel	10.00	0.28	2.80	VMT	1.02	90.00	0.29
TOTALS							26.68
Notes:							
1. Based on Week 4 of the construction schedule.							
2. Refer to the fugitve dust emissions calculations located at the end of the construction emissions tables.							

TABLE CE6
KRCDPP
Const Site Fugitive Dust Emissions
Annualized Emissions

Equipment	Av. # of Vehicles Over the 6 Month Const Sch (Note 1)	Daily Process Rate per Vehicle	Total Process Rate (Note 1)	Process Rate Units	PM10 Emissions Rate (lbs/unit) (Note 2)	Control Factor (%) (Note 2)	PM10 Emissions (lbs/yr)
Bulldozer D6H	0.12	8.00	144.00	hours	0.42	0.00	60.39
Bulldozer D4C	0.31	8.00	372.00	hours	0.42	0.00	156.02
Trencher Excavation	0.23	8.00	276.00	hours	0.30	0.00	83.35
Scraper Excavation	0.08	8.00	96.00	hours	0.42	0.00	40.26
Excavator-Scraper Unpaved Road Travel	0.08	12.00	144.00	VMT	1.17	90.00	16.83
Excavator-Motor Grader	0.19	24.00	684.00	VMT	0.28	90.00	18.84
Backhoe/Loader Excavation	0.58	8.00	696.00	hours	0.08	0.00	52.20
Loader Excavation	0.31	882.00	41013.00	tons	9.20E-05	0.00	3.77
Loader Unpaved Road Travel	0.31	18.20	846.30	VMT	0.69	90.00	58.39
Water Truck Unpaved Road Travel	0.31	20.00	930.00	VMT	0.98	90.00	91.14
Forklift Unpaved Road Travel	0.81	12.00	1458.00	VMT	0.62	90.00	91.05
Dump Truck Unpaved Road Travel	0.65	11.40	1111.50	VMT	1.02	90.00	113.71
Dump Truck Unloading	0.65	500.00	48750.00	tons	9.20E-05	0.00	4.49
Concrete Truck Unpaved Road Travel	0.75	11.40	1282.50	VMT	1.02	90.00	131.20
Fuel/Lube Truck Unpaved Road Travel	0.92	3.00	414.00	VMT	0.76	90.00	31.48
Concrete Pumper Truck Unpaved Road Travel	0.39	0.95	55.58	VMT	1.02	90.00	5.69
Tractor Truck 5th Wheel Unpaved Road Travel	0.12	0.76	13.68	VMT	1.02	90.00	1.40
Pickup Truck Unpaved Road Travel	2.69	1.90	766.65	VMT	0.39	90.00	29.55
3 Ton Truck Unpaved Road Travel	0.85	3.80	484.50	VMT	0.68	90.00	33.07
Windblown Dust (Active Const Area) (Note 3)	NA	400752.00	60112800.00	sq. ft.	1.68E-05	90.00	100.99
Worker Gravel Road Travel	52.50	0.50	3937.50	VMT	0.31	90.00	121.08
Delivery Truck Gravel Road Travel	10.00	0.19	285.00	VMT	0.82	90.00	23.24
Delivery Truck Unpaved Road Travel	10.00	0.28	420.00	VMT	1.02	90.00	42.97
TOTALS							1311.11
						Tons/yr =	0.66

Notes:
1. Based on 150 days of construction within a 26 week (6 month) construction schedule.
2. Refer to the fugitve dust emissions calculations located at the end of the construction emissions tables.
3. The average exposed soil area over the 6 month construction schedule is 9.2 acres.

TABLE CE7
KRCDPP
CONST - SITE DELIVERY TRUCK TAILPIPE DAILY EMISSIONS

Number of Deliveries per day	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 1) NOx	CO	POC	SOx	PM10	Emissions (lbs/day) NOx	CO	POC	SOx	PM10
10	70	700	0.028	0.0175	0.0025	0.0012	0.0016	19.6	12.25	1.75	0.84	1.12
Idle Exhaust (Note 2)												0.042
Totals								19.6	12.25	1.75	0.84	1.162

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.
2. Ten trucks/day x 1hr idle time/truck x 0.0042 lbs/hr

TABLE CE8
KRCDPP
CONST - SITE DELIVERY TRUCK TAILPIPE ANNUAL EMISSIONS

Number of Deliveries per year (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per year	Emissions Factors (lbs/VMT) (Note 2) NOx	CO	POC	SOx	PM10	Emissions (lbs/yr) NOx	CO	POC	SOx	PM10
1500	70	105000	0.028	0.0175	0.0025	0.0012	0.0016	2940	1837.5	262.5	126	168
Idle Exhaust (Note 3)												63
Totals								2940	1837.5	262.5	126	231
							Tons/yr =	1.47	0.91875	0.13125	0.063	0.1155

Notes:
1. Based on 150 days of construction.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.
3. Ten trucks/day x 1hr idle time/truck x 0.0042 lbs/hr x 1500 deliveries.

TABLE CE9
KRCDPP
CONST - SITE WORKER TAILPIPE DAILY EMISSIONS

Number of Round Trips per day (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 2) NOx	CO	POC	SOx	PM10	Emissions (lbs/day) NOx	CO	POC	SOx	PM10
78	70	5460	0.0029	0.0343	0.0027	1.88E-06	5.83E-05	15.834	187.278	14.742	0.010265	0.318318

Notes:
1. Based on a peak construction workforce of 101 workers and 1.3 workers/vehicle.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE10
KRCDPP
CONST - SITE WORKER TAILPIPE ANNUAL EMISSIONS

Number of Round Trips per year (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per year	Emissions Factors (lbs/VMT) (Note 2) NOx	CO	POC	SOx	PM10	Emissions (lbs/yr) NOx	CO	POC	SOx	PM10
7846	70	549220	0.0029	0.0343	0.0027	1.88E-06	5.83E-05	1592.738	18838.25	1482.894	1.032534	32.01953
												63
								1592.738	18838.25	1482.894	1.032534	95.01953
Totals												
							Tons/yr =	0.796369	9.419123	0.741447	0.000516	0.04751

Notes:
1. Based on a average construction workforce of 68 workers, 1.3 workers/vehicle and 150 days of construction.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE11
KRCDPP
CONST WATER PIPELINES HEAVY EQUIPMENT DAILY EMISSIONS

Equipment	Rating	Units	Number of Units	Load Factor (Note 1)	Hours per day per Unit	EMISSIONS FACTORS (g/bhp-hr) (Note 1) NOx	CO	POC	SOx	PM10	EMISSIONS (lbs/day) NOx	CO	POC	SOx	PM10
Trencher	150	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	8.67	1.26	0.50	0.23	0.38
Backhoe	100	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	5.78	0.84	0.34	0.15	0.25
Compactor	100	bhp	1	0.59	10	6.9	1	0.4	0.18	0.3	8.97	1.30	0.52	0.23	0.39
Loader	150	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	8.67	1.26	0.50	0.23	0.38
Grader	100	bhp	1	0.54	10	6.9	1	0.4	0.18	0.3	8.21	1.19	0.48	0.21	0.36
Paving Machine	100	bhp	1	0.56	10	6.9	1	0.4	0.18	0.3	8.52	1.23	0.49	0.22	0.37
Water Truck	150	bhp	1	0.65	10	3.36	2.6	0.39	0.18	0.22	7.22	5.59	0.84	0.39	0.47
Dump Truck	300	bhp	1	0.65	10	3.36	2.6	0.39	0.18	0.22	14.44	11.18	1.68	0.77	0.95
TOTALS											70.50	23.84	5.35	2.43	3.54

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE12
KRCDPP
CONST NATURAL GAS FUEL PIPELINE HEAVY EQUIPMENT DAILY EMISSIONS

				Load	Hours	EMISSIONS FACTORS (g/bhp-hr) (Note 1)						EMISSIONS (lbs/day)			
			Number	Factor	per day										
Equipment	Rating	Units	of Units	(Note 1)	per Unit	NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
Trencher	150	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	8.67	1.26	0.50	0.23	0.38
Backhoe	100	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	5.78	0.84	0.34	0.15	0.25
Compactor	100	bhp	1	0.59	10	6.9	1	0.4	0.18	0.3	8.97	1.30	0.52	0.23	0.39
Loader	150	bhp	1	0.38	10	6.9	1	0.4	0.18	0.3	8.67	1.26	0.50	0.23	0.38
Grader	100	bhp	1	0.54	10	6.9	1	0.4	0.18	0.3	8.21	1.19	0.48	0.21	0.36
Paving Machine	100	bhp	1	0.56	10	6.9	1	0.4	0.18	0.3	8.52	1.23	0.49	0.22	0.37
Water Truck	150	bhp	1	0.65	10	3.36	2.6	0.39	0.18	0.22	7.22	5.59	0.84	0.39	0.47
Dump Truck	300	bhp	1	0.65	10	3.36	2.6	0.39	0.18	0.22	14.44	11.18	1.68	0.77	0.95
TOTALS											70.50	23.84	5.35	2.43	3.54

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE13
KRCDPP
CONST TRANSMISSION LINE HEAVY EQUIPMENT DAILY EMISSIONS

				Load	Hours	EMISSIONS FACTORS (g/bhp-hr) (Note 1)						EMISSIONS (lbs/day)			
			Number	Factor	per day										
Equipment	Rating	Units	of Units	(Note 1)	per Unit	NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
Auger	150	bhp	1	0.75	10	6.9	1	0.4	0.18	0.3	17.11	2.48	0.99	0.45	0.74
Crane	250	bhp	1	0.43	10	6.9	1	0.4	0.18	0.3	16.35	2.37	0.95	0.43	0.71
Crawler Tractor	300	bhp	1	0.57	10	6.9	1	0.4	0.18	0.3	26.01	3.77	1.51	0.68	1.13
Water Truck	150	bhp	1	0.65	10	3.36	2.6	0.39	0.18	0.22	7.22	5.59	0.84	0.39	0.47
TOTALS											66.70	14.21	4.29	1.94	3.06

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE14
KRCDPP
CONST - WATER PIPELINES DELIVERY TRUCK TAILPIPE DAILY EMISSIONS

Number of Round Trips per day	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 1)					Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
4	100	400	0.028	0.0175	0.0025	0.0012	0.0016	11.2	7	1	0.48	0.64

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE15
KRCDPP
CONST - WATER PIPELINES WORKER TAILPIPE DAILY EMISSIONS

Number of Round Trips per day (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 2)					Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
6	70	420	0.0029	0.0343	0.0027	1.88E-06	5.83E-05	1.218	14.406	1.134	0.00079	0.024486

Notes:
1. Based on a workforce of 8 workers and 1.3 workers/vehicle.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE16
KRCDPP
CONST - NATURAL GAS FUEL PIPELINE DELIVERY TRUCK TAILPIPE DAILY EMISSIONS

Number of Round Trips per day	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 1)					Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
4	100	400	0.028	0.0175	0.0025	0.0012	0.0016	11.2	7	1	0.48	0.64

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE17
KRCDPP
CONST - NATURAL GAS FUEL PIPELINE WORKER TAILPIPE DAILY EMISSIONS

Number of Round Trips per day (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 2)					Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
6	70	420	0.0029	0.0343	0.0027	1.88E-06	5.83E-05	1.218	14.406	1.134	0.00079	0.024486

Notes:
1. Based on a workforce of 8 workers and 1.3 workers/vehicle.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE18
KRCDPP
CONST - TRANSMISSION LINE DELIVERY TRUCK TAILPIPE DAILY EMISSIONS

Number of Round Trips per day	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 1) NOx	CO	POC	SOx	PM10	Emissions (lbs/day) NOx	CO	POC	SOx	PM10
12	100	1200	0.028	0.0175	0.0025	0.0012	0.0016	33.6	21	3	1.44	1.92

Notes:
1. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE19
KRCDPP
CONST - TRANSMISSION LINE WORKER TAILPIPE DAILY EMISSIONS

Number of Round Trips per day (Note 1)	Average Round Trip Distance (miles)	Total Vehicle Miles Traveled per day	Emissions Factors (lbs/VMT) (Note 2) NOx	CO	POC	SOx	PM10	Emissions (lbs/day) NOx	CO	POC	SOx	PM10
9	70	630	0.0029	0.0343	0.0027	1.88E-06	5.83E-05	1.827	21.609	1.701	0.001184	0.036729

Notes:
1. Based on a workforce of 12 workers and 1.3 workers/vehicle.
2. Refer to the combustion emissions notes located at the end of the construction emissions tables.

TABLE CE20
KRCDPP
Const - Water Pipelines Daily Fugitive Dust Emissions

Equipment	Number of Vehicles	Daily Process Rate per Vehicle (Note 1)	Total Process Rate	Process Rate Units	PM10 Emissions Rate (lbs/unit) (Note 2)	Control Factor (%) (Note 2,3)	PM10 Emissions (lbs/day)
Excavation - Trencher	1.00	750.00	750.00	cu.yd/day	0.0015	0.00	1.13
Grading	1.00	8.00	8.00	VMT	0.28	45.00	1.21
Backfill - Backhoe/Loader	1.00	250.00	250.00	cu.yd/day	0.0015	0.00	0.38
Water Truck Unpaved Road Travel	1.00	1.00	1.00	VMT	0.98	45.00	0.54
Windblown Dust (Active Const Area)	NA	3000.00	3000.00	sq. ft.-day	1.68E-05	45.00	0.03
Delivery Truck Unpaved Road Travel	4.00	0.10	0.40	VMT	1.02	45.00	0.23
TOTALS							3.50

Notes:
1. VMTs for grading, water and deliver truck operation are estimated.
2. Refer to the fugitve dust emissions calculations located at the end of the construction emissions tables.
3. Control efficiency is estimated as 50% of that which is achievable for larger scale operations.

TABLE CE21							
KRCDPP							
Const - Natural Gas Fuel Pipeline Daily Fugitive Dust Emissions							
		Daily			PM10		
		Process			Emissions	Control	
		Rate per	Total	Process	Rate	Factor	PM10
	Number of	Vehicle	Process	Rate	(lbs/unit)	(%)	Emissions
Equipment	Vehicles	(Note 1)	Rate	Units	(Note 2)	(Note 2,3)	(lbs/day)
Excavation - Trencher	1.00	250.00	250.00	cu.yd/day	0.0015	0.00	0.38
Grading	1.00	8.00	8.00	VMT	0.28	45.00	1.21
Backfill - Backhoe/Loader	1.00	100.00	100.00	cu.yd/day	0.0015	0.00	0.15
Water Truck Unpaved Road Travel	1.00	1.00	1.00	VMT	0.98	45.00	0.54
Windblown Dust (Active Const Area)	NA	1200.00	1200.00	sq. ft.-day	1.68E-05	45.00	0.01
Delivery Truck Unpaved Road Travel	4.00	0.10	0.40	VMT	1.02	45.00	0.23
TOTALS							2.51
Notes:							
1. VMTs for grading, water and deliver truck operation are estimated.							
2. Refer to the fugitve dust emissions calculations located at the end of the construction emissions tables.							
3. Control efficiency is estimated as 50% of that which is achievable for larger scale operations.							

TABLE CE22
KRCDPP
Const - Transmission Line Daily Fugitive Dust Emissions

Equipment	Number of Vehicles	Daily Process Rate per Vehicle (Note 1)	Total Process Rate	Process Rate Units	PM10 Emissions Rate (lbs/unit) (Note 2)	Control Factor (%) (Note 2,3)	PM10 Emissions (lbs/day)
Excavation - Trencher	1.00	9.00	9.00	cu.yd/day	0.0015	0.00	0.01
Backfill - Backhoe/Loader	1.00	6.00	6.00	cu.yd/day	0.0015	0.00	0.01
Water Truck Unpaved Road Travel	1.00	0.50	0.50	VMT	0.98	45.00	0.27
Windblown Dust (Active Const Area)	NA	100.00	100.00	sq. ft.-day	1.68E-05	45.00	0.001
Delivery Truck Unpaved Road Travel	12.00	0.10	1.20	VMT	1.02	45.00	0.68
TOTALS							0.97

Notes:
1. VMTs for water and deliver truck operation are estimated.
2. Refer to the fugitve dust emissions calculations located at the end of the construction emissions tables.
3. Control efficiency is estimated as 50% of that which is achievable for larger scale operations.

KRCDPP

Notes for Construction Emissions Tables

A. Fugitive Dust Emissions Calculations

1. Bulldozer Operation & Scraper Excavation (Source: AP-42, Table 11.9-1, 7/98)

$E = (0.75)(s^{1.5})/(M^{1.4})$

where

s = silt content = 8.5% (AP-42, Table 13.2.2-1, 9/98, construction sites)
M = moisture content = 15% (SCAQMD CEQA Handbook, Table A9-8-G-1)
E = emissions factor = 0.4194 lbs/hr

2. Trencher Excavation (Source: AP-42, Table 11.9-1, dragline operations, 7/98)

$E = (0.75)(0.0021)(d^{0.7})/(M^{0.3})$

where

d = drop height = 3 feet (estimated)
M = moisture content = 15% (SCAQMD CEQA Handbook, Table A9-8-G-1)
E = emissions factor = 0.0015 lbs/cubic yard

Trencher excavating rate = TER = 200 cubic yards/hr (E110 Excavator, Caterpillar Performance Handbook, 10/89)

E x TER = 0.302 lbs/hr

3. Grader

a. Emissions Factor (Source: AP-42, Table 11.9-1, 7/98)

$E = (0.60)(0.051)(S^2)$

where

S = mean vehicle speed = 3 miles/hr (estimated)
E = emissions factor = 0.2754 lbs/VMT

b. Grader Vehicles Miles Traveled

3 miles/hr x 8 hrs/day = 24 VMT

4. Backhoe Excavation (Source: AP-42, Table 11.9-1, 7/98, dragline operations)

$E = (0.75)(0.0021)(d^{0.7})/(M^{0.3})$

where

d = drop height = 3 feet (estimated)
M = moisture content = 15% (SCAQMD CEQA Handbook, Table A9-8-G-1)
E = emissions factor = 0.0015 lbs/cubic yard

Backhoe excavating rate = BER = 49.8 cubic yards/hr (E70B Backhoe, Caterpillar Performance Handbook, 10/89)

E x BER = 0.075 lbs/hr

5. Loader Excavation

a. Emissions Factor (Source: AP-42, Section 13.2.4.3, 1/95, batch drop operations)

$E = k(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$

where

k = particle size multiplier = 0.35 for PM10
U = mean wind speed = 6.4 miles/hr for Fresno
M = moisture content = 15% (SCAQMD CEQA Handbook, Table A9-8-G-1)
E = emissions factor = 0.000092 lbs/ton

b. Loader Materials Process Rate

# of loads/day = 480 (estimated, based on 1 load/minute)

Loader Bucker Capacity = 1.75 cubic yards/load (916 Loader, Caterpillar Performance Handbook. 10/89)

Soil Density = 1.05 tons/cubic yard (Caterpillar Performance Handbook. 10/89)

Materials Process Rate = 1.84 tons/load x 480 loads/day = 882 tons/day

6. Dump Truck Unloading

a. Emissions Factor is the same as Item 5.a = 0.000092 lbs/ton

b. Assume the dump truck capacity is 25 tons and each truck makes 2.5 loads/hr (20 loads/day) for a total of 500 tons/dump truck-day.

7. Unpaved Road Travel

a. Emissions Factor (Source AP-42, Section 13.2.2-Unpaved Roads, 9/98)

E = k[(s/12)^a][(w/3)^b]/[(M/0.2)^c]

where

k = particle size constant = 2.6 for PM10
s = surface material silt content = 8.5% (AP-42, Table 13.2.2-1, construction sites)
a = 0.8 for PM10 (AP-42, Table 13.2.2-2)
b = 0.4 for PM10 (AP-42, Table 13.2.2-2)
M = surface material moisture content = 3.4% (AP-42, Table 13.2.4-1, 1/95, exposed ground)
c = 0.3 for PM10 (AP-42, Table 13.2.2-2)

w = mean vehicle weights

Scraper = 38.4 tons (28.2 tons empty & 48.6 tons loaded for a 615E scraper, Caterpillar Performance Handbook, 10/89)

Loader = 10.35 (Average of loaded and unloaded weights, 916 Loader, Caterpillar Performance Handbook, 10/89)

Water Truck = 24.7 tons (Estimated as 10 tons empty and 39.4 tons loaded with 8,000 gallons)

Forklift = 8 tons (estimated)

Dump Truck = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

Concrete Truck = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

Fuel/Lube Truck = 13.1 tons (Estimated as 8 tons empty and 18.2 tons loaded - heavy duty diesel truck)

Concrete Pumper Truck = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

Tractor Truck 5th Wheel = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

Pickup Truck = 2.4 tons (Based on CARB Area Source Manual, 9/97)

3 Ton Truck = 10 tons (Estimated as 8.5 tons empty and 11.5 tons loaded)

Delivery Truck = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

E = emissions factors = lbs/VMT

Scraper = 2.338 lbs/VMT

Loader = 1.384 lbs/VMT

Water Truck = 1.96 lbs/VMT

Forklift = 1.249 lbs/VMT

Dump Truck = 2.046 lbs/VMT

Concrete Truck = 2.046 lbs/VMT

Fuel/Lube Truck = 1.521 lbs/VMT

Concrete Pumper Truck = 2.046 lbs/VMT

Tractor Truck 5th Wheel = 2.046 lbs/VMT

Pickup Truck = 0.771 lbs/VMT

3 Ton Truck = 1.365 lbs/VMT

Delivery Truck = 2.046 lbs/VMT

An additional correction factor, based on an average vehicle speed of 7.5 mph, has been included in the final lbs/VMT emissions factors used. Per AP-42, Section 13.2.2.2, for on-site vehicle speeds of no more than 15 mph, the equation in 7.a. above can be multiplied by the S/15, where S is the average vehicle speed. This reduces the emissions factors above by 50%.

b. Vehicle Miles Traveled

Scraper – 120 loads (round trips)/day (estimated) x 0.1 miles/round trip (estimated) = 12.0 VMT

Loader – 480 loads/day x 200 feet/load = 96,000 feet = 18.2 VMT

Water Truck = Assumes constant 2.5 miles/hr x 8 hrs/day = 20 VMT

Forklift = Assumes 3 miles/hr x 4 hrs/day = 12 VMT

Dump Truck = 20 loads/day x 3,000 feet/load (on-site round trip) = 60,000 feet = 11.4 VMT

Concrete Truck = 20 loads/day x 3,000 feet/load (on-site round trip) = 60,000 feet = 11.4 VMT

Fuel/Lube Truck = 8 loads/day x 2,000 feet/load = 16,000 feet = 3 VMT

Concrete Pumper Truck = 10 locations/day x 500 feet/location = 5,000 feet = .95 VMT

Tractor Truck 5th Wheel = 8 locations/day x 500 feet/location = 4,000 feet = .76 VMT

Pickup Truck = 10 trips/day x 1,000 feet/trip = 10,000 feet = 1.9 VMT

3 Ton Truck = 10 trips/day x 2,000 feet/trip = 20,000 feet = 3.8 VMT

Delivery Truck = 10 deliveries x 1,500 feet/delivery = 15,000 feet = 2.8 VMT

8. Gravel Road Travel

a. Emissions Factor (Source AP-42, Section 13.2.2-Unpaved Roads, 9/98)

E = k[(s/12)^a][(w/3)^b]/[(M/0.2)^c]

where

k = particle size constant = 2.6 for PM10
s = surface material silt content = 6.4% (AP-42, Table 13.2.2-1, construction sites)
a = 0.8 for PM10 (AP-42, Table 13.2.2-2)
b = 0.4 for PM10 (AP-42, Table 13.2.2-2)

M = surface material moisture content = 3.4% (AP-42, Table 13.2.4-1, 1/95, exposed ground)
c = 0.3 for PM10 (AP-42, Table 13.2.2-2)

w = mean vehicle weights

Auto/Pickup Truck = 2.4 tons (Based on CARB Area Source Manual, 9/97)

Delivery Truck = 27.5 tons (Estimated as 15 tons empty and 40 tons loaded – heavy duty diesel truck)

E = emissions factors = lbs/VMT

Auto/Pickup Truck = .615 lbs/VMT

Delivery Truck = 1.631 lbs/VMT

Similar to the emissions factors in 7.a., <u>these two emission factors have been reduced by 50%</u>, based on an average vehicle speed of 7.5 mph.

b. Vehicle Miles Traveled

Auto/Pickup Truck = (101 workers/day)/(1.3workers/vehicle trip) x 0.5 miles/vehicle trip = 38.8 VMT

Delivery Truck = 10 deliveries x 1,000 feet/delivery = 10,000 feet = 1.9 VMT

9. Wind Erosion of Active Construction Area (Source, "Improvement pf Specific Emissions Factors (BACM Project No. 1), Final Report," prepared for the SCAQMD by the Midwest Research Institute, March 1996)

Level 2 Emissions Factor = 0.011 tons/acre-month

Construction Schedule (i.e., days/month soil is exposed) = 30 days/month

Emissions Factor = 1.684E-05 lbs/sq. ft.-day

10. Dust Control on Unpaved & Gravel Roads and Soil Areas Exposed to Wind Erosion

(Sources, Control of Open Fugitive Dust Sources, U.S. EPA, 9/88 and AP-42, Section 13.2.2.3, 9/98)

Both of these sources indicate that a control efficiency of 90% is achievable through the use of water of chemical dust suppression measures.

B. Combustion Emissions

Delivery Trucks

Tailpipe emissions from MVE17G version 1.0c, heavy-heavy duty diesel trucks, fleet average for calendar year 2000.

PM10 idle emissions rate based on 1.91 g/hr for the composite HDD truck fleet in 2001 from EPA's PART5 model.

Worker Travel

Tailpipe emissions from MVE17G version 1.0c, light duty autos and light duty trucks, fleet average for calendar year 2000.

Construction Equipment

Emissions factors for diesel construction equipment are based on equipment meeting EPA Tier-1 off-road diesel standards and use of CARB ultra low-sulfur fuel.

Truck emissions factors are based on MVE17G version 1.0c, heavy-heavy duty or medium duty diesel trucks, fleet average for calendar year 2000.

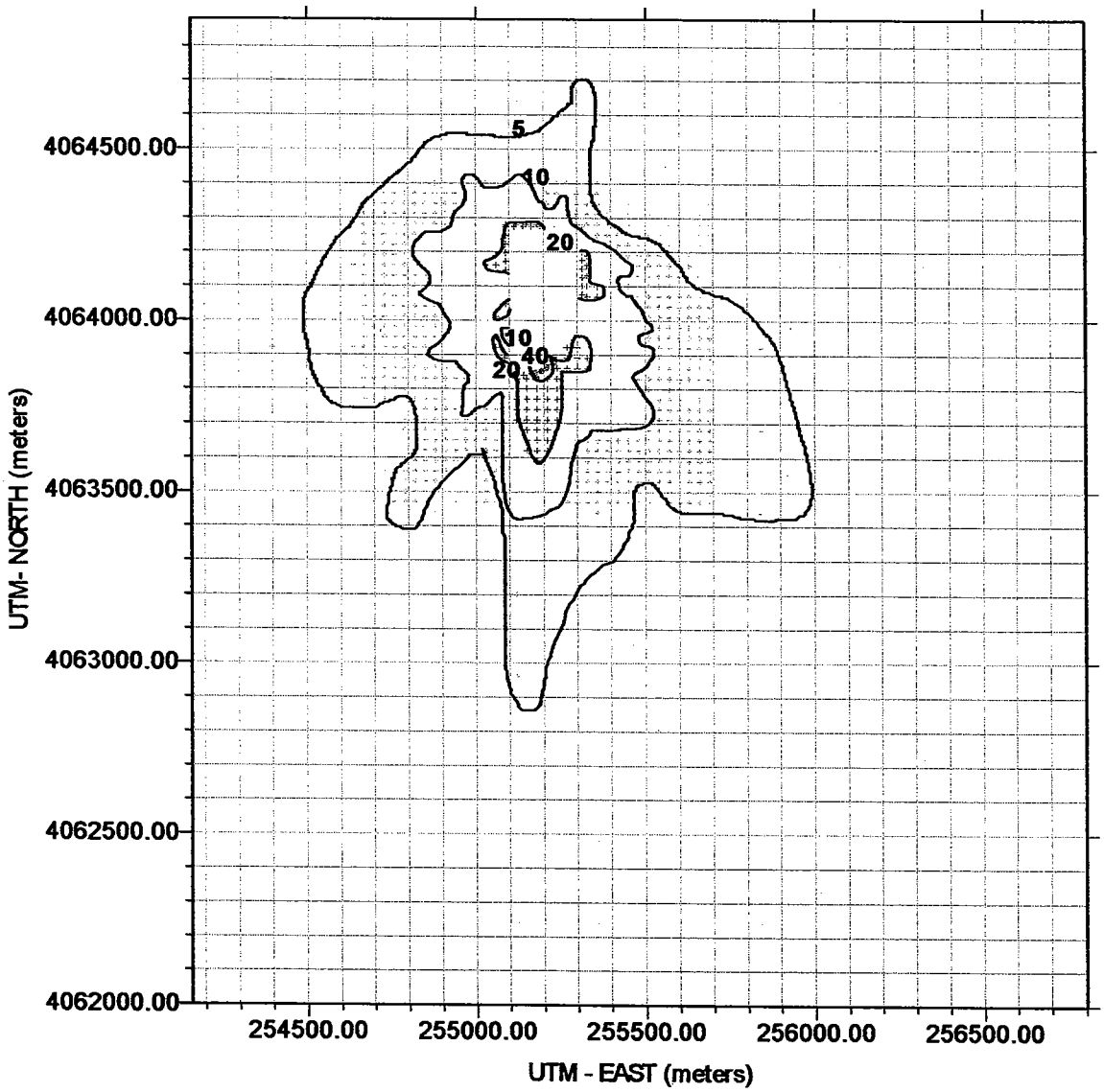


FIGURE 1. CONSTRUCTION IMPACTS – 24-HOUR PM_{10} CONCENTRATION ISOPLETHS ($\mu g/m^3$)

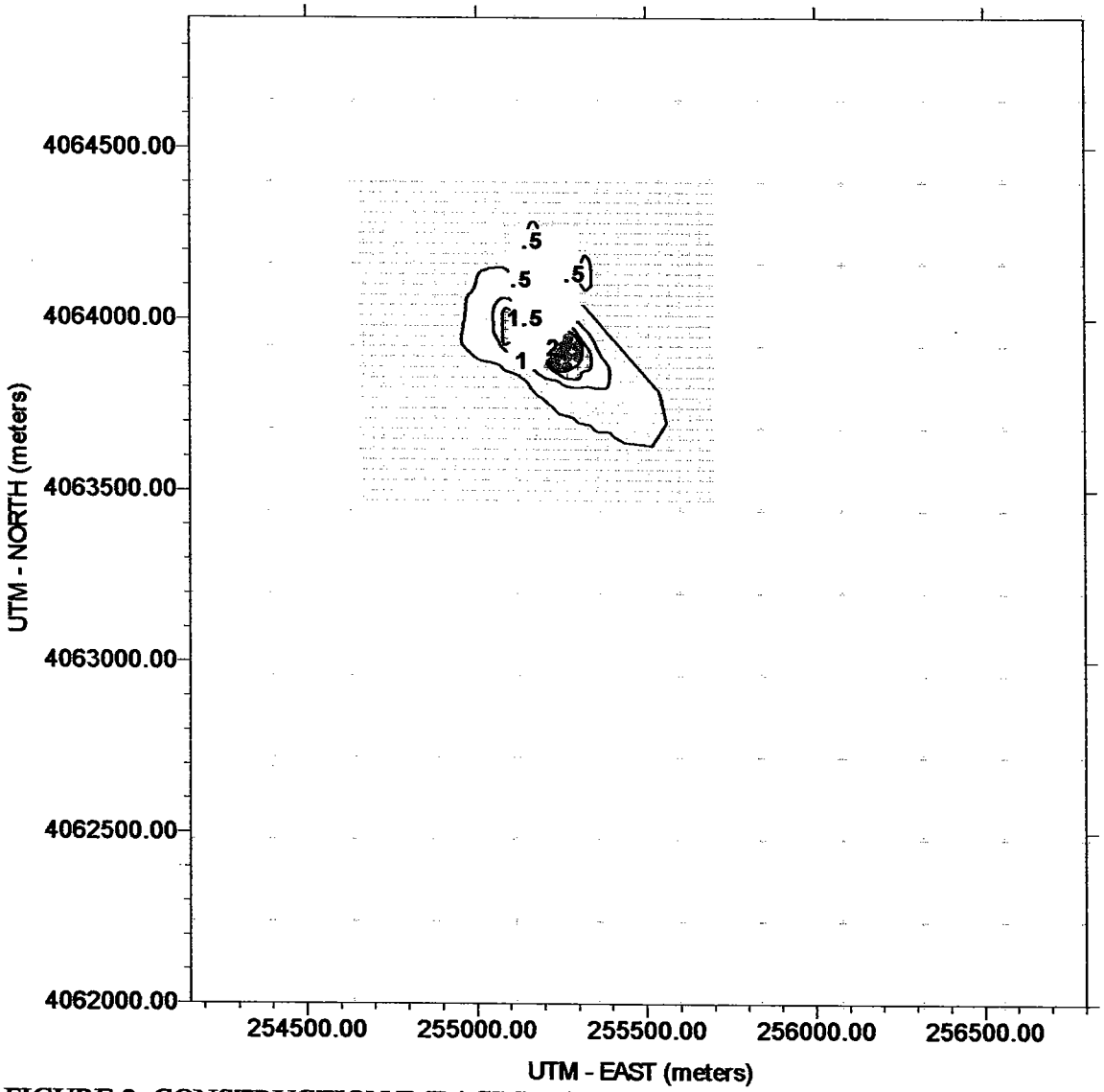


FIGURE 2. CONSTRUCTION IMPACTS – ANNUAL PM_{10} CONCENTRATION ISOPLETHS ($\mu g/m^3$)

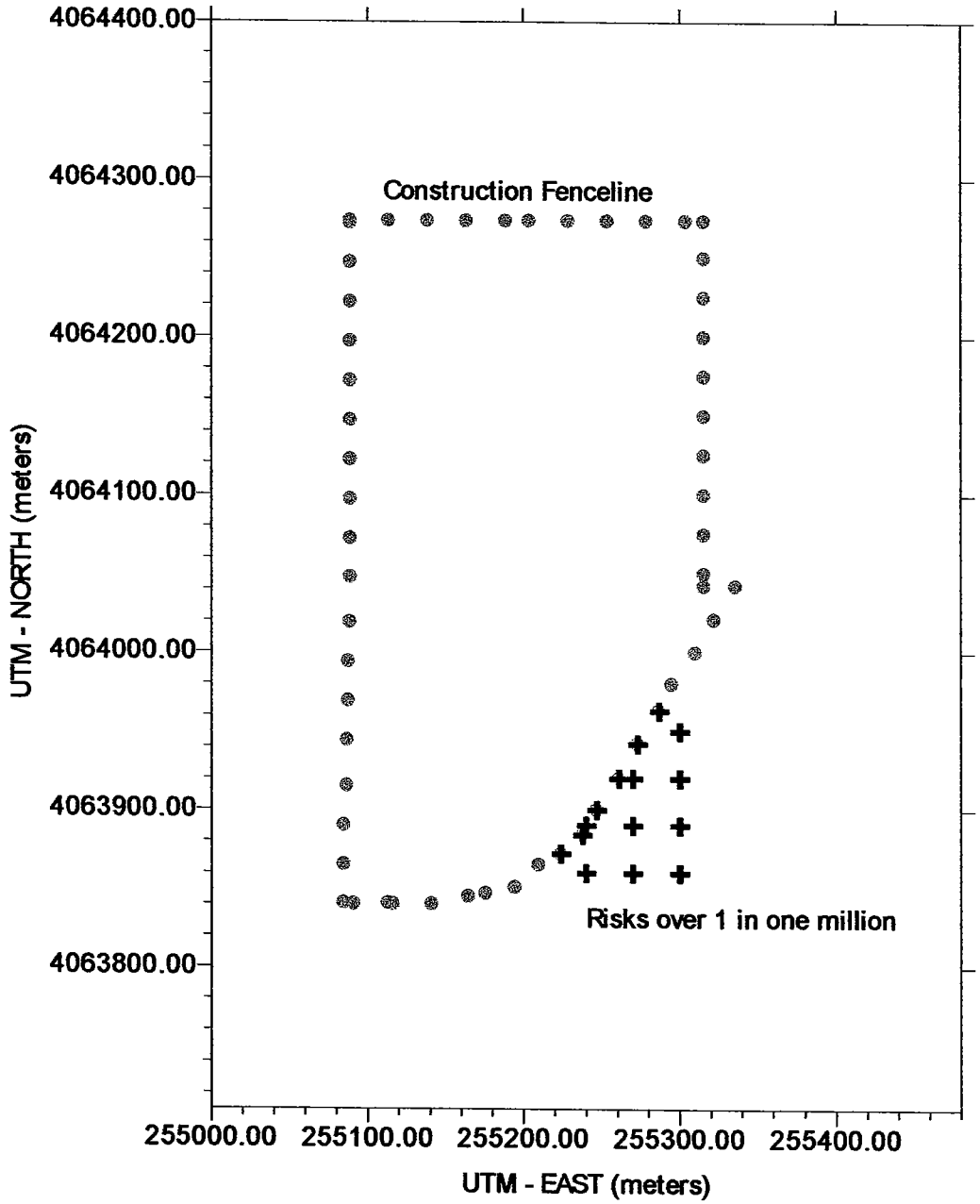
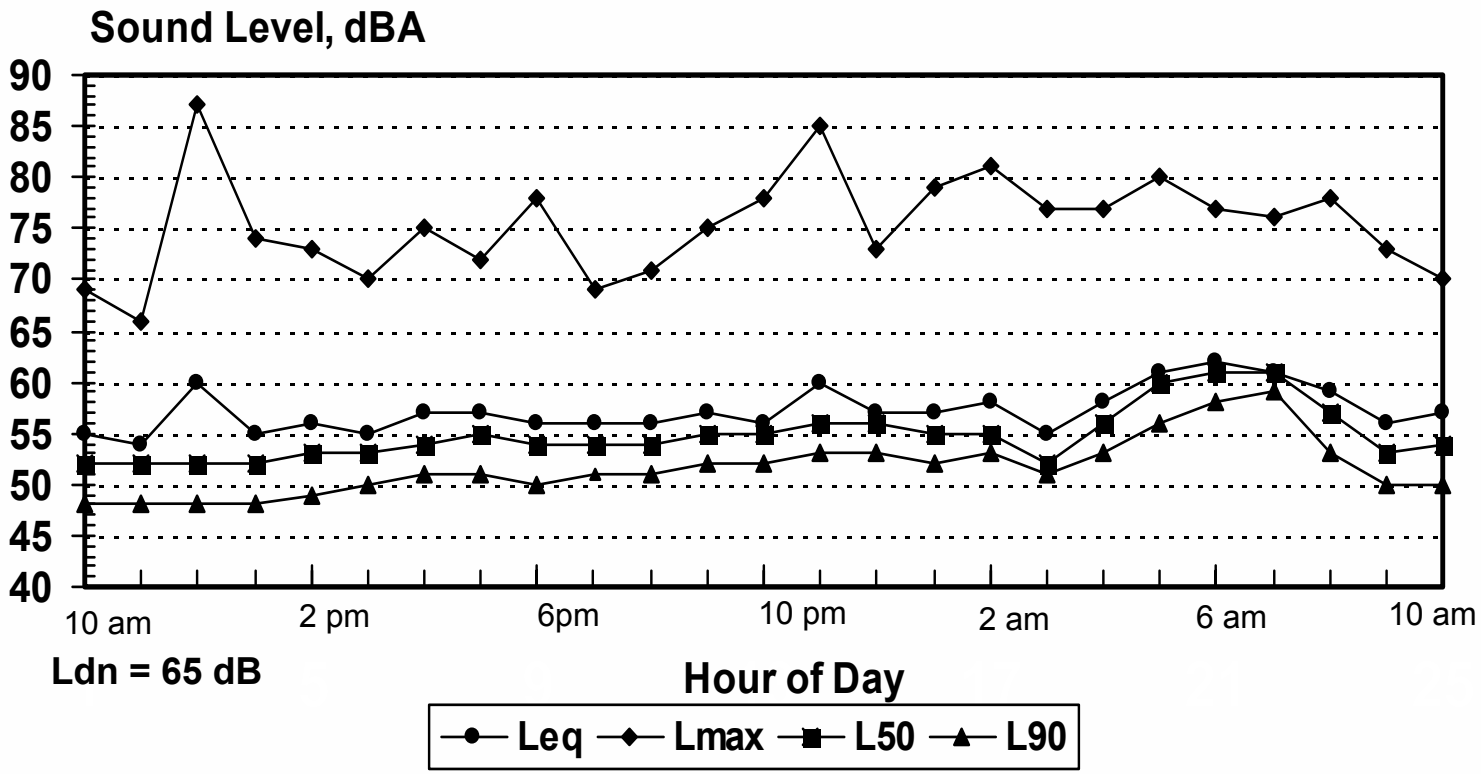


FIGURE 3. CONSTRUCTION DIESEL EXHAUST RISK LARGER THAN 1 IN ONE MILLION

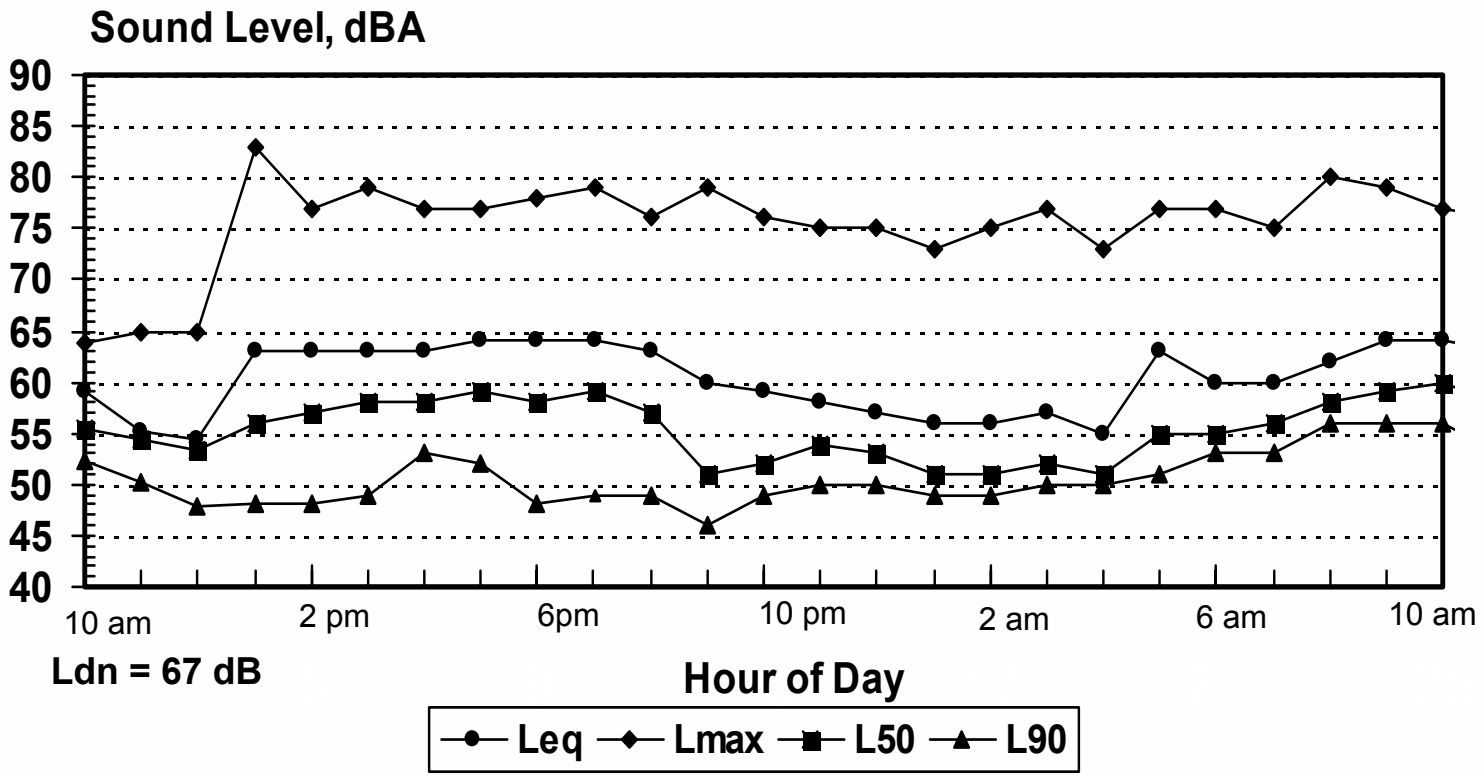
Appendix 5.2-1

Measured Ambient Noise Levels
KRCDPP
Monday September 22, 2003 – Tuesday September 23, 2003
Site #1



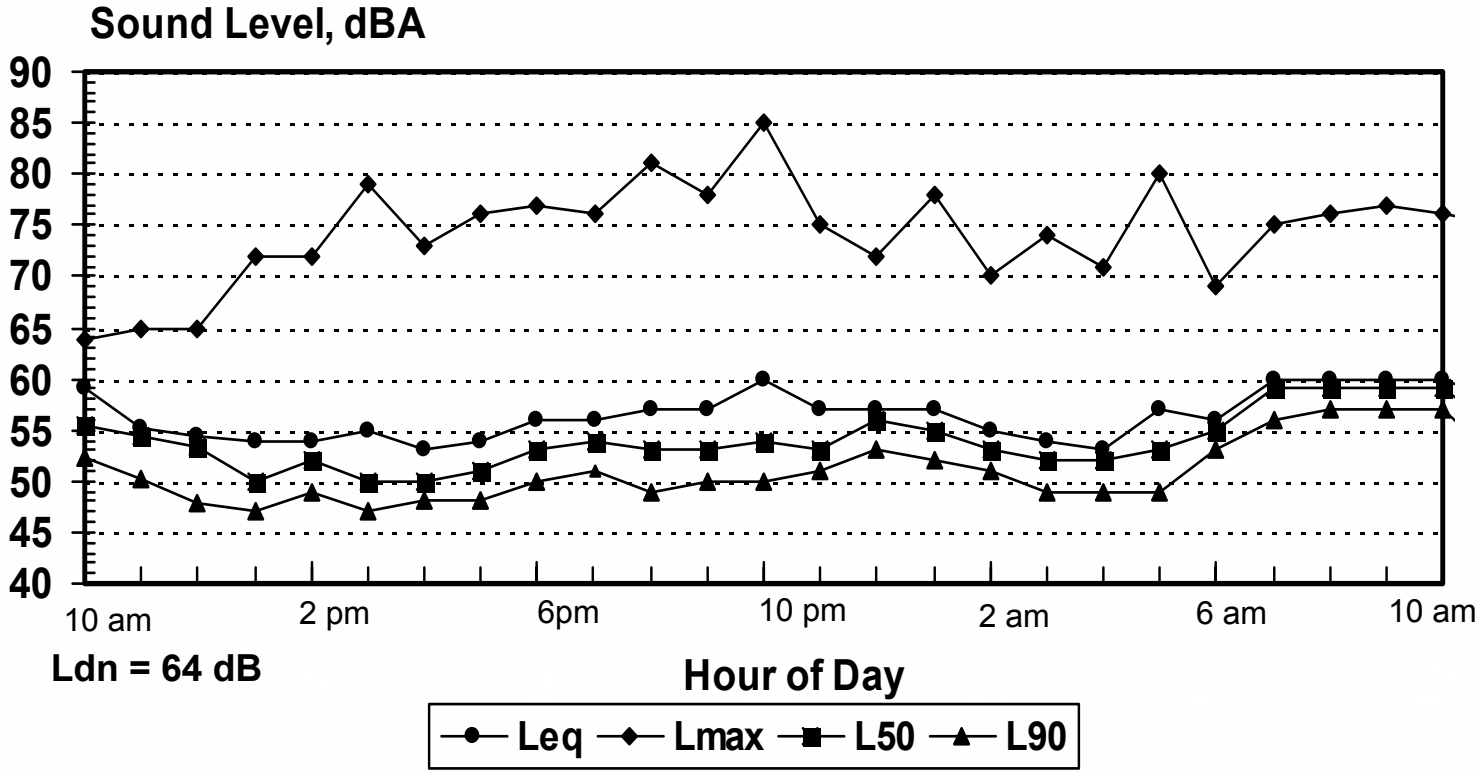
Bollard & Brennan, Inc.

Measured Ambient Noise Levels
KRCDPP
Monday September 22, 2003 – Tuesday September 23, 2003
Site #2



Ldn = 67 dB

Measured Ambient Noise Levels
KRCDPP
Monday September 22, 2003 – Tuesday September 23, 2003
Site #3



Ldn = 64 dB

Bollard & Brennan, Inc.

Appendix 5.2-2

2003-112 Unsilenced ENM Results

OUTPUT FOR (.rnk) KRCD-Unsilenced Stacks

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1755.6 Y= 1054.6 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Unsilenced	66.6
3 Stack 1 Unsilenced	65.6
2 Turbine 2	37.9
7 Transformer	37.5
1 Turbine 1	36.9
10 Cooling Tower 2	36.1
9 Cooling Tower 1	35.1
6 Exit Turbine Blower 2	33.6
5 Exit Turbine Blower 1	32.4
8 Compressor	26.2
TOTAL	69.2

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 2155.9 Y= 1290.5 Z= 91.4

SOURCE TITLE	dB(A)
4 Stack 2 Unsilenced	55.8
3 Stack 1 Unsilenced	54.9
7 Transformer	23.9
10 Cooling Tower 2	21.9
2 Turbine 2	21.6
9 Cooling Tower 1	21.5
1 Turbine 1	20.9
5 Exit Turbine Blower 1	17.6
6 Exit Turbine Blower 2	17.2
8 Compressor	13.1
TOTAL	58.4

2003-112 Unsilenced ENM Results
SINGLE POINT CALCULATION

X= 1847.1 Y= 351.4 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Unsilenced	57.0
3 Stack 1 Unsilenced	56.6
2 Turbine 2	28.0
1 Turbine 1	27.8
7 Transformer	25.9
10 Cooling Tower 2	25.8
9 Cooling Tower 1	25.4
6 Exit Turbine Blower 2	20.3
5 Exit Turbine Blower 1	19.9
8 Compressor	12.1
TOTAL	59.8

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1836.1 Y= 1551.4 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Unsilenced	60.1
3 Stack 1 Unsilenced	59.7
7 Transformer	23.1
6 Exit Turbine Blower 2	19.7
10 Cooling Tower 2	19.4
5 Exit Turbine Blower 1	19.1
9 Cooling Tower 1	18.9
2 Turbine 2	17.3
1 Turbine 1	16.9
8 Compressor	10.2
TOTAL	62.9

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1143.9 Y= 552.3 Z= 89.9

2003-112 Unsilenced ENM Results

SOURCE TITLE	dB(A)
3 Stack 1 Unsilenced	62.2
4 Stack 2 Unsilenced	61.7
1 Turbine 1	32.6
2 Turbine 2	32.1
7 Transformer	31.8
9 Cooling Tower 1	31.4
10 Cooling Tower 2	30.8
5 Exit Turbine Blower 1	27.3
6 Exit Turbine Blower 2	26.6
8 Compressor	20.7
TOTAL	65.0

2003-112 Silenced ENM Results

OUTPUT FOR (.rnk) KRCD Silenced

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1755.6 Y= 1054.6 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Silenced	47.5
3 Stack 1 Silenced	46.7
2 Turbine 2	37.9
7 Transformer	37.5
1 Turbine 1	36.9
10 Cooling Tower 2	36.1
9 Cooling Tower 1	35.1
6 Exit Turbine Blower 2	33.6
5 Exit Turbine Blower 1	32.4
8 Compressor	26.2
TOTAL	51.2

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 2155.9 Y= 1290.5 Z= 91.4

SOURCE TITLE	dB(A)
4 Stack 2 Silenced	32.6
3 Stack 1 Silenced	32.2
7 Transformer	23.9
10 Cooling Tower 2	21.9
2 Turbine 2	21.6
9 Cooling Tower 1	21.5
1 Turbine 1	20.9
5 Exit Turbine Blower 1	17.6
6 Exit Turbine Blower 2	17.2
8 Compressor	13.1
TOTAL	36.4

2003-112 Silenced ENM Results
SINGLE POINT CALCULATION

X= 1847.1 Y= 351.4 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Silenced	39.8
3 Stack 1 Silenced	39.5
2 Turbine 2	28.0
1 Turbine 1	27.8
7 Transformer	25.9
10 Cooling Tower 2	25.8
9 Cooling Tower 1	25.4
6 Exit Turbine Blower 2	20.3
5 Exit Turbine Blower 1	19.9
8 Compressor	12.1
TOTAL	43.2

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1836.1 Y= 1551.4 Z= 89.9

SOURCE TITLE	dB(A)
4 Stack 2 Silenced	31.0
3 Stack 1 Silenced	30.6
7 Transformer	23.1
6 Exit Turbine Blower 2	19.7
10 Cooling Tower 2	19.4
5 Exit Turbine Blower 1	19.1
9 Cooling Tower 1	18.9
2 Turbine 2	17.3
1 Turbine 1	16.9
8 Compressor	10.2
TOTAL	34.9

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 1143.9 Y= 552.3 Z= 89.9

2003-112 Silenced ENM Results

SOURCE	TITLE	dB(A)
3	Stack 1 Silenced	43.9
4	Stack 2 Silenced	43.4
1	Turbine 1	32.6
2	Turbine 2	32.1
7	Transformer	31.8
9	Cooling Tower 1	31.4
10	Cooling Tower 2	30.8
5	Exit Turbine Blower 1	27.3
6	Exit Turbine Blower 2	26.6
8	Compressor	20.7
	TOTAL	47.4

Appendix 5.3-1

Kings River Service Area

Annual Groundwater Report 2000

Kings River Conservation District
Fresno, California

KINGS RIVER CONSERVATION DISTRICT

2000 Annual Groundwater Report

for

Kings River Service Area

May 2001

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INTRODUCTION

The Kings River Conservation District (District) is a political subdivision of the State of California and was formed by the California Legislature with the passage of the "Kings River Conservation Act" in 1951. The District covers an area of approximately 1,240,000 acres in the central San Joaquin Valley which includes portions of Fresno, Kings and Tulare Counties. The District's boundaries encompass the entire service area of the Kings River, which is the primary source of surface water for the area. The District's boundaries and its six divisions are shown on Figure 1.

The flow of water in the Kings River is variable from year to year. During "normal" (average annual "natural" flow at Pine Flat Dam assuming no interference by storage) and "dry" (when runoff is less than normal) years, the available surface water supply does not meet the total water demand of the area. When such a shortage of water exists, the deficiency is remedied by the pumping of groundwater which may result in a drop in the water table. During the years when runoff exceeds normal, commonly referred to as "wet" years, the water table may rise due to a decrease in pumping and an increase in natural recharge.

The District initiated a groundwater study in 1987 to monitor the trends within the service area. This report is the eleventh in a series of groundwater reports which presents groundwater data and analysis pertinent to the District on an annual basis. Prior to 1990, reports were produced semiannually, one for each spring and fall measurement period.

OBJECTIVE

The objective of this report is to present groundwater conditions within the District as they existed during the spring and fall of 2000, and to compare those conditions with previous years. This report includes tables showing the depths to groundwater, changes in depth to groundwater, and net changes in stored groundwater. It also includes maps showing contours of groundwater surface elevations, depth to groundwater, and changes in the depth to groundwater. When applicable, this report will also identify specific areas within the District that are experiencing severe overdraft.

GROUNDWATER STUDY

The basis for the groundwater study is data derived from measurements of the depths to groundwater in wells throughout the San Joaquin Valley. The well measurements are taken by a variety of local, city, state and federal agencies, and the data is compiled by the U.S. Bureau of Reclamation (Bureau). The database utilized for this report contains data that was collected by eighteen various agencies (see page A-2).

The 2000 spring and fall well measurement data along with the 1999 readings are presented on pages A-3 through A-21. During a given measurement period, individual wells may not be measured for a variety of reasons. This lack of a measurement is indicated by "N/A" in the database.

In order to perform a groundwater study that is focused solely on the District, only those measured wells in the Bureau's valley-wide database which are within or near the District boundaries are analyzed. Wells adjacent to but outside of the District are included in order to provide continuity across the District boundaries. For well locations, please refer to Figure 1.

Unfortunately, the database used for this report does not completely cover the District. Divisions 1, 2, 3 and 4 are reasonably well covered, but a large portion of Division 5, and all of Division 6, have few if any well readings. As a result, an analysis of the groundwater conditions for a portion of Division 5 and all of Division 6 cannot be performed. For the area of the District where there is sufficient data to draw reasonable conclusions, the term "Study Area" has been assigned.

The District's Board of Directors adopted Resolution No. 90-1 on September 12, 1989, which provided for the annexation of nearly 140,000 acres to Division 4 of the District. The area annexed was previously situated between Divisions 2, 3 and 4. As a result of this annexation, the calculated average depths to groundwater, average changes in depths to groundwater, and net change in stored groundwater for Division 4 and for the District totals will not be entirely comparable to similar type data included in reports prior to the fall 1989 report.

When analyzing the groundwater data that is compiled by the Bureau, it is important to realize that there are several factors which can lead to the lack of quality control of the data that has been collected. First, the complexity and size of the data collection program can lead to less than perfect results. Second, variations in measurement technology, expertise of personnel and date of measurements among the agencies, can contribute to the lack of quality control in data collection. A final factor that contributes to inaccurate data is the lack of information regarding well construction. Many wells are completed through several water bearing formations and are screened for long distances. Therefore, some data may represent a composite of depths to water for confined and unconfined aquifers and not the depth to groundwater in a specific aquifer.

In the southern part of the study area, subsurface layers of clay exist which restrict the vertical flow of groundwater. This restriction can produce a perched water table in certain areas. One such clay layer, commonly known as "A-Clay," is within 60 feet of the ground surface. The bulk of the groundwater pumping in the area overlain by the A-Clay occurs below the confining

layer. Also, wells that are screened only below the A-Clay are more representative of the groundwater conditions in the aquifer that underlies the entire district. Therefore, the deeper aquifer is used in this report. Figure 4 shows the approximate A-Clay boundary within the Study Area.

Readings in wells that are screened above the clay layer may indicate a depth to groundwater of less than 30 feet. Wells that are screened only below the clay layer read a depth of more than 80 feet below the ground surface.

Beginning with the 1998 report, wells that are believed to be screened above the A-Clay have been removed from the database. This resulted in a water table that is significantly lower than would otherwise be indicated - in the order of 10 feet throughout the entire study area.

The graph shown in Figure 17 is frequently referred to as a quick visual aid for understanding the trends in changes in the groundwater supply over time. Because of the way data is now processed, all of the data presented in this graph was modified for the 1998 report to reflect the changes discussed above. This report uses the data as it was modified for the 1998 report.

Average depth to groundwater, change in depth to groundwater and net change in stored groundwater have been calculated for each Division of the District and are presented in Table 1 for spring readings and in Table 2 for fall readings. The spring measurements were taken during the months of January, February, and March of 2000 and the fall measurements were taken during the months of October and November of 2000. Additionally, average depth to groundwater, change in depth to groundwater and net change in stored groundwater have been calculated for Groundwater Management Areas "A" and "B" and tabulated for spring and fall in Table 3 and Table 4, respectively. The net change in stored groundwater values presented in the tables reflect values rounded to the nearest 100 acre-feet. Divisions with incomplete coverage have depth to groundwater calculations and change in stored groundwater estimates for the portion within the Study Area only.

The computer program Surfer 7 (Golden Software) is utilized for the depth to groundwater and change in stored groundwater calculations and to create the groundwater contour maps. Surfer 7 maps out points and corresponding depths to create contour surfaces for groundwater surface elevation, depth to groundwater, and change in depth to groundwater. These maps were created for changes in depth from 1986 to 2000 and from 1999 to 2000 for spring and fall.

In determining the net change in stored groundwater for each subdivision, the specific yield of the aquifer is used. Specific yield is defined as the ratio of the volume of water drained from a saturated soil (aquifer) under the force of gravity to the volume of soil. Values representing the specific yield for every quarter township were input into Surfer 7 and a contour map similar to those created for depth to and change in depth was created, with specific yield representing what is normally the "Z" coordinate. The surfaces created for change in depth were then multiplied by this "specific yield surface", and Surfer 7 calculated a volume representative of the change in stored groundwater.

The raw data acquired from the Bureau includes depth to groundwater measurements and elevation above mean sea level for a composite water table. This data is used to calculate changes in depths to groundwater from previous periods. Groundwater contour maps show lines of equal groundwater elevation, depth to groundwater, and change in depth to groundwater over a period of time. Due in part to the composite nature of the groundwater data, reported values for change in depth to groundwater and stored groundwater are approximations only.

For the most part, meaningful interpretation of the results of this report can best be made by comparing data from similar periods, such as from the spring (or fall) of one year to the spring (or fall) of another year. This report will follow that criteria. No comparisons are made between spring and fall data.

RESULTS

The six divisions that comprise the District have been divided into smaller areas, or subdivisions (see Figure 2), for purposes of reporting depths and changes in depth to groundwater and stored groundwater changes in Tables 1 and 2. Groundwater Management Areas "A" and "B" (see Figure 3) were studied individually and the results are summarized in Tables 3 and 4. Groundwater elevation, depth to groundwater, and change in depth to groundwater contour maps (see Figures 5 through 16) have been created to help identify trends across the service area and areas of significant change.

Spring 1999 to Spring 2000

An examination of the data for the change in depth to groundwater for the period from spring 1999 to spring 2000 shows an overall increase in the depth to groundwater of 3 feet (Table 1). Alta-Tulare/Kings County showed no change in depth while all other subdivisions showed an increase in groundwater depth. Division 5 South showed the greatest change in depth to groundwater with an increase of 20 feet.

During the period, the calculated net change in stored groundwater was a decrease of 466,300 acre-feet. All subdivisions recorded a decrease in stored groundwater except Alta-Tulare/Kings County which had an increase in stored groundwater of 3,300 acre-feet. Division 5 South showed the greatest decrease in stored groundwater at 164,900 acre-feet.

The depths to groundwater in both Management Areas "A" and "B" had minimal changes for 2000. Management Area "A" had a decrease in average depth to groundwater of 2 feet with a corresponding increase in stored groundwater of 33,600 acre-feet (Table 3). Management Area "B" showed no change in average depth to groundwater, but had a decrease in stored groundwater of 100 acre-feet. The groundwater Management Areas combined had a decrease in depth to groundwater of 1 foot and a corresponding increase in stored groundwater of 33,500 acre-feet.

Fall 1999 to Fall 2000

For the period of fall 1999 to fall 2000, most areas showed an increase in the depth to groundwater (Table 2). The entire District Study Area had a calculated average increase in the depth to groundwater of 1 foot. The subdivision with the largest increase in depth to groundwater is Division 5 South with a calculated increase of 7 feet. Fresno/Clovis Metropolitan area experienced a decrease in depth to groundwater of 3 feet. Based on full Divisions, the calculated average change in the depth to groundwater varied from a decrease of 2 feet in Division 3 to an increase of 4 feet in Division 4.

During the period, the calculated net change in stored groundwater for each Division ranged from an increase of 69,100 acre-feet in Division 3 to a decrease of 131,800 acre-feet in Division 4. The total calculated net change in stored groundwater for the entire Study Area was a decrease of 140,300 acre-feet.

Management Areas "A" and "B" both experienced an increase in average depth to groundwater, displaying a net change of 3 and 13 feet respectively (Table 4). Corresponding changes in stored groundwater exhibited for these areas were a decrease of 47,200 acre-feet for Area "A" and a decrease of 89,400 acre-feet for Area "B." The Management Areas combined had an average increase in depth to groundwater of 6 feet and a net decrease in stored groundwater of 136,600 acre-feet.

CONCLUSIONS

Based on the graph "Average Depth to Groundwater" (See Figure 17), 1987 was the beginning of a period when the depth to groundwater increased each year, resulting in a decrease in stored groundwater. This trend continued until the spring of 1991 when the decline leveled off. As the graph also indicates, a reversal of the decline in stored groundwater began in the fall of 1995 and continued through the spring of 1999. However, this period of recharge did not overcome the effects of the recent drought and an overall decline in stored groundwater started in the fall of 1999. The average groundwater depth in the Study Area was 20 feet deeper in fall of 2000 than it was in fall of 1986.

It is likely that overdraft conditions will remain as industry, agriculture, and population continue to expand within the Kings River service area. Due to the limited natural supply of water available to the service area, it is important to take steps to offset the anticipated increase in water usage. Enhancing the management of existing surface and groundwater supplies as well as increasing the amount of water available are two possibilities which could increase the amount of water available to the service area. Additional water can be secured by constructing new or expanding existing above-ground reservoirs or constructing groundwater recharge facilities to capture excess (flood) flows within the service area. Water might also be imported into the service area from areas with excess water.

TABLES

TABLE 1

KRCD DIVISION SUMMARY
SPRING 2000

KRCD DIVISION	SUBDIVISION*	Percent of Division within Study Area	SPRING 00 Depth to Groundwater (feet)	AVERAGE CHANGE IN DEPTH TO GROUNDWATER Spring 99 to Spring 00 (feet)**	Spring 86 to Spring 00 (feet)**	NET CHANGE IN STORAGE Spring 99 to Spring 00 (acre-feet)	Spring 86 to Spring 00 (acre-feet)
DIVISION 1							
	ALTA - FRESNO CO.		41	4	4	-9,700	-7,500
	ALTA - TULARE/KINGS CO.		32	0	6	3,300	-63,400
	TOTAL / AVERAGE DIVISION 1	99%	34	1	5	6,400	-70,900
DIVISION 2							
	CONSOLIDATED NORTHEAST OF HWY 99		30	2	3	-23,500	-49,900
	CONSOLIDATED SOUTHWEST OF HWY 99		56	4	13	-49,600	-186,700
	TOTAL / AVERAGE DIVISION 2	100%	43	3	8	-73,100	-236,600
DIVISION 3							
	WESTERN FRESNO IRRIGATION DISTRICT		67	3	8	-54,900	-133,100
	FRESNO/CLOVIS METROPOLITAN		91	2	14	-25,700	-122,900
	EASTERN FRESNO IRRIGATION DISTRICT		44	3	10	-21,200	-66,600
	TOTAL / AVERAGE DIVISION 3	99%	69	3	10	-101,800	-322,600
DIVISION 4							
	DIVISION 4 NORTH		123	1	16	-14,000	-376,700
	DIVISION 4 SOUTH		104	5	22	-75,300	-311,600
	TOTAL / AVERAGE DIVISION 4	95%	116	2	18	-89,300	-688,300
DIVISION 5							
	DIVISION 5 NORTH		83	3	20	-30,800	-186,300
	DIVISION 5 SOUTH		110	20	37	-164,900	-294,000
	TOTAL / AVERAGE DIVISION 5	64%	96	11	28	-195,700	-480,300
DIVISION 6							
	NO DATA						
	TOTAL / AVERAGE DIVISION 6	0%					
DISTRICT AVERAGES		76%	77	3	14	-----	-----
DISTRICT TOTALS		76%	-----	-----	-----	-466,300	-1,798,700

* FOR BOUNDARIES USED FOR SUBDIVISIONS SEE FIGURE 2

**DUE TO THE ROUNDING OF DECIMAL PLACES, A VALUE OF ZERO MAY INDICATE A SLIGHT INCREASE OR DECREASE IN DEPTH TO GROUNDWATER. THEREFORE, EVEN WITH A ZERO REPORTED FOR CHANGE IN DEPTH THERE WILL STILL MOST LIKELY BE A SMALL CHANGE IN STORAGE.

NOTE: POSITIVE VALUES FOR CHANGE IN DEPTH TO GROUNDWATER REFLECT AN INCREASE IN THE DEPTH TO GROUNDWATER AND A CORRESPONDING DECREASE IN STORAGE. NEGATIVE VALUES REFLECT A DECREASE IN THE DEPTH TO GROUNDWATER AND A CORRESPONDING INCREASE IN STORAGE.

TABLE 2

KRCD DIVISION SUMMARY
FALL 2000

KRCD DIVISION	SUBDIVISION*	Percent of Division within Study Area	FALL 00 Depth to Groundwater (feet)	AVERAGE CHANGE IN DEPTH TO GROUNDWATER Fall 99 to Fall 00 (feet)**	Fall 86 to Fall 00 (feet)**	NET CHANGE IN STORAGE Fall 99 to Fall 00 (acre-feet)	Fall 86 to Fall 00 (acre-feet)
DIVISION 1							
	ALTA - FRESNO CO.		40	-2	9	7,800	-23,100
	ALTA - TULARE/KINGS CO.		33	0	11	6,200	-111,200
	TOTAL / AVERAGE DIVISION 1	99%	35	-1	10	14,000	-134,300
DIVISION 2							
	CONSOLIDATED NORTHEAST OF HWY 99		30	1	6	-9,500	-91,800
	CONSOLIDATED SOUTHWEST OF HWY 99		58	2	18	-25,100	-247,200
	TOTAL / AVERAGE DIVISION 2	100%	44	1	12	-34,600	-339,000
DIVISION 3							
	WESTERN FRESNO IRRIGATION DISTRICT		64	-2	6	35,600	-109,500
	FRESNO/CLOVIS METROPOLITAN		93	-3	9	34,500	-75,300
	EASTERN FRESNO IRRIGATION DISTRICT		44	1	12	-1,000	-69,300
	TOTAL / AVERAGE DIVISION 3	99%	68	-2	8	69,100	-254,100
DIVISION 4							
	DIVISION 4 NORTH		136	4	25	-87,900	-610,400
	DIVISION 4 SOUTH		113	4	33	-43,900	-464,600
	TOTAL / AVERAGE DIVISION 4	95%	128	4	28	-131,800	-1,075,000
DIVISION 5							
	DIVISION 5 NORTH		90	0	29	1,600	-276,600
	DIVISION 5 SOUTH		120	7	58	-58,600	-478,500
	TOTAL / AVERAGE DIVISION 5	64%	104	3	43	-57,000	-755,100
DIVISION 6							
	NO DATA		—	—	—		
	TOTAL / AVERAGE DIVISION 6	0%					
DISTRICT AVERAGES		76%	82	1	20	---	----
DISTRICT TOTALS		76%	-----	-----	---	-140,300	-2,557,500

* FOR BOUNDARIES USED FOR SUBDIVISIONS SEE FIGURE 2

**DUE TO THE ROUNDING OF DECIMAL PLACES, A VALUE OF ZERO MAY INDICATE A SLIGHT INCREASE OR DECREASE IN DEPTH TO GROUNDWATER. THEREFORE, EVEN WITH A ZERO REPORTED FOR CHANGE IN DEPTH THERE WILL STILL MOST LIKELY BE A SMALL CHANGE IN STORAGE.

NOTE: POSITIVE VALUES FOR CHANGE IN DEPTH TO GROUNDWATER REFLECT AN INCREASE IN THE DEPTH TO GROUNDWATER AND A CORRESPONDING DECREASE IN STORAGE. NEGATIVE VALUES REFLECT A DECREASE IN THE DEPTH TO GROUNDWATER AND A CORRESPONDING INCREASE IN STORAGE.

TABLE 3

KRCD GROUNDWATER MANAGEMENT AREA SUMMARY
SPRING 2000

GROUNDWATER MANAGEMENT AREA*	Percent of Area within Study Area	SPRING 00 Depth to Groundwater (feet)	AVERAGE CHANGE IN DEPTH TO GROUNDWATER Spring 99 to Spring 00 (feet)**	Spring 86 to Spring 00 (feet)**	NET CHANGE IN STORAGE Spring 99 to Spring 00 (acre-feet)	Spring 86 to Spring 00 (acre-feet)
AREA A						
NORTHWESTERN PORTION OF AREA A		135	-2	15	35,200	-206,900
SOUTHEASTERN PORTION OF AREA A		47	1	12	-1,600	-27,300
TOTAL / AVERAGE AREA A	100%	125	-2	15	33,600	-234,200
AREA B						
TOTAL / AVERAGE AREA B	100%	146	0	17	-100	-123,300
MANAGEMENT AREA AVERAGES	100%	132	-1	16	-----	-----
MANAGEMENT AREA TOTALS	100%	-----	-----	-----	33,500	-357,500

TABLE 4

KRCD GROUNDWATER MANAGEMENT AREA SUMMARY
FALL 2000

GROUNDWATER MANAGEMENT AREA*	Percent of Area within Study Area	Fall 00 Depth to Groundwater (feet)	AVERAGE CHANGE IN DEPTH TO GROUNDWATER Fall 99 to Fall 00 (feet)**	Fall 86 to Fall 00 (feet)**	NET CHANGE IN STORAGE Fall 99 to Fall 00 (acre-feet)	Fall 86 to Fall 00 (acre-feet)
AREA A						
NORTHWESTERN PORTION OF AREA A		150	2	24	-31,600	-316,900
SOUTHEASTERN PORTION OF AREA A		58	7	21	-15,600	-47,000
TOTAL / AVERAGE AREA A	100%	140	3	23	-47,200	-363,900
AREA B						
TOTAL / AVERAGE AREA B	100%	163	13	38	-89,400	-272,800
MANAGEMENT AREA AVERAGES	100%	148	6	28	-----	-----
MANAGEMENT AREA TOTALS	100%	-----	-----	-----	-136,600	-636,700

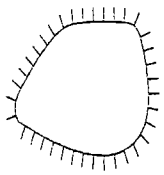
* FOR BOUNDARIES USED FOR GROUNDWATER MANAGEMENT AREAS SEE FIGURE 3

**DUE TO THE ROUNDING OF DECIMAL PLACES, A VALUE OF ZERO MAY INDICATE A SLIGHT INCREASE OR DECREASE IN DEPTH TO GROUNDWATER. THEREFORE, EVEN WITH A ZERO REPORTED FOR CHANGE IN DEPTH THERE WILL STILL MOST LIKELY BE A SMALL CHANGE IN STORAGE.

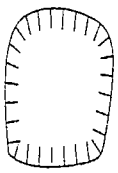
NOTE: POSITIVE VALUES FOR CHANGE IN DEPTH TO GROUNDWATER REFLECT AN INCREASE IN DEPTH TO GROUNDWATER AND A CORRESPONDING DECREASE IN STORAGE. NEGATIVE VALUES REFLECT A DECREASE IN DEPTH TO GROUNDWATER AND A CORRESPONDING INCREASE IN STORAGE.

FIGURES

Map Legend



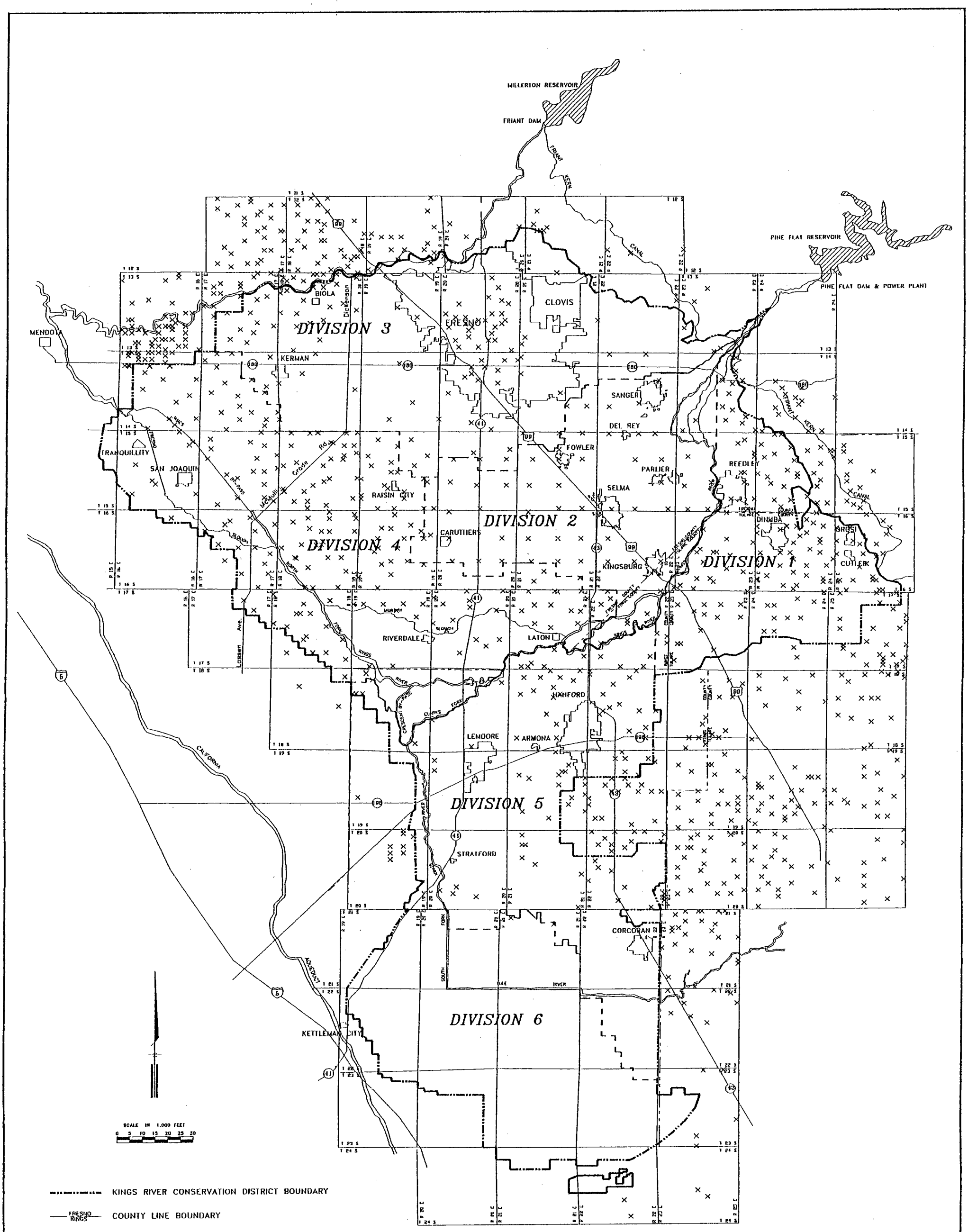
Tick marks on the outside of a closed contour indicate that groundwater is "mounded" at this location similar to a mountain shown on a topographical map.



Tick marks on the inside of a closed contour indicate that groundwater is "depressed" at this location, similar to a valley shown on a topographical map.

Standard line width used for most contours.

Thick line width used to emphasize every 50 foot change in elevation or depth. The 0, 50, and 100 foot elevations, for example, will use this thick line width.



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FAX: (559) 237-5560

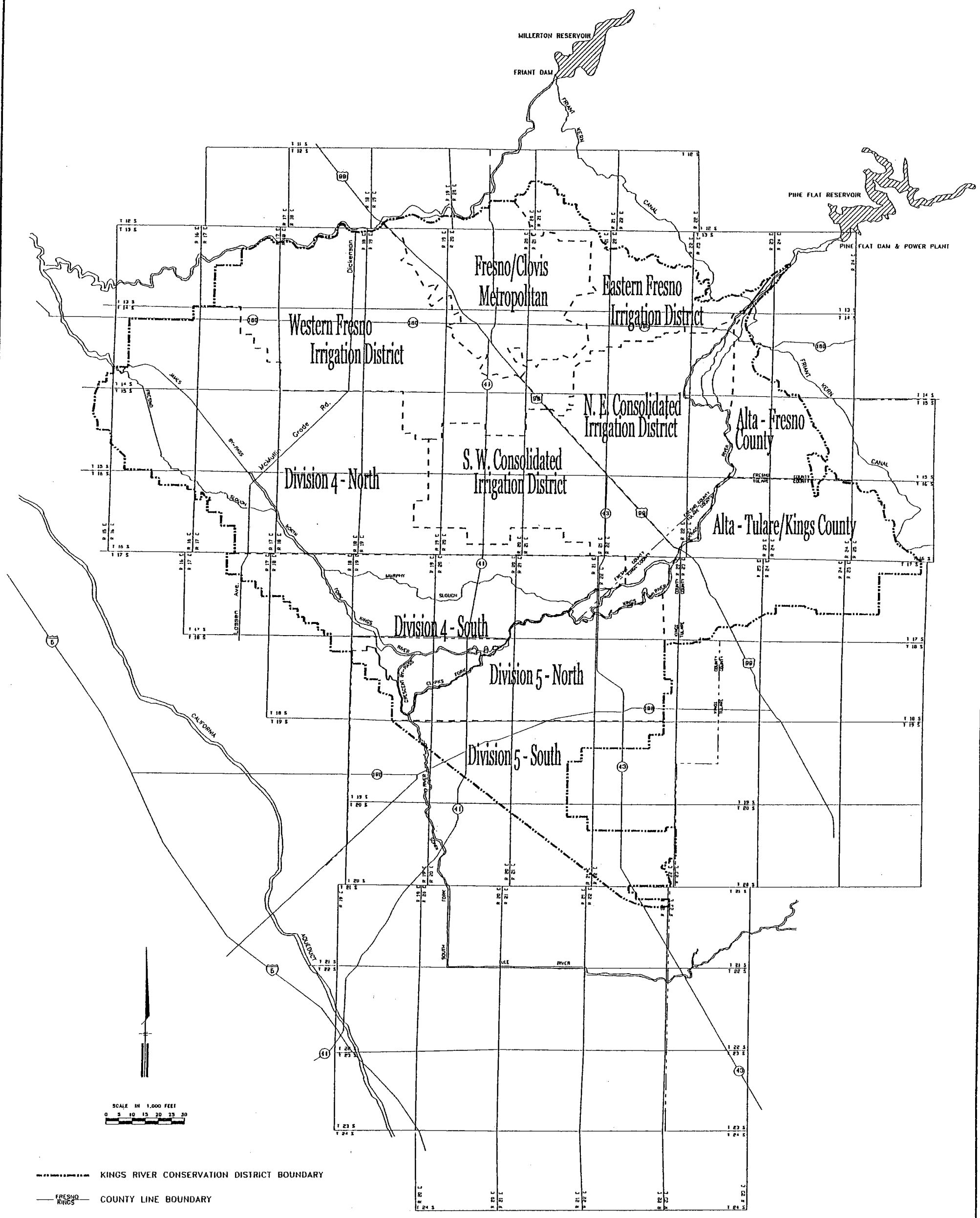
Project file: \GWREPORT\REPORT00
Dwg. No. 01-020

Spring 2000 Monitored Wells
KRCD Groundwater Database

Figure 1

APPROVED: _____
CHECKED: _____ R.C.E. # _____ EXPIRES: _____

DRAWN BY RA
DATE 05/18/2001



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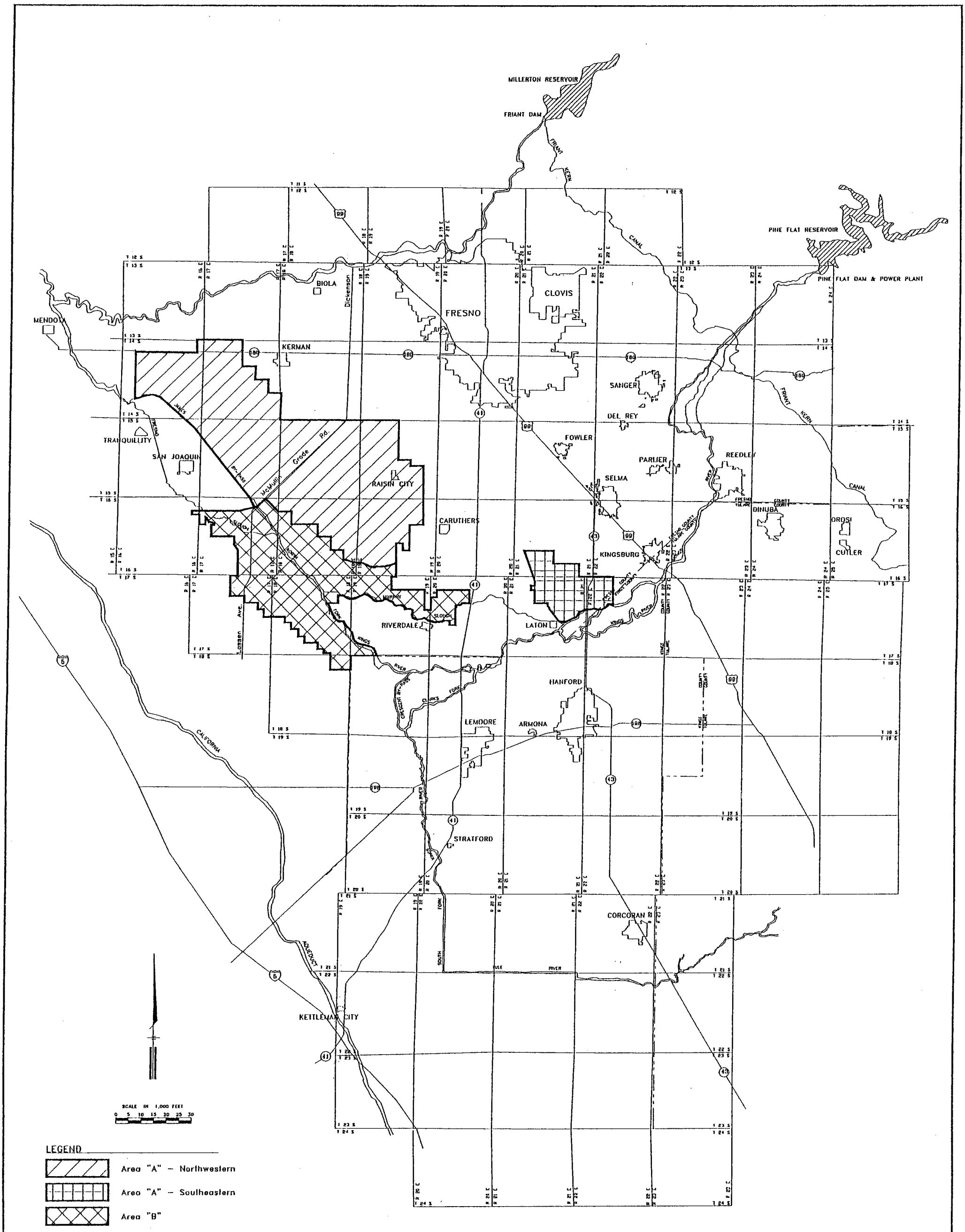
KRCD Subdivision Boundaries Used for Calculations

Figure 2

DRAWN BY RA
DATE 05/18/2001

Project File: \GWREPORT\REPORT00
Dwg. No. 01-020

APPROVED: _____
CHECKED: _____ R.C.E. # _____ EXPIRES: _____



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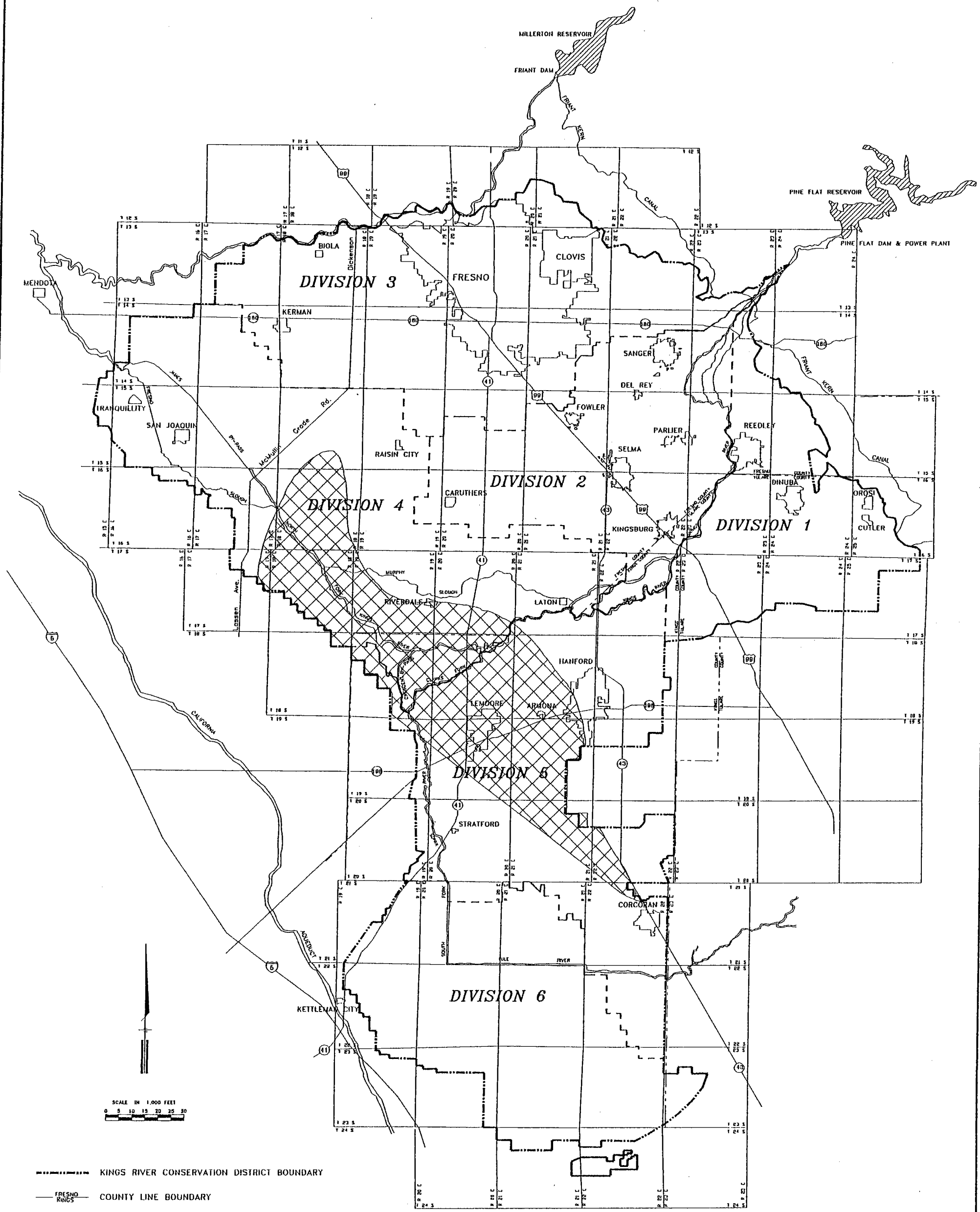
Groundwater Management Area Boundaries Used for Calculations

Figure 3

DRAWN BY RA
DATE 05/18/2001

Project File: \GWREPORT\REPORT00
Dwg. No. 01-020

APPROVED:
CHECKED: R.C.E. # EXPIRES:



LEGEND

Portion of Study Area Affected by A-Clay Confining Layer

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Approximate Extent of the A-Clay Confining Layer within the Study Area

Figure 4

APPROVED:
CHECKED: R.C.E. # EXPIRES:

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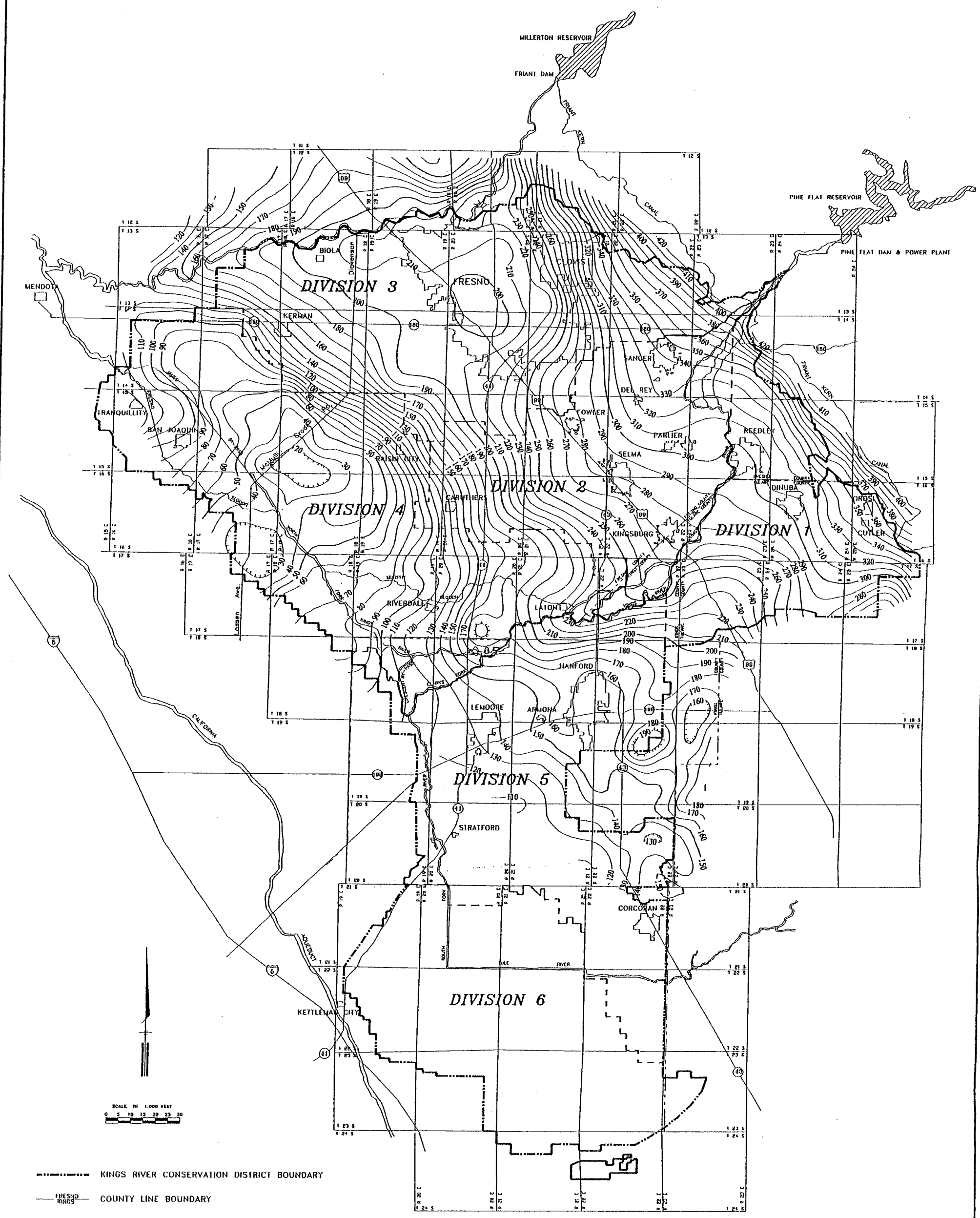
DATE 05/18/2001



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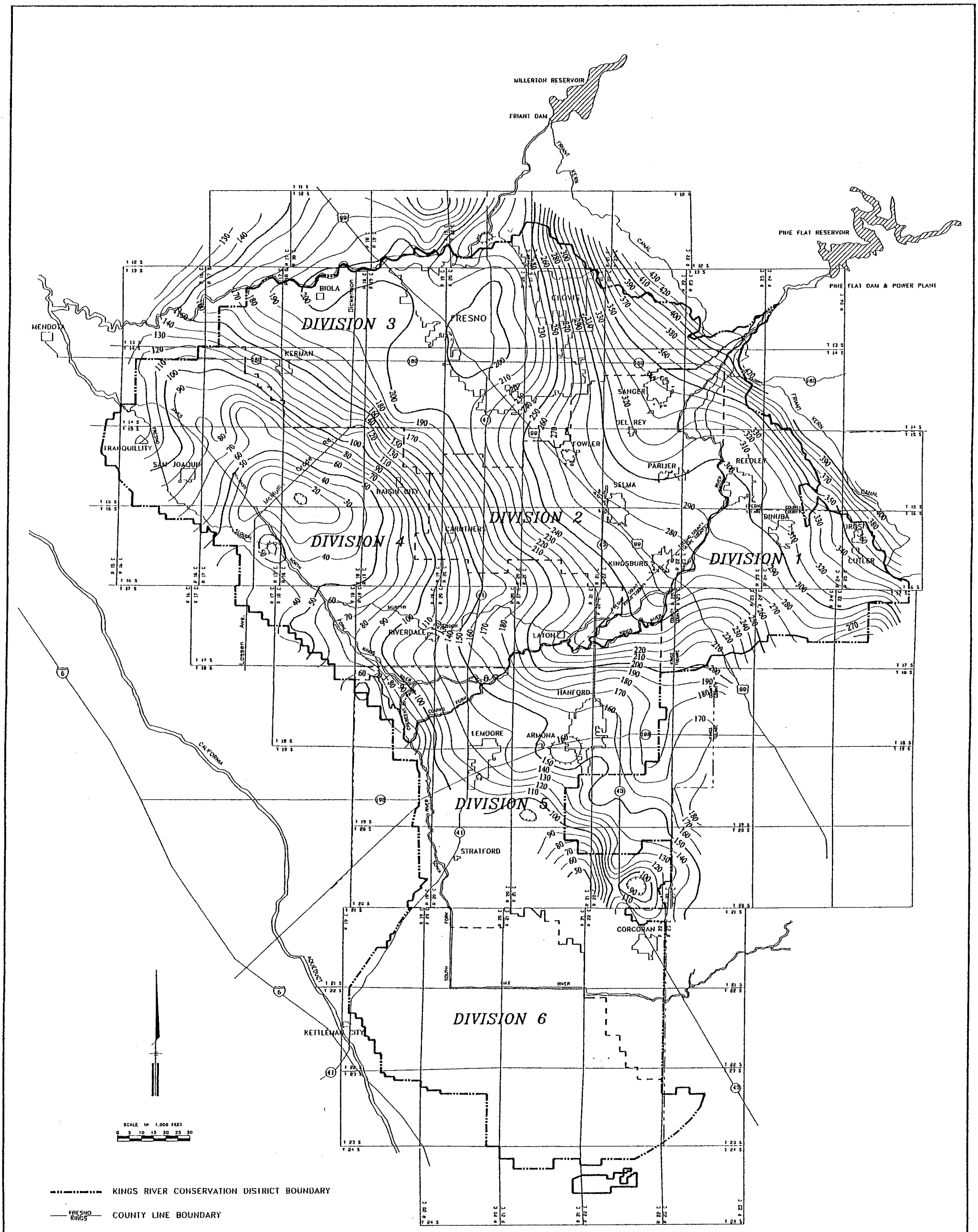
Dwg. No. 01-021

Groundwater Surface Elevation (feet above mean sea level) Spring 1999

Figure 5

DRAWN BY RA
DATE 05/18/2001

APPROVED:
CHECKED: R.C.E. # EXPIRES:



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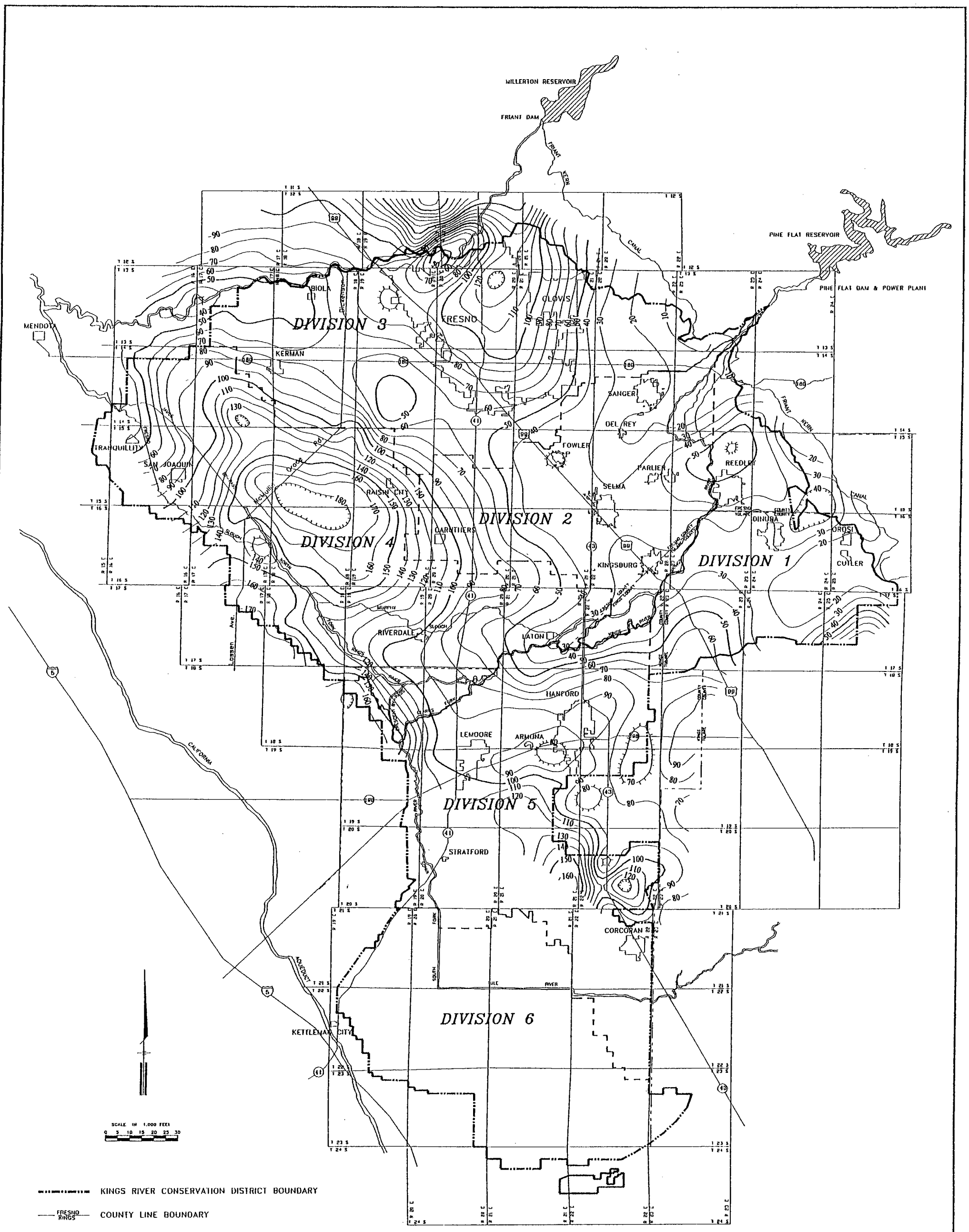
Project File: \GWREPORT\REPORT00
Dwg. No. 01-021

Groundwater Surface Elevation (feet above mean sea level) Spring 2000

Figure 7

CHECKED: _____ APPROVED: _____ R.C.E. # _____ EXPIRES: _____

DRAWN BY RA
DATE 05/18/2001



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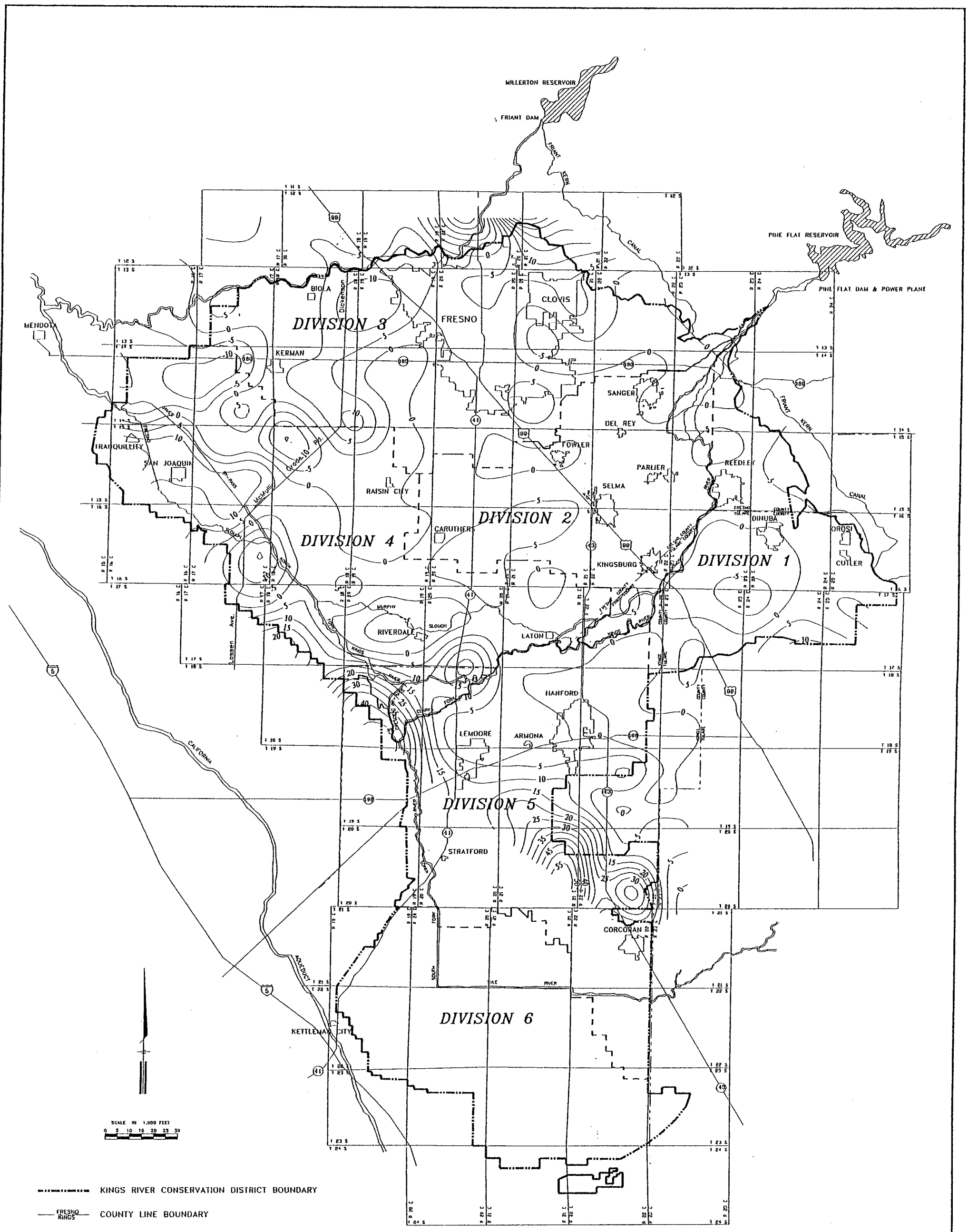
Project File: \GWREPORT\REPORT00
Dwg. No. 01-021

Depth to Groundwater (feet)
Spring 2000

Figure 8

DRAWN BY RA
DATE 05/18/2001

APPROVED:
CHECKED: R.C.E. # EXPIRES:



KINGS RIVER CONSERVATION DISTRICT BOUNDARY

FRESNO / KINGS — COUNTY LINE BOUNDARY

DIVISIONS BOUNDARY

CONTOUR INTERVAL 5 FEET

LEGEND

"10"	INDICATES AN INCREASE IN DEPTH TO GROUNDWATER
"0"	INDICATES NO CHANGE IN DEPTH TO GROUNDWATER
"-5"	INDICATES A DECREASE IN DEPTH TO GROUNDWATER

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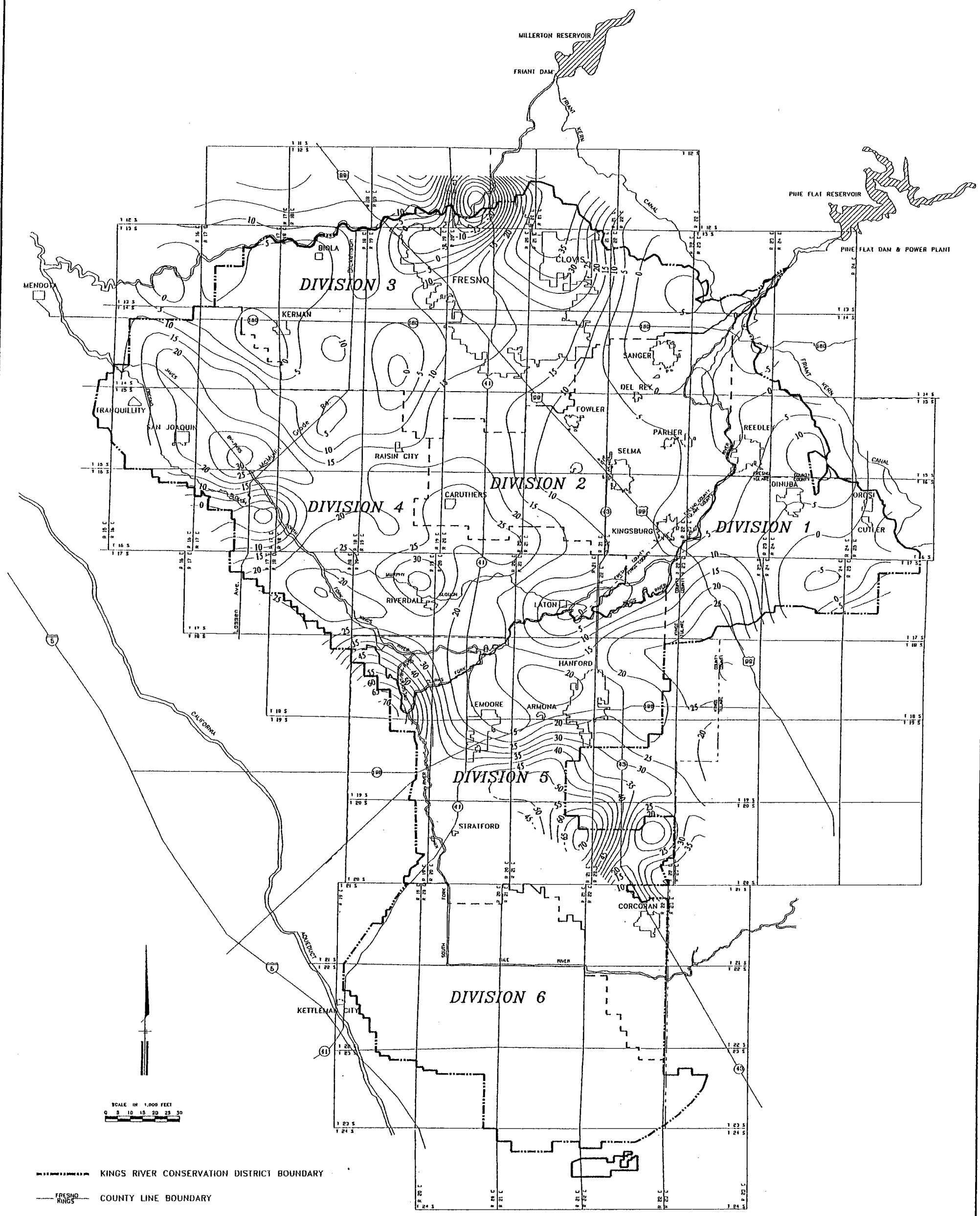
Dwg. No. 01-021

Change in Groundwater Depth (feet)
Spring 1999 to Spring 2000

Figure 9

APPROVED:
CHECKED: R.C.E. # EXPIRES:

DRAWN BY RA
DATE 05/18/2001



KINGS RIVER CONSERVATION DISTRICT BOUNDARY

FRESNO / KINGS — COUNTY LINE BOUNDARY

DIVISIONS BOUNDARY

CONTOUR INTERVAL 5 FEET

LEGEND

"10"	INDICATES AN INCREASE IN DEPTH TO GROUNDWATER
"0"	INDICATES NO CHANGE IN DEPTH TO GROUNDWATER
"-5"	INDICATES A DECREASE IN DEPTH TO GROUNDWATER

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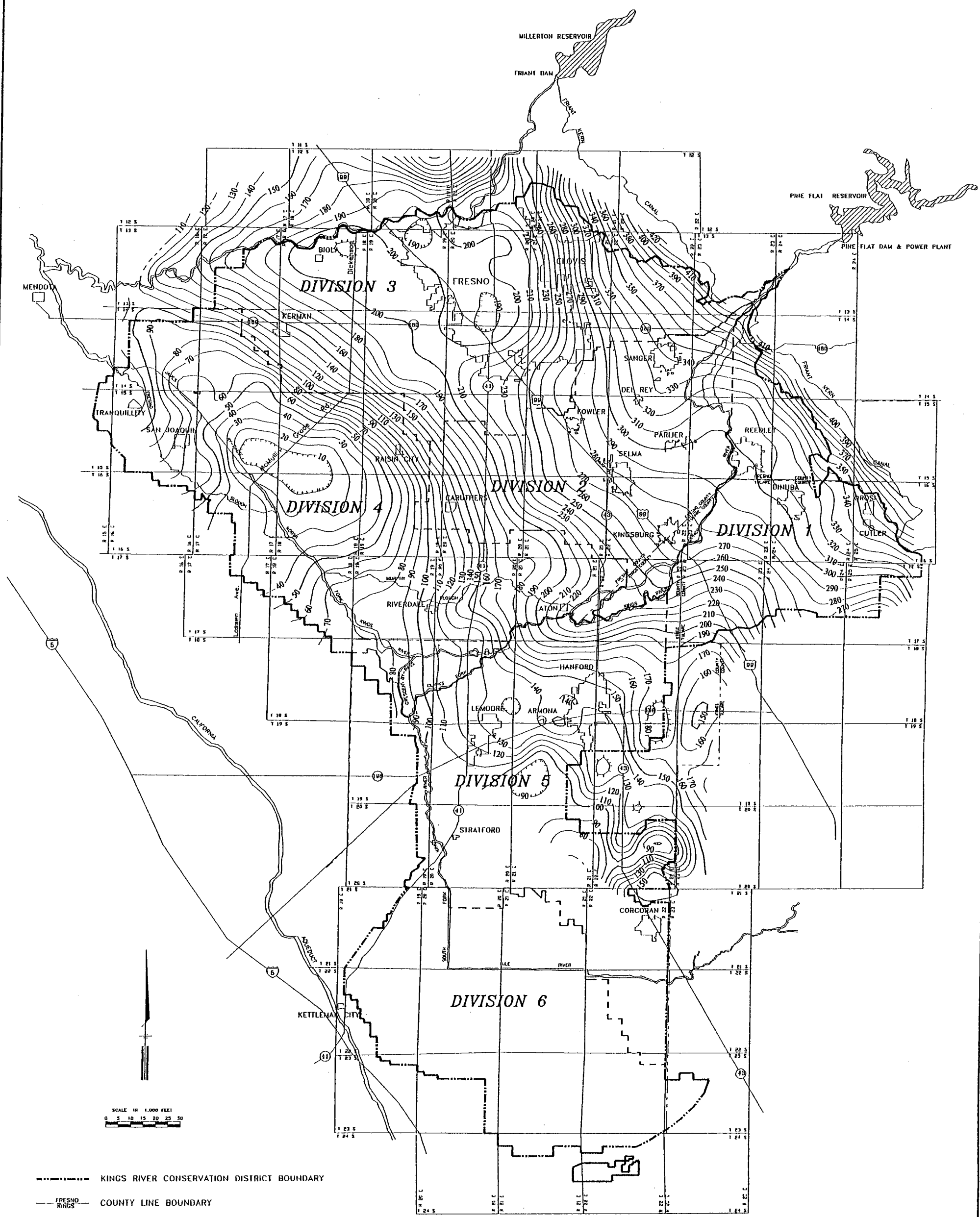
Dwg. No. 01-021

Change in Groundwater Depth (feet)
Spring 1986 to Spring 2000

Figure 10

APPROVED: _____
CHECKED: _____ R.C.E. # _____ EXPIRES: _____

DRAWN BY RA
DATE 05/18/2001



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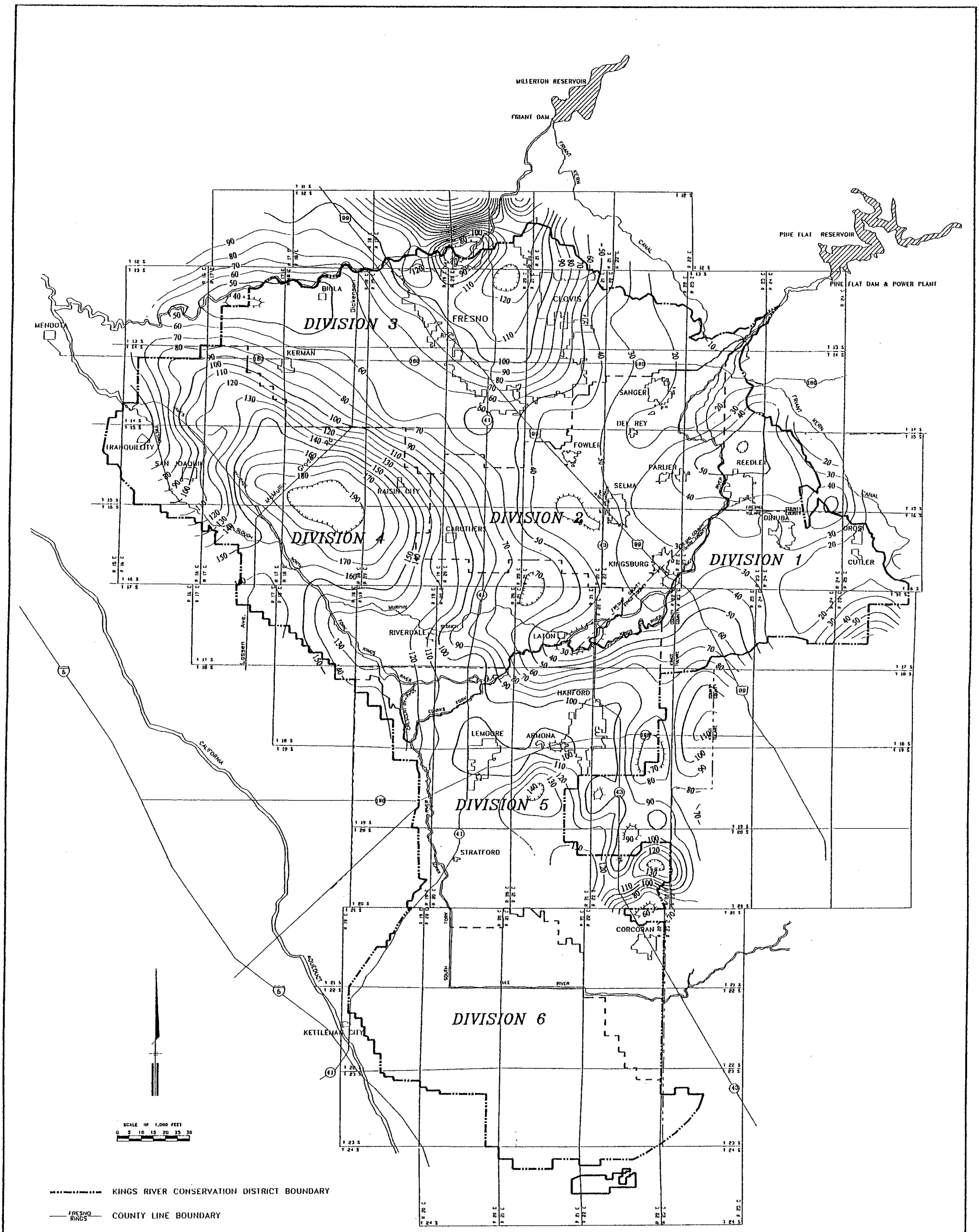
Groundwater Surface Elevation (feet above mean sea level) Fall 1999

Figure 11

DRAWN BY RA
DATE 05/18/2001

Project File: \GWREPORT\REPORT00
Dwg. No. 01-022
APPROVED:
CHECKED: R.C.E. # EXPIRES:



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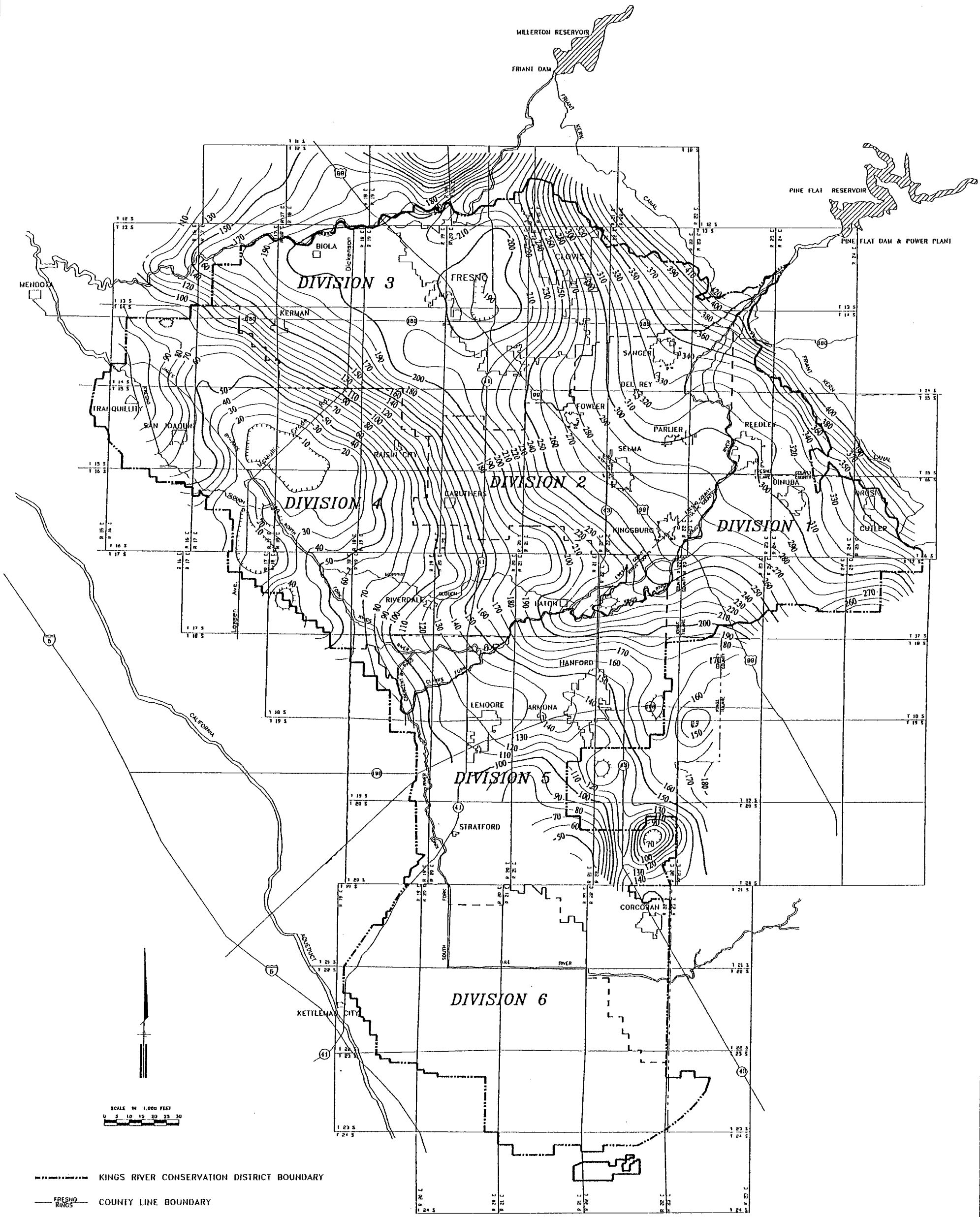
Project File: \GWREPORT\REPORT00
Dwg. No. 01-022

Depth to Groundwater (feet)
Fall 1999

Figure 12

APPROVED:
CHECKED: R.C.E. # EXPIRES:

DRAWN BY RA
DATE 05/18/2001



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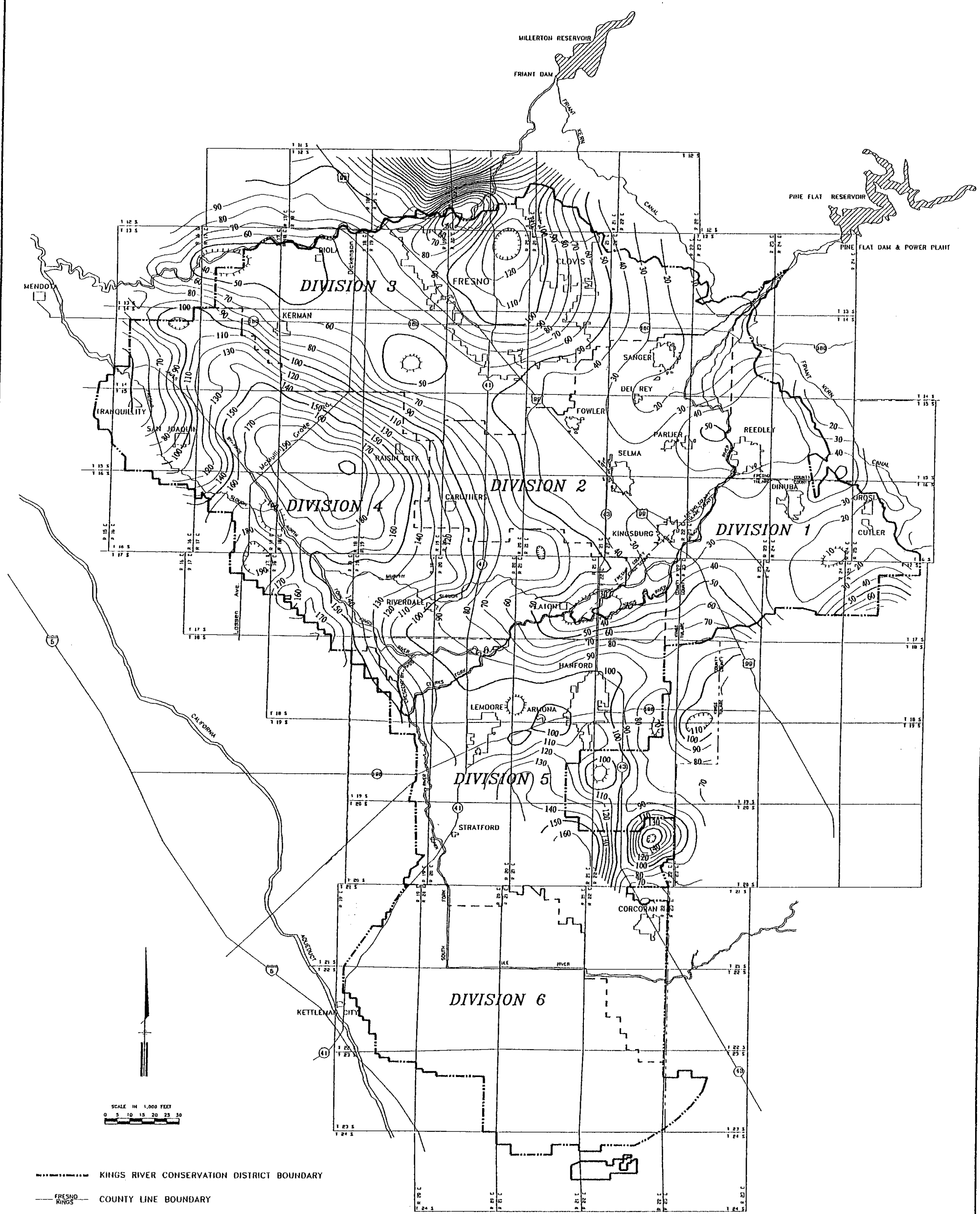
Project File: \GWREPORT\REPORT00
Dwg. No. 01-022

Groundwater Surface Elevation
(feet above mean sea level)
Fall 2000

Figure 13

APPROVED:
CHECKED: R.C.E. # EXPIRES:

DRAWN BY RA
DATE 05/18/2001



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Depth to Groundwater (feet)
Fall 2000

Figure 14

DRAWN BY RA
DATE 05/18/2001

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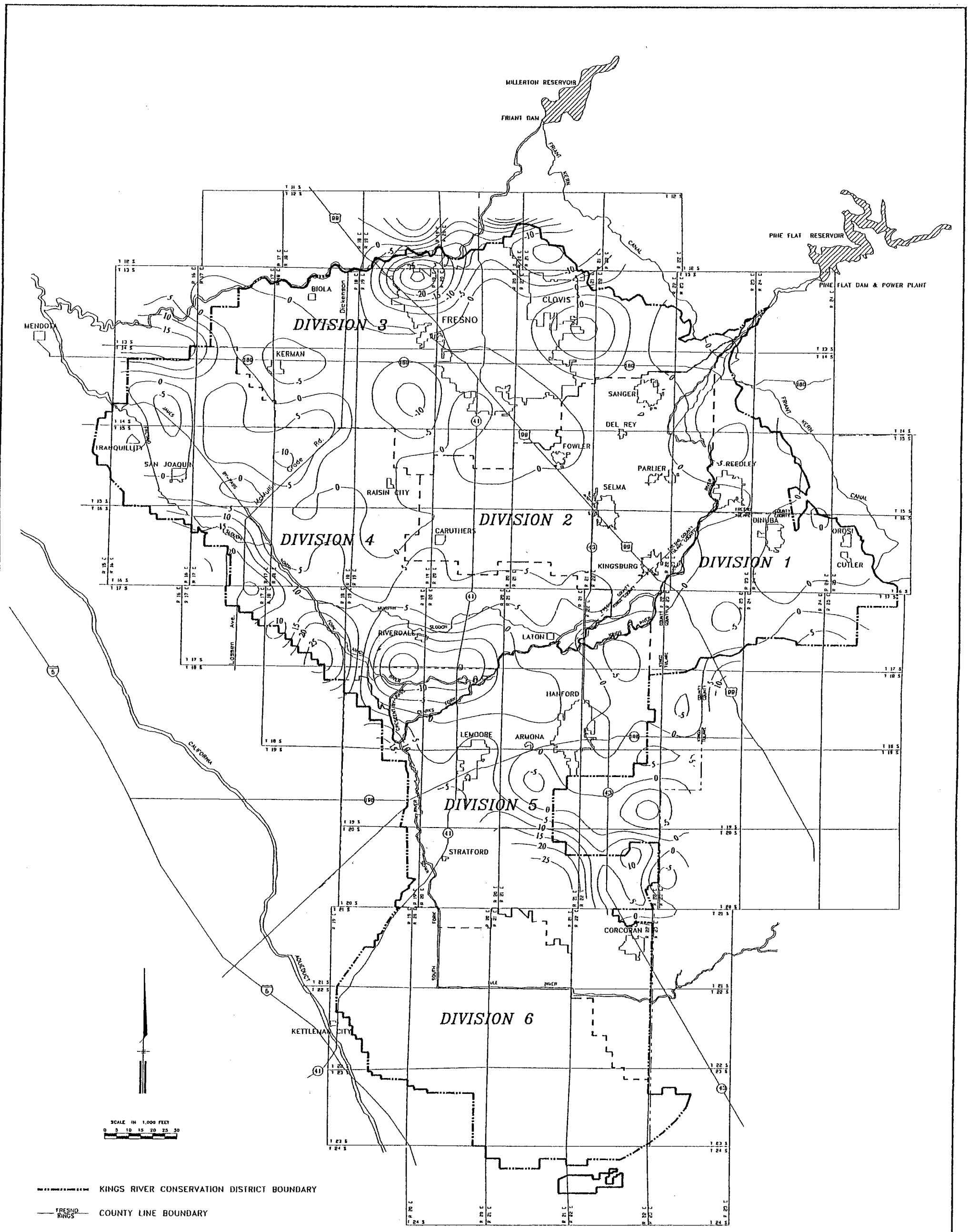
CHECKED: R.C.E. # EXPIRES:



KINGS RIVER CONSERVATION DISTRICT BOUNDARY

COUNTY LINE BOUNDARY

DIVISIONS BOUNDARY

CONTOUR INTERVAL 5 FEET

LEGEND

"10"	INDICATES AN INCREASE IN DEPTH TO GROUNDWATER
"0"	INDICATES NO CHANGE IN DEPTH TO GROUNDWATER
"-5"	INDICATES A DECREASE IN DEPTH TO GROUNDWATER

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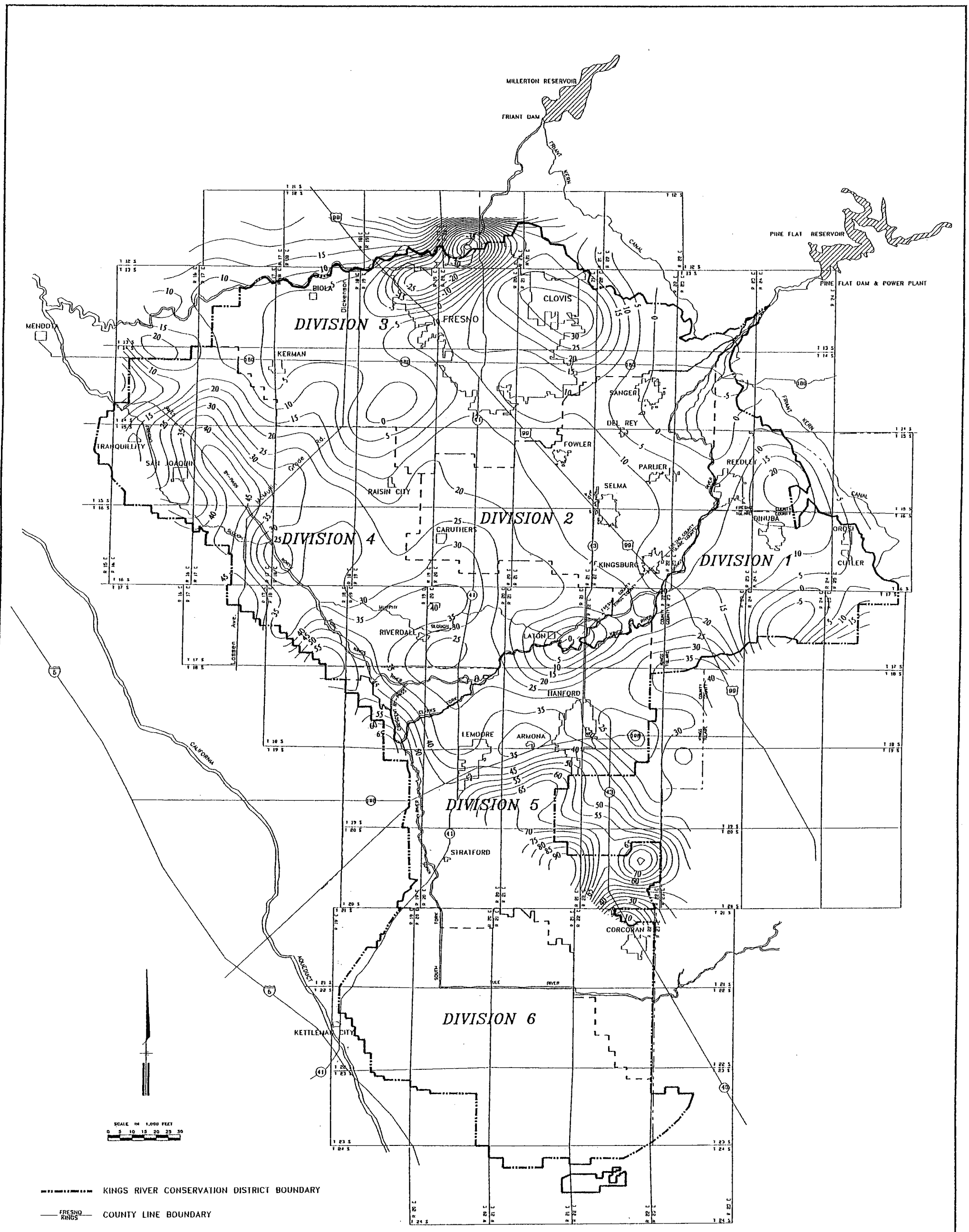
Change in Groundwater Depth (feet)
Fall 1999 to Fall 2000

Figure 15

DRAWN BY RA
DATE 05/18/2001

Project File: \GWREPORT\REPORT00
Dwg. No. 01-022
CHECKED: APPROVED: R.C.E. # EXPIRES:



LEGEND

"10"	INDICATES AN INCREASE IN DEPTH TO GROUNDWATER
"0"	INDICATES NO CHANGE IN DEPTH TO GROUNDWATER
"-5"	INDICATES A DECREASE IN DEPTH TO GROUNDWATER

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Dwg. No. 01-022

Change in Groundwater Depth (feet)
Fall 1986 to Fall 2000

Figure 16

APPROVED:
CHECKED: R.C.E. # EXPIRES:

DRAWN BY RA
DATE 05/18/2001

AVERAGE DEPTH TO GROUNDWATER

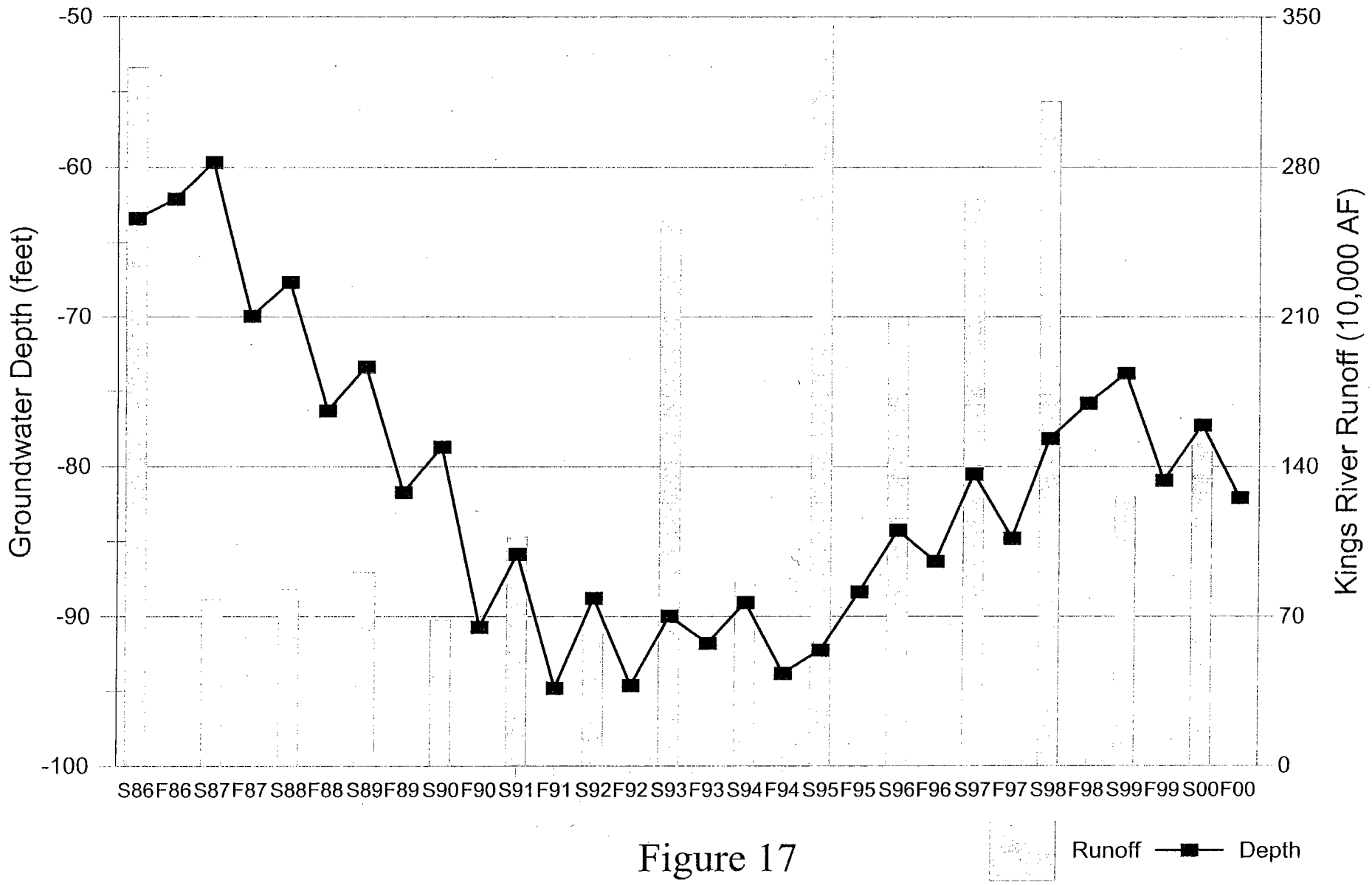
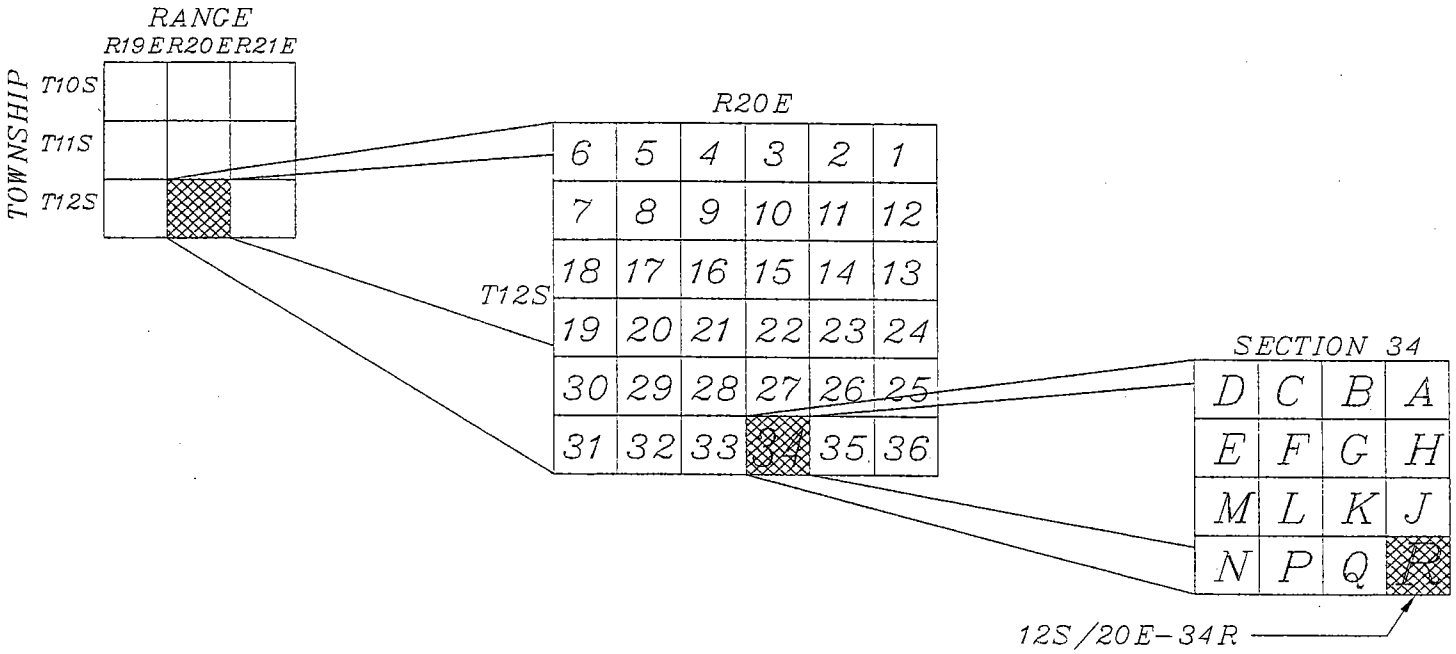


Figure 17

APPENDIX

WELL-NUMBERING SYSTEM

Wells are identified and numbered according to their location in the rectangular system for the subdivision of public lands. The identification consists of the township number, north or south; the range number, east or west; and the section number. Each section is further divided into sixteen 40-acre tracts lettered consecutively (except I and O), beginning with 'A' in the northeast corner of the section and progressing in a sinusoidal manner to 'R' in the southeast corner. Within the 40-acre tract, wells are sequentially numbered in the order they are inventoried. The approximate location of wells listed in the Groundwater Database that follows are indicated by the information shown in the columns labeled "T" (township), "R" (range), "S" (section), and "LC" (location code - the letter designation for the 40-acre tract within which the well is located.) The following diagram shows how the number for well 12S/20E-34R is derived.



KINGS RIVER CONSERVATION DISTRICT
GROUNDWATER DATABASE

CONTRIBUTING AGENCIES

AGENCY CODE	AGENCY
5001	U.S. Bureau of Reclamation
5050	Department of Water Resources
5129	Kings County Water District
5200	City of Fresno
5530	Madera Irrigation District
5600	Orange Cove Irrigation District
5601	Stone Corral Irrigation District
5602	Ivanhoe Irrigation District
5603	Kaweah Delta Water Conservation District
5604	Tulare Irrigation District
5609	Lower Tule River Irrigation District
5612	Pixley Irrigation District
5620	James Irrigation District
5621	Tranquillity Soil Conservation District
5622	Garfield Water District
5631	Fresno Irrigation District
5636	Consolidated Irrigation District
5637	Alta Irrigation District

GROUNDWATER DATABASE SUMMARY

SPRING and FALL 2000

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
1	5530	12S	17E	1	J	105.9	99.9	6.00	109.8	108.2	1.60
2	5530	12S	17E	2	J	107.2	102.6	4.60	110.5	107.7	2.80
3	5530	12S	17E	3	C	110.4	105.2	5.20	116.6	115.3	1.30
4	5530	12S	17E	3	F	105.1	100.6	4.50	109.8	107.1	2.70
5	5530	12S	17E	4	L	110.2	104.3	5.90	120	115.9	4.10
6	5530	12S	17E	6	A	103	96	7.00	105.4	103.8	1.60
7	5530	12S	17E	6	R	105.2	96.2	9.00	114.5	111.5	3.00
8	5530	12S	17E	8	G	107.1	95.2	11.90	106.2	107.7	-1.50
9	5530	12S	17E	8	G	107	96	11.00	115.7	116.7	-1.00
10	5530	12S	17E	9	J	98.4	92.1	6.30	105.4	103.3	2.10
11	5530	12S	17E	10	H	97.7	92.9	4.80	104.3	101.6	2.70
12	5530	12S	17E	11	D	97.6	93.7	3.90	104.2	101.5	2.70
13	5530	12S	17E	11	J	100.7	95.4	5.30	105.7	102.9	2.80
14	5530	12S	17E	13	J	97.6	91.3	6.30	104.3	104.1	0.20
15	5530	12S	17E	13	K	96.3	96.1	0.20	108.5	104.7	3.80
16	5530	12S	17E	14	F	94.2	91.6	2.60	99.4	96.9	2.50
17	5530	12S	17E	15	J	99.9	94.3	5.60	100.3	92.6	7.70
18	5530	12S	17E	16	A	94.6	81.3	13.30	99.1	94.6	4.50
19	5530	12S	17E	20	P	86.6	82.9	3.70	95	91.9	3.10
20	5530	12S	17E	21	H	85.4	81.1	4.30	94	91.2	2.80
21	5530	12S	17E	23	C	87.7	82.6	5.10	93.7	91.2	2.50
22	5530	12S	17E	24	H	81.9	74.7	7.20	91.6	88.3	3.30
23	5530	12S	17E	26	A	70.9	66.1	4.80	78.1	74.4	3.70
24	5530	12S	17E	26	C	69.7	66.2	3.50	75.3	72.2	3.10
25	5530	12S	17E	26	N	69.2	66	3.20	78.3	75.4	2.90
26	5530	12S	17E	29	H	76.4	73.6	2.80	86.2	84.6	1.60
27	5530	12S	17E	31	A	74.6	72.1	2.50	80.8	80.5	0.30
28	5530	12S	17E	32	H	73.9	71	2.90	81.8	81	0.80
29	5530	12S	17E	34	A	64.3	58.5	5.80	69	66.4	2.60
30	5530	12S	17E	34	D	64.7	59.6	5.10	71.9	70.5	1.40
31	5530	12S	17E	34	R	66.1	59.8	6.30	70.7	67.9	2.80
32	5530	12S	17E	35	R	69	63.3	5.70	71.6	71	0.60
33	5530	12S	17E	36	K	69.5	63.4	6.10	71.9	69.7	2.20
34	5530	12S	18E	3	D	103.2	101.1	2.10	110.7	108.8	1.90
35	5530	12S	18E	4	C	N/A	N/A	N/A	N/A	N/A	N/A
36	5530	12S	18E	4	L	97.3	94.2	3.10	100.8	100	0.80
37	5530	12S	18E	5	A	112.8	111	1.80	120.1	116.3	3.80
38	5530	12S	18E	6	J	100.8	97.9	2.90	110.4	108	2.40
39	5530	12S	18E	7	H	103.7	99.7	4.00	109.8	109.6	0.20
40	5530	12S	18E	8	Q	89.6	84	5.60	92.1	91	1.10
41	5530	12S	18E	9	P	93.9	90.4	3.50	99.5	93	6.50
42	5530	12S	18E	10	D	94.9	88.7	6.20	99.7	95.5	4.20
43	5530	12S	18E	10	R	95.1	89.6	5.50	96.5	93.9	2.60
44	5530	12S	18E	12	N	100	98.6	1.40	112.8	107.7	5.10
45	5530	12S	18E	13	R	100.8	99.3	1.50	102.6	102.4	0.20
46	5530	12S	18E	13	R	102.4	100.3	2.10	111.2	110.6	0.60
47	5530	12S	18E	16	A	87.7	84.6	3.10	90.6	90.1	0.50
48	5530	12S	18E	16	K	92.1	91.3	0.80	100.2	100.1	0.10
49	5530	12S	18E	17	L	89.6	84.8	4.80	91.4	89.8	1.60
50	5530	12S	18E	19	H	80.7	78.5	2.20	85.5	85.2	0.30
51	5530	12S	18E	20	P	80.2	73.1	7.10	85	80.7	4.30
52	5530	12S	18E	21	G	86.7	83.3	3.40	92.5	90.9	1.60
53	5530	12S	18E	21	H	84.9	79	5.90	91.6	87.1	4.50
54	5530	12S	18E	25	B	84.9	82.6	2.30	96.1	95.5	0.60
55	5530	12S	18E	25	L	86.6	81.3	5.30	92.6	87.5	5.10
56	5530	12S	18E	25	M	85.7	81.3	4.40	93.6	89.5	4.10
57	5530	12S	18E	26	D	87.1	82.1	5.00	96.3	90.6	5.70
58	5530	12S	18E	26	L	90.5	82.6	7.90	99.1	90	9.10
59	5530	12S	18E	26	R	87.2	77.9	9.30	95.2	88.6	6.60
60	5530	12S	18E	28	J	84.2	75.6	8.60	92.4	89.7	2.70
61	5530	12S	18E	30	C	83.1	78.6	4.50	91.1	87.7	3.40
62	5530	12S	18E	30	D	N/A	77.7	N/A	N/A	85.4	N/A
63	5530	12S	18E	31	J	79.9	76.9	3.00	83.6	81.1	2.50
64	5530	12S	18E	33	C	73.4	67.9	5.50	83.6	82	1.60
65	5530	12S	18E	34	L	71.1	68.8	2.30	73	73.1	-0.10

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
66	5530	12S	18E	35	G	78.5	74	4.50	84	83.4	0.60
67	5530	12S	18E	36	P	76.2	73.2	3.00	82.4	81.2	1.20
68	5001	12S	19E	2	A	209.8	215.5	-5.70	276.5	267.4	9.10
69	5001	12S	19E	3	Q	N/A	198.1	N/A	258.8	228.3	30.5
70	5001	12S	19E	11	B	238.8	N/A	N/A	N/A	240.7	N/A
71	5001	12S	19E	13	E	137.3	188.9	-51.60	230.9	N/A	N/A
72	5530	12S	19E	18	P	112	106.1	5.90	110.4	107.6	2.80
73	5530	12S	19E	20	A	103.1	102.1	1.00	106.7	103.2	3.50
74	5530	12S	19E	20	D	95.2	94.6	0.60	97.7	95.5	2.20
75	5530	12S	19E	21	B	98	97.9	0.10	101.2	98.4	2.80
76	5001	12S	19E	23	K	171.3	129.6	41.70	152.1	132.1	20.00
77	5530	12S	19E	25	E	31.6	30	1.60	33.6	31.9	1.70
78	5001	12S	19E	25	J	37.1	34.6	2.50	41.6	N/A	N/A
79	5001	12S	19E	26	C	170.4	130	40.40	191.7	143.4	48.30
80	5530	12S	19E	28	A	94.7	92.1	2.60	104.1	101.5	2.60
81	5530	12S	19E	28	P	90.6	88.7	1.90	96.6	92.5	4.10
82	5530	12S	19E	29	A	109.7	107.8	1.90	123.4	123.4	0.00
83	5530	12S	19E	31	M	87.8	82.1	5.70	92.4	91.4	1.00
84	5631	12S	19E	34	P	N/A	N/A	N/A	N/A	147.8	N/A
85	5001	12S	19E	35	A	36.4	34.6	1.80	36.5	N/A	N/A
86	5001	12S	20E	1	H	N/A	48.3	N/A	N/A	N/A	N/A
87	5001	12S	20E	2	R	N/A	35.8	N/A	N/A	37.3	N/A
88	5001	12S	20E	4	K	N/A	233.8	N/A	N/A	242.6	N/A
89	5001	12S	20E	5	P	N/A	N/A	N/A	264.2	N/A	N/A
90	5001	12S	20E	11	K	N/A	141.1	N/A	N/A	141.9	N/A
91	5622	12S	20E	13	H	144.8	138.8	6.00	N/A	134.3	N/A
92	5001	12S	20E	17	A	N/A	177.2	N/A	N/A	183.6	N/A
93	5001	12S	20E	17	H	N/A	168.7	N/A	177	194.1	-17.10
94	5001	12S	20E	18	B	198.4	195.2	3.20	N/A	N/A	N/A
95	5001	12S	20E	18	N	N/A	163.7	N/A	N/A	185.8	N/A
96	5001	12S	20E	20	A	38.8	37	1.80	37	42.3	-5.30
97	5001	12S	20E	32	G	N/A	N/A	N/A	N/A	N/A	N/A
98	5622	12S	21E	7	A	145.7	96.5	49.20	150.3	136.9	13.40
99	5622	12S	21E	17	G	76.8	73.5	3.30	80.3	76.3	4.00
100	5622	12S	21E	17	L	91.8	71.7	20.10	88.2	87.1	1.10
101	5622	12S	21E	17	M	95.2	74.1	21.10	N/A	N/A	N/A
102	5622	12S	21E	18	A	N/A	N/A	N/A	N/A	144.7	N/A
103	5622	12S	21E	18	B	143.2	94.5	48.70	119.1	144.8	-25.70
104	5001	12S	21E	20	Q	N/A	64.1	N/A	69.8	N/A	N/A
105	5001	12S	21E	26	R	N/A	41.3	N/A	N/A	N/A	N/A
106	5631	12S	21E	33	P	90.7	88.1	2.60	N/A	90.3	N/A
107	5001	12S	22E	18	M	N/A	14.8	N/A	17	N/A	N/A
108	5001	12S	22E	21	E	N/A	N/A	N/A	N/A	N/A	N/A
109	5001	12S	22E	25	A	0.8	0.7	0.10	N/A	0.6	N/A
110	5001	12S	22E	27	G	N/A	14.8	N/A	N/A	N/A	N/A
111	5001	12S	22E	29	D	N/A	20.6	N/A	33.8	N/A	N/A
112	5001	12S	22E	29	H	28.8	23.8	5	24.8	23.7	1.10
113	5001	12S	22E	30	D	34	17.1	16.9	N/A	N/A	N/A
114	5001	12S	22E	30	N	N/A	34.8	N/A	33	N/A	N/A
115	5530	13S	16E	2	C	85	82.3	2.70	95.1	93.2	1.90
116	5530	13S	16E	2	C	85.7	84.2	1.50	100.7	98.4	2.30
117	5001	13S	16E	2	F	71.7	87	-15.30	N/A	N/A	N/A
118	5001	13S	16E	3	L	69.3	N/A	N/A	N/A	85.1	N/A
119	5001	13S	16E	5	C	N/A	73.3	N/A	89.1	N/A	N/A
120	5001	13S	16E	6	M	65.4	N/A	N/A	N/A	84.2	N/A
121	5001	13S	16E	7	R	N/A	N/A	N/A	N/A	88	N/A
122	5001	13S	16E	8	H	N/A	79.2	N/A	94.3	N/A	N/A
123	5001	13S	16E	14	H	N/A	39.1	N/A	64.3	49.7	14.60
124	5001	13S	16E	15	H	54.1	53.5	0.60	69	59.6	9.40
125	5001	13S	16E	16	D	75.7	78.8	-3.10	81.6	85.9	-4.30
126	5001	13S	16E	19	J	52.2	54.2	-2.00	82	87.3	-5.30
127	5001	13S	16E	19	K	56.8	53	3.80	80.1	74.3	5.80
128	5001	13S	16E	19	P	N/A	53.7	N/A	N/A	87.8	N/A
129	5001	13S	16E	20	J	N/A	55.5	N/A	73.2	N/A	N/A
130	5001	13S	16E	21	J	N/A	39.9	N/A	N/A	N/A	N/A

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
131	5001	13S	16E	22	B	N/A	45.8	N/A	N/A	49.9	N/A
132	5001	13S	16E	22	F	20.8	17.6	3.20	23.2	21.3	1.90
133	5001	13S	16E	22	J	34	36.8	-2.80	63.2	22.9	40.30
134	5001	13S	16E	22	J	41.2	41.5	-0.30	48.9	25.8	23.10
135	5001	13S	16E	23	A	41.8	44.2	-2.4	62.2	N/A	N/A
136	5001	13S	16E	23	N	40.4	48.3	-7.90	64.2	51.1	13.10
137	5001	13S	16E	24	C	31	30.6	0.40	42.1	N/A	N/A
138	5001	13S	16E	26	A	42.3	43.4	-1.10	69.3	64.6	4.70
139	5001	13S	16E	26	J	47.1	53.2	-6.10	N/A	59	N/A
140	5001	13S	16E	26	L	N/A	52.6	N/A	N/A	59.8	N/A
141	5001	13S	16E	27	A	41.2	39.3	1.90	67.8	N/A	N/A
142	5001	13S	16E	27	B	39.8	N/A	N/A	N/A	59.3	N/A
143	5001	13S	16E	27	C	42.2	38.8	3.40	55.1	48.6	6.50
144	5001	13S	16E	27	F	N/A	42.6	N/A	73.1	49.9	23.20
145	5001	13S	16E	27	H	44	46.4	-2.40	N/A	57.6	N/A
146	5001	13S	16E	28	A	44.3	N/A	N/A	80.2	62.5	17.70
147	5001	13S	16E	28	E	N/A	46.4	N/A	N/A	47.8	N/A
148	5001	13S	16E	28	H	N/A	45.5	N/A	N/A	74.1	N/A
149	5001	13S	16E	28	J	48.9	N/A	N/A	89.5	N/A	N/A
150	5001	13S	16E	29	F	46.4	59.9	-13.50	91.2	67.2	24.00
151	5001	13S	16E	29	J	48	55.8	-7.80	N/A	N/A	N/A
152	5001	13S	16E	29	J	N/A	N/A	N/A	N/A	70.8	N/A
153	5001	13S	16E	30	A	47.3	50	-2.70	79.9	87.7	-7.80
154	5001	13S	16E	30	B	N/A	48.8	N/A	86.2	84.9	1.30
155	5001	13S	16E	30	E	42.3	46.4	-4.10	91.4	65.1	26.30
156	5001	13S	16E	30	J	42.6	58.4	-15.80	93.7	65.4	28.30
157	5001	13S	16E	30	L	41.1	N/A	N/A	93.7	67.8	25.90
158	5001	13S	16E	30	L	41.8	62.5	-20.70	83.8	N/A	N/A
159	5001	13S	16E	30	Q	N/A	42.3	N/A	N/A	62.8	N/A
160	5001	13S	16E	30	R	N/A	N/A	N/A	N/A	N/A	N/A
161	5001	13S	16E	32	E	42.7	47.2	-4.50	N/A	63.6	N/A
162	5001	13S	16E	32	F	42.7	49.3	-6.60	N/A	66.3	N/A
163	5001	13S	16E	33	B	46.8	51.1	-4.30	N/A	68.1	N/A
164	5001	13S	16E	33	F	41.2	49.8	-8.60	91.4	N/A	N/A
165	5001	13S	16E	33	J	48.9	47.4	1.50	92.8	N/A	N/A
166	5001	13S	16E	33	L	47.8	51.8	-4.00	88.8	N/A	N/A
167	5001	13S	16E	34	C	N/A	52.8	N/A	66.1	N/A	N/A
168	5001	13S	16E	34	C	50.9	62.3	-11.40	91.8	N/A	N/A
169	5001	13S	16E	34	D	53.1	54.8	-1.70	89.9	N/A	N/A
170	5001	13S	16E	34	F	N/A	61.8	N/A	90.9	N/A	N/A
171	5001	13S	16E	34	P	44.3	62.8	-18.50	N/A	N/A	N/A
172	5001	13S	16E	35	A	45.1	61.1	-16.00	79.5	N/A	N/A
173	5001	13S	16E	35	L	69.4	68.8	0.60	89.1	N/A	N/A
174	5001	13S	16E	36	R	74.2	75.2	-1.00	101.3	N/A	N/A
175	5530	13S	17E	2	M	N/A	47.2	N/A	N/A	52	N/A
176	5530	13S	17E	3	H	51.8	47.6	4.20	58.9	56.8	2.10
177	5530	13S	17E	4	R	50.6	45.6	5.00	57.6	52.6	5.00
178	5530	13S	17E	5	P	53.9	48	5.90	62.1	58.6	3.50
179	5530	13S	17E	7	A	47.2	44.4	2.80	55.6	51.4	4.20
180	5530	13S	17E	7	J	45.1	43	2.10	49	47	2.00
181	5530	13S	17E	8	L	37.9	34.7	3.20	39.5	39.5	0.00
182	5530	13S	17E	9	A	46.7	45.4	1.30	57.7	54.5	3.20
183	5001	13S	17E	9	R	35	30.9	4.10	36.7	N/A	N/A
184	5001	13S	17E	11	R	41.8	37.5	4.30	38	N/A	N/A
185	5631	13S	17E	12	J	45.8	48.4	-2.60	47.2	47	0.20
186	5001	13S	17E	14	D	41.4	36.6	4.80	36.9	N/A	N/A
187	5001	13S	17E	17	A	N/A	N/A	N/A	28.9	N/A	N/A
188	5001	13S	17E	18	J	21.3	19.8	1.50	24.2	N/A	N/A
189	5001	13S	17E	18	M	12.8	13.4	-0.60	16.7	N/A	N/A
190	5001	13S	17E	18	P	N/A	N/A	N/A	25.9	N/A	N/A
191	5001	13S	17E	18	R	N/A	N/A	N/A	37.4	N/A	N/A
192	5001	13S	17E	19	C	N/A	N/A	N/A	N/A	N/A	N/A
193	5631	13S	17E	19	H	46.9	33.4	13.50	40.7	40.2	0.50
194	5631	13S	17E	20	A	56.6	36.7	19.90	31.6	36.8	-5.20
195	5631	13S	17E	22	B	39.9	38	1.90	47.3	34.7	12.60

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
196	5001	13S	17E	23	N	46.6	52.9	-6.30	49.6	44.1	5.50
197	5001	13S	17E	24	A	46.7	N/A	N/A	43	42.5	0.50
198	5631	13S	17E	25	C	52.3	53	-0.70	42.3	50	-7.70
199	5001	13S	17E	27	J	52.7	50.1	2.60	51.3	N/A	N/A
200	5001	13S	17E	28	H	50.2	49.7	0.50	50.4	60.1	-9.70
201	5631	13S	17E	32	H	N/A	76.8	N/A	76.8	72.5	4.30
202	5001	13S	17E	33	D	63	62.1	0.90	60.2	67.6	-7.40
203	5631	13S	17E	34	F	56.2	60.5	-4.30	61.9	62.2	-0.30
204	5001	13S	17E	35	L	N/A	54	N/A	67.9	65.6	2.30
205	5001	13S	18E	1	H	74.4	70.2	4.20	72.8	73.5	-0.70
206	5001	13S	18E	2	C	59.3	51.7	7.60	54.5	50.2	4.30
207	5001	13S	18E	2	P	65.1	57.5	7.60	72.5	N/A	N/A
208	5530	13S	18E	3	C	60.5	58.5	2.00	63.7	60.9	2.80
209	5001	13S	18E	3	P	N/A	56.7	N/A	N/A	N/A	N/A
210	5530	13S	18E	4	A	61.1	56.3	4.80	65.4	61.4	4.00
211	5530	13S	18E	4	B	61.5	61	0.50	66.5	62.1	4.40
212	5530	13S	18E	5	E	61.1	56	5.10	62.4	59	3.40
213	5530	13S	18E	5	J	60.9	55.1	5.80	66.1	59.5	6.60
214	5530	13S	18E	6	F	58.6	54.5	4.10	62.5	57.2	5.30
215	5530	13S	18E	6	K	61	54.8	6.20	61.3	56.8	4.50
216	5001	13S	18E	7	G	34.3	26.6	7.70	29.8	27.6	2.20
217	5001	13S	18E	9	B	45.2	43.1	2.10	46	41.1	4.90
218	5631	13S	18E	10	C	52.2	62.3	-10.10	49.7	52	-2.30
219	5001	13S	18E	10	P	N/A	46.6	N/A	50.5	N/A	N/A
220	5631	13S	18E	11	J	N/A	N/A	N/A	N/A	N/A	N/A
221	5001	13S	18E	13	R	79.1	57.5	21.60	60.3	60.3	0.00
222	5001	13S	18E	14	H	70.3	55.3	15.00	63.1	N/A	N/A
223	5001	13S	18E	15	J	60	53.2	6.80	57.5	53.5	4.00
224	5631	13S	18E	17	A	48.6	49.8	-1.20	46.9	47.2	-0.30
225	5001	13S	18E	20	C	51.3	43.5	7.80	43	43.3	-0.30
226	5001	13S	18E	21	P	44.1	44.2	-0.10	43	44.4	-1.40
227	5001	13S	18E	22	L	47.6	48.9	-1.30	48.1	47.8	0.30
228	5001	13S	18E	23	R	N/A	56	N/A	58.5	55.3	3.20
229	5631	13S	18E	25	B	N/A	N/A	N/A	N/A	N/A	N/A
230	5631	13S	18E	29	C	49.3	47.2	2.10	39.3	43.1	-3.80
231	5631	13S	18E	32	N	53.5	54.8	-1.30	50.6	54.8	-4.20
232	5001	13S	18E	34	D	60	53.1	6.90	53	52.3	0.70
233	5001	13S	19E	16	K	98.6	82.7	15.90	84.5	N/A	N/A
234	5631	13S	19E	23	E	80.5	74.5	6.00	83.5	80.4	3.10
235	5200	13S	20E	3	H	138.3	130.1	8.20	149.6	143.7	5.90
236	5200	13S	20E	10	B	N/A	127.1	N/A	N/A	138.6	N/A
237	5200	13S	20E	10	Q	127.4	121	6.40	133.4	129.5	3.90
238	5200	13S	20E	11	C	139.8	132.1	7.70	148.4	142.5	5.90
239	5631	13S	20E	12	H	N/A	N/A	N/A	N/A	N/A	N/A
240	5200	13S	20E	13	E	119.3	118	1.30	128.3	124.7	3.60
241	5200	13S	20E	13	J	N/A	N/A	N/A	N/A	112.7	N/A
242	5200	13S	20E	14	B	122	118	4.00	126.4	125.1	1.30
243	5200	13S	20E	15	L	N/A	N/A	N/A	122.7	101.5	21.20
244	5200	13S	20E	16	Q	N/A	N/A	N/A	120.9	121.8	-0.90
245	5200	13S	20E	17	F	116	109.1	6.90	116.1	120	-3.90
246	5200	13S	20E	19	C	101.3	103.2	-1.90	108.1	111.9	-3.80
247	5200	13S	20E	20	E	101.9	103.7	-1.80	106.3	107.4	-1.10
248	5200	13S	20E	20	H	103.7	106.6	-2.90	107.1	113.2	-6.10
249	5200	13S	20E	20	R	104.1	100.2	3.90	109.9	100.5	9.40
250	5200	13S	20E	21	J	110.9	113.3	-2.40	138.1	117.1	21.00
251	5200	13S	20E	21	K	N/A	N/A	N/A	N/A	126.8	N/A
252	5200	13S	20E	22	A	121	96	25.00	122.1	92.7	29.40
253	5200	13S	20E	22	L	115.6	114	1.60	118.8	116.7	2.10
254	5200	13S	20E	23	B	119	118.1	0.90	122.9	122.6	0.30
255	5200	13S	20E	23	J	109.4	108.1	1.30	109.7	113.7	-4.00
256	5200	13S	20E	23	Q	115	110.1	4.90	114.8	120.5	-5.70
257	5200	13S	20E	26	D	115.1	113	2.10	117.1	122	-4.90
258	5200	13S	20E	27	J	110.5	109.1	1.40	112.4	117.7	-5.30
259	5200	13S	20E	28	C	101.3	106.7	-5.40	109.7	111.1	-1.40
260	5200	13S	20E	28	E	105.2	105.9	-0.70	106.7	113.8	-7.10

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
261	5200	13S	20E	28	N	90.4	94.2	-3.80	104.2	98.1	6.10
262	5200	13S	20E	28	R	N/A	N/A	N/A	N/A	N/A	N/A
263	5200	13S	20E	29	K	N/A	N/A	N/A	N/A	N/A	N/A
264	5200	13S	20E	30	B	107.4	107.2	0.20	107.8	105.2	2.60
265	5200	13S	20E	32	D	88.4	89.1	-0.70	90.7	93.2	-2.50
266	5200	13S	20E	32	L	100.1	97.9	2.20	100.1	96.1	4.00
267	5200	13S	20E	33	J	87.3	87.8	-0.50	102.7	101.2	1.50
268	5200	13S	20E	34	B	107.6	102.7	4.90	101.8	103.6	-1.80
269	5200	13S	20E	34	M	N/A	N/A	N/A	N/A	134.3	N/A
270	5200	13S	20E	35	D	111.2	107	4.20	116.7	N/A	N/A
271	5200	13S	20E	35	H	N/A	102.1	N/A	N/A	107	N/A
272	5200	13S	20E	36	P	102.3	97	5.30	109.2	105.7	3.50
273	5631	13S	21E	23	D	N/A	41.2	N/A	N/A	46	N/A
274	5631	13S	21E	24	J	30	27	3.00	N/A	27.9	N/A
275	5200	13S	21E	30	P	103.4	95	8.40	104.4	102	2.40
276	5200	13S	21E	31	A	N/A	130.1	N/A	N/A	N/A	N/A
277	5200	13S	21E	31	E	100.8	93.1	7.70	104.1	101.5	2.60
278	5001	13S	22E	2	A	N/A	16	N/A	N/A	N/A	N/A
279	5631	13S	22E	7	R	N/A	29.6	N/A	38.2	37	1.20
280	5001	13S	22E	11	B	N/A	13	N/A	N/A	11.9	N/A
281	5631	13S	22E	13	A	7.8	6.2	1.60	7.4	10.9	-3.50
282	5001	13S	22E	13	A	N/A	8.8	N/A	N/A	N/A	N/A
283	5001	13S	23E	9	D	9.8	0.9	8.90	2.8	3.6	-0.80
284	5001	13S	23E	17	D	10.7	6.3	4.40	9.1	9.6	-0.50
285	5631	13S	23E	30	C	3.5	6.3	-2.80	8.3	10.9	-2.60
286	5001	13S	23E	33	Q	9.8	11.5	-1.70	7.8	8	-0.20
287	5001	13S	23E	34	M	11.8	8.1	3.70	11.2	N/A	N/A
288	5001	14S	16E	3	A	65.8	71.7	-5.90	98.3	79.7	18.60
289	5001	14S	16E	3	F	57.6	62.7	-5.10	105.3	78.4	26.90
290	5001	14S	16E	3	P	56.1	N/A	N/A	109	93.7	15.30
291	5001	14S	16E	4	A	51.8	59.8	-8.00	66.5	74.5	-8.00
292	5001	14S	16E	4	C	59.8	57.8	2.00	N/A	72.3	N/A
293	5001	14S	16E	4	D	41.8	55.8	-14.00	N/A	69.8	N/A
294	5001	14S	16E	4	L	51	67.8	-16.80	N/A	75.6	N/A
295	5001	14S	16E	5	C	48.3	51.5	-3.20	93.3	70.6	22.70
296	5001	14S	16E	5	F	50.8	N/A	N/A	86.2	71.1	15.10
297	5001	14S	16E	5	J	41.3	N/A	N/A	83.8	71.7	12.10
298	5001	14S	16E	5	L	43.8	64.3	-20.50	N/A	64.5	N/A
299	5001	14S	16E	6	A	45.3	47.9	-2.60	93.3	N/A	N/A
300	5001	14S	16E	6	B	38.8	N/A	N/A	N/A	61.4	N/A
301	5001	14S	16E	6	G	45.3	N/A	N/A	86.8	62.2	24.60
302	5001	14S	16E	7	B	34.6	38.1	-3.50	57.9	51.1	6.80
303	5001	14S	16E	7	C	24.7	45.6	-20.90	55.3	52.9	2.40
304	5001	14S	16E	8	J	43.7	44.8	-1.10	60.2	60.8	-0.60
305	5001	14S	16E	23	L	N/A	N/A	N/A	57.1	77.3	-20.20
306	5620	14S	16E	26	R	N/A	N/A	N/A	N/A	N/A	N/A
307	5620	14S	16E	33	N	35.1	N/A	N/A	N/A	39.5	N/A
308	5620	14S	16E	35	M	76.8	59.7	17.10	92.2	110.6	-18.40
309	5001	14S	17E	1	E	67.4	N/A	N/A	58.3	66.8	-8.50
310	5001	14S	17E	3	F	N/A	N/A	N/A	N/A	N/A	N/A
311	5631	14S	17E	4	R	N/A	113.2	N/A	N/A	N/A	N/A
312	5001	14S	17E	5	D	79.1	95.5	-16.40	N/A	84.1	N/A
313	5001	14S	17E	8	D	98.9	N/A	N/A	N/A	N/A	N/A
314	5001	14S	17E	11	A	N/A	N/A	N/A	65.1	N/A	N/A
315	5001	14S	17E	14	J	109.9	90.4	19.50	91.7	100.8	-9.10
316	5001	14S	17E	17	R	N/A	114.2	N/A	126	125.3	0.70
317	5001	14S	17E	18	H	N/A	N/A	N/A	110.9	123.8	-12.90
318	5001	14S	17E	21	A	N/A	N/A	N/A	N/A	N/A	N/A
319	5620	14S	17E	28	A	125.7	118.1	7.60	144.1	136	8.10
320	5620	14S	17E	29	E	N/A	N/A	N/A	N/A	N/A	N/A
321	5620	14S	17E	31	R	N/A	87.8	N/A	N/A	120.3	N/A
322	5620	14S	17E	32	R	93.1	110.8	-17.70	117.1	115.8	1.30
323	5620	14S	17E	33	A	174.8	N/A	N/A	139.9	N/A	N/A
324	5620	14S	17E	35	A	152.6	N/A	N/A	146.8	166	-19.20
325	5620	14S	17E	36	A	130.9	131.2	-0.30	122.8	141.6	-18.80

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
326	5631	14S	18E	2	B	N/A	53.8	N/A	50.4	59.1	-8.70
327	5631	14S	18E	4	A	59.5	62.7	-3.20	N/A	58.9	N/A
328	5631	14S	18E	8	J	77.9	65.3	12.60	66.9	78.7	-11.80
329	5631	14S	18E	13	R	62	64.4	-2.40	65	67.7	-2.70
330	5620	14S	18E	18	E	79.7	81.1	-1.40	77.7	86.9	-9.20
331	5620	14S	18E	29	H	N/A	89	N/A	N/A	N/A	N/A
332	5631	14S	19E	4	R	55	62.7	-7.70	N/A	63.6	N/A
333	5631	14S	19E	7	D	N/A	57	N/A	N/A	52.7	N/A
334	5631	14S	19E	22	R	45.1	43.5	1.60	35.5	52.3	-16.80
335	5631	14S	19E	33	D	34.8	41.3	-6.50	42.1	46.6	-4.50
336	5631	14S	19E	36	A	60.2	55.9	4.30	52.3	61.8	-9.50
337	5200	14S	20E	1	J	107.9	99	8.90	111.3	110.7	0.60
338	5200	14S	20E	1	P	N/A	N/A	N/A	N/A	110.9	N/A
339	5200	14S	20E	2	J	101.6	100.3	1.30	103.5	102.3	1.20
340	5200	14S	20E	2	Q	N/A	N/A	N/A	N/A	97.3	N/A
341	5200	14S	20E	3	C	N/A	N/A	N/A	N/A	103.7	N/A
342	5200	14S	20E	3	J	N/A	N/A	N/A	N/A	N/A	N/A
343	5200	14S	20E	3	M	101.4	104.3	-2.90	117.6	114.6	3.00
344	5200	14S	20E	8	R	74.7	71.7	3.00	80.8	80.3	0.50
345	5200	14S	20E	9	C	84.5	80.6	3.90	90.9	N/A	N/A
346	5200	14S	20E	9	L	79.3	80	-0.70	80.1	84.9	-4.80
347	5200	14S	20E	10	C	96.1	100.9	-4.80	98.6	N/A	N/A
348	5200	14S	20E	10	M	N/A	81.3	N/A	N/A	94.3	N/A
349	5200	14S	20E	11	F	94	94	0.00	93.6	95.9	-2.30
350	5200	14S	20E	14	F	78.1	78.1	0.00	77.3	82.2	-4.90
351	5200	14S	20E	16	A	80.4	80.1	0.30	77.4	81.9	-4.50
352	5631	14S	20E	19	B	59.5	55.8	3.70	53.7	59.5	-5.80
353	5631	14S	20E	33	F	56.9	54.9	2.00	55.2	37	18.20
354	5631	14S	20E	34	R	52.2	54.7	-2.50	50.3	54.2	-3.90
355	5200	14S	21E	6	E	102.5	95	7.50	105.2	104.5	0.70
356	5200	14S	21E	7	M	89.9	87	2.90	91	91.9	-0.90
357	5631	14S	21E	22	D	58.5	53.1	5.40	N/A	52	N/A
358	5636	14S	21E	25	D	39.3	37.2	2.10	39.6	N/A	N/A
359	5636	14S	21E	27	B	43.4	41.9	1.50	43.3	N/A	N/A
360	5631	14S	21E	29	D	N/A	40.6	N/A	37.3	40.2	-2.90
361	5631	14S	22E	3	B	25.4	26	-0.60	24.9	27.7	-2.80
362	5631	14S	22E	6	A	28.1	31.1	-3.00	44.6	33	11.60
363	5636	14S	22E	9	P	N/A	N/A	N/A	N/A	N/A	N/A
364	5636	14S	22E	14	B	28	22.5	5.50	25.5	23.1	2.40
365	5636	14S	22E	22	N	24.1	23	1.10	24.4	24.4	0.00
366	5636	14S	22E	26	A	N/A	30.5	N/A	N/A	N/A	N/A
367	5636	14S	22E	30	A	29	23.9	5.10	28.5	26.6	1.90
368	5637	14S	23E	2	E	8.9	8.3	0.60	7.6	N/A	N/A
369	5001	14S	23E	2	F	10	3	7.00	12	10	2.00
370	5637	14S	23E	11	D	11.9	22	-10.10	27	N/A	N/A
371	5001	14S	23E	11	F	13.5	9.5	4.00	14.5	13.5	1.00
372	5001	14S	23E	14	A	-1	-1	0.00	0	9	-9.00
373	5637	14S	23E	14	E	12	18.7	-6.70	11	N/A	N/A
374	5637	14S	23E	15	C	9	12	-3.00	10	N/A	N/A
375	5637	14S	23E	22	A	16	20.2	-4.20	23.1	N/A	N/A
376	5637	14S	23E	25	N	50.5	51	-0.50	58.8	N/A	N/A
377	5637	14S	23E	26	E	26.3	28.5	-2.20	24.5	N/A	N/A
378	5001	14S	23E	27	C	19.4	18.9	0.50	21.4	N/A	N/A
379	5001	14S	23E	31	P	16	12	4.00	15	15	0.00
380	5001	14S	23E	32	C	15	11	4.00	15.5	15	0.50
381	5637	14S	23E	34	B	27	N/A	N/A	N/A	N/A	N/A
382	5001	14S	23E	35	H	52	47	5.00	55	N/A	N/A
383	5637	14S	23E	36	R	51.4	52.5	-1.10	48.7	N/A	N/A
384	5001	14S	24E	15	L	53.5	42.5	11.00	58.5	57.5	1.00
385	5600	14S	24E	17	C	8.9	3	5.90	11.3	9.1	2.20
386	5001	14S	24E	17	J	16	11	5.00	24	24	0.00
387	5600	14S	24E	21	D	3.5	1.3	2.20	4.7	3.8	0.90
388	5600	14S	24E	21	H	44.6	43.6	1.00	47	37.6	9.40
389	5600	14S	24E	22	L	2.6	2.1	0.50	N/A	2.8	N/A
390	5600	14S	24E	22	N	20.6	14.6	6.00	15.5	13.6	1.90

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
391	5001	14S	24E	24	H	26.5	10	16.50	26	27	-1.00
392	5600	14S	24E	28	R	7	6.5	0.50	7.6	7	0.60
393	5600	14S	24E	29	C	40.5	37	3.50	40.5	48.5	-8.00
394	5600	14S	24E	29	K	38	24	14.00	34.7	34.5	0.20
395	5637	14S	24E	31	P	41.3	41.3	0.00	39.4	N/A	N/A
396	5600	14S	24E	34	R	1.6	-2.6	4.20	N/A	-3.1	N/A
397	5600	14S	24E	35	R	19.6	15.1	4.50	N/A	23.9	N/A
398	5620	15S	16E	1	Q	100.4	70.2	30.20	121.6	138.1	-16.50
399	5620	15S	16E	2	B	80.1	64.2	15.90	98	111.3	-13.30
400	5620	15S	16E	12	C	64.7	56	8.70	77.2	79.5	-2.30
401	5621	15S	16E	17	L	N/A	18.5	N/A	N/A	N/A	N/A
402	5621	15S	16E	17	L	N/A	16.1	N/A	47.8	63.3	-15.50
403	5621	15S	16E	17	L	52.6	40.5	12.10	57.3	56	1.30
404	5621	15S	16E	21	Q	75.3	68.6	6.70	80.5	78.9	1.60
405	5620	15S	16E	25	R	105.8	96.3	9.50	116	111.8	4.20
406	5620	15S	16E	28	A	71.6	72.7	-1.10	73.2	73.5	-0.30
407	5620	15S	16E	28	A	73.1	67.8	5.30	78.9	80.1	-1.20
408	5620	15S	16E	28	A	70.3	68.7	1.60	74	74.2	-0.20
409	5620	15S	16E	29	N	89.1	77.3	11.80	93.2	89.8	3.40
410	5620	15S	17E	2	B	144.3	136.2	8.10	155	155.3	-0.30
411	5620	15S	17E	5	C	N/A	103.1	N/A	N/A	109.9	N/A
412	5620	15S	17E	7	H	85.4	105.8	-20.40	N/A	92.7	N/A
413	5620	15S	17E	11	A	139.7	N/A	N/A	N/A	156.8	N/A
414	5620	15S	17E	13	R	158.8	156.7	2.10	175.7	168.8	6.90
415	5620	15S	17E	15	J	N/A	144.8	N/A	176.1	168.6	7.50
416	5620	15S	17E	18	B	104.5	80	24.50	N/A	125.5	N/A
417	5620	15S	17E	20	C	N/A	93.3	N/A	142.3	147.5	-5.20
418	5620	15S	17E	21	J	141.9	85.8	56.10	157	178.3	-21.30
419	5620	15S	17E	22	J	N/A	155.3	N/A	171.6	181.1	-9.50
420	5620	15S	17E	23	A	164.9	137.3	27.60	192.7	N/A	N/A
421	5620	15S	17E	26	A	188.7	135.7	53.00	187.1	194.5	-7.40
422	5620	15S	17E	28	K	N/A	119.8	N/A	151.2	149	2.20
423	5620	15S	17E	32	L	109.6	109.7	-0.10	107.4	106.8	0.60
424	5620	15S	17E	33	A	145.7	133.7	12.00	151	191	-40.00
425	5620	15S	17E	35	N	N/A	143.2	N/A	174.9	168.5	6.40
426	5620	15S	17E	36	G	N/A	175.5	N/A	192.1	192	0.10
427	5001	15S	18E	1	A	135.6	N/A	N/A	89.8	N/A	N/A
428	5620	15S	18E	3	R	120.8	121.5	-0.70	137.2	133.1	4.10
429	5620	15S	18E	4	A	120.6	114.8	5.80	119	113.4	5.60
430	5620	15S	18E	6	A	124.8	168.3	-43.50	N/A	138.6	N/A
431	5620	15S	18E	7	A	149.7	164.8	-15.10	150	153.2	-3.20
432	5050	15S	18E	11	A	114	118	-4.00	123	126	-3.00
433	5050	15S	18E	11	R	132	146	-14.00	154	145	9.00
434	5001	15S	18E	12	B	141.8	128.5	13.30	123.6	145.2	-21.60
435	5050	15S	18E	15	A	152	154	-2.00	151	N/A	N/A
436	5001	15S	18E	15	J	N/A	157.8	N/A	138.6	189.1	-50.50
437	5620	15S	18E	17	C	N/A	183.3	N/A	N/A	171.2	N/A
438	5620	15S	18E	17	R	N/A	180.8	N/A	N/A	N/A	N/A
439	5620	15S	18E	19	R	N/A	179.5	N/A	195	N/A	N/A
440	5001	15S	18E	22	P	146.8	N/A	N/A	175.8	209.1	-33.30
441	5001	15S	18E	23	A	N/A	148.7	N/A	N/A	187.3	N/A
442	5050	15S	18E	24	J	161	162	-1.00	164.5	167	-2.50
443	5050	15S	18E	29	J	186	187	-1.00	189	193	-4.00
444	5620	15S	18E	30	L	189.4	174.4	15.00	195.2	186.7	8.50
445	5050	15S	18E	32	E	195	192	3.00	200	203	-3.00
446	5050	15S	18E	33	E	195	195	0.00	198	197	1.00
447	5050	15S	18E	33	N	188	189	-1.00	195	197	-2.00
448	5631	15S	19E	3	J	74.3	75.7	-1.40	66.3	77.3	-11.00
449	5050	15S	19E	7	Q	117	120	-3.00	122	125	-3.00
450	5636	15S	19E	12	N	77.5	76.7	0.80	76.2	76.6	-0.40
451	5631	15S	19E	14	M	94.8	107.6	-12.80	101.1	100.7	0.40
452	5050	15S	19E	19	M	158	159	-1.00	163	165	-2.00
453	5050	15S	19E	21	A	113	118	-5.00	116	122	-6.00
454	5050	15S	19E	21	C	118	119	-1.00	121	130	-9.00
455	5636	15S	19E	24	N	100.1	99	1.10	N/A	102	N/A

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
456	5050	15S	19E	28	E	143	145	-2.00	146	150	-4.00
457	5050	15S	19E	30	N	193	196	-3.00	185	194	-9.00
458	5050	15S	19E	31	D	170	190	-20.00	191.2	N/A	N/A
459	5050	15S	19E	32	P	173	176	-3.00	176	178	-2.00
460	5050	15S	19E	33	Q	161	157	4.00	159	161	-2.00
461	5050	15S	19E	34	C	136	139	-3.00	141	146	-5.00
462	5636	15S	19E	35	R	113.7	107.5	6.20	115.9	114.8	1.10
463	5050	15S	19E	36	Q	105	104	1.00	110	116	-6.00
464	5631	15S	20E	9	K	57.5	52.9	4.60	52.2	57.8	-5.60
465	5631	15S	20E	12	F	43.4	47	-3.60	40.2	55.4	-15.20
466	5636	15S	20E	13	D	43.2	42.5	0.70	42	41.8	0.20
467	5631	15S	20E	13	E	N/A	51.2	N/A	50.6	55.8	-5.20
468	5636	15S	20E	15	D	57	55.7	1.30	55.4	56.8	-1.40
469	5636	15S	20E	17	D	67.6	67.5	0.10	69.4	69.2	0.20
470	5636	15S	20E	19	R	84.4	84.6	-0.20	86.4	86.3	0.10
471	5636	15S	20E	25	D	54.2	52.4	1.80	53.8	55.3	-1.50
472	5636	15S	20E	28	A	68.7	69.6	-0.90	70.2	70.4	-0.20
473	5636	15S	20E	36	N	N/A	53.5	N/A	57.4	N/A	N/A
474	5636	15S	21E	2	A	34.1	34.7	-0.60	34.2	34.2	0.00
475	5636	15S	21E	3	D	31.9	29.6	2.30	31.3	31.5	-0.20
476	5631	15S	21E	6	C	45	43.2	1.80	47.6	43.8	3.80
477	5631	15S	21E	10	E	32.1	32.7	-0.60	31.8	35.5	-3.70
478	5636	15S	21E	14	A	31.9	32.6	-0.70	32.3	33	-0.70
479	5636	15S	21E	15	D	26.1	N/A	N/A	27.2	29.9	-2.70
480	5636	15S	21E	17	D	32.6	32.9	-0.30	33	31.8	1.20
481	5636	15S	21E	27	D	34.3	31.9	2.40	35.4	33.9	1.50
482	5636	15S	21E	34	N	27	22.6	4.40	29.3	26	3.30
483	5636	15S	21E	35	R	34.5	25.4	9.10	35.4	31.7	3.70
484	5636	15S	22E	2	C	23.5	19.6	3.90	22.4	22.4	0.00
485	5636	15S	22E	3	D	11.5	10	1.50	9.2	8.5	0.70
486	5636	15S	22E	6	A	26.3	24.2	2.10	25.1	24.6	0.50
487	5636	15S	22E	14	A	35.5	35.6	-0.10	35.2	35.5	-0.30
488	5636	15S	22E	16	A	24.8	22.6	2.20	24.5	23.6	0.90
489	5636	15S	22E	18	A	N/A	N/A	N/A	29.2	N/A	N/A
490	5636	15S	22E	23	R	39.4	37.4	2.00	40.2	39.7	0.50
491	5636	15S	22E	32	N	30.4	29	1.40	31.7	30	1.70
492	5636	15S	22E	33	R	31.1	30.9	0.20	31.4	30.1	1.30
493	5636	15S	22E	36	P	35.2	33.2	2.00	36.6	35.3	1.30
494	5637	15S	23E	1	M	53	50.9	2.10	47.8	N/A	N/A
495	5001	15S	23E	2	Q	72.5	47	25.50	N/A	73	N/A
496	5636	15S	23E	7	R	52.6	48.3	4.30	55.1	54.6	0.50
497	5637	15S	23E	12	J	53	52	1.00	49	N/A	N/A
498	5637	15S	23E	12	R	50.1	53	-2.90	45.2	N/A	N/A
499	5636	15S	23E	21	Q	50.8	44.3	6.50	49.4	47.7	1.70
500	5637	15S	23E	22	B	N/A	57.5	N/A	N/A	N/A	N/A
501	5637	15S	23E	23	A	48.1	47.5	0.60	46.8	N/A	N/A
502	5001	15S	23E	24	D	49.5	45.5	4.00	52.5	52.5	0.00
503	5637	15S	23E	24	N	47.4	47.9	-0.50	49.6	N/A	N/A
504	5001	15S	23E	24	N	48	45	3.00	51	52	-1.00
505	5636	15S	23E	30	B	44.1	38.7	5.40	44.8	44.1	0.70
506	5636	15S	23E	31	R	39.1	32.7	6.40	40.4	39.2	1.20
507	5636	15S	23E	33	P	35.1	30.2	4.90	34.6	33.1	1.50
508	5637	15S	23E	35	D	44	45	-1.00	44.8	N/A	N/A
509	5637	15S	23E	36	A	41	38.4	2.60	38.6	N/A	N/A
510	5637	15S	23E	36	P	35.9	35.1	0.80	35	N/A	N/A
511	5001	15S	24E	5	A	17.5	13	4.50	N/A	21	N/A
512	5001	15S	24E	5	A	19	13	6.00	24	22	2.00
513	5637	15S	24E	5	A	19.9	17.9	2.00	35	N/A	N/A
514	5637	15S	24E	5	C	38.6	42	-3.40	29	N/A	N/A
515	5637	15S	24E	6	P	51	49	2.00	49.2	N/A	N/A
516	5637	15S	24E	7	Q	48	48.6	-0.60	47.7	N/A	N/A
517	5001	15S	24E	8	L	45.6	33	12.60	56	51	5.00
518	5001	15S	24E	9	B	23	13	10.00	26	27.5	-1.50
519	5600	15S	24E	10	H	18	9.5	8.50	16.5	11.5	5.00
520	5600	15S	24E	11	A	13.7	6.6	7.10	11.5	10.6	0.90

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
521	5600	15S	24E	12	G	8.1	2	6.10	4	4.5	-0.50
522	5600	15S	24E	12	H	9.7	3.4	6.30	8.8	5.7	3.10
523	5600	15S	24E	12	R	13.2	9.8	3.40	12.4	6	6.40
524	5600	15S	24E	14	H	22.2	19	3.20	23.5	22.8	0.70
525	5637	15S	24E	16	A	24	15	9.00	13.9	N/A	N/A
526	5637	15S	24E	16	P	40.4	39.4	1.00	43.1	N/A	N/A
527	5637	15S	24E	19	D	45.9	44.9	1.00	44	N/A	N/A
528	5001	15S	24E	19	H	47.5	32	15.50	58	53.5	4.50
529	5637	15S	24E	20	N	42.4	41.6	0.80	45.1	N/A	N/A
530	5637	15S	24E	22	D	33.8	29	4.80	35.2	N/A	N/A
531	5001	15S	24E	22	E	38.9	23.5	15.40	44.5	39.5	5.00
532	5600	15S	24E	23	C	27.5	21.5	6.00	32.5	27.5	5.00
533	5600	15S	24E	23	J	31.5	26.5	5.00	34	32	2.00
534	5600	15S	24E	26	B	39.8	33	6.80	41.4	42	-0.60
535	5637	15S	24E	27	R	33.4	31.6	1.80	33.4	N/A	N/A
536	5637	15S	24E	28	D	42	34.6	7.40	38.5	N/A	N/A
537	5637	15S	24E	30	C	N/A	N/A	N/A	N/A	N/A	N/A
538	5637	15S	24E	32	C	43.9	41.6	2.30	39.1	N/A	N/A
539	5001	15S	24E	32	J	43.5	30.5	13.00	45.5	45.5	0.00
540	5637	15S	24E	33	B	39.1	38	1.10	38.3	N/A	N/A
541	5001	15S	24E	35	G	53.5	51	2.50	58	57	1.00
542	5600	15S	24E	36	F	60	56	4.00	61.5	64.4	-2.90
543	5600	15S	25E	6	Q	17.5	14	3.50	16.8	20.5	-3.70
544	5600	15S	25E	7	D	N/A	N/A	N/A	N/A	N/A	N/A
545	5600	15S	25E	7	G	18.3	9.3	9.00	27.7	10.3	17.40
546	5600	15S	25E	16	R	29.5	26	3.50	31.5	30.5	1.00
547	5600	15S	25E	17	D	14.2	9.7	4.50	N/A	11.7	N/A
548	5600	15S	25E	19	A	26	15.5	10.50	28	27	1.00
549	5600	15S	25E	19	J	32	27.6	4.40	37.5	33.6	3.90
550	5600	15S	25E	29	A	15.9	11.5	4.40	17.9	17	0.90
551	5600	15S	25E	29	E	10.8	5.2	5.60	13.5	9.7	3.80
552	5600	15S	25E	31	A	32	22.8	9.20	34	30.3	3.70
553	5600	15S	25E	32	F	22.7	17.2	5.50	23.7	22.4	1.30
554	5600	15S	25E	32	J	10.9	3.1	7.80	18.5	13.1	5.40
555	5600	15S	25E	33	D	12.4	9.6	2.80	14	10.6	3.40
556	5620	16S	16E	2	M	103.2	94.3	8.90	109.8	103.7	6.10
557	5001	16S	16E	8	N	N/A	N/A	N/A	182.3	153.8	28.50
558	5001	16S	16E	9	N	N/A	N/A	N/A	173.8	150.1	23.70
559	5001	16S	17E	2	J	N/A	N/A	N/A	160	174.8	-14.80
560	5620	16S	17E	3	J	158.6	137.2	21.40	161.8	162	-0.20
561	5620	16S	17E	4	P	164.6	118.8	45.80	161.8	132.5	29.30
562	5001	16S	17E	16	F	N/A	N/A	N/A	181	152.8	28.20
563	5001	16S	17E	17	H	N/A	N/A	N/A	N/A	148.3	N/A
564	5001	16S	17E	24	F	74.1	149.8	-75.70	95	150.8	-55.80
565	5001	16S	17E	27	N	N/A	N/A	N/A	164.3	150.4	13.90
566	5050	16S	18E	1	J	181	181	0.00	188	194	-6.00
567	5050	16S	18E	3	A	185	190	-5.00	195	199	-4.00
568	5050	16S	18E	3	J	204.5	184	20.50	180.5	196	-15.50
569	5050	16S	18E	5	N	176	167	9.00	182	187	-5.00
570	5050	16S	18E	9	F	175	173	2.00	185	187	-2.00
571	5050	16S	18E	10	J	174	169	5.00	188	190	-2.00
572	5050	16S	18E	15	F	170	166	4.00	184	190	-6.00
573	5050	16S	18E	16	J	150	141	9.00	163	154	9.00
574	5050	16S	18E	20	L	160	148	12.00	165	167	-2.00
575	5050	16S	18E	25	M	158	152	6.00	163	160	3.00
576	5050	16S	18E	33	Q	137	130	7.00	139	139	0.00
577	5050	16S	19E	9	F	166	167	-1.00	170	175	-5.00
578	5050	16S	19E	10	A	142	145	-3.00	148	152	-4.00
579	5050	16S	19E	12	P	123	126	-3.00	123	N/A	N/A
580	5636	16S	19E	14	A	127.7	128.2	-0.50	130.4	130	0.40
581	5050	16S	19E	15	C	146	157	-11.00	152	161	-9.00
582	5050	16S	19E	16	R	155	159	-4.00	158	163	-5.00
583	5050	16S	19E	17	C	161	174	-13.00	158	182	-24.00
584	5050	16S	19E	20	D	168	171	-3.00	172	183	-11.00
585	5050	16S	19E	21	P	144	143	1.00	152	154	-2.00

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
586	5050	16S	19E	22	Q	147	147	0.00	150	155	-5.00
587	5636	16S	19E	26	A	130.1	127	3.10	135	110.4	24.60
588	5050	16S	19E	28	P	156	154	2.00	158	N/A	N/A
589	5050	16S	19E	32	P	157	155	2.00	161	161.5	-0.50
590	5636	16S	20E	6	A	97.2	97.5	-0.30	100	99.8	0.20
591	5636	16S	20E	9	R	N/A	80.4	N/A	84.5	83.2	1.30
592	5636	16S	20E	14	A	62.3	54.4	7.90	64.4	N/A	N/A
593	5636	16S	20E	18	A	108	108.3	-0.30	110.2	110.4	-0.20
594	5636	16S	20E	20	N	112.3	99.4	12.90	117.4	111.5	5.90
595	5636	16S	20E	22	N	92.1	78.3	13.80	95	92.7	2.30
596	5636	16S	20E	23	R	70	68.5	1.50	72	72.5	-0.50
597	5636	16S	21E	6	A	38.3	30.5	7.80	40.4	N/A	N/A
598	5636	16S	21E	14	A	29.5	26.5	3.00	30.5	29.2	1.30
599	5636	16S	21E	18	A	47.7	36.1	11.60	47.2	44.5	2.70
600	5636	16S	21E	20	N	63.6	64	-0.40	65.7	67.5	-1.80
601	5636	16S	21E	22	N	49.2	48.4	0.80	49.9	51	-1.10
602	5636	16S	21E	23	R	38.8	38.7	0.10	39.9	38.7	1.20
603	5636	16S	22E	18	A	31.6	32.2	-0.60	32.4	31.1	1.30
604	5636	16S	22E	19	R	30.6	29.5	1.10	30.8	30.3	0.50
605	5636	16S	22E	21	R	26.6	24.1	2.50	27.1	24.7	2.40
606	5636	16S	22E	23	R	28.2	25.6	2.60	29.6	27.8	1.80
607	5637	16S	22E	36	R	11.4	10.2	1.20	10	N/A	N/A
608	5637	16S	23E	3	A	39	39.6	-0.60	39.1	N/A	N/A
609	5637	16S	23E	9	E	19.4	22.9	-3.50	20.2	N/A	N/A
610	5637	16S	23E	13	H	24.8	29.5	-4.70	23.6	N/A	N/A
611	5637	16S	23E	15	A	29	31.2	-2.20	29	N/A	N/A
612	5637	16S	23E	17	R	21	26.9	-5.90	23.6	N/A	N/A
613	5636	16S	23E	18	A	34.9	29.8	5.10	35.9	N/A	N/A
614	5636	16S	23E	19	P	N/A	N/A	N/A	N/A	N/A	N/A
615	5001	16S	23E	20	B	26	23	3.00	27	24	3.00
616	5001	16S	23E	21	A	32.5	29.5	3.00	31.5	31	0.50
617	5637	16S	23E	21	N	24.4	26.8	-2.40	24.7	N/A	N/A
618	5637	16S	23E	22	D	27.9	30.3	-2.40	28.5	N/A	N/A
619	5637	16S	23E	23	E	29	29	0.00	27	N/A	N/A
620	5637	16S	23E	25	M	27.9	29.8	-1.90	27.9	N/A	N/A
621	5637	16S	23E	27	H	26.6	29	-2.40	27.2	N/A	N/A
622	5637	16S	23E	31	L	24.7	28	-3.30	23.8	N/A	N/A
623	5637	16S	23E	32	B	31.9	34.9	-3.00	32.8	N/A	N/A
624	5637	16S	23E	32	P	32.9	N/A	N/A	32.1	N/A	N/A
625	5001	16S	23E	33	B	33	32	1.00	33	33	0.00
626	5637	16S	23E	33	H	34.9	37.9	-3.00	33.7	N/A	N/A
627	5637	16S	24E	2	B	49	29.2	19.80	47.5	N/A	N/A
628	5001	16S	24E	2	P	42.5	37	5.50	44.5	44.5	0.00
629	5637	16S	24E	3	J	41.7	N/A	N/A	48.2	N/A	N/A
630	5637	16S	24E	4	B	34.4	34	0.40	32.5	N/A	N/A
631	5637	16S	24E	5	M	24	30.2	-6.20	29.4	N/A	N/A
632	5001	16S	24E	6	D	16	16	0.00	20	21	-1.00
633	5637	16S	24E	7	D	33	N/A	N/A	32.7	N/A	N/A
634	5001	16S	24E	7	M	28	26	2.00	29	31	-2.00
635	5637	16S	24E	8	H	26.1	27	-0.90	27.7	N/A	N/A
636	5001	16S	24E	9	C	36.5	37	-0.50	38.5	37.5	1.00
637	5637	16S	24E	10	D	50	50.6	-0.60	48.5	N/A	N/A
638	5637	16S	24E	10	J	40	38.1	1.90	36.9	N/A	N/A
639	5001	16S	24E	10	P	44.5	35.5	9.00	47.5	46.5	1.00
640	5637	16S	24E	12	D	41.9	39.2	2.70	40.6	N/A	N/A
641	5001	16S	24E	13	F	N/A	N/A	N/A	32.5	30.5	2.00
642	5001	16S	24E	14	A	24	21	3.00	23	24	-1.00
643	5637	16S	24E	14	H	13.8	14.8	-1.00	N/A	N/A	N/A
644	5637	16S	24E	14	N	21	19.9	1.10	20	N/A	N/A
645	5637	16S	24E	16	H	34	36	-2.00	36.1	N/A	N/A
646	5637	16S	24E	19	C	26	28.9	-2.90	26.2	N/A	N/A
647	5001	16S	24E	19	M	22.5	21.5	1.00	17.5	23.5	-6.00
648	5637	16S	24E	20	A	33.1	34.6	-1.50	33.7	N/A	N/A
649	5001	16S	24E	21	B	29.5	N/A	N/A	32.5	31.5	1.00
650	5637	16S	24E	21	J	25	27.9	-2.90	25	N/A	N/A

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
651	5001	16S	24E	23	A	14	13	1.00	23	13	10.00
652	5637	16S	24E	23	J	N/A	12	N/A	8.1	N/A	N/A
653	5001	16S	24E	24	J	18	13	5.00	N/A	N/A	N/A
654	5001	16S	24E	25	C	14.5	18.5	-4.00	15.5	14.5	1.00
655	5001	16S	24E	27	A	14	13	1.00	16	15	1.00
656	5637	16S	24E	27	R	14.9	14.9	0.00	15.2	N/A	N/A
657	5001	16S	24E	28	F	N/A	24	N/A	28	N/A	N/A
658	5637	16S	24E	28	J	23.2	21.5	1.70	27.5	N/A	N/A
659	5637	16S	24E	29	A	22.4	27.9	-5.50	22.9	N/A	N/A
660	5637	16S	24E	30	D	20.1	27.2	-7.10	21	N/A	N/A
661	5637	16S	24E	30	R	30.2	29	1.20	37.2	N/A	N/A
662	5001	16S	24E	31	D	23	20.5	2.50	24	22	2.00
663	5637	16S	24E	33	M	11.1	N/A	N/A	12.6	N/A	N/A
664	5001	16S	24E	33	R	11.5	12.5	-1.00	12.5	11.5	1.00
665	5637	16S	24E	34	M	13	11.7	1.30	9.9	N/A	N/A
666	5001	16S	24E	36	D	9	5	4.00	9	N/A	N/A
667	5637	16S	24E	36	E	7.5	5.4	2.10	7	N/A	N/A
668	5600	16S	25E	3	K	19.5	7	12.50	N/A	18	N/A
669	5600	16S	25E	4	C	20.5	11.7	8.80	19	17.2	1.80
670	5637	16S	25E	7	D	28.2	28	0.20	29	N/A	N/A
671	5637	16S	25E	8	D	25	24.4	0.60	26	N/A	N/A
672	5600	16S	25E	10	J	22.3	17.2	5.10	28.5	25.5	3.00
673	5600	16S	25E	11	D	15.9	11.5	4.40	12.9	15.2	-2.30
674	5600	16S	25E	15	E	24.2	17.5	6.70	22.2	20	2.20
675	5001	16S	25E	17	C	13	N/A	N/A	10	13	-3.00
676	5637	16S	25E	17	H	15.1	15.2	-0.10	15	N/A	N/A
677	5637	16S	25E	17	P	N/A	N/A	N/A	N/A	N/A	N/A
678	5637	16S	25E	18	D	19.2	19.4	-0.20	19.5	N/A	N/A
679	5637	16S	25E	19	D	14.4	13.8	0.60	13.6	N/A	N/A
680	5637	16S	25E	19	L	N/A	12.8	N/A	20.4	N/A	N/A
681	5637	16S	25E	21	D	20	12	8.00	21.3	N/A	N/A
682	5637	16S	25E	21	P	15	10.3	4.70	17	N/A	N/A
683	5600	16S	25E	22	B	9.1	2.5	6.60	9.5	5.5	4.00
684	5600	16S	25E	22	E	10.2	2.7	7.50	11.5	7.2	4.30
685	5637	16S	25E	28	R	16.2	12.9	3.30	17.8	N/A	N/A
686	5637	16S	25E	29	A	20.9	N/A	N/A	23.6	N/A	N/A
687	5001	16S	25E	29	A	22	15	7.00	24.5	24	0.50
688	5637	16S	25E	31	C	13.9	11.4	2.50	13	N/A	N/A
689	5001	16S	25E	31	R	14	15	-1.00	20	17	3.00
690	5637	16S	25E	32	C	16.9	13.8	3.10	17.2	N/A	N/A
691	5001	16S	25E	33	A	14.5	14.5	0.00	N/A	N/A	N/A
692	5001	16S	25E	34	D	14.5	9	5.50	N/A	17	N/A
693	5001	16S	25E	34	P	12.5	N/A	N/A	N/A	9.5	N/A
694	5637	16S	25E	34	Q	11	10	1.00	12.7	N/A	N/A
695	5050	17S	18E	2	P	138	126	12.00	133	134	-1.00
696	5050	17S	18E	9	C	158	134	24.00	155	147	8.00
697	5050	17S	18E	9	N	175	131	44.00	159	147	12.00
698	5050	17S	18E	9	R	127	129	-2.00	151	140	11.00
699	5050	17S	18E	17	N	128	128	0.00	112	N/A	N/A
700	5050	17S	18E	18	M	197	155	42.00	185	164	21.00
701	5050	17S	18E	21	P	175	140	35.00	159	147	12.00
702	5050	17S	18E	26	M	N/A	133	N/A	142	137	5.00
703	5050	17S	18E	29	N	189	151	38.00	179	156	23.00
704	5050	17S	19E	7	A	136	112	24.00	132	126	6.00
705	5050	17S	19E	7	D	145.5	132	13.50	141.5	139	2.50
706	5050	17S	19E	10	A	135	110	25.00	135	138	-3.00
707	5050	17S	19E	10	A	126	118	8.00	132	133	-1.00
708	5050	17S	19E	34	N	92	89	3.00	98	130	-32.00
709	5636	17S	20E	1	C	92.1	76.2	15.90	72.5	N/A	N/A
710	5050	17S	20E	4	B	93	93	0.00	97	100.9	-3.90
711	5050	17S	20E	6	M	110.5	106	4.50	117.5	124.4	-6.90
712	5050	17S	20E	9	H	83	85	-2.00	90	91	-1.00
713	5050	17S	20E	11	J	65.5	55.8	9.70	N/A	69	N/A
714	5050	17S	20E	20	D	77	84	-7.00	77	81.5	-4.50
715	5050	17S	20E	22	P	56	60	-4.00	60	64	-4.00

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
716	5050	17S	20E	24	N	51.7	54	-2.30	54.7	60	-5.30
717	5050	17S	20E	26	E	72	65	7.00	77	81	-4.00
718	5050	17S	20E	28	N	78	76	2.00	86	88	-2.00
719	5050	17S	20E	33	A	N/A	11.6	N/A	N/A	120	N/A
720	5636	17S	21E	1	C	47.9	49.1	-1.20	49	N/A	N/A
721	5636	17S	21E	3	C	59.5	60.9	-1.40	62.4	N/A	N/A
722	5636	17S	21E	5	C	67.4	68.3	-0.90	71.5	N/A	N/A
723	5050	17S	21E	7	J	68.5	67	1.50	77.5	76.5	1.00
724	5050	17S	21E	11	K	47	49	-2.00	45.9	53	-7.10
725	5050	17S	21E	13	M	29	21.4	7.60	30.1	30.4	-0.30
726	5050	17S	21E	17	J	40	35	5.00	44	45	-1.00
727	5129	17S	21E	27	L	23	18	5.00	23	22	1.00
728	5129	17S	21E	31	R	51.4	60.4	-9.00	61.4	59.4	2.00
729	5129	17S	21E	32	K	43.5	40.5	3.00	59.5	51.5	8.00
730	5129	17S	21E	32	P	42.5	40.5	2.00	42.5	45.5	-3.00
731	5129	17S	21E	33	Q	41.5	38.5	3.00	46.5	44.5	2.00
732	5129	17S	21E	35	C	N/A	22	N/A	26	24	2.00
733	5050	17S	21E	36	B	35.5	30.3	5.20	36.5	32.5	4.00
734	5636	17S	22E	3	C	28.1	19.8	8.30	26.2	N/A	N/A
735	5636	17S	22E	5	C	33.1	N/A	N/A	35.8	N/A	N/A
736	5050	17S	22E	7	A	38.5	41	-2.50	N/A	N/A	N/A
737	5129	17S	22E	11	P	25	17	8.00	29	27	2.00
738	5129	17S	22E	16	H	25	17	8.00	31	48	-17.00
739	5129	17S	22E	16	J	25.5	15.5	10.00	33.5	25.5	8.00
740	5129	17S	22E	24	E	32.6	28.6	4.00	35.6	37.6	-2.00
741	5001	17S	22E	24	J	45.2	N/A	N/A	53	50.5	2.50
742	5637	17S	22E	25	A	45.8	N/A	N/A	47.2	N/A	N/A
743	5637	17S	22E	25	J	N/A	N/A	N/A	N/A	N/A	N/A
744	5129	17S	22E	30	A	17.5	18.5	-1.00	15.5	31.5	-16.00
745	5129	17S	22E	31	A	44	42	2.00	50	44	6.00
746	5129	17S	22E	33	P	70.5	79.5	-9.00	N/A	83.5	N/A
747	5001	17S	22E	35	B	54	77	-23.00	78.5	79.5	-1.00
748	5129	17S	22E	35	N	58.5	56.5	2.00	60.5	60.5	0.00
749	5001	17S	22E	36	J	58.2	65.3	-7.10	78	65	13.00
750	5637	17S	23E	1	A	28.2	39.9	-11.70	27	N/A	N/A
751	5001	17S	23E	2	A	N/A	46.9	N/A	N/A	N/A	N/A
752	5129	17S	23E	7	B	38	51	-13.00	39	39	0.00
753	5129	17S	23E	8	J	47	44.2	2.80	54	51	3.00
754	5637	17S	23E	9	B	43.4	46.4	-3.00	43.5	N/A	N/A
755	5001	17S	23E	9	Q	53.5	56.3	-2.80	54.5	55.5	-1.00
756	5637	17S	23E	10	A	42.1	49.5	-7.40	41.7	N/A	N/A
757	5637	17S	23E	12	C	36.6	40.7	-4.10	36.1	N/A	N/A
758	5001	17S	23E	13	C	43.6	48.5	-4.90	N/A	48.5	N/A
759	5637	17S	23E	15	B	55.9	53.9	2.00	42.4	N/A	N/A
760	5001	17S	23E	18	D	40.5	47.8	-7.30	50	53.2	-3.20
761	5637	17S	23E	18	E	38	34	4.00	37.6	N/A	N/A
762	5637	17S	23E	21	C	61.1	58	3.10	57	N/A	N/A
763	5603	17S	23E	27	L	65.5	N/A	N/A	N/A	66.5	N/A
764	5129	17S	23E	30	A	69	60	9.00	67	67	0.00
765	5637	17S	23E	30	B	53.9	57.3	-3.40	63.5	N/A	N/A
766	5129	17S	23E	31	F	61	51	10.00	69	71	-2.00
767	5637	17S	24E	1	B	11	10.9	0.10	6.6	N/A	N/A
768	5637	17S	24E	2	R	11.4	10.8	0.60	11.8	N/A	N/A
769	5637	17S	24E	3	K	10.7	5.7	5.00	10.3	N/A	N/A
770	5637	17S	24E	5	B	N/A	N/A	N/A	N/A	N/A	N/A
771	5637	17S	24E	8	A	20	N/A	N/A	19.9	N/A	N/A
772	5001	17S	24E	8	C	26	42	-16.00	25.5	23.9	1.60
773	5637	17S	24E	15	A	13	8	5.00	12.9	N/A	N/A
774	5001	17S	24E	15	A	20.1	34	-13.90	23	22.4	0.60
775	5001	17S	24E	15	A	20	33	-13.00	N/A	23	N/A
776	5637	17S	24E	16	A	21.9	N/A	N/A	19.4	N/A	N/A
777	5637	17S	24E	17	A	21.6	N/A	N/A	21	N/A	N/A
778	5637	17S	24E	20	A	23.2	19.9	3.30	22.1	N/A	N/A
779	5637	17S	24E	20	D	20.8	19.9	0.90	21	N/A	N/A
780	5603	17S	24E	27	F	23.2	10.7	12.50	21.2	19.2	2.00

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
781	5603	17S	24E	34	B	28.5	14.5	14.00	N/A	N/A	N/A
782	5603	17S	24E	36	H	N/A	N/A	N/A	N/A	58.5	N/A
783	5637	17S	25E	1	D	13.9	10.9	3.00	14.2	N/A	N/A
784	5637	17S	25E	1	P	13	12.1	0.90	12	N/A	N/A
785	5637	17S	25E	3	B	21.4	N/A	N/A	23.7	N/A	N/A
786	5001	17S	25E	3	R	42	40	2.00	36.2	44	-7.80
787	5637	17S	25E	6	A	15.9	15.9	0.00	13	N/A	N/A
788	5001	17S	25E	11	H	28	27	1.00	29	27	2.00
789	5601	17S	25E	12	R	21	N/A	N/A	21	22	-1.00
790	5001	17S	25E	13	H	30.5	25	5.50	36	28.5	7.50
791	5001	17S	25E	13	P	46.5	48.5	-2.00	50.5	45.5	5.00
792	5001	17S	25E	15	P	89	90	-1.00	N/A	N/A	N/A
793	5637	17S	25E	18	A	28.9	31.2	-2.30	42	N/A	N/A
794	5637	17S	25E	18	R	43	39	4.00	48	N/A	N/A
795	5001	17S	25E	21	R	90.5	94.5	-4.00	94.5	95.5	-1.00
796	5602	17S	25E	25	A	61	59.2	1.80	62.4	63.7	-1.30
797	5602	17S	25E	26	C	82	82.2	-0.20	83.8	83.6	0.20
798	5602	17S	25E	26	R	79.3	78.3	1.00	78	78.7	-0.70
799	5602	17S	25E	27	R	88.5	89.9	-1.40	92	90.8	1.20
800	5637	17S	25E	29	D	86	75	11.00	89.5	N/A	N/A
801	5603	17S	25E	29	E	92	N/A	N/A	117	95	22.00
802	5001	17S	25E	29	R	98.5	85.5	13.00	98.5	92.5	6.00
803	5001	17S	25E	33	J	104	N/A	N/A	112	116	-4.00
804	5602	17S	25E	35	D	83.2	82.8	0.40	84.7	84.7	0.00
805	5602	17S	25E	35	E	82.6	84.3	-1.70	82.8	84	-1.20
806	5602	17S	25E	35	M	79.8	80.5	-0.70	79.2	80	-0.80
807	5602	17S	25E	36	A	71	65	6.00	70.6	72.3	-1.70
808	5602	17S	25E	36	G	72.7	69	3.70	71.1	71.3	-0.20
809	5602	17S	25E	36	M	72.1	71.3	0.80	71	71.4	-0.40
810	5050	18S	18E	7	R	N/A	151	N/A	N/A	N/A	N/A
811	5050	18S	18E	9	E	164	165	-1.00	189	167	22.00
812	5050	18S	18E	13	N	162	135	27.00	151	157	-6.00
813	5050	18S	19E	5	E	153	116	37.00	135	127	8.00
814	5050	18S	19E	5	Q	154	119	35.00	135	138	-3.00
815	5050	18S	19E	7	N	184	136	48.00	170	137	33.00
816	5050	18S	19E	7	P	171	N/A	N/A	152	144	8.00
817	5050	18S	19E	7	R	171	N/A	N/A	156	145	11.00
818	5050	18S	19E	35	J	156	97	59.00	N/A	123	N/A
819	5050	18S	20E	12	C	74	70	4.00	81.6	83	-1.40
820	5050	18S	20E	19	N	103	100	3.00	111	105	6.00
821	5050	18S	20E	34	N	92.2	93.6	-1.40	N/A	92.5	N/A
822	5129	18S	21E	1	C	60.5	64.5	-4.00	64.5	62.5	2.00
823	5129	18S	21E	2	R	76	79.5	-3.50	85	83	2.00
824	5129	18S	21E	3	D	44.5	45.5	-1.00	48.5	47.5	1.00
825	5129	18S	21E	3	J	69	66	3.00	75	79	-4.00
826	5129	18S	21E	4	L	44.5	46.5	-2.00	64.5	64.5	0.00
827	5129	18S	21E	5	M	51	47	4.00	55	56	-1.00
828	5129	18S	21E	7	R	82	83	-1.00	90	97	-7.00
829	5129	18S	21E	8	J	63	64	-1.00	69	70	-1.00
830	5129	18S	21E	10	F	68	76	-8.00	73	76	-3.00
831	5129	18S	21E	10	R	76	84	-8.00	90	90	0.00
832	5129	18S	21E	12	N	81	93	-12.00	97	92	5.00
833	5129	18S	21E	15	C	74.5	80.5	-6.00	N/A	103.5	N/A
834	5129	18S	21E	21	H	100.5	94	6.50	107.5	107.5	0.00
835	5129	18S	21E	27	B	90.5	80	10.50	110.5	109.5	1.00
836	5129	18S	21E	31	B	101	97	4.00	119	115	4.00
837	5129	18S	21E	32	A	90	89	1.00	97	93	4.00
838	5129	18S	21E	34	B	90	83.7	6.30	100.4	103.6	-3.20
839	5129	18S	22E	3	B	78	70	8.00	69	105	-36.00
840	5129	18S	22E	3	M	71.7	81.7	-10.00	70.7	77.7	-7.00
841	5129	18S	22E	6	D	74	72	2.00	77	72	5.00
842	5129	18S	22E	6	E	71	80	-9.00	82	N/A	N/A
843	5129	18S	22E	8	A	89	82	7.00	100	96	4.00
844	5129	18S	22E	8	N	87.5	91	-3.50	96.5	91.5	5.00
845	5001	18S	22E	10	C	N/A	86.8	N/A	N/A	N/A	N/A

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
846	5129	18S	22E	16	L	95	93	2.00	100.3	102.2	-1.90
847	5129	18S	22E	17	Q	97	91.9	5.10	105	105.6	-0.60
848	5129	18S	22E	19	H	102.5	102	0.50	104.5	102.3	2.20
849	5001	18S	22E	20	D	92.5	107.4	-14.90	99	100	-1.00
850	5001	18S	22E	22	A	79	88.8	-9.80	94	90	4.00
851	5129	18S	22E	24	D	77	64.6	12.40	79	76.6	2.40
852	5001	18S	22E	24	E	N/A	N/A	N/A	N/A	N/A	N/A
853	5001	18S	22E	26	F	64	59.2	4.80	68.5	75.5	-7.00
854	5129	18S	22E	27	M	77.5	74.2	3.30	80.5	82.1	-1.60
855	5603	18S	22E	32	J	N/A	N/A	N/A	N/A	100.7	N/A
856	5603	18S	22E	34	R	N/A	N/A	N/A	N/A	N/A	N/A
857	5001	18S	22E	35	C	64	102.6	-38.60	67.5	63.5	4.00
858	5603	18S	23E	2	Q	57.5	70.5	-13.00	N/A	74	N/A
859	5129	18S	23E	4	Q	69	64	5.00	92	104	-12.00
860	5603	18S	23E	12	B	70.5	58.5	12.00	91.5	80.5	11.00
861	5603	18S	23E	14	A	81	81.5	-0.50	151	98.5	52.50
862	5129	18S	23E	15	A	108	91.2	16.80	96	98.1	-2.10
863	5129	18S	23E	21	J	88	94	-6.00	115	115	0.00
864	5603	18S	23E	26	F	N/A	N/A	N/A	N/A	N/A	N/A
865	5129	18S	23E	26	L	105	97	8.00	111	105	6.00
866	5129	18S	23E	27	P	94	92	2.00	105	116	-11.00
867	5129	18S	23E	28	B	96	92	4.00	106	112	-6.00
868	5129	18S	23E	28	R	95.5	99.5	-4.00	101.5	108.5	-7.00
869	5129	18S	23E	32	B	N/A	116	N/A	98	117	-19.00
870	5001	18S	23E	32	P	96.5	98.6	-2.10	128	113.5	14.50
871	5129	18S	23E	33	C	105	120	-15.00	112	113	-1.00
872	5603	18S	23E	33	J	93	91.5	1.50	118.5	101	17.50
873	5129	18S	23E	34	A	96	95	1.00	107	121	-14.00
874	5603	18S	23E	34	A	114	93	21.00	124.5	105	19.50
875	5603	18S	24E	2	H	55.5	40.5	15.00	N/A	N/A	N/A
876	5603	18S	24E	4	J	48.5	32	16.50	N/A	45.5	N/A
877	5603	18S	24E	6	H	40	38	2.00	52	44	8.00
878	5603	18S	24E	7	H	56.5	61.5	-5.00	72.5	63.5	9.00
879	5603	18S	24E	10	J	57.5	39.5	18.00	64.5	52.5	12.00
880	5603	18S	24E	13	H	58	38	20.00	58.5	48	10.50
881	5603	18S	24E	15	R	74	55	19.00	79.5	73.5	6.00
882	5603	18S	24E	17	L	55	N/A	N/A	67	58	9.00
883	5603	18S	24E	31	C	93.5	87	6.50	99.5	92.5	7.00
884	5602	18S	25E	1	C	70.3	71	-0.70	70.5	72	-1.50
885	5602	18S	25E	1	J	70.9	69.2	1.70	72.8	74.8	-2.00
886	5602	18S	25E	2	D	80.3	81.8	-1.50	81	82.8	-1.80
887	5602	18S	25E	2	G	71.1	71.3	-0.20	73.2	73.5	-0.30
888	5603	18S	25E	4	H	70	69	1.00	84	77	7.00
889	5603	18S	25E	5	E	70	58	12.00	85	64.5	20.50
890	5603	18S	25E	5	Q	63	N/A	N/A	N/A	66.5	N/A
891	5603	18S	25E	15	A	51	46	5.00	56.5	50	6.50
892	5603	18S	25E	15	C	46.5	45	1.50	59	50	9.00
893	5603	18S	25E	16	B	56	49	7.00	62	52	10.00
894	5603	18S	25E	19	H	66	55	11.00	60	61	-1.00
895	5603	18S	25E	20	J	56	48	8.00	N/A	51.5	N/A
896	5603	18S	25E	22	P	41.5	19.5	22.00	40.5	34	6.50
897	5603	18S	25E	23	J	35	21	14.00	41	30	11.00
898	5603	18S	25E	33	R	55	54	1.00	65.5	54.5	11.00
899	5603	18S	25E	34	L	48	41.5	6.50	N/A	47.5	N/A
900	5050	19S	19E	3	D	N/A	109	N/A	167	139	28.00
901	5050	19S	19E	4	G	N/A	N/A	N/A	N/A	N/A	N/A
902	5050	19S	19E	19	K	169.7	136	33.70	154	150	4.00
903	5050	19S	20E	6	C	N/A	92	N/A	N/A	113	N/A
904	5050	19S	20E	6	L	92.6	92	0.60	96.6	94	2.60
905	5050	19S	20E	7	F	115.5	85	30.50	119.5	106	13.50
906	5129	19S	21E	2	F	N/A	87	N/A	106	101	5.00
907	5129	19S	21E	3	B	64	58.1	5.90	73	66	7.00
908	5129	19S	21E	3	J	N/A	100	N/A	113	N/A	N/A
909	5129	19S	21E	7	R	74.7	72	2.70	83.7	80.7	3.00
910	5129	19S	21E	10	R	117.3	90.2	27.10	124.5	127.4	-2.90

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
911	5129	19S	21E	11	B	72.5	70.5	2.00	102.5	96.5	6.00
912	5129	19S	21E	11	L	90	86	4.00	118	115	3.00
913	5129	19S	21E	11	M	52	44	8.00	61	N/A	N/A
914	5603	19S	21E	13	A	114.6	86.1	28.50	139.6	118.6	21.00
915	5129	19S	21E	13	J	73.4	60.9	12.50	76.8	75.5	1.30
916	5129	19S	21E	15	J	96	86.8	9.20	115	112	3.00
917	5129	19S	21E	17	B	113	99	14.00	153	155	-2.00
918	5129	19S	21E	17	B	104	98	6.00	130	N/A	N/A
919	5129	19S	21E	21	C	N/A	N/A	N/A	N/A	N/A	N/A
920	5129	19S	21E	23	J	113.8	85.8	28.00	114.3	124.3	-10.00
921	5129	19S	21E	24	H	78.1	72.3	5.80	101.4	102.9	-1.50
922	5129	19S	21E	25	J	79	74	5.00	88.2	89.1	-0.90
923	5129	19S	21E	26	B	74.2	91	-16.80	126.2	130.6	-4.40
924	5129	19S	21E	29	M	128	90	38.00	139	126	13.00
925	5129	19S	21E	30	A	135	110	25.00	159	154	5.00
926	5603	19S	21E	34	D	130.4	100.4	30.00	124.4	130.4	-6.00
927	5603	19S	22E	1	N	62	45.5	16.50	66.5	55	11.50
928	5603	19S	22E	2	K	55.3	41.8	13.50	58.8	51.3	7.50
929	5129	19S	22E	4	B	78.1	74.5	3.60	84.8	84.1	0.70
930	5129	19S	22E	4	J	82.7	78.6	4.10	98	98.8	-0.80
931	5129	19S	22E	4	M	80	90	-10.00	89	98	-9.00
932	5603	19S	22E	9	J	62.4	32.4	30.00	68.4	61.4	7.00
933	5603	19S	22E	10	R	58	33	25.00	N/A	59.5	N/A
934	5129	19S	22E	14	M	78.5	76.2	2.30	100.9	110	-9.10
935	5129	19S	22E	15	M	71.5	55.7	15.80	77.2	80.8	-3.60
936	5603	19S	22E	16	A	66.5	29	37.50	74	N/A	N/A
937	5129	19S	22E	17	A	95.1	79.2	15.90	120	125.9	-5.90
938	5603	19S	22E	17	L	69.9	N/A	N/A	85.4	78.4	7.00
939	5129	19S	22E	19	M	79.7	77.6	2.10	92.4	94.2	-1.80
940	5129	19S	22E	20	A	90	76.8	13.20	108	107	1.00
941	5603	19S	22E	21	C	85	82	3.00	134	106	28.00
942	5603	19S	22E	22	A	64.5	55.5	9.00	64	63	1.00
943	5603	19S	22E	23	A	77.5	82.5	-5.00	N/A	86.5	N/A
944	5603	19S	22E	24	B	69.8	N/A	N/A	64.8	76.8	-12.00
945	5603	19S	22E	28	D	N/A	103	N/A	101	N/A	N/A
946	5603	19S	22E	30	D	53.5	58	-4.50	56.5	60.5	-4.00
947	5603	19S	22E	31	B	85.5	68.5	17.00	95	92	3.00
948	5129	19S	22E	32	D	94	75.2	18.80	122.6	145.7	-23.10
949	5603	19S	22E	34	L	85.5	85.5	0.00	93.5	92.5	1.00
950	5129	19S	22E	36	E	100	94	6.00	N/A	127	N/A
951	5603	19S	23E	2	F	95.5	N/A	N/A	105.5	94	11.50
952	5603	19S	23E	6	H	N/A	N/A	N/A	128	103.5	24.50
953	5603	19S	23E	7	A	101.5	106.5	-5.00	N/A	109.5	N/A
954	5129	19S	23E	8	J	85.5	90	-4.50	96.5	91.5	5.00
955	5129	19S	23E	10	C	73.5	76	-2.50	85.5	N/A	N/A
956	5129	19S	23E	10	D	78.5	59.5	19.00	75.5	82.5	-7.00
957	5603	19S	23E	10	Q	76.4	69.4	7.00	96.4	N/A	N/A
958	5603	19S	23E	12	L	83.9	79.9	4.00	101.4	85.4	16.00
959	5604	19S	23E	13	A	74.5	74.5	0.00	78.5	75.5	3.00
960	5604	19S	23E	19	H	73.5	71.5	2.00	76.5	73.5	3.00
961	5603	19S	23E	21	C	74.9	N/A	N/A	75.4	90.4	-15.00
962	5604	19S	23E	21	P	66	64	2.00	73	N/A	N/A
963	5604	19S	23E	23	D	64	59	5.00	70	62	8.00
964	5604	19S	23E	24	L	70.5	66.5	4.00	73.5	69.5	4.00
965	5604	19S	23E	25	C	69.5	N/A	N/A	79.5	69.5	10.00
966	5604	19S	23E	25	L	74.5	44.5	30.00	82.5	80.5	2.00
967	5604	19S	23E	26	B	54.5	44.5	10.00	53.5	49.5	4.00
968	5604	19S	23E	27	A	58	43	15.00	57	54	3.00
969	5604	19S	23E	27	P	56.5	N/A	N/A	52.5	49.5	3.00
970	5604	19S	23E	30	H	73.5	88.5	-15.00	82.5	71.5	11.00
971	5604	19S	23E	31	R	76.5	43.5	33.00	80.5	86.5	-6.00
972	5604	19S	23E	32	H	55	52	3.00	64	N/A	N/A
973	5604	19S	23E	34	L	57.5	52.5	5.00	57.5	57.5	0.00
974	5604	19S	23E	35	H	65.5	70.5	-5.00	62.5	120.5	-58.00
975	5604	19S	24E	10	G	84	72	12.00	91	90	1.00

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
976	5604	19S	24E	13	C	77	82	-5.00	83	80	3.00
977	5604	19S	24E	14	A	96	N/A	N/A	96	102	-6.00
978	5603	19S	24E	14	B	84.6	73.6	11.00	87.6	84.6	3.00
979	5604	19S	24E	17	A	97	91	6.00	108	114	-6.00
980	5604	19S	24E	17	N	85	78	7.00	95	90	5.00
981	5603	19S	24E	18	J	96.6	85.6	11.00	102.6	99.6	3.00
982	5604	19S	24E	18	R	88.5	84.5	4.00	103.5	105.5	-2.00
983	5604	19S	24E	19	L	83	79	4.00	91	90	1.00
984	5604	19S	24E	20	J	90	86	4.00	106	100	6.00
985	5603	19S	24E	22	C	86.6	95.1	-8.50	98.6	102.6	-4.00
986	5604	19S	24E	22	C	78	67	11.00	83	76	7.00
987	5604	19S	24E	22	P	88	84	4.00	97	92	5.00
988	5604	19S	24E	23	D	86	N/A	N/A	91	91	0.00
989	5604	19S	24E	24	A	70.5	68.5	2.00	81.5	73.5	8.00
990	5604	19S	24E	25	D	79	78	1.00	92	84	8.00
991	5604	19S	24E	27	H	93.5	84.5	9.00	89.5	99.5	-10.00
992	5604	19S	24E	27	Q	93	93	0.00	111	97	14.00
993	5604	19S	24E	28	H	90	87	3.00	99	96.5	2.50
994	5604	19S	24E	29	D	96	N/A	N/A	99	97	2.00
995	5604	19S	24E	29	R	98.5	86.5	12.00	92.5	99.5	-7.00
996	5604	19S	24E	30	J	90.5	86.5	4.00	98.5	98.5	0.00
997	5604	19S	24E	31	E	96.5	90	6.50	116.5	114.5	2.00
998	5603	19S	24E	31	K	86.7	83.7	3.00	99.7	90.7	9.00
999	5604	19S	24E	33	A	95	93	2.00	106	102	4.00
1000	5604	19S	24E	33	H	95	96	-1.00	108	104	4.00
1001	5604	19S	24E	36	C	N/A	85.5	N/A	102.5	99.5	3.00
1002	5604	19S	24E	36	R	84.5	83.5	1.00	84.5	84.5	0.00
1003	5603	19S	25E	1	P	30	20.5	9.50	N/A	28.5	N/A
1004	5603	19S	25E	2	A	29.5	21	8.50	32	27	5.00
1005	5603	19S	25E	9	H	51	47	4.00	58	51	7.00
1006	5603	19S	25E	10	R	44.5	36.5	8.00	45.5	N/A	N/A
1007	5603	19S	25E	13	A	29	19	10.00	28	36.5	-8.50
1008	5603	19S	25E	16	A	51	41	10.00	52	50	2.00
1009	5604	19S	25E	19	B	64.5	64	0.50	68.5	66.5	2.00
1010	5604	19S	25E	20	P	54	38	16.00	54	48	6.00
1011	5603	19S	25E	23	D	40.5	30	10.50	N/A	40	N/A
1012	5603	19S	25E	24	M	35	22.5	12.50	34.5	30.5	4.00
1013	5603	19S	25E	27	A	46	32	14.00	46.5	44	2.50
1014	5603	19S	25E	28	H	48	37	11.00	56	51.5	4.50
1015	5604	19S	25E	29	B	53.5	30.5	23.00	45.5	44.5	1.00
1016	5604	19S	25E	30	C	69	64	5.00	73	73	0.00
1017	5603	19S	25E	34	A	45.5	31.5	14.00	N/A	47	N/A
1018	5603	19S	25E	35	B	37.5	25.5	12.00	46.5	24.5	22.00
1019	5050	20S	19E	2	D	115	108	7.00	142	107	35.00
1020	5050	20S	19E	2	E	125	102	23.00	146	110	36.00
1021	5050	20S	19E	2	J	113	106	7.00	62.5	111	-48.50
1022	5050	20S	19E	10	E	131	119	12.00	154	119	35.00
1023	5050	20S	19E	10	N	137	129	8.00	165	128	37.00
1024	5050	20S	19E	11	E	97	75	22.00	50	90	-40.00
1025	5050	20S	19E	11	N	125	116	9.00	148	115	33.00
1026	5050	20S	19E	15	E	100.5	106	-5.50	165.5	92	73.50
1027	5050	20S	20E	20	L	N/A	92	N/A	116.5	92	24.50
1028	5050	20S	20E	28	E	104	92	12.00	119	94	25.00
1029	5050	20S	20E	28	E	99.5	91	8.50	N/A	95	N/A
1030	5050	20S	20E	29	R	97	90	7.00	99	92	7.00
1031	5050	20S	20E	30	J	105	93	12.00	120	97	23.00
1032	5050	20S	20E	34	B	97	89	8.00	119.6	95	24.60
1033	5129	20S	21E	5	E	123	118	5.00	143	122	21.00
1034	5050	20S	21E	8	C	112	94	18.00	140	120	20.00
1035	5050	20S	21E	8	D	110	95	15.00	141.1	120	21.10
1036	5129	20S	21E	11	D	N/A	84.7	N/A	146	122	24.00
1037	5129	20S	21E	11	N	N/A	91.5	N/A	164	146	18.00
1038	5050	20S	21E	16	M	123	100	23.00	152.5	120	32.50
1039	5050	20S	21E	17	D	114	N/A	N/A	138	115	23.00
1040	5050	20S	21E	24	G	163.5	94	69.50	159.5	132	27.50

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
1041	5050	20S	21E	24	H	N/A	94	N/A	138.5	132	6.50
1042	5603	20S	21E	36	P	163	N/A	N/A	178	147	31.00
1043	5604	20S	22E	1	H	82	67	15.00	87	84	3.00
1044	5129	20S	22E	1	Q	85	70	15.00	94.5	90.2	4.30
1045	5129	20S	22E	2	C	85	78.5	6.50	88.9	88.9	0.00
1046	5129	20S	22E	3	B	84.3	82.7	1.60	90	88	2.00
1047	5603	20S	22E	3	C	N/A	N/A	N/A	N/A	88	N/A
1048	5129	20S	22E	3	P	79.4	75.5	3.90	82.4	80	2.40
1049	5129	20S	22E	4	D	69.6	68	1.60	74.3	74.8	-0.50
1050	5129	20S	22E	5	L	102.3	89.1	13.20	128.5	122	6.50
1051	5129	20S	22E	6	C	120.5	82.2	38.30	132.3	130	2.30
1052	5129	20S	22E	7	A	N/A	N/A	N/A	N/A	127.6	N/A
1053	5603	20S	22E	7	A	130	92	38.00	153	140	13.00
1054	5129	20S	22E	7	A	112.4	88	24.40	120	N/A	N/A
1055	5603	20S	22E	7	M	N/A	N/A	N/A	N/A	120.4	N/A
1056	5603	20S	22E	8	A	112	95	17.00	N/A	113	N/A
1057	5129	20S	22E	8	J	67.4	56.1	11.30	78.2	76.4	1.80
1058	5129	20S	22E	9	H	96.7	84.2	12.50	112.4	92	20.40
1059	5603	20S	22E	13	C	N/A	99	N/A	152	144	8.00
1060	5603	20S	22E	14	C	N/A	103.5	N/A	195.5	144.5	51.00
1061	5050	20S	22E	18	G	149	91	58.00	154	135	19.00
1062	5050	20S	22E	18	R	90	97	-7.00	175.5	139	36.50
1063	5050	20S	22E	19	J	N/A	94	N/A	157.5	137	20.50
1064	5050	20S	22E	19	L	N/A	95	N/A	156	133	23.00
1065	5050	20S	22E	19	N	177	103	74.00	162	134	28.00
1066	5129	20S	22E	20	A	50	N/A	N/A	38	55.8	-17.80
1067	5603	20S	22E	23	M	N/A	86.5	N/A	181.5	161.5	20.00
1068	5050	20S	22E	23	P	N/A	61	N/A	80	71	9.00
1069	5603	20S	22E	24	R	N/A	97	N/A	N/A	166	N/A
1070	5604	20S	22E	25	R	78.5	73.5	5.00	76.5	80.5	-4.00
1071	5603	20S	22E	27	A	N/A	N/A	N/A	156.5	45.5	111.00
1072	5603	20S	22E	28	H	176.5	85	91.50	N/A	176	N/A
1073	5603	20S	22E	33	F	62	N/A	N/A	63	56	7.00
1074	5050	20S	22E	34	J	N/A	N/A	N/A	66.2	58.2	8.00
1075	5603	20S	22E	35	L	N/A	N/A	N/A	N/A	60	N/A
1076	5050	20S	22E	35	R	123	N/A	N/A	70	54	16.00
1077	5603	20S	22E	36	A	75.2	66.2	9.00	84.2	73.7	10.50
1078	5050	20S	22E	36	H	77.5	72	5.50	81.5	N/A	N/A
1079	5604	20S	23E	2	H	64	63	1.00	68	68	0.00
1080	5604	20S	23E	3	L	63	58	5.00	64	63	1.00
1081	5604	20S	23E	4	F	75.5	75.5	0.00	77.5	75.5	2.00
1082	5129	20S	23E	5	J	79	81	-2.00	82	81	1.00
1083	5604	20S	23E	7	H	88	N/A	N/A	99	89	10.00
1084	5129	20S	23E	8	G	81	94	-13.00	92	94	-2.00
1085	5604	20S	23E	8	H	84	85	-1.00	87	85	2.00
1086	5604	20S	23E	9	J	70	57	13.00	66	56	10.00
1087	5604	20S	23E	11	L	N/A	69	N/A	73.5	72	1.50
1088	5604	20S	23E	12	A	82.5	83.5	-1.00	83.5	83.5	0.00
1089	5604	20S	23E	13	E	82.5	N/A	N/A	78.5	77.5	1.00
1090	5604	20S	23E	15	A	N/A	62.5	N/A	76.5	74.5	2.00
1091	5604	20S	23E	16	J	78.5	67.5	11.00	76.5	74.5	2.00
1092	5604	20S	23E	17	C	88.5	87.5	1.00	92.5	92.5	0.00
1093	5604	20S	23E	18	R	104	N/A	N/A	99	102	-3.00
1094	5604	20S	23E	19	J	100.5	96.5	4.00	N/A	105.5	N/A
1095	5604	20S	23E	21	B	84	79	5.00	83	82	1.00
1096	5604	20S	23E	24	L	79.5	N/A	N/A	83.5	87.5	-4.00
1097	5604	20S	23E	25	J	95.5	87.5	8.00	112.5	95.5	17.00
1098	5604	20S	23E	26	C	82	103	-21.00	89	78	11.00
1099	5604	20S	23E	26	R	78.5	73.5	5.00	76.5	76.5	0.00
1100	5604	20S	23E	27	D	77.5	78.5	-1.00	77.5	78	-0.50
1101	5604	20S	23E	27	R	81	82	-1.00	81	82	-1.00
1102	5604	20S	23E	29	J	79.5	79.5	0.00	80.5	80.5	0.00
1103	5604	20S	23E	30	R	89	108	-19.00	94	N/A	N/A
1104	5604	20S	24E	4	E	92	91	1.00	98	97	1.00
1105	5604	20S	24E	4	J	93.5	94.5	-1.00	94.5	95.5	-1.00

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
1106	5604	20S	24E	6	A	91	88	3.00	103	103	0.00
1107	5604	20S	24E	7	G	95.5	86.5	9.00	90.5	91.5	-1.00
1108	5604	20S	24E	9	M	85	87	-2.00	89	90	-1.00
1109	5604	20S	24E	14	R	85.5	82.5	3.00	90.5	93.5	-3.00
1110	5604	20S	24E	15	P	71.5	73.5	-2.00	81.5	83.5	-2.00
1111	5604	20S	24E	16	H	92.5	92.5	0.00	112.5	108.5	4.00
1112	5604	20S	24E	17	A	76.5	80.5	-4.00	77.5	80.5	-3.00
1113	5604	20S	24E	17	P	61.5	67.5	-6.00	74.5	66.5	8.00
1114	5604	20S	24E	18	F	88	85	3.00	101	98	3.00
1115	5604	20S	24E	20	M	68.5	72	-3.50	71	73	-2.00
1116	5603	20S	24E	24	H	N/A	73.5	N/A	108.5	95.5	13.00
1117	5603	20S	24E	25	N	47	46	1.00	53	47	6.00
1118	5604	20S	24E	27	C	60	58	2.00	66	62	4.00
1119	5604	20S	24E	28	L	65	65	0.00	65	69	-4.00
1120	5604	20S	24E	29	B	78.5	N/A	N/A	94.5	91.5	3.00
1121	5604	20S	24E	30	J	78	75	3.00	79	78	1.00
1122	5604	20S	24E	31	R	79	74	5.00	76	77	-1.00
1123	5604	20S	24E	33	C	54	N/A	N/A	66	69	-3.00
1124	5603	20S	24E	34	C	N/A	54.5	N/A	58.5	53.5	5.00
1125	5603	20S	25E	1	A	43.5	22	21.50	39.5	38.5	1.00
1126	5603	20S	25E	2	A	N/A	26.5	N/A	N/A	N/A	N/A
1127	5603	20S	25E	3	R	47.5	32	15.50	53	45	8.00
1128	5604	20S	25E	6	C	78.5	71.5	7.00	96.5	84.5	12.00
1129	5603	20S	25E	12	A	42.5	27.5	15.00	47.5	N/A	N/A
1130	5603	20S	25E	14	F	50.5	42	8.50	71.5	56.5	15.00
1131	5603	20S	25E	14	F	54.5	47.5	7.00	69.5	63.5	6.00
1132	5603	20S	25E	14	F	58	45	13.00	73	59.5	13.50
1133	5603	20S	25E	16	J	56.5	33	23.50	85	59	26.00
1134	5603	20S	25E	17	A	N/A	53	N/A	76	N/A	N/A
1135	5604	20S	25E	18	M	79	93	-14.00	96	93	3.00
1136	5603	20S	25E	19	R	83	66.5	16.50	98.5	87.5	11.00
1137	5603	20S	25E	21	J	28.5	28.5	0.00	34.5	27.5	7.00
1138	5603	20S	25E	23	H	N/A	60	N/A	76.5	66.5	10.00
1139	5603	20S	25E	24	R	72.5	73.5	-1.00	81.5	80.5	1.00
1140	5609	20S	25E	33	J	74	N/A	N/A	99.7	98	1.70
1141	5609	20S	25E	35	G	67.1	63.8	3.30	77.5	72.3	5.20
1142	5609	20S	25E	36	H	N/A	48.5	N/A	N/A	N/A	N/A
1143	5050	21S	21E	6	J	94	33	61.00	104	93	11.00
1144	5050	21S	21E	11	D	122	91	31.00	N/A	115	N/A
1145	5603	21S	23E	2	A	109	89	20.00	121.5	N/A	N/A
1146	5604	21S	23E	2	C	75.5	N/A	N/A	82.5	96.5	-14.00
1147	5603	21S	23E	3	D	88.8	75.8	13.00	93.8	90.8	3.00
1148	5604	21S	23E	3	N	69	71	-2.00	79	69	10.00
1149	5604	21S	23E	4	A	71	78	-7.00	73	73	0.00
1150	5604	21S	23E	5	A	74	79	-5.00	75	79	-4.00
1151	5604	21S	23E	5	E	69.5	54.5	15.00	81.5	72.5	9.00
1152	5604	21S	23E	5	R	69.5	74.5	-5.00	69.5	73.5	-4.00
1153	5604	21S	23E	7	H	70.5	72.5	-2.00	68.5	66.5	2.00
1154	5603	21S	23E	7	J	95	95	0.00	N/A	90	N/A
1155	5604	21S	23E	8	F	66.5	101.5	-35.00	N/A	79.5	N/A
1156	5604	21S	23E	8	R	64	67	-3.00	60	64	-4.00
1157	5604	21S	23E	10	J	67	72	-5.00	70	96	-26.00
1158	5603	21S	23E	11	D	121.5	88.5	33.00	148.5	138.5	10.00
1159	5603	21S	23E	12	C	N/A	77	N/A	92.5	79.5	13.00
1160	5603	21S	23E	13	A	93	86	7.00	N/A	107	N/A
1161	5604	21S	23E	14	C	86	96	-10.00	92	94	-2.00
1162	5603	21S	23E	17	M	146.5	90.5	56.00	174.5	149.5	25.00
1163	5050	21S	23E	18	N	45	57	-12.00	47	N/A	N/A
1164	5604	21S	23E	21	C	45.5	72.5	-27.00	38.5	46.5	-8.00
1165	5604	21S	23E	21	C	53	54	-1.00	59	59	0.00
1166	5604	21S	23E	22	H	50	53.5	-3.50	54	53.5	0.50
1167	5603	21S	23E	22	J	N/A	39	N/A	60	70	-10.00
1168	5609	21S	23E	24	R	55.6	51.4	4.20	64.5	N/A	N/A
1169	5609	21S	23E	25	A	50.9	45.9	5.00	N/A	49.5	N/A
1170	5609	21S	23E	31	B	26	19.8	6.20	22.3	20	2.30

INDEX NO.	AGENCY CODE	T	R	S	LC	DEPTH TO GW SPRING 00	DEPTH TO GW SPRING 99	CHANGE IN DEPTH TO GW SPRING 99 TO SPRING 00	DEPTH TO GW FALL 00	DEPTH TO GW FALL 99	CHANGE IN DEPTH TO GW FALL 99 TO FALL 00
1171	5609	21S	23E	32	K	N/A	14.5	N/A	24.4	22.7	1.70
1172	5609	21S	23E	33	Q	42.8	21.7	21.10	32.5	28.9	3.60
1173	5609	21S	23E	36	J	N/A	53.1	N/A	64.4	60.2	4.20
1174	5609	22S	23E	1	F	64.2	56.4	7.80	60.3	60.9	-0.60
1175	5609	22S	23E	2	D	29.5	N/A	N/A	26.9	25	1.90
1176	5609	22S	23E	6	B	22.1	N/A	N/A	19.4	17.3	2.10
1177	5609	22S	23E	7	R	35.9	N/A	N/A	32.7	18.4	14.30
1178	5609	22S	23E	8	A	50.3	37.3	13.00	59.6	49	10.60
1179	5609	22S	23E	12	A	83.5	83.5	0.00	N/A	88.3	N/A
1180	5609	22S	23E	13	R	N/A	N/A	N/A	N/A	28.9	N/A
1181	5609	22S	23E	15	K	79.3	61.4	17.90	86	77.6	8.40
1182	5609	22S	23E	16	C	30.7	N/A	N/A	32.4	32.2	0.20
1183	5612	23S	23E	2	A	127.5	N/A	N/A	166.5	N/A	N/A
1184	5001	23S	23E	3	C	136.3	N/A	N/A	193.6	172.6	21.00
1185	5050	23S	23E	24	J	N/A	N/A	N/A	244	205	39.00
1186	5050	23S	23E	24	M	N/A	N/A	N/A	253	207	46.00
1187	5050	23S	23E	24	R	164	N/A	N/A	232	217	15.00
1188	5050	23S	23E	25	N	N/A	N/A	N/A	231	205	26.00
1189	5001	23S	23E	33	A	8.2	N/A	N/A	8.9	7.3	1.60
1190	5001	23S	23E	33	A	55.1	N/A	N/A	58	53.4	4.60
1191	5050	23S	23E	33	R	190	N/A	N/A	263	231	32.00

Appendix 5.3-2

BOARD OF DIRECTORS

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MALAGA COUNTY WATER DISTRICT
3580 SOUTH FRANK STREET - FRESNO, CALIFORNIA 93725
PHONE (559) 485-7353 - FAX (559) 485-7319

November 14, 2003

RECEIVED K.R.C.D.
NOV 17 2003
File No.

Mr. Jack Sinor, Assistant General Manager
Kings River Conservation District
4886 E. Jensen Avenue
Fresno, CA 93725

Subject: Kings River Conservation District Peaking Plant (KRCDPP)

Dear Mr. Sinor:

This letter serves as a response to the Kings River Conservation District's request for water and sewer service for the proposed peaking plant at 2611 E. North Avenue. The proposed project is located adjacent to the Malaga County Water District (MCWD) boundary within MCWD's sphere of influence. If the project moves forward, MCWD would require the property to be annexed into the MCWD. Annexation would not be a pre-requisite to obtaining water and sewer service, a temporary Out-of-District Service Agreement would be developed to allow water and sewer service during annexation proceedings.

It is understood that the KRCD requires peak deliveries of 210 gallons per minute at the site. It is also understood that sewer service requirements are limited to domestic uses, industrial wastewater discharges are not requested by KRCD. Capacity of MCWD's water supply and wastewater treatment plant are sufficient for the stated demands. The MCWD can provide the water to the KRCD PP from the MCWD's distribution system at typical community system pressures.

The MCWD will cause to be constructed water and sewer main extensions necessary to serve the property. The KRCD will be responsible for costs associated with the extensions. The location of the water and sewer main extensions has not yet been finalized. It is the policy of MCWD that individual developments fund and/or construct the necessary facilities to interconnect the necessary water and sewer main extensions to the MCWD's systems and pay applicable fees. It is also the policy of MCWD that water and sewer mains be constructed across the entire frontage of a developed property. An estimate of applicable fees is attached.

The MCWD does have the capability to produce non-potable treated effluent at the wastewater treatment plant at a rate of 350,000 gallons per day. Capital improvements necessary to delver the water to the site includes approximately one mile of pipeline crossing three railroad tracks, State Route 99, and Golden State Boulevard. It is possible that the pipeline would also be required to cross the Fresno Irrigation District's Central Canal. Permitting requirements and capital costs associated with non-potable effluent greatly exceed those associated with the extension of the water distribution system from Chestnut Avenue. Further, MCWD policy presently requires the extension of the potable water system across the entire frontage of a development. This would result in construction of both the potable and non-potable systems. The MCWD potable distribution system is supplied by multiple groundwater wells for redundancy. The non-potable system does not have redundancy in the event of pipeline or tertiary filter failure.

Assembly Bill 2523 authorizes MCWD to undertake groundwater management activities within its service area, including the right to levy and collect groundwater extraction charges on wells within the MCWD. The MCWD does not support private wells within the MCWD.

The MCWD looks forward to working with KRCD on this project. Please contact me if you have any questions or of you require any additional information.

Sincerely,

Michael G. Taylor, P.E.
District Engineer

Enclosure: Annexation Fees
Water Connection Fees
Sewer Connection Fees
Monthly Charges

CC: Malaga County Water District, General Manager

Appendix 5.3-3

Draft

Construction Storm Water Pollution Prevention Plan for the Kings River Conservation District Peaking Plant (KRCDPP)

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Appendix 1 - Notice of Intent
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Appendix 3 - Applicable BMPs

LIST OF ACRONYMS

BMPs	Best Management Practices
CDWR	California Department of Water Resources
CO	Carbon Monoxide
CTGs	Combustion Gas Turbines
EPC	Engineering, Procurement and Construction
Es	Exeter Sandy Loam
°F	Fahrenheit
FMFCD	Fresno Metropolitan Flood Control District
GE	General Electric
Hc	Hanford Sandy Loam
Ho	Hanford Fine Sandy Loam
Hst	Hesperia Fine Sandy Loam
Hsy	Hesperia Fine Sandy Loam
KRCD	Kings River Conservation District
KRCDPP	Kings River Conservation District Peaking Plant
kV	Kilovolts
LORS	Laws, Ordinances, Regulations and Standards
MSDS	Material Safety Data Sheets
MW	Megawatt
NPDES	National Pollutant Discharge Elimination System
NO	Nitrous Oxide
NOI	Notice Of Intent
NOT	Notice Of Termination
O&M	Operation and Maintenance
PG&E	Pacific Gas & Electric
PPA	Power Purchase Agreement
RWQCB	Regional Water Quality Control Board
SWPPP	Storm Water Pollution Prevention Plan
USEPA	United States Environmental Protection Agency
ZLD	Zero Liquid Discharge

Certification

Project Name: **Kings River Conservation District Peaking Plant.**

The following will serve as certification of the Storm Water Pollution Prevention Plan and Monitoring Program as specified in the General Construction Storm Water Permit:

"I certify under penalty of law that this document and all appendices were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate 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 for knowing violations."

_____

Signature

_____

Name and Title

_____

Date

1.0 INTRODUCTION

In 1972, the Federal Water Pollution Control Act (or Clean Water Act) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. In 1987, the Clean Water Act was amended and section 402(p) was added which established a framework for regulating municipal and industrial storm water discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that established storm water permit application requirements for specified categories of industries.

Federal regulations allow two permitting options for storm water discharges, the individual permit and the General Permit. The General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (NPDES Permit No. CAS000002), also known as the General Permit, is required for all construction activities that involve more than five (5) acres of land disturbance.[1] Modifications to the General Permit, which were adopted in late 2002, expanded the NPDES program by lowering the threshold acreage of soil disturbance requiring permit coverage from 5 acres to one acre. The program modification became effective in March 2003. The General Permit is implemented and enforced by the appropriate Regional Water Quality Control Board (RWQCB). The General Permit for the proposed Kings River Conservation District Peaking Plant (KRCDPP) will be implemented and enforced by the Central Valley RWQCB Fresno Office.

To be covered under the General Permit, a Notice of Intent (NOI) must be filed with the appropriate RWQCB and a Storm Water Pollution Prevention Plan (SWPPP) must be prepared. The SWPPP must also be kept onsite during construction and made available to the RWQCB or other appropriate local agencies upon request.

1.1 GENERAL PERMIT REQUIREMENTS

Elimination or reduction of nonstorm water discharges is a major goal of the General Permit. The General Permit requires dischargers to:

[1] There is one statewide General Permit in place that applies to all storm water dischargers except those on Tribal Lands, those located in the Lake Tahoe Hydrologic Unit and those performed by the California Department of Transportation (Caltrans). These are regulated under separate permits.

1. Develop a SWPPP, which specifies Best Management Practices (BMPs) that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion moving off site into receiving waters;
2. Eliminate or reduce nonstorm water discharges to storm sewer systems and other waters of the nation; and
3. Perform inspections of all BMPs.

1.1.1 Storm Water Pollution Prevention Plan

The General Permit requires the development and implementation of a SWPPP prior to any soil disturbing activities. The major objectives of the SWPPP are:

1. To help identify the sources of sediment and other pollutants that may affect the quality of storm water discharges associated with construction activity (storm water discharges) from the construction site; and
2. To describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water as nonstorm water discharges from the construction site during construction.

1.2 PROJECT OVERVIEW

1.2.1 Project Ownership

The KRCDPP is being developing and will be owned and operated by the Kings River Conservation District (KRCD). KRCD is a multi-county special district public agency that provides resource management for the Kings River region serving agriculture, business and residential communities within a 1.2 million acre service area in portions of Fresno, Kings and Tulare counties. The mission of KRCD is to provide flood protection, achieve a balanced and high quality water supply, and develop power resources on the Kings River for the public good.

1.2.2 Development History

In November 2002, the California Department of Water Resources (CDWR) and Williams Energy Marketing and Trading Company (Williams Energy) executed a settlement agreement with respect to the Power Purchase Agreement (PPA) between CDWR and Williams Energy. As part of settlement agreement, Williams Energy transferred ownership of six General Electric (GE) LM6000 Sprint PC model natural gas fired generating units and associated equipment (CTGs) to the State of California. Williams Energy also agreed to pay funds into an escrow account to be used to pay costs incurred by the state for the development of power plants utilizing the CTGs. On December 31, 2002, KRCD executed an Implementation Agreement and a long–term (10

year) PPA with CDWR for the development and operation of a power plant utilizing two of these CTGs.

1.2.3 Project Description

KRCD is proposing to develop both CTGs on one site, resulting in an approximately 97 megawatt (MW) natural gas-fired, peaking power plant. The KRCD currently has an option to purchase approximately 19 acres of land located in an industrial area south of the City of Fresno and near the Community of Malaga, in Fresno County. The KRCDPP would be located on the southern 9.5 acres of the 19 acre parcel. The northern 9.5 acres would be used for temporary construction staging and parking areas. An access road and right-of-ways for the gas and electric transmission interconnections and right-of-ways for the alternative water supply and sewer pipelines would also cross the northern 9.5 acres. An existing 4-acre storm water basin is located on the southern portion of the northern 9.5 acres. Table 1 provides some land use information for the KRCDPP site and Figure 1 shows the location of the KRCDPP site and associated linear facilities.

Table 1
Land Use Information
KRCDPP

Assessor's Parcel Number	Site Address	Site Location Information	Current Zoning/Land Use
330-050-23S	2611 E. North Avenue	Southwest corner of North and Chestnut Avenues	Industrial (M-3)

Each of the CTGs includes an air-cooled electric generator with an output voltage of 13.8 kilovolts (kV). Each also includes lubricating oil storage and coolers, a water injection system for Sprint and nitrous oxide (NOx) control, fire protection, control systems, and system enclosures. Inlet air to the CTGs will be chilled using a water-cooled chilling process. Emissions from the KRCDPP will be controlled in two ways; by injecting water into the CTGs and by passing the CTG exhaust gas through a selective catalytic reduction (SCR) system that will utilize aqueous ammonia. Carbon monoxide (CO) emissions will be controlled through the use of an oxidation catalyst.

Each CTG will be installed in a simple cycle plant configuration. Fuel will be natural gas supplied from an approximately 700 foot interconnection to the existing local Pacific Gas and Electric (PG&E) gas transmission line that parallels North Avenue. The natural gas will be compressed and filtered on site to meet GE requirements.

Electric transmission for the KRCDPP will be provided by a new interconnection from the KRCDPP project site to the Pacific Gas and Electric (PG&E) Malaga Substation located on the northeast corner of North and Willow Avenues. A new, single 115 kilovolt (kV) transmission interconnection line approximately three-quarters of a mile in length will interconnect the KRCDPP to the PG&E Malaga Substation. The interconnection line will run north along the eastern border of the KRCDPP site to North Avenue and then proceed east along the south side of North Avenue to the intersection of North and Willow Avenues, where it will cross North Avenue into the Malaga Substation. There is an existing PG&E 12 kV distribution line running along the south side of North Avenue. The existing poles between Chestnut and Willow Avenues would be upgraded with new taller transmission poles, which would carry the new 115kV line above the 12kV line. The interconnection line would be constructed, owned and operated by PG&E.

Water for power plant use and domestic needs will be supplied from the Malaga County Water District (MCWD) system, which has an existing supply line located along Chestnut Avenue. Water will be demineralized using either a permanent or temporary (leased) water treatment system on site, and used for NOx control, Sprint power augmentation and air chiller cooling tower needs. Currently, the KRCD is considering two alternative routes for interconnection into the MCWD system. The preferred interconnection would include a linear running east from the project site a distance of approximately 750 feet to Chestnut Avenue. The secondary alternative would be to interconnect at the intersection of North and Chestnut Avenues. The proposed interconnection for the secondary alternative is approximately 2000 feet and would run north from the project site and along the south side of North Avenue to the intersection of North and Chestnut Avenues.

A zero liquid discharge (ZLD) system is proposed to treat process wastewater and thus eliminate wastewater discharge from the KRCDPP. Two onsite ZLD technologies and one offsite ZLD technology are currently being considered. Waste from the onsite ZLD technologies will be collected and transported off-site for proper disposal. The offsite ZLD technology will utilize a portable water treatment system, which is periodically replaced as the treatment system is consumed. Wastewater from domestic wastes will be discharged to the MCWD sewer system, which is located along Chestnut Avenue. The interconnection would run within the same right-of-way as either the preferred or alternative water supply linears described in the above paragraph.

Access to the site for construction will be from the entrance along North Avenue. Currently the CTGs and associated equipment are being stored in warehouses on a nearby parcel. This parcel is separated from the project site by a 60-acre parcel. Other necessary

equipment and construction workers will enter the project site from the access along North Avenue.

1.2 PROJECT SCHEDULE

Construction of the proposed KRCDPP is expected to take approximately 6 months, and is scheduled to begin in June 2004 and end in December 2004. The proposed commercial operation of the proposed KRCDPP would be December 31, 2004. The phases of construction, as they pertain to storm water management include:

1.2.1 Site Preparation

Parking areas for workers and staging/laydown areas for the proposed KRCDPP will encompass approximately 5.5 acres. This area will include the 9.5 acres north of the project site minus the 4-acre basin located on the southern end of the 9.5 acre parcel.

Access to the site for construction will be from the entrance along North Avenue and south along the access road to be constructed across this northern 9.5 acre parcel. A stabilized entrance/exit will be provided along North Avenue to clean vehicle wheels before entering/exiting the access road to the KRCDPP project site. This will minimize the potential for transporting pollutants either on or offsite. In addition, any debris found during preparation of the KRCDPP site will be removed and properly disposed of.

1.2.2 Site Grading

A preliminary grading and drainage plan has been completed for the construction of the proposed KRCDPP and is included as Figure 2. During construction storm water will be directed towards the northwestern boundary of the KRCDPP project site. The proposed access road and southwestern corner of the existing 4-acre storm water basin also converge at this point.

1.2.3 Foundation

All underground piping work and wiring on the project site will be installed, followed by the installation of the foundation for the KRCDPP and associated structures. During these activities, storm water on paved or impervious areas will directed towards the 4-acre storm basin located north of the project site.

1.2.4 Installation of Linear Facilities

The linear facilities associated with the KRCDPP include an electric transmission interconnection, a gas interconnection, and preferred and alternative water and sewer interconnections, as previously discussed. These linears would be primarily constructed along existing road rights-of-way. During the construction of the linear facilities, storm

water would either be directed to the 4-acre storm basin or to the Community of Malaga's existing storm water system.

1.2.5 Plant Construction

During plant construction on the project site, all storm water will be directed to the 4-acre storm water basin located north of the project site.

1.2.6 Site Stabilization

After completion of all construction activities, any temporary storm water management or erosion control measures will be replaced with permanent measures, as necessary. Revegetation and landscaping will also be completed, as applicable.

1.2.7 Demobilization

After the completion of all construction activities, all temporary construction facilities, temporary storm water management and temporary erosion control measures will be removed. Storm water controls outlined in the KRCDPP Industrial SWPPP will then be in effect; this plan will be in effect during project operation and will be prepared prior to operation of the KRCDPP.

1.2.8 Timing of Permitting and SWPPP Availability

An NOI will be prepared and submitted prior to beginning construction. At that time the appropriate application fees will also be paid. A copy of the NOI form is included as Appendix 1. This SWPPP will also be finalized prior to the beginning of construction activities. The SWPPP will also be amended as necessary when there is a change in construction or operations that may affect the discharge status of pollutants. A copy of the General Permit and this SWPPP will be kept on the construction site during working hours for the entire duration of construction activities.

Once all construction activities associated with the proposed KRCDPP are complete and all applicable requirements have been met, a Notice of Termination (NOT) will be prepared and submitted to the Central Valley RWQCB Fresno Office. A copy of the NOT form is included as Appendix 2. Upon completion of construction activities and submittal of the NOT, this Construction SWPPP will no longer be in effect and storm water management for the KRCDPP will be managed under the Industrial SWPPP, which will be prepared prior to that time.

2.0 REGIONAL INFORMATION AND SITE DESCRIPTION

This section describes the existing site hydrology and of the KRCDPP project area, including a description of the existing and proposed site drainage at the KRCDPP project site. An identification of vegetation, soils and agriculture as well as a description of activities resulting in site disturbance is also included.

2.1 SITE HYDROLOGY

The proposed KRCDPP is located in the southern San Joaquin Valley, south of the City of Fresno and near the industrial Community of Malaga, Fresno County, California. The region's climate is Mediterranean, characterized by hot, dry summers and cool wet winters. Summer temperatures frequently exceed 100 degrees Fahrenheit (°F), while winter temperatures are generally mild, with few freezing days per year. Rainfall averages 12 inches per year, with the wettest months between November and March.

The following table, Table 2, provides precipitation and temperature data that was based upon monthly averages for the periods of 1971 to 2000.

Table 2
Summary of Temperature (in °F) and Precipitation (in inches)
KRCDPP

		Month											
	Average	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**
Maximum Temperature	75.3	78.1	63.0	53.4	53.6	61.3	66.1	74.0	82.7	90.9	96.6	94.8	88.8
Minimum Temperature	51.9	51.9	42.3	37.0	38.4	41.4	44.9	48.4	54.9	61.2	66.1	64.9	60.4
Monthly Precipitation	11.23	.65	1.10	1.34	2.16	2.12	2.20	.76	.39	.23	.01	.01	.26

2.1.1 Existing Site Drainage

Currently storm water from the KRCDPP project site is discharged to the 4-acre storm basin located north of the project site The Fresno Metropolitan Flood Control District (FMFCD) is the agency responsible for storm water management in the project area and the KRCDPP project site. In communications with FMFCD, using the basin on the project site is allowable, as long as it is capable of supporting a 100-year rain event. The basin has a capacity of 22 acre feet, a 100-year event on the 19 acre parcel would be approximately 9 acre feet of water. Therefore the basin would support a 100-year rain event.

2.1.2 Proposed Site Drainage

KRCD will use the 4-acre basin for storm water discharge during construction of the KRCDPP. All storm water collected onsite during construction would be directed to the basin, as shown on Figure 2. Through communications with FMFCD a draft layout for storm water removal during KRCDPP operation was also determined. When FMFCD acquires enough drainage fees from the watershed area AZ (i.e. the watershed area that includes the area of the KRCDPP), they will construct a 24 to 36 inch pipeline extending along the centerline of the existing electrical distribution line located off the eastern border of the KRCDPP project site. The pipeline will begin at the southwestern corner of the 4-acre basin and will travel south and under the Union Pacific railroad. The pipeline will continue running southerly for a couple hundred feet and change to a southeasterly direction towards FMFCD's existing storm basin AZ. The 4-acre basin will be used for storm water collection during construction and on a temporary basis during operation until the new pipeline is in place. KRCD will be required to pay drainage fees to FMFCD for use of the basin. It is the fees, such as these, that will be used to construct the new pipeline, which will direct the storm water from the site to Basin AZ. The long-term plan for storm water during KRCDPP operations will be discussed further in the KRCD Industrial SWPPP that will be prepared prior to operation of the KRCDPP.

Storm water from the linear facilities associate with the KRDPP will be directed towards the 4-acre storm basin or FMFCD Basin AZ. The basin use is dependant upon availability and cost. Both the 4-acres basin and Basin AZ, have capacity and existing infrastructure to handle run off associated with the construction of the KRCDPP linear facilities.

2.1.3 Vegetation, Soils and Agriculture

The KRCDPP project site is located on the southwest corner of North and Chestnut Avenues near the Community of Malaga, in Fresno County. The site address is 2611 E. North Avenue and the Assessors Parcel Number is 330-050-23S. The property is currently vacant and is zoned Heavy Industrial (M-3). The KRCDPP project site has a convergence of three soil series types including Hanford fine sandy loam (Ho), Hanford sandy loam (Hc), Hesperia fine sandy loam (Hst). Soil types along the linear facilities include Hc, Hesperia fine sandy loam (Hsy), Exeter sandy loam (Es), and Ho. Based on these soil types, the potential for wind and water erosion associated with construction activities is slight/none and the permeability is low to moderate.

There is an area along the southern border of the project site that is denoted as Prime Farmland. This 19-acre parcel generally grows vineyards. To receive this designation, the property has been surface irrigated for at least the last two mapping cycles. There are

no other areas of agricultural significance in the immediate area of the KRCDPP. The KRCDPP will not result in the conversion of or any impacts to agricultural lands.

2.1.4 Earthwork

Excavation work will consist of the removal, storage, and/or disposal of soil, sand, gravel, vegetation, loose rock, and debris, etc. to modify the site area to the line and grade necessary for construction of the KRCDPP. Graded areas will be smoothed and cleared free of irregular surfaces, compacted and sloped to facilitate drainage. Materials suitable for backfill will be stored in designated stockpiles using appropriate erosion protection methods. Where practical, topsoil will be segregated and stockpiled for reuse in final site grading, revegetation or landscaping, as appropriate. Areas to be backfilled will be prepared by removing unsuitable materials and rocks and examining the bottom of the excavation for loose or soft areas. Backfilling will be done in layers of uniform, specified thickness. The soil in each layer will also be properly moistened to facilitate compaction to achieve specified density. Representative field density and moisture-content tests will be performed during compaction in accordance with applicable American Society for Testing and Materials (ASTM) standards.

All structures associated with the KRCDPP will be designed to meet seismic requirements that are appropriate for Seismic Risk Zone 3, the zone in which the project site is located. All structures will also be designed to meet applicable requirements of the California Building Code and the Uniform Building Code.

Any excess materials will either be spread along unused portions of the project site or properly disposed of offsite. Disposal of all materials, including any contaminated materials encountered during excavation will be in compliance with all applicable federal, state and local laws, ordinances, regulations and standards (LORS).

2.1.5 Estimated Total Site Area and Total Disturbed Area

Table 3 shows the estimated areas of disturbance during construction of the proposed KRCDPP, including offsite linear facilities:

Table 3
Estimated Disturbed Area
KRCDPP

Construction Area	Acres
Project Site	9.5
Equipment Laydown/Staging/Parking Area/Basin	9.5
Natural Gas Interconnection	<. 5 acres

Electric Transmission Interconnection	<. 5 acres
Preferred Water and Sewer Interconnection	<. 5 acres
Alternative Water and Sewer Interconnection	<1. 5 acres
Approximate Total Project Area[1]	21.5 acres
[1]Assumes that the alternative water and sewer interconnections are constructed since they would result in the greatest area of disturbance.	

An engineering, procurement and construction (EPC) contractor will be selected for the KRCDPP through a competitive bid process. The selected EPC contractor will be responsible for prepared detailed site maps once a final design footprint has been established.

3.0 DESCRIPTION OF POTENTIAL SOURCES OF POLLUTANTS IN DISCHARGES

The construction of the proposed KRCDPP will involve the use of a large variety of chemicals, materials and other equipment. The primary potential pollutant source for storm water during construction of the KRCDPP would result from soil materials being exposed to wind and water movement. The most soil would be exposed during the Site Preparation and Site Grading phases of construction on the project site and during the Installation of Linear Facilities phase, as discussed above. Upon completion of the construction phases, the amount of soil exposed will be significantly reduced. As described later in this report, appropriate erosion control measures and BMPs will be implemented to reduce the potential for soil and sediments in storm water runoff from the KRCDPP project site and areas of the proposed linear facilities.

There will also be a number of chemicals used and stored on the project site during construction activities. These substances could include: concrete, paint materials, adhesives, detergents, lubricants, fertilizers, fuels (unleaded gasoline and diesel), lumber, solvents, oil, lubricants, and building materials such as asphalt, sealants, and concrete. There are no feasible alternatives to these chemicals and they are necessary for construction of the KRCDPP. Material Safety Data Sheets (MSDS) will be prepared for each chemical used onsite. These will be kept onsite and all construction workers will be briefed on their location and content. The selected EPC contractor will assume responsibility for assuring that the use, storage and handling of these materials complies with all applicable LORS, including those relating to licensing, personnel training, accumulation limits, reporting requirements and record keeping requirements. As described later in this report, the potential for contact between chemicals and storm water runoff in the KRCDPP project area is expected to be insignificant. Contact between chemicals and storm water runoff will be minimized by implementing BMPs; including

storm water runoff prevention and control procedures. With the implementation of these BMPs, the quantities of chemical runoff in storm water are expected to be minimal.

Chemicals used and stored during operation and maintenance (O&M) of the KRCDPP will be addressed in the Industrial SWPPP, which will be prepared and implemented prior to operation.

4.0 EROSION AND SEDIMENT CONTROL PRACTICES

This section describes the erosion and sediment control practices intended to prevent a net increase of sediment load into storm water discharge, including the implementation of BMPs and temporary erosion control measures. Erosion control, or soil stabilization, is the most effective way to retain soil and sediment on a construction site. Figure 2 illustrates the site grading and drainage plan during construction. Figure 3 indicates the location of various erosion control measures relative to the construction area and site layout.

4.1 BEST MANAGEMENT PRACTICES

The following sections present standard construction BMPs, most of which are described in the Caltrans Storm Water Quality Handbook (2002). This resource handbooks provides comprehensive details on BMP implementation and will be obtained and reviewed by construction contractors associated with the KRCDPP, as appropriate. Applicable BMPs from this handbook are included as Appendix 3. Contractors will implement additional control measures as necessary during construction.

4.2 GENERAL EROSION CONTROL MEASURES

The most efficient way to address the potential for erosion control is to preserve existing vegetation where feasible, to limit disturbance, and to stabilize and revegetate disturbed areas as soon as possible after grading or construction. The KRCDPP will be designed to impact as small an area as possible at any given time thus limiting the amount of disturbed vegetation and exposed soil. The topography of the project site is relatively flat; therefore the potential for slope instability, landslides, or substantial soil erosion is low. Also, based on the soil types in the project area (as previously described), the potential for wind and water erosion associated with construction activities is slight/none and the potential for permeability is low to moderate.

To further reduce the potential for erosion, work areas will be protected with erosion control and sediment controls including dikes, drainage swales, sand bags, straw bales, or by other appropriate measures to prevent both run-on and uncontrolled run-off from work areas. In addition, all equipment will be maintained to prevent leaks and spills, and

fueling will only be conducted within contained areas. Spill containment equipment will be readily available if required. Any contaminated soils resulting from spills will be dug up as quickly as possible and removed from the site for proper disposal.

Other general control measures that would be implemented during the various phases of the project will include:

- Proper scheduling and sequencing of activities,
- Material and waste management,
- Sanitary and septic waste management,
- Vehicle and equipment fueling and maintenance,
- Spill prevention and control, and
- Employee and contractor training.

These measures are discussed further in Appendix 3.

4.2.1 KRCDPP Project Site

4.2.1.2 Grading/Drainage

The KRCDPP will be constructed on relatively level ground and therefore barriers around the entire property boundary are not currently proposed as necessary to control run-off. However, areas of barriers may be strategically placed, as appropriate to prevent run-off and sediment from leaving the site. If necessary, the barriers would be properly installed and then removed after construction. Any soil stockpiles would be stabilized and covered, if left onsite for long periods of time. In addition, sediment barriers would be placed around the base of the stockpiles, as necessary. All storm water on the site during construction would be directed to the existing 4-acre basin located adjacent to the north of the KRCDPP project site.

4.2.1.2 Foundations

As the foundation for the KRCDPP structures are developed, drainage swales may be replaced with surface water collectors and underground drainpipes. Sediments and hydrocarbons will be minimized or prevented from entering the surface collectors with appropriate storm drain inlet protection devices.

A concrete washout site will be designated and dumping of excess concrete and washing out of delivery vehicles will be prohibited at other locations on site. Notices will be posted to inform all drivers.

4.2.1.3 Stabilization and Demobilization

As construction on the KRCDPP nears completion, areas on the project site that will be used for parking or storage during operation will have permanent storm water collection and conveyance structures. Other areas will be seeded and/or provided with landscaping and vegetative cover, as appropriate. Vegetative cover will significantly reduce the likelihood of erosion and sediment transport. Vegetation restoration will be monitored following the completion of construction. Vegetation monitoring will be conducted as part of the post-construction monitoring. When needed, additional remedial measures will be implemented as part of the post-construction project maintenance program.

4.2.2 Linear Facilities, Access Road, and Parking/Staging Area

Linear facilities associated with the KRCDPP include an electric transmission interconnection, a gas interconnection, and preferred and alternative water and sewer interconnections, as previously discussed.

The northern 5.5 acres of the 19 acre KRCD property (i.e. the 9.5 acre parcel minus the 4-acre basin located on the southern end of the property) will be utilized for temporary equipment laydown/staging, and parking during construction. There is sufficient space to serve as staging for construction of the KRCDPP and the linear facilities. The access road to the KRCDPP site on the southern part of the property will be built from North Avenue down the west side of the 9.5 acre parcel to the project site. Right-of-ways for the gas, alternative water, alternative sewer and electric transmission interconnections would also cross the 9.5 acres to the north of the proposed KRCDPP site.

Construction of the proposed linear facilities would require heavy vehicles for installation and are proposed to follow existing roadways to the greatest extent possible. The project site access road from North Avenue and parking areas will be paved and remaining areas will be covered with crushed rock or will be landscaped with plants and trees, as necessary to limit sediment tracking and creation of dust. Based on soil types in the area, as previously described, there is only a slight/no potential for wind and water erosion. Surfaces will be regularly watered to reduce generation of dust, but will not be excessively watered as to generate runoff. Figure 1 illustrates the general location of the construction laydown area. Other general BMPs that will be implemented, as applicable, during construction include:

- Implementation of silt fencing or straw bales,
- Stabilizing and compacting road surfaces,
- Proper scheduling and sequencing of activities,
- Preservation of existing vegetation,

- Dust control, and
- Vehicle equipment cleaning.

These BMPs are discussed further in Appendix 3.

4.3 OTHER CONTROLS

4.3.1 Hazardous Materials/Inventory

A variety of chemicals and substances are expected to be present and/or stored and used on site during construction of the KRCDPP. These substances could include: concrete, paint materials, adhesives, detergents, lubricants, fertilizers, fuels (unleaded gasoline and diesel), lumber, solvents, oil, lubricants, and building materials such as asphalt, sealants, and concrete. There are no feasible alternatives to these materials for construction of the facility. Contractors using these materials during the construction of the KRCDPP will be responsible for assuring that the use, storage and handling of these materials will comply with applicable federal, state, and local LORS, including licensing, personnel training, accumulation limits, reporting requirements, and recordkeeping.

As required by state and federal law, contractors will be required to have inventories of hazardous materials. The storage, handling, and use of all chemicals will be in accordance with applicable LORS. If the use of other types of hazardous materials at the site becomes necessary, the SWPPP will be amended to include them. Chemicals will be stored in appropriate chemical storage facilities. Bulk chemicals will be stored in storage tanks, and most other chemicals will be stored in returnable delivery containers. Chemical storage areas will be designed to contain leaks and spills. Berm and drain piping design will allow a full-tank capacity spill without overflowing the berms. For multiple tanks located within the same bermed area, the capacity of the largest single tank will determine the volume of the bermed area and drain piping. Drain piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors.

4.3.2 Potential Contaminated Soil

Construction personnel will be asked to report any unusual soil conditions/or potentially contaminated soil to appropriate personnel. The area and/or material will be properly contained during investigative actions. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be properly handled and disposed of in an authorized waste management facility.

4.3.3 Groundwater Controls

Depth of groundwater under the KRCDPP site is approximately 50 feet below ground surface and flows in a northwesterly direction. Contamination of groundwater from site activities is not likely to occur as a result of KRCDPP construction. During construction, the KRCDPP would be subject to LORS requiring standards for isolating and controlling offsite runoff and contaminants that could enter groundwater. Appropriate erosion control measures including using fiber, rolls, mats or similar devices would be implemented during construction, to direct storm water to the onsite basin and to isolate all work areas and keep any potentially contaminated runoff from leaving the project site.

4.3.4 Offsite Vehicle Tracking

As previously described, applicable controls will be in place to minimize or eliminate soils from being tracked off the KRCDPP site by vehicles. The project site access road from North Avenue and parking areas will be paved and remaining areas will be covered with crushed rock or will be landscaped with plants and trees, as necessary to limit the amount of material adhering to tires. Paved roads located at the entrance of the construction site will be inspected daily and cleaned as necessary using manual or mechanical street sweepers.

4.3.5 Dust Suppression and Control

As previously stated, there is a slight to no potential for wind erosion at the project site, based on the soil types. Wind erosion controls shall be evaluated and implemented as needed throughout construction on all disturbed soils that are subject to wind erosion, and when significant wind and dry conditions are anticipated. Wind controls will be used to prevent the transport of soil from soil- disturbed areas by the wind.

The following control methods will be implemented, as applicable, for dust suppression:

- Water access road, staging/parking areas and other construction areas as necessary;
- Cover all trucks hauling soil, sand, and other loose materials offsite or require all trucks to maintain at least 18 inches of freeboard;
- Sweep adjacent streets and any on-site paved surfaces;
- Hydroseed or apply non-toxic soil stabilizers to inactive or completed construction areas as soon as practical;
- Enclose, cover, water or apply non-toxic soil stabilizers to exposed stockpiles of sand, dirt, etc.;
- Limit traffic speed to 15 miles per hour (mph);

- Suspend excavation and grading during periods of high winds; and
- Replant vegetation in disturbed areas as quickly as possible.

These BMPS are described further in Appendix 3.

5.0 NON-STORM WATER MANAGEMENT

5.1 GENERAL

Non-storm water management during construction primarily involves the prevention of contamination in runoff. Control practices will be effectively implemented, thus non-storm water discharges from the site are not anticipated.

5.2 SOLID AND HAZARDOUS WASTES

The construction of the proposed KRCDPP will generate various types of non-hazardous solid wastes, including debris and other materials requiring removal during site grading and excavation, excess concrete, lumber, scrap metal, and empty non-hazardous chemical containers. Management of these wastes will be minimized through efficient and careful use of materials, and recycling when possible. Non-hazardous materials will be used where acceptable to meet construction requirements. Drummed and bagged wastes will not be stored directly on the ground, and will be covered or stored indoors where feasible. Incompatible materials will be separated, and secondary containment will be provided for liquids. Sufficient spill cleanup materials will be kept in proximity to areas where materials are stored and used.

Small quantities of hazardous wastes will be generated over the course of construction. These may include waste paint, spent solvents, and spent welding materials. All hazardous wastes generated during facility construction will be handled and disposed of in accordance with applicable LORS. Hazardous wastes generated during construction will be collected in hazardous waste accumulation containers near the point of generation and moved daily to the contractor's 90-day hazardous waste storage area located on site. The accumulated waste will subsequently be delivered to an authorized management facility.

Contractor waste materials will be collected and stored in metal dumpsters provided by a licensed solid waste management company. The dumpster will meet local and state solid waste management regulations, and be provided with solid lids or removable flexible covers. Trash and construction debris will be deposited in the dumpsters, the dumpsters will be covered, and then hauled off site weekly to an approved landfill. No construction waste will be buried onsite. Personnel will be instructed as to proper disposal procedures, notices will be posted, and individuals will be designated to assure that the procedures are

followed. A licensed contractor will regularly collect all sanitary waste from portable units.

Other BMPs that will be implemented, as applicable, include:

- Cover or store hazardous materials indoors, if possible,
- Appropriate methods of material use, delivery and storage,
- Appropriate spill prevention and control,
- Appropriate solid and hazardous waste management, and
- Use of covered dumpsters and containers for waste.

These BMPS are described further in Appendix 3.

5.3 PREVENTION OF NON-STORM WATER DISCHARGES

There will be specific designated temporary waste storage areas on site. These areas will be contained within earthen berms or an equivalent barrier measure. Non-hazardous construction wastes such as trash and construction debris will be collected and placed into commercial disposal containers as soon as possible.

BMPs that will be implemented, as applicable, to prevent non-storm water discharges include:

- Monitoring of all vehicle and equipment fueling and maintenance activities; fuel offsite wherever possible,
- Use secondary containment for hazardous material delivery and storage areas to prevent spills or leakage of liquid material from contaminating soil or soaking into the ground,
- Train employees on the proper use of materials such as fuel, oil, asphalt and concrete compounds, paints, solvents, etc.,
- Regularly remove construction wastes,
- Storage of all liquid wastes in covered containers,
- Use portable toilet facilities managed and regularly serviced by a licensed contractor, and
- Restricted vehicle and equipment washing to designated areas.

These BMPS are described further in Appendix 3.

5.4 GOOD HOUSEKEEPING

The following good housekeeping practices will also be followed on site during construction of the KRCDPP, as applicable:

- An effort will be made to store only enough product to do the job,
- All materials stored on site will be stored in a neat, orderly manner in their appropriate containers, and, if possible, under a roof or other enclosure,
- Products will be kept in their original containers with the original manufacturer's label,
- Substances will not be mixed unless recommended by the manufacturer,
- Whenever possible, all of a product will be used before disposing of the container,
- Manufacturer and/or state and local recommendations for proper use and disposal will be followed, and
- Storage areas including equipment storage will be inspected for visible signs of oil or other spillages.

5.5 PRODUCT SPECIFIC PRACTICES

The following product specific practices will also be followed onsite, as applicable:

- Petroleum Products: All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the potential for leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Asphalt substances used on site will be used according to manufacturer recommendations.
- Fertilizers: In the event fertilizers are required during revegetation, they will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
- Paints: Containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer instructions and state and local regulations.
- Concrete: Equipment used for concrete mixing and transport will be washed out in designated areas specifically designed for rinse out as previously described. Wash water will be contained in a temporary pit where waste concrete can harden for later removal. Fresh concrete washing will be avoided unless runoff can be drained to a bermed or level area, away from waterways and storm drain inlets.

5.6 SPILL PREVENTION PRACTICES

In addition to the good housekeeping and material management practices discussed is this SWPPP; the following practices will also be followed, as applicable, for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and personnel will be made aware of the procedures and the location of the information and cleanup supplies;
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite, and will include, but not be limited to brooms, dustpans, mops, rags, gloves, goggles, absorbents, and plastic and metal trash containers specifically for this purpose;
- Spills will be cleaned up immediately after discovery;
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from and contact with a hazardous substance;
- The names of responsible spill personnel and authorized contractors will be posted in various areas;
- Any spills of toxic or hazardous materials will be reported to authorized personnel or contractors; and
- Spills of hazardous materials that exceed their reportable quantities will be reported to all appropriate local, state and federal government agencies.

Contaminated soil or debris that cannot be recycled, reused or salvaged will be collected and stored in securely lidded dumpsters rented from a licensed solid waste management company. The dumpsters will meet all local and State of California solid waste management regulations. Potentially hazardous wastes will be separated from known non-hazardous wastes. This includes the segregation of storage areas and proper labeling of containers. All waste will be removed from the site by licensed contractors in accordance with applicable regulatory requirements and disposed of at either local or regional approved facilities. No waste material will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal. Notices stating these procedures will be posted in various areas.

Responsible personnel would be responsible for investigating spills and determining whether the reportable quantity has been exceeded. Regulations defining the reportable quantity levels for oil and hazardous substances are found in the Code of Federal Regulations Section 40, Part 110, Part 117 or Part 302. Should a release occur during

construction activities which exceeds the reportable quantity, the following steps will be taken:

- Notification of Local Emergency Response Agency at 911,
- Notification of the National Response Center at 800-424-8802, and
- Notification of the Governor's Office of Emergency Services Warning Center at 916-845-8911.

A written description of the release would be submitted to the EPA Regional Office providing the date, circumstances of the release, and the preventative measures taken to prevent further releases.

5.6.1 Isolation of Potentially Hazardous Materials

A supply of drums will be available in the event of spills of known materials or if potentially hazardous materials are found during KRCDPP construction. The contaminated material will be placed in the drums, sealed and placed in a storage area to await proper characterization and disposal. The sealed drums should be further placed in a lined roll-off container with a tarpaulin cover. In this case, the potentially hazardous materials are stored in a marked covered area that has secondary containment. In the event that a larger amount of material needs to be isolated, it will be placed directly into a lined roll-off container from a licensed hazardous waste transporter. The roll-off container will be placed out of the flow of construction traffic and equipment in a bermed area to contain and isolate possible leaks and rainwater. In the unlikely event that even larger volumes of potentially hazardous material must be temporarily held awaiting disposition, a containment area will be constructed. Plastic sheeting will be laid on the ground prior to placement of the contaminated material and the material itself will be covered. A berm will surround the covered material to keep any rainwater from leaving the project site.

5.7 POST CONSTRUCTION STORM WATER MANAGEMENT

Post construction, storm water will continue to be directed into the existing storm water basin located on adjacent to the northern boundary of the project site. This will occur until such time as the FMFCD completes the proposed pipeline from KRCDPP to FMFCD Basin AZ. This will be discussed in further detail in the Industrial SWPPP, to be prepared prior to KRCDPP operations.

6.0 MAINTENANCE, MONITORING AND REPORTING

Erosion and sediment control structures must be maintained to remain effective. Features that are washed out or damaged will be repaired as soon as possible, depending on

worker safety. Structures designed to accumulate sediment will have sediment removed in advance of the rainy season, and before major storm events. Criteria, similar to the following, will be used to determine whether erosion and sediment control features should be cleaned, repaired, or replaced:

- Sediment or other debris has accumulated to greater than one-third the height of sediment fabric fences or hay bale barriers,
- Sediment or debris has reduced the storage capacity of sediment traps by 50 percent or more, and
- More than one-third of the cross-section of conveyance structures, such as drainage swales or ditches are plugged or blocked.

In addition, the following maintenance activities will be performed, as necessary:

- Paved roads immediately surrounding the construction site will be cleaned as necessary using manual or mechanical street sweepers,
- Entrance/exit to the access road will be maintained so as to limit sediment tracking and creation of dust,
- Surfaces that are not paved or provided with gravel surfacing will be watered to limit the generation of dust but will not be excessively watered so as to create runoff,
- All equipment will be maintained according to manufacturer specifications so as to prevent any leaks and spills, and
- Any contaminated soils resulting from spills will be dug up as quickly as possible, and then removed from the site for proper disposal.

The contractor will inspect the project site prior to a forecast storm, after a rain event that causes runoff from the construction site, and at 24-hour intervals during extended rain events. As appropriate, the contractor will also inspect the site during heavy rains to observe storm water runoff, and implementation and effectiveness of BMPs. The results of all inspections will be documented and copies of the completed inspection checklists will be maintained with the SWPPP. The inspection reports shall include the inspection date, name of the inspector and the observations made.

Equipment, materials, and workers will also be available for rapid response to failures or emergencies and all corrective maintenance to BMPs will be performed as soon as possible after the conclusion of each storm event, depending on worker safety.

Records of monitoring information, copies of all reports required by the General Permit, and records of data used to complete the NOI for the construction activity shall be held, retained, and kept by the facility operator and/or contractor for a period of at least 3 years.

The facility operator and/or contractor will annually certify that its construction activity is in compliance with the requirements of this general permit and its SWPPP. Noncompliance notifications will be submitted within 30 days of identification of noncompliance.

7.0 TRAINING

Prior to the initiation of KRCDPP construction, all designated onsite representatives and contractors will participate in a pre-project storm water training workshop. The workshop will cover basic storm water information, the requirements of the general permit, and the SWPPP. Specifically, the workshop will focus on implementation, inspection, and maintenance of storm water controls. New employees will be trained by staff familiar with these topics.

As required by the SWRCB, individuals responsible for SWPPP preparation, implementation, and permit compliance will be appropriately trained, and the training will be documented. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also document their training.

All contractors are responsible for familiarizing their personnel with the information contained in the SWPPP. Contractors will be informed of this obligation and will be expected to conduct one or more employee training or briefing sessions. The purpose of the sessions will be to review the proper installation methods and maintenance of all erosion control BMPs proposed to be used on the project. As stated above, monitoring and inspection activities will be conducted by individuals who have had additional training specific for this purpose. Records will be maintained to track the training.

Each contractor will be required to certify that they understand the requirements of the SWPPP, and will perform their duties in accordance with its requirements.

8.0 AMENDMENTS

During construction, changes may occur that will affect the control practices described in this SWPPP. This SWPPP will be amended whenever there is a change in construction

or operation that may cause the discharge if significant quantities of pollutants to surface water, ground water, municipal storm drains or when otherwise deemed necessary.

The SWPPP shall also be amended if it is in violation of a condition of the permit or has not achieved the general objective of reducing or eliminating pollutants in storm water discharges.

9.0 REFERENCES

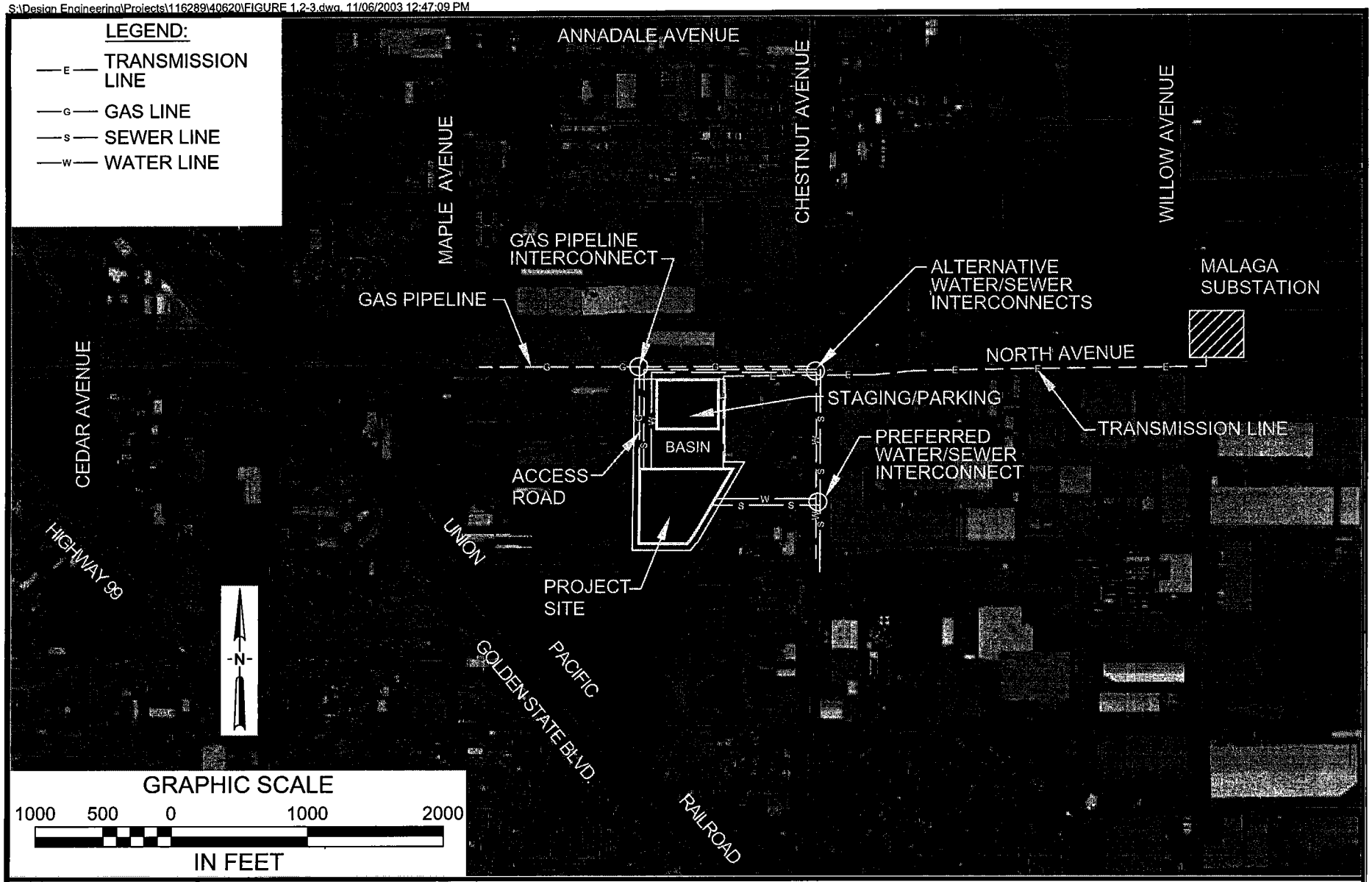
Hoffman, Allen, 2003. Fresno Metropolitan Flood Control District. Personal Communication, October 2003.

MID, 2003. Modesto Irrigation District Electric Generating Station. Construction Storm Water Pollution Prevention Plan. Prepard by CH2M Hill for Modesto Irrigation District. June 2003.

State of California Department of Transportation (Caltrans), 2003. Caltrans Storm Water Quality Handbook.

Storm Water Quality Task Force, 1993. California Storm Water Best Management Practices Handbooks. Volume 2: Commercial/Industrial Handbook.

S:\Design Engineering\Projects\116289\40620\FIGURE 1.2-3.dwg, 11/06/2003 12:47:09 PM



KRCD
Kings River Conservation District

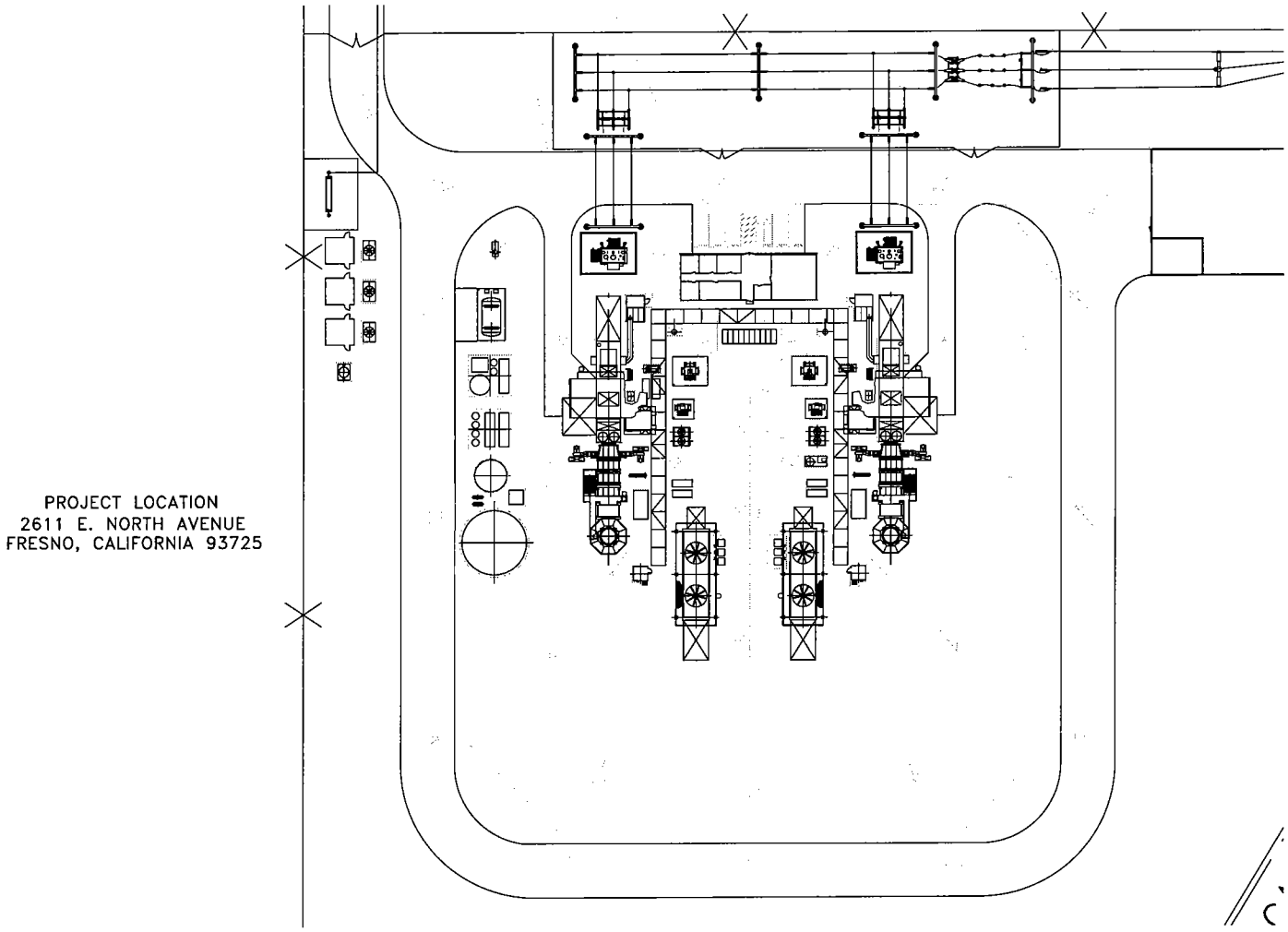
FIGURE 1.2-3

KRCDPP Project Site
and Linear Facilities

KRCDPP

09/30/03 REV. 0

S:\Design Projects\Projects\116288\062\FIGURE 2.dwg, 11/19/2003 03:23:28 PM



KRCD
Kings River Conservation District

FIGURE 2

PRELIMINARY DRAINAGE AND GRADING PLAN

KRCDPP

09/30/03 REV. 0

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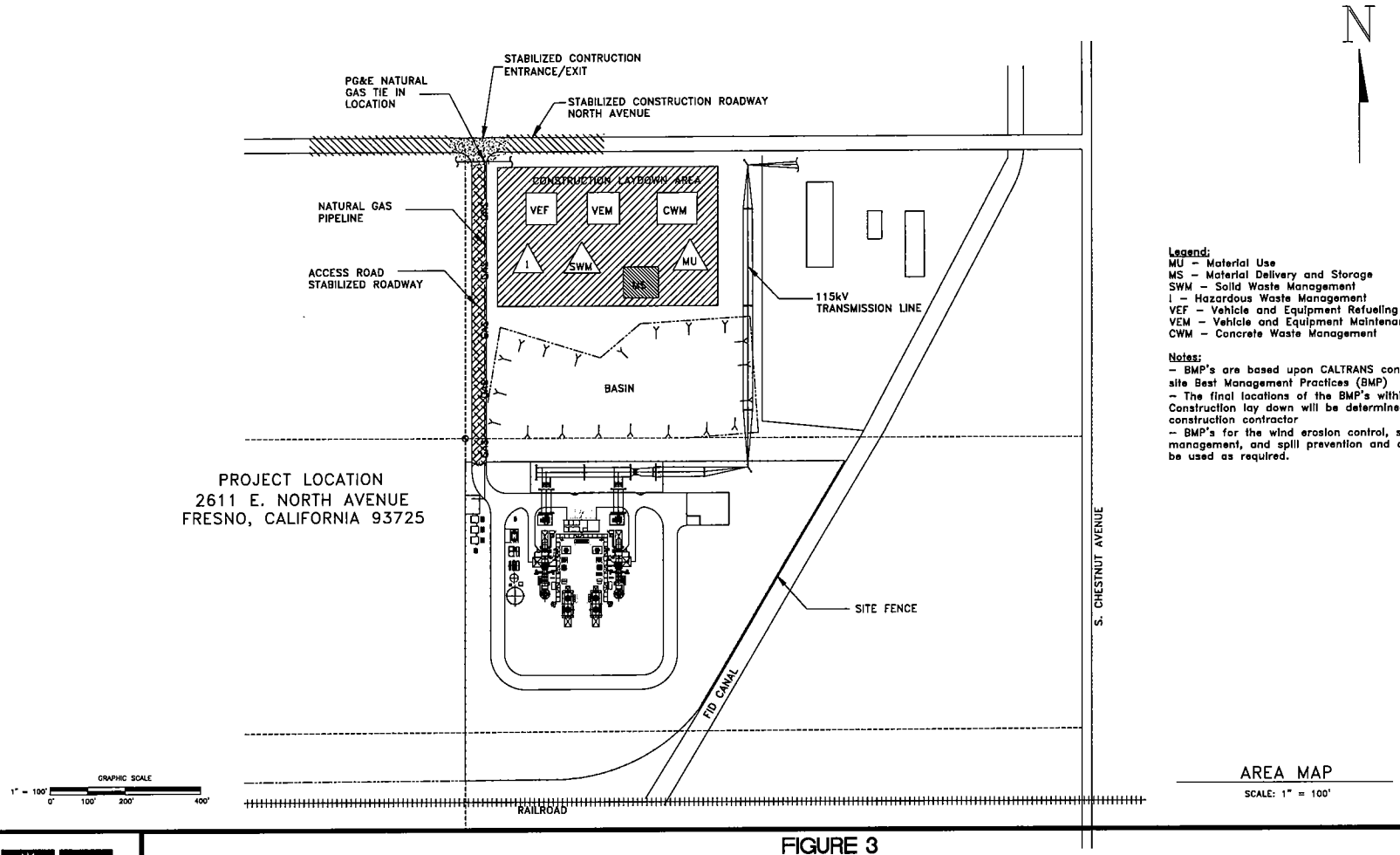


Legend:
MU – Material Use
MS – Material Delivery and Storage
SWM – Solid Waste Management
I – Hazardous Waste Management
VEF – Vehicle and Equipment Refueling
VEM – Vehicle and Equipment Maintenance
CWM – Concrete Waste Management

Notes:
– BMP's are based upon CALTRANS construction site Best Management Practices (BMP)
– The final locations of the BMP's within the Construction lay down will be determined by the construction contractor
– BMP's for the wind erosion control, stockpile management, and spill prevention and control will be used as required.

AREA MAP
SCALE: 1" = 100'

KRCD
Kings River Conservation District

FIGURE 3

EROSION CONTROL PLAN

KRCDPP

09/30/03 REV. 0

Appendix A

Notice of Intent

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WQ ORDER No. 99-08-DWQ)

I. NOI STATUS (SEE INSTRUCTIONS)

MARK ONLY ONE ITEM 1. ☐ New Construction 2. ☐ Change of Information for WDID#

II. PROPERTY OWNER

Name	Contact Person		
Mailing Address	Title		
City	State	Zip	Phone ( ) --

III. DEVELOPER/CONTRACTOR INFORMATION

Developer/Contractor	Contact Person		
Mailing Address	Title		
City	State	Zip	Phone ( ) --

IV. CONSTRUCTION PROJECT INFORMATION

Site/Project Name	Site Contact Person		
Physical Address/Location	Latitude ____°	Longitude ____°	County
City (or nearest City)	Zip	Site Phone Number ( ) --	Emergency Phone Number ( ) --

A. Total size of construction site area: _____ Acres B. Total area to be disturbed: _____ Acres (% of total _____)	C. Percent of site imperviousness (including rooftops): Before Construction: _____% After Construction: _____%	D. Tract Number(s): _____, _____ E. Mile Post Marker: _____

F. Is the construction site part of a larger common plan of development or sale? ☐ YES ☐ NO	G. Name of plan or development:
H. Construction commencement date: ____/____/____ I. % of site to be mass graded: _____	J. Projected construction dates: Complete grading: ____/____/____ Complete project: ____/____/____

K. Type of Construction (Check all that apply):

☐ ☐ ☐ ☐ ☐

1. Residential 2. Commercial 3. Industrial 4. Reconstruction 5. Transportation

6. Utility Description: _____ 7. Other (Please List): _____

V. BILLING INFORMATION

SEND BILL TO:	Name	Contact Person	
☐ OWNER (as in II. above)			
☐ DEVELOPER (as in III. above)	Mailing Address	Phone/Fax	
☐ OTHER (enter information at right)	City	State	Zip

VI. REGULATORY STATUS

A. Has a local agency approved a required erosion/sediment control plan? ☐ YES ☐ NO

Does the erosion/sediment control plan address construction activities such as infrastructure and structures? ☐ YES ☐ NO

Name of local agency: _____ Phone: ( ) --

B. Is this project or any part thereof, subject to conditions imposed under a CWA Section 404 permit of 401 Water Quality Certification? ☐ YES ☐ NO

If yes, provide details: _____

VII. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (Check all that apply):

1. ☐ **Indirectly to waters of the U.S.**
2. ☐ **Storm drain system - Enter owner's name:** _____
3. ☐ **Directly to waters of U.S. (e.g. , river, lake, creek, stream, bay, ocean, etc.)**

B. Name of receiving water: (river, lake, creek, stream, bay, ocean): _____

VIII. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (check one)

☐ A SWPPP has been prepared for this facility and is available for review: Date Prepared: ____/____/____ Date Amended: ____/____/____

☐ A SWPPP will be prepared and ready for review by (enter date): ____/____/____

☐ A tentative schedule has been included in the SWPPP for activities such as grading, street construction, home construction, etc.

B. MONITORING PROGRAM

☐ A monitoring and maintenance schedule has been developed that includes inspection of the construction BMPs before anticipated storm events and after actual storm events and is available for review.

If checked above: A qualified person has been assigned responsibility for pre-storm and post-storm BMP inspections to identify effectiveness and necessary repairs or design changes. ☐ YES ☐ NO

Name: _____ Phone: ( ) --

C. PERMIT COMPLIANCE RESPONSIBILITY

A qualified person has been assigned responsibility to ensure full compliance with the Permit, and to implement all elements of the Storm Water Pollution Prevention Plan including:

1. Preparing an annual compliance evaluation. ☐ YES ☐ NO

   Name: _____ Phone: ( ) --

2. Eliminating all unauthorized discharges. ☐ YES ☐ NO

IX. VICINITY MAP AND FEE (must show site location in relation to nearest named streets, intersections, etc.)

Have you included a vicinity map with this submittal? ☐ YES ☐ NO

Have you included payment of the annual fee with this submittal?..... YES NO

X. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate 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 or imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan will be complied with."

Printed Name: _____

Signature: _____ **Date:** _____

Title: _____

Appendix B

Notice of Termination

State of California
State Water Resources Control Board

NOTICE OF TERMINATION

OF COVERAGE UNDER THE NPDES GENERAL PERMIT NO. CAS000002
FOR DISCHARGES OF STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY

Submission of this Notice of Termination constitutes notice that the owner (and his/her agent) of the site identified on this form is no longer authorized to discharge storm water associated with construction activity by NPDES General Permit No. CAS000002.

I. WDID NO.

II. OWNER

COMPANY NAME _____ CONTACT PERSON _____

STREET ADDRESS _____ TITLE _____

CITY _____ STATE _____ ZIP _____ PHONE _____

III. CONSTRUCTION SITE INFORMATION

A. DEVELOPER NAME _____ CONTACT PERSON _____

STREET ADDRESS _____ TITLE _____

CITY _____ CA ____ ZIP _____ PHONE _____

B. SITE ADDRESS _____ COUNTY _____

CITY _____ CA ____ ZIP _____ PHONE _____

IV. BASIS OF TERMINATION

_____ 1. The construction project is complete and the following conditions have been met.

- All elements of the Storm Water Pollution Prevention Plan have been completed.
- Construction materials and waste have been disposed of properly.
- The site is in compliance with all local storm water management requirements.
- A post-construction storm water operation and management plan is in place.

Date of project completion _____/_____/_____

_____ 2. Construction activities have been suspended, either temporarily _____ or indefinitely _____ and the following conditions have been met.

- All elements of the Storm Water Pollution Prevention Plan have been completed.
- Construction materials and waste have been disposed of properly.
- All denuded areas and other areas of potential erosion are stabilized.
- An operation and maintenance plan for erosion and sediment control is in place.

- The site is in compliance with all local storm water management requirements.

Date of suspension _____/_____/_____ Expected start up date _____/_____/_____

_____ 3. Site can not discharge storm water to waters of the United States (check one).

_____ All storm water is retained on site.

_____ All storm water is discharged to evaporation or percolation ponds offsite.

_____ 4. Discharge of storm water from the site is now subject to another NPDES general permit or an individual NPDES permit.

NPDES Permit No._____ Date coverage began _____/_____/_____

_____ 5. There is a new owner of the identified site. Date of owner transfer _____/_____/_____

Was the new owner notified of the General Permit requirements? YES ____ NO ____

NEW OWNER INFORMATION

COMPANY NAME _____ CONTACT PERSON

STREET ADDRESS _____ TITLE

CITY _____ STATE _____ ZIP _____ PHONE

V. EXPLANATION OF BASIS OF TERMINATION (Attach site photographs - see instructions).

VI. CERTIFICATION:

I certify under penalty of law that all storm water discharges associated with construction activity from the identified site that are authorized by NPDES General Permit No. CAS000002 have been eliminated or that I am no longer the owner of the site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with construction activity under the general permit, and that discharging pollutants in storm water associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release an owner from liability for any violations of the general permit or the Clean Water Act.

PRINTED NAME _____ TITLE

SIGNATURE: _____ DATE ____/____/____

REGIONAL WATER BOARD USE ONLY

This Notice of Termination has been reviewed, and I recommend termination of coverage under the subject NPDES general permit.

Printed Name _____ Region No. _____

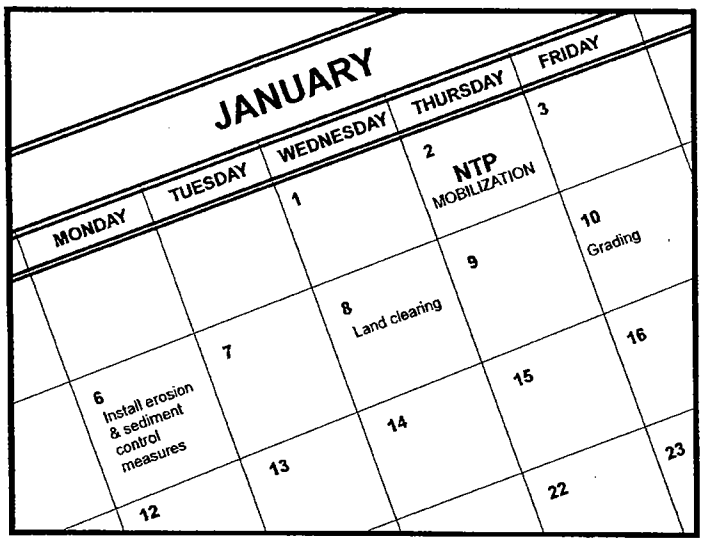
Signature _____ Date _____/_____/_____

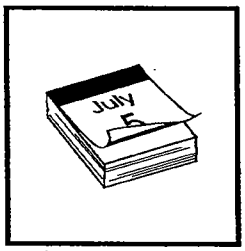
Appendix C

Best Management Practices

Scheduling

SS-1





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

This best management practice (BMP) involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment controls measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Appropriate Applications

Construction sequencing shall be scheduled to minimize land disturbance for all projects during the rainy and non-rainy season. Appropriate BMPs shall be implemented during both rainy and non-rainy seasons.

Limitations

None identified.

Standards and Specifications

- Developing a schedule and planning the project are the very first steps in an effective storm water program. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The construction schedule shall be incorporated into the SWPPP or WPCP.
- The schedule shall include detail on the rainy season implementation and deployment of:
  - Temporary soil stabilization BMPs.
  - Temporary sediment control BMPs.
  - Tracking control BMPs.
  - Wind erosion control BMPs.

- Non-storm water BMPs.
- Waste management and materials pollution control BMPs.

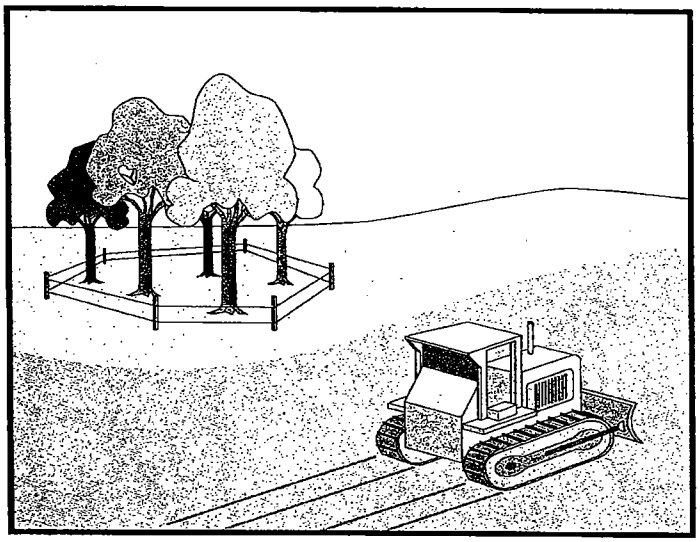
- Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule work to minimize soil disturbing activities during the rainy season.
- Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season.
- Schedule major grading operations for the non-rainy season when practical.
- Stabilize non-active areas within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy soil stabilization and sediment control practices as required by Section 2 of this Manual. Erosion may be caused during dry seasons by unseasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Sequence trenching activities so that most open portions are closed before new trenching begins.
- Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
- Consider scheduling when establishing permanent vegetation (appropriate planting time for specified vegetation).
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

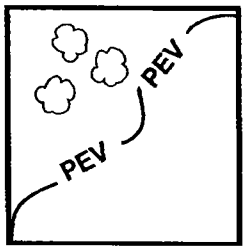
Maintenance and Inspection

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted or when directed by the Resident Engineer (RE).
- The Special Provisions require annual submittal of a rainy season implementation schedule. Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

Preservation of Existing Vegetation

SS-2





Standard Symbol

BMP Objectives

Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

Appropriate Applications

- Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date. Specifications for preservation of existing vegetation can be found in Standard Specifications, Section 7-1.11.
- On a year-round basis, temporary fencing shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas.
- Clearing and grubbing operations should be staged to preserve existing vegetation.

Limitations

Protection of existing vegetation requires planning, and may limit the area available for construction activities.

Standards and Specifications

Timing

- Preservation of existing vegetation shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas identified on the plans to be preserved, especially on areas designated as Environmentally Sensitive Areas (ESAs).
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.

Design and Layout

- Mark areas to be preserved with temporary fencing made of orange polypropylene that is stabilized against ultraviolet light. The temporary fencing shall be at least 1 meter (3.2. ft) tall and shall have openings not larger than 50 mm by 50 mm (2 in by 2 in).

- Fence posts shall be either wood or metal, at the Contractor's discretion, as appropriate for the intended purpose. The post spacing and depth shall be adequate to completely support the fence in an upright position.
- Minimize the disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling.
- Consider the impact of grade changes to existing vegetation and the root zone.

Installation

- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- Keep equipment away from trees to prevent trunk and root damage.
- Maintain existing irrigation systems.
- Employees and subcontractors shall be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be retained. Removed trees shall not be felled, pushed, or pulled into any retained trees. Fires shall not be permitted within 30 m (100 ft) of the drip line of any retained trees. Any fires shall be of limited size, and shall be kept under continual surveillance. No toxic or construction materials (including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants) shall be stored within 15 m (50 ft) of the drip line of any retained trees, nor disposed of in any way which would injure vegetation.

Trenching and Tunneling

- Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 450 mm (18 in) below the ground surface, and not below the tree center to minimize impact on the roots.
- Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.
- The ends of damaged or cut roots shall be cut off smoothly.
- Trenches and tunnels shall be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil which can damage roots.
- Remove any trees intended for retention if those trees are damaged seriously enough to affect their survival. If replacement is desired or required, the new tree shall be of similar species, and at least 50 mm (2 in) caliper, unless

otherwise required by the contract documents.

- After all other work is complete, fences and barriers shall be removed last. This is because protected trees may be destroyed by carelessness during the final cleanup and landscaping.

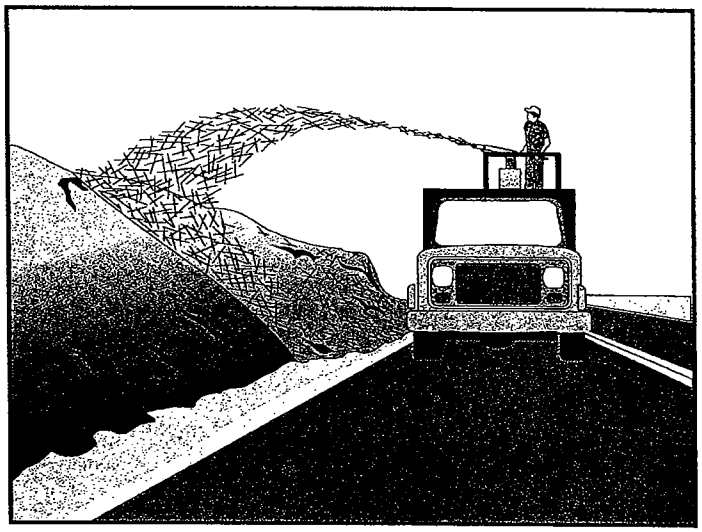
Maintenance and Inspection

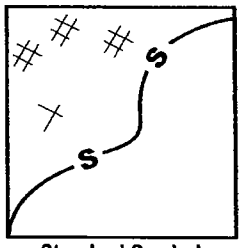
During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

- Serious tree injuries shall be attended to by an arborist.
- During construction, District Environmental shall be contacted to ensure that ESAs are protected.

Straw Mulch

SS-6





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a stabilizing emulsion. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
- There is a potential for introduction of weed-seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 45 m (150 ft) of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- "Punching" of straw does not work in sandy soils.

Standards and Specifications

- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Sections 20-2.06, 20-2.07 and 20-2.11.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Apply loose straw at a minimum rate of 3,570 kg/ha (4,000 lb/ac), or as indicated in the project's special provisions, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 140 kg/ha (125 lb/ac). In windy conditions, the rates are typically 200 kg/ha (178 lb/ac).
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
  - Applying and incorporating straw shall follow the requirements in Standard Specifications Section 20-3.03.
  - On small areas, a spade or shovel can be used.

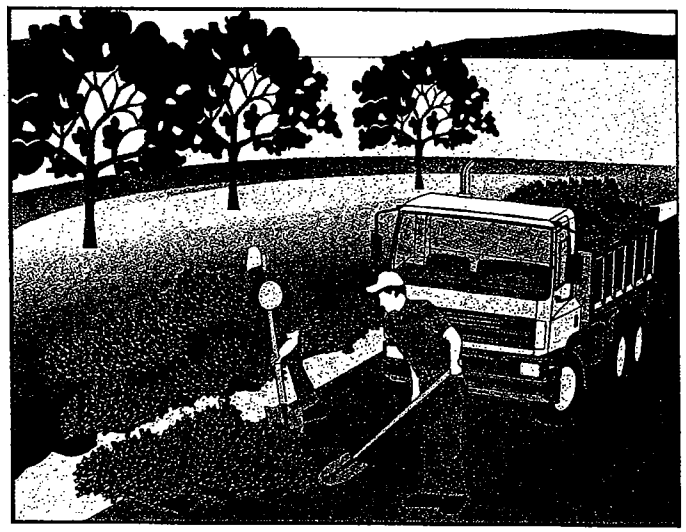
- On slopes with soils, which are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper."
- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes. Refer to BMP SS-7, "Geotextiles, Plastic Covers and Erosion Control Blankets/Mats."

Maintenance and Inspections

- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required by the Resident Engineer (RE) to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Wood Mulching

SS-8



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Wood mulching consist of applying a mixture of shredded wood mulch, bark or compost. Wood mulch is mostly applicable to landscape projects.

The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Appropriate Applications

Wood mulching is considered a temporary soil stabilization (erosion control) alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
- As short term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment and reduce wind erosion.

Limitations

- Wood mulch may introduce unwanted species.
- Shredded wood does not withstand concentrated flows and is prone to sheet erosion.
- Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.

Wood Mulching

SS-8

Standards and Specifications

Mulch Selection

There are many types of mulches, and selection of the appropriate type shall be based on the type of application and site conditions. Prior to use of wood mulches, there shall be concurrence with the District Landscape Architect since some mulch use on construction projects may not be compatible with planned or future projects. Selection of wood mulches by the Contractor shall comply with Standard Specifications Section 20-2.08, and must be approved by the Resident Engineer (RE).

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a punching-type roller or by track walking. The construction-application procedures for mulches vary significantly depending upon the type of mulching method specified. Two (2) methods are highlighted here:

- Green Material: This type of mulch is produced by recycling vegetation trimmings such as grass, shredded shrubs and trees. Methods of application are generally by hand, although pneumatic methods are available. Mulch shall be composted to kill weed seeds.
  - It can be used as a temporary ground cover with or without seeding.
  - The green material shall be evenly distributed on site to a depth of not more than 50 mm (2 in).
- Shredded Wood: Suitable for ground cover in ornamental or revegetated plantings.
  - Shredded wood/bark is conditionally suitable; see note under limitations.
  - Shall be distributed by hand (although pneumatic methods may be available).
  - The mulch shall be evenly distributed across the soil surface to a depth of 50 mm (2 in) to 75 mm (3 in).
- Avoid mulch placement onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- All material must be removed before re-starting work on the slopes.

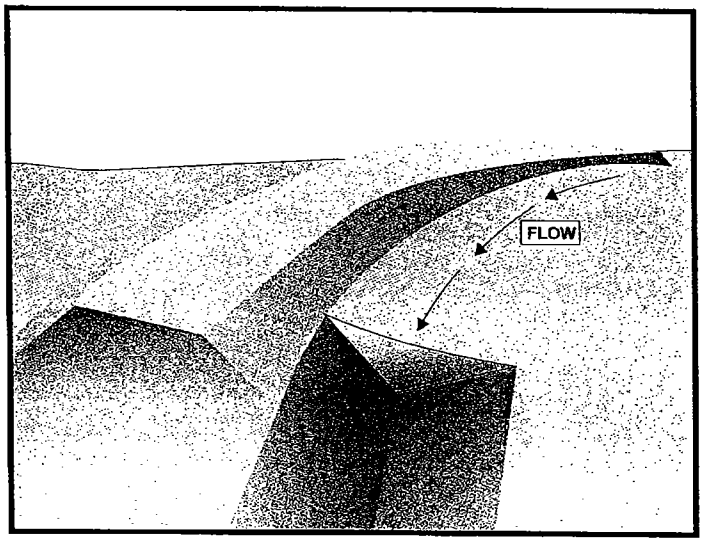
Maintenance and Inspection

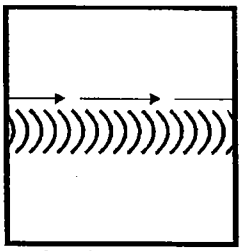
- Regardless of the mulching technique selected, the key consideration in Maintenance and Inspection is that the mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it shall last the length of time the site will remain barren or until final re-grading and revegetation.

- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance shall focus on longevity and integrity of the mulch.

Earth Dikes/Drainage Swales and Lined Ditches

SS-9





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- o Sediment Control
- o Tracking Control
- o Wind Erosion Control
- o Non-Storm Water Management
- o Materials and Waste Management

Definition and Purpose

These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

- Earth dikes/drainage swales and lined ditches may be used to:
  - Convey surface runoff down sloping land.
  - Intercept and divert runoff to avoid sheet flow over sloped surfaces.
  - Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
  - Intercept runoff from paved surfaces.
- Earth dikes/drainage swales and lined ditches also may be used:
  - Below steep grades where runoff begins to concentrate.
  - Along roadways and facility improvements subject to flood drainage.
  - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
  - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Earth Dikes/Drainage Swales and Lined Ditches

SS-9

Limitations

- Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.
- May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

Standards and Specifications

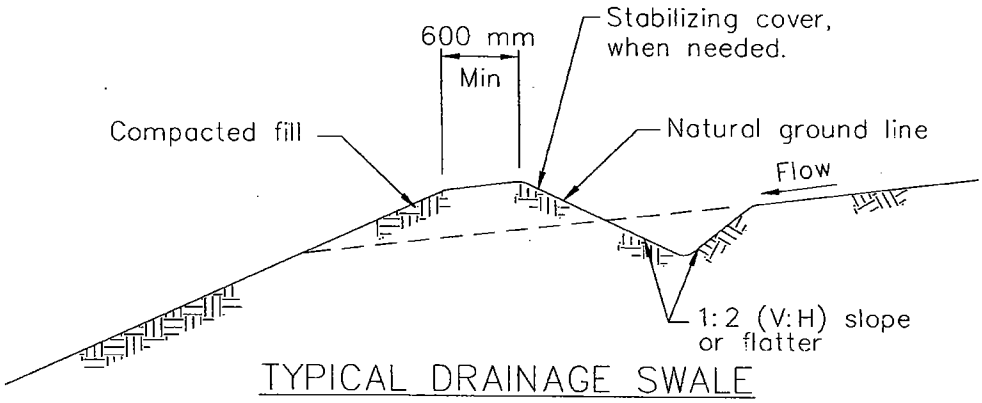
- Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Conveyances shall be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, over topping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff from the highway right-of-way onto other property.
- When possible, install and utilize permanent dikes, swales and ditches early in the construction process.
- Provide stabilized outlets. Refer to SS-10, "Outlet Protection/Velocity/ Dissipation Devices."

Maintenance and Inspections

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed or as directed by the RE.
- Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Earth Dikes/Drainage Swales and Lined Ditches

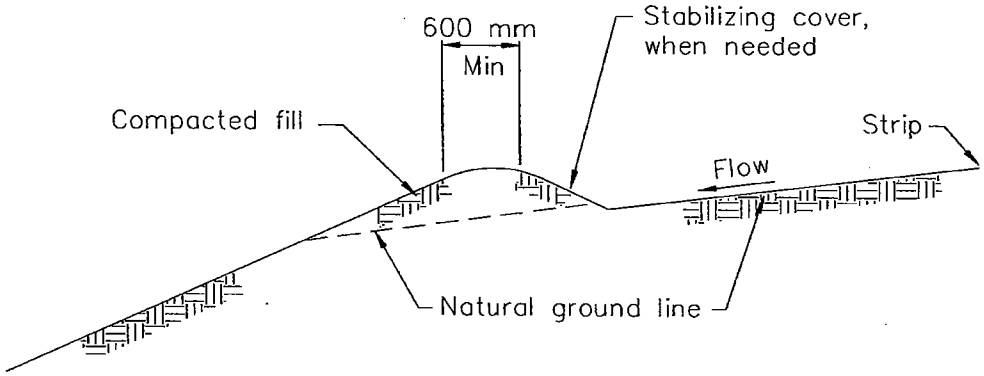
SS-9



TYPICAL DRAINAGE SWALE
NOT TO SCALE

NOTES:

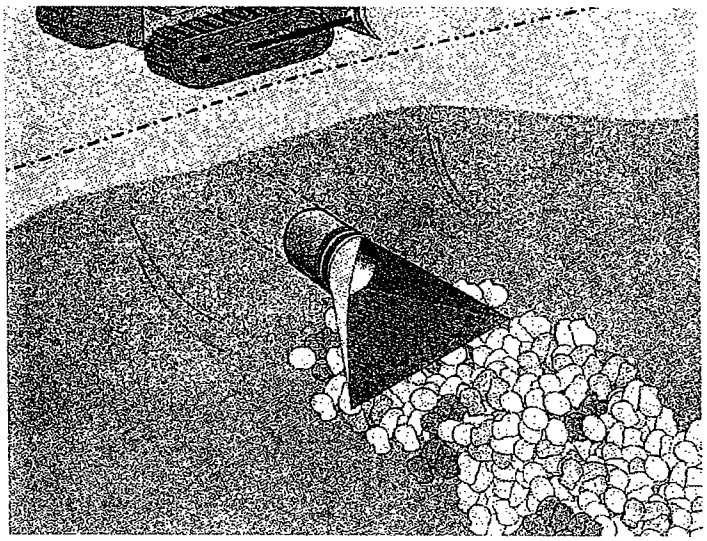
1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade, in conformance with Section 19–5 of the Caltrans Standard Specifications.

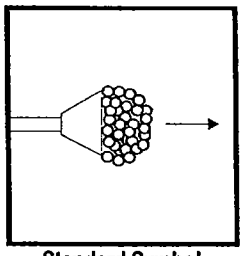


TYPICAL EARTH DIKE
NOT TO SCALE

Outlet Protection/Velocity Dissipation Devices

SS-10





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of storm water flows.

Appropriate Applications

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Loose rock may have stones washed away during high flows.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.

Outlet Protection/Velocity Dissipation Devices

SS-10

Standards and Specifications

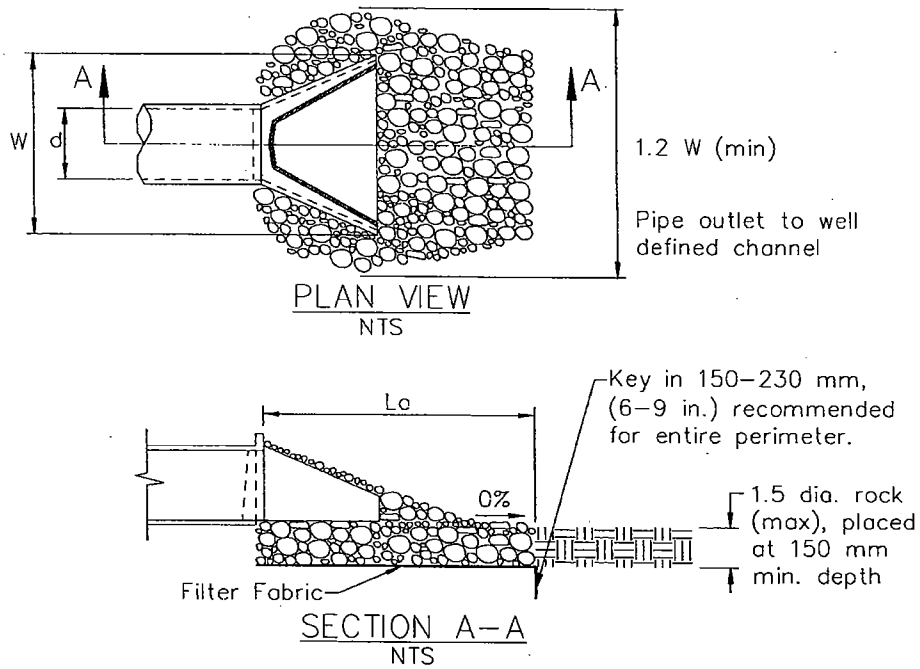
- There are many types of energy dissipaters, with rock being the one that is represented in the figure on Page 3. Please note that this is only one example and the RE may approve other types of devices proposed by the contractor.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction.
- Carefully place riprap to avoid damaging the filter fabric.
- For proper operation of apron:
  - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
  - If size of apron riprap is large, protect underlying filter fabric with a gravel blanket.
- Outlets on slopes steeper than 10% shall have additional protection.

Maintenance and Inspection

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap that has washed away.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- Temporary devices shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Outlet Protection/Velocity Dissipation Devices

SS-10

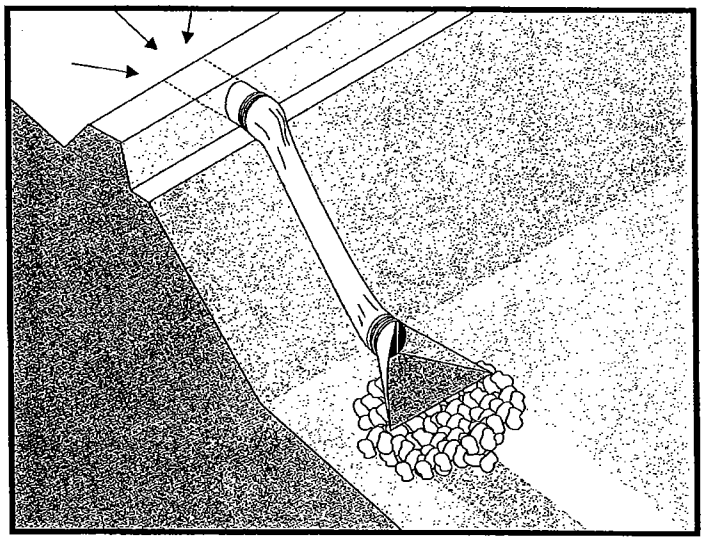


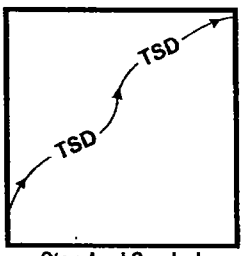
Pipe Diameter mm	Discharge m^3/s	Apron Length, La m	Rip Rap D_{50} Diameter Min mm
300	0.14	3	100
	0.28	4	150
450	0.28	3	150
	0.57	5	200
	0.85	7	300
	1.13	8	400
600	0.85	5	200
	1.13	8	200
	1.42	8	300
	1.70	9	400
For larger or higher flows, consult a Registered Civil Engineer			

Source: USDA – SCS

Slope Drains

SS-11





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Appropriate Applications

- Slope drains may be used on construction sites where slopes may be eroded by surface runoff.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

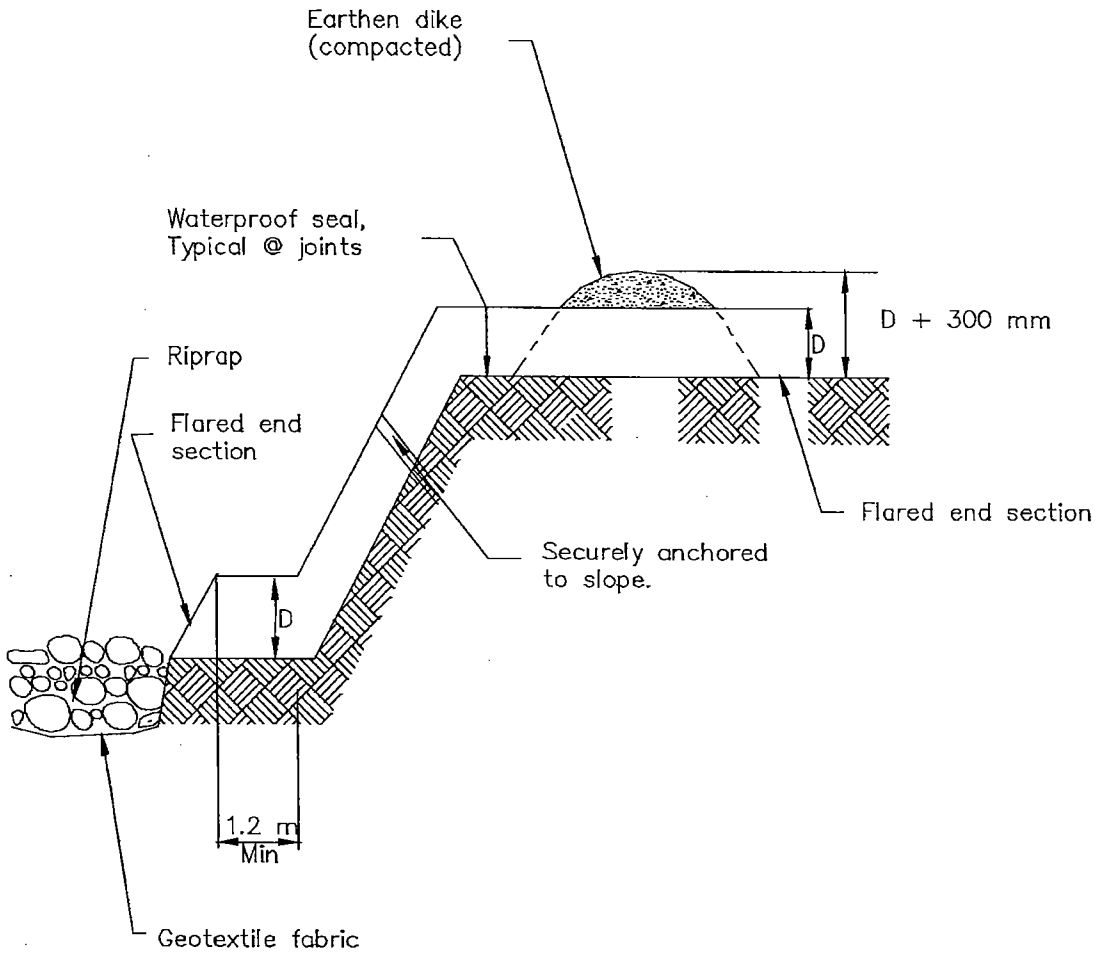
Standards and Specifications

- When using slope drains, limit drainage area to 4 ha (10 ac) per pipe. For larger areas, use a rock-lined channel or a series of pipes.
- Maximum slope generally limited to 1:2 (V:H), as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP SS-8, "Earth Dikes/Drainage Swales, and Lined Ditches."
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials are PVC, ABS, or comparable pipe.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.

- Compact soil around and under entrance, outlet, and along length of pipe.
- Securely anchor and stabilize pipe and appurtenances into soil.
- Check to ensure that pipe connections are water tight.
- Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
- Protect inlet and outlet of slope drains; use standard flared end section at entrance and exit for pipe slope drains 300 mm (12in) and larger.

Maintenance and Inspection

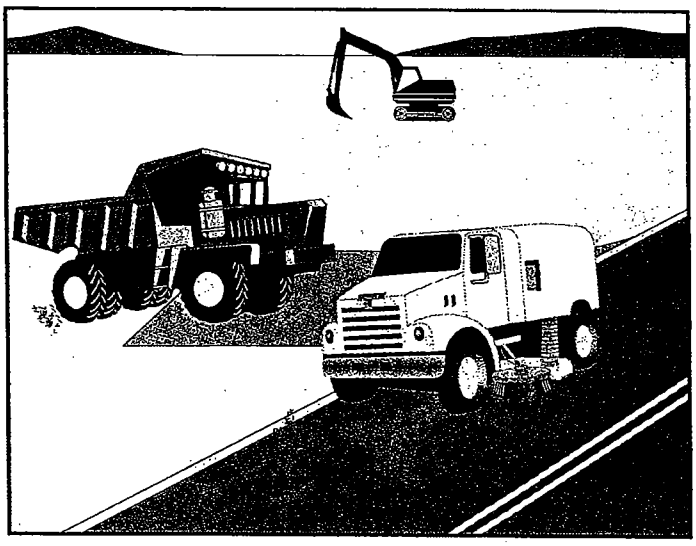
- Inspect before and after each rain storm, and twice monthly until the tributary drainage area has been stabilized. Follow routine inspection procedures for inlets thereafter.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built-up sediment from entrances, outlets, and within drains as required.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).

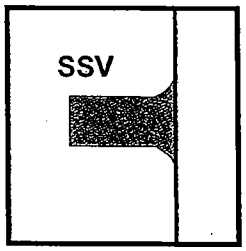


TYPICAL SLOPE DRAIN
NOT TO SCALE

Street Sweeping and Vacuuming

SC-7





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ● Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Practices to remove tracked sediment to prevent the sediment from entering a storm drain or watercourse.

Appropriate Applications

These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of ingress/egress.

Limitations

Sweeping and vacuuming may not be effective when soil is wet or muddy.

Standards and Specifications

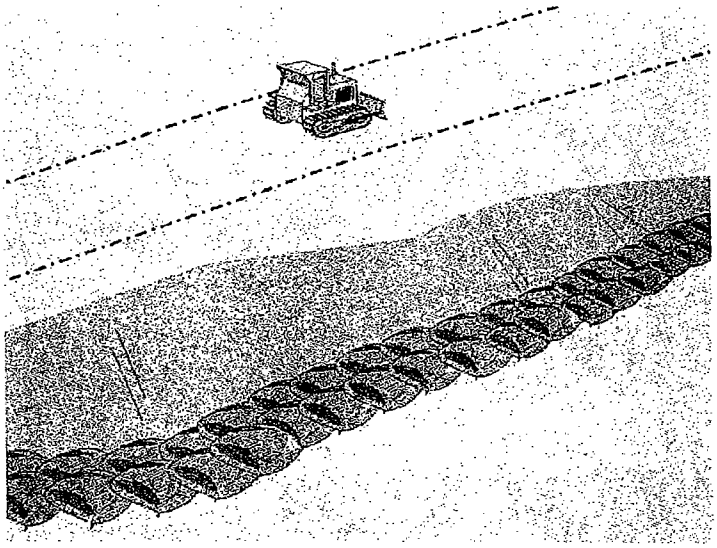
- Kick brooms or sweeper attachments shall not be used.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking shall be swept and/or vacuumed daily.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project.

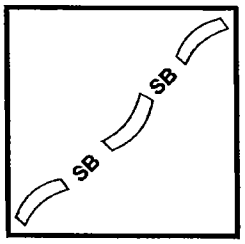
Maintenance and Inspection

- Inspect ingress/egress access points daily and sweep tracked sediment as needed, or as required by the Resident Engineer (RE).
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite in conformance with the provisions in Standard Specifications Section 7-1.13 .

Sandbag Barrier

SC-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment/desilting basin.
- During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).

- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.

Limitations

- Limit the drainage area upstream of the barrier to 2 ha (5 ac).
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

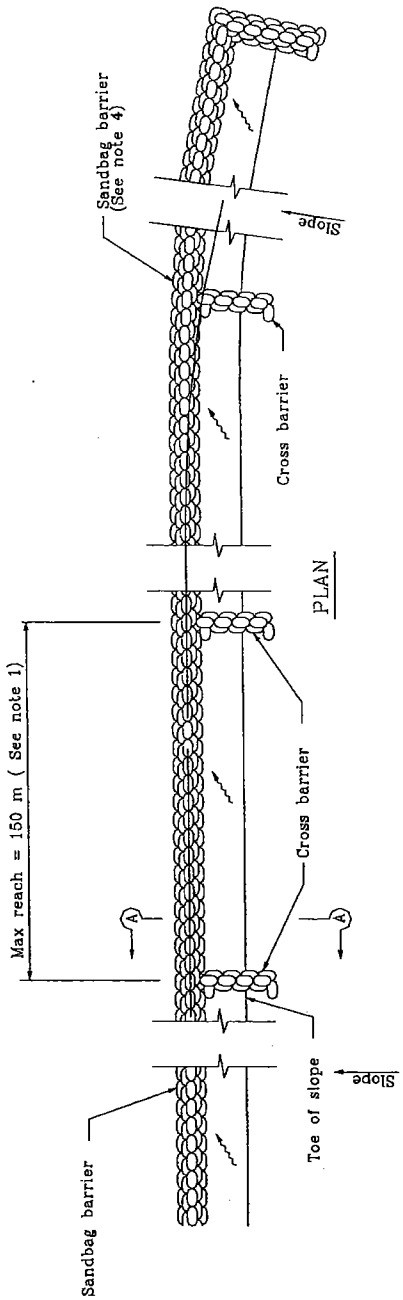
- Sandbag Material: Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m2 (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- Sandbag Size: Each sand-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb.). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.
- Fill Material: All sandbag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Standard Specifications Section 68-1.025 "Permeable Material". The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the RE.

Installation

- When used as a linear sediment control:
  - Install along a level contour.
  - Turn ends of sandbag row up slope to prevent flow around the ends.
  - Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
  - Install as shown in Pages 4 and 5 of this BMP.
- Construct sandbag barriers with a set-back of at least 1m (3 ft) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace sandbags as needed, or as directed by the RE.
- Repair washouts or other damages as needed, or as directed by the RE.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.



TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

Caltrans Metric

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 150 m.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

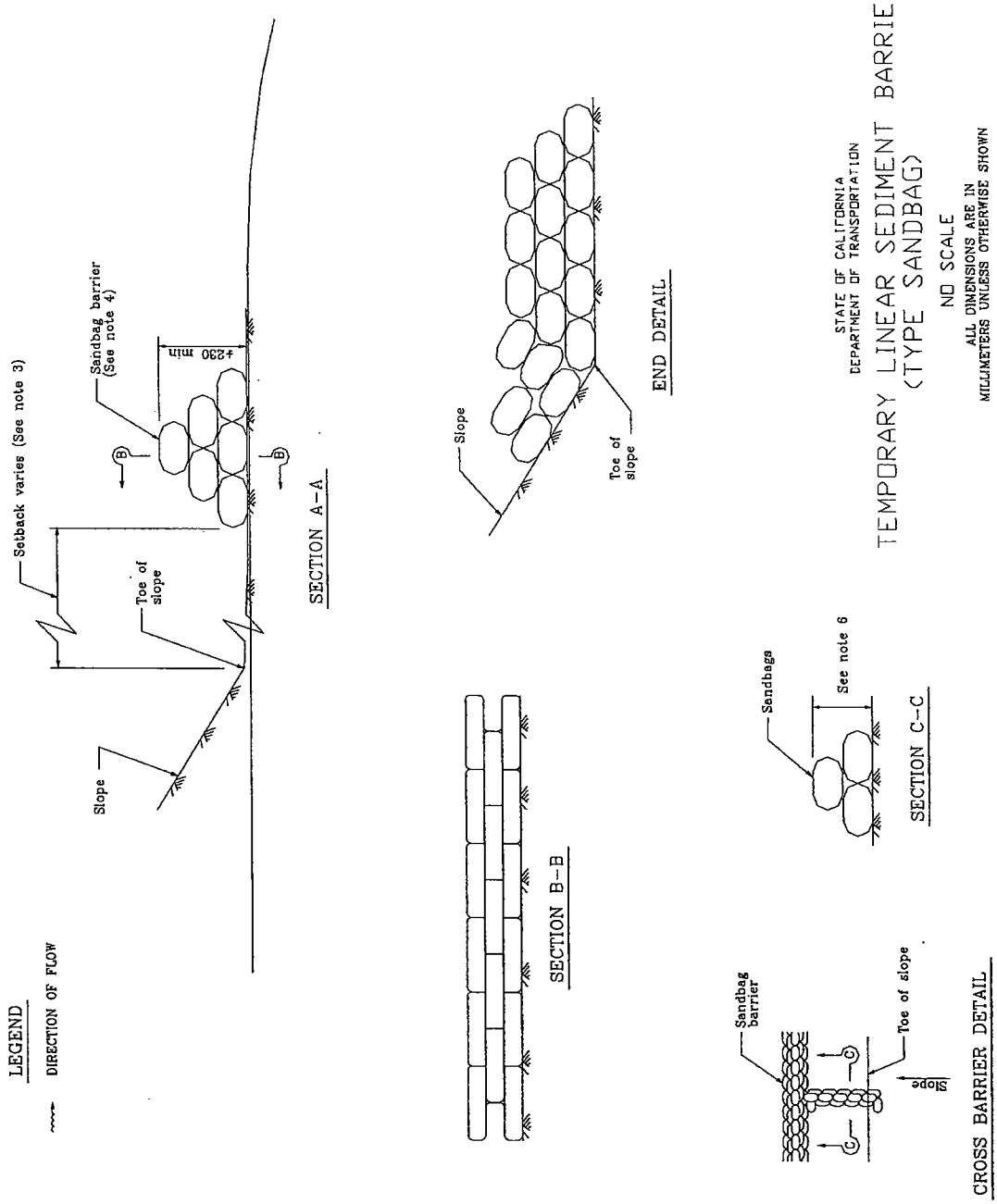
TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE SANDBAG)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

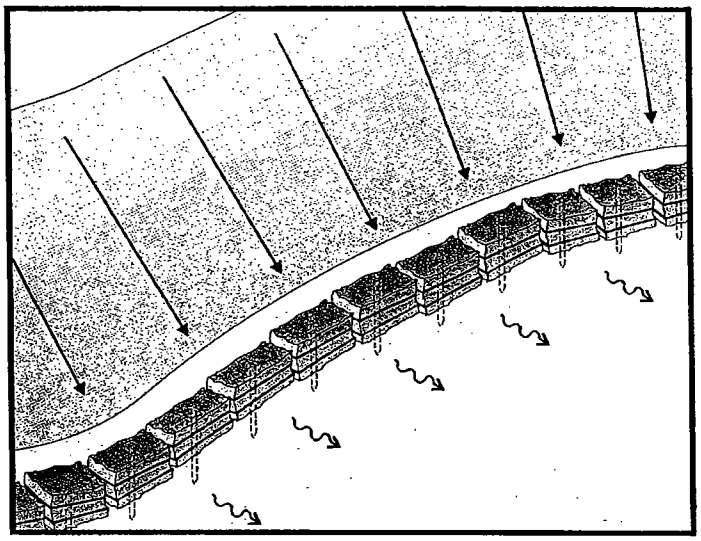
Sandbag Barrier

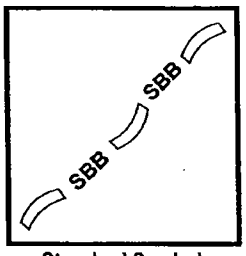
SC-8



Straw Bale Barrier

SC-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across minor swales or ditches with small catchments.
- Around above grade type temporary concrete washouts (See BMP WM-8, "Concrete Waste Management").
- Parallel to a roadway to keep sediment off paved areas.

Limitations

- Installation can be labor intensive.
- Straw bale barriers are maintenance intensive.
- Degraded straw bales may fall apart when removed or left in place for extended periods.
- Can't be used on paved surfaces.
- Not to be used for drain inlet protection.
- Shall not be used in areas of concentrated flow.
- Can be an attractive food source for some animals.
- May introduce undesirable non-native plants to the area.

Standards and Specifications

Materials

- ***Straw Bale Material:*** Straw bale materials shall conform to the provisions in Standard Specifications Section 20-2.06, "Straw."
- Straw Bale Size: Each straw bale shall be a minimum of 360 mm (14 in) wide, 450 mm (18 in) in height, 900 mm (36 in) in length and shall have a minimum mass of 23 kg (51 lb.) The straw bale shall be composed entirely of vegetative matter, except for the binding material.
- Bale Bindings: Bales shall be bound by either steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding shall not be used. Baling wire shall be a minimum diameter of 1.57 mm (0.06 inch). Nylon or polypropylene string shall be approximately 2 mm (0.08 inch) in diameter with a breaking strength of 360 N.
- Stakes: Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement shall be equal to a number four designation or greater. End protection shall be provided for any exposed bar reinforcement.

Installation

- Limit the drainage area upstream of the barrier to 0.3 ha/100 m (0.25 ac/100ft) or barrier.
- Limit the slope length draining to the straw bale barrier to 30 m (100 ft.)

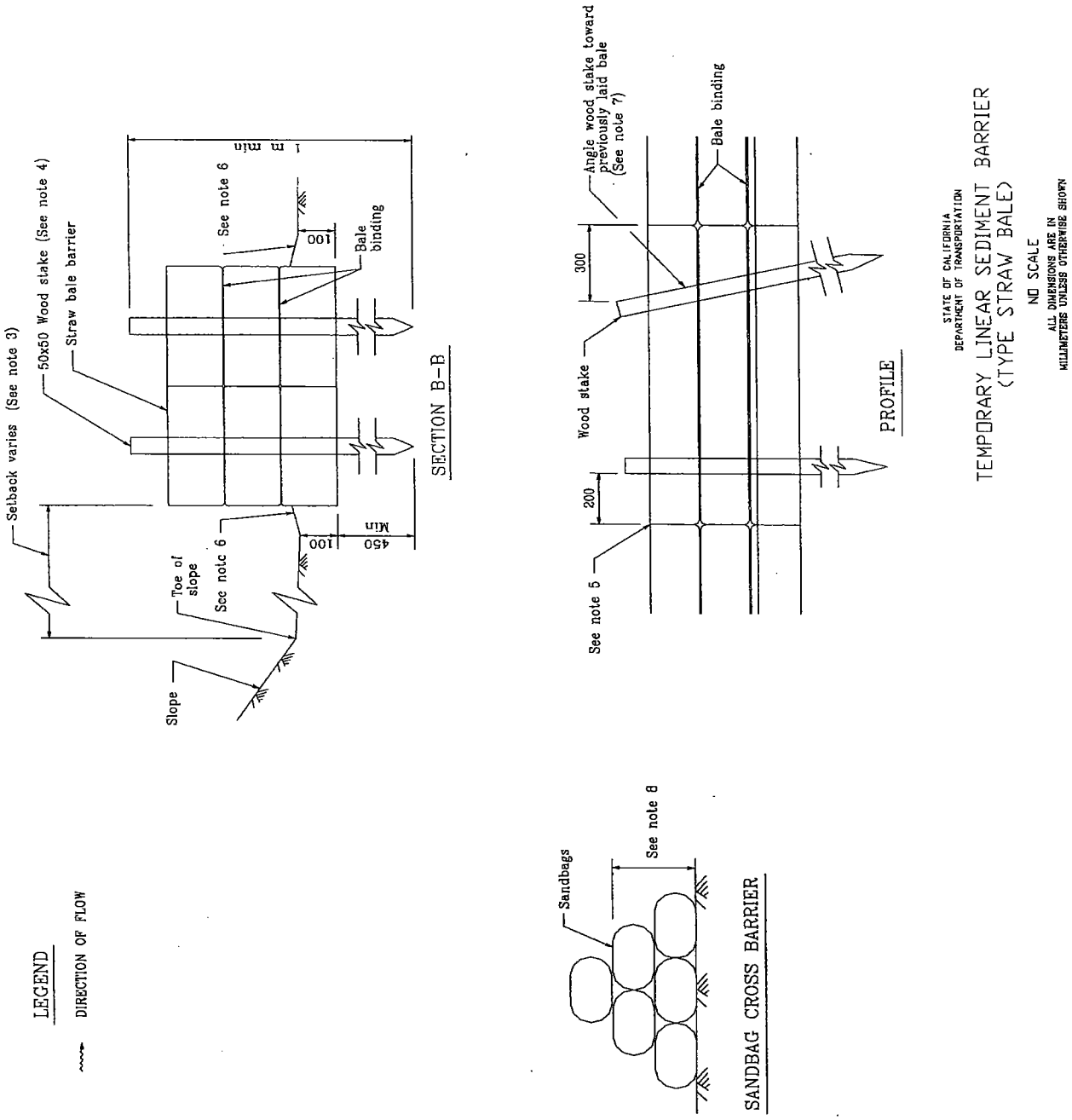
- Slopes of 2:100 (V:H) (2%) or flatter are preferred. If the slope exceeds 1:10 (V:H) (10%), the length of slope upstream of the barrier must be less than 15 m (50 ft).
- Install straw bale barriers along a level contour, with the last straw bale turned up slope.
- Straw bales must be installed in a trench and tightly abut adjacent bales.
- Construct straw bale barriers with a set-back of at least 1 m (3 ft) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the straw bale barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical.
- See pages 4 and 5 of this BMP for installation detail.

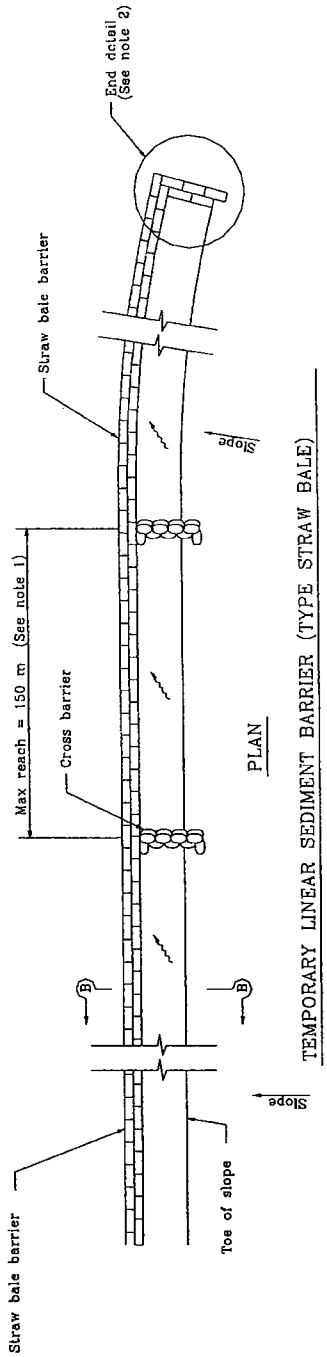
Maintenance and Inspection

- Inspect straw bale barriers before and after each rainfall event, and weekly throughout the rainy season.
- Inspect straw bale barriers for sediment accumulations and remove sediment when depth reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Replace or repair damage bales as needed or as directed by the RE.
- Repair washouts or other damages as needed or as directed by the RE.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

Straw Bale Barrier

SC-9





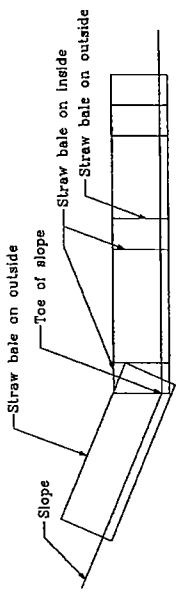
PLAN

TEMPORARY LINEAR SEDIMENT BARRIER (TYPE STRAW BALE)

Caltrans Metric

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 150 m.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers shall be offset to eliminate gaps.



END DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

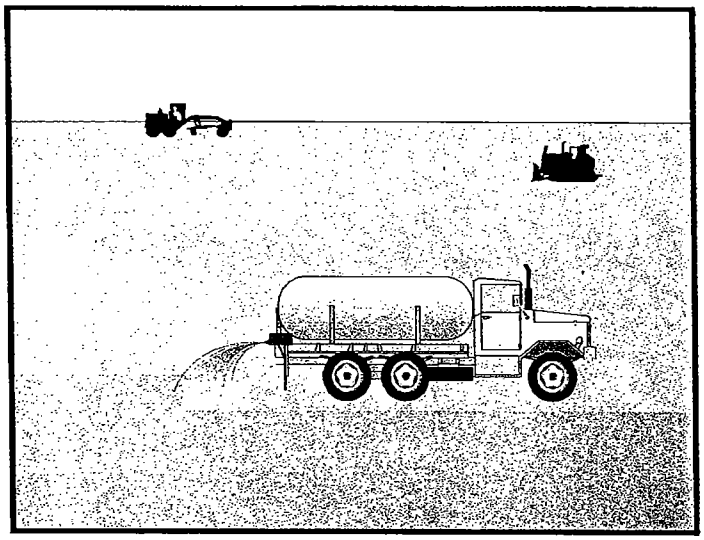
TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE STRAW BALE)

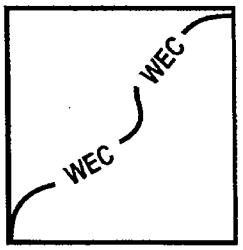
NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

Wind Erosion Control

WE-1





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control shall be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives.

Appropriate Applications

- This practice is implemented on all exposed soils subject to wind erosion.

Limitations

- Effectiveness depends on soil, temperature, humidity and wind velocity.

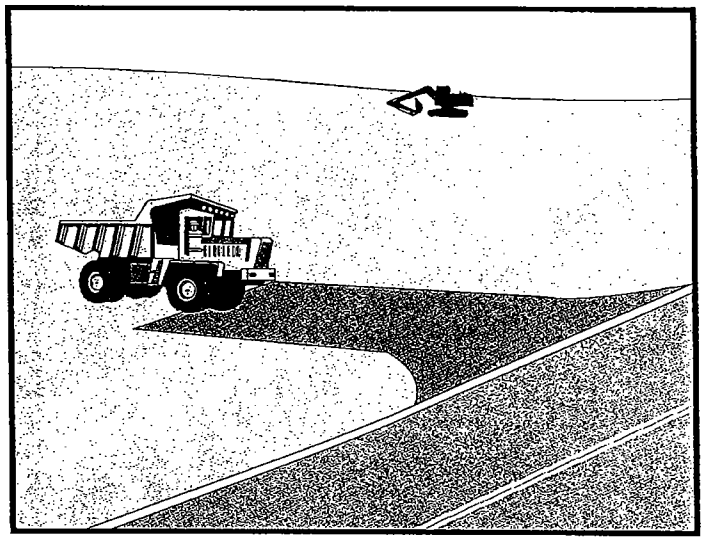
Standards and Specifications

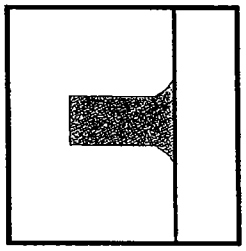
- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment shall be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
- If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked "NON-POTABLE WATER - DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders will also provide wind erosion control benefits.

Maintenance and Inspection

- Check areas that have been protected to ensure coverage.

Stabilized Construction Entrance/Exit TC-1





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ● Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Appropriate Applications

- Use at construction sites:
  - Where dirt or mud can be tracked onto public roads.
  - Adjacent to water bodies.
  - Where poor soils are encountered.
  - Where dust is a problem during dry weather conditions.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Site conditions will dictate design and need.

Standards and Specifications

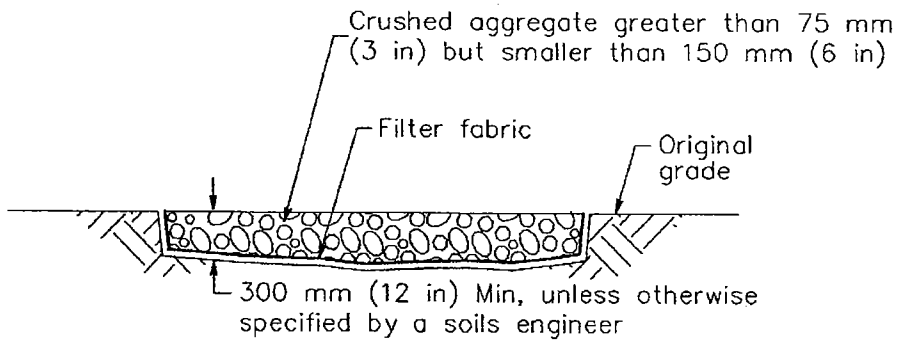
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment-trapping device before discharge.
- Design stabilized entrance/exit to support the heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
- Use of constructed/manufactured steel plates with ribs for entrance/exit access is allowed with written approval from the RE.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed and as required.
- Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.
- All exit locations intended to be used continuously and for a period of time shall have stabilized construction entrance/exit BMPs (TC-1 "Stabilized Construction Entrance/Exit" or TC-3 "Entrance/Outlet Tire Wash").

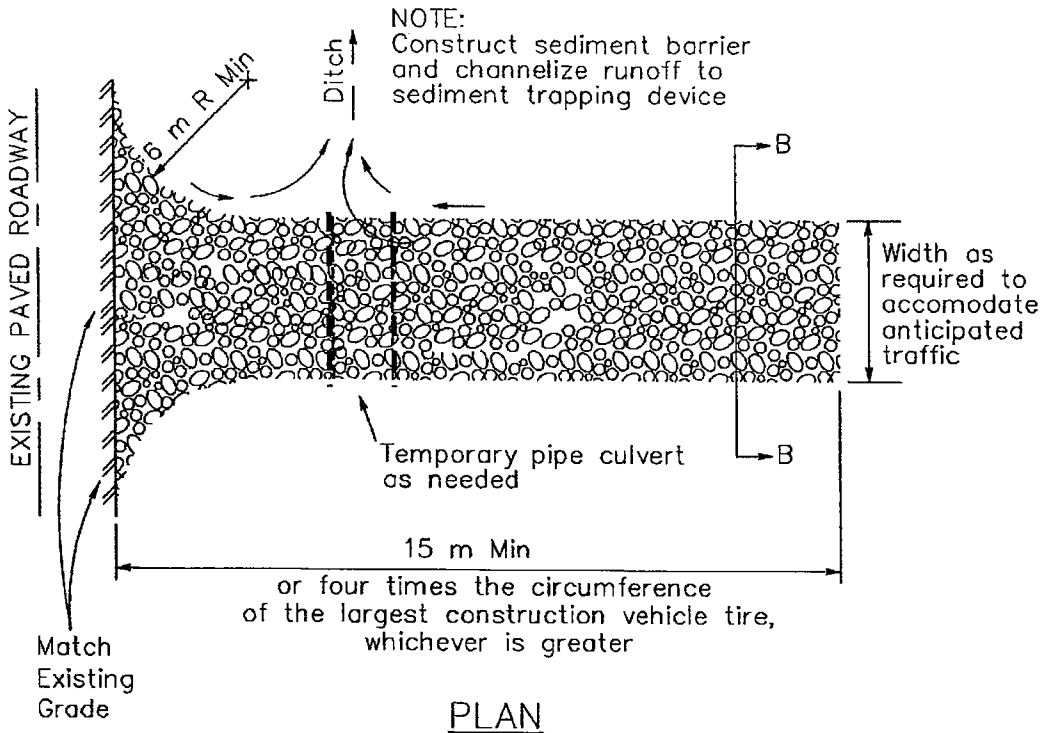
Maintenance and Inspection

- Inspect routinely for damage and assess effectiveness of the BMP. Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment or as directed by the RE.
- Keep all temporary roadway ditches clear.
- Inspect for damage and repair as needed.

Stabilized Construction Entrance/Exit TC-1



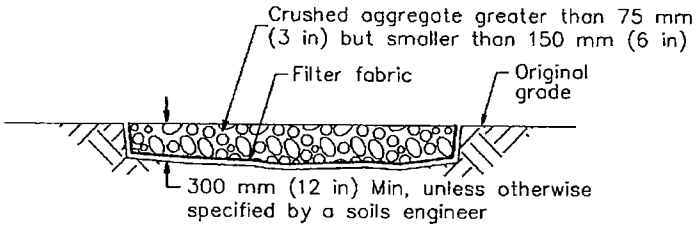
SECTION B–B
NTS



PLAN
NTS

Stabilized Contraction Entrance/Exit (Type 1)

Stabilized Construction Entrance/Exit TC-1



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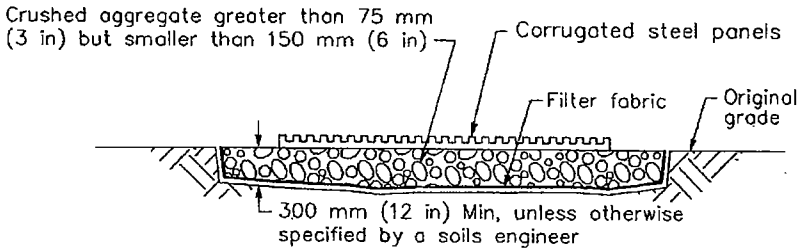

SECTION A–A
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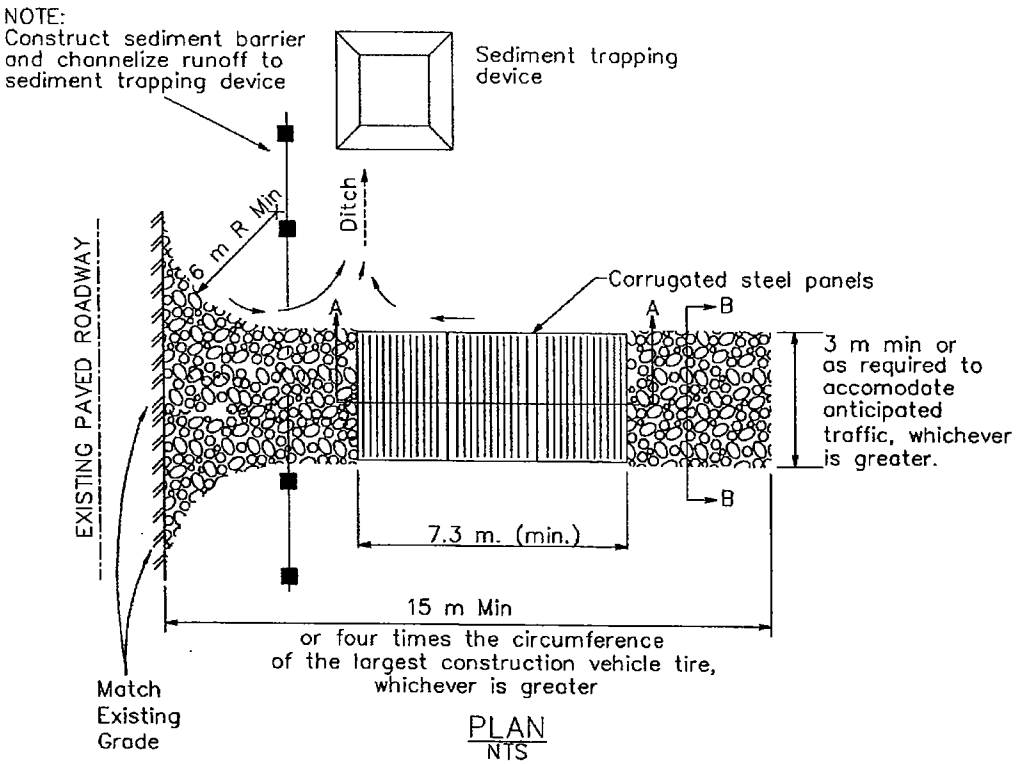
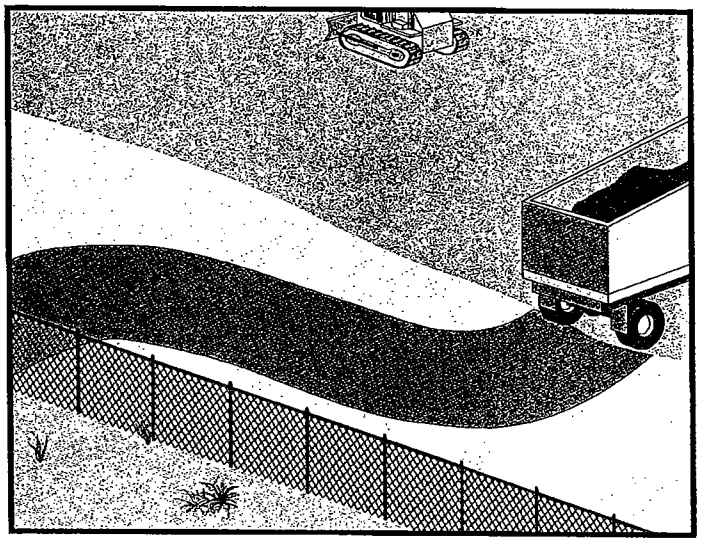


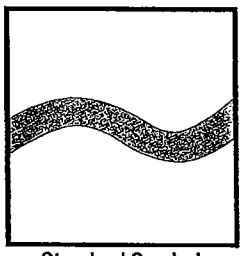
PLAN
NTS

Stabilized Construction Entrance/Exit (Type 2)

Stabilized Construction Roadway

TC-2





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ● Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A stabilized construction roadway is a temporary access road. It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

- Construction roadways and short-term detour roads:
  - Where mud tracking is a problem during wet weather.
  - Where dust is a problem during dry weather.
  - Adjacent to water bodies.
  - Where poor soils are encountered.
  - Where there are steep grades and additional traction is needed.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Materials will likely need to be removed prior to final project grading and stabilization.
- Site conditions will dictate design and need.
- May not be applicable to very short duration projects.
- Limit speed of vehicles to control dust.

Stabilized Construction Roadway

TC-2

Standards and Specifications

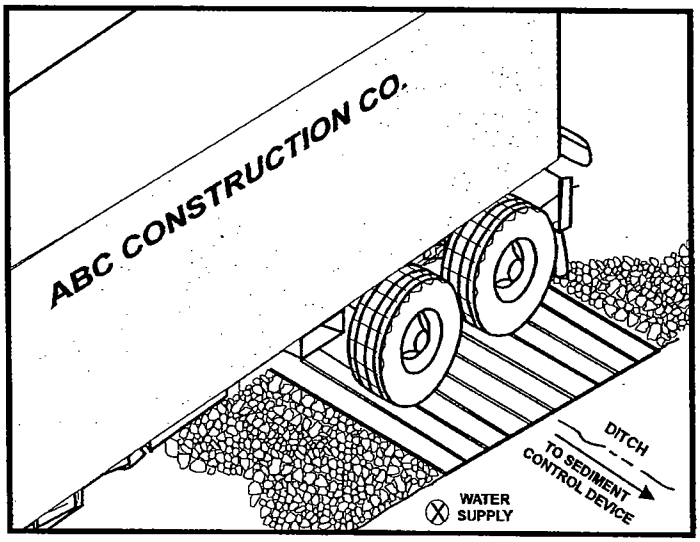
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support the heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE or Construction Storm Water Coordinator. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.

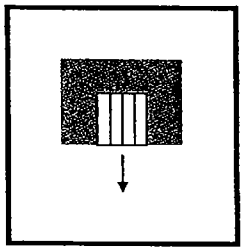
Maintenance and Inspection

- Inspect routinely for damage and repair as needed, or as directed by the RE.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.

Entrance/Outlet Tire Wash

TC-3





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ● Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages, and to prevent sediment from being transported onto public roadways.

Appropriate Applications

- Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Requires a supply of wash water.
- Requires a turnout or doublewide exit to avoid having entering vehicles drive through the wash area.

Standards and Specifications

- Incorporate with a stabilized construction entrance/exit. See BMP TC-1, "Stabilized Construction Entrance/Exit."
- Construct on level ground when possible, on a pad of coarse aggregate, greater than 75 mm (3 inches) and smaller than 150 mm (6 inches). A geotextile fabric shall be placed below the aggregate.
- Wash rack shall be designed and constructed/manufactured for anticipated traffic loads.
- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch shall be of sufficient grade, width, and depth to carry the wash runoff.

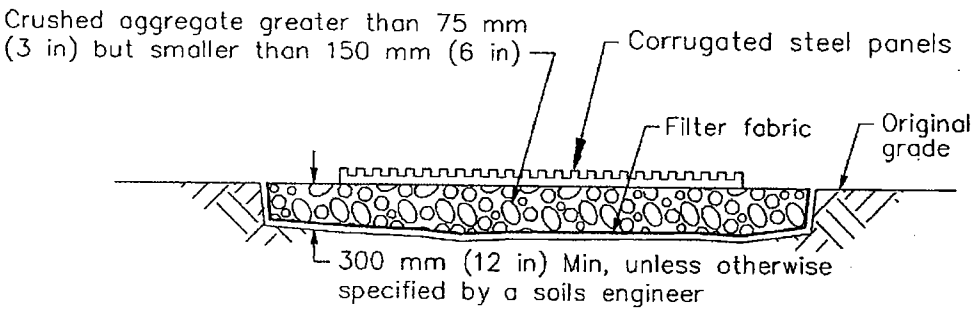
- Require all employees, subcontractors, and others that leave the site with mud-caked tires and/or undercarriages to use the wash facility.
- Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed.
- Use of constructed or prefabricated steel plate with ribs for entrance/exit access is allowed with written approval of RE.

Maintenance and Inspection

- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

Entrance/Outlet Tire Wash

TC-3



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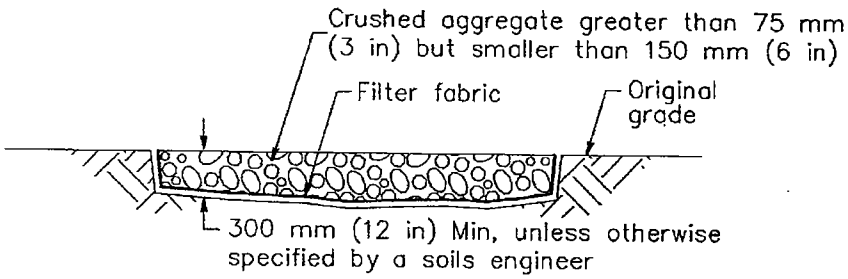

SECTION B–B
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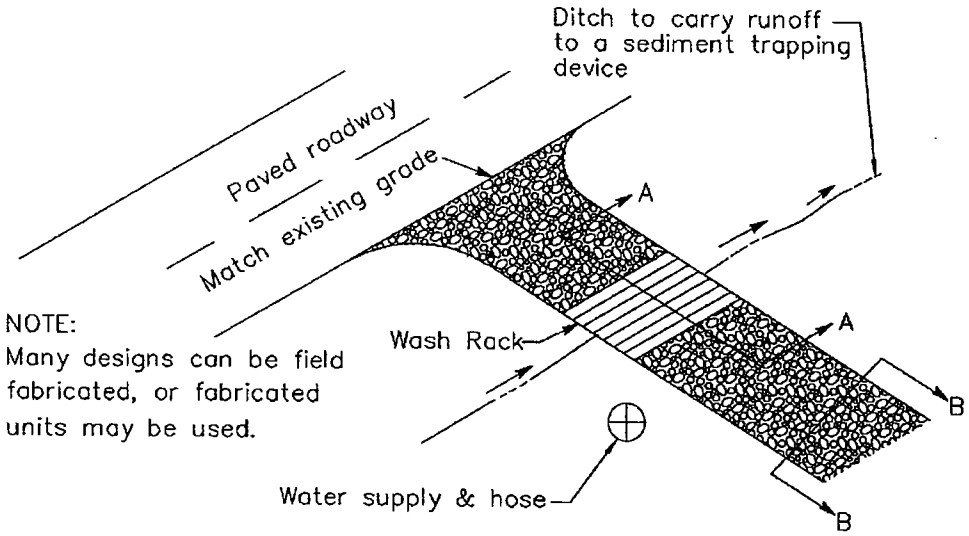
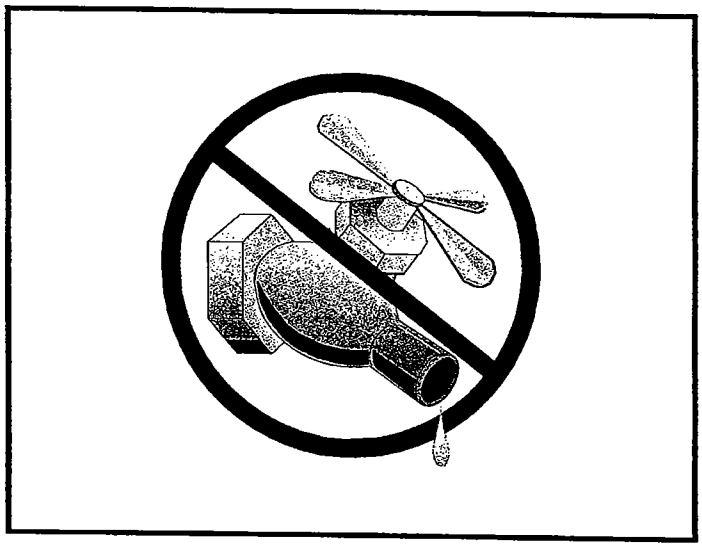


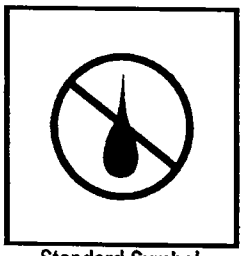
NOTE:
Many designs can be field fabricated, or fabricated units may be used.

TYPICAL TIRE WASH
NOT TO SCALE

Water Conservation Practices

NS-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and/or the transport of pollutants off site.

Appropriate Applications

- Water conservation practices are implemented on all construction sites and wherever water is used.
- Applies to all construction projects.

Limitations

- None identified.

Standards and Specifications

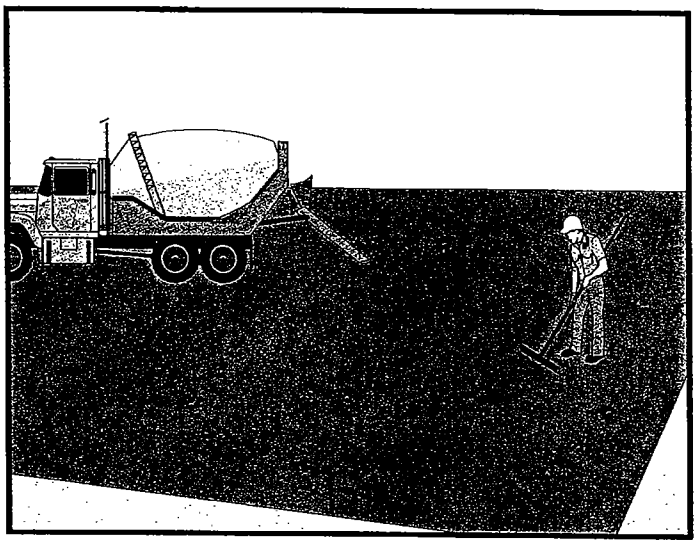
- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Vehicles and equipment washing on the construction site is discouraged.
- Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept and vacuumed.
- Direct construction water runoff to areas where it can infiltrate into the ground.
- Apply water for dust control in accordance with the Standard Specifications Section 10, and WE-1, "Wind Erosion Control."
- Report discharges to RE immediately.

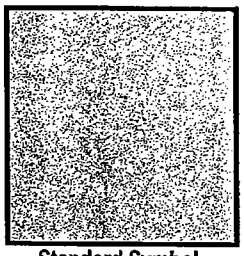
Maintenance and Inspection

- Inspect water equipment at least weekly.
- Repair water equipment as needed.

Paving and Grinding Operations

NS-3





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices for conducting paving, saw cutting, and grinding operations to minimize the transport of pollutants to the storm drain system or receiving water body.

Appropriate Applications

These procedures are implemented where paving, surfacing, resurfacing, grinding or sawcutting, may pollute storm water runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Standards and Specifications

- Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap and shall be non-foaming and non-toxic.
- Place plastic materials under asphaltic concrete (AC) paving equipment while not in use, to catch and/or contain drips and leaks. See also BMP WM-4, "Spill Prevention and Control."
- When paving involves AC, the following steps shall be implemented to prevent the discharge of uncompacted or loose AC, tack coats, equipment cleaners, or other paving materials:
  - Minimize sand and gravel from new asphalt from getting into storm drains, streets, and creeks by sweeping.
  - Old or spilled asphalt must be recycled or disposed as approved by the Resident Engineer (RE).

- AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drain or watercourses. Install silt fence until structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with Standard Specification 7-1.13.
- Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 0.3 m (1 ft) of material.
- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Use silt fence until installation is complete.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.
- Paving equipment parked onsite shall be parked over plastic to prevent soil contamination.
- Clean asphalt-coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP WM-5, "Solid Waste Management." Any cleaning onsite shall follow BMP NS-8, "Vehicle and Equipment Cleaning."
- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile, or dispose of properly.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in BMP WM-8, "Concrete Waste Management," or dispose in accordance with Standard Specifications Section 7-1.13.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses.

Pavement Grinding or Removal

- Residue from PCC grinding operations shall be picked up by means of a vacuum attachment to the grinding machine, shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP WM-8, "Concrete Waste Management;" and BMP WM-10, "Liquid Waste Management," and Standard Specifications Section 42-2

"Grindings."

- Collect pavement digout material by mechanical or manual methods. This material may be recycled if approved by the RE for use as shoulder backing or base material at locations approved by the RE.
- If digout material cannot be recycled, transport the material back to a maintenance facility or approved storage site.
- Digout activities shall not be conducted in the rain.
- When approved by the RE, stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses and stored consistent with BMP WM-3, "Stockpile Management."
- Disposal or use of AC grindings shall be approved by the RE. See also BMP WM-8, "Concrete Waste Management."

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the storm water drainage system, or watercourses.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Contractor shall not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with Standard Specification 7-1.13.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the storm water drainage system or watercourses.
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large scale projects, use mechanical or manual methods to collect excess

bituminous material from the roadway after removal of markers.

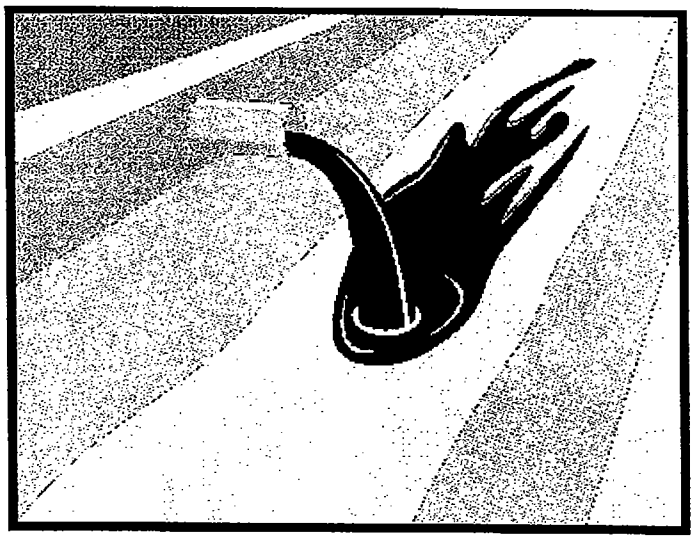
- Waste shall be disposed of in accordance with Standard Specification 7-1.13.

Maintenance and Inspection

- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents to the Resident Engineer (RE).

Appropriate Applications

- Illicit connection/illegal discharge detection and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.
- This best management practice (BMP) applies to all construction projects.

Limitations

- Unlabeled or non-identifiable material shall be assumed to be hazardous.
- Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the RE when illicit connections or illegal dumping or discharges are discovered, and take no further action unless directed by the RE.
- If pre-existing hazardous materials or wastes are known to exist onsite, the contractor's responsibility will be detailed in separate special provisions.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6

Standards and Specifications

Planning

- Inspect site before beginning the job for evidence of illicit connections or illegal dumping or discharges.
- Inspect site regularly during project execution for evidence of illicit connections or illegal dumping or discharges.
- Observe site perimeter for evidence or potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of illicit connections and illegal dumping or discharges.

- Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- Liquids – signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Abnormal water flow during the dry weather season.
- Urban Areas - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season.
  - Unusual flows in subdrain systems used for dewatering.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.

- Rural Areas - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the dry weather season.
  - Non-standard junction structures.
  - Broken concrete or other disturbances at or near junction structures.

Reporting

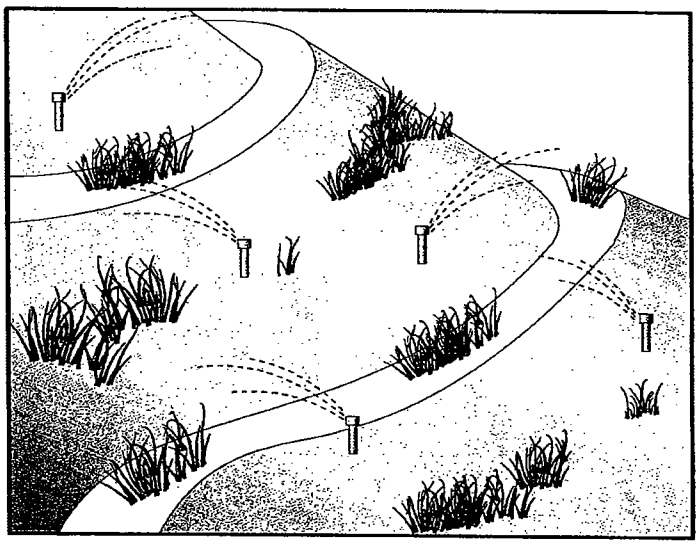
- Notify the RE of any illicit connections and illegal dumping or discharge incidents at the time of discovery. The RE will notify the District Construction Storm Water Coordinator and the Construction Hazmat Coordinator for reporting.

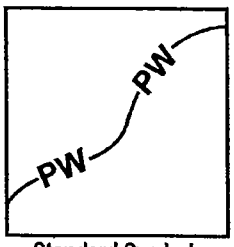
Cleanup and Removal

The contractor is not responsible for investigation and clean up of illicit or illegal dumping or discharges not generated by the contractor. Caltrans may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.

Potable Water/Irrigation

NS-7





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Potable Water/Irrigation management consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Appropriate Applications

Implement this BMP whenever the above activities or discharges occur at or enter a construction site.

Limitations

- None identified.

Standards and Specifications

- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.
- RE approval is required prior to commencing any washing activities that could discharge to the storm drain or receiving waterbody.
- Where possible, direct water from off-site sources around or through a construction site in a way that minimizes contact with the construction site.
- When possible, discharges from water line flushing shall be reused for landscaping purposes.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.

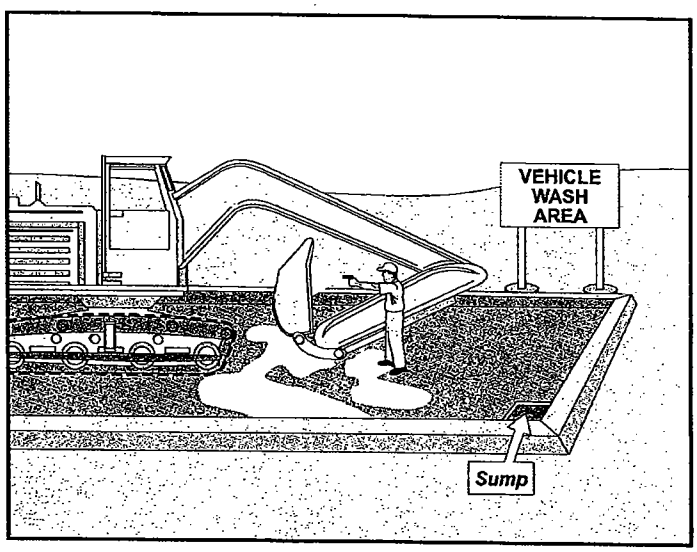
- Protect downstream storm water drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

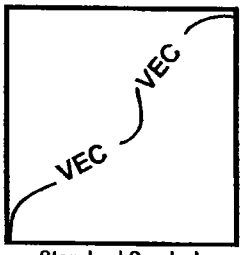
Maintenance and Inspection

- Repair broken water lines as soon as possible or as directed by the RE.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

Vehicle and Equipment Cleaning

NS-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Vehicle and equipment cleaning procedures and practices are used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain system or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Limitations

- None.

Standards and Specifications

- On-site vehicle and equipment washing is discouraged.
- Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project site unless the Resident Engineer (RE) has been notified in advance and the resulting wastes are fully contained and disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 7-1.13. Resulting wastes and by-products shall not be discharged or buried within the highway right-of-way, and must be captured and recycled or disposed according to the requirements of WM-10, "Liquid Waste Management" or WM-6, "Hazardous Waste Management," depending on the waste characteristics. Minimize use of solvents. The use of diesel for vehicle and equipment cleaning is prohibited.
- Vehicle and equipment wash water shall be contained for percolation or evaporative drying away from storm drain inlets or watercourses and shall not be discharged within the highway right-of-way. Apply sediment control BMPs if applicable.
- All vehicles/equipment that regularly enter and leave the construction site must be cleaned off-site.
- When vehicle/equipment washing/cleaning must occur onsite, and the

operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the following characteristics, and shall be arranged with the construction storm water coordinator:

- Located away from storm drain inlets, drainage facilities, or watercourses.
- Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff.
- Configured with a sump to allow collection and disposal of wash water.
- Wash waters shall not be discharged to storm drains or watercourses.
- Used only when necessary.

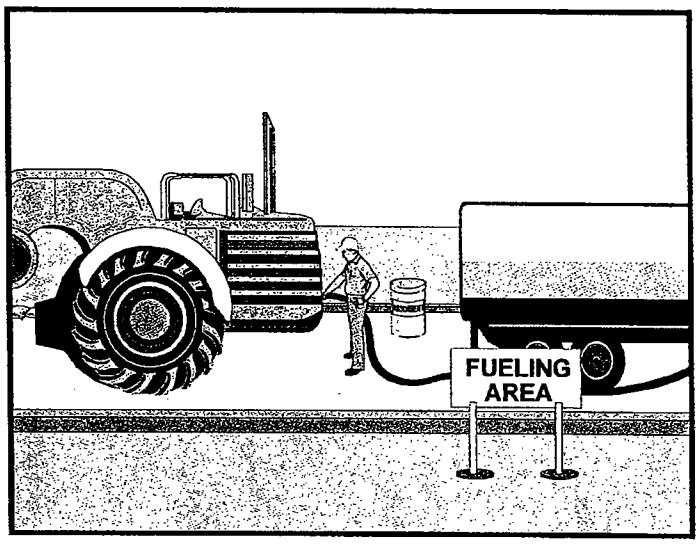
- When cleaning vehicles/equipment with water:
  - Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
  - Use positive shutoff valve to minimize water usage.
  - Facility wash racks shall discharge to a sanitary sewer, recycle system or other approved discharge system and shall not discharge to the storm drainage system or watercourses.

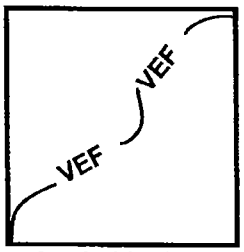
Maintenance and Inspection

- The control measure shall be inspected at a minimum of once a week.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed or as directed by the RE.

Vehicle and Equipment Fueling

NS-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks into storm drain systems or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

- Onsite vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

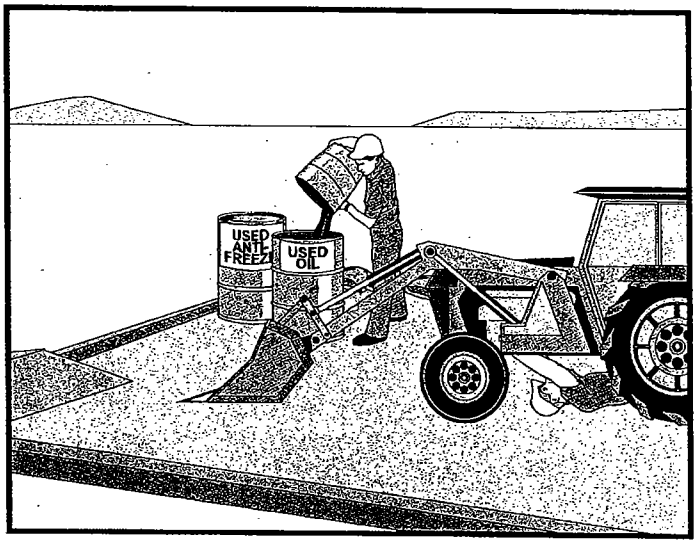
- When fueling must occur onsite, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer (RE).
- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m (50 ft) from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.
- Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.

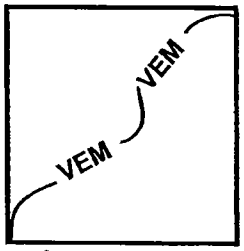
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD). Ensure the nozzle is secured upright when not in use.
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available in fueling and maintenance areas and used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks. Refer to WM-1, "Material Delivery and Storage."
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected regularly.
- Keep an ample supply of spill cleanup material on the site.
- Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.

Vehicle and Equipment Maintenance NS-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment maintenance procedures.

Appropriate Applications

These procedures are applied on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

- None identified.

Standards and Specifications

- Drip pans or absorbent pads shall be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- All maintenance areas are required to have spill kits and/or use other spill protection devices.
- Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m (50 ft) from downstream drainage facilities and watercourses.
- Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt-spreading equipment shall be non-toxic.
- Use off-site maintenance facilities whenever practical.

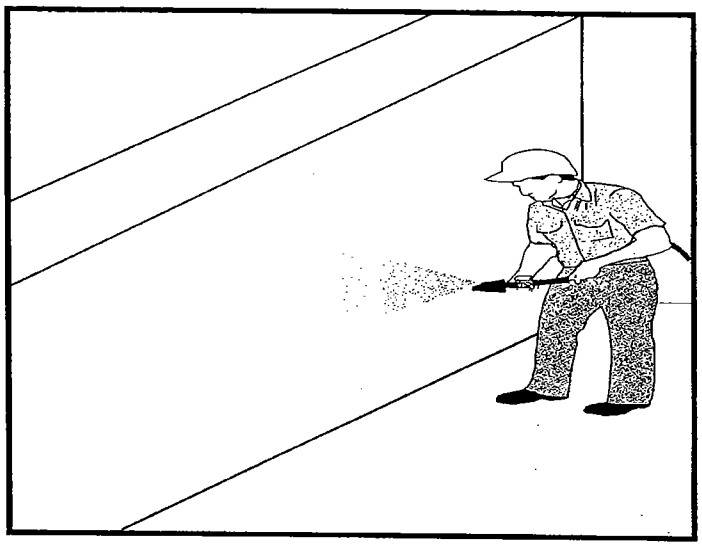
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose or recycle used batteries.
- Do not bury used tires.
- Repair of fluid and oil leaks immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums.

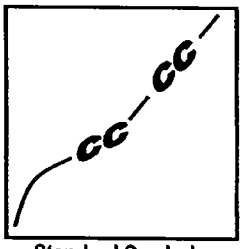
Maintenance and Inspection

- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas shall be inspected regularly.
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

Concrete Curing

NS-12





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, and pump houses. Concrete curing includes the use of both chemical and water methods. Proper procedures minimize pollution of runoff during concrete curing.

Appropriate Applications

All concrete elements of a structure (e.g., footings, columns, abutments, stems, soffit, deck) are subject to curing requirements.

Limitations

- None identified.

Standards and Specifications

Chemical Curing

- Avoid over-spray of curing compounds.
- Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to BMP WM-1, "Material Delivery and Storage."
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, "Spill Prevention and Control."

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for removal as approved by the RE and in accordance with all applicable permits.

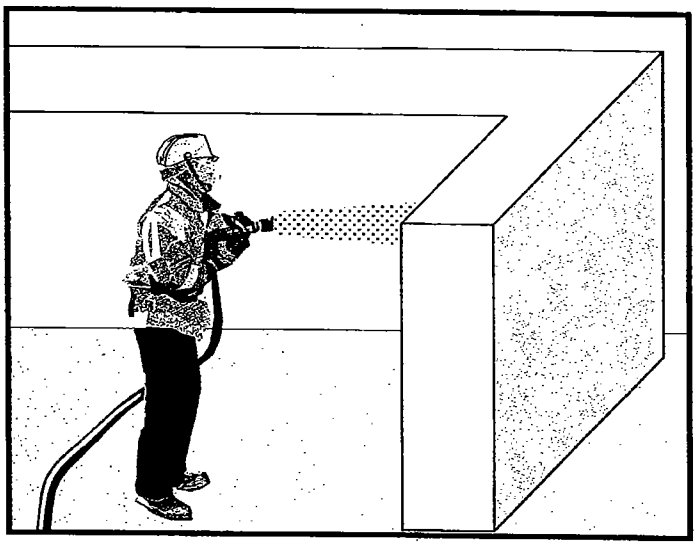
- Collect cure water and transport or dispose of water in a non-erodible manner. See BMPs SS-9, "Earth Dikes/Drainage Swales & Lined Ditches," SS-10, "Outlet Protection/Velocity Dissipation Devices," and SS-11, "Slope Drains."
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

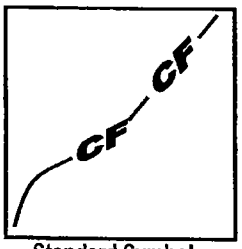
Maintenance and Inspection

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect any temporary diversion devices, lined channels, or swales for washouts, erosion, or debris. Replace lining and remove debris as necessary.
- Inspect cure containers and spraying equipment for leaks.

Concrete Finishing

NS-14





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
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- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Proper procedures minimize the impact that concrete finishing methods may have on runoff.

Appropriate Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Limitations

- Specific permit requirements may be included in the contract documents for certain concrete finishing operations.

Standards and Specifications

- Follow containment requirements stated in the project special provisions, if any.
- Collect and properly dispose of water and solid waste from high-pressure water blasting operations.
- Collect water from blasting operations and transport or dispose of water in a non-erodible manner. Refer to BMPs SS-9, "Earth Dikes/Drainage Swales & Lined Ditches," SS-10, "Outlet Protection/Velocity Dissipation Devices," and SS-11, "Slope Drains."
- Direct water from blasting operations away from inlets and watercourses to collection areas for removal (e.g., dewatering) as approved in advance by the RE and in accordance with applicable permits.
- Protect inlets during sandblasting operations. Refer to BMP SC-10, "Storm Drain Inlet Protection."

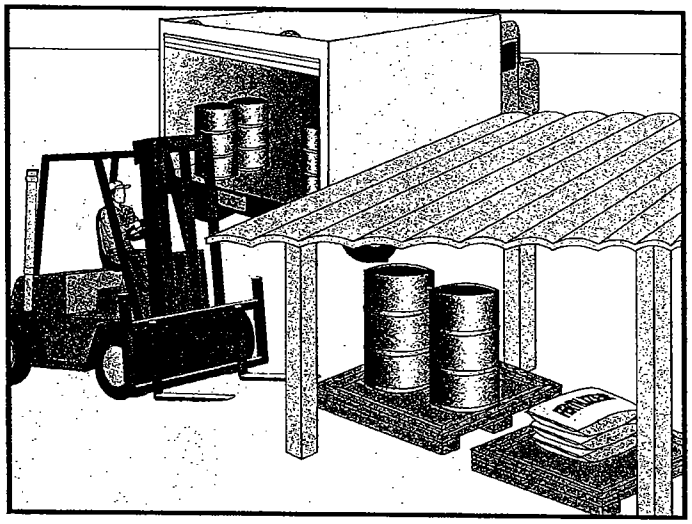
- Refer to BMP WM-8, "Concrete Waste Management."
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to BMP WM-6, "Hazardous Waste Management."

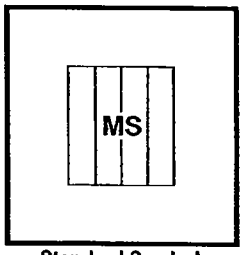
Maintenance and Inspection

- Follow inspection procedure as required in the project special provisions.
- At a minimum, inspect containment structures, if any, for damage or voids prior to use each day and prior to the onset of rain.
- At the end of each work shift, remove and contain the liquid and solid wastes from containment structures, if any, and from the general work area.
- Discharges to waterways shall be reported to RE immediately upon discovery. A written discharge notification must follow within 7 days or as required by special provisions.

Material Delivery and Storage

WM-1





Standard Symbol

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Definition and Purpose

Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications

These procedures are implemented at all construction sites with delivery and storage of the following:

- Hazardous chemicals such as:
  - Acids,
  - lime,
  - glues,
  - adhesives,
  - paints,
  - solvents, and
  - curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.

- Other materials that may be detrimental if released to the environment.

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds must meet building & fire code requirements.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials stored.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for storage.
- Throughout the rainy season, each temporary containment facility shall have a permanent cover and side wind protection or be covered during non-working days and prior to and during rain events.
- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.

-
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.
- Stockpiles shall be protected in accordance with BMP WM-3, "Stockpile Management."
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Also see BMP WM-6, "Hazardous Waste Management", for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

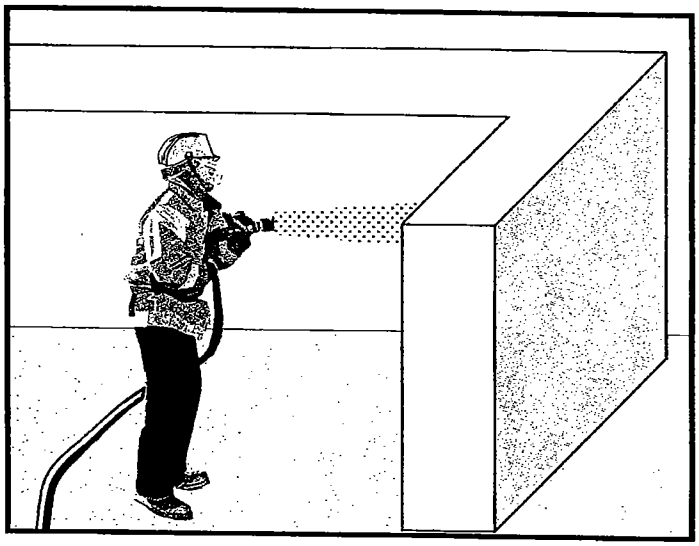
- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, "Spill Prevention and Control", for spills of chemicals and/or hazardous materials.

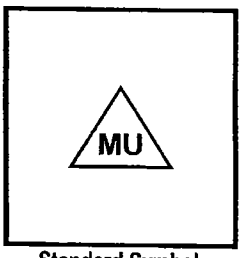
Maintenance and Inspection

- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Inspect storage areas before and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater.

Material Use

WM-2





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
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- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications

This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Hazardous chemicals such as:

  Acids,
  lime,
  glues,
  adhesives,
  paints,
  solvents, and
  curing compounds.

- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.
- Other materials that may be detrimental if released to the environment.

Material Use

WM-2

Limitations

- Safer alternative building and construction products may not be available or suitable in every instance.

Standards and Specifications

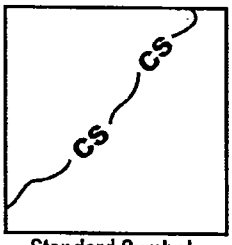
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- Application of herbicides and pesticides shall be performed by a licensed applicator.
- Contractors are required to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspections

- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Stockpile Management

WM-3



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt binder (so called "cold mix" asphalt) and pressure treated wood.

Appropriate Applications

Implemented in all projects that stockpile soil and other materials.

Limitations

- None identified

Standards and Specifications

- Protection of stockpiles is a year-round requirement.
- Locate stockpiles a minimum of 15 m (50 ft)away from concentrated flows of storm water, drainage courses, and inlets.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information see BMP WE-1, "Wind Erosion Control."
- Stockpiles of contaminated soil shall be managed in accordance with BMP WM-7, "Contaminated Soil Management."
- Bagged materials should be placed on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials shall be protected further as follows:

- ***Soil stockpiles:***
  - During the rainy seasons, soil stockpiles shall be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
  - During the non-rainy season, soil stockpiles shall be covered and protected with a temporary perimeter sediment barrier prior to the onset of precipitation.
- ***Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase:***
  - During the rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier at all times.
  - During the non-rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.
- ***Stockpiles of "cold mix":***
  - During the rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material at all times.
  - During the non-rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.
- ***Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate:***
  - During the rainy season, treated wood shall be covered with plastic or comparable material at all times.
  - During the non-rainy season, treated wood shall be covered with plastic or comparable material and shall be placed on pallets prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials shall be protected further as follows:

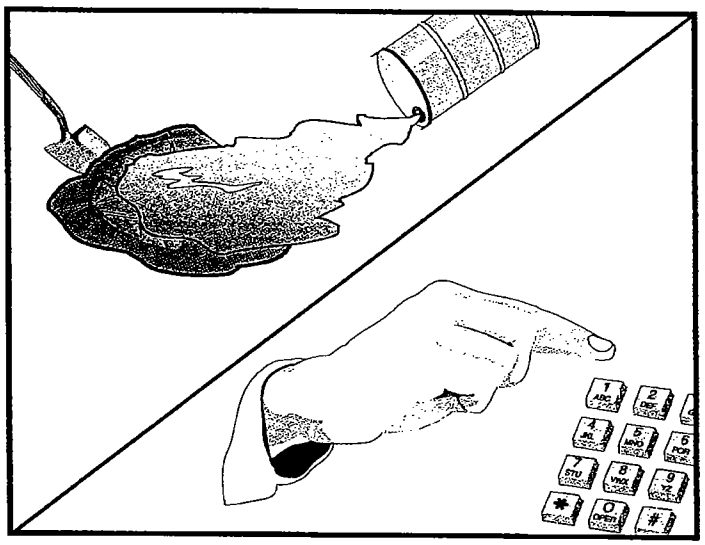
- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Maintenance and Inspections

- Repair and/or replace perimeter controls and covers as needed, or as directed by the RE, to keep them functioning properly. Sediment shall be removed when sediment accumulation reaches one-third (1/3) of the barrier height.

Spill Prevention and Control

WM-4



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These procedures and practices are implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Application

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders.
- Dust Palliatives.
- Herbicides.
- Growth inhibitors.
- Fertilizers.
- Deicing/anti-icing chemicals.
- Fuels.
- Lubricants.
- Other petroleum distillates.

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

Spill Prevention and Control

WM-4

Limitations

- This BMP only applies to spills caused by the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site.

Standards and Specifications

- To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.
- Spills shall not be buried or washed with water.
- Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with the special provisions.
- Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-10, "Liquid Waste Management."
- Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.
- Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.
- Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

- Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.

Cleanup and Storage Procedures

- Minor Spills
  - Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
  - Use absorbent materials on small spills rather than hosing down or burying the spill.
  - Remove the absorbent materials promptly and dispose of properly.
  - The practice commonly followed for a minor spill is:
    - Contain the spread of the spill.
    - Recover spilled materials.
    - Clean the contaminated area and/or properly dispose of contaminated materials.
- Semi-Significant Spills
  - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
  - Clean up spills immediately:
    - Notify the project foreman immediately. The foreman shall notify the Resident Engineer (RE).
    - Contain spread of the spill.
    - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
    - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
    - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

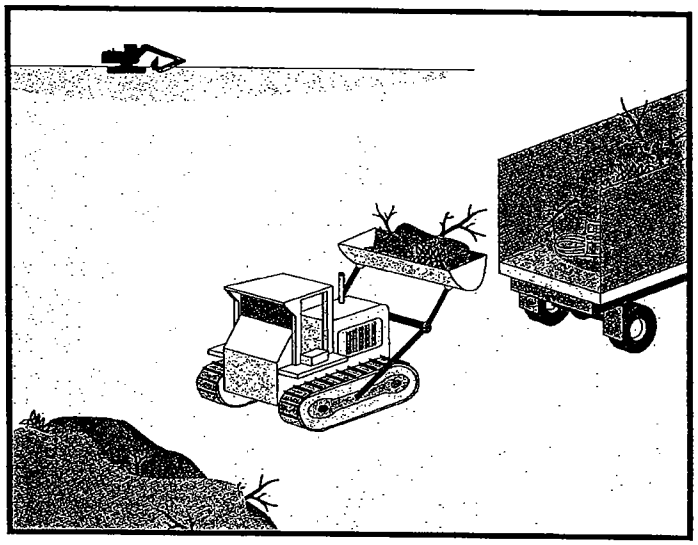
- Significant/Hazardous Spills
  - For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
    - Notify the RE immediately and follow up with a written report.
    - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
    - Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
    - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
    - Notification shall first be made by telephone and followed up with a written report.
    - The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff have arrived at the job site.
    - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, RWQCB, etc.

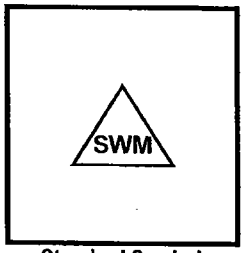
Maintenance and Inspection

- Verify weekly that spill control clean up materials are located near material storage, unloading, and use areas.
- Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored onsite.

Solid Waste Management

WM-5





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling, or removal of construction site wastes.

Appropriate Applications

Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations

- Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Standards and Specifications

Education

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and properly serviced.
- Littering on the project site shall be prohibited.
- To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 7-1.13.
- Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
- Construction debris and waste shall be removed from the site every two weeks or as directed by the RE.

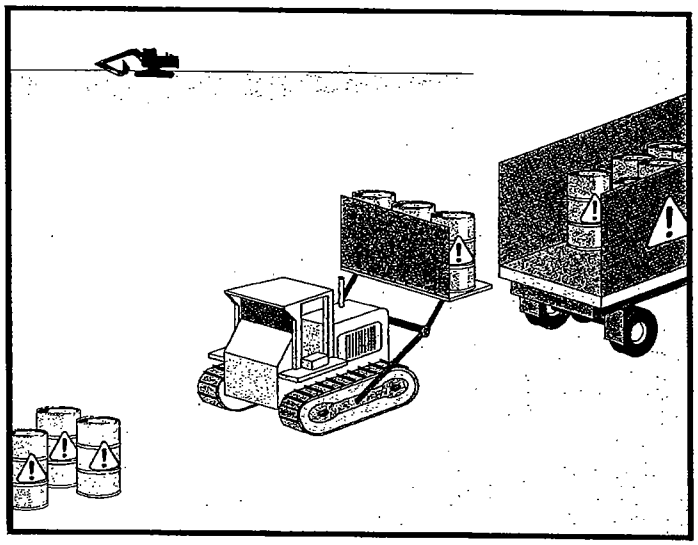
- Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the RE.
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas shall be located at least 15 m (50 ft) from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting or protected in conformance with the applicable Disturbed Soil Area protection section.
- Dumpster washout on the project site is not allowed.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Construction waste shall be stored in a designated area approved by the RE.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway Right of Way.
- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management." Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

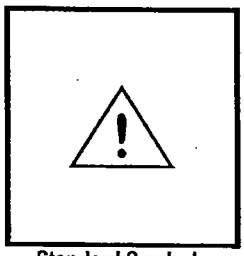
Maintenance and Inspection

- The WPCM shall monitor onsite solid waste storage and disposal procedures.
- Police site for litter and debris.

Hazardous Waste Management

WM-6





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain systems or to watercourses.

Appropriate Applications

- This best management practice (BMP) applies to all construction projects.
- Hazardous waste management practices are implemented on construction projects that generate waste from the use of:
  - Petroleum Products,
  - Asphalt Products,
  - Concrete Curing Compounds,
  - Pesticides,
  - Acids,
  - Paints,
  - Stains,
  - Solvents,
  - Wood Preservatives,
  - Roofing Tar, or
  - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

Limitations

- Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to BMP WM-7, "Contaminated Soil Management," and the project special provisions.

Standards and Specifications

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

- Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172,173, 178, and 179.
- All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
  - Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.

- Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.

- Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.

- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

- Throughout the rainy season, temporary containment facilities shall be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.

- Drums shall not be overfilled and wastes shall not be mixed.

- Unless watertight, containers of dry waste shall be stored on pallets.

- Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

- Ensure that adequate hazardous waste storage volume is available.

- Ensure that hazardous waste collection containers are conveniently located.

- Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

- Minimize production or generation of hazardous materials and hazardous waste on the job site.

- Use containment berms in fueling and maintenance areas and where the potential for spills is high.

- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.

Disposal Procedures

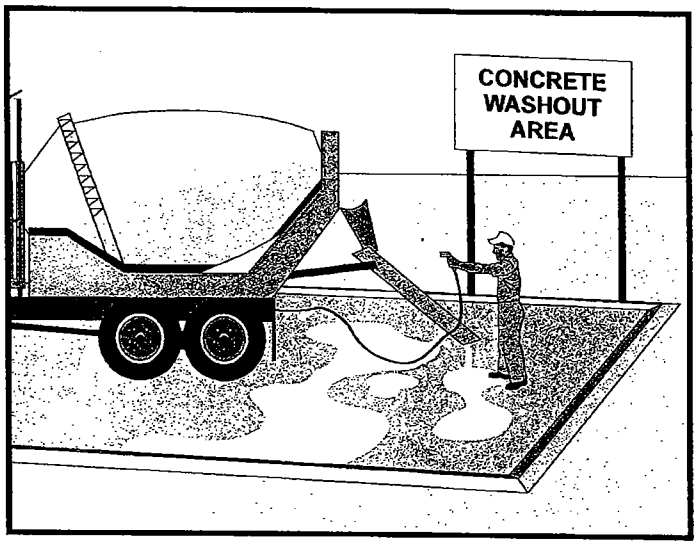
- Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE). In no case shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.
- Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services (DHS) certified laboratory shall sample waste and classify it to determine the appropriate disposal facility.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Recycle any useful material such as used oil or water-based paint when practical.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

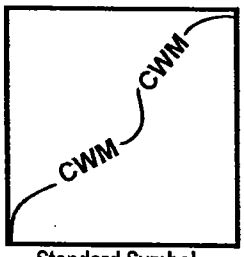
Maintenance and Inspection

- A foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.
- Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Storage areas shall be inspected in conformance with the provisions in the contract documents.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- Copy of the hazardous waste manifests shall be provided to the RE.

Concrete Waste Management

WM-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices that are designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems or watercourses.

Appropriate Applications

- Concrete waste management procedures and practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, "Vehicle and Equipment Cleaning."
- Where mortar-mixing stations exist.

Limitations

- None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce concrete waste management procedures.

Concrete Slurry Wastes

- PCC and AC waste shall not be allowed to enter storm drains or watercourses.

- PCC and AC waste shall be collected and properly disposed of outside the highway right-of-way in conformance with Standard Specifications Section 7-1.13 or placed in a temporary concrete washout facility as shown in the figures on Pages 5 and 6.

- Disposal of hardened PCC and AC waste shall be in conformance with Standard Specifications Section 15-3.02.

- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities as shown on Page 6.

- A foreman and/or construction supervisor shall monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.

- Do not allow saw-cut PCC slurry to enter storm drains or watercourses. See also BMP NS-3, "Paving and Grinding Operations;" and BMP WM-10, "Liquid Waste Management." Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine. Saw cutting residue shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement.

- Vacuum slurry residue and dispose in a temporary facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allow slurry to dry. Dispose of dry slurry residue in accordance with BMP WM-5, "Solid Waste Management", or, for on-site disposal, in accordance with Standard Specification 15-3.02, Removal Methods.

- Collect and dispose of residue from grooving and grinding operations in accordance with Standard Specifications Section 42-1.02 and 42-2.02.

Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures

- Temporary concrete washout facilities shall be located a minimum of 15 m (50 ft) from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.

- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be installed as shown on the plans and in conformance with the provisions in Standard Specifications Section 56-2, Roadside Signs.

- Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.

- Perform washout of concrete mixer trucks in designated areas only.

- Wash concrete only from mixer truck chutes into approved concrete washout facility. Washout may be collected in an impermeable bag for disposal.

- Pump excess concrete in concrete pump bin back into concrete mixer truck.

- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.

- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per BMP WM-5, "Solid Waste Management", and in conformance with the provisions in Standard Specifications Section 15-3.02, "Removal Methods."

Temporary Concrete Washout Facility Type "Above Grade"

- Temporary concrete washout facility Type "Above Grade" shall be constructed as shown on Page 5 or 6, with a recommended minimum length and minimum width of 3 m (10 ft), but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval from the RE.

- Straw bales, wood stakes, and sandbag materials shall conform to the provisions in BMP SC-9, "Straw Bale Barrier."

- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.

- Portable delineators shall conform to the provisions in Standard Specifications Section 12-3.04, "Portable Delineators.". The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement in Standard Specifications Section 85-1.06, "Placement." Portable delineators shall be applied only to a clean, dry surface.

Temporary Concrete Washout Facility (Type Below Grade)

- Temporary concrete washout facility Type "Below Grade" shall be constructed as shown on page 6, with a recommended minimum length and minimum width of 3m (10 ft). The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE. Lath and flagging shall be commercial type.

- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.

- The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 15-3.02. Disposal of PCC slurries or liquid waste shall be disposed of outside the highway right-of-way in conformance with provisions of Standard Specifications Section 7-1-13. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way in conformance with the provisions of the Standard Specifications, Section 7-1.13.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Standard Specifications Section 15-1.02, "Preservation of Property."

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site concrete waste storage and disposal procedures at least weekly or as directed by the RE.

- The WPCM shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving daily to ensure proper methods are employed or as directed by the RE.

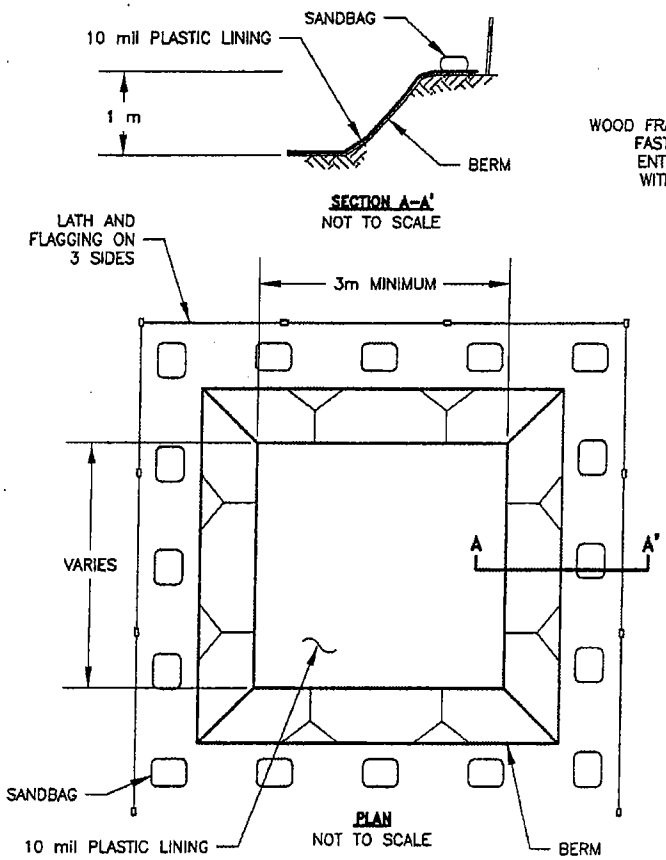
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 15-3.02, "Removal Methods."

- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

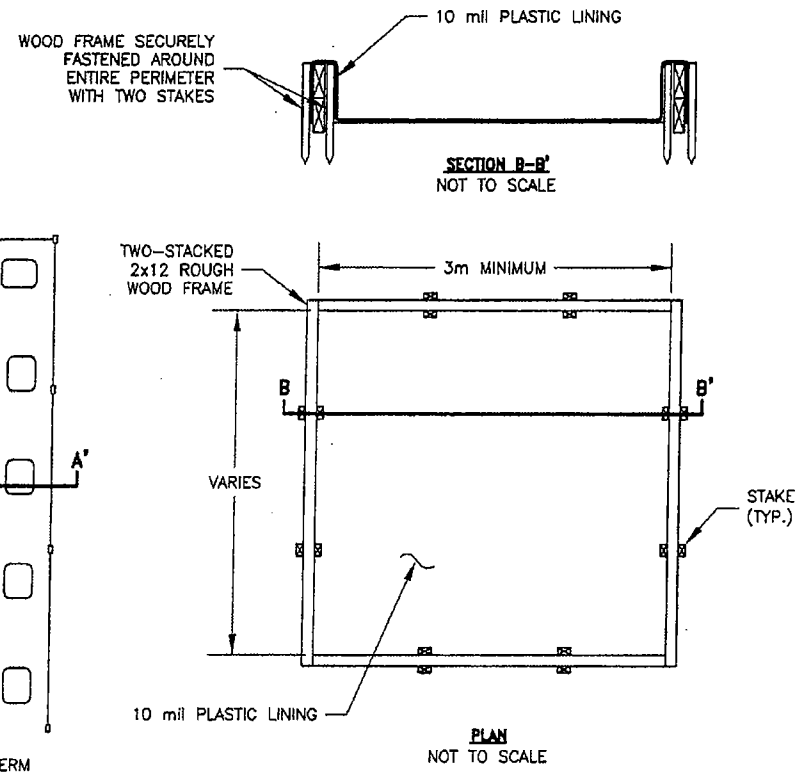
- Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.). Damaged facilities shall be repaired.

Concrete Waste Management

WM-8



TYPE "BELOW GRADE"



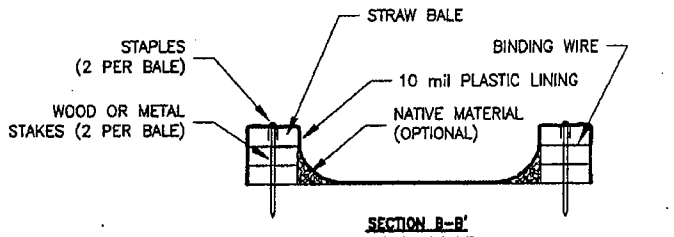
TYPE "ABOVE GRADE" WITH WOOD PLANKS

NOTES:

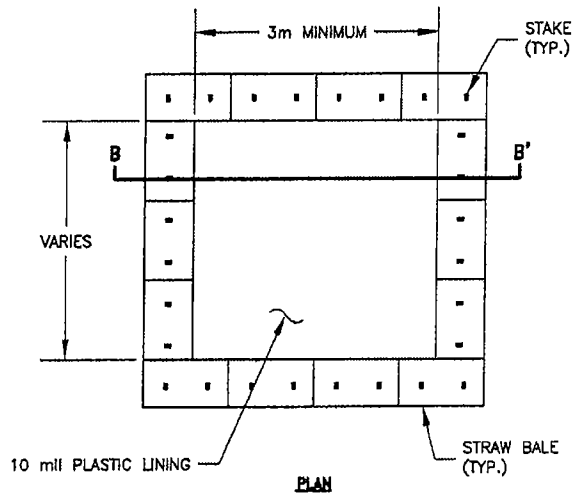
1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE PAGE 6) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Concrete Waste Management

WM-8

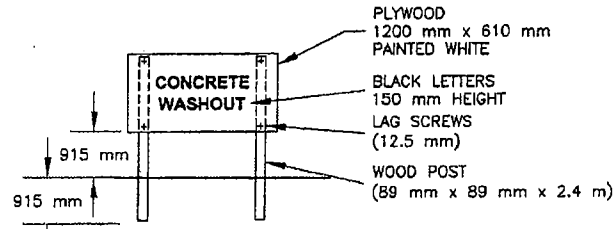


SECTION B–B'
NOT TO SCALE

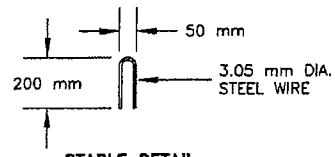


PLAN
NOT TO SCALE

TYPE "ABOVE GRADE"
WITH STRAW BALES



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)



STAPLE DETAIL

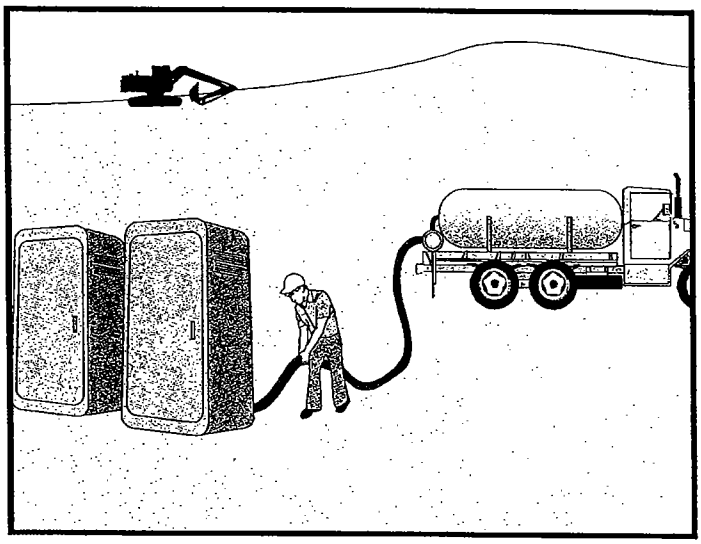
NOTES:

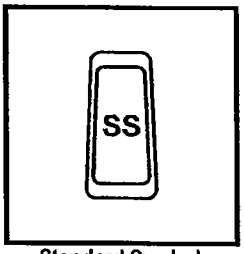
1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE FIG. 4–15) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

CALTRANS/FIG4–14.DWG SAC 8–14–02

Sanitary/Septic Waste Management

WM-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

Appropriate Applications

Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary/septic waste systems.

Limitations

- None identified.

Standards and Specifications

Education

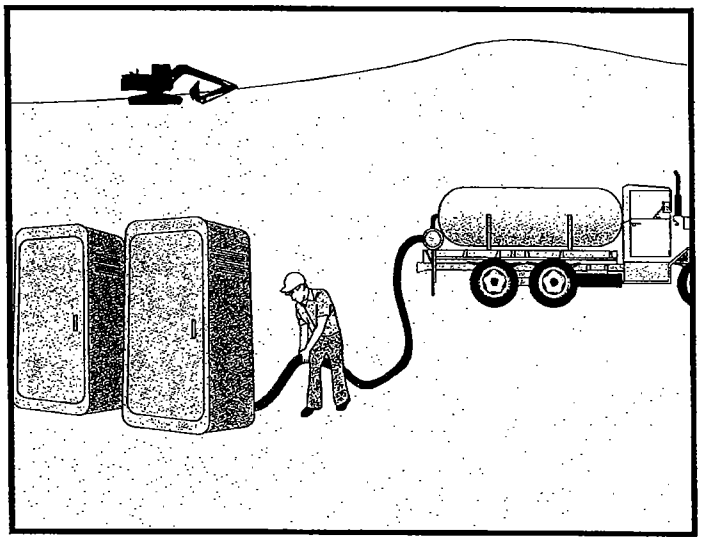
- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

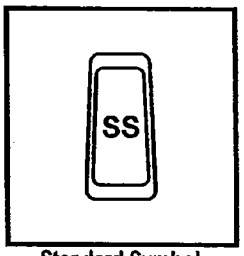
Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk.

Sanitary/Septic Waste Management

WM-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
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Limitations

- None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk.

- Wastewater shall not be discharged or buried within the highway right-of-way.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor onsite sanitary/septic waste storage and disposal procedures at least weekly.

Appendix 5.5-1

KINGS RIVER CONSERVATION DISTRICT
Kings River Conservation District Peaking Plant

Legal Description – Project Site

All of that portion of Lots 5, 12 and 21 of Malaga Tract, according to the map thereof recorded in Book 2, Page 17 of Plats, Fresno County Records, more particularly described as follow:

Commencing at the Northwest corner of said Lot 5; thence South 00º00'40" West a distance of 18.47 feet to a point on the South line of North Avenue as granted to the County of Fresno by deed recorded April 9, 1969 in Book 5676, Page 923, Official Records of Fresno County, and the True Point of Beginning of this description, said point being on a non-tangent curve concave to the North with a radius of 20.942.00 feet and a radial bearing of South 00º57'45" West; thence Easterly along said curve through an interior angle of 1º19'00" an arc distance of 481.20 feet; thence North 89º38'45" East a distance of 129.08 feet; thence leaving said South line of North Avenue, South 00º40'53" East a distance of 588.68 feet; thence South 85º55'22" East a distance of 201.80 feet to the Northwesterly line of that property granted to the Southern Pacific Company by deed recorded March 4, 1969 in Book 5667, Page 746, Official Records of Fresno County,; thence South 30º19'26" West a distance of 685.50 feet; thence North 59º40'34" West a distance of 5.00 feet to a point on a non-tangent curve concave to the Northwest with a radius of 367.25 feet and a radial bearing of South 59º40'34" East; thence Southwesterly along said curve through an interior angle 59º20'50" an arc distance of 380.40 feet; thence South 89º40'16" West a distance of 153.50 feet to a point on the West line of said Lot 21; thence North 00º00'40" East, along the West line of said Lots 21, 12 and 5, a distance of 1376.63 feet to the True Point of Beginning.

Containing 18.84 acres, more or less.

Appendix 5.5-2

Information To Build On

Engineering • Consulting • Testing

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

For the

TRUCK SHOP
2635 EAST NORTH AVENUE
FRESNO COUNTY, CALIFORNIA 93725

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

For the

TRUCK SHOP
2635 EAST NORTH AVENUE
FRESNO COUNTY, CALIFORNIA 93725

Prepared for

DUNAVANT ENTERPRISES, INC.
8225 NORTH FRESNO STREET
FRESNO, CALIFORNIA 93720

Prepared by

Professional Service Industries, Inc.
3960 Gilman Street
Long Beach, California 90815
Telephone (562) 597-3977

PSI PROJECT NO. 559-3E032

May 6, 2003

Christine Prado
Project Manager

Valerie Marshall
Senior Technical Professional

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APPENDIX F - CREDENTIALS

1. EXECUTIVE SUMMARY

Professional Service Industries, Inc. (PSI) has completed a Phase I Environmental Site Assessment (ESA) of the Truck Shop located at 2635 East North Avenue, in Fresno County, California 93725. The assessment was performed in general accordance with the scope and limitations of the American Society for Testing and Materials (ASTM) Standard E 1527-00, to comply with the contract between PSI and Dunavant Enterprises, Inc. dated November 1, 2002. Any exceptions to, or deletions from the ASTM E 1527-00 standard of practice are described in Section 2.4 of this report. In connection with the Phase I ESA, assessment of other environmental issues to evaluate business environmental risks that are beyond the scope of the ASTM E 1527-00 standard of practice was not conducted pursuant to the authorized scope of services.

The property consists of approximately 28 acres. The northeastern five acres of the property is developed with a truck shop facility. The facility is currently vacant. Improvements to this parcel include a truck maintenance building, and two storage warehouses, located on the northeastern five acres of the parcel. A concrete tank/drum containment is located to the south of the structures. Historical records indicate that the truck maintenance building was constructed in or around the late 1950s. This structure was formerly referred to as the Gin Warehouse. It is utilized to store truck maintenance supplies. Historical records indicate that the storage warehouses (referred to as east warehouse and west warehouse) were constructed in the mid-1970s.

The remainder of the property is undeveloped. An excavation pit, estimated to be approximately 125,000 cubic feet in size, is located near the center of the property. According to Mr. Bob Lange of Dunavant Enterprises, this was a former overflow pond for the on-site stormwater retention pond. Usage of this overflow pond was discontinued when the current stormwater retention pond was enlarged. Soil from this overflow pond was tested and used as backfill soil associated with remedial activities for the south and southwest ponds on Parcel B.

The property is currently vacant. Boyajian Trucking occupied the property from December 2002 to January 2003, using it to park flatbed trucks. Prior to that, the property was occupied by E&B Trucking, Inc. from October 2002 to January 2003, who used the property for truck maintenance. The property was previously occupied by Anderson Clayton, who used the property for maintenance of vehicles and equipment associated with the operations at the Cottonseed Delinting Plant. Producers Cotton Oil Company (PCOC) originally developed the property with the current improvements between the late 1950's and the mid-1970's. The property was previously developed with a vineyard and a residence from at least 1937 to 1950.

The vicinity of the property can generally be described as mixed use. Current usage of adjoining property includes: North Avenue followed by an Anderson Clayton property to the north; followed the Southern Pacific Railroad followed by undeveloped land to the south; a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal

followed by residential dwellings and United Agricultural Products to the east; and a cottonseed delinting plant owned by Dunavant Enterprises to the west.

1.1 PHASE I ESA

In accordance with ASTM Standard E 1527-00, this Phase I Environmental Site Assessment included reconnaissance of the subject and adjoining properties, interviews, and review of historical records and regulatory databases in an effort to identify evidence of recognized environmental conditions that may impact the property. This assessment has revealed no evidence of recognized environmental conditions in connection with the property.

ON-SITE CONDITIONS

Recognized Environmental Conditions

- None

Historical Recognized Environmental Conditions

- None

OFF-SITE CONDITIONS

Recognized Environmental Conditions

- None

Historical Recognized Environmental Conditions

- None

1.2 RECOMMENDATIONS

Based on investigation of the property for evidence of recognized environmental conditions, PSI offers the following recommendations.

- No further assessment regarding recognized environmental conditions appears warranted at this time.

- Based on the age of the structures, it is recommended that, prior to any demolition or renovation activities, a comprehensive asbestos survey be conducted. All confirmed asbestos containing materials that will be affected should be properly abated.

This summary does not contain all the information that is found in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided, and to aid in any decisions made or actions taken based on this information.

2. INTRODUCTION

2.1 PURPOSE AND SCOPE

This Phase I ESA was performed to search for evidence of recognized environmental conditions that may have an adverse environmental impact upon the property. Based upon information provided to PSI, this Phase I ESA was conducted as part of a real estate transaction. The assessment included records review, interviews and reconnaissance to evaluate whether such conditions exist in connection with the property. The protocol utilized for this Phase I ESA was in general accordance with the requirements of ASTM Standard E 1527-00 as specified in the assessment contract. Assessment of other environmental issues beyond the scope of ASTM E 1527-00 was not performed in connection with the Phase I ESA. This report includes documentation to support the analysis, opinions and conclusions as presented.

2.2 SPECIAL TERMS AND CONDITIONS

AUTHORIZATION

Authorization to perform this assessment was given on November 1, 2002 by a signed copy of PSI Proposal No. 588-2289, between Dunavant Enterprises, Inc. and PSI.

PROPERTY ACCESS

Instructions as to the location of the property, access, and an explanation of the property and facilities to be assessed were provided by Mr. Bob Lange of Dunavant Enterprises, Inc.

USE BY THIRD PARTIES

This report was prepared pursuant to the contract PSI has with Dunavant Enterprises, Inc.. That contractual relationship included an exchange of information about the property that was unique and between PSI and its client and serves as the basis upon which this report was prepared. Because of the importance of the communication between PSI and its client, reliance or any use of this report by anyone other than Dunavant Enterprises, Inc., for whom it was prepared, is prohibited and therefore not foreseeable to PSI.

Reliance or use by any such third party without explicit authorization in the report does not make said third party a third party beneficiary to PSI's contract with Dunavant Enterprises, Inc.. Any such unauthorized reliance on or use of this report, including any of its information or conclusions, will be at the third party's risk. For the same reasons, no warranties or representations, expressed or implied in this report, are made to any such third party.

Third party reliance letters may be issued on request and upon payment of the, then current fee for such letters. All third parties relying on PSI's reports, by such reliance, agree to be bound by the proposal and PSI's General Conditions. No reliance by any

party is permitted without such agreement, regardless of the content of the reliance letter itself.

2.3 METHODOLOGY AND RESOURCES

RECONNAISSANCE

Ground reconnaissance was conducted on November 24 and 25, 2002 by Ms. Christine Prado of PSI. A follow-up reconnaissance was conducted on April 25, 2003 by Ms. Prado of PSI accompanied by Mr. Bob Lange of Dunavant Enterprises, Inc. The ground reconnaissance consisted of observing the periphery of the property and viewing the site from accessible adjacent public thoroughfares. Interior portions of the property were systematically traversed to provide an overlapping field of view, wherever possible. The periphery of structures, where present on the property, were observed along with interior accessible common areas, maintenance and repair areas and a representative number of occupant spaces. Visual reconnaissance of adjoining properties was limited to areas and facilities that were readily observable from the subject property or from public access areas. Photographs were taken to document the features observed during the reconnaissance and environmental conditions of concern, where possible. A photographic log and copies of the photographs are included in Appendix D.

INTERVIEWS

Interviews were conducted with persons as noted in the following table. Records of Communication from interviews are included in Appendix E, and pertinent information reported by the interviewed parties is discussed in appropriate sections of the report.

Name	Title/Function	Affiliation	Date	Contact No.
Mr. Bob Lange	Vice President	Dunavant Enterprises	11/24/02 4/25/03	In Person
Public Counter	Records	Fresno County Environmental Health Department (FCEHD)	11/25/02	In Person
Public Counter	Building Department	County of Fresno	11/26/02	In Person
Reference Desk	Research	Fresno County Public library	11/26/02	In Person
Mr. Bill Walker	Truck Shop Occupant	E&B Trucking	2/28/03	(800) 540-5492
Mr. Richard Espinoza	Gin Superintendent	Anderson Clayton Corporation	5/2/03	(559) 351-1163

ENVIRONMENTAL REGULATORY DATABASE INFORMATION

Information for the standard Federal and state environmental record sources specified in ASTM Standard E 1527-00 § 7.2.1.1 was obtained through Environmental Data Resources, Inc. (EDR). The database information was reviewed to help identify evidence of recognized environmental conditions in connection with the property. Unmappable (orphan) sites listed in the database with insufficient address or geocoding

information to be mapped were evaluated for potential location within the approximate minimum search distance (AMSD). Copies of the EDR research data and a description of the databases are included in Appendix C of this report.

Historical Use Information

A history of the previous uses of the property, and properties in the surrounding area to the extent that this information was revealed in the course of researching the subject property, was developed consistent with practices specified in ASTM Standard E 1527-00 § 7.3. A summary of the standard historical sources and data reviewed by PSI is listed below. Copies of representative historical source information are provided in applicable Appendices.

Historical Data Sources	Years Reviewed	Data Source/Publisher	Note
Aerial Photographs	1957, 1961, 1965, 1984	D&M Geo-Search	
Fire Insurance Maps	No Coverage Letter	EDR	NA
USGS Topographic Maps	1964, photorevised 1981	USGS	
Local Street Directories	1961, 1967, 1972, 1977, 1981, 1987, 1992 & 1999	Fresno County Public Library	
Building Department Records	1973, 1975, 1980 & 1981	Fresno County Building Department	
Note Key: NRA = Not Reasonably Ascertainable, NLU = Not Likely to be Useful NA = None Available, NR = Not Reviewed			

The first obvious developed use of the property identified in this assessment was in or prior to 1937. Historical information sources researched in this assessment allowed uses of the property to be traced from the present back to 1937. Although this meets the 1940-minimum research limit per the ASTM Standard E 1527-00 § 7.3.2, this does not predate the property's obvious first developed use and constitutes historical data failure per ASTM Standard E 1527-00 § 7.3.2.3. However, PSI believes this historical data failure will not affect the conclusions presented herein.

Information Reported By User

Pursuant to ASTM Standard E 1527-00 § 5.2 and § 5.3, PSI requested that the client provide information on any environmental liens or activity and use limitations recorded against the property, communicate any specialized knowledge or experience that is material to recognized environmental conditions in connection with the property, and identify key site managers for interview purposes. Information that was reported has been incorporated into and is discussed in appropriate sections of the report. Documents provided by the client for our use in preparation of this report are presented in applicable Appendices, and included a site plan and previous reports as listed below.

- Phase I Environmental Site Assessment of the Planting Seed facility, dated November 14, 1997, prepared by PSI for Queensland Cotton Holding Limited.

- Phase I Environmental Site Assessment of the Truck Shop, dated November 7, 1997 prepared by PSI for Queensland Cotton Holding Limited.

- June 1999 Groundwater Monitoring Sulfate Plume Assessment, dated January 12, 2000, prepared by Krazan & Associates, Inc. for Anderson Clayton Corporation.

ASTM Non-Scope Services

Assessment of other environmental issues beyond the consideration of ASTM E 1527-00 was not conducted in connection with this Phase I ESA.

Other Resources & Environmental Professional Qualifications

Other resources and information accessed for purposes of this site assessment are discussed in appropriate sections of the report. Published references used in the completion of this Phase I ESA not previously listed are cited at the location they are referred to in the report. Credentials and qualifications of the environmental professionals responsible for preparation of this report are included in Appendix F.

2.4 Limitations Of Assessment

Along with all of the limitations set forth in various sections of the ASTM Standard E 1527-00 protocol, the accuracy and completeness of this report is necessarily limited by the following:

- Access Limitations – PSI was not able to access the interior of the western warehouse on the Truck Shop facility during the site reconnaissance conducted in November 2002. This warehouse reportedly is used to store equipment. Reportedly, hazardous substances were not stored within this building. PSI was able to access the interior of the building during the follow-up reconnaissance conducted on April 25, 2003. During this time, the building was observed to be vacant and empty. No staining was observed on the concrete pavement during the follow-up reconnaissance. As such, PSI believes this access limitation in November 2002 will not affect the conclusions presented herein.

- Physical Obstructions to Observations - None

- Outstanding Information Requests – None

- Historical Data Source Failure - The first obvious developed use of the property identified in this assessment was in or prior to 1937. Historical information sources researched in this assessment allowed uses of the property to be traced from the present back to 1937. Although this meets the 1940-minimum research limit per the ASTM Standard E 1527-00 § 7.3.2, this does not predate the property's obvious first developed use and constitutes historical data failure per ASTM Standard E 1527-00 § 7.3.2.3. However, PSI believes this historical data failure will not affect the conclusions presented herein.

- Other - None

2.5 SIGNIFICANT ASSUMPTIONS

PSI has made the following significant assumptions in the preparation of this report:

- Regulatory Records Information – PSI assumes that all information provided by EDR regarding the regulatory status of facilities within the AMSD is complete, accurate, and current.

- Other - None

3. PROPERTY DESCRIPTION AND PHYSICAL SETTING

3.1 LOCATION

The subject property is known as the Truck Shop, and it is located at 2635 East North Avenue in Fresno County, California 93725. The subject property is bound by North Avenue to the north, the Fresno Irrigation District Central Canal to the southeast, and the Southern Pacific Railroad followed by Golden Sate Boulevard to the southwest.

The subject property's location is identified on the site vicinity map provided as Figure 1 in Appendix A.

3.2 PROPERTY VICINITY CHARACTERISTICS

The vicinity of the property can generally be described as mixed use. Current usage of adjoining property includes: North Avenue followed by an Anderson Clayton property to the north; followed the Southern Pacific Railroad followed by undeveloped land to the south; a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by residential dwellings and United Agricultural Products to the east; and a cottonseed delinting plant owned by Dunavant Enterprises to the west.

A site vicinity sketch is included as Figure 2 in Appendix A.

3.3 DESCRIPTION OF PROPERTY AND IMPROVEMENTS

The property consists of approximately 28 acres. The northeastern five acres of the property is developed with a truck shop facility. The remainder of the property is undeveloped. The facility is currently vacant. A site plan for the property furnished by Mr. Lange is included in Appendix A.

Improvements to this parcel include a truck maintenance building, and two storage warehouses, located on the northeastern five acres of the parcel. A concrete tank/drum containment is located to the south of the structures.

The truck maintenance building high-bay building constructed of metal frame and corrugated metal siding and roofing over a concrete slab floor, and is approximately 9,822 square feet in size. A partial mezzanine is located on the northern end of the building. Historical records indicate that this structure was constructed in or around the late 1950s. This structure was formerly referred to as the Gin Warehouse. It is utilized to store truck maintenance supplies. The northern portion of the building is developed with offices.

The storage warehouses (referred to as east warehouse and west warehouse) are high-bay warehouses constructed of metal frame and corrugated metal siding and roofing over a concrete slab floor. The east warehouse is approximately 5,600 square feet in size and the west warehouse is approximately 1,811 square feet in size. Historical records indicate that these structures were constructed in the mid-1970s.

An excavation pit, estimated to be approximately 125,000 cubic feet in size, is located near the center of the property. According to Mr. Bob Lange of Dunavant Enterprises, this was a former overflow pond for the on-site stormwater retention pond. Usage of this overflow pond was discontinued when the current stormwater retention pond was enlarged. Soil from this overflow pond was tested and used as backfill soil associated with remedial activities for the south and southwest ponds on Parcel B.

Please refer to the site plan, prepared by PSI and included in Appendix A as Figure 2, for the locations of the structures listed above. Photographs showing prominent features of the site are provided in Appendix D.

UTILITIES

Utility systems identified at the property, as specified in ASTM Standard E 1527-00 § 8.4.1 and § 8.4.3 are as follows:

- Electricity at the subject property is provided through Pacific Gas & Electric (PG&E).
- Sewage disposal at the property is provided through a septic tank located to the northeast of the truck maintenance building. A single restroom in the building is the only connection to the septic tank.
- Potable water at the property is obtained through on on-site domestic water well located to the north of the structures.

3.4 PHYSICAL SETTING

TOPOGRAPHIC MAP REVIEW

A current United States Geological Survey (USGS) 7.5 minute topographic map showing the area where the property is located was obtained and reviewed as specified in ASTM Standard E 1527-00 § 7.2.3. The 1964 (photorevised 1981) USGS "Malaga, California" quadrangle map was reviewed. According to the contour lines on the topographic map, the elevation of the property ranges from 209 to 295 feet above mean sea level. The contour lines in the area of the property indicate the area has a downgradient slope towards the west. The property appears on the map as developed with two structures located on the northeast corner of the property. A depression with vegetation growing inside is depicted near the center of the property. Three dwellings are depicted on the southern half of the property. A small road leading from the north border to the dwellings is depicted on the map. A canal is depicted along the east border of the property.

SUPPLEMENTAL PHYSICAL SETTING INFORMATION

The following discretionary physical setting sources pursuant to ASTM Standard E 1527-00 § 7.2.3, were obtained and reviewed to provide supplemental information regarding radon incidence, geology, and hydrogeology in the vicinity of the property.

Radon Incidence

Based on a review of a current California Environmental Protection Agency (EPA) Map of Radon Zones, Fresno County is located in Zone 2, which has a moderate potential for elevated levels of indoor radon gas (from 2 to 4 picoCuries/liter). The EPA recommended action level for indoor radon levels is 4 picoCuries/liter.

Subsurface Soils

According to the Soil Survey of the Eastern Fresno Area, published by the United States Department of Agriculture Soil Conservation Service (1971), the near surface soil underlying the subject is classified as "Hanford fine sandy loam, gravelly substratum", "Hanford sandy loam", "Hesperia fine sandy loam", and "Hesperia fine sandy loam, moderately deep".

Approximately 60 percent of the subject property is classified as "Hanford fine sandy loam, gravelly substratum". The surface layer ranges from 8 to 18 inches of predominantly fine sandy loam, but in mall inclusions it is loamy fine sand. Surface crusting and tillage compaction in varying degrees is common. The underlying material is uniformly fine sandy loam. A thick layer of gravel and cobblestones underlies this soil at a depth ranging from 2.5 to 3.5 feet. This coarse layer tends to impede internal drainage somewhat.

Approximately 40 percent of the subject property is classified as "Hanford sandy loam", "Hesperia fine sandy loam", and "Hesperia fine sandy loam, moderately deep". Hanford sandy loam is characterized by a surface layer ranging from 8 to 18 inches of predominantly sandy loam. Surface crusting and tillage compaction in varying degrees is common. The underlying material is uniformly sandy loam. Available water holding capacity is moderate. Hesperia fine sandy loam, moderately deep, is characterized by a mainly fine sandy loam surface layer and underlying material, with small areas of very fine sandy loam. The surface layer is neutral to mildly alkaline, and the underlying material is mildly to moderately alkaline. Lime accumulation occurs below a depth of 6 feet in many areas. The soil is moderately permeable. Hesperia fine sandy loam is very similar to Hesperia fine sandy loam, moderately deep, except that it is deeper to an underlying silty layer, occurring at a depth of 4.5 to 5 feet.

Groundwater Resources

According to a June 1999 Groundwater Monitoring Sulfate Plume Assessment of the west adjacent cottonseed delinting plant property, dated January 12, 2000, prepared by Krazan & Associates, Inc. for Anderson Clayton Corporation, the groundwater underlying the subject property flows in a northwesterly direction. Depth to groundwater is reported to be approximately 54 feet below ground surface (bgs).

4. PROPERTY USAGE

4.1 CURRENT USES OF THE PROPERTY

Current use of the property as determined through observation, interviews and records review is described below.

The subject property is developed with a vacant truck maintenance facility consisting of a truck maintenance building and two storage warehouses.

The User should refer to Section 6 of this report for additional site reconnaissance details.

4.2 PAST USES OF THE PROPERTY

To the extent that indications of past uses of the property were identified through historical records review, reconnaissance observation, interviews, or through client provided information, they are identified below.

Year(s)	Description of Past Property Use
1937-1950	According to the 1997 Phase I ESA, the subject property was developed with a vineyard and a residence.
1957	The subject property appeared to be developed with residential dwellings and the Gin Warehouse (truck maintenance building) in aerial photographs. Portions of the property also appear to be developed for agricultural use.
1961	The subject property appeared to be developed with residential dwellings and the Gin Warehouse (truck maintenance building) in aerial photographs. Portions of the property also appear to be developed for agricultural use.
1965	The subject property was not visible in the 1965 aerial photograph.
1967	The subject property was listed as Producers Cotton Oil (gin warehouse) in city directories.
1972	The subject property was not listed in city directories.
1973	An electrical permit was issued to Producers Cotton Oil Company for a 1,800 square-foot warehouse at 2635 East North Avenue.
1975	A building permit was issued to Producers Cotton Oil Company to erect a 40,000 square-foot warehouse at 2635 East North Avenue
1977	The subject property was not listed in city directories.
1980	Building permits were issued to Producers Cotton Oil Company to construct a 3,240 square-foot addition to an existing 6,840 square-foot warehouse and a 1,600 square-foot addition to an existing 40,000 square-foot warehouse at 2635 East North Avenue
1981	The subject property was not listed in city directories.
1984	Due to the poor quality of the print, it is difficult to discern the structures and use of the subject property in the 1984 aerial photograph.
1987	The subject property was not listed in city directories.
1992	The subject property was not listed in city directories.
1997	During a site reconnaissance conducted by PSI in 1997, the subject property was observed to be developed with Anderson Clayton Corporation.
1999	The subject property was not listed in city directories.

Year(s)	Description of Past Property Use
2002	During a site reconnaissance conducted by PSI in 2002, the subject property was observed to be developed with a truck shop occupied by E&B Trucking, Inc.
2003	During a site reconnaissance conducted by PSI in 2003, the subject property was observed to be developed with a vacant truck shop.

According to the Fresno County Building Department, building department records prior to 1962 do not exist. Copies of the building permits discussed above are included in Appendix B.

A Phase I Environmental Site Assessment of the Truck Shop, dated November 7, 1997, was prepared by PSI for Queensland Cotton Holding Limited. No evidence of recognized environmental conditions were identified in the report.

The historical information developed and reviewed for the subject property revealed no evidence of recognized environmental conditions.

4.3 Environmental Liens

No knowledge of environmental liens or activity and land use limitations recorded against the property was reported to PSI.

4.4 Current And Past Uses Of Adjoining Properties

To the extent that indications of current and past uses of adjoining properties were identified through reconnaissance observation, interviews, records review or through client provided information, they are described below. Locations of adjoining properties discussed can be found on the site vicinity sketch in Appendix A.

Year(s)	Description of Past Property Use
North	
1957	The north adjoining property appeared to be developed with agricultural land and the Anderson Clayton property in aerial photographs. Several large warehouses appeared to be located on the property.
1961	The north adjoining property appeared to be developed with agricultural land and the Anderson Clayton property in aerial photographs. Several large warehouses appeared to be located on the property.
1965	The north adjoining property appeared to be developed with agricultural land in aerial photographs. Only the western half of north adjoining property was visible in the 1965 aerial photograph.
1984	The north adjoining property appeared to be developed with agricultural land and the Anderson Clayton property in aerial photographs.
2002	During a site reconnaissance conducted by PSI in 2002, the north adjoining property was developed with the Anderson Clayton property.
2003	During a site reconnaissance conducted by PSI in 2003, the north adjoining property was developed with the Anderson Clayton property.

Year(s)	Description of Past Property Use
South	
1957	The south adjoining property appeared to be developed for agricultural use in aerial photographs.
1961	The south adjoining property appeared to be developed for agricultural use in aerial photographs.
1965	The south adjoining property was not visible in the 1965 aerial photograph.
1984	The south adjoining property appeared to be developed for agricultural use in aerial photographs.
2002	During a site reconnaissance conducted by PSI in 2002, the south adjoining property was undeveloped.
2003	During a site reconnaissance conducted by PSI in 2003, the south adjoining property was undeveloped.
East	
1957	The east adjoining property appeared to be developed with a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by single-family residential dwellings and agricultural in aerial photographs.
1961	The east adjoining property appeared to be developed with a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by single-family residential dwellings and agricultural in aerial photographs.
1984	The east adjoining property appeared to be developed with a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by single-family residential dwellings and a commercial structure in aerial photographs.
2002	During a site reconnaissance conducted by PSI in 2002, the east adjoining property is developed with a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by single-family residential dwellings and United Agricultural Products.
2003	During a site reconnaissance conducted by PSI in 2003, the east adjoining property is developed with a Southern Pacific Railroad spur and the Fresno Irrigation District Central Canal followed by single-family residential dwellings and United Agricultural Products.
West	
1957	The west adjoining property appeared to be developed with the Cottonseed Delinting Plant in aerial photographs.
1961	The west adjoining property appeared to be developed with the Cottonseed Delinting Plant in aerial photographs.
1965	The west adjoining property appeared to be developed with the Cottonseed Delinting Plant in aerial photographs.
1984	The west adjoining property appeared to be developed with the Cottonseed Delinting Plant in aerial photographs.
2002	During a site reconnaissance conducted by PSI in 2002, the west adjoining property was developed with a vacant Cottonseed Delinting Plant owned by Dunavant Enterprises.
2003	During a site reconnaissance conducted by PSI in 2003, the west adjoining property was developed with the Cottonseed Delinting Plant owned by Dunavant Enterprises.

PCOC occupied the west adjoining property from approximately 1920 to 1992. According to a review of historical Building Department records and information provided by Dunavant Enterprises, a solvent plant, cooling towers and refinery were located on the west adjoining PCOC property. These structures were located on the northeastern quadrant of the east adjoining property and were demolished in or around 1992. These structures were located crossgradient to the subject property in respect to groundwater flow direction. As such, these structures do not represent a recognized environmental condition in connection to the subject property.

PCOC occupied the west adjoining property from approximately 1920 to 1992. In August 1991, two 1,000-gallon USTs containing gasoline were excavated from the PCOC facility (from the northwest corner of the west adjoining property). Analytical testing of soil samples collected during the time of excavation indicated that the soil was impacted by total petroleum hydrocarbons as gasoline (TPH-G), ethylbenzene and xylenes. The lateral and vertical extents of the contamination were determined to be 30 feet wide and 20 feet deep. Approximately 700 cubic yards or contaminated soil was excavated. Of this, 400 cubic yards was hauled off-site for disposal and the remaining 300 cubic yards was remediated on-site by aeration. The excavation pit was backfilled with clean soil. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. However, these historical USTs were located crossgradient to the subject property with respect to groundwater flow direction and do not represent a recognized environmental condition in connection to the subject property.

PCOC occupied the west adjoining property from approximately 1920 to 1992. In June 1993, a 22,000-gallon underground concrete diesel bunker was excavated from the PCOC facility (from north of the Planting Seed House building). Soil samples collected during the time of excavation were analyzed for total petroleum hydrocarbons as diesel (TPH-D) and oil and grease. TPH-D was not detected in any of the soil samples. Oil and grease was detected in two out of the five samples collected. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. However, these historical USTs were located crossgradient to the subject property with respect to groundwater flow direction and do not represent a recognized environmental condition in connection to the subject property.

PCOC occupied the west adjoining property from approximately 1920 to 1992. According to records reviewed at the FCEHD, three 10,000-gallon hexane USTs were excavated from the northern half of the PCOC facility in 1986. No leakage from or structural damage to the tanks was detected during the time of excavation. No evidence of clean closure was identified among the agency's records. In June 1993, a 22,000-gallon underground concrete diesel bunker was excavated from the northern half of the PCOC facility. Soil samples collected during the time of excavation were analyzed for total petroleum hydrocarbons as diesel (TPH-D) and oil and grease. TPH-D was not detected in any of the soil samples. Oil and grease was detected in two out of the five samples collected.

According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. However, these historical USTs were located crossgradient to the subject property with respect to groundwater flow direction and do not represent a recognized environmental condition in connection to the subject property.

PCOC occupied the west adjoining property from approximately 1920 to 1992. The PCOC facility engaged in two main processes: preparation of cotton planting seeds and processing cottonseed oil. The preparation of cotton planting seeds involved an acid delinting process in which seeds were dipped into a hydrogen sulfate wash, then rinsed with water. According to records reviewed at the Fresno County Environmental Health Department (FCEHD), between 1981 and 1985, the rinse water generated from the acid delinting process was discharged through storm drain lines into an unlined pond, approximately 230,000 gallons in capacity, known as the "southwest pond" located near the southwest corner of the west adjoining property. The overflow from this pond was directed to an unlined pond, approximately 10 million gallons in capacity, known as the "south pond", located along the south border of the west adjoining property to the east of the southwest pond. The rinse water was allowed to percolate into the soil through this process, which resulted in sulfates being deposited into the soil.

The rinse water was considered a hazardous waste according to the criteria of the Regional Water Quality Control Board (RWQCB) and the facility was placed on the Toxic Pits Cleanup Act (TCPA) list. In 1991, PCOC conducted a soil and groundwater assessment related to the south and southwest ponds in order to comply with TCPA requirements. Elevated sulfate concentrations and slightly acidic pH levels were detected in the soil and groundwater beneath the ponds. The ponds, no longer in service, had been backfilled and sealed with an 18-inch bentonite cap to prevent rainwater from causing sulfates to migrate from the soil into the groundwater.

Based on the soil and groundwater analysis and the fact that ponds had not received effluent since 1985, the RWQCB recommended that the facility be removed from the TCPA list. In August 1991, the RWQCB requested that PCOC submit closure plans for the former ponds, and a work plan for assessing the vertical and lateral extent of groundwater degradation. Four shallow groundwater monitoring wells, MW-1 through MW-4 (screened from 60 to 80 feet bgs), were installed in the vicinity of the former ponds. The RWQCB recommended that the concentrations of sulfate and pH in the samples collected from the upgradient well MW-1 (60 mg/L and 8.0, respectively) be considered as background for the purpose of evaluating groundwater quality at the property.

Additional groundwater assessment activities were conducted by Kleinfielder, Inc. in March 1992, during which three additional groundwater monitoring wells, MW-5 through MW-7, were installed at the estimated edge of the sulfate plume. MW-5 was installed as a deep groundwater monitoring well (screened from 89 to 169 feet bgs) to assess the vertical extent of the sulfate plume, and MW-6 and MW-7 were installed near the northern boundary of the property to assess the lateral extent of the plume.

Currently groundwater assessment activities include existing off-site wells located to the west and northwest of the subject property.

According to a June 1999 Groundwater Monitoring Sulfate Plume Assessment, prepared by Krazan & Associates, Inc. for Anderson Clayton Corporation, during a sampling event conducted in June 1999, the highest concentrations of sulfate were detected in MW-3 (330 mg/L). The sulfate concentration detected in the on-site deep groundwater monitoring well, MW-5, was 68 mg/L. According to Krazan, the distribution of the constituents of concern appeared to occur in a linear southeast-northwest orientation, which corresponds with the regional groundwater flow direction (northwest). The sulfate plume was determined to extend as far as 1,000 feet northwest of the subject property (according to data obtained from an off-site well, MW-38, in which 140 mg/L of sulfate was detected).

Based on the crossgradient positioning of this sulfate plume to the subject property, this sulfate plume does not represent a recognized environmental condition in connection to the subject property.

The historical information developed and reviewed for adjoining properties revealed evidence of recognized environmental conditions in connection with the subject property.

The User should refer to Section 6 of this report for additional site reconnaissance information on the current use of adjoining property.

5. ENVIRONMENTAL REGULATORY RECORDS REVIEW

5.1 STANDARD FEDERAL AND STATE ENVIRONMENTAL RECORD SOURCES

The number of listed sites identified within the AMSD from the Federal and state standard environmental records database listings specified in ASTM Standard E 1527-00 § 7.2.1.1 are summarized in the following table. [Also shown are ASTM supplemental database searched and sites identified within the search distance.] Detailed information for sites identified within the AMSDs is provided following the table, along with an opinion about the significance of the listing to the analysis of recognized environmental conditions in connection with the subject property. Copies of the EDR research data and a description of the databases are included in Appendix C of this report.

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 – 1/4	1/4 – 1/2	1/2 – 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	1	0	NR	1
CERCLIS		0.500	0	0	1	NR	NR	1
CERC-NFRAP		0.250	0	1	NR	NR	NR	1
CORRACTS		1.000	0	0	0	1	NR	1
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	1	NR	NR	NR	1
RCRIS Sm. Quan. Gen.	X	0.250	0	1	NR	NR	NR	1
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
AWP		1.000	0	0	1	0	NR	1
Toxic Pits		1.000	0	0	1	0	NR	1
State Landfill		0.500	0	0	1	NR	NR	1
WMUDS/SWAT		0.500	0	0	2	NR	NR	2
LUST	X	0.500	0	0	6	NR	NR	6
CA Bond Exp. Plan		1.000	0	0	1	0	NR	1
UST	X	0.250	0	2	NR	NR	NR	2
VCP		0.500	0	0	0	NR	NR	0
HIST UST	X	0.250	0	0	NR	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
SSTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
DEED		TP	NR	NR	NR	NR	NR	0

TP = Target Property
NR = Not Requested at this Search Distance
* Sites may be listed in more than one database

A total of eleven (11) unmappable sites were reported in the database findings. A review of these sites was conducted, and those that could be field verified within the AMSD are discussed in the appropriate section below.

5.2 Subject Property Database Findings

The subject property was not identified through the Federal and state environmental records review.

5.3 Adjoining Property Database Findings

Adjoining properties as defined in ASTM Standard E 1527-00 § 3.3.2 were identified through the Federal and state environmental records review as further discussed below.

Federal RCRA Generators List

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Generators database is a compilation by the EPA of reporting facilities that generate hazardous waste. A total of one (1) RCRA generator was located on the adjoining properties.

Site Address	Producers Cotton Oil Company 2365 East North Avenue Fresno, California 93725	Map ID#: Distance	A2, A3 & A4 Immediately adjacent to the west
Producers Cotton Oil Company was located on the adjoining property to the west of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is a small quantity generator, generating at least 100 kg/month but less than 1000 kg/month of non-acutely hazardous waste. No known violations were reported for this facility. However, this facility was reported to have experienced unauthorized releases from USTs. Please refer to the LUST section for additional information on the releases from this facility.			

State Registered UST List

The state UST list is a compilation of petroleum storage tank sites that are registered with the State. A total of two (2) UST sites were identified on the adjoining properties.

Site Address	Anderson Clayton-Planting Seed 2365 East North Avenue Fresno, California 93725	Map ID#: Distance	A1 Immediately adjacent to the west
Anderson Clayton-Planting Seed was located on the adjoining property to the west of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility operated one UST. The contents and size of the tank were not reported. This facility was not reported to have experienced an unauthorized release of hazardous materials to the environment. Please refer to the LUST section for additional information on releases from USTs on the subject property.			

Site Address	Producers Cotton Oil Company 2365 East North Avenue Fresno, California 93725	Map ID#: Distance	A2, A3 & A4 Immediately adjacent to the west
PCOC was located on the adjoining property to the west of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility historically operated six (6) USTs: one 3,000-gallon waste solvent tank installed in 1963; two 10,000-gallon hexane tanks installed in 1963; one 10,000-gallon hexane tank installed in 1973; one 1,000-gallon diesel tank installed in 1967; and one 1,000-gallon gasoline tank installed in 1967. This facility was reported to have experienced an unauthorized release of hazardous materials to the environment. Please refer to the LUST section for additional information regarding the release at this facility.			

STATE LEAKING UNDERGROUND STORAGE TANK (LUST) LIST

The state LUST list is a compilation of petroleum UST sites that have reported a release. A total of two (2) LUST sites were identified on an adjoining property.

Site Address	Producers Cotton Oil Ware 2907 South Maple Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	D15, D16 & D17 Adjacent North Approximately 100 feet
Producers Cotton Oil Ware (also listed as Producers Cotton Oil Company) was located adjacent to the north of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized waste oil release impacting the soil only. According to the local implementing agency, this facility has been granted a case closed status and no further action is needed at this time. Based on the case closed status, the medium affected, and the crossgradient positioning this facility does not represent a recognized environmental condition in connection with the subject property.			

Site Address	Producers Cotton Oil Company 2365 East North Avenue Fresno, California 93725	Map ID#: Distance	A2, A3 & A4 Immediately adjacent to the west
Producers Cotton Oil Company was located on the adjoining property to the west of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized gasoline release on February 21, 1986 impacting the soil. The abatement method was reported to be excavation of the contaminated soil and treating (which includes spreading and farming). According to the database, this facility has been granted a case closed status for the February 21, 1986 release and no further action is needed at this time. According to records reviewed at the FCEHD, three 10,000-gallon hexane USTs were excavated from the northern half of this facility in 1986. No leakage from or structural damage to the tanks was detected during the time of excavation. No evidence of clean closure was identified among the agency's records. As such, these tanks represent a recognized environmental condition in connection to the subject property pending closure by the FCEHD.			

Site Address	Producers Cotton Oil Company 2365 East North Avenue Fresno, California 93725	Map ID#: Distance	A2, A3 & A4 Immediately adjacent to the west

(continued) :

In May 1986, two 10,000-gallon USTs containing gasoline and diesel were excavated from the northern half of this facility.. An unauthorized release, impacting the soil to a depth of 20 feet bgs, was detected at that time. The impacted soil was excavated and aerated on-site. The excavation pit was backfilled with clean imported soil. The aerated soil was deemed adequately remediated by the FCEHD and was disposed on-site. In January 1992, the product lines and fuel dispensers associated with these USTs were removed. Analytical testing of soil samples taken during the time of removal indicated that the soil contained trace amounts of toluene and xylenes (0.005 mg/kg and 0.007mg/kg, respectively). No evidence of clean closure was identified among the agency's records. As such, these tanks represent a recognized environmental condition in connection to the subject property pending closure by the FCEHD.

In the EDR environmental database, the PCOC facility was also reported to have experienced an unauthorized gasoline release on September 16, 1991. According to FCEHD files, in August 1991, two 1,000-gallon USTs containing gasoline were excavated from the PCOC facility (from the northwest corner of Parcel B). Analytical testing of soil samples collected during the time of excavation indicated that the soil was impacted by total petroleum hydrocarbons as gasoline (TPH-G), ethylbenzene and xylenes. The lateral and vertical extents of the contamination were determined to be 30 feet wide and 20 feet deep. Approximately 700 cubic yards or contaminated soil was excavated. Of this, 400 cubic yards was hauled off-site for disposal and the remaining 300 cubic yards was remediated on-site by aeration. The excavation pit was backfilled with clean soil. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. These former USTs represent a historical recognized environmental condition in connection to the subject property pending closure by the FCEHD.

In June 1993, a 22,000-gallon underground concrete diesel bunker was excavated from the northern half of this facility. Soil samples collected during the time of excavation were analyzed for total petroleum hydrocarbons as diesel (TPH-D) and oil and grease. TPH-D was not detected in any of the soil samples. Oil and grease was detected in two out of the five samples collected. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. These former USTs represent a recognized environmental condition in connection to the subject property pending closure by the FCEHD.

WASTE MANAGEMENT UNIT DATABASE SYSTEM (WMUDS/SWAT) LIST

The state Waste Management Unit Database System (WMUDS/SWAT) list is used by the State Water Resources Control Board and the Regional Water Quality Control Board for tracking and inventory of waste management units. A total of one (1) WMUDS/SWAT site was identified on an adjoining property.

Site Address	Producers Cotton Oil Company 2907 South Maple Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	D15, D16 & D17 Adjacent North Approximately 100 feet
Producers Cotton Oil Company was located adjacent to the north of the subject property and was crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility disposed of liquid or semi-solid process waste. Based on the crossgradient positioning of this facility to the subject property, this facility does not represent a recognized environmental condition in connection to the subject property.			

STATE LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LIST

The state Solid Waste Landfill (SWLF) list is a compilation of landfills and solid waste disposal sites permitted by the State. A total of one (1) SWLF site was identified on an adjoining property.

Site Address	Fresno United Metal 3270 South Golden State Boulevard Fresno, California	Map ID#: Distance (ft) Direction Distance (ft)	9 Approx. 0.09 mile Southwest Approx. 500 feet
Fresno United Metal is located approximately 0.09 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is an active, minor waste tire facility. This facility is not reported to have experienced unauthorized releases. Based on the lack of evidence indicating a release of hazardous waste has occurred from this facility, this facility does not represent a recognized environmental condition in connection with the subject property.			

TOXIC PITS LIST

The state Toxic Pits list is a compilation of sites that are suspected of containing hazardous substances where cleanup has not yet been completed. A total of one (1) Toxic Pit site was identified on an adjoining property.

Site Address	Producers Cotton Oil Company 2907 South Maple Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	D15, D16 & D17 Adjacent North Approximately 100 feet
Producers Cotton Oil Company is located approximately adjacent to the north of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility has a closed status. Based on the crossgradient positioning of this facility to the subject property, this facility does not represent a recognized environmental condition in connection to the subject property.			

5.4 NON-ADJOINING PROPERTY DATABASE FINDINGS

Non-adjoining properties within the AMSD were identified through the Federal and state environmental records review as further discussed below.

FEDERAL CERCLIS LIST

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) is a compilation of sites that the EPA has investigated or is currently investigating for a release or threatened release of hazardous substances. A total of two (2) CERCLIS sites were listed within 0.5 mile of the subject property.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet

Purity Oil Sales, Inc. is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility was a waste oil refinery/reclaiming facility that was closed in 1974. Oily liquid and sludge were reportedly spilled and disposed on-site. According to the database, this facility underwent an event discovery in February 1979. A preliminary site assessment was completed in May 1981. This facility was included on the National Priority List in September 1983. Please refer to the NPL section for additional information on this facility.

Site Address	Bruno Used Material 3211 Golden Sate Boulevard Malaga, California 93726	Map ID#: Distance Direction Distance (ft)	B8 Approx. 0.27 mile Southwest Approx. 1,400 feet

Bruno Used Material is located approximately 0.27 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility underwent an event discovery in March 1987. A preliminary site assessment was completed in September 1987. According to the EPA, this facility has been granted a No Further Remedial Action Planned (NFRAP) status. This site is not included on the National Priority List. Based on the NFRAP status and the crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.

FEDERAL NPL LIST

The National Priorities List (Superfund) is EPA's database of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the Superfund Program. A total of one (1) NPL site was listed within one (1) mile of the subject property.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet

Purity Oil Sales, Inc. is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EPA, this facility operated as a used oil reprocessing facility from 1934 until 1974. Oil and by-products from the refining process were collected, stored in sumps and storage tanks, and disposed of on-site in sludge pits. Waste oil sludge was used by local farmers for dust control or buried in on-site unlined pits and ponds. Contamination problems resulted from the improper storage and disposal of wastes, and numerous surface spills which occurred during site operations. In 1973, Purity Oil began to empty and backfill the waste pits. Although the waste pits were backfilled with construction debris, there is no evidence that the pits were emptied.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet

(continued):

In 1976, a fire at the site destroyed the main warehouse building and adjacent equipment. The remaining equipment was removed from the site, and the area was partially regraded. Seven aboveground steel tanks were left on site. The tanks are believed to have been used to store oil prior to reprocessing and during the acidification process. One of the tanks had an exterior asbestos coating. Although the tanks were not leaking severely, all of the tanks were rusting. All buildings and tanks have been removed from the site, and the site has been fenced. By 1982, the site was abandoned. Approximately 225 residents lived in an adjacent trailer park until October 2000. The Fresno Aquifer, designated as a sole source aquifer, provides water for municipal, industrial, and agricultural purposes, as well as for a number of private wells. A number of properties in the area were affected and are now served by the Fresno and Malaga water districts. The site is located in the San Joaquin River drainage basin, and the San Joaquin River is 12 miles north of the site.

This facility was placed on the NPL list in September 1983. According to the EPA, groundwater at this facility is contaminated with various volatile organic compounds (VOCs) and heavy metals including iron, lead, and manganese. Soils are contaminated with phenols, polychlorinated biphenyls (PCBs), pesticides, oil and grease, VOCs, and heavy metals including lead, copper, and zinc. The contaminants identified in tank samples include PCBs, pesticides, and heavy metals including lead and zinc.

Soil and groundwater remediation are currently underway at this facility. Based on crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.

STATE LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LIST

The state Solid Waste Landfill (SWLF) list is a compilation of landfills and solid waste disposal sites permitted by the State. A total of two (2) SWLF sites were identified within 0.5 mile of the subject property.

Site Address	Recycling Unlimited TS/Mr. Fand Vermicomp 3077 South Golden State Frontage Road Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	Orphan Site Approx. 0.40 mile West Approx. 2,100 feet

Recycling Unlimited TS/Mr. Fand Vermicomp is located approximately 0.40 mile to the west of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is an solid waste landfill facility. Based on the distance separating this facility from the subject site and the crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.

Site Address	Cedar Avenue Recycling and Transfer Station Highway 99 between North Avenue and Central Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	Orphan Site Approx. 0.46 mile Southwest Approx. 2,450 feet
Cedar Avenue Recycling and Transfer Station is located approximately 0.46 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is a solid waste landfill facility. Based on the distance separating this facility from the subject site and the crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.			

STATE LEAKING UNDERGROUND STORAGE TANK (LUST) LIST

The state LUST list is a compilation of petroleum UST sites that have reported a release. A total of six (6) LUST sites were identified within 0.5 mile of the subject property.

Site Address	Suburban Propane 3363 South Golden State Boulevard Fresno, California 93778	Map ID#: Distance Direction Distance (ft)	14 Approx. 0.20 mile Southwest Approx. 1,050 feet
Suburban Propane is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized gasoline release impacting the groundwater. According to the local implementing agency, this facility has been granted a case closed status and no further action is needed at this time. Based on the case closed status and the crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.			

Site Address	Rhodes Residence 3355 Maple Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	10 Approx. 0.27 mile Southwest Approx. 1,400 feet
Rhodes Residence is located approximately 0.27 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized gasoline release impacting the soil only. According to the local implementing agency, this facility has been granted a case closed status and no further action is needed at this time. Based on the case closed status, the medium affected, the crossgradient positioning, and the distance separating this facility from the subject property, this facility does not represent a recognized environmental condition in connection with the subject property.			

Site Address	Haskele State Property 3486 Maple Avenue Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	19 Approx. 0.33 mile southwest Approx. 1,750 feet

Haskele State Property is located approximately 0.33 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized waste oil release impacting the soil only. According to the local implementing agency, this facility has been granted a case closed status and no further action is needed at this time. Based on the case closed status, the medium affected, the crossgradient positioning, and the distance separating this facility from the subject property, this facility does not represent a recognized environmental condition in connection with the subject property.

Site Address	Safety Kleen Corporation 7-015-01 3561 South Maple Street Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	21 Approx. 0.40 mile South/southwest Approx. 2,100 feet

Safety Kleen Corporation 7-015-01 is located approximately 0.40 mile to the south/southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized solvents release. The media affected are reported to be unknown. According to the local implementing agency, the responsible party is in the process of confirming the leak. Based on the crossgradient positioning and the distance separating this facility from the subject property, this facility does not represent a recognized environmental condition in connection with the subject property.

Site Address	Santa Fe Intermodal Yard 2989 Golden State Boulevard Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	18 Approx. 0.46 mile West Approx. 2,450 feet

Santa Fe Intermodal Yard is located approximately 0.46 mile to the west of the subject property and is downgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is reported as experiencing an unauthorized diesel release impacting the groundwater. According to the local implementing agency, this facility has been granted a case closed status and no further action is needed at this time. Based on the case closed status and the downgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.

California Bond Expenditure Plan List

The Department of Health Services developed a site specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. The California Bond Expenditure Plan list is a compilation of sites that are included in this plan. A total of one (1) California Bond Expenditure Plan site was identified within one (1) mile of the subject property.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet
Purity Oil Sales is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is included in the California Bond Expenditure Plan list. Please refer to the NPL section for a detailed discussion on this facility.			

Annual Work Plan List

The Annual Work Plan list is a compilation of sites by the Department of Toxic Substances Control (DTSC) that are known hazardous substance sites targeted for cleanup. A total of one (1) California Bond Expenditure Plan site was identified within one (1) mile of the subject property.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet
Purity Oil Sales is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is included in the Annual Work Plan List. Please refer to the NPL section for a detailed discussion on this facility.			

Waste Management Unit Database System (WMUDS/SWAT) List

The state Waste Management Unit Database System (WMUDS/SWAT) list is used by the State Water Resources Control Board and the Regional Water Quality Control Board for tracking and inventory of waste management units. A total of one (1) WMUDS/SWAT site was identified within 0.5 mile of the subject property.

Site Address	Purity Oil Sales, Inc. 3265 South Maple Avenue Malaga, California 93725	Map ID#: Distance Direction Distance (ft)	C11, C12 & C13 Approx. 0.20 mile Southwest Approx. 1,050 feet
Purity Oil Sales is located approximately 0.20 mile to the southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility is waste management facility. Please refer to the NPL section for a detailed discussion on this facility.			

Federal RCRA CORRACTS TSD Facilities List

The Corrective Action Report (CORRACTS) is a compilation of RCRA facilities undergoing corrective action. A corrective action order is issued pursuant to RCRA Section 3008(h) when there has been a release of hazardous waste or constituents into the environment from a RCRA facility. Corrective actions may be required beyond the facility's boundary and can be required regardless of when the release occurred. A total of one (1) CORRACTS site was identified within one (1) mile of the subject property.

Site Address	Safety Kleen Corporation 7-015-01 3561 South Maple Street Fresno, California 93725	Map ID#: Distance Direction Distance (ft)	21 Approx. 0.40 mile South/southwest Approx. 2,100 feet
Safety Kleen Corporation 7-015-01 is located approximately 0.40 mile to the south/southwest of the subject property and is crossgradient with respect to groundwater flow direction. According to the EDR environmental database, this facility has been assigned a *low* corrective action priority status. Based on the distance separating this facility from the subject property and the crossgradient positioning, this facility does not represent a recognized environmental condition in connection with the subject property.			

6. RECONNAISSANCE FINDINGS

6.1 PROPERTY RECONNAISSANCE FINDINGS

A summary of uses and conditions consistent with ASTM Standard E 1527-00 § 8.4 indicating the likelihood of recognized environmental conditions in connection with the property is provided below. For each of the uses or conditions identified on the property, detailed information is discussed following the summary along with an opinion about the significance of the listing to the analysis of recognized environmental conditions in connection with the subject property.

IDENTIFIED YES	IDENTIFIED NO	
☒	☐	Hazardous Substances In Connection With Identified Uses
☒	☐	Petroleum Products In Connection With Identified Uses
☒	☐	Aboveground Or Underground Storage Tanks (ASTs/USTs)
☐	☒	Suspect Containers Not In Connection With Identified Use
☐	☒	Electrical Or Mechanical Equipment Of A Type Likely To Contain PCBs
☒	☐	Interior Stains Or Corrosion
☒	☐	Drains Or Sumps
☐	☒	Wastewater Discharges
☒	☐	Septic Or Sewage Tanks
☒	☐	Pits, Ponds Or Lagoons
☐	☒	Pools Of Liquid Or Standing Water
☐	☒	Solid Waste Dumping, Landfills Or Suspect Fill Material
☒	☐	Stained Soil Or Pavement
☐	☒	Stressed Vegetation
☒	☐	Wells
☐	☒	Odors
☐	☒	Other Uses Or Conditions Of Concern

HAZARDOUS SUBSTANCES & PETROLEUM PRODUCTS IN CONNECTION WITH IDENTIFIED USES

To the extent observed or identified through interviews, the use, generation, treatment, storage or disposal of hazardous substances and petroleum products identified in connection with use of the property is described below.

A concrete berm is located on the subject property, to the south of the west warehouse. During the site reconnaissance in November 2002, PSI observed approximately 10 unlabeled drums, one 55-gallon drum containing absorbant, and one 35-gallon drum containing oil within the berm. Approximately 15 containers (5-gallons or less in capacity), containing motor oil and hydraulic oil were situated on a wooden pallet within the berm. Two ASTs, each approximately 500-gallons in capacity were situated within the berm. The contents of the ASTs are unknown. Additionally, one drum containing used oil filters was situated on a wooden pallet located adjacent to the berm. The interior of the berm was noted to contain rainwater (less than a foot). The water

appeared slightly discolored. According to Mr. Bill Walker at E&B Trucking, Inc., occupant of the Truck Shop facility from approximately October 2002 to January 1, 2003, the drums, tanks, and containers located on the property were not generated or maintained by E&B Trucking. According to Mr. Walker, the containers were generated by Anderson Clayton, who was the prior tenant. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. The substances observed during the November 2002 site reconnaissance were hauled off-site by licensed waste haulers in March 2003. The waste removal was coordinated by Anderson Clayton Corporation. Based on the proper removal of the former containers, these containers do not represent a recognized environmental condition in connection to the subject property.

During the site reconnaissance in November 2002, PSI observed hazardous substances stored within the truck maintenance building. A degreasing tank was situated directly on the concrete pavement in this building. The tank appeared to be in good condition. Three 55-gallon drums containing hydraulic oil were situated over a wooden pallet in this building. The hydraulic oil drums appeared to be in good condition. A 35-gallon drum containing oil absorbant and a 35-gallon drum containing oily rags were situated directly over the concrete pavement in this building. Additionally, approximately 25-50 smaller containers of oil were observed in this building, stored either on wooden pallets, directly over the concrete pavement, or stocked on shelves. These containers appeared to be in good general condition. A single-wall plastic waste oil AST, approximately 75-gallons in capacity, was observed near the south wall of the building. The AST was situated directly on the concrete pavement. Smaller containers of train fluid and lubricant were situated by the AST. Additionally, a metal pan, which appeared to contain waste oil, was observed on the pavement near the AST. Approximately 3 square feet of oil staining was observed on the pavement underlying the pan. No cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. Use of oil absorbant was evident in the vicinity of the pan and AST area. According to Mr. Walker, the drums and most of the containers within the truck maintenance building were left by Anderson Clayton. The contents of the waste oil AST, maintained by E&B Trucking, were hauled off-site regularly by Evergreen. Additionally, two open buckets (less than 5-gallons in capacity) were observed in the building, situated directly over the concrete pavement. Both appeared to contain waste oil. Two of the containers were observed to be in good condition. The oils stored within the truck maintenance building are heavy hydrocarbons and releases onto the concrete pavement are not expected to result in soil or groundwater contamination. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. No surficial staining was observed in the truck maintenance building. As such, the former containers within the truck maintenance building do not represent a recognized environmental condition in connection to the subject property.

During the November 2002 site reconnaissance, PSI observed petroleum products storage within the trailer located on Parcel A. Several containers, less than 5-gallons in capacity, were stacked on the floor of the trailer and stocked on the shelves. The containers appeared to be in good condition with no evidence of releases. During the April

2003 site reconnaissance, no hazardous substances or petroleum products were observed on the subject property. Based on the good condition of these containers observed in November 2002, these former containers do not represent a recognized environmental condition in connection to the subject property.

During the November 2002 site reconnaissance, PSI observed four 35-gallon drums containing lubricant located exterior to the south and west sides of the truck maintenance building. The drums were situated either on a wooden pallet or directly over the concrete pavement. No surficial staining was observed on the pavement in the vicinity of the drums. Two 1-gallon open buckets with an oily substance were observed by the south wall of the building. The buckets were situated directly over the concrete pavement. A small stain, approximately one square foot in size, was observed on the underlying pavement. The stain did not appear to penetrate the subsurface. An open metal container, approximately 100 gallons in capacity, with an oily waste liquid was observed by the west wall of the building. Rubbish was observed in the liquid. The container was situated directly over the concrete pavement. No staining was observed on the underlying concrete. Additionally, one 35-gallon drum containing lubricant was observed on the east side of the building, situated on a wooden pallet. No surficial staining was observed on the underlying concrete pavement. According to Mr. Walker, all drums and other containers of hazardous substances or petroleum products on the exterior of the truck shop facility were maintained by Anderson Clayton, who was the prior tenant. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. The substances observed during the November 2002 site reconnaissance were hauled off-site by licensed waste haulers in March 2003. The waste removal was coordinated by Anderson Clayton Corporation. Based on the proper removal of the former containers, these containers do not represent a recognized environmental condition in connection to the subject property.

Aboveground Or Underground Storage Tanks (ASTs/USTs)

To the extent observed or identified through interviews, hazardous substance and petroleum product storage tanks identified in connection with use of the property are described below.

A propane AST, estimated to be 2,000 gallons in capacity, is located on the northeast corner of the subject property. The tank appeared to be in good condition. Due to the extremely low boiling point of propane, any leaks or spills from this AST are not expected to result in contamination of soil or groundwater. Based on the good condition of the AST at the time of site reconnaissance, this AST does not represent a recognized environmental condition in connection to the subject property.

A concrete berm is located on the subject property, to the south of the west warehouse. During the site reconnaissance in November 2002, PSI observed approximately 10 unlabeled drums, one 55-gallon drum containing absorbant, and one 35-gallon drum containing oil situated within the berm. Additionally, approximately 15 containers (5-gallons or less in capacity), containing motor oil and hydraulic oil were situated on a wooden pallet within the berm. Two ASTs, each approximately 500-gallons in capacity

were situated within the berm. The contents of the ASTs are unknown. Additionally, one drum containing used oil filters was situated on a wooden pallet located adjacent to the berm. The interior of the berm was noted to contain rainwater (less than a foot). The water appeared slightly discolored. According to Mr. Bill Walker at E&B Trucking, Inc., occupant of the Truck Shop facility from approximately October 2002 to January 1, 2003, the drums, tanks, and containers located on the property were not generated or maintained by E&B Trucking. According to Mr. Walker, the containers were generated by Anderson Clayton, who was the prior tenant. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. The substances observed during the November 2002 site reconnaissance were hauled off-site by licensed waste haulers in March 2003. The waste removal was coordinated by Anderson Clayton Corporation. Based on the proper removal of the former containers, these containers do not represent a recognized environmental condition in connection to the subject property.

During the site reconnaissance in November 2002, PSI observed a single-wall plastic waste oil AST, approximately 75-gallons in capacity, was observed near the south wall of the truck maintenance building. The AST was situated directly on the concrete pavement. Smaller containers of train fluid and lubricant were situated by the AST. Additionally, a metal pan, which appeared to contain waste oil, was observed on the pavement near the AST. Approximately 3 square feet of oil staining was observed on the pavement underlying the pan. No cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. Use of oil absorbant was evident in the vicinity of the pan and AST area. According to Mr. Walker, the drums and most of the containers within the truck maintenance building were left by Anderson Clayton. The contents of the waste oil AST, maintained by E&B Trucking, were hauled off-site regularly by Evergreen Environmental Services for disposal. The oils stored within the truck maintenance building are heavy hydrocarbons and releases onto the concrete pavement are not expected to result in soil or groundwater contamination. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. No surficial staining was observed in the truck maintenance building. As such, the former containers within the truck maintenance building do not represent a recognized environmental condition in connection to the subject property.

Interior Stains Or Corrosion

To the extent observed or identified through interviews, stains or corrosion on interior surfaces of structures on the property are described below.

During the site reconnaissance in November 2002, PSI observed a single-wall plastic waste oil AST, approximately 75-gallons in capacity, was observed near the south wall of the truck maintenance building. The AST was situated directly on the concrete pavement. Smaller containers of train fluid and lubricant were situated by the AST. Additionally, a metal pan, which appeared to contain waste oil, was observed on the pavement near the AST. Approximately 3 square feet of oil staining was observed on the pavement underlying the pan. No cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. Use of oil absorbant was

evident in the vicinity of the pan and AST area. According to Mr. Walker, the drums and most of the containers within the truck maintenance building were left by Anderson Clayton. The contents of the waste oil AST, maintained by E&B Trucking, were hauled off-site regularly by Evergreen. The oils stored within the truck maintenance building are heavy hydrocarbons and releases onto the concrete pavement are not expected to result in soil or groundwater contamination. During the site reconnaissance in April 2003, no hazardous substances were observed on the subject property. No surficial interior staining was observed. The substances observed during the November 2002 site reconnaissance were hauled off-site by licensed waste haulers in March 2003. The waste removal was coordinated by Anderson Clayton Corporation. Based on the proper disposal of the substances on the property, the staining does not represent a recognized environmental condition in connection to the subject property.

Drains Or Sumps

To the extent observed or identified through interviews, drains or sumps identified on the property are described below.

A concrete berm is located on the subject property, to the south of the west warehouse. During the site reconnaissance in April 2003, PSI observed a drain located within the berm. The drain was not observed during the November 2002 site reconnaissance due to storage of containers obstructing view of the drain. The drain was observed to be clean and filled with rainwater during the April 2003 site reconnaissance. According to Mr. Lange, the drain leads to a small concrete-lined containment area beneath the surface of the drain. The capacity of this containment area is estimated to be less than ten gallons. Based on the good condition of the drain, this drain does not represent a recognized environmental condition in connection to the subject property.

Septic Or Sewage Tanks

To the extent observed or identified through interviews, septic or sewage tanks identified on the property are described below.

The Truck Shop is equipped with an on-site septic tank, located to the northeast of the truck maintenance building. According to Mr. Lange, a single restroom in the building is the only connection to the septic tank. As such, this septic tank does not represent a recognized environmental condition in connection to the subject property.

Pits, Ponds Or Lagoons

To the extent observed or identified through interviews, pits, ponds or lagoons identified on the property are described below.

PSI observed a large excavation pit is located near the center of the subject property. According to Mr. Lange, this was a former overflow pond for a stormwater retention pond located on the west-adjoining property. Usage of this overflow pond was discontinued when the current stormwater retention pond was enlarged. Soil from this overflow pond was tested and used as backfill soil associated with remedial activities for the south and southwest ponds on the west-adjoining Cottonseed Delinting Plant. Based on the

knowledge that the soil in this excavation pit has been analyzed and contamination was not identified, this excavation pit does not represent a recognized environmental condition in connection to the subject property.

Stained Soil Or Pavement

To the extent observed or identified through interviews, areas of stained soil or pavement identified on the property are described below.

During the April 2003 site reconnaissance, PSI observed a blue stain (less than five square feet in size) located to the west of the concrete berm area. The stain, which appeared to be a result of a recent spill, was partially on the soil and partially on the concrete pad. The stained area did not appear to penetrate further than the surface of the soil and pavement. Mr. Lange was not aware of origin of the stain. PSI contacted Mr. Richard Espinoza of Anderson Clayton Corporation, who was responsible for the removal of hazardous substances identified on the property in November 2002. Mr. Espinoza indicated that to his knowledge, no blue-colored substances were stored on the property. Based on the small area and surficial nature of the stain observed, this stain does not represent a recognized environmental condition in connection to the subject property.

Wells

To the extent observed or identified through interviews, wells identified on the property are described below.

A domestic water well is located on the northern portion of the property, which supplies the potable water at the Truck Shop. The well is surrounded by protective metal barriers and was observed to be in good condition. Based on the usage of this well, this well does not represent a recognized environmental condition in connection to the subject property.

6.2 ADJOINING PROPERTY RECONNAISSANCE FINDINGS

A summary of uses and conditions identified on adjoining properties consistent with ASTM Standard E 1527-00 § 8.4 indicating the likelihood of recognized environmental conditions in connection with the subject property is provided below. For each of the uses or conditions identified on adjoining properties, detailed information is discussed following the summary along with an opinion about the significance of the listing to the analysis of recognized environmental conditions in connection with the subject property.

IDENTIFIED YES	IDENTIFIED NO	
☒	☐	Hazardous Substances In Connection With Identified Uses
☒	☐	Petroleum Products In Connection With Identified Uses
☒	☐	Aboveground Or Underground Storage Tanks (ASTs/USTs)
☐	☒	Suspect Containers Not In Connection With Identified Use
☒	☐	Electrical Or Mechanical Equipment Of A Type Likely To Contain PCBs
☒	☐	Interior Stains Or Corrosion
☒	☐	Drains Or Sumps
☐	☒	Wastewater Discharges
☒	☐	Septic Or Sewage Tanks
☒	☐	Pits, Ponds Or Lagoons
☐	☒	Pools Of Liquid Or Standing Water
☐	☒	Solid Waste Dumping, Landfills Or Suspect Fill Material
☒	☐	Stained Soil Or Pavement
☐	☒	Stressed Vegetation
☒	☐	Wells
☐	☒	Odors
☐	☒	Other Uses Or Conditions Of Concern

HAZARDOUS SUBSTANCES & PETROLEUM PRODUCTS IN CONNECTION WITH IDENTIFIED USES

To the extent observed or identified through interviews, the use, generation, treatment, storage or disposal of hazardous substances and petroleum products identified in connection with uses of adjoining property is described below.

PSI observed hazardous substances and petroleum products on the west adjoining property, the Cottonseed Delinting Plant owned by Dunavant Enterprises:

PSI observed located PSI observed a hydraulic bale press located in the southwest corner of the machine delinting plant. The hydraulic pump was observed adjacent to the pump situated directly on the concrete pavement. Approximately 25 square feet of staining was observed on the pavement in the vicinity of the pump. No cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. The stains appeared superficial in nature and are considered to be *de minimis*. Based on the *de minimis* nature of the staining observed, the hydraulic pump does not represent a recognized environmental condition in connection to the subject property.

PSI observed a concrete berm located on the east side of the machine delinting plant. The interior of the berm was observed to be stained with a pink dye. According to Mr. Lange, this area was used to apply dyes onto the delinted seeds prior to packaging, so that the type of seed could be distinguished by color. *De minimis* staining was observed on the concrete pavement around the berm. However, no cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. Based on the *de minimis* staining observed, this area does not represent a recognized environmental condition in connection to the subject property.

PSI observed an open 55-gallon drum containing a small amount of liquid near the railroad spur on the northern half of the subject property. Additionally, two open 55-gallon drums containing liquid were observed by the hull house. The drums appeared to contain rainwater. No staining was observed on the underlying these drums. As such, these drums do not represent a recognized environmental concern in condition in connection with the subject property.

Aboveground Or Underground Storage Tanks (ASTs/USTs)

To the extent observed or identified through interviews, hazardous substance and petroleum product storage tanks identified in connection with uses of adjoining property are described below.

PSI observed aboveground storage tanks and obtained evidence of former underground storage tanks on the west adjoining property, the Cottonseed Delinting Plant owned by Dunavant Enterprises:

According to records reviewed at the FCEHD, three 10,000-gallon hexane USTs were excavated from the PCOC facility (from the northern half of the west adjoining property) in 1986. No leakage from or structural damage to the tanks was detected during the time of excavation. No evidence of clean closure was identified among the agency's records. However, based on the crossgradient positioning of these historical USTs from the subject property, these USTs do not represent a recognized environmental condition in connection to the subject property.

In May 1986, two 10,000-gallon USTs containing gasoline and diesel were excavated from the PCOC facility (from the northern half of the west adjoining property). An unauthorized release, impacting the soil to a depth of 20 feet bgs, was detected at that time. The impacted soil was excavated and aerated on-site. The excavation pit was backfilled with clean imported soil. The aerated soil was deemed adequately remediated by the FCEHD and was disposed on-site. In January 1992, the product lines and fuel dispensers associated with these USTs were removed. Analytical testing of soil samples taken during the time of removal indicated that the soil contained trace amounts of toluene and xylenes (0.005 mg/kg and 0.007mg/kg, respectively). No evidence of clean closure was identified among the agency's records. However, based on the crossgradient positioning of these historical USTs from the subject property, these USTs do not represent a recognized environmental condition in connection to the subject property.

In August 1991, two 1,000-gallon USTs containing gasoline were excavated from the PCOC facility (from the northwest corner of the west adjoining property). Analytical testing of soil samples collected during the time of excavation indicated that the soil was impacted by total petroleum hydrocarbons as gasoline (TPH-G), ethylbenzene and xylenes. The lateral and vertical extents of the contamination were determined to be 30 feet wide and 20 feet deep. Approximately 700 cubic yards of contaminated soil was excavated. Of this, 400 cubic yards was hauled off-site for disposal and the remaining 300 cubic yards was remediated on-site by aeration. The excavation pit was backfilled with clean soil. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. However, based on the crossgradient positioning of these historical USTs from the subject property, these USTs do not represent a recognized environmental condition in connection to the subject property.

In June 1993, a 22,000-gallon underground concrete diesel bunker was excavated from the PCOC facility (from the northern half of the west adjoining property, north of the Planting Seed House). Soil samples collected during the time of excavation were analyzed for total petroleum hydrocarbons as diesel (TPH-D) and oil and grease. TPH-D was not detected in any of the soil samples. Oil and grease was detected in two out of the five samples collected. According to a memorandum dated May 15, 1995, upon the FCEHD's receipt of the disposition of the impacted soil, i.e., waste disposal manifest, a clean closure letter can be issued. No clean closure letter was identified among the FCEHD files reviewed. However, based on the crossgradient positioning of these historical USTs from the subject property, these USTs do not represent a recognized environmental condition in connection to the subject property.

During the site reconnaissance, an 8,000-gallon concentrated sulfuric acid AST, associated with the acid delinting process, was observed by the south wall of the delinting plant. The tank was situated within a concrete berm. The interior of the concrete berm was visibly eroded and stained. However, no cracks were observed on the concrete, which would provide a pathway for fluid migration to the subsurface. The system is referred to as a "zero discharge system". The unused solution is pumped into a reservoir and back into the system for recycled use. Based on the secondary containment observed and the crossgradient positioning of this AST from the subject property, this AST does not represent a recognized environmental condition in connection to the subject property.

Three sulfuric acid ASTs, two approximately 200 gallons and one approximately 500 gallons in capacity, were observed in the acid delinting plant. The tanks were situated within a concrete berm (acid wash area) and appeared to be in good condition. The interior of the concrete berm was visibly eroded and stained. However, no cracks were observed on the concrete, which would provide a pathway for fluid migration to the subsurface. This area was used for a "dilute acid" operation. After the machine delinting process, the seeds were conveyed to the acid spray wash area and a diluted sulfuric acid solution was sprayed onto the seeds. Buffer was then applied onto the seeds. The dilute

acid was contained and recycled within the system. Residual rinse water was collected in catch basins and hauled off-site for recycling at the Kettleman site. Based on the secondary containment observed and the crossgradient positioning of this AST from the subject property, these ASTs do not represent a recognized environmental condition in connection to the subject property.

An AST, approximately 200 gallons in capacity, was observed to the south of the machine delinting plant, situated on concrete pavement without a secondary containment. The tank reportedly contained a dye that was applied onto the delinted cottonseed for identification purposes, and is no longer in use. No surficial staining was observed on the concrete pavement underlying the tank. Based on the lack of evidence to suggest a latent discharge has occurred from this tank and the crossgradient positioning of this AST from the subject property, this tank does not represent a recognized environmental condition in connection to the subject property.

An AST, approximately 100-gallons in capacity, was observed by the southeast corner of the pond containing the emergency water supply located near the northern border of the property. The contents of the tank are currently unknown. The tank appeared to be in good condition. No evidence of a release was observed from this tank. Based on the good condition of the tank and the crossgradient positioning of this AST from the subject property, this tank does not represent a recognized environmental condition in connection to the subject property.

A propane AST, estimated to be 2,000 gallons in capacity, was observed on the northern portion of the property, to the east of the hull house. A second propane AST, estimated to be 500 gallons in capacity, was observed by the south wall of Seed House No. 2. The tanks were observed to be in good condition. Due to the extremely low boiling point of propane, any leaks or spills from this tank are not expected to result in contamination of soil or groundwater. Based on the good condition of the tank at the time of site reconnaissance, this tank is not considered to represent a recognized environmental condition in connection to the subject property.

Several ASTs containing seed, water, and molasses were observed on the northern portion of the property in the vicinity of the hull house and the meal warehouse. Based on their non-hazardous contents, these ASTs do not represent a recognized environmental condition in connection to the subject property.

Additionally, PSI observed ASTs located on the north adjoining property, the Anderson Clayton property: The contents of the ASTs are currently unknown. However, based on the cross/downgradient positioning of these ASTs from the subject property, these ASTs do not represent a recognized environmental condition in connection to the subject property.

Electrical Or Mechanical Equipment Of A Type Likely To Contain PCBs

To the extent observed or identified through interviews, stationary electrical or mechanical equipment identified on adjoining property and known to contain polychlorinated biphenyls (PCBs), or likely to contain PCBs, are described below.

PSI observed electrical transformers located on the adjoining properties of the subject property. The transformers appeared to be in good general condition. The transformers are owned and maintained by PG&E. Based on the good condition of the transformers observed during site reconnaissance, these transformers do not represent a recognized environmental condition in connection to the subject property.

Interior Stains Or Corrosion

To the extent observed or identified through interviews, stains or corrosion on interior surfaces of structures on adjoining property are described below.

PSI observed interior stains on the west adjoining property, the Cottonseed Delinting Plant owned by Dunavant Enterprises. Stained concrete pavement was observed in the interior of the hull house located on the northern portion of the property. The hull house was observed to be vacant at the time of site reconnaissance. The staining consisted of small areas totaling approximately 100 square feet in size. The staining appeared to be a result of spillage of a corrosive agent. No cracks were observed on the pavement, which would provide a pathway for fluid migration to the subsurface. As such, these stains do not represent a recognized environmental condition in connection to the subject property.

Drains Or Sumps

To the extent observed or identified through interviews, drains or sumps identified on adjoining property are described below.

PSI observed several trenches and pits throughout the western half of the west-adjoining Cottonseed Delinting Plant owned by Dunavant Enterprises. Mr. Lange indicated that to his knowledge, there were no clarifiers or USTs currently on the property. The trenches and pits on the property were associated with unloading and conveyance operations for bulk cottonseed. The operation consisted of sealed concrete enclosures with either screw conveyors or air handling systems to facilitate the unloading and conveyance of seeds. Based on the usage of these trenches and pits, the trenches and pits do not represent a recognized environmental condition in connection to the subject property.

Pits, Ponds Or Lagoons

To the extent observed or identified through interviews, pits, ponds or lagoons identified on adjoining property are described below.

PSI observed pits, ponds and/or lagoons on the west adjoining property, the Cottonseed Delinting Plant owned by Dunavant Enterprises:

Producers Cotton Oil Company (PCOC) occupied the Cottonseed Delinting Plant from approximately 1920 to 1992. The PCOC facility engaged in two main processes:

preparation of cotton planting seeds and processing cottonseed oil. The preparation of cotton planting seeds involved an acid delinting process in which seeds were dipped into a hydrogen sulfate wash, then rinsed with water. According to records reviewed at the FCEHD, between 1981 and 1985, the rinse water generated from the acid delinting process was discharged through storm drain lines into an unlined pond, approximately 230,000 gallons in capacity, known as the "southwest pond" located near the southwest corner of the property. The overflow from this pond was directed to an unlined pond, approximately 10 million gallons in capacity, known as the "south pond", located along the south border of the property to the east of the southwest pond. The rinse water was allowed to percolate into the soil through this process, which resulted in sulfates being deposited into the soil.

The rinse water was considered a hazardous waste according to the criteria of the Regional Water Quality Control Board (RWQCB) and the facility was placed on the Toxic Pits Cleanup Act (TCPA) list. In 1991, PCOC conducted a soil and groundwater assessment related to the south and southwest ponds in order to comply with TCPA requirements. Elevated sulfate concentrations and slightly acidic pH levels were detected in the soil and groundwater beneath the ponds. The ponds, no longer in service, have been backfilled and sealed with an 18-inch bentonite cap to prevent rainwater from causing sulfates to migrate from the soil into the groundwater.

Based on the soil and groundwater analysis and the fact that ponds had not received effluent since 1985, the RWQCB recommended that the facility be removed from the TCPA list. In August 1991, the RWQCB requested that PCOC submit closure plans for the former ponds, and a work plan for assessing the vertical and lateral extent of groundwater degradation. Four shallow groundwater monitoring wells, MW-1 through MW-4 (screened from 60 to 80 feet bgs), were installed in the vicinity of the former ponds. The RWQCB recommended that the concentrations of sulfate and pH in the samples collected from the upgradient well MW-1 (60 mg/L and 8.0, respectively) be considered as background for the purpose of evaluating groundwater quality at the property.

Additional groundwater assessment activities were conducted by Kleinfelder, Inc. in March 1992, during which three additional groundwater monitoring wells, MW-5 through MW-7, were installed at the estimated edge of the sulfate plume. MW-5 was installed as a deep groundwater monitoring well (screened from 89 to 169 feet bgs) to assess the vertical extent of the sulfate plume, and MW-6 and MW-7 were installed near the northern boundary of the property to assess the lateral extent of the plume.

Currently groundwater assessment activities include existing off-site wells located to the west and northwest of the Cottonseed Delinting Plant.

According to a June 1999 Groundwater Monitoring Sulfate Plume Assessment, prepared by Krazan & Associates, Inc. for Anderson Clayton Corporation, during a sampling event conducted in June 1999, the highest concentrations of sulfate were detected in MW-3 (330 mg/L). The sulfate concentration detected in the on-site deep groundwater monitoring well, MW-5, was 68 mg/L. According to Krazan, the distribution of the constituents of

concern appeared to occur in a linear southeast-northwest orientation, which corresponds with the regional groundwater flow direction (northwest). The sulfate plume was determined to extend as far as 1,000 feet northwest of the subject property (according to data obtained from an off-site well, MW-38, in which 140 mg/L of sulfate was detected).

Based on the crossgradient positioning of the southwest and south ponds to the subject property, this sulfate plume does not represent an off-site recognized environmental condition in connection to the subject property. Furthermore, based on the lack of evidence to suggest that sulfates were ever stored or generated on the subject property, it is highly unlikely that the occupant of the subject property will be held responsible for the remediation of groundwater contamination at the subject property, if any, resulting from this release.

According to a memorandum, dated November 6, 1990, issued by the RWQCB, until early 1989, a pond on the Cottonseed Delinting Plant received stormwater discharge from Curie Bros., and adjacent bulk oil distributor. An inspection of the site in early 1989 revealed that drainage from this facility contained gasoline constituents. Gasoline constituents, as well as metals, were later detected at the bottom of the pond. Subsequently, Anderson Clayton sealed the drain pipe leading to the pond from the Curie Bros. facility.

A site assessment and remediation was conducted by Anderson Clayton in the vicinity of the pond. The assessment included the drilling of a total of four test pits within the pond to a depth of 10 feet to determine the vertical extent of the contamination. An additional five test pits were drilled to a depth of 30 feet, two within the pond and three adjacent to the pond as background. A water sample was also collected from the Curie Bros. storm drain. The samples were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethyl benzene, and xylenes (BTEX), volatile aromatic hydrocarbons, and various metals and minerals.

TPH were detected at levels not greater than 30 mg/kg below the area excavated as part of the remediation. No petroleum hydrocarbons were detected at depths below 10 feet. No volatile aromatic hydrocarbons were detected. Several metals and minerals were detected above background levels. However, these levels were attributed to normal stormwater runoff. Additionally, at depths below 10 feet, the levels detected were equal to background levels.

Upon review of the findings of the assessment, the RWQCB approved the usage of the excavated soil as road base on the subject property, based on the expectation that thinly spreading the soil would enhance the biodegradation of the hydrocarbons. As such, the discharge from the Curie Bros. storm drain does not represent a recognized environmental condition in connection to the subject property.

PSI observed a concrete-lined pond with an associated sump near the north border of the Cottonseed Delinting Plant, to the east of the fire pump house. The pond and sump were observed to be filled with water during the time of site reconnaissance. According to Mr. Lange, the pond was used in connection with the fire suppression system and supplied

emergency water in case of a fire. Based on the reported usage, this pond does not represent a recognized environmental condition in connection to the subject property.

An unlined stormwater retention pond was observed on the southeast corner of the Cottonseed Delinting Plant. This pond reportedly does not receive influent from any chemical processes. The pond is used for stormwater retention purposes only. As such, this pond does not represent a recognized environmental condition in connection to the subject property.

The hull house, located on the northern portion of the Cottonseed Delinting Plant, was reportedly used for storage of bulk cottonseed hulls that were separated from the cottonseed during the during the oil extraction process. This building is currently not in use. A pit with conveyance equipment is located to the south of this structure. This area is the location of a former "mixed feed operation", which involved application of molasses to seeds as a protein supplement. This operation was reportedly discontinued in the late 1970's. Debris was observed in and around the pit, which is reportedly due to lack of operation and maintenance. No evidence of hazardous substances or petroleum products was observed in the debris. Based on the above, the debris is not considered to represent a recognized environmental condition.

Pools Of Liquid Or Standing Water

To the extent observed or identified through interviews, pools of liquid and areas of standing surface water identified on adjoining property are described below.

During the off-site reconnaissance in November 2002, PSI observed several small pools of standing water throughout the Cottonseed Delinting Plant due to rainfall. These pools of standing water do not represent a recognized environmental concern in condition in connection with the subject property.

Stained Soil Or Pavement

To the extent observed or identified through interviews, areas of stained soil or pavement identified on adjoining property are described below.

PSI observed staining on the soil throughout the Cottonseed Delinting Plant, in the vicinity and to the east of the seed houses. According to Mr. Lange, this area was used to stockpile manure (by Imperial Western). No petroleum or solvent odor was detected in the stained areas. However, a manure odor was detected. Based on the historical usage in the area of the staining the staining doe not represent a recognized environmental condition in connection to the subject property.

Wells

To the extent observed or identified through interviews, wells identified on adjoining property are described below.

PSI observed several wells on the west adjoining Cottonseed Delinting Plant owned by Dunavant Enterprises:

An domestic water well is located on the northern portion of the Cottonseed Delinting Plant, to the west of the hull house. Based on the nature of this well, this well does not represent a recognized environmental condition in connection to the subject property.

Producers Cotton Oil Company (PCOC) occupied the Cottonseed Delinting Plant from approximately 1920 to 1992. The PCOC facility engaged in two main processes: preparation of cotton planting seeds and processing cottonseed oil. The preparation of cotton planting seeds involved an acid delinting process in which seeds were dipped into a hydrogen sulfate wash, then rinsed with water. According to records reviewed at the FCEHD, between 1981 and 1985, the rinse water generated from the acid delinting process was discharged through storm drain lines into an unlined pond, approximately 230,000 gallons in capacity, known as the "southwest pond" located near the southwest corner of the property. The overflow from this pond was directed to an unlined pond, approximately 10 million gallons in capacity, known as the "south pond", located along the south border of the property to the east of the southwest pond. The rinse water was allowed to percolate into the soil through this process, which resulted in sulfates being deposited into the soil.

The rinse water was considered a hazardous waste according to the criteria of the Regional Water Quality Control Board (RWQCB) and the facility was placed on the Toxic Pits Cleanup Act (TCPA) list. In 1991, PCOC conducted a soil and groundwater assessment related to the south and southwest ponds in order to comply with TCPA requirements. Elevated sulfate concentrations and slightly acidic pH levels were detected in the soil and groundwater beneath the ponds. The ponds, no longer in service, have been backfilled and sealed with an 18-inch bentonite cap to prevent rainwater from causing sulfates to migrate from the soil into the groundwater.

Based on the soil and groundwater analysis and the fact that ponds had not received effluent since 1985, the RWQCB recommended that the facility be removed from the TCPA list. In August 1991, the RWQCB requested that PCOC submit closure plans for the former ponds, and a work plan for assessing the vertical and lateral extent of groundwater degradation. Four shallow groundwater monitoring wells, MW-1 through MW-4 (screened from 60 to 80 feet bgs), were installed in the vicinity of the former ponds. The RWQCB recommended that the concentrations of sulfate and pH in the samples collected from the upgradient well MW-1 (60 mg/L and 8.0, respectively) be considered as background for the purpose of evaluating groundwater quality at the property.

Additional groundwater assessment activities were conducted by Kleinfelder, Inc. in March 1992, during which three additional groundwater monitoring wells, MW-5 through MW-7, were installed at the estimated edge of the sulfate plume. MW-5 was installed as a deep groundwater monitoring well (screened from 89 to 169 feet bgs) to assess the vertical extent of the sulfate plume, and MW-6 and MW-7 were installed near the northern boundary of the property to assess the lateral extent of the plume.

Currently groundwater assessment activities include existing off-site wells located to the west and northwest of the Cottonseed Delinting Plant.

According to a June 1999 Groundwater Monitoring Sulfate Plume Assessment, prepared by Krazan & Associates, Inc. for Anderson Clayton Corporation, during a sampling event conducted in June 1999, the highest concentrations of sulfate were detected in MW-3 (330 mg/L). The sulfate concentration detected in the on-site deep groundwater monitoring well, MW-5, was 68 mg/L. According to Krazan, the distribution of the constituents of concern appeared to occur in a linear southeast-northwest orientation, which corresponds with the regional groundwater flow direction (northwest). The sulfate plume was determined to extend as far as 1,000 feet northwest of the subject property (according to data obtained from an off-site well, MW-38, in which 140 mg/L of sulfate was detected).

Based on the crossgradient positioning of the southwest and south ponds to the subject property, this sulfate plume does not represent an off-site recognized environmental condition in connection to the subject property. Furthermore, based on the lack of evidence to suggest that sulfates were ever stored or generated on the subject property, it is highly unlikely that the occupant of the subject property will be held responsible for the remediation of groundwater contamination at the subject property, if any, resulting from this release.

Other Uses Or Conditions Of Concern

To the extent observed or identified through interviews, other uses or conditions of concern identified on adjoining property are described below.

PSI observed several pipes protruding from the ground in the vicinity of the seed houses on the west-adjoining Cottonseed Delinting Plant. The pipes were approximately one foot wide in diameter and were generally two feet high, although some were observed that were approximately 10 feet high. Mr. Lange indicated that the shorter pipes on the property were vent pipes associated with an air duct system for cooling the bulk cottonseed when the seed houses were in use. The cooling fans and connecting ductwork have been removed when the seed houses were no longer in use. The taller pipes were reportedly support columns for a former seed storage facility. Based on the usage of these pipes, these pipes do not represent a recognized environmental condition in connection to the subject property.

PSI observed railroad spurs running through the northern half of the property, originating at the west border and terminating on the eastern half of the west-adjoining Cottonseed Delinting Plant. The railroad spurs are located greater than 500 feet from the subject property. According to a review of historical aerial photographs, these railroad spurs were located on the subject property since at least 1957. Based on the distance of these railroad spurs to the subject property, these railroad spurs do not represent a recognized environmental condition in connection to the subject property.

7. FINDINGS AND CONCLUSIONS

7.1 PHASE I ENVIRONMENTAL SITE ASSESSMENT

PSI has performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of the ASTM Standard E 1527-00 protocol of Truck Shop in Fresno County, California. Exceptions to or deletions from this protocol are discussed earlier in this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property except for the following:

ON-SITE CONDITIONS

Recognized Environmental Conditions

- None

Historical Recognized Environmental Conditions

- None

OFF-SITE CONDITIONS

Recognized Environmental Conditions

- None

Historical Recognized Environmental Conditions

- None

8. RECOMMENDATIONS

Based on investigation of the property for evidence of recognized environmental conditions and other environmental issues, PSI offers the following recommendations.

- No further assessment of recognized environmental conditions appears to be warranted.

- Based on the age of the structures, it is recommended that, prior to any demolition or renovation activities, a comprehensive asbestos survey be conducted. All confirmed asbestos containing materials that will be affected should be properly abated.

9. WARRANTY

PHASE I ENVIRONMENTAL SITE ASSESSMENT

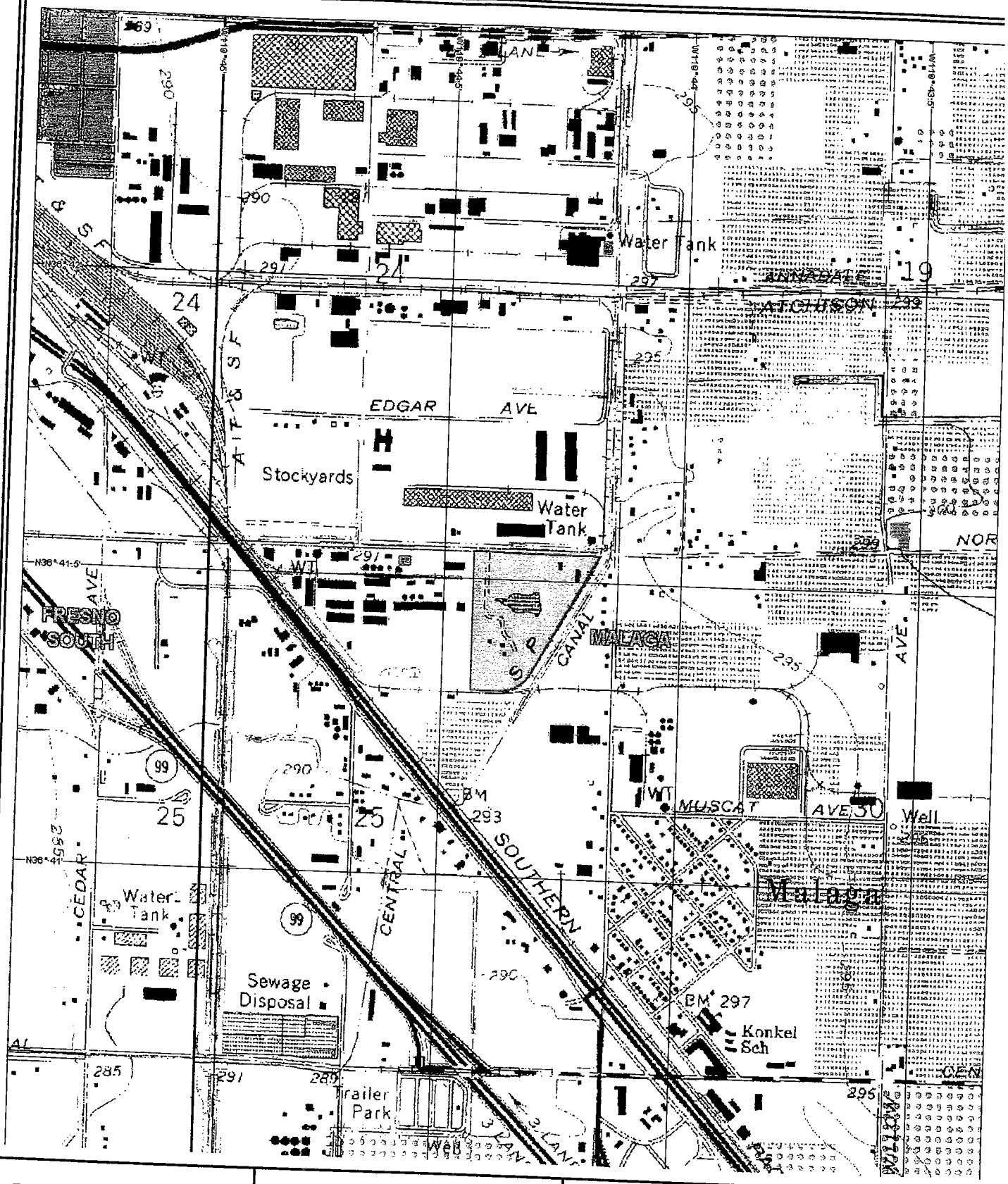
PSI warrants that the findings and conclusions contained herein were accomplished in accordance with the methodologies set forth in the ASTM Standard E 1527-00 protocol. These methodologies are described by the standard as representing good commercial and customary practice for conducting an Environmental Site Assessment of a parcel of property for the purpose of identifying recognized environmental conditions. However, these findings and conclusions contain all of the limitations inherent in these methodologies that are referred to in the protocol and some of which are more specifically set forth below.

UNIDENTIFIABLE CONDITIONS

There is a possibility that even with proper application of these methodologies, conditions may exist on the property that could not be identified within the scope of the assessment or that were not reasonably identifiable from the available information. PSI believes that the information obtained from the records review and the interviews concerning the property is reliable. However, PSI cannot and does not warrant or guarantee that the information provided by these other sources is accurate or complete. The methodologies of this assessment are not intended to produce all inclusive or comprehensive results, but rather to provide the client with information regarding apparent suspicions of existing and potential adverse environmental conditions relating to the subject property.

No other warranties are implied or expressed.

APPENDIX A - MAPS AND SKETCHES



psi Information To Build On
Engineering • Consulting • Testing

3960 Gilman Street
Long Beach, CA 90815
562/597-3977
Fax 562/597-8459

PROJECT NAME:

Truck Shop
2635 East North Avenue
Fresno County, California 93725

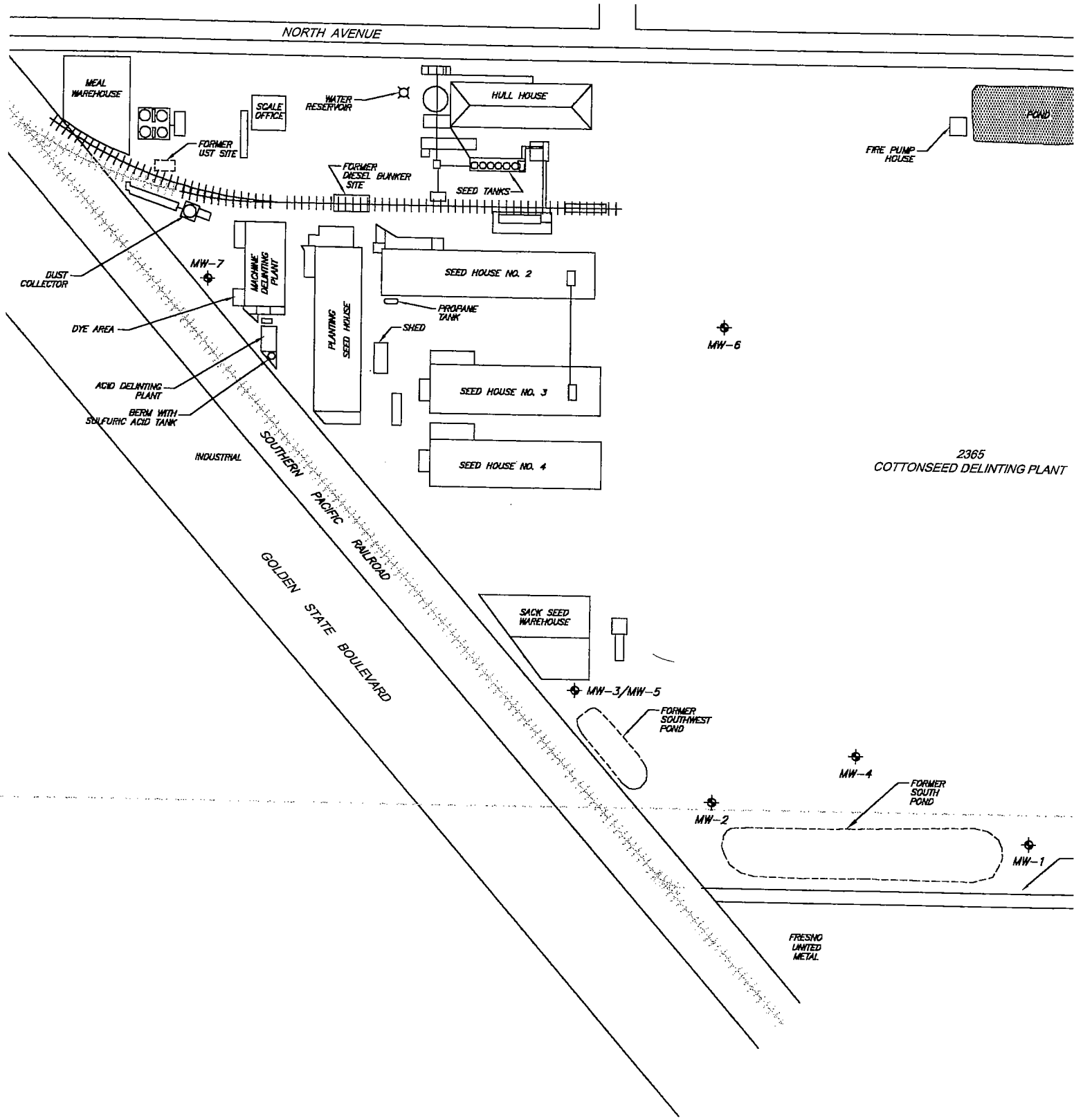
PSI Project No.: 559-3E032

SITE VICINITY MAP

Map:
Malaga, California Quadrangle
7.5' USGS Topographic Map

Scale: 1: 16,000
Date: 1964 (photorevised 1981)

N



LEGEND

W-7 — EXISTING GROUNDWATER MONITORING WELL (APPROXIMATE LOCATION)

Engineering
ENVIRO
J
Long B

APPENDIX B - OWNERSHIP AND HISTORICAL DOCUMENTS

Environmental Data Resources, Inc.

"Linking Technology with Tradition"

Sanborn® Map Report

Ship to: Christine Prado
PSI, Inc.
3960 Gilman Street
Long Beach, CA 90815

1612155TLB 562-597-3977

Order Date: 11/19/2002 **Completion Date:** 11/20/2002
Inquiry #: 884087.2S
P.O. #: NA
Site Name: Dunavant Enterprises
Address: 2365 & 2635 East North Avenue
City/State: Fresno, CA 93725
Cross Streets:

This document reports that the largest and most complete collection of Sanborn fire insurance maps has been reviewed based on client-supplied information, and fire insurance maps depicting the target property at the specified address were not identified.

NO COVERAGE

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BUILDING

DRAINAGE FEE

1 — BUILDING SQ. FT. 1800

DESCRIPTION OF STRUCTURE

30X60 WAREHOUSE
Electrical Only
BP #74142

LEGAL DESC BLOCK | LOT NO | TRACT

TRACT
SW 1/4 SEC 25 T16S R20E
LYING WORK OF THE
SOUTHERLY PARCEL OF
RELINQUISHMENT OF WAY

PERMIT

1 (2) 3 - 4 - 5

BUILDING ADDRESS 2635 E. NORTH AVENUE
LOCATION FRESNO NEAREST CROSS ST CHESTNUT
OWNER PRODUCERS COTTON OIL CO. DATE 3/14/74
MAIL ADDRESS P.O. BOX
CITY FRESNO TEL NO 268-7641

CONTRACTOR	LICENSE NO.	PHONE
BLDG		
PLUMBING		
ELECT		
MECH		

WHEN VALIDATED THIS APPLICATION IS YOUR PERMIT

DATE	PERMIT NUMBER	CLASS	AMOUNT
MAR-14-73	76092		

FIRST PRINT LINE

BLDG. LOT | NO. OF BLDGS NOW ON LOT

USE OF EXISTING BLDG | NO. OF FAMILIES

ARCHITECT OR ENGINEER

ADDRESS | TEL NO

SEWER CONNECTION APPROVAL | ENCROACHMENT APPROVAL

PLANNING DEPARTMENT

REQUIRED SETBACK	FRONT MIN	FRONT MAX	SIDE INTERIOR	SIDE STREET	REAR

APPROVED | DATE

CERTIFICATE OF OCCUPANCY | APPROVED ☐ | PENDING ☐

PLUMBING

	EACH	FEE
PERMIT FEE	3.00	3.00
WATER CLOSET	1.75	
BASIN LAVATORY	1.75	
BATH TUB	1.75	
SHOWER	1.75	
KITCHEN SINK	1.75	
DISHWASHER	1.75	
LAUNDRY TRAYS	1.75	
FLOOR DRAIN	1.75	
URINAL	1.75	
WASTE DISPOSAL	1.75	
CONVERSION OF GAS TO OIL	15.00	
HOUSE SEWER	5.00	
WATER PIPING and or SERVICE	1.50	
LA GAS PIPING SYSTEM 1 to 5 outlets	2.00	
GAS PIPING SYSTEM 6 or more outlets	.40	
GAS APPLIANCE	2.50	
SPECIAL SEE ORDINANCE		
ROOF DRAINS NO. 4	2.00	
EACH ADDITIONAL DRAIN	.50	

SPECIAL INSPECTION FEE 8.00 PER HOUR

SINGLE FAMILY DWELLING

All plumbing work in living unit, hot water heater in a one bathroom newly constructed, single family dwelling, excluding all other gas or 15.00

ELECTRICAL

NO		EACH	FEE
1	PERMIT FEE	3.00	3.00
16	RECEPTACLES Switches Light Outlets		
3	FIXTURES		
9	TOTAL of two lines above		
	FIRST 10 OR PORTION	2.50	2.50
	REMAINDER ___ x 10 ea		
	ELECTRIC RANGES / DISHWASHER	1.00	
	DRYERS / HEATER / DISPOSAL	1.00	
	0 - 5 HP 50 / OVER 5 - 15 HP	2.00	
	OVER 5 - 2 HP 1.00 / OVER 15 - 50 HP	4.00	
1	OVER 2 - 5 HP 1.50 / WELDERS	1.00	
	MOTORS		1.50

SPECIAL INSPECTION FEE 8.00 PER HOUR

SERVICE CONDUCTORS & SUB-PANELS

NO. 8 OR NO. 6 WIRE	1.50	
1 NO. 4 OR 2 OR NO. 1 WIRE	2.50	2.50
NO. 1/0 - 2/0 - 3/0 OR 4/0 WIRE	1.50	
250,000 C.M. to 350,000 C.M. WIRE	5.00	
OVER 350,000 C.M. WIRE	7.50	

SINGLE FAMILY DWELLING

Accessory Construction 8 to 200 Sq. Ft. | 10.00

MECHANICAL

NO		EACH	FEE
	PERMIT FEE	1.00	1.00
	LA GAS PIPING SYSTEM 1 to 5 outlets	2.00	
	GAS APPLIANCE	2.50	
	VENTILATION DUCT GRAVITY	2.00	
	SERVING COMM. KITCHEN	1.00	
	Mechanical Inc. Hood		
	Under 4,000 C.F.M. 1.00		
	Over 4,000 C.F.M. 5.00		
	SERVING COMM. KITCHEN		
	UNDER 4 MC.F.M. $4.00		
	OVER 4 MC.F.M. $6.00		
	DUCT SYSTEM NON RESIDENT		
	SINGLE STORY 0 - 4M SQ. FT.	5.00	
	OVER 4M SQ. FT.	10.00	
	MULTI STORY PER FLOOR	4.00	
	EVAP. COOLER TAX	2.00	

SPECIAL INSPECTION FEE 8.00 PER HOUR

REFRIGERATION COOLING UNITS

2 TONS to 7 TONS	4.00	
OVER 7 TONS to 14 TONS	7.00	
Gas Absorption System to 130,000 BTU	4.00	
130,001 to 170,000 BTU	7.00	
LESS THAN 2 TONS TAX	5.00	

BUILDING

DRAINAGE FEE

BUILDING SIZE SQ. FT. 4,000

PARKING

GAR. CAP.

1 - 40'x100' WAREHOUSE BUILDING

W 1/4 SEC 25 T14S R20E

YING NORTH OF THE SOUTHERN PACIFIC RAIL ROAD RIGHT-OF-WAY

PERMIT

2365 E. NORTH AVENUE

FRESNO

NEAREST CROSS ST. CHESTNUT

PRODUCERS COTTON OIL CO. DATE 5/30/75

P.O. BOX 1832

FRESNO 93717 TEL NO 268-7611

CONTRACTOR	LICENSE NO.	PHONE
BLDG.		
PLUMBING		
ELECT.		
MECH.		

WHEN VALIDATED THIS APPLICATION IS YOUR PERMIT

DATE	PERMIT NUMBER	CLASS	AMOUNT
MAY-30-75	128009	PC	26.0
MAY-30-75	128010	B	52.0
MAY-30-75	128011	E	9.5
		Mic	1.1
			88.6

7/22/75 131939 Hcc 10

FIRST PRINT LINE

NO. OF BLDGS. NOW ON LOT

NO. OF FAMILIES

B.J. GREULICH

343 CROCKER BUILDING

TEL NO. 233-2322

RE-CONNECTION FEE

ENCROACHMENT APPROVAL

PLANNING DEPARTMENT

DATE 5-30-75

APPROVED X REQUIRED

M-3

SPECIAL PERMITS

PLUMBING

	EACH	FEE
PERMIT FEE	3.00	3.00
WATER CLOSET	1.75	
BASIN LAVATORY	1.75	
BATH TUB	1.75	
SHOWER	1.75	
KITCHEN SINK	1.75	
DISHWASHER	1.75	
LAUNDRY TRAYS	1.75	
FLOOR DRAIN	1.75	
URINAL	1.75	
WASTE DISPOSAL	1.75	
CONVERSION OF GAS TO NATURAL GAS	10.00	
HOUSE SEWER	5.00	
WATER PIPING and/or SERVICE	1.50	
EA. GAS PIPING SYSTEM 1 to 5 outlets	2.00	
GAS PIPING SYSTEM 6 or over outlets	.40	
GAS APPLIANCE	2.50	
SPECIAL SEE ORDINANCE		
FOOD DRAIN 1 TO 4	2.00	
EACH ADDITIONAL DRAIN	.50	

SPECIAL INSPECTION FEE 8.00 PER HOUR

SINGLE FAMILY DWELLING

All plumbing work including water heater, etc.

ELECTRICAL

NO.		EACH	FEE
1	PERMIT FEE	3.00	3.00
6	RECEPTACLES (switches, light O'lets)		
9	FIXTURES		
15	TOTAL of Receptacles above		
	FIRST 10 FOR PORTION	2.50	2.50
	REMAINDER		.50
	ELECTRIC RANGES / DISHWASHER	1.00	
	DRYERS / HEATER / DISPOSAL	1.00	
	0 - 100 .50		
	OVER 100 - 200 1.00		
	OVER 200 1.50		
	OVER 1 - 500	2.00	
	OVER 1 - 500	4.00	
	WELDERS	1.00	1.0
	MOTORS		

SPECIAL INSPECTION FEE 8.00 PER HOUR

SERVICE CONDUCTORS - - SUB-PANELS

NO.		EACH	FEE
1	100 AMP 2 OR MORE WIRE	2.50	2.50
	101 TO 200 2 OR MORE WIRE	2.50	
	201 TO 2 OR 3 OR MORE WIRE	2.50	
	250,000 CM to 350,000 CM WIRE	5.00	
	OVER 350,000 CM WIRE	7.50	

SINGLE FAMILY DWELLING

MECHANICAL

NO.		EACH	FEE
1	PERMIT FEE	3.00	3.00
1	EA. GAS PIPING SYSTEM 1 to 5 outlets	2.00	2.00
2	GAS APPLIANCE	2.50	5.00
	VENTILATION DUCT (GRAVITY)	2.00	
	SERVING COMM. KITCHEN	3.00	
	Mechanical Hood		
	Under 4,000 CFM $3.00		
	Over 4,000 CFM $5.00		
	SERVING COMM. KITCHEN		
	UNDER 4,000 CFM $4.00		
	OVER 4,000 CFM $5.00		
	DUCT SYSTEM NON RESIDENTIAL		
	SINGLE STORY 0-4M SQ. FT.	5.00	
	OVER 4M SQ. FT.	10.00	
	MULTI STORY PER FLOOR	4.00	
	EVAP. COOLER	2.00	

SPECIAL INSPECTION FEE 8.00 PER HOUR

REFRIGERATION COOLING UNITS

1 HP OR LESS	4.00	
OVER 1 HP to 50 HP	7.50	
Gas Absorption Systems to 100,000 BTU	4.00	
100,001 to 500,000 BTU	7.50	
	7.50	

COUNTY OF FRESNO
DEPT. OF PUBLIC WORKS
BUILDING AND SAFETY
2220 KINGS CANYON RD
FRESNO, CALIFORNIA 93702
455-3886

APPLICATION FOR PERMIT

CLINTON D. BEERY
DIRECTOR OF PUBLIC WORKS

JOHN L. WEAVER
CHIEF BUILDING INSPECTOR

24 HR. INSPECTION ANSWERING SERVICE
453-3805

ZONE 1 / 2 - 3 - 4 - 5 - 6

(PLEASE TO FILL IN (Type or Print)

ADDRESS 2635 E. NORTH AVE
TOWN FRESNO NEAREST CROSS ST. CHESTNUT
PRODUCERS COTTON OIL DATE
ADDRESS P.O. BOX 1832
FRESNO ZIP 93717 PHONE 442-4400
PROJ. CREULICH ADDRESS 336 CROCKER PHONE 233-2322
NONE ADDRESS BUILDING BRANCH

CONTRACTOR	ADDRESS	PHONE
AMERICAN BRIDGE	P.O. BOX 11925 FRESNO, 93775	264-4741

BUILDING

NEW	ALTERATION	PATIO	PORCH
X			

STORIES 1 BUILDING SIZE SQ. FT. 3240 GARAGE

PROJECT
54' x 60' ADDITION TO EXISTING 54' x 120' GIN WAREHOUSE FOR HANDLING FUMIGATE MATERIALS

LEGAL DESC.
NE 1/4 SECTION 25 T14S R20E LYING NORTH OF THE SOUTHERN PACIFIC RAILROAD RIGHT-OF-WAY

A.P.N. 530-050-18
SIZE OF LOT 23.33 ACRES
USE OF BLDGS NOW ON LOT 3
SEWER N/A
DRAINAGE FEE N/A

ZONING

REQUIRED SETBACK	FRONT MIN.	FRONT MAX.	SIDE INTERIOR	SIDE STREET	REAR
	Ø	—	Ø	—	Ø

APPROVED BY
DATE 6/26/80
ZONING ACCEPTANCE APPROVED ☒ PENDING ☐
ZONE DISTRICT M-3
SPECIAL PERMITS SPR 2248 [NO special conditions]

WHEN VALIDATED THIS APPLICATION IS YOUR PERMIT

PLUMBING

	EACH	FEE
PERMIT FEE	6.00	6.00
WATER CLOSET / URINAL	5.00	
KITCHEN SINK / DISPOSAL	5.00	
DISHWASHER / BATH TUB	5.00	
LAUNDRY TRAYS / SHOWER	5.00	
DRINKING FONT. / LAV	5.00	
WATER PIPING and/or SERVICE	5.00	
FLOOR DRAIN	5.00	
LAWN SPRINKLING SYST. FOR WITH BACK FLOW DEVICES.	10.00	
OTHER BK. FLOW. DEV.	5.00	
CONVERSION LPG to NAT. GAS	22.00	
GAS PIPING SYSTEM 1-5 outlets	5.00	
Additional Outlet 6 or more	1.00 ea.	
GAS APPLIANCE	6.00	

	EA. BLDG. SEWER	15.00
	PRIVATE SEWERAGE DISPOSAL SYSTEM	25.00

NEW SINGLE FAMILY DWELLING

1	All plumbing work in a one bathroom newly constructed single family dwelling (excluding sewer & septic system)	40.00
2	All plumbing work in a two bathroom newly constructed single family dwelling (excluding sewer & septic system)	45.00
3	All plumbing work in a three bathroom newly constructed single family dwelling (excluding sewer & septic system)	50.00
	For each additional bathroom over three 5.00 per bathroom fixture	

Min. $10.00 TOTAL FEE $

ELECTRICAL

	EACH	FEE
PERMIT FEE	6.00	6.00
CIRCUIT (REMODEL WORK ONLY)	2.00	
WIRING OUTLET & FIXTURES AT WHICH CURRENT IS USED OR CONTROLLED	.30	2.70
RANGES / DISHWASHER	3.00	
DRYERS / HEATER / DISP	3.00	
3.00 / WELDER	3.00	
2.00 / OVER 30-50 HP	11.00	
5.00 / OVER 50-100 HP	18.00	
7.00 / OVER 100 HP	28.00	
TIME CLOCK	2.00	
ELEC. VALVE	1.00	
IRRIG PUMP AND MACH. OVER 5 HP	20.00	

SERVICE & OR SUB-PANELS

6	M/H FIXTURES	200	1200
2	0 TO 200 AMPS	5.00	10.00
	201 TO 400 AMPS	16.00	
	401 TO 600 AMPS	25.00	
	OVER 600 AMPS	50.00	

NEW SINGLE FAMILY DWELLING

Area of Construction 0 to 750 Sq. Ft.	25.00
Area of Construction 751 to 1000 Sq. Ft.	30.00
Area of Construction 1001 to 1500 Sq. Ft.	40.00
Area of Construction 1501 to 2000 Sq. Ft.	50.00
Area of Construction 2001 to 2500 Sq. Ft.	60.00
Area of Construction 2501 to 3000 Sq. Ft.	70.00
EA. ADD 500 Sq. Ft.	5.00

Min. $10.00 TOTAL FEE $ 30.70

0 107.00 PC PC
0 164.00 PLB B
0 30.70 PLE E
0 14.00 MIC
0 2.95 SMI
1 321.65 TOTL
321.65 CKTD
.00 CACC
B 7218 101 6/27/80
B 7218 6/27/80

MECHANICAL

	EACH	FEE
PERMIT FEE	6.00	6.00
GAS PIPING SYSTEM 1-5 outlets	5.00	
Additional Outlet 6 or more	1.00 ea.	
GAS APPLIANCE	6.00	
HOOD		
SYSTEM		
SINGLE STORY, 0-4M SQ. FT.	5.00	

REFRIGERATION COOLING UNITS

LESS THAN 7 TONS	6.00
OVER 7 TONS to 14 TONS	9.00
OVER 14 TONS	14.00

NEW SINGLE FAMILY DWELLING

0 to 750 SQ. FT.	10.00
751 to 1500 SQ. FT.	15.00
1501 to 2500 SQ. FT.	20.00
EA. ADD 500 SQ. FT.	1.00

ZONE 1 (2) 3 4 5 6

SIGNS: NUMBER / SIZE / COST 1,670 | CONSTRUCTION

BLDG ADDRESS 2635 E. NORTH AVENUE

NEAREST TOWN FRESNO NEAREST CROSS ST CHESTNUT

OWNER PRODUCERS COTTON OIL COMPANY (DATELAND)

MAIL ADDRESS P.O. BOX 1832

FRESNO ZIP 93717 PHONE 442-8400

ENGINEER B.J. GREULICH ADDRESS 336 E. BROADWAY 233-2322

ARCHITECT ADDRESS BUS. OFF. BRANCH

CONTRACTOR	ADDRESS	PHONE
DANCO CONSTRUCTION	3161 W. DAKOTA	226-8414
PLUMBING		
ELEC.		
MECH.		

PROJECT: 40'x40' EXTENSION TO EXISTING 40'x100' WAREHOUSE BUILDING

LEGAL DESC.: NE¼ SECTION 25 T14S R20E LYING NORTH OF THE SOUTHERN PACIFIC RAILROAD RIGHT-OF-WAY

A.P.N. 330-050-18

SIZE OF LOT: 23.33 ACRES | USE OF BLDGS NOW ON LOT: 3

SEWER | DRAINAGE FEE

PLUMBING

	EACH	FEE
PERMIT FEE	6.00	6.00
WATER CLOSET / URINAL	5.00	
KITCHEN SINK / DISPOSAL	5.00	
DISHWASHER / BATH TUB	5.00	
LAUNDRY TRAYS / SHOWER	5.00	
DRINKING FONT. / LAV	5.00	
WATER PIPING and/or SERVICE	5.00	
FLOOR DRAIN	5.00	
EA. LAWN SPRINKLING SYST. FOR S.F.D. WITH BACK FLOW DEVICES	10.00	
ALL OTHER BK. FLOW. DEV.	5.00	
CONVERSION LPG to NAT. GAS	22.00	
EA. GAS PIPING SYSTEM 1-5 outlets	5.00	
Ea. Additional Outlet 6 or more	1.00 ea	
GAS APPLIANCE	6.00	

EA. BLDG. SEWER	15.00
PRIVATE SEWER/ACCE DISPOSAL SYSTEM	25.00

NEW SINGLE FAMILY DWELLING

1 All plumbing work in a one bathroom newly constructed single family dwelling (excluding sewer & septic system)	40.00
2 All plumbing work in a two bathroom newly constructed single family dwelling (excluding sewer & septic system)	45.00
3 All plumbing work in a three bathroom newly constructed single family dwelling (excluding sewer & septic system)	50.00
For each additional bathroom over three 5.00 per bathroom fixture	

Min. $10.00 TOTAL FEE $

ZONING

REQUIRED SETBACK	FRONT MIN.	FRONT MAX.	SIDE INTERIOR	SIDE STREET	REAR
	Ø		Ø		Ø

APPROVED BY [signature] DATE 6/5/80

ZONING ACCEPTANCE APPROVED [X] PENDING [ ]

ZONE DISTRICT: M-3

SPECIAL PERMITS: SEE BP # 128010 5/30/75 SPR 2248

WHEN VALIDATED THIS APPLICATION IS YOUR PERMIT

ELECTRICAL

	EACH	FEE
PERMIT FEE	6.00	6.00
EA. CIRCUIT (REMODEL WORK ONLY)	2.00	
EA. WIRING OUTLET & FOR FIXTURES AT WHICH CURRENT IS USED OR CONTROLLED	.30	0.90
ELEC. RANGES / DISHWASHER	3.00	
DRYERS / HEATER / DISP	3.00	
20 OUTLET	3.00	
WELDER	3.00	
30-1 HP	2.00	
OVER 30-50 HP	11.00	
OVER 1-5 HP	5.00	
OVER 50-100	18.00	
OVER 5 TO 30 HP	7.00	
OVER 100 HP	28.00	
EA. TIME CLOCK	2.00	
ELEC. VALVE	1.00	
EA. AG PUMP OR WIND MACH. OVER 5 HP	20.00	

SERVICE & OR SUB-PANELS

0 TO 200 AMPS	5.00
201 TO 400 AMPS	10.00
401 TO 600 AMPS	25.00
OVER 600 AMPS	50.00

NEW SINGLE FAMILY DWELLING

Area of Construction 0 to 750 Sq. Ft.	25.00
Area of Construction 751 to 1000 Sq. Ft.	30.00
Area of Construction 1001 to 1500 Sq. Ft.	40.00
Area of Construction 1501 to 2000 Sq. Ft.	50.00
Area of Construction 2001 to 2500 Sq. Ft.	60.00
Area of Construction 2501 to 3000 Sq. Ft.	70.00
EA. 400 500 Sq. Ft.	5.00

Min. $10.00 TOTAL FEE $ 6.90

1	52.00	PC PC.
2	26.00	BLP 8
3	6.50	FLP 5
0	1.46	SMI
0	12.00	MICR
	105.76	TOTL
	105.76	CKTD
	.00	CASH
B6321		6/05/80
B6322.		6/5/80

MECHANICAL

	EACH	FEE
PERMIT FEE	6.00	6.00
EA. GAS PIPING SYSTEM 1-5 outlets	5.00	
Additional Outlet 6 or more	1.00 ea	
GAS APPLIANCE	6.00	
MECH. HOOD		
DUCT SYSTEM		
SINGLE STORY, 0-4M SQ. FT.	5.00	
SNGL STORY OVER 4M SQ. FT.	10.00	
MULTI story-PER FLOOR	5.00	
EVAP. COOLER	10.00	
WINDOW UNIT	2.00	

REFRIGERATION COOLING UNITS

LESS THAN 7 TONS	6.00
OVER 7 TONS to 14 TONS	9.00
OVER 14 TONS	14.00

NEW SINGLE FAMILY DWELLING

0 to 750 SQ. FT.	10.00
751 to 1500 SQ. FT.	15.00
1501 to 2500 SQ. FT.	20.00
EA. ADD. 500 SQ. FT.	1.00

Min. $10.00 TOTAL FEE $

INSPECTION RECORD

BUILDING INSPECTION	INSPECTOR'S APPROVAL	DATE	REMARKS	INSPECTOR'S TRIPS	DATE ON JOB
	Hurtado	6/17/80			
	Colely	9-9-80			
Wall Overhead					
INSPECTION	Colely	9-9-80			

FOUNDATION INSPECTION	INSPECTOR'S APPROVAL	DATE	REMARKS	INSPECTOR'S TRIPS	DATE ON JOB
	Colely	9-9-80			
Ground					
INSPECTION	Colely	9-9-80			

PLUMBING INSPECTION	INSPECTOR'S APPROVAL	DATE	REMARKS	INSPECTOR'S TRIPS	DATE ON JOB

ELECTRICAL INSPECTION	INSPECTOR'S APPROVAL	DATE	REMARKS	INSPECTOR'S TRIPS	DATE ON JOB

ZONING

WHEN VALIDATED THIS APPLICATION IS YOUR PERMIT

PLUMBING

PERMIT FEE

NEW SINGLE FAMILY DWELLING

TOTAL FEE

MECHANICAL

ELECTRICAL

PERMIT FEE

NONE

OWNER-BUILDER DECLARATION

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500.)

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law.)

☐ I am exempt under Sec. _____, B.&P.C. for this reason

Owner _____

Date _____

WORKERS' COMPENSATION DECLARATION

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab. C.).

Policy No _____ Company _____

☐ Certified copy is hereby furnished.

☐ Certified copy is filed with the County of Fresno Department of Building & Safety. (Expiration Date _____)

Applicant _____

CERTIFICATE OF EXEMPTION FROM WORKERS' COMPENSATION INSURANCE

(This section need not be completed if work is for one hundred dollars ($100) or less.)

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Date _____ Applicant PER FILE

NOTICE TO APPLICANT: If, after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.

CONSTRUCTION LENDING AGENCY

I hereby affirm that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Div. C.).

Lender's Name _____

Lender's Address _____

I certify that I have read this application and state that the above information is correct. I agree to comply with all city and county ordinances and state laws relating to building construction, and hereby authorize representatives of this county to enter upon the above-mentioned property for inspection purposes.

Applicant or Agent _____

Date _____

PROJECT ADDRESS: 2635 E NORTH

NEAREST TOWN: FRESNO | NEAREST CROSS ST: CHESTNUT

PROPERTY OWNER: PRODUCERS COTTON OIL

MAIL ADDRESS: ~~SAME~~ PO BOX 1842

CITY: FRESNO | ZIP: 93725 | TEL NO: 442-4400

BLDG CONTRACTOR _____ | ST. LIC. # _____ | TEL NO _____

ADDRESS _____

PLUMB CONTRACTOR _____ | ST. LIC. # _____ | TEL NO _____

ADDRESS _____

ELECT CONTRACTOR: ELECTRIC MOTOR SHOP | ST. LIC. # 246015 | TEL NO 233-1152

ADDRESS: 253 FULTON FRESNO 93721

MECH CONTRACTOR _____ | ST. LIC. # _____ | TEL NO _____

ADDRESS _____

DESIGNER _____ | ST. LIC. # _____ | TEL. NO. _____

ADDRESS _____

LEGAL DESC.

PROJECT: 50 KVA TRANSF 1 200 AMP SUB PANE

FLOOD MAP PAGE | ZONE

A.P.N. 33-050-23 S

ZONING

REQUIRED SETBACKS	FRONT MIN.	FRONT MAX.	SIDE INTERIOR	SIDE STREET	REAR MIN.

APPROVED BY _____ DATE _____

OCCUPANCY: APPROVED ☐ PENDING ☐

ZONE DIST. _____ REMARKS: _____

SCHOOL DISTRICT(S) _____

TYPE CONST.	OCCUP. GRP.	STORIES

	SQ. FT.	UF	
BLDG.			
GAR.			
PATIO			
DECK			

TOTAL VALUATION $

SLUC	PLAN CHECK

CONSOLIDATED PERMIT FEE USED? ( ) YES ( )

BUILDING PERMIT	
ELECTRICAL PERMIT	5
PLUMBING PERMIT	
SEPTIC	
MECH. PERMIT	
SWIMMING POOL	

CALL-IN-FEE

APPROVED BY _____ | MICROFILM _____

FEES BY _____ | ENERGY SURCHARGE _____ | S.M.I. _____

VALIDATED BY _____ | SEWER _____

ACCOUNT NO _____ | DRAINAGE _____ | REINSPECTION _____

CASH ☐ CHECK ☐ | TOTAL 6

WHEN VALIDATED THIS APPLICATION IS YOUR PER

PLUMBING

NO.			EACH	FEE
	PERMIT FEE			
	WATER PIPING	FLOOR DRAIN		
	KITCHEN SINK	LAVATORY		
	WASH MACH.	BATH TUB		
	WATER CLOSET	SHOWER		
	DRINKING FOUNTAIN	URINAL		
	EA. BLDG. SEWER			
	BACK FLOW DEVICE			
	GAS APPLIANCE			
	GAS PIPING SYSTEM			

NEW SINGLE FAMILY DWELLING

All plumbing work in a newly constructed single family dwelling excluding sewer & septic system.

one bathroom	
two bathroom	
three bathroom	
additional bathroom fixtures	
Min.	

TOTAL FEE $

ELECTRICAL

NO.			EACH	FEE
1	PERMIT FEE			15 00
	EA. CIRCUIT (REMODEL WORK ONLY)			
	EA. WIRING OUTLET & OR FIXTURES AT WHICH CURRENT IS USED OR CONTROLLED			
	ELEC RANGES	DISHWASHER		
	DRYERS	DISPOSAL		
	240 OUTLET	WELDER		
	0-1 HP MOTOR	OVER 30-50 HP		
	OVER 1 TO 5 HP	OVER 50-100		
	OVER 5 TO 30 HP	OVER 100 HP		
	EA. TIME CLOCK			
	SWIMMING POOL LIGHT TRANSFORMER			

SEPTIC

NO.		EACH	FEE
	PERMIT FEE		
	NEW SYSTEM		
	REPAIR SYSTEM		
	TEST HOLE INSPECTION		

TOTAL FEE $

MECHANICAL

NO.		EACH	FEE

#1

I hereby affirm that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

Lic. Number 246015 License Class C-10

Contractor Electric Motor Shop

OWNER BUILDER DECLARATION

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500.):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law).

I am exempt under Sec. _____ B.&P.C. for this reason

Owner _____

Date _____

WORKERS' COMPENSATION DECLARATION

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab. C.)

Policy No. _____ Company _____

☐ Certified copy is hereby furnished

☐ Certified copy is filed with the County of Fresno Department of Building & Safety (Expiration Date _____)

Applicant _____

CERTIFICATE OF EXEMPTION FROM WORKERS' COMPENSATION INSURANCE

(This section need not be completed if work is for one hundred dollars ($100) or less.)

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Date _____ Applicant _____

NOTICE TO APPLICANT: If, after making this Certificate of Exemption, you become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.

CONSTRUCTION LENDING AGENCY

I hereby affirm that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Div. C.).

Lender's Name _____

Lender's Address _____

I certify that I have read this application and state that the above information is correct. I agree to comply with all city and county ordinances and state laws relating to building construction, and hereby authorize representatives of this county to enter upon the above-mentioned property for inspection purposes.

Applicant _____

Agent _____

Date _____

NO.	ELECTRICAL		EACH	FEE
1	PERMIT FEE			15
	EA. CIRCUIT (REMODEL WORK ONLY)			
	EA. WIRING OUTLET & OR FIXTURES AT WHICH CURRENT IS USED OR CONTROLLED			
	ELEC RANGES	DISHWASHER		
	DRYERS	DISPOSAL		
	240 OUTLET	WELDER		

COUNTY OF FRESNO
PUBLIC WORKS & DEVELOPMENT SERVICES DEPARTMENT
DEVELOPMENT SERVICES DIVISION
2220 TULARE STREET - 6TH FLOOR
FRESNO, CALIFORNIA 93721

LOCATION
SOUTHWEST CORNER OF TULARE AND M STREETS
SUITE "A" - STREET LEVEL

PHONE NUMBERS
24 HOUR ANSWERING SERVICE
FOR INSPECTIONS
LOCAL (209) 453-
TOLL FREE 1-(800) 742-1011

PROJECT ADDRESS: 2635 E North

NEAREST TOWN: Fresno | NEAREST CROSS ST.: Chestnut NEW

PROPERTY OWNER: Producers Cotton Oil

MAIL ADDRESS: P.O.B. 1842

CITY: Fresno ZIP: 937 TEL NO: 442-44

BLDG CONTRACTOR _____ ST. LIC # _____ TEL. NO. _____

ADDRESS _____

PLUMB CONTRACTOR _____ ST. LIC. # _____ TEL. NO. _____

ADDRESS _____

ELECT CONTRACTOR: Electric Motor Shop ST. LIC. # _____ TEL. NO. _____

ADDRESS _____

MECH. CONTRACTOR _____ ST. LIC # _____ TEL. NO. _____

ADDRESS _____

DESIGNER _____ ST. LIC # _____ TEL. NO. _____

ADDRESS _____

PROJECT: Elec Svc (from 200 Am 240 Volt - 700 Amp 480 Volt - S

FLOOD MAP PAGE _____ ZONE _____

A.P.N. _____

ZONING

REQUIRED SETBACKS	FRONT MIN.	FRONT MAX.	SIDE INTERIOR	SIDE STREET	REAR MIN.

APPROVED BY _____ DATE _____

OCCUPANCY: _____ APPROVED _____ PENDING _____

ZONE DIST. _____ REMARKS: _____

SCHOOL DISTRICT(S) _____

TYPE CONST.	OCCUP. GRP.	STORIES

	SQ. FT.	UF	
BLDG.			
GAR.			
PATIO			
DECK			

TOTAL VALUATION $ _____

NO.	PLUMBING		EACH	FEE
	PERMIT FEE			
	WATER PIPING	FLOOR DRAIN		
	KITCHEN SINK	LAVATORY		
	WASH MACH.	BATH TUB		
	WATER CLOSET	SHOWER		
	DRINKING FOUNTAIN	URINAL		
	EA. BLDG. SEWER			
	BACK FLOW DEVICE			
	GAS APPLIANCE			
	GAS PIPING SYSTEM			

NEW SINGLE FAMILY DWELLING

All plumbing work in a newly constructed single family dwelling excluding sewer & septic system.	one bathroom	
	two bathroom	
	three bathroom	
additional bathroom fixtures		
Min.	TOTAL FEE	$

NO.	SEPTIC	EACH	FEE
	PERMIT FEE		
	NEW SYSTEM		

SLUC _____ PLAN CHECK _____

CONSOLIDATED PERMIT FEE USED? ( ) YES ( )

BUILDING PERMIT	
ELECTRICAL PERMIT	
PLUMBING PERMIT	
SEPTIC	
MECH. PERMIT	
SWIMMING POOL	

Call - in

APPROVED BY: Om	MICROFILM
	ENERGY SURCHARGE
FEES BY: BKS	S.M.I.
VALIDATED BY: CO	SEWER
	DRAINAGE
ACCOUNT NO.	REINSPECTION
CASH / CHECK	TOTAL 35

APPENDIX C - REGULATORY DOCUMENTATION

The EDR Radius Map™ Report

Dunavant Enterprises
2365 & 2635 East North Avenue
Fresno, CA 93725

Inquiry Number: 1884087.1p

November 19, 2002

Environmental Data Resources, Inc.

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06890

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

FORM-TLB

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Orphan Summary	31
EPA Waste Codes	EPA-1
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

GeoCheck - Not Requested

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

2365 & 2635 EAST NORTH AVENUE
FRESNO, CA 93725

COORDINATES

Latitude (North):	36.690900 - 36' 41' 27.2"
Longitude (West):	119.742900 - 119' 44' 34.4"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	254930.3
UTM Y (Meters):	4063888.0

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	2436119-F6 MALAGA, CA
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following government records. For more information on this property see page 5 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
ANDERSON CLAYTON-PLANTING SEED 2365 NORTH FRESNO, CA 93725	UST	N/A
PRODUCERS COTTON OIL CO. 2365 NORTH AVE E FRESNO, CA 93725	LUST	N/A
PRODUCERS COTTON OIL CO 2365 E NORTH AVENUE FRESNO, CA 93725	RCRIS-SQG HIST UST	CAT080030885
PRODUCERS COTTON OIL CO 2365 NORTH AVE E FRESNO, CA 93725	LUST	N/A

EXECUTIVE SUMMARY

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

RCRIS-TSD..... Resource Conservation and Recovery Information System
ERNS..... Emergency Response Notification System

STATE ASTM STANDARD

VCP..... Voluntary Cleanup Program Properties

FEDERAL ASTM SUPPLEMENTAL

SSTS..... Section 7 Tracking Systems

STATE OR LOCAL ASTM SUPPLEMENTAL

DEED..... List of Deed Restrictions

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Elevations have been determined from the USGS 1 degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. EDR's definition of a site with an elevation equal to the target property includes a tolerance of +/- 10 feet. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property (by more than 10 feet). Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL ASTM STANDARD

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 07/18/2002 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PURITY OIL SALES, INC.	*3265 S MAPLE AVE*	*1/4 - 1/2 SW*	*0*	*9*

EXECUTIVE SUMMARY

CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the CERCLIS list, as provided by EDR, and dated 06/15/2002 has revealed that there is 1 CERCLIS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PURITY OIL SALES, INC.	*3265 S MAPLE AVE*	*1/4 - 1/2 SW*	*0*	*9*

CERCLIS-NFRAP: As of February 1995. CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund Action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

A review of the CERC-NFRAP list, as provided by EDR, and dated 09/15/2002 has revealed that there is 1 CERC-NFRAP site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
BRUNO USED MATERIAL	3211 S GOLDEN STATE BLV	1/8 - 1/4 SW	B7	13

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 05/02/2002 has revealed that there is 1 CORRACTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SAFETY KLEEN CORP 7-015-01	*3561 S MAPLE ST*	*1/2 - 1 SSW*	*21*	*26*

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-LQG list, as provided by EDR, and dated 09/09/2002 has revealed that there is 1 RCRIS-LQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
BRUNOS IRON AND METAL	3211 SOUTH GOLDEN STATE	1/8 - 1/4 SW	B8	14

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-SQG list, as provided by EDR, and dated 09/09/2002 has revealed that there is 1 RCRIS-SQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
WHOLESALE EQUIPMENT OF FRESNO	*3183 GOLDEN STATE BLVD*	*1/8 - 1/4 SW*	*6*	*13*

STATE ASTM STANDARD

AWP: California DTSC's Annual Workplan, formerly known as BEP, identifies known hazardous substance sites targeted for cleanup. The source is the California Environmental Protection Agency.

A review of the AWP list, as provided by EDR, and dated 10/04/2002 has revealed that there is 1 AWP site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PURITY OIL SALES, INC	3265 SOUTH MAPLE AVENUE	1/4 - 1/2 SW	C12	17

TOXIC PITS: The Toxic Pits Cleanup Act Sites database identifies sites suspected of containing hazardous substances where cleanup has not yet been completed. The data come from the State Water Resources Control Board.

A review of the Toxic Pits list, as provided by EDR, has revealed that there is 1 Toxic Pits site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PRODUCERS COTTON OIL COMPANY	2907 SOUTH MAPLE	1/4 - 1/2 NNW	D16	21

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Integrated Waste Management Board's Solid Waste Information System (SWIS) database.

A review of the SWF/LF list, as provided by EDR, has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
FRESNO UNITED METAL	3270 SOUTH GOLDEN STATE	1/4 - 1/2 SSW	9	14

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, has revealed that there are 2 WMUDS/SWAT sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PURITY OIL SALES	3265 S. MAPLE	1/4 - 1/2 SW	C13	17

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PRODUCERS COTTON OIL COMPANY	2907 S MAPLE AVE	1/4 - 1/2 NNW	D15	19

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the State Water Resources Control Board Leaking Underground Storage Tank Information System.

A review of the LUST list, as provided by EDR, and dated 07/11/2002 has revealed that there are 6 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
RHODES RESIDENCE	3355 MAPLE S	1/4 - 1/2 SSW	10	15
SUBURBAN PROPANE	3363 S GOLDEN STATE BLV	1/4 - 1/2 S	14	18
PRODUCERS COTTON OIL WARE	2907 MAPLE	1/4 - 1/2 NNW	D17	21
SANTA FE INTERMODAL YARD	2989 GOLDEN STATE	1/4 - 1/2 WNW	18	22
HASKEL ESTATE PROPERTY	3486 MAPLE S	1/4 - 1/2 SSW	19	23
KBK OIL	2874 GOLDEN STATE BLVD	1/4 - 1/2 WNW	20	25

BEP: Bond Expenditure Plan comes from the Department of Health Services.

A review of the CA BOND EXP. PLAN list, as provided by EDR, has revealed that there is 1 CA BOND EXP. PLAN site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
PURITY OIL SALES	3254 SOUTH MAPLE AVENUE	1/4 - 1/2 SW	C11	17

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, and dated 01/17/2002 has revealed that there are 2 UST sites within approximately 0.25 miles of the target property.

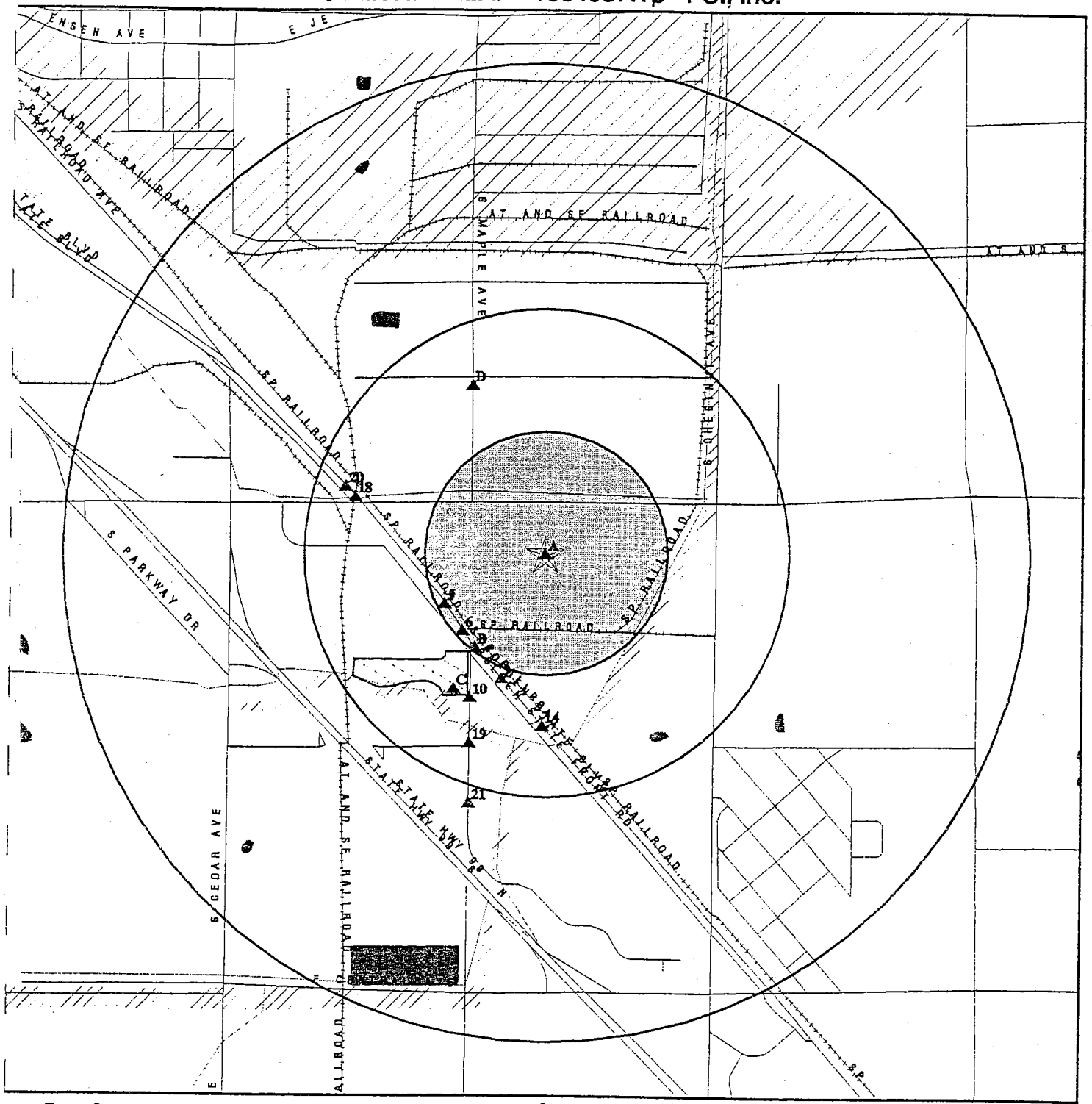
Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
NELSON SIGNS	3147 GOLDEN STATE BLVD	1/8 - 1/4 WSW	5	13
WHOLESALE EQUIPMENT OF FRESNO	*3183 GOLDEN STATE BLVD*	*1/8 - 1/4 SW*	*6*	*13*

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
CHET & SONS TRUCK WASH	RCRIS-SQG, CERC-NFRAP
CEDAR AVE. RECYCLING & TRANSFER STATION	SWF/LF
SALAS TIRE	SWF/LF
RECYCLING UNLIMITED TS/MRF AND VERMICOMP	SWF/LF
CENTRAL VALLEY TIRE DISPOSAL	SWF/LF
OHANESIAN WTS	SWF/LF
CHATEAU FRESNO LANDFILL	SWF/LF
BALCH CAMP DISPOSAL SITE	SWF/LF
PIPCO RANCH	LUST
CALTRANS	UST
THREE ROCKS RANCH	HIST UST

OVERVIEW MAP - 1884087.1p - PSI, Inc.



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Coal Gasification Sites

National Priority List Sites

Landfill Sites

0 1/4 1/2 1 Miles

Power transmission lines

Oil & Gas pipelines

100-year flood zone

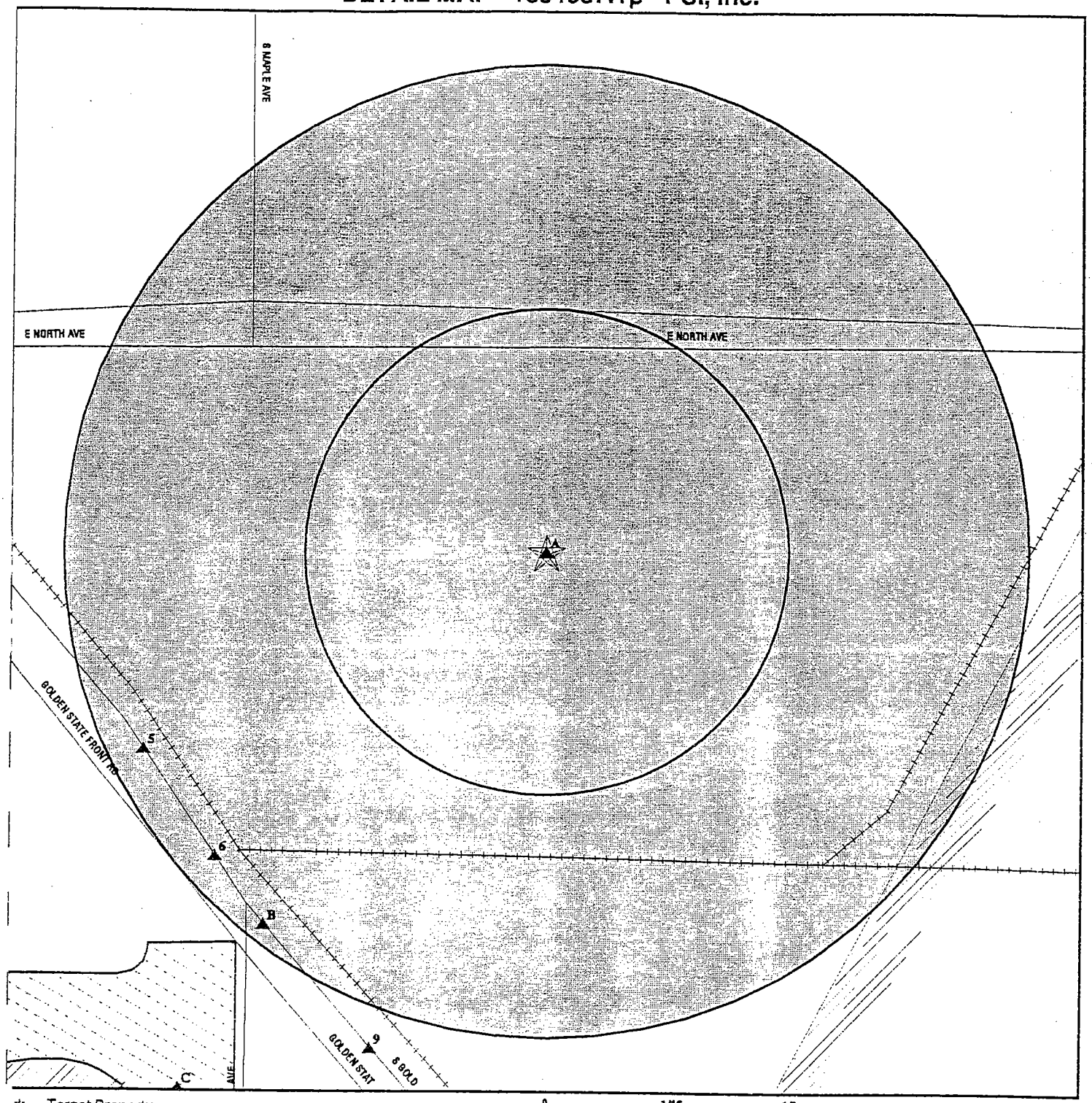
500-year flood zone

Wetlands

Areas of Concern

TARGET PROPERTY:	Dunavant Enterprises	CUSTOMER:	PSI, Inc.
ADDRESS:	2365 & 2635 East North Avenue	CONTACT:	Christine Prado
CITY/STATE/ZIP:	Fresno CA 93725	INQUIRY #:	1884087.1p
LAT/LONG:	36.6909 / 119.7429	DATE:	November 19, 2002 1:04 pm

DETAIL MAP - 1884087.1p - PSI, Inc.



0 1/16 1/8 1/4 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

TARGET PROPERTY:	Dunavant Enterprises	CUSTOMER:	PSI, Inc.
ADDRESS:	2365 & 2635 East North Avenue	CONTACT:	Christine Prado
CITY/STATE/ZIP:	Fresno CA 93725	INQUIRY #:	1884087.1p
LAT/LONG:	36.6909 / 119.7429	DATE:	November 19, 2002 1:04 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	1	0	NR	1
CERCLIS		0.500	0	0	1	NR	NR	1
CERC-NFRAP		0.250	0	1	NR	NR	NR	1
CORRACTS		1.000	0	0	0	1	NR	1
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	1	NR	NR	NR	1
RCRIS Sm. Quan. Gen.	X	0.250	0	1	NR	NR	NR	1
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
AWP		1.000	0	0	1	0	NR	1
Toxic Pits		1.000	0	0	1	0	NR	1
State Landfill		0.500	0	0	1	NR	NR	1
WMUDS/SWAT		0.500	0	0	2	NR	NR	2
LUST	X	0.500	0	0	6	NR	NR	6
CA Bond Exp. Plan		1.000	0	0	1	0	NR	1
UST	X	0.250	0	2	NR	NR	NR	2
VCP		0.500	0	0	0	NR	NR	0
HIST UST	X	0.250	0	0	NR	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
SSTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
DEED		TP	NR	NR	NR	NR	NR	0

TP = Target Property

NR = Not Requested at this Search Distance

* Sites may be listed in more than one database

A1 Target Property — **ANDERSON CLAYTON-PLANTING SEED**
2365 NORTH
FRESNO, CA 93725

UST — **U003787611**
N/A

Site 1 of 4 in cluster A

State UST:

Facility ID:	FA0170152
Total Tanks:	1
Region:	STATE
Local Agency:	10000

A2 Target Property — **PRODUCERS COTTON OIL CO.**
2365 NORTH AVE E
FRESNO, CA 93725

LUST — **S105023830**
N/A

Site 2 of 4 in cluster A

State LUST:

Cross Street:	Not reported		
Qty Leaked:	Not reported		
Case Number	5T10000104		
Reg Board:	5		
Chemical:	Gasoline		
Lead Agency:	Local Agency		
Local Agency :	10000		
Case Type:	Soil only		
Status:	Not reported		
County:	Fresno		
Abate Method:	Excavate and Treat - remove contaminated soil and treat (includes spreading or land farming)		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	7/8/88		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	2/21/86		
Enforcement Dt :	1/1/65		
Enf Type:	None Taken		
Enter Date :	7/17/88		
Funding:	Not reported		
Staff Initials:	LEI		
How Discovered:	Tank Closure		
How Stopped:	Close Tank		
Interim :	Not reported		
Leak Cause:	Unknown		
Leak Source:	Tank		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.		
Priority:	4		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	BEM		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		
Soil Qualifies :	Not reported		
Hydr Basin #:	Not reported		
Operator :	Not reported		
Oversight Prgm:	Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)		

PRODUCERS COTTON OIL CO. (Continued) **S105023830**

Oversight Prgm : LIA
Review Date : 7/8/88
Stop Date : 2/21/86
Work Suspended :N
Responsible PartyPRODUCERS COTTON OIL
RP Address: 2907 S. MAPLE, FRESNO, CA 93717
Global Id: T0601900103
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: ANDERSON CLATYON-FRESNO WHSE #
Well Name: WELL 01 - PRIMARY
Distance To Lust: 2055.11045
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: GASOLINE
Case Type: Soil only
Program: LUST
Staff Initials: DAM Case Number: 5T10000104
Status: Case Closed
MTBE Code: N/A
Respble Party: PRODUCERS COTTON OIL
County Name: FRESNO

A3 Target Property **PRODUCERS COTTON OIL CO**
2365 E NORTH AVENUE
FRESNO, CA 93725

RCRIS-SQG **1000192926**
HIST UST **CAT080030885**

Site 3 of 4 in cluster A

RCRIS:
Owner: PRODUCERS COTTON OIL COMPANY
(415) 555-1212
EPA ID: CAT080030885
Contact: ENVIRONMENTAL MANAGER
(209) 442-4400
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

UST HIST:
Facility ID: 14535
Tank Num: 1 Container Num: #1 HEXANE
Tank Capacity: 10000 Year Installed: 1963
Tank Used for: PRODUCT
Type of Fuel: Not Reported Tank Construction: Not reported
Leak Detection: Stock Inventor
Contact Name: JAMES H. GREER, MILL MANAGER Telephone: (209) 442-4400
Total Tanks: 6 Region: STATE
Facility Type: 2 Other Type: SOLVENT EXTRACTION O

Facility ID: 14535
Tank Num: 2 Container Num: #2 HEXANE

PRODUCERS COTTON OIL CO (Continued) **1000192926**

Tank Capacity:	10000	Year Installed:	1963
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JAMES H. GREER, MILL MANAGER	Telephone:	(209) 442-4400
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	SOLVENT EXTRACTION O

Facility ID:	14535		
Tank Num:	3	Container Num:	#3 HEXAND
Tank Capacity:	10000	Year Installed:	1973
Tank Used for:	PRODUCT		
Type of Fuel:	Not Reported	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JAMES H. GREER, MILL MANAGER	Telephone:	(209) 442-4400
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	SOLVENT EXTRACTION O

Facility ID:	14535		
Tank Num:	4	Container Num:	#1 DIESEL
Tank Capacity:	1000	Year Installed:	1967
Tank Used for:	PRODUCT		
Type of Fuel:	DIESEL	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JAMES H. GREER, MILL MANAGER	Telephone:	(209) 442-4400
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	SOLVENT EXTRACTION O

Facility ID:	14535		
Tank Num:	5	Container Num:	#1 GASOLIN
Tank Capacity:	1000	Year Installed:	1967
Tank Used for:	PRODUCT		
Type of Fuel:	REGULAR	Tank Construction:	Not reported
Leak Detection:	Stock Inventor		
Contact Name:	JAMES H. GREER, MILL MANAGER	Telephone:	(209) 442-4400
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	SOLVENT EXTRACTION O

Facility ID:	14535		
Tank Num:	6	Container Num:	SOLVENT SU
Tank Capacity:	3000	Year Installed:	1963
Tank Used for:	WASTE		
Type of Fuel:	Not Reported	Tank Construction:	8 inches
Leak Detection:	Visual		
Contact Name:	JAMES H. GREER, MILL MANAGER	Telephone:	(209) 442-4400
Total Tanks:	6	Region:	STATE
Facility Type:	2	Other Type:	SOLVENT EXTRACTION O

A4 Target Property **PRODUCERS COTTON OIL CO**
2365 NORTH AVE E
FRESNO, CA 93725

LUST S105023831
N/A

Site 4 of 4 in cluster A

State LUST:

Cross Street:	Not reported
Qty Leaked:	Not reported
Case Number	5T10000333
Reg Board:	5

PRODUCERS COTTON OIL CO (Continued) **S105023831**

Chemical: Gasoline
Lead Agency: Local Agency
Local Agency : 10000
Case Type: Undefined
Status: Not reported
County: Fresno
Review Date: 9/18/91
Workplan: Not reported
Pollution Char: Not reported
Remed Action: Not reported
Close Date: Not reported
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 9/16/91
Enforcement Dt : 1/1/65
Enf Type: None Taken
Enter Date : 9/25/91
Funding: Responsible Party
Staff Initials: CHR
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
Priority: Medium priority
Local Case # : Not reported
Beneficial: Not reported
Staff : DAM
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 9/25/91
Stop Date : 8/29/91
Work Suspended :N
Responsible Party PRODUCERS COTTON OIL CO
RP Address: PO BOX 1832, FRESNO, CA 93717
Global Id: T0601900326
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: ANDERSON CLATYON-FRESNO WHSE #
Well Name: WELL 01 - PRIMARY
Distance To Lust: 2055.11045
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

Confirm Leak: 9/18/91
Prelim Assess: Not reported
Remed Plan: Not reported
Monitoring: Not reported

LUST Region 5:
Substance: GASOLINE
Case Type: Undefined

PRODUCERS COTTON OIL CO (Continued) **S105023831**

Program: LUST
Staff Initials: DAM Case Number: 5T10000333
Status: Leak being confirmed
MTBE Code: N/A
Respble Party: PRODUCERS COTTON OIL CO
County Name: FRESNO

NPL Region SW 1/4-1/2 1356 ft.

PURITY OIL SALES, INC.
3265 S MAPLE AVE
MALAGA, CA 93725

CERCLIS 1000265027
NPL CAD980736151

CERCLIS Classification Data:

Site Incident Category: Non-Oil Spill Federal Facility: Not a Federal Facility
Non NPL Status: Not reported
Ownership Status: State Owned NPL Status: Currently on the Final NPL
Contact: Rosemarie Caraway Contact Tel: (415) 972-3158
Contact Title: Not reported
Contact: Jere Johnson Contact Tel: (415) 972-3094
Contact Title: Not reported
Site Description: PURITY OIL SALES INC, FRESNO, CA. FORMERLY A WASTE OIL REFINERY/RECLAIMING FACILITY CLOSED IN 1974. FACIL IS 6 ACRES. SOLE SOURCE AQUIFER 30 FT BELOW SURFACE. OILY LIQUID & SLUDGE SPILLED & DISPOSED OF ON-SITE.

CERCLIS Assessment History:

Assessment:	DISCOVERY	Completed:	02/01/1979
Assessment:	PRELIMINARY ASSESSMENT	Completed:	05/01/1981
Assessment:	SITE INSPECTION	Completed:	12/01/1982
Assessment:	HRS PACKAGE	Completed:	12/01/1982
Assessment:	PROPOSAL TO NPL	Completed:	12/30/1982
Assessment:	FINAL LISTING ON NPL	Completed:	09/08/1983
Assessment:	RI/FS WORKPLAN APPROVAL BY HQ	Completed:	02/01/1984
Assessment:	REMOVAL	Completed:	04/04/1985
Assessment:	REMOVAL	Completed:	05/06/1985
Assessment:	COMBINED RI/FS	Completed:	12/31/1985
Assessment:	REMOVAL	Completed:	09/17/1987
Assessment:	COMBINED RI/FS	Completed:	09/27/1989
Assessment:	RECORD OF DECISION	Completed:	09/27/1989
Assessment:	NPL RP SEARCH	Completed:	03/21/1990
Assessment:	REMEDIAL DESIGN	Completed:	05/11/1990
Assessment:	ADMINISTRATIVE RECORDS	Completed:	06/30/1990
Assessment:	REMOVAL ASSESSMENT	Completed:	08/24/1990
Assessment:	NPL RP SEARCH	Completed:	03/14/1991
Assessment:	REMEDIAL ACTION	Completed:	04/11/1991
Assessment:	REMEDIAL DESIGN	Completed:	09/27/1991
Assessment:	RD/RA NEGOTIATIONS	Completed:	09/30/1991
Assessment:	UNILATERAL ADMIN ORDER	Completed:	09/30/1991
Assessment:	REMEDIAL ACTION	Completed:	03/31/1992
Assessment:	TREATABILITY STUDY	Completed:	07/30/1992
Assessment:	FEASIBILITY STUDY	Completed:	09/30/1992
Assessment:	RECORD OF DECISION	Completed:	09/30/1992
Assessment:	REMOVAL ASSESSMENT	Completed:	11/02/1992
Assessment:	ADMINISTRATIVE RECORDS	Completed:	11/19/1992
Assessment:	PRP RD	Completed:	06/29/1993
Assessment:	RD/RA NEGOTIATIONS	Completed:	01/06/1994
Assessment:	ADMIN ORDER ON CONSENT	Completed:	01/06/1994
Assessment:	PRP RA	Completed:	03/31/1995

PURITY OIL SALES, INC. (Continued) **1000265027**

Assessment:	COMMUNITY INVOLVEMENT	Completed:	03/31/1995
Assessment:	Explanation Of Significant Differences	Completed:	07/03/1996
Assessment:	PRP RD	Completed:	09/05/1996
Assessment:	RD/RA NEGOTIATIONS	Completed:	03/17/1998
Assessment:	Lodged By DOJ	Completed:	04/21/1998
Assessment:	CONSENT DECREE	Completed:	12/21/1998
Assessment:	Explanation Of Significant Differences	Completed:	03/31/2001
Assessment:	Lodged By DOJ	Completed:	07/27/2001
Assessment:	CONSENT DECREE	Completed:	07/30/2001
Assessment:	FIVE YEAR REMEDY ASSESSMENT	Completed:	09/28/2001

CERCLIS Site Status:
Not reported

CERCLIS Alias Name(s):
PURITY OIL SALES, INC
PURITY OIL SALES, INC.
PURITY OIL SALES, INC.

NPL:

EPA ID:	CAD980736151
Region:	09
Federal:	General
Final Date:	09/08/1983

NPL Contaminant:

NPL Status:	Final
Substance Id:	C178
Case Num:	7440-50-8
Substance :	COPPER AND COMPOUNDS, NOS (CU)
Pathway :	NOT INDICATED
GW Scoring :	Not reported
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	C247
Case Num:	7440-66-6
Substance :	ZINC AND COMPOUNDS, NOS (ZN)
Pathway :	NOT INDICATED
GW Scoring :	Not reported
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	D008
Case Num:	7439-92-1
Substance :	LEAD (PB)
Pathway :	NOT INDICATED
GW Scoring :	Not reported
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

PURITY OIL SALES, INC. (Continued) **1000265027**

NPL Status:	Final
Substance Id:	C230
Case Num:	7664-93-9
Substance :	SULFURIC ACID
Pathway :	AIR
GW Scoring :	Not reported
SW Scoring :	Not reported
Air Scoring:	Toxicity
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	A030
Case Num:	540-59-0
Substance :	DICHLOROETHENE, NOS
Pathway :	The Ground water migration route , or pathway.
GW Scoring :	Observed Release
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	A046
Case Num:	1336-36-3
Substance :	POLYCHLORINATED BIPHENYLS, NOS
Pathway :	The Ground water migration route , or pathway.
GW Scoring :	Toxicity
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	C349
Case Num:	Not reported
Substance :	DICHLOROETHANE, NOS
Pathway :	The Ground water migration route , or pathway.
GW Scoring :	Observed Release
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Status:	Final
Substance Id:	U044
Case Num:	67-66-3
Substance :	CHLOROFORM
Pathway :	The Ground water migration route , or pathway.
GW Scoring :	Observed Release
SW Scoring :	Not reported
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

PURITY OIL SALES, INC. (Continued) **1000265027**

NPL Status:	Final
Substance Id:	A046
Case Num:	1336-36-3
Substance :	POLYCHLORINATED BIPHENYLS, NOS
Pathway :	SW
GW Scoring :	Not reported
SW Scoring :	Toxicity
Air Scoring:	Not reported
Soil Scoring:	Not reported
DC Scoring:	Not reported
FE Scoring:	Not reported

NPL Site:

CERCLIS Id:	CAD980736151
Site City:	Malaga
Site State:	CA
NPL Status:	Final
Status Date:	09/08/83
Federal Site:	Not reported
HRS Score:	43.27
GW Score:	55.10
SW Score:	50.67
Air Score:	0.00
Soil Score:	0.00
DC Score:	33.33
FE Score:	70.83

NPL Char:

NPL Status:	Final
Category Description:	DEPTH TO AQUIFER
Category Value:	50
NPL Status:	Final
Category Description:	DISTANCE TO THE NEAREST POPULATION
Category Value:	10
NPL Status:	Final
Category Description:	OBSERVED RELEASE-Ground Water
Category Value:	Not reported
NPL Status:	Final
Category Description:	OTHER GROUND WATER USE-Industrial Process Cooling
Category Value:	Not reported
NPL Status:	Final
Category Description:	PERMIT-None
Category Value:	Not reported
NPL Status:	Final
Category Description:	PHYSICAL STATE-Liquid
Category Value:	Not reported
NPL Status:	Final
Category Description:	PHYSICAL STATE-Sludge
Category Value:	Not reported
NPL Status:	Final
Category Description:	SITE ACTIVITY WASTE SOURCE-Industry Recyclers
Category Value:	Not reported
NPL Status:	Final
Category Description:	SITE ACTIVITY WASTE SOURCE-Industry Waste Oil Processing

PURITY OIL SALES, INC. (Continued) — **1000265027**

Category Value: Not reported

NPL Status: Final
Category Description: SURFACE WATER ADJACENT TO SITE-Canal
Category Value: Not reported

NPL Status: Final
Category Description: SURFACE WATER ADJACENT TO SITE-Wetland
Category Value: Not reported

---

5 WSW 1/8-1/4 1225 ft. Higher

NELSON SIGNS
3147 GOLDEN STATE BLVD
FRESNO, CA 93725

UST — U003788278 / N/A

State UST:
Facility ID: FA0268369
Total Tanks: 1
Region: STATE
Local Agency: 10000

---

6 SW 1/8-1/4 1226 ft. Higher

WHOLESALE EQUIPMENT OF FRESNO
3183 GOLDEN STATE BLVD
FRESNO, CA 93745

RCRIS-SQG — 1000281478
UST — CAD982371122

RCRIS:
Owner: HUDSON GERRY
(415) 555-1212
EPA ID: CAD982371122

Contact: ENVIRONMENTAL MANAGER
(209) 268-6285

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

State UST:
Facility ID: FA0268365
Total Tanks: 1
Region: STATE
Local Agency: 10000

B7 SW 1/8-1/4 1270 ft. Higher

BRUNO USED MATERIAL
3211 S GOLDEN STATE BLVD
MALAGA, CA 93726

CERC-NFRAP — 1003878379 / CAD082445248

Site 1 of 2 in cluster B

BRUNO USED MATERIAL (Continued) **1003878379**

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported
Non NPL Code: NFRAP
Ownership Status: Unknown
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
CERCLIS-NFRAP Assessment History:
Assessment: DISCOVERY Completed: 03/01/1987
Assessment: ARCHIVE SITE Completed: 09/01/1987
Assessment: PRELIMINARY ASSESSMENT Completed: 09/01/1987
CERCLIS-NFRAP Alias Name(s):
PURITY OIL SALES

B8
SW
1/8-1/4
1270 ft.
Higher

BRUNOS IRON AND METAL
3211 SOUTH GOLDEN STATE BLVD
FRESNO, CA 93725

RCRIS-LQG **1001815503**
CAR000054486

Site 2 of 2 in cluster B

RCRIS:
Owner: FREDA TOSI
(559) 255-0922
EPA ID: CAR000054486
Contact: ENVIRONMENTAL MANAGER
Classification: Large Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported
Violation Status: No violations found

9
SSW
1/4-1/2
1429 ft.
Higher

FRESNO UNITED METAL
3270 SOUTH GOLDEN STATE
FRESNO, CA

SWF/LF **S104310761**
N/A

LF:
Facility ID: 10-TI-1101
Operator: Not reported
Operator Phone: Not reported
Operator Addr:
Owner: Fresno United Metal
Owner Address: Not reported
1701 South Orange Avenue
Fresno, CA 93702
Owner Telephone: (559) 264-6303
Activity: Minor Waste Tire Facility
Operator's Status: Active
Regulation Status: Unpermitted
Region: STATE
Lat/Long: 36.68833 / -119.74556
Permit Date: Not reported
Accepted Waste: Tires
Status : Not reported
Swisnumber : Not reported
Site Type : Not reported
Aka : Not reported
Type Of Waste : Not reported

FRESNO UNITED METAL (Continued) **S104310761**

Disposal Area :	Not reported
SWFP Date :	Not reported
WDR Number :	Not reported
Dates Of Operation :	Not reported
Closure Approved :	Not reported
Date Of Field Units :	Not reported
Surface Condition :	Not reported
Landfill Gas :	Not reported
Leachate :	Not reported
Emergency Response :	Not reported
Other Recommendation :	Not reported
Reassess Site :	Not reported
Priority For Site Assessment :	Not reported
Lea Date :	Not reported
Explanation:	Not Reported
No Further Action:	Not Reported
Permitted Throughput with Units:	0
Permitted Throughput with Units:	0
Permitted Throughput with Units:	0
Actual Throughput with Units:	Tires
Actual Capacity with Units:	0
Permitted Capacity with Units:	0
Remaining Capacity with Units:	Not reported
Permitted Total Acreage:	0
Inspection Frequency:	None
Landuse Name:	Not reported
GIS Source:	Not reported
Permit Status:	Not reported
Category:	Waste Tire Site
Unit Number:	01
Last Waste Tire Inspection Count :	350
Last Waste Tire Inspection Date:	7/31/02
Original Waste Tire Count:	0
Original Waste Tire Count Date:	Not reported
Closure Date:	/ /
Closure Type:	Not reported
Disposal Acreage:	Not reported
Remaining Capacity:	Not reported

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10 SSW 1/4-1/2 1758 ft. Higher

RHODES RESIDENCE
3355 MAPLE S
FRESNO, CA 93725

LUST **S104404184**
N/A

State LUST:

Cross Street:	GOLDEN STATE BLVD		
Qty Leaked:	Not reported		
Case Number	5T10000547		
Reg Board:	5		
Chemical:	Gasoline		
Lead Agency:	Local Agency		
Local Agency :	10000		
Case Type:	Soil only		
Status:	Not reported		
County:	Fresno		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported

RHODES RESIDENCE (Continued) **S104404184**

Remed Action: Not reported Monitoring: Not reported
Close Date: 9/20/95
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 2/14/95
Enforcement Dt : 1/1/65
Enf Type: None Taken
Enter Date : 3/10/95
Funding: Responsible Party
Staff Initials: DAV
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
Priority: 4
Local Case # : Not reported
Beneficial: Not reported
Staff : BEM
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 9/20/95
Stop Date : 1/19/95
Work Suspended :N
Responsible Party ROBERT & IRENE RHODES
RP Address: RRI, ANDREW, ALBERTA
Global Id: T0601900530
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: CITY OF FRESNO
Well Name: WELL 162
Distance To Lust: 2425.972323
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: GASOLINE
Case Type: Soil only
Program: LUST
Staff Initials: DAM Case Number: 5T10000547
Status: Case Closed
MTBE Code: N/A
Respble Party: ROBERT & IRENE RHODES
County Name: FRESNO

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
C11 SW 1/4-1/2 1768 ft. Higher	PURITY OIL SALES 3254 SOUTH MAPLE AVENUE MALAGA, CA 93727 Site 1 of 3 in cluster C	CA BOND EXP. PLAN	S100833431 N/A
C12 SW 1/4-1/2 1768 ft. Higher	PURITY OIL SALES, INC 3265 SOUTH MAPLE AVENUE MALAGA, CA 93726 Site 2 of 3 in cluster C	AWP	S105481921 N/A
C13 SW 1/4-1/2 1768 ft. Higher	PURITY OIL SALES 3265 S. MAPLE FRESNO ,CA, CA 93725 Site 3 of 3 in cluster C	WMUDS/SWAT	S104156464 N/A

WMUDS:

Region:	5F
Date of Last Facility Edit:	Not reported
Last Facility Editors:	Not reported
Waste Discharge System ID:	5D102003001
Solid Waste Information ID:	Not reported
Waste Discharge System:	True
Solid Waste Assessment Test Program:	False
Facility Name:	Not reported
Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act Program:	False
Department of Defense:	False
Open to Public:	False
Number of WMUDS at Facility:	1
Facility Telephone:	Not reported
Primary Standard Industrial Classification:	2992
Secondary Standard Industrial Classification:	Not reported
Solid Waste Assessment Test Program Name:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Sub Chapter 15:	True
Reg. Board Project Officer:	LSO
Section Range:	Not reported
RCRA Facility:	No
Waste Discharge Requirements:	H
Base Meridian:	Not reported
Waste List:	False
Facility Description:	Not reported
Self-Monitoring Rept. Frequency:	No Reporting Requirements

Threat to Water Quality:

Major Threat to Water Quality. A violation could render unusable a ground water or surface water resource used as a significant drink water supply, require closure of an area used for contact recreation, result in long-term deleterious effects on shell fish spawning or growth areas of aquatic resources, or directly expose the public to toxic substances.

PURITY OIL SALES (Continued) **S104156464**

Facility Type: Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.

Complexity: Category A - Any major NPDES facility, any non-NPDES facility (particularly those with toxic wastes) that would be a major if discharge was made to surface or ground waters, or any Class I disposal site. Includes any small-volume complex facility (particularly those with toxicwastes) with numerous discharge points, leak detection systems or ground water monitoring wells.

Prime Waste: Process Waste (Waste produced as part of the industrial/manufacturing process) - Hazardous/Influent or Solid Wastes that contain toxic, corrosive, ignitable or reactive substances and must be managed according to applicable DOHS standards.

Agency: PURITY OIL SALES, INC.
Address: 873-81ST AVENUE
OAKLAND ,CA 94621
Department: Not reported
Contact: NONE
Telephone: (333) 333-3333
Type: Private
Landowner: Not reported
Address: Not reported
Telephone: Not reported
Contact: Not reported

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14 South 1/4-1/2 1861 ft. Higher

SUBURBAN PROPANE
3363 S GOLDEN STATE BLVD
FRESNO, CA 93778

LUST **S101581326**
N/A

State LUST:

Cross Street:	MAPLE		
Qty Leaked:	Not reported		
Case Number	5T10000189		
Reg Board:	5		
Chemical:	Gasoline		
Lead Agency:	Regional Board		
Local Agency :	10000		
Case Type:	Aquifer affected		
Status:	Not reported		
County:	Fresno		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	11/7/89	Prelim Assess:	11/7/89
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	3/24/99		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	8/10/89		
Enforcement Dt :	9/18/89		
Enf Type:	None Taken		
Enter Date :	9/15/89		
Funding:	Responsible Party		
Staff Initials:	LAN		
How Discovered:	Tank Closure		

SUBURBAN PROPANE (Continued) **S101581326**

How Stopped: Close Tank
Interim : No
Leak Cause: Unknown
Leak Source: Tank
MTBE Date : 3/11/99
Max MTBE GW : 5
MTBE Tested: MTBE Detected. Site tested for MTBE & MTBE detected
Priority: 4
Local Case # : Not reported
Beneficial: Not reported
Staff : BEM
GW Qualifies : <
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 3/24/99
Stop Date : Not reported
Work Suspended :N
Responsible PartySUBURBAN PROPANE
RP Address: 2171 N. FINE, PO BOX 12647, FRESNO, CA 93727
Global Id: T0601900187
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 1
Mtbe Fuel: Not reported
Water System Name: Not reported
Well Name: Not reported
Distance To Lust: 2548.904813
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: GASOLINE
Case Type: Aquifer affected
Program: LUST
Staff Initials: DAM Case Number: 5T10000189
Status: Case Closed
MTBE Code: 1
Respble Party: SUBURBAN PROPANE
County Name: FRESNO

D15 NNW 1/4-1/2 1995 ft. Higher

PRODUCERS COTTON OIL COMPANY **WMUDS/SWAT** **S104164280**
2907 S MAPLE AVE **N/A**
FRESNO CA, CA 93725

Site 1 of 3 in cluster D

WMUDS:
Region: 5F
Date of Last Facility Edit: Not reported
Last Facility Editors: Not reported
Waste Discharge System ID: 5D102110001
Solid Waste Information ID: Not reported
Waste Discharge System: True
Solid Waste Assessment Test Program: False
Facility Name: Not reported

PRODUCERS COTTON OIL COMPANY (Continued) **S104164280**

Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act Program:	False
Department of Defense:	False
Open to Public:	False
Number of WMUDS at Facility:	1
Facility Telephone:	Not reported
Primary Standard Industrial Classification:	0723
Secondary Standard Industrial Classification:	Not reported
Solid Waste Assessment Test Program Name:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Sub Chapter 15:	True
Reg. Board Project Officer:	AM
Section Range:	Not reported
RCRA Facility:	No
Waste Discharge Requirements:	A
Base Meridian:	Not reported
Waste List:	False
Facility Description:	Not reported
Self-Monitoring Rept. Frequency:	Quarterly Submittal

Threat to Water Quality:
Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.

Facility Type: Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.

Complexity: Category B - Any facility having a physical, chemical, or biological waste treatment system (except for septic systems with subsurface disposal), or any Class II or III disposal site, or facilities without treatment systems that are complex, such as marinas with petroleum products, solid wastes, and sewage pump out facilities.

Prime Waste: Process Waste (Waste produced as part of the industrial/manufacturing process) - Hazardous/Influent or Solid Wastes that contain toxic, corrosive, ignitable or reactive substances and must be managed according to applicable DOHS standards.

Agency: PRODUCERS COTTON OIL COMPANY
Address: 2365 E NORTH AVE
FRESNO CA 93725
Department: Not reported
Contact: DUNCAN MC COOK
Telephone: (559) 446-6415
Type: Private
Landowner: Not reported
Address: Not reported
Telephone: Not reported
Contact: Not reported

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
D16 NNW 1/4-1/2 1995 ft. Higher	PRODUCERS COTTON OIL COMPANY 2907 SOUTH MAPLE FRESNO, CA 93725 Site 2 of 3 in cluster D	Toxic Pits	S100676302 N/A

TOXIC PITS:

Region:	05F	Task #:	85178
Owner:	PRODUCERS COTTON OIL COMPANY		
Num. of Pits:	2	1/2 Mi Limit:	Not reported
Hydro Geological Assessment Report Due: 07/01/91			
Final Hydro Geological Assessment Review Completed: Not Reported			
Cease Discharge Due:	Not reported	Cease Discharge Completed:	08/16/91
Closure Due:	05/01/92	Closure Completed:	08/16/91
Status:	CLOSED		

D17 NNW 1/4-1/2 1995 ft. Higher	PRODUCERS COTTON OIL WARE 2907 MAPLE FRESNO, CA 93717 Site 3 of 3 in cluster D	LUST	S104404094 N/A

State LUST:

Cross Street:	NORTH AVE		
Qty Leaked:	Not reported		
Case Number	5T10000290		
Reg Board:	5		
Chemical:	Waste Oil		
Lead Agency:	Local Agency		
Local Agency :	10000		
Case Type:	Soil only		
Status:	Not reported		
County:	Fresno		
Review Date:	Not reported	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	Not reported
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	2/11/92		
Release Date:	Not reported		
Cleanup Fund Id :	Not reported		
Discover Date :	1/16/91		
Enforcement Dt :	1/1/65		
Enf Type:	None Taken		
Enter Date :	3/1/91		
Funding:	Responsible Party		
Staff Initials:	JIM		
How Discovered:	Tank Closure		
How Stopped:	Not reported		
Interim :	Not reported		
Leak Cause:	Unknown		
Leak Source:	Unknown		
MTBE Date :	Not reported		
Max MTBE GW :	Not reported		
MTBE Tested:	Not Required to be Tested.		
Priority:	4		
Local Case # :	Not reported		
Beneficial:	Not reported		
Staff :	BEM		
GW Qualifies :	Not reported		
Max MTBE Soil :	Not reported		

PRODUCERS COTTON OIL WARE (Continued) **S104404094**

Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 2/11/92
Stop Date : 12/6/90
Work Suspended :N
Responsible Party PRODUCERS COTTON OIL CO.
RP Address: P.O. BOX 1832, FRENSO, CA 93717
Global Id: T0601900286
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: CITY OF FRESNO
Well Name: WELL 203
Distance To Lust: 886.3670988
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: WASTE OIL
Case Type: Soil only
Program: LUST
Staff Initials: DAM Case Number: 5T10000290
Status: Case Closed
MTBE Code: N/A
Respble Party: PRODUCERS COTTON OIL CO.
County Name: FRESNO

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18 WNW 1/4-1/2 2183 ft. Higher

SANTA FE INTERMODAL YARD
2989 GOLDEN STATE
FRESNO, CA 93725

LUST S104404150
N/A

State LUST:
Cross Street: Not reported
Qty Leaked: Not reported
Case Number 5T10000451
Reg Board: 5
Chemical: Diesel
Lead Agency: Regional Board
Local Agency : 10000
Case Type: Aquifer affected
Status: Not reported
County: Fresno
Review Date: Not reported Confirm Leak: Not reported
Workplan: Not reported Prelim Assess: Not reported
Pollution Char: Not reported Remed Plan: Not reported
Remed Action: Not reported Monitoring: Not reported
Close Date: 10/10/00
Release Date: Not reported
Cleanup Fund Id : 12547
Discover Date : 8/30/93
Enforcement Dt : 1/1/65
Enf Type: None Taken

SANTA FE INTERMODAL YARD (Continued) **S104404150**

Enter Date : 10/21/93
Funding: Responsible Party
Staff Initials: OSC
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: 4
Local Case # : Not reported
Beneficial: Not reported
Staff : JWH
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: RB Lead Underground Storage Tank
Oversight Prgm : UST
Review Date : 10/10/00
Stop Date : 6/9/93
Work Suspended :N
Responsible Partyburlington northern SANTA FE
RP Address: 740 E. CARNEGIE, SAN BERNARDINO, CA 92408
Global Id: T0601900441
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: WILLIAM HOPKINS WATER SYSTEM
Well Name: NORTH DRUG STORE WELL
Distance To Lust: 1722.273151
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: DIESEL
Case Type: Aquifer affected
Program: LUST
Staff Initials: JWH Case Number: 5T10000451
Status: Case Closed
MTBE Code: N/A
Respble Party: burlington northern SANTA FE
County Name: FRESNO

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19 SSW 1/4-1/2 2204 ft. Higher

HASKEL ESTATE PROPERTY
3486 MAPLE S
FRESNO, CA 93725

LUST S104404201
N/A

State LUST:
Cross Street: MUSCAT
Qty Leaked: Not reported
Case Number 5T10000592
Reg Board: 5

HASKEL ESTATE PROPERTY (Continued) **S104404201**

Chemical: Waste Oil
Lead Agency: Local Agency
Local Agency : 10000
Case Type: Soil only
Status: Not reported
County: Fresno
Review Date: Not reported
Workplan: Not reported
Pollution Char: Not reported
Remed Action: Not reported
Close Date: 4/24/96
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 11/12/95
Enforcement Dt : 1/1/65
Enf Type: None Taken
Enter Date : 12/11/95
Funding: Responsible Party
Staff Initials: DAV
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: 4
Local Case # : Not reported
Beneficial: Not reported
Staff : BEM
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 4/24/96
Stop Date : 10/20/95
Work Suspended :N
Responsible PartyHASKEL ESTATE PROPERTY
RP Address: 4053 FARRIAN WAY E, FRESNO, CA 93726
Global Id: T0601900573
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: CITY OF FRESNO
Well Name: WELL 162
Distance To Lust: 2372.20988
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

Confirm Leak: Not reported
Prelim Assess: Not reported
Remed Plan: Not reported
Monitoring: Not reported

LUST Region 5:
Substance: WASTE OIL
Case Type: Soil only

HASKEL ESTATE PROPERTY (Continued) **S104404201**

Program: LUST
Staff Initials: DAM
Status: Case Closed
MTBE Code: N/A
Respble Party: HASKEL ESTATE PROPERTY
County Name: FRESNO
Case Number: 5T10000592

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20 WNW 1/4-1/2 2316 ft. Higher

KBK OIL
2874 GOLDEN STATE BLVD
FRESNO, CA 93725

LUST **S105033193**
N/A

State LUST:

Cross Street: CEDAR AVENUE
Qty Leaked: Not reported
Case Number 5T10000398
Reg Board: 5
Chemical: Diesel
Lead Agency: Local Agency
Local Agency : 10000
Case Type: Soil only
Status: Not reported
County: Fresno
Review Date: Not reported
Workplan: Not reported
Pollution Char: Not reported
Remed Action: Not reported
Close Date: 8/20/96
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 9/16/92
Enforcement Dt : 1/1/65
Enf Type: None Taken
Enter Date : 10/22/92
Funding: Responsible Party
Staff Initials: LUI
How Discovered: Tank Closure
How Stopped: Close Tank
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: 4
Local Case # : Not reported
Beneficial: Not reported
Staff : BEM
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 8/20/96
Stop Date : 8/26/92

Confirm Leak: Not reported
Prelim Assess: Not reported
Remed Plan: Not reported
Monitoring: Not reported

KBK OIL (Continued) **S105033193**

Work Suspended :N
Responsible PartyKBK OIL
RP Address: P. O. BOX 594 - KINGSBURG, CA 93631
Global Id: T0601900389
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: CAL TRANS RAILROAD AVE MAINT STAT
Well Name: WELL 01
Distance To Lust: 169.2065147
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

LUST Region 5:
Substance: DIESEL
Case Type: Soil only
Program: LUST
Staff Initials: DAM Case Number: 5T10000398
Status: Case Closed
MTBE Code: N/A
Respble Party: KBK OIL
County Name: FRESNO

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21 SSW 1/2-1 2818 ft. Higher

SAFETY KLEEN CORP 7-015-01 LUST **1000224240**
3561 S MAPLE ST RCRIS-LQG **93275VSTFD60**
FRESNO, CA 93725 RCRIS-TSD
UST
CORRACTS
CERC-NFRAP
HIST UST

CERCLIS-NFRAP Classification Data:
Site Incident Category: Not reported Federal Facility: Not a Federal Facility
Non NPL Code: DR
Ownership Status: Private NPL Status: Not on the NPL
CERCLIS-NFRAP Assessment History:
Assessment: DISCOVERY Completed: 07/12/1989
Assessment: PRELIMINARY ASSESSMENT Completed: 05/21/1990
Assessment: ARCHIVE SITE Completed: 01/23/1996

CORRACTS Data:

EPA Id: CAD066113465
Region: 9
State: CA
Area Name: ENTIRE FACILITY
Original Scheduled Date: Not reported
New Scheduled Date: Not reported
Actual Date: 05/21/1990
Corrective Action: CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority

SAFETY KLEEN CORP 7-015-01 (Continued) **1000224240**

RCRIS Corrective Action Summary:
Event: RFI Approved
Event Date: 09/28/1998

Event: CA Prioritization, Facility or area was assigned a low corrective action priority.
Event Date: 05/21/1990

RCRIS:
Owner: ROBERT PAPAZIAN
(209) 434-3700
EPA ID: CAD066113465

Contact: JOHN SCHWIND
(714) 751-0106

Rank Status: 1
Rank Date: 08/27/1992
Classification: Handler transports wastes, but commercial status is unknown, Handler transports wastes, but commercial status is unknown, Large Quantity Generator, TSDF
Used Oil Recyc: No
TSDF Activities: Not reported

BIENNIAL REPORTS:
Last Biennial Reporting Year: 1999

Waste	Quantity (Lbs)	Waste	Quantity (Lbs)
D001	1872115.00	D006	2939.00
D007	1738.00	D008	2939.00
D011	1738.00	D018	1733285.00
D022	1738.00	D027	1738.00
D028	1738.00	D035	3794.00
D039	19289.00	D040	1732084.00
F001	2939.00	F002	2939.00
F003	3794.00	F005	3794.00

Violation Status: Violations exist

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 04/24/1998
Actual Date Achieved Compliance: 04/29/1998

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 04/24/1998
Penalty Type: Not reported

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 11/20/1990
Actual Date Achieved Compliance: 12/17/1990

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 12/17/1990
Penalty Type: Not reported

Regulation Violated: 264.140-150.H
Area of Violation: TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS
Date Violation Determined: 11/15/1990
Actual Date Achieved Compliance: 09/24/1992

Enforcement Action: WRITTEN INFORMAL

SAFETY KLEEN CORP 7-015-01 (Continued) **1000224240**

Enforcement Action Date: 11/15/1990
Penalty Type: Not reported

Regulation Violated: 268 ALL
Area of Violation: TSD-LAND BAN REQUIREMENTS
Date Violation Determined: 01/19/1988
Actual Date Achieved Compliance: 12/17/1990

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 02/19/1988
Penalty Type: Not reported

Regulation Violated: 268.7
Area of Violation: GENERATOR-LAND BAN REQUIREMENTS
Date Violation Determined: 01/19/1988
Actual Date Achieved Compliance: 12/17/1990

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 02/19/1988
Penalty Type: Not reported

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 01/19/1988
Actual Date Achieved Compliance: 12/17/1990

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 02/19/1988
Penalty Type: Not reported

Regulation Violated: 270
Area of Violation: TSD-OTHER REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 01/20/1987
Actual Date Achieved Compliance: 02/19/1988

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 01/20/1987
Penalty Type: Not reported

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 01/22/1987
Penalty Type: Not reported

There are 7 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS (OVERSIGHT)	19980429
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS (OVERSIGHT)	19901217
Financial Record Review	TSD-FINANCIAL RESPONSIBILITY REQUIREMENTS	19920924
Compliance Evaluation Inspection	TSD-LAND BAN REQUIREMENTS	19901217
	GENERATOR-LAND BAN REQUIREMENTS	19901217
	TSD-OTHER REQUIREMENTS (OVERSIGHT)	19901217
Compliance Evaluation Inspection	TSD-OTHER REQUIREMENTS (OVERSIGHT)	19880219

State LUST:
Cross Street: HWY 99
Qty Leaked: Not reported
Case Number 5T10000378
Reg Board: 5
Chemical: Solvents
Lead Agency: Local Agency

SAFETY KLEEN CORP 7-015-01 (Continued) **1000224240**

Local Agency : 10000
Case Type: Undefined
Status: Not reported
County: Fresno
Review Date: 1/1/65
Workplan: Not reported
Pollution Char: Not reported
Remed Action: Not reported
Close Date: Not reported
Release Date: Not reported
Cleanup Fund Id : Not reported
Discover Date : 3/3/92
Enforcement Dt : 1/1/65
Enf Type: None Taken
Enter Date : 8/4/92
Funding: Responsible Party
Staff Initials: JIM
How Discovered: Tank Closure
How Stopped: Remove Contents
Interim : Not reported
Leak Cause: Unknown
Leak Source: Unknown
MTBE Date : Not reported
Max MTBE GW : Not reported
MTBE Tested: Not Required to be Tested.
Priority: Medium priority
Local Case # : Not reported
Beneficial: Not reported
Staff : DAM
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm: Local Implementing Agency UST (includes non-LOP cases within LOP jurisdiction)
Oversight Prgm : LIA
Review Date : 3/19/92
Stop Date : 2/14/92
Work Suspended :N
Responsible Party SAFETY KLEEN CORP
RP Address: P. O. BOX 1429 - SAN PEDRO, CA 90733
Global Id: T0601900369
Org Name: Not reported
Contact Person: Not reported
MTBE Conc: 0
Mtbe Fuel: Not reported
Water System Name: CITY OF FRESNO
Well Name: WELL 162
Distance To Lust: 2229.269202
Waste Discharge Global ID: Not reported
Waste Disch Assigned Name: Not reported

Confirm Leak: 1/1/65
Prelim Assess: Not reported
Remed Plan: Not reported
Monitoring: Not reported

LUST Region 5:
Substance: SOLVENTS
Case Type: Undefined
Program: LUST
Staff Initials: DAM
Case Number: 5T10000378

SAFETY KLEEN CORP 7-015-01 (Continued) **1000224240**

Status: Leak being confirmed
MTBE Code: N/A
Respble Party: SAFETY KLEEN CORP
County Name: FRESNO

UST HIST:

Facility ID: 6126
Tank Num: 1 — Container Num: 01
Tank Capacity: 10000 — Year Installed: 1976
Tank Used for: WASTE
Type of Fuel: Not Reported — Tank Construction: .25 inches
Leak Detection: Visual, Stock Inventor
Contact Name: DAVID WALL — Telephone: (312) 697-8460
Total Tanks: 3 — Region: STATE
Facility Type: 2 — Other Type: PARTS WASHER SERVICE

Facility ID: 6126
Tank Num: 2 — Container Num: 02
Tank Capacity: 1000 — Year Installed: 1976
Tank Used for: WASTE
Type of Fuel: Not Reported — Tank Construction: .1875 inches
Leak Detection: Visual, Stock Inventor
Contact Name: DAVID WALL — Telephone: (312) 697-8460
Total Tanks: 3 — Region: STATE
Facility Type: 2 — Other Type: PARTS WASHER SERVICE

Facility ID: 6126
Tank Num: 3 — Container Num: 03
Tank Capacity: 10000 — Year Installed: 1976
Tank Used for: PRODUCT
Type of Fuel: Not Reported — Tank Construction: .25 inches
Leak Detection: Visual, Stock Inventor
Contact Name: DAVID WALL — Telephone: (312) 697-8460
Total Tanks: 3 — Region: STATE
Facility Type: 2 — Other Type: PARTS WASHER SERVICE

State UST:

Facility ID: FA0170041
Total Tanks: 1
Region: STATE
Local Agency: 10000

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRESNO	S105003776	CEDAR AVE. RECYCLING & TRANSFER STATION	HWY 99 / BETWEEN NORTH AVE. / CENTRAL AVE		SWF/LF
FRESNO	S104809385	SALAS TIRE	BELMONT AVENUE		SWF/LF
FRESNO	S104735738	PIPCO RANCH	5414 NORTH E	93725	LUST
FRESNO	S104809377	RECYCLING UNLIMITED TS/MRF AND VERMICOMP	3077 SOUTH GOLDEN STATE FRONTAGE ROAI	93725	SWF/LF
FRESNO	S104809386	CENTRAL VALLEY TIRE DISPOSAL	1661 GRANTLAND		SWF/LF
FRESNO	1000390923	CHET & SONS TRUCK WASH	4025 S HWY 99	93725	RCRIS-SQG, CERC-NFRAP
FRESNO	S104809393	OHANESIAN WTS	420 SOUTH LEONARD AVENUE		SWF/LF
FRESNO	S102359949	CHATEAU FRESNO LANDFILL	MUSCAT AVE 1/4 MI W OF CHATEAU FRESNO /		SWF/LF
FRESNO	S102360028	BALCH CAMP DISPOSAL SITE	TRIMMER SPRINGS ROAD		SWF/LF
MENDOTA	U003787449	CALTRANS	HIGHWAY 180 AT BELMONT	93725	UST
THREE ROCKS	U001592740	THREE ROCKS RANCH	KAMM AVE 1/2 MI W OF HWY 33	93725	HIST UST

EPA Waste Codes Addendum

Code	Description
D001	IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
D006	CADMIUM
D007	CHROMIUM
D008	LEAD
D011	SILVER
D018	BENZENE
D022	CHLOROFORM
D027	1,4-DICHLOROBENZENE
D028	1,2-DICHLOROETHANE
D035	METHYL ETHYL KETONE
D039	TETRACHLOROETHYLENE
D040	TRICHLOROETHYLENE
F001	THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE. 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
F002	THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2-TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE LISTED IN F001, F004, OR F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
F003	THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND

Code	Description
	ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
F005	THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/18/02
Date Made Active at EDR: 09/20/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02
Elapsed ASTM days: 50
Date of Last EDR Contact: 08/01/02

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 6
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 08/15/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 09/23/02
Elapsed ASTM days: 35
Date of Last EDR Contact: 09/23/02

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 09/15/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 10/03/02
Elapsed ASTM days: 25
Date of Last EDR Contact: 09/23/02

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/02/02
Date Made Active at EDR: 07/15/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/06/02
Elapsed ASTM days: 70
Date of Last EDR Contact: 09/09/02

RCRIS: Resource Conservation and Recovery Information System
Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 09/09/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 09/24/02
Elapsed ASTM days: 34
Date of Last EDR Contact: 09/24/02

ERNS: Emergency Response Notification System
Source: EPA/NTIS
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/01
Date Made Active at EDR: 07/15/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/02/02
Elapsed ASTM days: 13
Date of Last EDR Contact: 07/24/02

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/99
Database Release Frequency: Biennially

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 04/25/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/24/02
Date of Next Scheduled EDR Contact: 12/23/02

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides. active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/00
Database Release Frequency: Annually

Date of Last EDR Contact: 10/22/02
Date of Next Scheduled EDR Contact: 01/20/03

STATE OF CALIFORNIA ASTM STANDARD RECORDS

AWP: Annual Workplan Sites
Source: California Environmental Protection Agency
Telephone: 916-323-3400
Known Hazardous Waste Sites. California DTSC's Annual Workplan (AWP), formerly BEP, identifies known hazardous substance sites targeted for cleanup.

Date of Government Version: 10/04/02
Date Made Active at EDR: 10/23/02
Database Release Frequency: Annually

Date of Data Arrival at EDR: 10/07/02
Elapsed ASTM days: 16
Date of Last EDR Contact: 10/07/02

TOXIC PITS: Toxic Pits Cleanup Act Sites
Source: State Water Resources Control Board
Telephone: 916-227-4364
Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/95
Date Made Active at EDR: 09/26/95
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 08/30/95
Elapsed ASTM days: 27
Date of Last EDR Contact: 07/25/02

SWF/LF (SWIS): Solid Waste Information System
Source: Integrated Waste Management Board
Telephone: 916-341-6320
Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/13/02
Date Made Active at EDR: 10/08/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 09/16/02
Elapsed ASTM days: 22
Date of Last EDR Contact: 09/16/02

WMUDS/SWAT: Waste Management Unit Database
Source: State Water Resources Control Board
Telephone: 916-227-4448
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/00
Date Made Active at EDR: 05/10/00
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 04/10/00
Elapsed ASTM days: 30
Date of Last EDR Contact: 09/11/02

LUST: Leaking Underground Storage Tank Information System
Source: State Water Resources Control Board
Telephone: 916-341-5740
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 07/11/02
Date Made Active at EDR: 09/03/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 07/18/02
Elapsed ASTM days: 47
Date of Last EDR Contact: 10/11/02

CA BOND EXP. PLAN: Bond Expenditure Plan
Source: Department of Health Services
Telephone: 916-255-2118
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/89
Date Made Active at EDR: 08/02/94
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 07/27/94
Elapsed ASTM days: 6
Date of Last EDR Contact: 05/31/94

CA UST:

UST: Active UST Facilities
Source: SWRCB
Telephone: 916-341-5700
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 01/17/02
Date Made Active at EDR: 02/12/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 01/21/02
Elapsed ASTM days: 22
Date of Last EDR Contact: 10/16/02

VCP: Voluntary Cleanup Program Properties
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 10/10/02
Date Made Active at EDR: 10/23/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 10/14/02
Elapsed ASTM days: 9
Date of Last EDR Contact: 10/14/02

HIST UST: Hazardous Substance Storage Container Database
Source: State Water Resources Control Board
Telephone: 916-341-5700
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/90
Date Made Active at EDR: 02/12/91
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 01/25/91
Elapsed ASTM days: 18
Date of Last EDR Contact: 07/26/01

STATE OF CALIFORNIA ASTM SUPPLEMENTAL RECORDS

DEED: List of Deed Restrictions
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
The use of recorded land use restrictions is one of the methods the DTSC uses to protect the public from unsafe exposures to hazardous substances and wastes.

Date of Government Version: 10/04/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 10/07/02
Date of Next Scheduled EDR Contact: 01/06/03

LOCAL RECORDS

ALAMEDA COUNTY:

Local Oversight Program Listing of UGT Cleanup Sites
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 07/12/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/12/02
Date of Next Scheduled EDR Contact: 10/28/02

Underground Tanks
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 06/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/28/02

KERN COUNTY:

Underground Storage Tank Sites & Tanks Listing
Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Kern County Sites and Tanks Listing.

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/02/02

LOS ANGELES COUNTY:

List of Solid Waste Facilities
Source: La County Department of Public Works
Telephone: 818-458-5185

Date of Government Version: 01/01/02
Database Release Frequency: Varies

Date of Last EDR Contact: 08/28/02
Date of Next Scheduled EDR Contact: 11/18/02

City of El Segundo Underground Storage Tank
Source: City of El Segundo Fire Department
Telephone: 310-607-2239

Date of Government Version: 08/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

City of Long Beach Underground Storage Tank
Source: City of Long Beach Fire Department
Telephone: 562-570-2543

Date of Government Version: 05/30/02
Database Release Frequency: Annually

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

City of Torrance Underground Storage Tank
Source: City of Torrance Fire Department
Telephone: 310-618-2973

Date of Government Version: 08/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

City of Los Angeles Landfills
Source: Engineering & Construction Division
Telephone: 213-473-7869

Date of Government Version: 03/01/02
Database Release Frequency: Varies

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

San Gabriel Valley Areas of Concern
Source: EPA Region 9
Telephone: 415-972-3178
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 12/31/98
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 06/29/99
Date of Next Scheduled EDR Contact: N/A

MARIN COUNTY:

Underground Storage Tank Sites
Source: Public Works Department Waste Management
Telephone: 415-499-6647
Currently permitted USTs in Marin County.

Date of Government Version: 08/06/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/29/02
Date of Next Scheduled EDR Contact: 11/04/02

NAPA COUNTY:

Sites With Reported Contamination
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 09/30/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

Closed and Operating Underground Storage Tank Sites
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 09/30/02
Database Release Frequency: Annually

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

ORANGE COUNTY:

List of Underground Storage Tank Cleanups
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 11/27/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

List of Underground Storage Tank Facilities
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 11/27/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Source: Department of Public Health
Telephone: 909-358-5055
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 09/26/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

Underground Storage Tank Tank List
Source: Health Services Agency
Telephone: 909-358-5055

Date of Government Version: 09/04/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

SAN DIEGO COUNTY:

Solid Waste Facilities
Source: Department of Health Services
Telephone: 619-338-2209
San Diego County Solid Waste Facilities.

Date of Government Version: 08/01/00
Database Release Frequency: Varies

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

SAN FRANCISCO COUNTY:

Local Oversite Facilities
Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920

Date of Government Version: 09/16/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

Underground Storage Tank Information
Source: Department of Public Health
Telephone: 415-252-3920

Date of Government Version: 09/16/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

SAN MATEO COUNTY:

Fuel Leak List
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921

Date of Government Version: 10/28/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 10/28/02
Date of Next Scheduled EDR Contact: 01/27/03

SANTA CLARA COUNTY:

Fuel Leak Site Activity Report
Source: Santa Clara Valley Water District
Telephone: 408-265-2600

Date of Government Version: 07/23/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

SOLANO COUNTY:

Leaking Underground Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/17/02
Date of Next Scheduled EDR Contact: 12/16/02

Underground Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 06/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/17/02
Date of Next Scheduled EDR Contact: 12/16/02

SONOMA COUNTY:

Leaking Underground Storage Tank Sites
Source: Department of Health Services
Telephone: 707-565-6565

Date of Government Version: 11/29/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/22/02
Date of Next Scheduled EDR Contact: 10/28/02

SUTTER COUNTY:

Underground Storage Tanks
Source: Sutter County Department of Agriculture
Telephone: 530-822-7500

Date of Government Version: 07/01/01
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/06/03

VENTURA COUNTY:

Inventory of Illegal Abandoned and Inactive Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 09/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

Listing of Underground Tank Cleanup Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 09/04/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

Underground Tank Closed Sites List
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 04/22/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/14/02
Date of Next Scheduled EDR Contact: 01/13/03

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Source: Yolo County Department of Health
Telephone: 530-666-8646

Date of Government Version: 05/01/02
Database Release Frequency: Annually

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

California Regional Water Quality Control Board (RWQCB) LUST Records

LUST REG 1: Active Toxic Site Investigation
Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-576-2220
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

LUST REG 2: Fuel Leak List
Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457

Date of Government Version: 07/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/14/02
Date of Next Scheduled EDR Contact: 01/13/03

LUST REG 3: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147

Date of Government Version: 08/19/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 08/19/02
Date of Next Scheduled EDR Contact: 11/18/02

LUST REG 4: Underground Storage Tank Leak List
Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-266-6600
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 08/09/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

LUST REG 5: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-255-3125

Date of Government Version: 10/01/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/08/02
Date of Next Scheduled EDR Contact: 01/06/03

LUST REG 6L: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 916-542-5424
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 01/02/02
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 10/08/02
Date of Next Scheduled EDR Contact: 01/06/03

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-346-7491

Date of Government Version: 10/25/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/08/02
Date of Next Scheduled EDR Contact: 01/06/03

LUST REG 7: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-346-7491

Date of Government Version: 07/02/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

LUST REG 8: Leaking Underground Storage Tanks
Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4498
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 07/23/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/16/02
Date of Next Scheduled EDR Contact: 11/11/02

LUST REG 9: Leaking Underground Storage Tank Report
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/01
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

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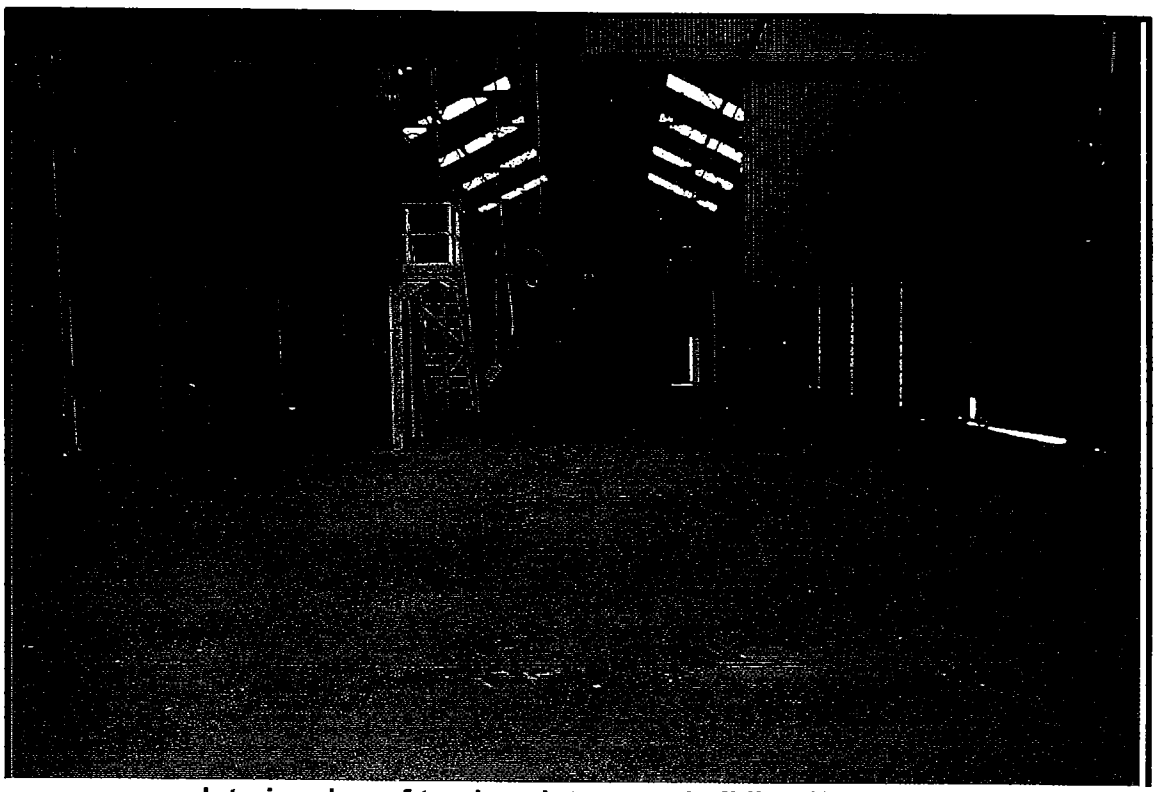
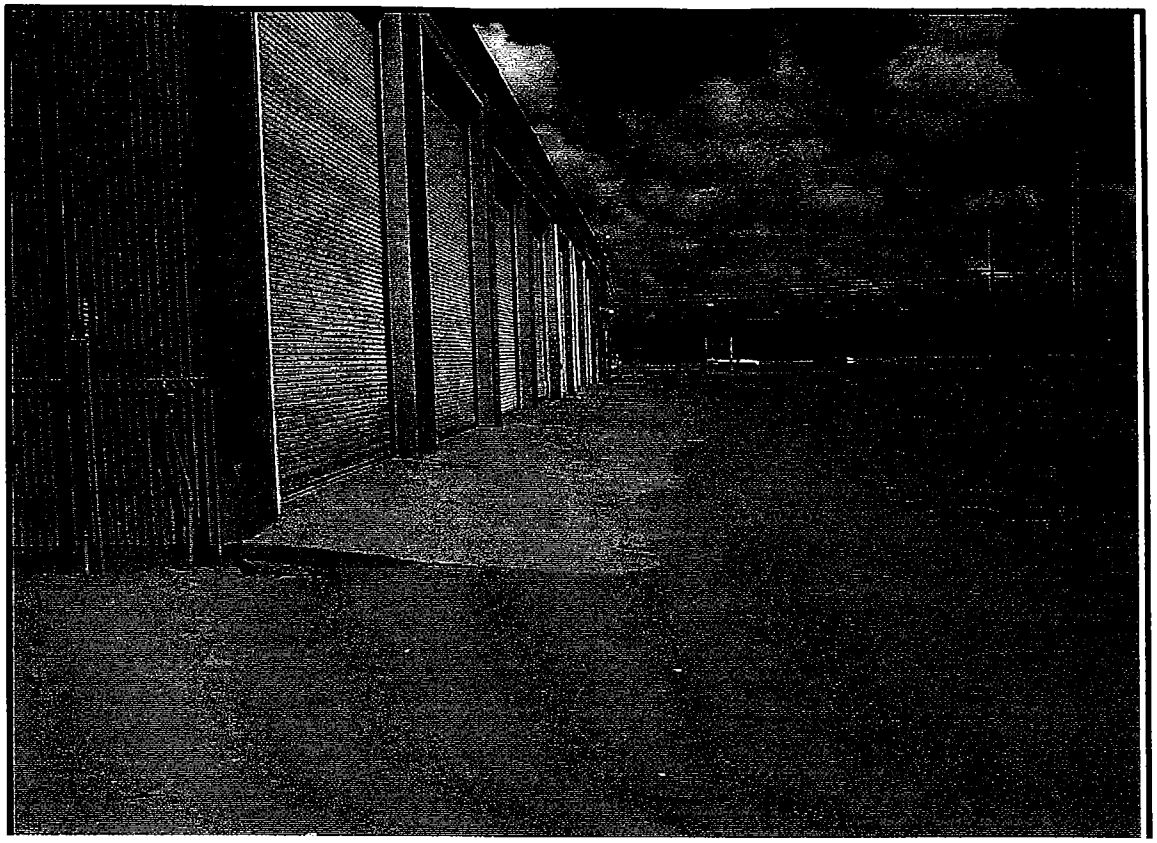
APPENDIX D - RECONNAISSANCE PHOTOGRAPHS

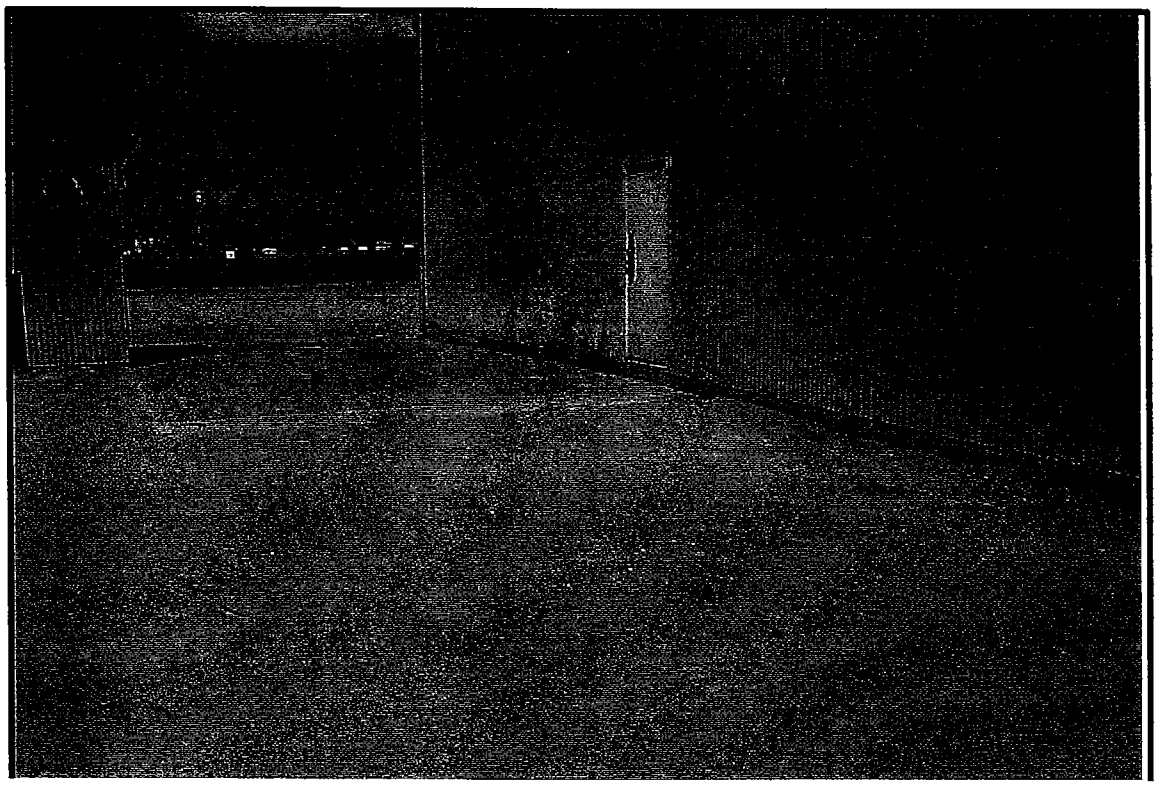
View of north border of subject property, looking southeast.



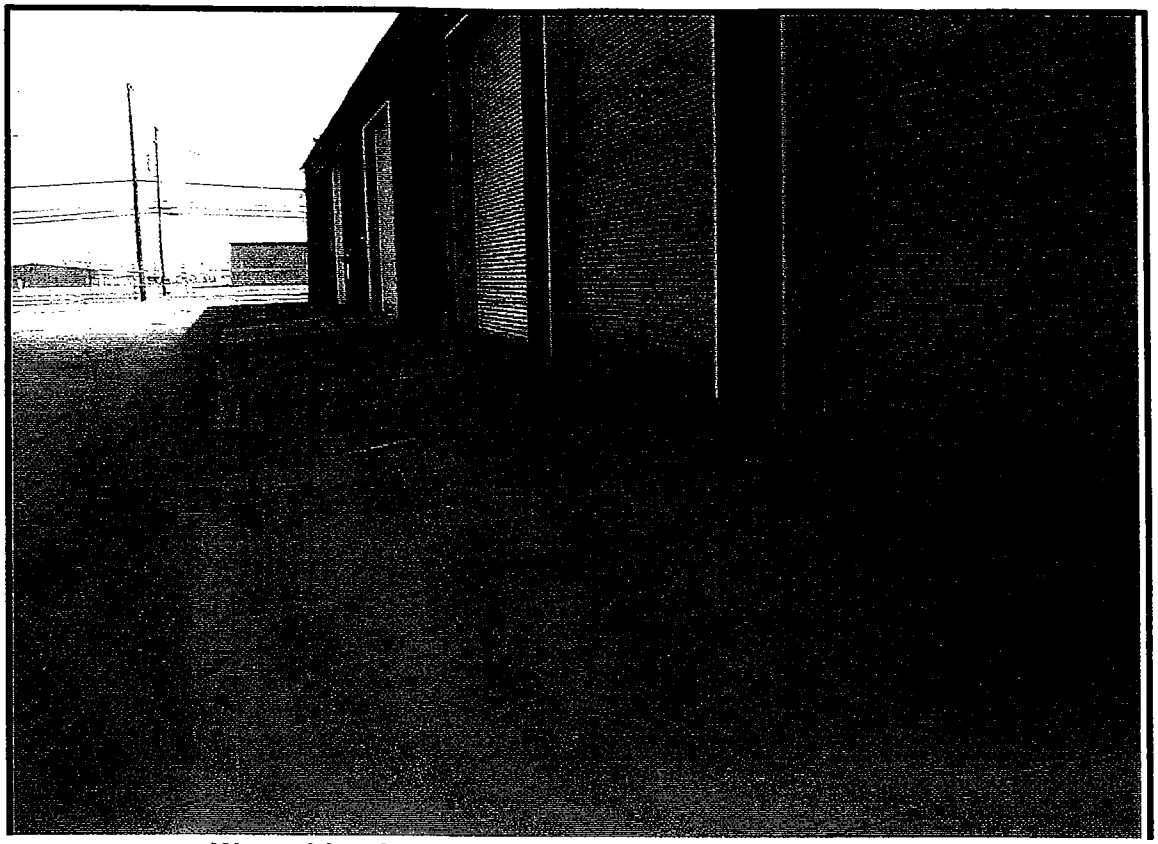
Interior view of truck maintenance building (April 2003).



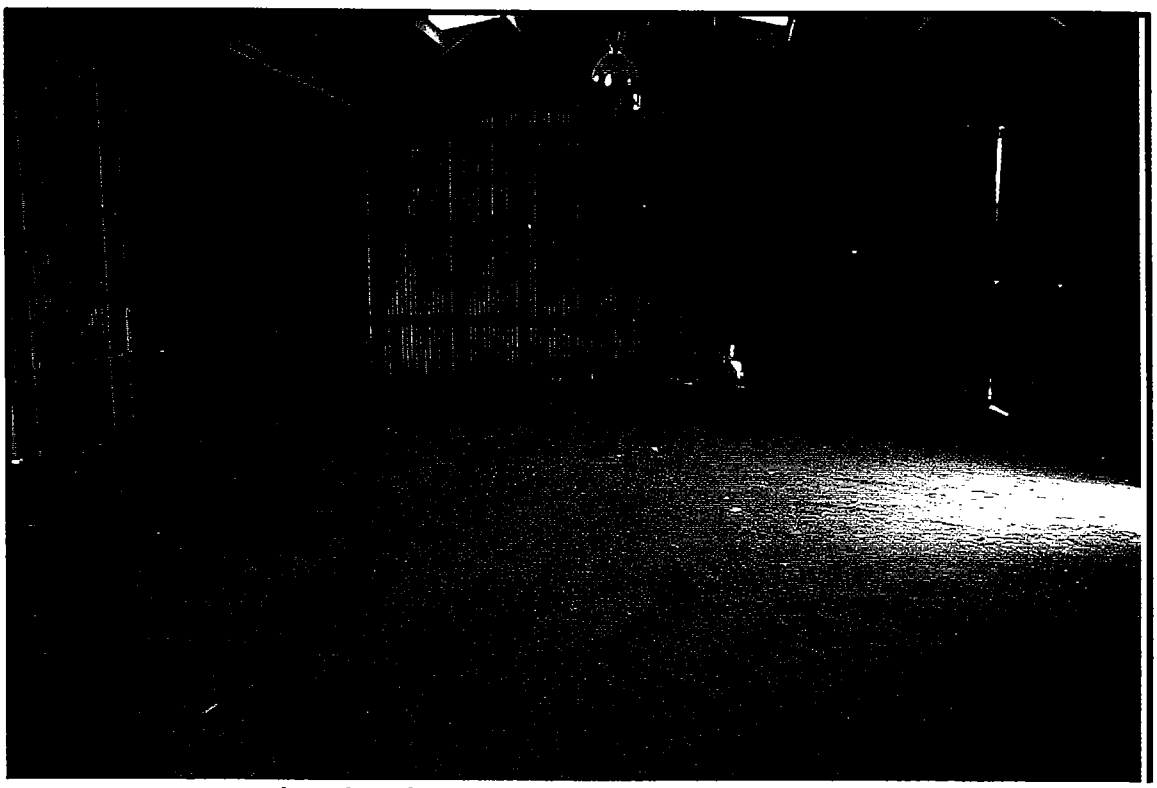
East side of truck maintenance building (April 2003).



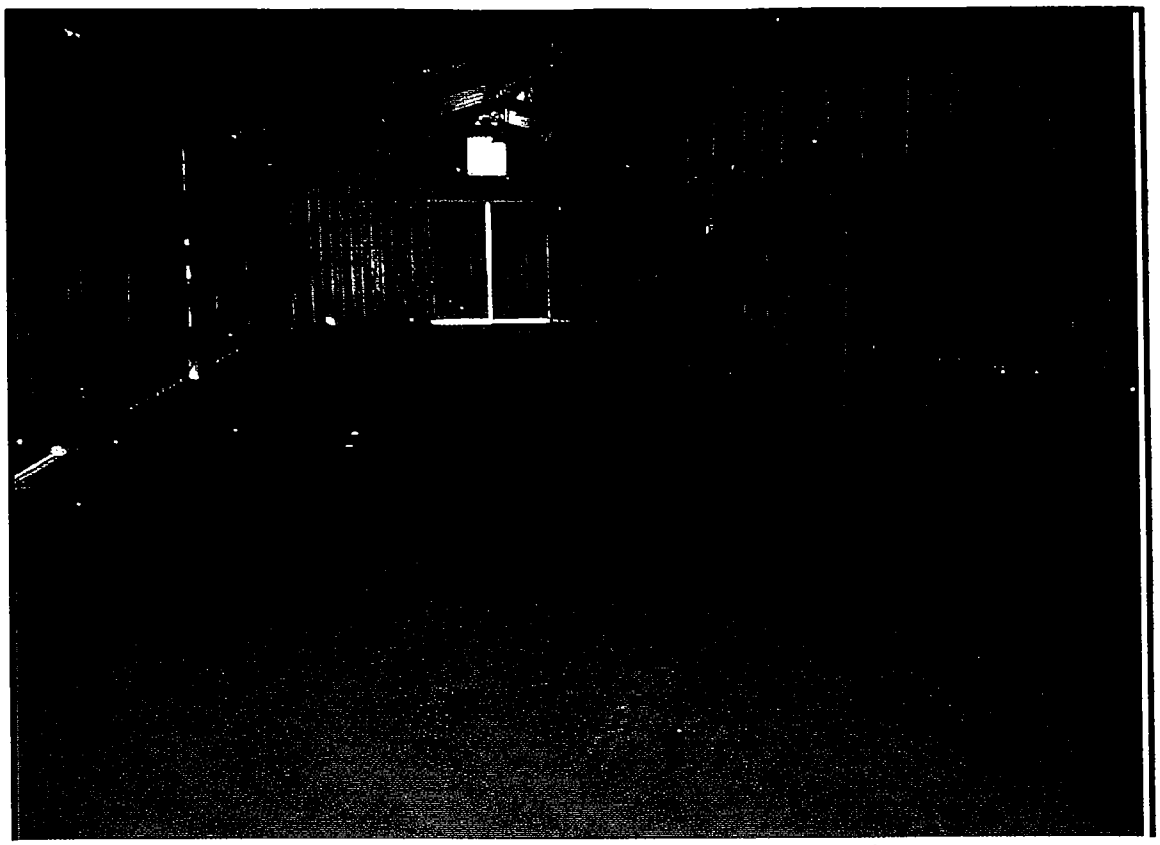
South side of truck maintenance building (April 2003).



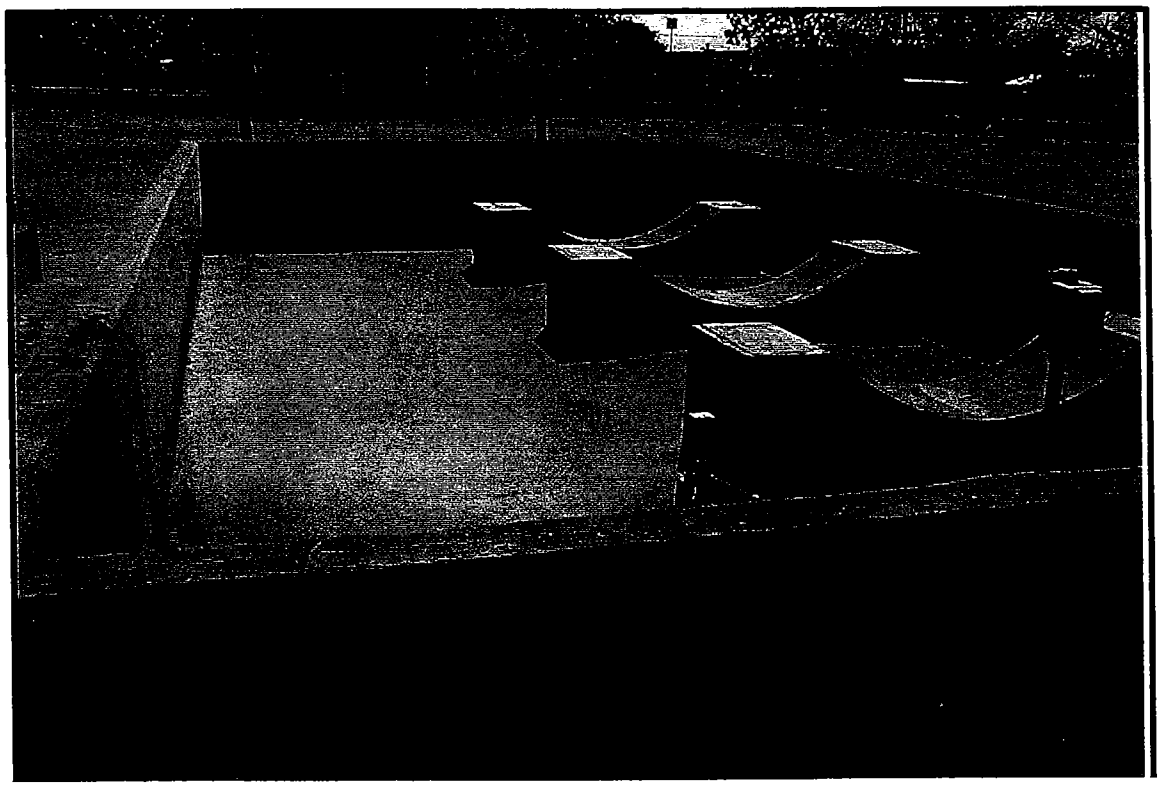
West side of truck maintenance building (April 2003).



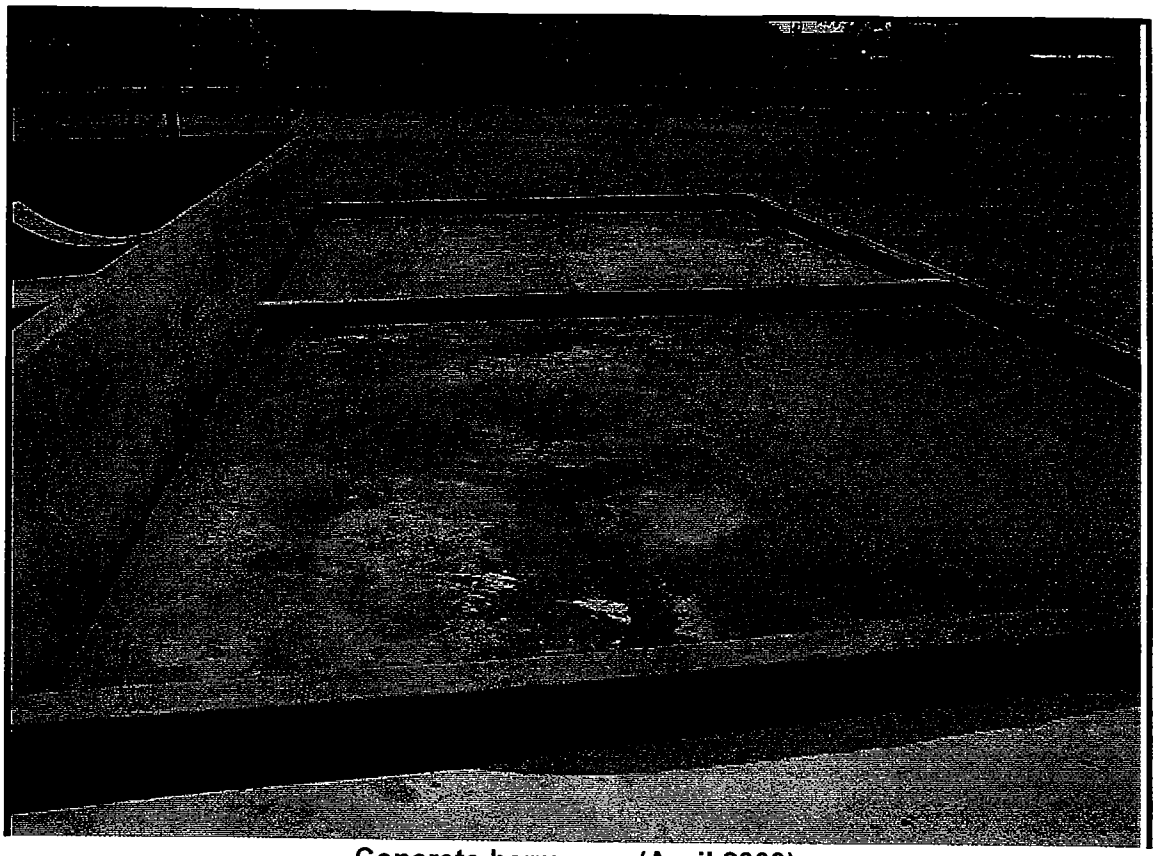
Interior view of west warehouse (April 2003).



Interior view of east warehouse (April 2003).

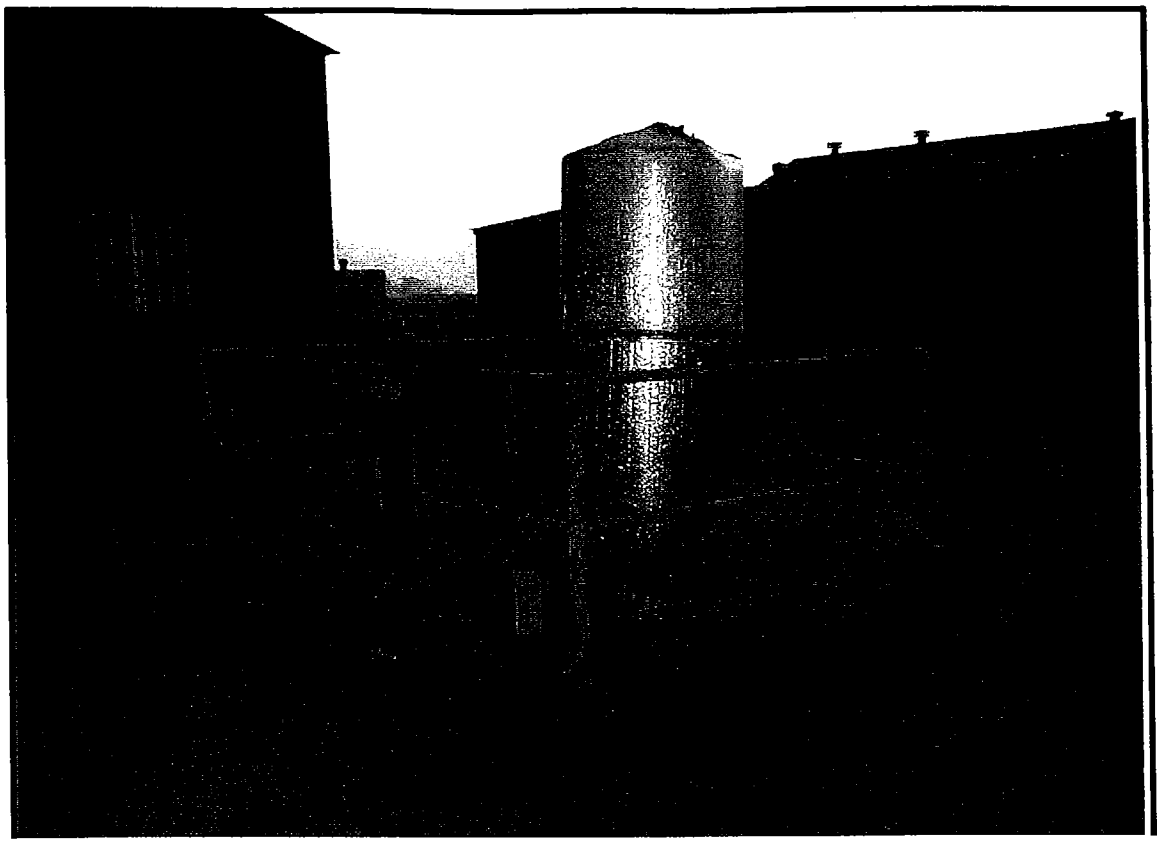


Concrete berm area (April 2003).



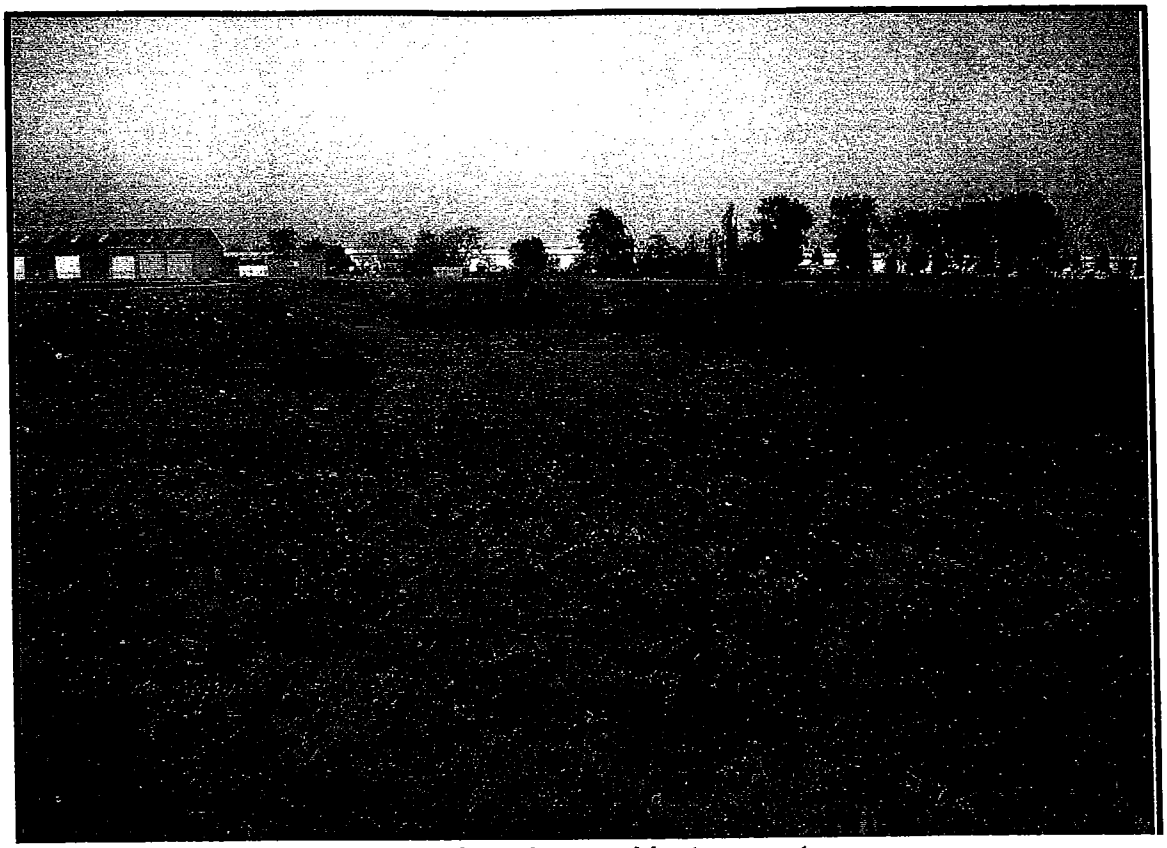
Concrete berm area (April 2003).

Stain observed by concrete berm area (April 2003).

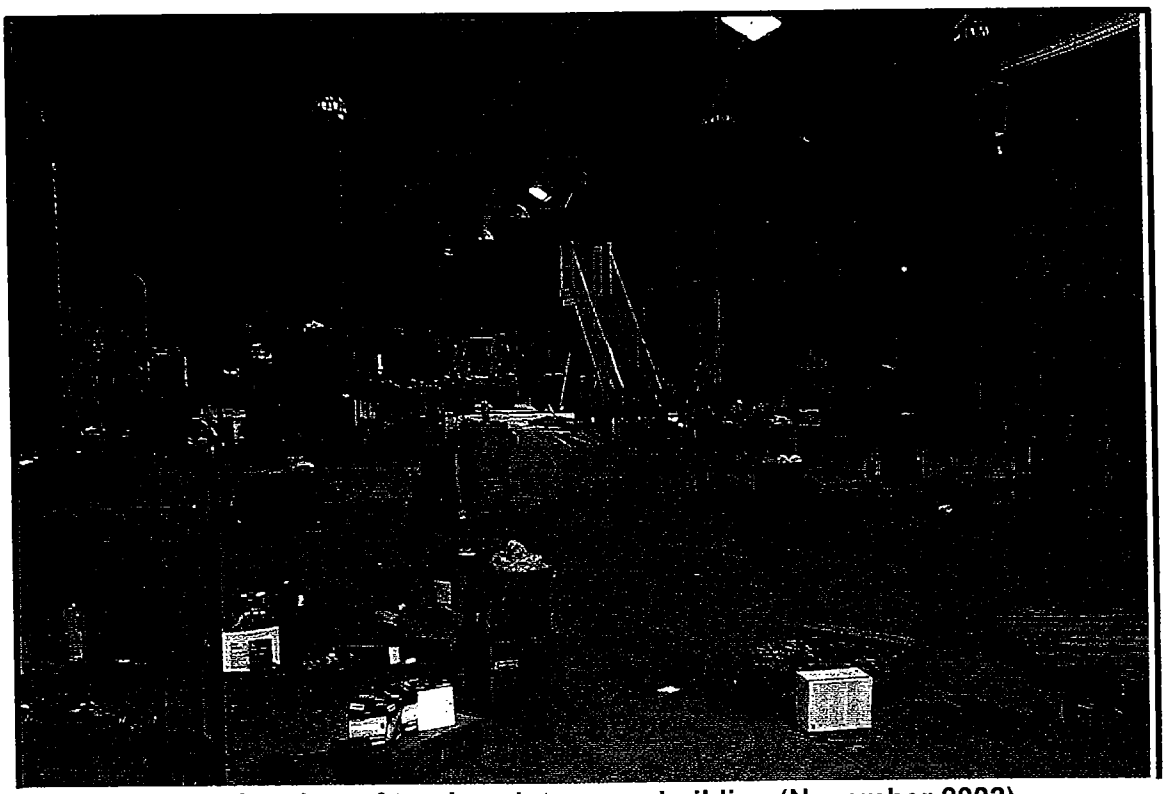


Domestic water well on subject property.

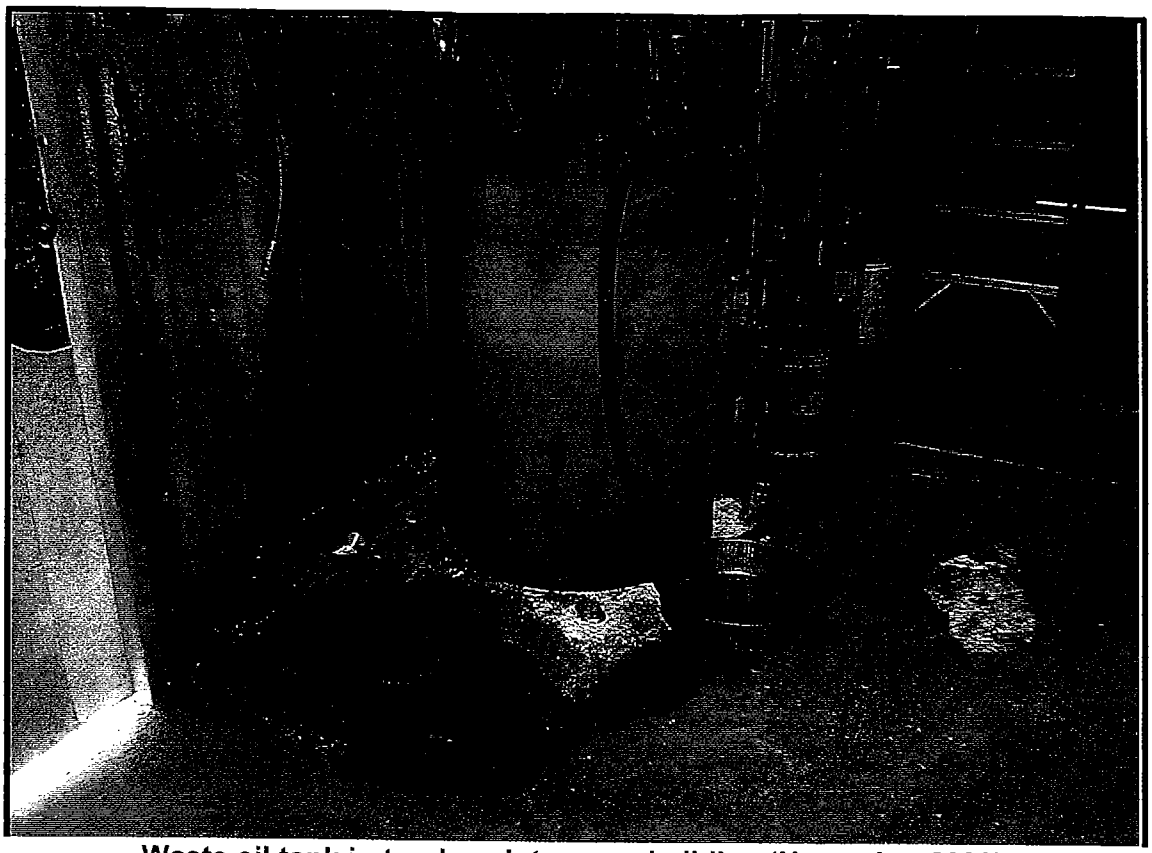
Propane tank on subject property.



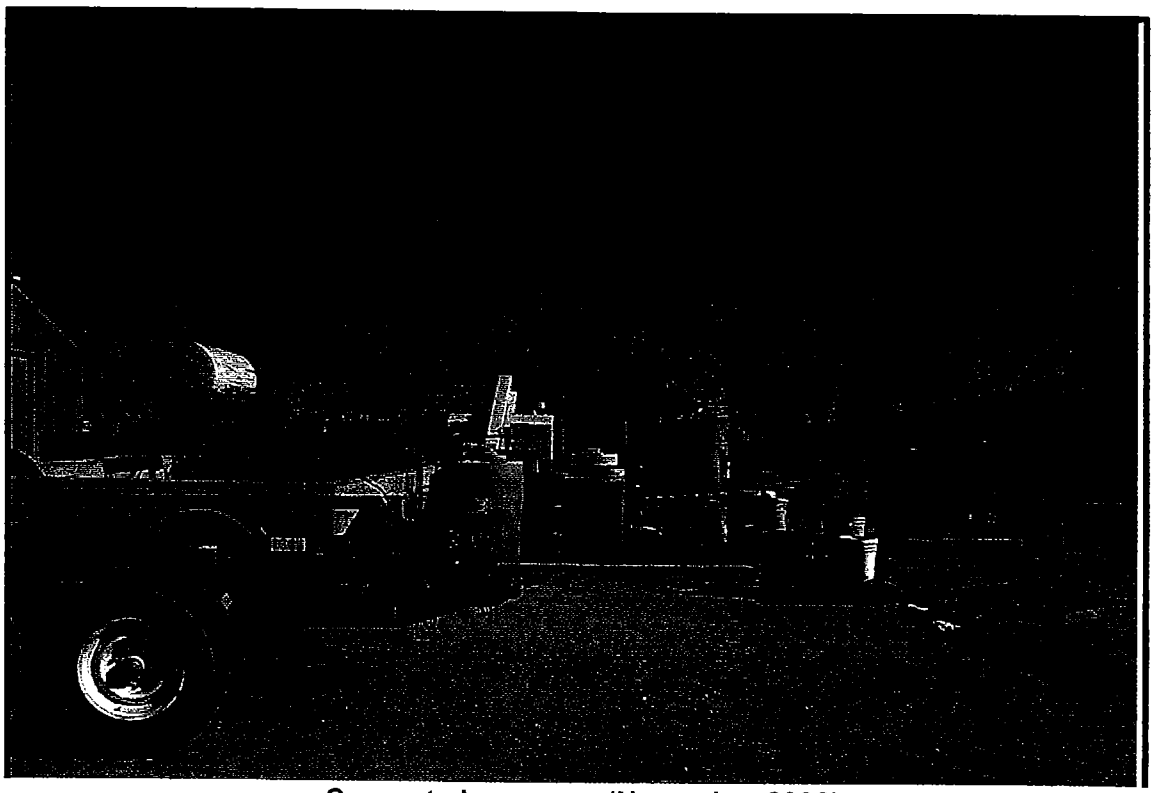
Excavation pit on subject property.



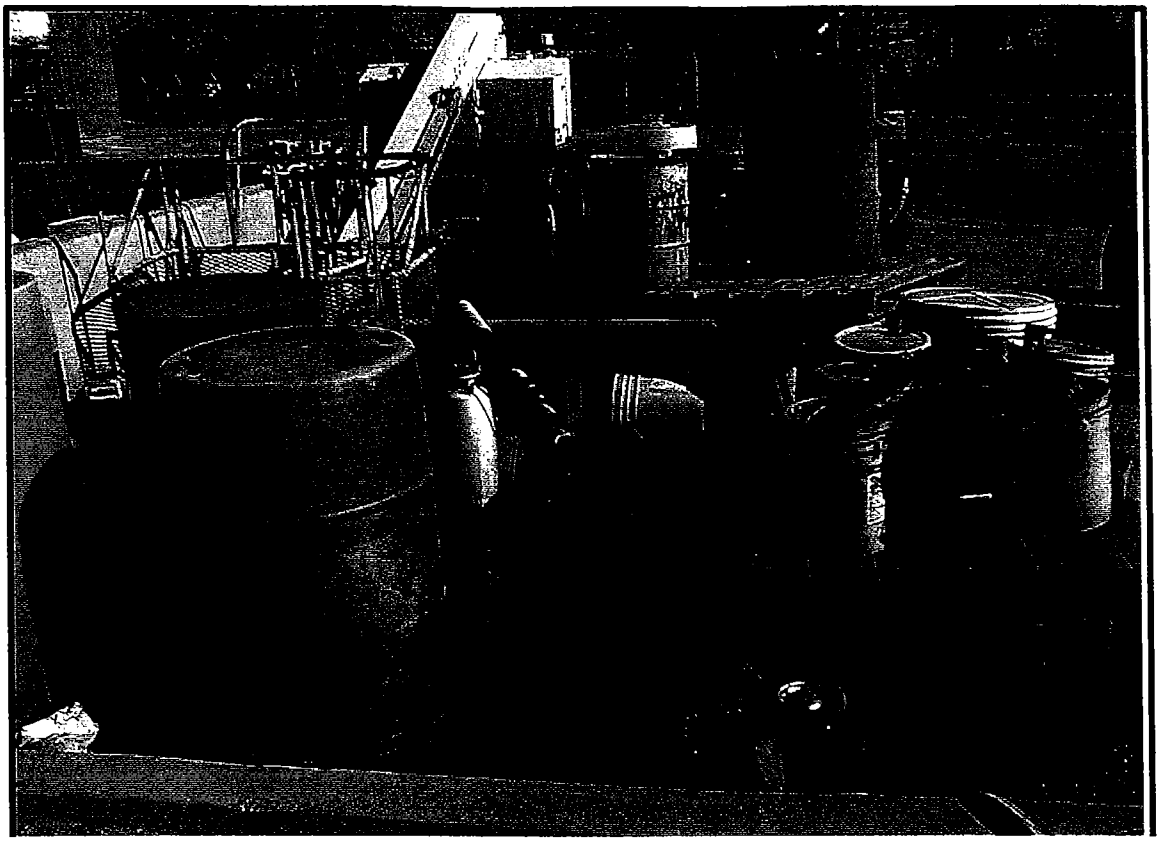
Interior view of truck maintenance building (November 2002).



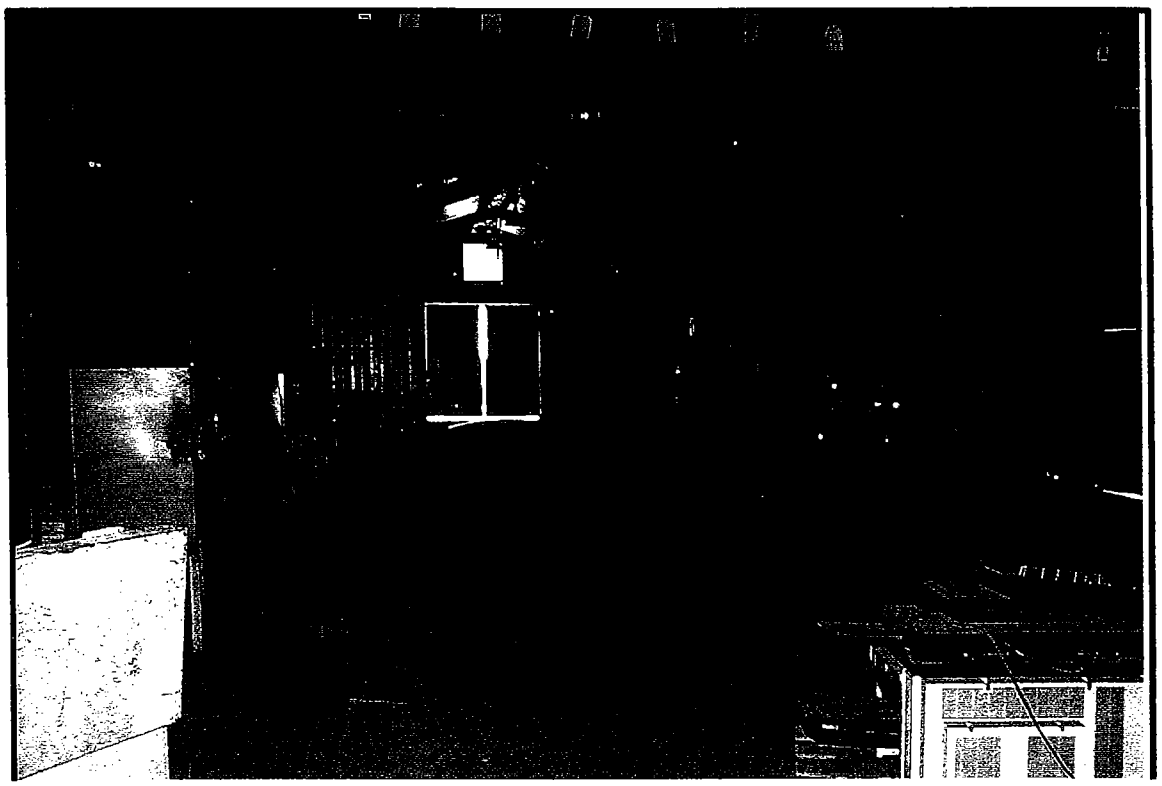
Waste oil tank in truck maintenance building (November 2002).



Concrete berm area (November 2002).

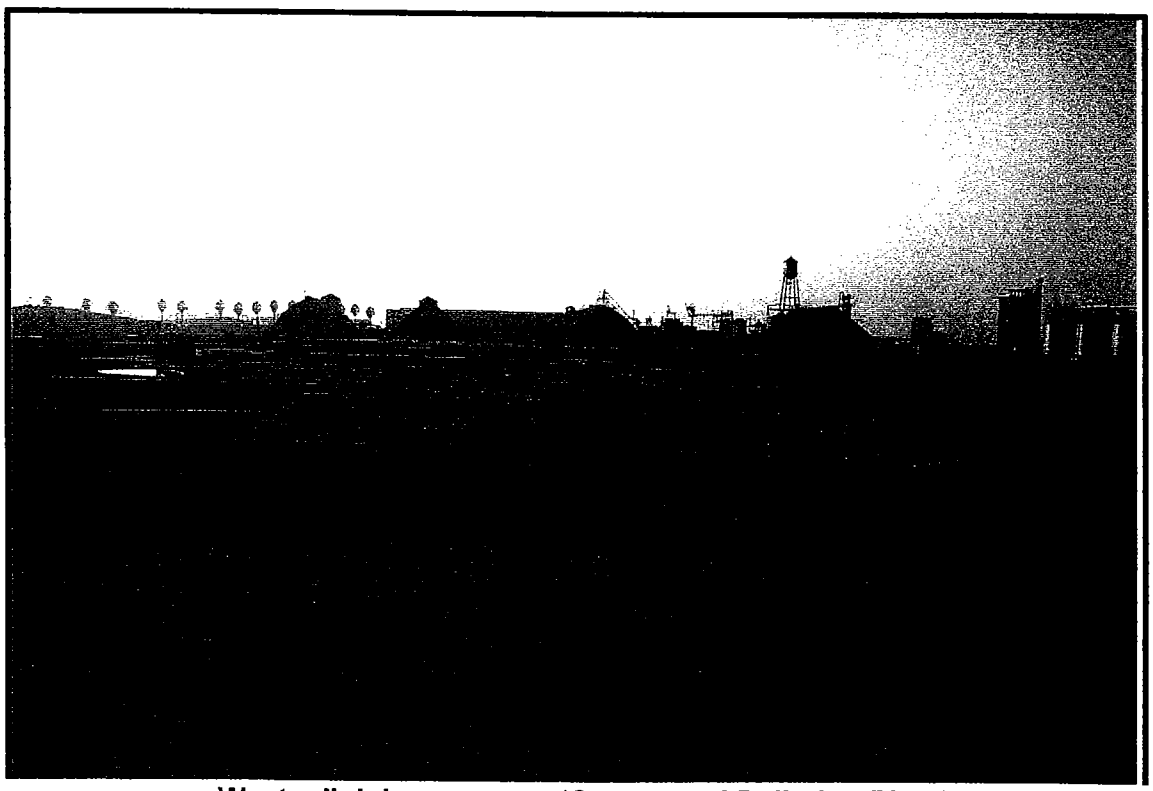


Concrete berm area (November 2002).

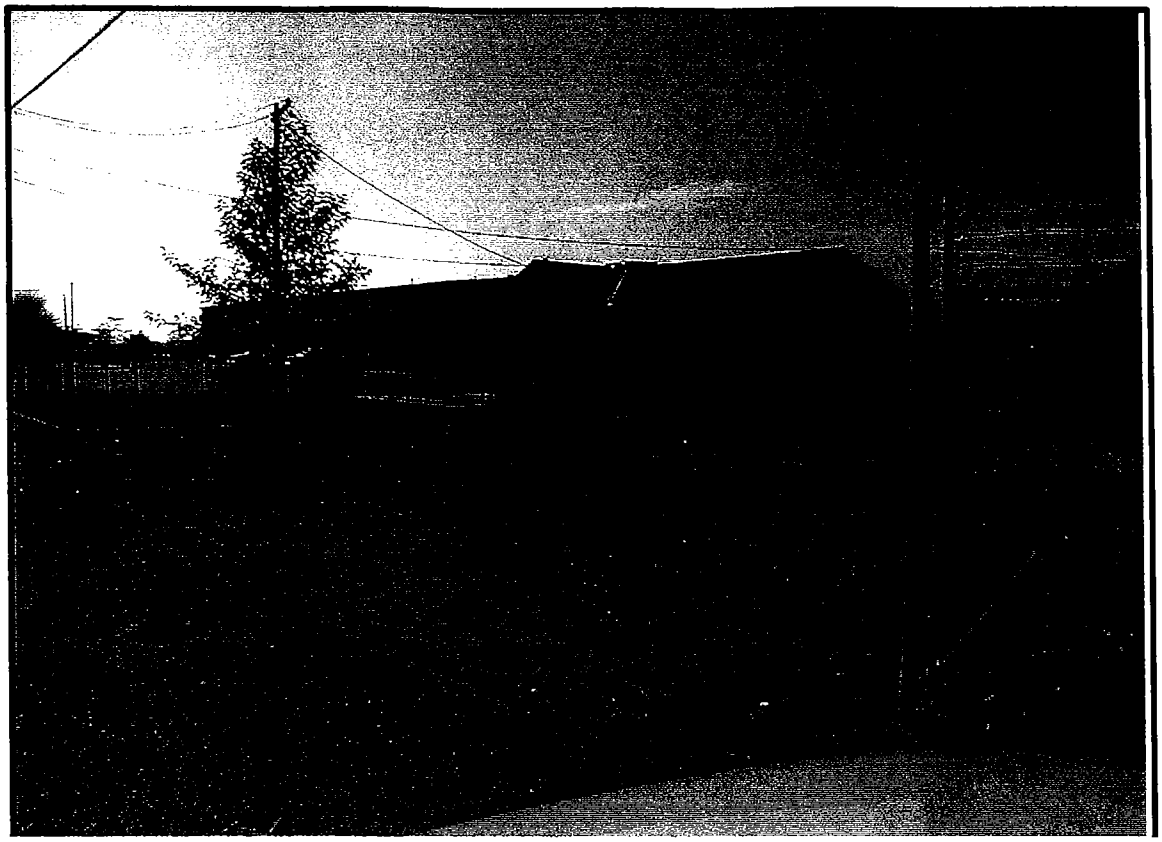


Interior view of east warehouse (November 2002).

North adjoining property (Anderson Clayton Corporation).



West adjoining property (Cottonseed Delinting Plant).



East adjoining property.

APPENDIX E - SOURCE AND INTERVIEW DOCUMENTATION

Information To Build On

Engineering • Consulting • Testing

PSI, Inc.
3960 Gilman Street
Long Beach, CA 90815

RECORD OF COMMUNICATION

DATE: February 28, 2003 | PROJECT NUMBER: 559-3E032

Contact:	Bill Walker
Company:	E&B Trucking
Regarding:	Truck Shop
Phone No.:	(800) 540-5492

Recorded By:	Christine Prado
	Project Manager

☒ I CALLED ☐ CONTACT CALLED ☐ IN PERSON INTERVIEW

Mr. Walker indicated that the drums, tanks, and containers located on the property were not generated or maintained by E&B Trucking. According to Mr. Walker, the containers were generated by Anderson Clayton, who was the prior tenant.

PSI Information To Build On
Engineering • Consulting • Testing

PSI, Inc.
3960 Gilman Street
Long Beach, CA 90815

RECORD OF COMMUNICATION

DATE: Aril 25, 2003 PROJECT NUMBER: 559-3E032

Contact:	Bob Lange
Company:	Dunavant Enterprises
Regarding:	Site Reconnaissance
Phone No.:	In Person

Recorded By:	Christine Prado
	Project Manager

☐ I CALLED ☐ CONTACT CALLED ☒ IN PERSON INTERVIEW

PSI was accompanied by Mr. Lange during the site reconnaissance. Mr. Lange indicated that all of the hazardous substances and petroleum products observed during the November 2002 site reconnaissance had been properly disposed. Removal was coordinated by Anderson Clayton Corporation. Mr. Lange provided copies of waste manifests.

Mr. Lange indicated that the property is currently vacant. Boyajian Trucking occupied the property from December 2002 to January 2003, using it to park flatbed trucks.

Information To Build On

Engineering • Consulting • Testing

PSI, Inc.
3960 Gilman Street
Long Beach, CA 90815

RECORD OF COMMUNICATION

DATE: May 2, 2003 PROJECT NUMBER: 559-3E032

Contact:	Richard Espinoza
Company:	Anderson Clayton Corporation
Regarding:	Truck Shop
Phone No.:	(559) 351-1163

Recorded By:	Christine Prado
	Project Manager

☒ I CALLED ☐ CONTACT CALLED ☐ IN PERSON INTERVIEW

Mr. Espinoza of Anderson Clayton Corporation, who was responsible for the removal of hazardous substances identified on the property in November 2002. Mr. Espinoza indicated that to his knowledge, no blue-colored substances were stored on the property.

Anderson Clayton Corp.

April 1, 2003

Mr. Robert Lange
Dunavant of California
8225 N. Fresno Street
Fresno, Ca 93778

Re: **Clean-up at 2635 E. North Avenue**

Dear Bob:

As per your request, enclosed please find the following:

1. Copy of the Uniform Hazardous Waste Manifest 22466202 – disposal of oily debris (4 barrels) and disposal of grease (1 barrel).
2. Copy of Invoice #47872 San Joaquin Filter Recycling for disposal of water in containment basin.
3. Copy of Invoice #48775 San Joaquin Filter Recycling for disposal of used oil filters.
4. Copy f Invoice #400794 Asbury Environmental Services for disposal of used oil.

Should you have any questions, please do not hesitate to give me a call.

Sincerely,

Elda Lopez
Safety Coordinator

Enclosures

:ell

ANDERSON CLAYTON CORP.
P. O. BOX 12506 • FRESNO, CALIFORNIA 93778-2506
PHONE (559) 447-1390 • FAX (559) 447-4400

State of California—Environmental Protection Agency
Form Approved OMB No. 2050—0039 (Expires 9-30-99)
Please print or type. Form designed for use on elite (12-pitch) typewriter.

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CAPPPPPPPPPP Manifest Document No. 6 0 2 0 2
2. Page 1 of

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
ANDERSON CLAYTON - FRESNO
PO BOX 12506
FRESNO CA 93778
4. Generator's Phone (559 446-6415

A. State Manifest Document Number 22466202
B. State Generator's ID

5. Transporter 1 Company Name: ASBURY ENVIRONMENTAL SERVICES
6. US EPA ID Number: CAPPPPPPPPPP
C. State Transporter's ID [Reserved.]
D. Transporter's Phone (800)974-4495

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID [Reserved.]
F. Transporter's Phone

9. Designated Facility Name and Site Address
O / K ENVIRONMENTAL
3650 EAST 26TH STREET
LOS ANGELES CA 90023
10. US EPA ID Number: CATPPPPPPPPP
G. State Facility's ID
H. Facility's Phone (323)268-5056

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. NON -RCRA HAZARDOUS WASTE, SOLID (OILY DEBRIS)	004	DM	01600	P	State 352 / EPA/Other NONE
b. NON -RCRA HAZARDOUS WASTE, SOLID (GREASE)	001	DM	00200	P	State 352 / EPA/Other NONE
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above
11A) 300913-15, 4 X 55 G
11B) 1 X 55 G "COMMODITY PACK"

K. Handling Codes for Wastes Listed Above
a. b. c. d.

15. Special Handling Instructions and Additional Information
USE PPE
NAERG # 11A. 171, 11B. 171
SITE: 2635 E NORTH AVE, FRESNO, CA 93725 Project# PO#
EMERGENCY CONTACT CHEMTREC 1-800-424-9300

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: RICHARD ESPINOSA Signature: [signature] Month 03 Day 07 Year 03

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: EFRAIN LOPEZ Signature: [signature] Month 03 Day 07 Year 03

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name Signature Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name Signature Month Day Year

GENERATOR
TRANSPORTER
FACILITY

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

22466202

DO NOT WRITE BELOW THIS LINE.

DTSC 8022A (1/99)
EPA 8700—22

Yellow: GENERATOR RETAINS

ASBURY ENVIRONMENTAL SERVICES

SERVICE ORDER

03152

OTHER LOCATIOI
FONTANA, C
SAN DIEGO, C
RICHMOND,

ORDER DATA XXXXXXXX Salesperson: H. Binsch

PROJECT # _____

DRIVER E. Lopez

CUSTOMER PO # _____

TRUCK # 100

CORPORATE OFFICE: 2100 NORTH ALAMEDA STREET • COMPTON, CALIFORNIA 90222 • (310) 886-3400 • (800) 974-4495 • FAX (310) 763-5922

JOB SITE:	BILL TO:
NAME Anderson Clayton	NAME Anderson Clayton
ADDRESS 2635 E. North Avenue	ADDRESS PO Box 12506
CITY Fresno ST. CA ZIP 93725	CITY Fresno ST. CA ZIP 93778
CONTACT Elda Lopez TEL (559) 446-6416	CONTACT Elda Lopez TEL (559) 446-6416

SPECIAL INSTRUCTIONS:

WORK PERFORMED IF DIFFERENT FROM WORK ORDER:

PERSONNEL	DESCRIPTION	TRUCK #	START	FINISH
E. Lopez	DOT Driver	100	12:30	2:30

SUPPLIES / DELIVERY INFORMATION

QUANTITY	U/M	DESCRIPTION
5	X 55	OT/[illegible]

SUPPLIES / DELIVERY INFORMATION

QUANTITY	U/M	DESCRIPTION

PICK UP INFORMATION

QUANTITY	U/N	DESCRIPTION	MANIFEST NUMBER	PAC	ARRIVE	DEPART	COMMENTS
4	X 55	Oily Debris	22466202-11a				
1	X 55	Grease	-11B				

CUSTOMERS SIGNATURE

DATE

San Joaquin Filter Recycling & Environmental Services LLC.

1922 W. Belmont Ave.
Fresno, CA 93728-2626
(559) 498-0240 • Fax (559) 498-0256

INVOICE
48782

Manifest# _____
EPA # _____

473

CUSTOMER / GENERATOR

NAME: ANDERSON CLAYTON
DATE: 3/10/03
EPA # CAL 000188148
ADDRESS: 2635 E. North Ave.
P.O.#: Richard 351-1163
CITY: Fresno STATE: CA ZIP: 93725
PHONE #: 447-1390

SHIP TO

S.J.F.R.
☐ 1922 W. Belmont
Fresno, CA 93728-2626
☐ 14287 E. Manning
Parlier, CA 93648

McKITTRICK WASTE
☐ 30533 Hwy. 58W
McKittrick, CA 93251
(661) 762-7366

TAMCO
☐ 12459 ARROW HWY
RANCHO CUCAMONGA,CA
(909) 899-0660

T.S.D.F. Ind. Svs. Oil
☐ 1700 S. SOTO
LA, CA 90023
(562) 598-5577

D/K ENVIRONMENTAL
☐ 3650 E. 26th Street
Vernon, CA 90023
(323) 268-5056

PRODUCT	QUANTITY	PRICE	AMOUNT
USED OIL FILTERS			
BARREL DISPOSAL		Chg: Colton Transport	
ANTI-FREEZE RECYCLED		630022	
USED OIL 1 2 3 4 5 6		8810	
WASH RACK			
OTHER Clean-up Absorbent Drum Rinse & Wash water & HF			3/13/03

PLEASE PAY FROM THIS INVOICE **TERMS: NET 30 DAYS** **TOTAL** $ 950.00

1.5% INTEREST WILL BE CHARGED AFTER 30 DAYS.
In the event of Judicial proceedings to enforce collections, the purchaser will be liable for all expenses of collection.

DRIVER: Ray ROUTE #: 3 DRIVER SIGNATURE: _____ GENERATOR'S SIGNATURE: _____

THIS DOCUMENT MUST BE KEPT FOR AT LEAST 3 YEARS

San Joaquin Filter Recycling & Environmental Services LLC.

1922 W. Belmont Ave.
Fresno, CA 93728-2626
(559) 498-0240 • Fax (559) 498-0256

INVOICE
48775

Manifest# _____

EPA # _____

473

CUSTOMER / GENERATOR			
NAME: ANDERSON CLAYTON		DATE: 3-10-03	EPA # CAL 000188148
ADDRESS: 2635 E. North Ave.		P.O. #	
CITY: Fresno	STATE: CA / ZIP: 93725	PHONE #: 447-1390	

SHIP TO

S.J.F.R.	McKITTRICK WASTE	TAMCO	T.S.D.F. Ind. Svs. Oil	D/K ENVIRONMENTAL
☐ 1922 W. Belmont Fresno, CA 93728-2626	☐ 56533 Hwy. 58W McKittrick, CA 93251 (661) 762-7366	☐ 12459 ARROW HWY RANCHO CUCAMONGA,CA (909) 899-0660	☐ 1700 S. SOTO LA, CA 90023 (562) 598-5577	☐ 3650 E. 26th Street Vernon, CA 90023 (323) 268-5056
☐ 14287 E. Manning Parlier, CA 93648				

PRODUCT	QUANTITY	PRICE	AMOUNT
USED OIL FILTERS	2 DRUMS	65.00	130.00
BARREL DISPOSAL			
ANTI-FREEZE RECYCLED		Chg: Cotton Transport	
USED OIL 1 2 3 4 5 6		08022	
WASH RACK			
OTHER			

PLEASE PAY FROM THIS INVOICE

TERMS: NET 30 DAYS

1.5% INTEREST WILL BE CHARGED AFTER 30 DAYS.
In the event of Judicial proceedings to enforce collections the purchaser will be liable for all expenses of collection.

TOTAL 130.00

DRIVER ROUTE # DRIVER SIGNATURE GENERATOR'S SIGNATURE

THIS DOCUMENT MUST BE KEPT FOR AT LEAST 3 YEARS

SERVICE ORDER

NO. N 400794

ASBURY ENVIRONMENTAL SERVICES

2100 NORTH ALAMEDA STREET ☐ COMPTON, CALIFORNIA 90222 ☐ (310) 886-3400

SAN DIEGO OFFICE
1-800-748-5744

EPA CAD028277036

NORTHERN CALIFORNIA
1-800-727-2879
1-800-933-9194

DATE 3-1

CUSTOMER [illegible]

BILLING ADDRESS

PHONE [illegible] CONTACT

CUSTOMER EPA # [illegible] CA1000163051

JOB SITE ADDRESS [illegible] E North Ave
Fresno 93725

CROSS STREETS

NOTES: Cath. Transport

ONE TIME PICK UP ☐ YES or ☒ NO

RESIDENT ☐ YES or ☒ NO

CONTRACT CUSTOMER ☒ YES or ☐ NO

CUSTOMER NUMBER [illegible]

AMOUNT 112 [illegible]

CHECK NUMBER

P.O. NUMBER

CASH RECEIVED (AMOUNT)

COMMODITY [illegible]

HALIDES [illegible] P.P.M.

☒ NON-RCRA HAZARDOUS WASTE, LIQUID (USED OIL/MIXED OILS)
NO PLACARDS REQUIRED

☐ NON-RCRA HAZARDOUS WASTE, LIQUID (ETHYLENE GLYCOL SOLUTIONS)
NO PLACARDS OR MARKINGS REQUIRED

☐ OTHER

MANIFEST NO. 220 36987

DRIVER [illegible]

☐ NON HAZARDOUS DRAINED USED OIL FILTER

☐ **COMMERCIAL FILTER RECYCLING**, 33210 Western Avenue, Union City, CA, 510-487-9277

☐ ALTERNATE FACILITY

NEXT SERVICE DATE

DRUMS DRUM SIZE

NO. OF GALLONS 450

TRUCK NO. & RT. 56/21

DESIGNATED TSDF:
- ☐ **ALVISO INDEPENDENT OIL** - 5002 Archer Street • Alviso, CA 95502 • CAI000161743 • (408) 262-1360
- ☐ **BAYSIDE OIL II, INC.** • 210 Encinal Street • Santa Cruz, CA 95060 • CAD088838222 • (408) 427-3778
- ☐ **ARTESIAN OIL RECOVERY INC.** • 2306 Magnolia Street • Oakland, CA 94067 • CAL000233905 • (510) 839-4234
- ☐ **DeMENNO/KERDOON** • 2000 N. Alameda Street • Compton, CA 90222 • CAT080013352 • (310) 537-7100
- ☒ **OCS** - 3255 N. Marks Street. • Fresno, CA 93722 • CAD980673842 • (559) 485-5496
- ☐ **RAMOS ENVIRONMENTAL** • 1515 S. River Road • W. Sacramento, CA 95691 • CAD44003556 • (916) 371-5747
- ☐ **ASBURY ENVIRONMENTAL SERVICES** • 2549 Scott Avenue • Chico, CA 95928 • CAL000827844
- ☐ ALTERNATE FACILITY

USED OIL, USED ANTIFREEZE AND OILY WATER WASTE STREAMS ARE RECYCLED AT OUR SISTER COMPANY DEMENNO/KERDOON THE LARGEST RECYCLER OF USED OIL IN THE WESTERN UNITED STATES.

I HEREBY CERTIFY THAT I HAVE NOT MIXED THIS WASTE WITH ANY OTHER WASTE, THAT THE TOTAL HALIDES ARE LESS THAN 1000 P.P.M.; AND THAT THE WASTE DOES NOT CONTAIN ANY P.C.B'S..

I FURTHER AGREE TO ACCEPT THE ADDITIONAL CHARGES FOR LEGAL DISPOSAL IF THIS WASTE IS OVER 1000 P.P.M. TOTAL HALIDES, OR CONTAINS ANY P.C.B'S.

This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

X _____ CUSTOMER SIGNATURE 1/21/13 DATE

X _____ PRINT NAME

APPENDIX F - CREDENTIALS

Résumé

Christine Y. Prado

Project Scientist, Long Beach, California

Education

Bachelor of Science in Biology, University of California, Irvine, 1997

Registrations/Certifications/Technical Training

Phase I Environmental Site Assessments, PSI
Environmental Professional - Phase I ESA, PSI, 2000
Asbestos Building Inspector Certification, 2001
OSHA 40 Hour HAZWOPER Training

Professional Experience

Ms. Prado is an environmental consultant for the Southern California Environmental Services Department. Her responsibilities include performing and managing Phase I and II Environmental Site Assessments (ESAs) for property transfers throughout Southern and Northern California, Nevada and Arizona. Ms. Prado has been directly involved with numerous portfolios, which included approximately 25-150 ESAs.

Ms. Prado performs a site reconnaissance and a record search to ascertain information on the site. She also contacts the building occupants, local governmental officials, and other sources familiar with the site. Ms. Prado assembles the facts and data for a project and arranges methodical and comprehensive procedures to attain the client's goals. The result is a comprehensive report summarizing the environmental concerns associated with a site.

Ms. Prado has also prepared and reviewed environmental reports for soil and groundwater assessments, on-going remedial projects, and well abandonment reports.

Ms. Prado has been performing environmental consulting services since August 2000.

Representative Project Experience

Phase I ESAs

- Community Redevelopment Agency of Los Angeles - Environmental site inspector for ESA for community redevelopment projects.
- Preferred Bank - Environmental site inspector for ESAs for commercial and industrial properties.
- First Republic Bank - Environmental site inspector for numerous ESAs for various multi-facility properties.
- KinderCare Learning Centers- Environmental site inspector for numerous ESAs for various commercial properties.
- Payless Shoe Source, Inc. - Environmental site inspector for ESA for a redevelopment project.

- Tokai Bank of California - Environmental site inspector for ESA for a commercial property.
- Iron Mountain Records Management, Inc. - Environmental site inspector for ESA for an industrial property.
- Darden Restaurants, Inc. - Environmental site inspector for ESA for a redevelopment project.
- Developers Diversified Realty Corporation - Environmental site inspector for ESA for a redevelopment project.
- Washington Mutual - Environmental site inspector for ESA for various industrial and commercial properties.
- California Bank & Trust - Environmental site inspector for ESA for commercial and industrial properties.
- California Warehouse Company - Environmental site inspector for ESA for an industrial property.
- Boukather & Associates - Environmental site inspector for ESA for an industrial property.
- Fieldstone Communities - Environmental site inspector for ESA for a redevelopment project.
- National City Bank - Environmental site inspector for ESA for a commercial property.
- Fullmer Construction Company - Environmental site inspector for ESA for a redevelopment project.

Phase II ESAs and Advanced Assessments

- Investment Property Group – Soil investigation of a dry cleaning facility. Preparation of final reports for the client.
- SIMA Management Corporation – Soil investigation of a dry cleaning facility. Preparation of final reports for the client.
- Marden Susco – Preparation of groundwater monitoring well abandonment report for client and regulatory agencies.

Remedial Projects

- Parker Hannifin Corporation – Groundwater monitoring reporting for client and regulatory agencies.
- Marden Susco – Groundwater monitoring reporting for client and regulatory agencies.
- Caltrans – Groundwater monitoring reporting for client and regulatory agencies.
- Technicolor Corporation – Groundwater monitoring reporting for client and regulatory agencies.

YEAR STARTED WITH PSI: 2000

Résumé

Valerie Marshall

Senior Engineer, Long Beach, California

Education

MS in Environmental Engineering, University of Southern California, 1981
BS in Biology/Chemistry, University of Southern California, 1977

Certifications/Registrations/Technical Training

Certificate, Environmental Management, University of Southern California
Certified, State of California, Department of Health Services, Asbestos Analysis and Identification
OSHA 29 CFR 1910.120 HAZWOPER Supervisor
Environmental Professional – Phase I ESA, PSI

Professional Experience

Ms. Marshall has more than 17 years of experience of project management in the fields of soil and hazardous waste management and remediation, environmental engineering and regulatory permitting and compliance.

She is responsible for implementing soil and hazardous waste management and remediation, environmental engineering, and regulatory permitting and compliance on assigned task orders. Her experience includes the management and supervision of the field implementation of US EPA-ordered remediation activities on closed Class I Hazardous Waste Landfills. Her responsibilities included management of Class I groundwater monitoring system and database; project scheduling; budgeting; permit acquisition; field personnel management; in-field troubleshooting; data evaluations; and the investigation of groundwater, surface water, ambient air, soil/gas and leachate.

Representative Phase I/II Environmental Site Assessment Project Experience

- Phase I/II Environmental Site Assessments, Miltiple sites; Southern California-Project engineer for over twenty-five Phase I/II ESAs throughout Southern California. Reviewed aerial photographs, analyzed environmental and land use data, prepared work plans for Remedial Investigations/Corrective Actions, undertook extensive field investigations, including soil, ambient air and groundwater sampling analyses, and oversaw cleanup activities.

Representative Landfill Project Experience

- California Integrated Waste Management Board-Project engineer for a pilot project to evaluate the use of treated sewage sludge as an alternative daily cover material at an active Class III solid waste landfill in Southern California. The study included an assessment of the geotechnical suitability of the material as well as the flammability and the potential for environmental hazards including vector attraction of the cover material. Collected physical soil samples, completed field infiltration tests, monitored odor release, and completed vector analysis. The investigation was completed on four cells containing various percentages of the treated sewage sludges. A final report was prepared following guidelines set forth in Title 14 of the CCR.

- Class I Hazardous Waste Landfill and Treatment, San Bernardino County, California-Project manager for the preparation and approval of an EIR/EIS to develop a new Class I Hazardous Waste Landfill and Treatment Facility. Oversaw the preliminary design and engineering for the proposed project to facilitate the Part B Permit.

- Class III Solid Waste Landfill, Los Angeles County, California-Project director for the preparation of an EIR/EIS for the siting and permitting of a new Class III Solid Waste Landfill. Oversaw the technical evaluation of 141 alternative landfill sites in the region.
- Underground Storage Tank Closures, Multiple sites; Southern California-Project manager for the preparation of over thirty underground storage tank closure reports, which included soil excavation and disposal, or treatment of contaminated soils.
- Superfund Site; Wilmington, California-Project manager for a state Superfund investigation under Cal-EPA for a former liquid disposal facility in Wilmington, California. Negotiated exemptions from regulatory agency to expedite the schedule, which resulted in significant cost savings.
- Cal Compact Landfill; Carson, California-Project manager for an environmental resolution, including RI/FS scope, for a Brownfield Site Reclamation Project at the former Cal Compact Landfill.

Representative Hazardous Waste Project Experience

- Broadwell Corporation; San Bernardino, California-Project manager for the preparation and approval of an EIR/EIS to develop a new Class I Hazardous Waste Landfill and Treatment Facility. Oversaw the preliminary design and engineering for the proposed project to facilitate the Part B Permit.
- BKK Corporation; Southern California-Project manager for the approval process from the California Integrated Waste Management Board to start a pilot project to evaluate the use of treated sewage sludge as an alternative daily cover material at an active Class III solid waste landfill.
- Elsmere Corporation; Los Angeles, California-Project director for the preparation of an EIR/EIS for the siting and permitting of a new Class III Solid Waste Landfill. Oversaw the technical evaluation of 141 alternative landfill sites in the region.
- California Integrated Waste Management Board; Southern California-Project manager for the initiation of a pilot project to evaluate the use of a treated sewage sludge as an alternative daily cover material at an active Class II solid waste landfill. The study included an assessment of the geotechnical suitably of the material as well as the flammability and the potential for environmental hazards including vector attraction of the cover material. Collected physical soils samples, completed field infiltration test, monitored odor release, and completed vector analysis. The investigation was completed on four cells containing various percentages of the treated sewage sludges. A final report was prepared following guidelines set forth in Title 14 of the CCR.
- Cal-Compact Landfill; Carson, California-Project coordinator for an environmental resolution, including RI/FS scope for a Brownfields Site Reclamation Project.
- Superfund Site; Wilmington, California-Project manager for Superfund investigation under Cal-EPA for liquid disposal facility.

YEARS EXPERIENCE WITH OTHER FIRMS: 10

Year started with PSI: 1997

Information To Build On
Engineering • Consulting • Testing

RECEIVED
SEP 10 2003
FILE NO. _____

September 5, 2003

Mr. Jack Sinor
Assistant General Manager/Chief Engineer
Kings River Conservation District
4886 East Jensen Avenue
Fresno, California 93725

RE: Release of Phase I Environmental Site Assessment Report
Truck Shop
2635 East North Avenue
Fresno County, California 93725
PSI Project No.: 559-3E032

Dear Mr. Sinor:

The above-referenced report was prepared pursuant to a specific scope of work and written contract between Dunavant Enterprises, Inc. and Professional Service Industries, Inc. (PSI). You may rely upon this report as though it was specifically addressed to you at the time of issuance.

The use of this report constitutes your acceptance of the attached General Conditions. PSI shall not be responsible for events or changes that may have occurred subsequent to PSI's preparation of said report.

Sincerely,
Professional Service Industries, Inc.

Christine Prado

Christine Prado
Project Manager

Attachments: General Conditions; Liability Insurance

cc: Mr. Bob Lange, Dunavant Enterprises, Inc.

GENERAL CONDITIONS

1. PARTIES AND SCOPE OF WORK: Professional Service Industries Inc. (hereinafter referred to as "PSI") shall include said company or its particular division, subsidiary or affiliate performing the work. "Work" means the specific geotechnical, analytical, testing or other service to be performed by PSI as set forth in PSI's proposal, Client's acceptance thereof and these General Conditions. Additional work ordered by Client shall also be subject to these General Conditions. "Client" refers to the person or business entity ordering the work to be done by PSI. If Client is ordering the work on behalf of another, Client represents and warrants that it is the duly authorized agent of said party for the purpose of ordering and directing said work. Unless otherwise stated in writing, Client assumes sole responsibility for determining whether the quantity and the nature of the work ordered by the client is adequate and sufficient for Client's intended purpose. Client shall communicate these General Conditions to each and every third party to whom Client transmits any part of PSI's work. PSI shall have no duty or obligation to any third party greater than that set forth in PSI's proposal, Client's acceptance thereof and these General Conditions. The ordering of work from PSI, or the reliance on any of PSI's work, shall constitute acceptance of the terms of PSI's proposal and these General Conditions, regardless of the terms of any subsequently issued document.

2. TESTS AND INSPECTIONS: Client shall cause all tests and inspections of the site, materials and work performed by PSI or others to be timely and properly performed in accordance with the plans, specifications and contract documents and PSI's recommendations. No claims for loss, damage or injury shall be brought against PSI by Client or any third party unless all tests and inspections have been so performed and unless PSI's recommendations have been followed. Client agrees to indemnify, defend and hold PSI, its officers, employees and agents harmless from any and all claims, suits, losses, costs and expenses, including, but not limited to, court costs and reasonable attorney's fees in the event that all such tests and inspections are not so performed or PSI's recommendations are not so followed except to the extent that such failure is the result of the negligence, willful or wanton act or omission of PSI, its officers, agents or employees, subject to the limitation contained in paragraph 9.

3. SCHEDULING OF WORK: The services set forth in PSI's proposal and Client's acceptance will be accomplished in a timely, workmanlike and professional manner by PSI personnel at the prices quoted. If PSI is required to delay commencement of the work or if, upon embarking upon its work, PSI is required to stop or interrupt the progress of its work as a result of changes in the scope of the work requested by Client, to fulfill the requirements of third parties, interruptions in the progress of construction, or other causes beyond the direct reasonable control of PSI, additional charges will be applicable and payable by Client.

4. ACCESS TO SITE: Client will arrange and provide such access to the site as is necessary for PSI to perform the work. PSI shall take reasonable measures and precautions to minimize damage to the site and any improvements located thereon as the result of its work or the use of its equipment: however, PSI has not included in its fee the cost of restoration of damage which may occur. If Client desires or requires PSI to restore the site to its former condition, upon written request PSI will perform such additional work as is necessary to do so and Client agrees to pay to PSI for the cost.

5. CLIENT'S DUTY TO NOTIFY ENGINEER: Client represents and warrants that it has advised PSI of any known or suspected hazardous materials, utility lines and pollutants at any site at which PSI is to do work hereunder, and unless PSI has assumed in writing the responsibility of locating subsurface objects, structures, lines or conduits, Client agrees to defend, indemnify and save PSI harmless from all claims, suits, losses, costs and expenses, including reasonable attorney's fees as a result of personal injury, death or property damage occurring with respect to PSI's performance of its work and resulting to or caused by contact with subsurface or latent objects, structures, lines or conduits where the actual or potential presence and location thereof were not revealed to PSI by Client.

6. RESPONSIBILITY: PSI's work shall not include determining, supervising or implementing the means, methods, techniques, sequences or procedures of construction. PSI shall not be responsible for evaluating, reporting or affecting job conditions concerning health, safety or welfare. PSI's work or failure to perform same shall not in any way excuse any contractor, subcontractor or supplier from performance of its work in accordance with the contract documents. PSI has no right or duty to stop the contractor's work.

7. SAMPLE DISPOSAL: Unless otherwise agreed in writing, test specimens or samples will be disposed immediately upon completion of the test. All drilling samples or specimens will be disposed sixty (60) days after submission of PSI's report.

8. PAYMENT: Client shall be invoiced once each month for work performed during the preceding period. Client agrees to pay each invoice within thirty (30) days of its receipt. Client further agrees to pay interest on all amounts invoiced and not paid or objected to for valid cause in writing within said thirty (30) day period at the rate of eighteen (18) percent per annum (or the maximum interest rate permitted under applicable law), until paid. Client agrees to pay PSI's cost of collection of all amounts due and unpaid after sixty (60) days, including court costs and reasonable attorney's fees. PSI shall not be bound by any provision or agreement requiring or providing for arbitration of disputes or controversies arising out of this agreement, any provision wherein PSI waives any rights to a mechanics' lien, or any provision conditioning PSI's right to receive payment for its work upon payment to Client by any third party. These General Conditions are notice, where required, that PSI shall file a lien whenever necessary to collect past due amounts. Failure to make payment within 30 days of invoice shall constitute a release of PSI from any and all claims which Client may have, whether in tort, contract or otherwise, and whether known or unknown at the time.

9. WARRANTY: PSI'S SERVICES WILL BE PERFORMED, ITS FINDINGS OBTAINED AND ITS REPORTS PREPARED IN ACCORDANCE WITH ITS PROPOSAL, CLIENT'S ACCEPTANCE THEREOF, THESE GENERAL CONDITIONS, AND WITH GENERALLY ACCEPTED PRINCIPLES AND PRACTICES. IN PERFORMING ITS PROFESSIONAL SERVICES, PSI WILL USE THAT DEGREE OF CARE AND SKILL ORDINARILY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY MEMBERS OF ITS PROFESSION. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR REPRESENTATIONS, EITHER EXPRESS OR IMPLIED. STATEMENTS MADE IN PSI REPORTS ARE OPINIONS BASED UPON ENGINEERING JUDGMENT AND ARE NOT TO BE CONSTRUED AS REPRESENTATIONS OF FACT.

SHOULD PSI OR ANY OF ITS PROFESSIONAL EMPLOYEES BE FOUND TO HAVE BEEN NEGLIGENT IN THE PERFORMANCE OF ITS WORK, OR TO HAVE MADE AND BREACHED ANY EXPRESS OR IMPLIED WARRANTY, REPRESENTATION OR CONTRACT, CLIENT, ALL PARTIES CLAIMING THROUGH CLIENT AND ALL PARTIES CLAIMING TO HAVE IN ANY WAY RELIED UPON PSI'S WORK AGREE THAT THE MAXIMUM AGGREGATE AMOUNT OF THE LIABILITY OF PSI, ITS OFFICERS, EMPLOYEES AND AGENTS SHALL BE LIMITED TO $25,000.00 OR THE TOTAL AMOUNT OF THE FEE PAID TO PSI FOR ITS WORK PERFORMED WITH RESPECT TO THE PROJECT, WHICHEVER AMOUNT IS GREATER.

IN THE EVENT CLIENT IS UNWILLING OR UNABLE TO LIMIT PSI'S LIABILITY IN ACCORDANCE WITH THE PROVISIONS SET FORTH IN THIS PARAGRAPH, CLIENT MAY, UPON WRITTEN REQUEST OF CLIENT RECEIVED WITHIN FIVE DAYS OF CLIENT'S ACCEPTANCE HEREOF, INCREASE THE LIMIT OF PSI'S LIABILITY TO $250,000.00 OR THE AMOUNT OF PSI'S FEE, WHICHEVER IS THE GREATER, BY AGREEING TO PAY PSI A SUM EQUIVALENT TO AN ADDITIONAL AMOUNT OF 5% OF THE TOTAL FEE TO BE CHARGED FOR PSI'S SERVICES. THIS CHARGE IS NOT TO BE CONSTRUED AS BEING A CHARGE FOR INSURANCE OF ANY TYPE, BUT IS INCREASED CONSIDERATION FOR THE GREATER LIABILITY INVOLVED. IN ANY EVENT, ATTORNEY'S FEES EXPENDED BY PSI IN CONNECTION WITH ANY CLAIM SHALL REDUCE THE AMOUNT AVAILABLE, AND ONLY ONE SUCH AMOUNT WILL APPLY TO ANY PROJECT.

NO ACTION OR CLAIM, WHETHER IN TORT, CONTRACT, OR OTHERWISE, MAY BE BROUGHT AGAINST PSI, ARISING FROM OR RELATED TO PSI'S WORK, MORE THAN TWO YEARS AFTER THE CESSATION OF PSI'S WORK HEREUNDER.

10. INDEMNITY: Subject to the foregoing limitations, PSI agrees to indemnify and hold Client harmless from and against any and all claims, suits, costs and expenses including reasonable attorney's fees and court costs arising out of PSI's negligence to the extent of PSI's negligence. Client shall provide the same protection to the extent of its negligence. In the event that Client or Client's principal shall bring any suit, cause of action, claim or counterclaim against PSI, the party initiating such action shall pay to PSI the costs and expenses incurred by PSI to investigate, answer and defend it, including reasonable attorney's and witness fees and court costs to the extent that PSI shall prevail in such suit.

11. TERMINATION: This Agreement may be terminated by either party upon seven days' prior written notice. In the event of termination, PSI shall be compensated by Client for all services performed up to and including the termination date, including reimbursable expenses, and for the completion of such services and records as are necessary to place PSI's files in order and/or protect its professional reputation.

12. EMPLOYEES/WITNESS FEES: PSI's employees shall not be retained as expert witnesses except by separate, written agreement. Client agrees to pay PSI's legal expenses, administrative costs and fees pursuant to PSI's then current fee schedule for PSI to respond to any subpoena. Client agrees not to hire PSI's employees except through PSI. In the event Client hires a PSI employee, Client shall pay PSI an amount equal to one-half of the employee's annualized salary, without PSI waiving other remedies it may have.

13. HAZARDOUS MATERIALS: Nothing contained within this agreement shall be construed or interpreted as requiring PSI to assume the status of an owner, operator, generator, storer, transporter, treater or disposal facility as those terms appear within RCRA or within any Federal or State statute or regulation governing the generation, transportation, treatment, storage and disposal of pollutants. Client assumes full responsibility for compliance with the provisions of RCRA and any other Federal or State statute or regulation governing the handling, treatment, storage and disposal of pollutants.

14. PROVISIONS SEVERABLE: The parties have entered into this agreement in good faith, and it is the specific intent of the parties that the terms of these General Conditions be enforced as written. In the event any of the provisions of these General Conditions should be found to be unenforceable, it shall be stricken and the remaining provisions shall be enforceable.

15. ENTIRE AGREEMENT: This agreement constitutes the entire understanding of the parties, and there are no representations, warranties or undertakings made other than as set forth herein. This agreement may be amended, modified or terminated only in writing, signed by each of the parties hereto.

Appendix 5.8-1

Five copies of Appendix 5.8-1, 10-mile radius of the KRCDPP, were submitted to the California Energy Commission under separate cover, additional copies can be provided upon request.

Appendix 5.8-2

		Non-Criteria Emissions from the KRCDPP Combustion Turbines							
								1-hr	Annual
			Max Fuel		Max.	Emission	Emission	Emission	Emission
		Emission	One CT		Annual	Rate	Rate	Rate	Rate
		Factor	MMBtu/hr	Nat Gas	Operating	One CT	One CT	One CT	One CT
Pollutant		lbs/MMscf	(HHV)	Btu/scf	Hours	lbs/hr	tons/yr	gm/sec	gm/sec
Acetaldehyde		1.80E-01	466.3	1025.9	3120	0.081815	0.127631	0.010309	0.003672
Acrolein		3.69E-03	466.3	1025.9	3120	0.001677	0.002616	0.000211	7.53E-05
Ammonia (ppmv)		10	466.3	1025.9	3120	6.54	10.2024	0.82404	0.293494
Benzene		3.33E-03	466.3	1025.9	3120	0.001514	0.002361	0.000191	6.79E-05
Benzo(a)anthracene*		2.26E-05	466.3	1025.9	3120	1.03E-05	1.6E-05	1.29E-06	4.61E-07
Benzo(a)pyrene*		1.39E-05	466.3	1025.9	3120	6.32E-06	9.86E-06	7.96E-07	2.84E-07
Benzo(b)fluoranthene*		1.13E-05	466.3	1025.9	3120	5.14E-06	8.01E-06	6.47E-07	2.3E-07
Benzo(k)fluoranthene*		1.10E-05	466.3	1025.9	3120	5E-06	7.8E-06	6.3E-07	2.24E-07
1,3 Butadiene		1.27E-04	466.3	1025.9	3120	5.77E-05	9.01E-05	7.27E-06	2.59E-06
Chrysene*		2.52E-05	466.3	1025.9	3120	1.15E-05	1.79E-05	1.44E-06	5.14E-07
Dibenz(a,h)anthracene*		2.35E-05	466.3	1025.9	3120	1.07E-05	1.67E-05	1.35E-06	4.79E-07
Ethylbenzene		3.26E-02	466.3	1025.9	3120	0.014818	0.023115	0.001867	0.000665
Formaldehyde		3.67E-01	466.3	1025.9	3120	0.166812	0.260226	0.021018	0.007486
Hexane		2.59E-01	466.3	1025.9	3120	0.117723	0.183647	0.014833	0.005283
Indeno(1,2,3-cd)pyrene*		2.35E-05	466.3	1025.9	3120	1.07E-05	1.67E-05	1.35E-06	4.79E-07
Naphthalene*		1.66E-03	466.3	1025.9	3120	0.000755	0.001177	9.51E-05	3.39E-05
Propylene		7.70E-01	466.3	1025.9	3120	0.349986	0.545979	0.044098	0.015706
Propylene Oxide		4.78E-02	466.3	1025.9	3120	0.021726	0.033893	0.002738	0.000975
Toluene		7.10E-02	466.3	1025.9	3120	0.032271	0.050343	0.004066	0.001448
Xylene		2.61E-02	466.3	1025.9	3120	0.011863	0.018507	0.001495	0.000532
Carbon monoxide					3120	33.4		4.2084	0.278236
nitrogen dioxide					3120	30.5		3.843	0.307096
sulfur dioxide					3120	0.53		0.06678	0.023785
* Polycyclic Aromatic Hydrocarbon (PAH)									

		KRCDDP Risk "Emissions" from the Combustion Turbines					
				Inhalation	Oral Risk	Oral Risk	Total
		Inhalation	Oral	Risk	Emission	Emission	Risk
		Cancer	Cancer	Emission	One CT	One CT	Emission
		Potency	Potency	One CT	Ingestion	Dermal	One CT
Pollutant		1/(mg/kg-day)	1/(mg/kg-day)	(gm/sec)/(ug/m3)	(gm/sec)/(ug/m3)	(gm/sec)/(ug/m3)	(gm/sec)/(ug/m3)
Acetaldehyde		1.00E-02		2.05E-08			2.05E-08
Acrolein							
Ammonia (ppmv)							
Benzene		1.00E-01		3.78E-09			3.78E-09
Benzo(a)anthracene*		3.90E-01	1.2	1.00E-10	4.76E-10	6.21E-10	1.20E-09
Benzo(a)pyrene*		3.90E+00	1.20E+01	6.16E-10	2.93E-09	3.82E-09	7.37E-09
Benzo(b)fluoranthene*		3.90E-01	1.2	5.01E-11	2.38E-10	3.11E-10	5.99E-10
Benzo(k)fluoranthene*		3.90E-01	1.2	4.88E-11	2.32E-10	3.02E-10	5.83E-10
1,3 Butadiene		6.00E-01		8.66E-10			8.66E-10
Chrysene*		3.90E-02	1.20E-01	1.12E-11	5.31E-11	6.93E-11	1.34E-10
Dibenz(a,h)anthracene*		4.10E+00	4.1	1.09E-09	1.69E-09	2.21E-09	4.99E-09
Ethylbenzene							
Formaldehyde		2.10E-02		8.76E-08			8.76E-08
Hexane							
Indeno(1,2,3-cd)pyrene*		3.90E-01	1.2	1.04E-10	4.95E-10	6.46E-10	1.25E-09
Naphthalene*							
Propylene							
Propylene Oxide		1.30E-02		7.06E-09			7.06E-09
Toluene							
Xylene							
Carbon monoxide							
nitrogen dioxide							
sulfur dioxide							
		Total:		1.22E-07	6.12E-09	7.98E-09	1.36E-07
* Polycyclic Aromatic Hyd		Total x 1e6:		0.1218	0.0061	0.0080	0.1359
			Risk = Dose x Cancer Potency				

		KRCDPP Acute and Chronic Hazard Index Calculations from Combustion Turbines							
		Normalized							
		Conc.			Acute		Acute	Chronic	Chronic
		X/Q (max) 2 CT's			Inhalation	Averaging	Hazard	Inhalation	Hazard
		1-hr	6-hr	Annual	REL	Time	Index	REL	Index
Pollutant		(ug/m3)/(g/sec)	(ug/m3)/(g/sec)	(ug/m3)/(g/sec)	ug/m3	hour		ug/m3	
		1.82	0.48	0.041					
Acetaldehyde				0.041				9.00E+00	1.67E-05
Acrolein				0.041				6.00E-02	5.14E-05
Ammonia (ppmv)		1.82		0.041	3.20E+03	1	4.69E-04	2.00E+02	6.02E-05
Benzene			0.48	0.041	1.30E+03	6	7.04E-08	6.00E+01	4.64E-08
Benzo(a)anthracene*									
Benzo(a)pyrene*									
Benzo(b)fluoranthene*									
Benzo(k)fluoranthene*									
1,3 Butadiene				0.041				2.00E+01	5.31E-09
Chrysene*									
Dibenz(a,h)anthracene*									
Ethylbenzene				0.041				2.00E+03	1.36E-08
Formaldehyde		1.82		0.041	9.40E+01		4.07E-04	3.00E+00	1.02E-04
Hexane				0.041				7.00E+03	3.09E-08
Indeno(1,2,3-cd)pyrene*									
Naphthalene*				0.041				9.00E+00	1.54E-07
Propylene				0.041				3.00E+03	2.15E-07
Propylene Oxide		1.82		0.041	3.10E+03		1.61E-06	3.00E+01	1.33E-06
Toluene		1.82		0.041	3.70E+04		2.00E-07	3.00E+02	1.98E-07
Xylene		1.82		0.041	2.20E+04		1.24E-07	7.00E+02	3.12E-08
Carbon monoxide		1.82			2.30E+04		3.33E-04		
nitrogen dioxide		1.82			4.70E+02		1.49E-02		
sulfur dioxide		1.82		0.041	6.60E+02		1.84E-04	2.50E+01	3.90E-05
* Polycyclic Aromatic Hyd									
			Hazard index = Concentration/REL						

Appendix 5.8-3

EXCESS CANCER RISK DISPERSION MODELING – PARTIAL OUTPUT

```
*** ISCST3 - VERSION 02035 ***    *** KRCD RISK X 1x10^6, CASE 9: 103 deg F, CHILL
OFF, DILUT OFF          ***        10/29/03
                                    *** FRESNO 1989, COMBUSTION TURBINES (ann er),COOL
TOWERS, & ZLD         ***        22:57:12
**MODELOPTs:
PAGE   1
CONC                    RURAL ELEV         DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY
***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates PERIOD Averages Only

**This Run Includes:     7 Source(s);      1 Source Group(s); and    5733 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
```

```
**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and
Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot.
Angle =     0.0
                 Emission Units = (GRAMS/SEC)                                ;  Emission
Rate Unit Factor =   0.10000E+07
                 Output Units   = (RISKX1,000,000)

**Approximate Storage Requirements of Model =     1.4 MB of RAM.

**Input Runstream File:          risk.inp
**Output Print File:             risk.out
**Detailed Error/Message File:   ERRORS.OUT
```

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS BY	EMISSION RATE SCALAR VARY
CTW	0	0.13600E+00	255157.6	4063966.5	89.9	32.00	723.16	22.84	3.66	YES	
CTE	0	0.13600E+00	255205.8	4063965.8	89.9	32.00	723.16	22.84	3.66	YES	
COOLWN	0	0.81700E-04	255172.5	4063963.8	89.9	10.67	301.49	12.23	3.66	YES	
COOLWS	0	0.81700E-04	255172.5	4063956.3	89.9	10.67	301.49	12.23	3.66	YES	
COOLEN	0	0.81700E-04	255190.7	4063963.8	89.9	10.67	301.49	12.23	3.66	YES	
COOLES	0	0.81700E-04	255190.7	4063956.3	89.9	10.67	301.49	12.23	3.66	YES	
ZLD	0	0.20500E-03	255135.8	4063993.8	89.9	21.34	463.72	8.02	0.30	YES	

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (RISKX1,000,000) **

NETWORK
GROUP ID AVERAGE CONC RECEPTOR (XR, YR, ZELEV, ZFLAG) OF TYPE GRID-ID

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       0.00801 AT (  255247.00,  4063900.00,     89.92,
0.00)  DC      NA
         2ND HIGHEST VALUE IS       0.00718 AT (  255270.00,  4063890.00,     89.61,
0.00)  DC      NA
         3RD HIGHEST VALUE IS       0.00601 AT (  255240.00,  4063890.00,     89.61,
0.00)  DC      NA
         4TH HIGHEST VALUE IS       0.00601 AT (  255300.00,  4063860.00,     89.61,
0.00)  DC      NA
         5TH HIGHEST VALUE IS       0.00570 AT (  259650.00,  4060290.00,     94.49,
0.00)  DC      NA
         6TH HIGHEST VALUE IS       0.00570 AT (  259620.00,  4060320.00,     94.49,
0.00)  DC      NA
         7TH HIGHEST VALUE IS       0.00569 AT (  259620.00,  4060290.00,     94.49,
0.00)  DC      NA
         8TH HIGHEST VALUE IS       0.00569 AT (  259680.00,  4060290.00,     94.49,
0.00)  DC      NA
         9TH HIGHEST VALUE IS       0.00569 AT (  259650.00,  4060260.00,     94.49,
0.00)  DC      NA
        10TH HIGHEST VALUE IS       0.00569 AT (  259590.00,  4060320.00,     94.49,
0.00)  DC      NA

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
   ************************************
```

ACUTE HAZARD INDEX, COMBUSTION TURBINES DISPERSION MODELING, 1-HOUR AND 6-HOUR AVERAGE NORMALIZED CONCENTRATION – PARTIAL OUTPUT

```
*** ISCST3 - VERSION 02035 ***    *** KRCD ACUTE INH, CASE 9: 103 deg F, CHILL OFF,
DILUT AIR OFF          ***        10/30/03
                                   *** FRESNO 1989, NORMALIZED CONCENTRATIONS
COMBUSTION TURBINES           ***        09:24:00
**MODELOPTs:
PAGE   1
CONC                    RURAL ELEV         DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY
***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.

           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR   6-HR

**This Run Includes:     2 Source(s);      1 Source Group(s); and    5733 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
```

```
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and
Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot.
Angle =     0.0
                 Emission Units = (GRAMS/SEC)                               ;  Emission
Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.7 MB of RAM.

**Input Runstream File:          acutect.inp
**Output Print File:             acutect.out
```

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS BY	EMISSION RATE SCALAR VARY
CTW	0	0.10000E+01	255157.6	4063966.5	89.9	32.00	723.16	22.84	3.66	YES	
CTE	0	0.10000E+01	255205.8	4063965.8	89.9	32.00	723.16	22.84	3.66	YES	

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	CTW , CTE ,

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

```
SOURCE ID: CTW
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,  18.2, 0
17  15.2,  12.4, 0    18  15.2,   6.1, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,  37.1, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,  18.2, 0
35  15.2,  12.4, 0    36  15.2,   6.1, 0


SOURCE ID: CTE
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,  18.2, 0
17  15.2,  12.4, 0    18  15.2,   6.1, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,  37.1, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,  18.2, 0
35  15.2,  12.4, 0    36  15.2,   6.1, 0


*** ISCST3 - VERSION 02035 ***    *** KRCD ACUTE INH, CASE 9: 103 deg F, CHILL OFF,
DILUT AIR OFF          ***        10/30/03
                                   *** FRESNO 1989, NORMALIZED CONCENTRATIONS
COMBUSTION TURBINES           ***        09:24:00
**MODELOPTs:
PAGE 359
CONC                    RURAL ELEV         DFAULT

                                                 *** THE SUMMARY OF HIGHEST  1-HR
RESULTS ***


                                          ** CONC OF OTHER    IN (MICROGRAMS/CUBIC-METER)
**

                                                          DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)             RECEPTOR
(XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - -
```

```
ALL      HIGH  1ST HIGH VALUE IS       1.82479  ON 89082612: AT (  256110.00,
4064400.00,     90.83,      0.00)  DC      NA
         HIGH  2ND HIGH VALUE IS       1.71130  ON 89082212: AT (  256230.00,
4063950.00,     90.53,      0.00)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

 *** ISCST3 - VERSION 02035 ***    *** KRCD ACUTE INH, CASE 9: 103 deg F, CHILL OFF,
DILUT AIR OFF          ***        10/30/03
                                   *** FRESNO 1989, NORMALIZED CONCENTRATIONS
COMBUSTION TURBINES           ***        09:24:00
**MODELOPTs:
PAGE 360
CONC                    RURAL ELEV         DFAULT

                                                *** THE SUMMARY OF HIGHEST  6-HR
RESULTS ***


                                         ** CONC OF OTHER    IN (MICROGRAMS/CUBIC-METER)
**

                                                      DATE
NETWORK
GROUP ID                        AVERAGE CONC     (YYMMDDHH)             RECEPTOR
(XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       0.47577c ON 89022306: AT (  263400.00,
4057320.00,     97.54,      0.00)  DC      NA
         HIGH  2ND HIGH VALUE IS       0.39866  ON 89073124: AT (  263400.00,
4057740.00,     97.54,      0.00)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
   ************************************
```

COOLING TOWER, ACUTE AND CHRONIC HAZARD INDEX DISPERSION MODELING: 1-HOUR AND ANNUAL AVERAGE NORMALIZED CONCENTRATIONS – PARTIAL OUTPUT

```
 *** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                   *** FRESNO 1989
***        21:44:36
**MODELOPTs:
PAGE   1
CONC                    RURAL ELEV         DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY
***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:   1-HR
    and Calculates PERIOD Averages

**This Run Includes:     4 Source(s);      1 Source Group(s); and    5733 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
```

```
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and
Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot.
Angle =     0.0
                 Emission Units = (GRAMS/SEC)                                ;  Emission
Rate Unit Factor =   0.10000E+07
                 Output Units   = (HAZARD_INDEX_X_1_E6)

**Approximate Storage Requirements of Model =     1.5 MB of RAM.

**Input Runstream File:          krcdcool.inp
**Output Print File:             krcdcool.out
**Detailed Error/Message File:   ERRORS.OUT

 *** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                   *** FRESNO 1989
***        21:44:36
**MODELOPTs:
PAGE   2
CONC                    RURAL ELEV         DFAULT



                                                     *** POINT SOURCE DATA ***


             NUMBER EMISSION RATE                    BASE     STACK   STACK    STACK
STACK    BUILDING EMISSION RATE
   SOURCE     PART. (USER UNITS)     X        Y      ELEV.    HEIGHT  TEMP.   EXIT
VEL. DIAMETER   EXISTS   SCALAR VARY
     ID       CATS.               (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)
(METERS)                BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - -

  COOLWN        0   0.10000E+01  255172.5 4063963.8    89.9    10.67   301.49    12.23
3.66      YES
  COOLWS        0   0.10000E+01  255172.5 4063956.3    89.9    10.67   301.49    12.23
3.66      YES
  COOLEN        0   0.10000E+01  255190.7 4063963.8    89.9    10.67   301.49    12.23
3.66      YES
  COOLES        0   0.10000E+01  255190.7 4063956.3    89.9    10.67   301.49    12.23
3.66      YES

 *** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                   *** FRESNO 1989
***        21:44:36
```

```
**MODELOPTs:
PAGE   3
CONC                    RURAL ELEV         DFAULT



                                        *** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID                                                    SOURCE IDs



 ALL       COOLWN  , COOLWS  , COOLEN  , COOLES  ,
 *** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                  *** FRESNO 1989
***        21:44:36
**MODELOPTs:
PAGE   4
CONC                    RURAL ELEV         DFAULT

                                         *** DIRECTION SPECIFIC BUILDING DIMENSIONS
***


SOURCE ID: COOLWN
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  10.7,  10.9, 0     2  10.7,  13.9, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,  18.2, 0
17  15.2,  12.4, 0    18  10.7,   7.6, 0
  19  10.7,  10.9, 0    20  10.7,  13.9, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,  37.1, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,  18.2, 0
35  15.2,  12.4, 0    36  10.7,   7.6, 0



SOURCE ID: COOLWS
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  10.7,  10.9, 0     2  10.7,  13.9, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  10.7,  21.0, 0
   7  10.7,  21.2, 0     8  10.7,  20.8, 0     9  10.7,  19.8, 0    10  10.7,  11.3, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  15.2,  18.2, 0
17  15.2,  12.4, 0    18  10.7,   7.6, 0
  19  10.7,  10.9, 0    20  10.7,  13.9, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  10.7,  19.8, 0    28  10.7,  20.8, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
```

```
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  15.2,  18.2, 0
35  15.2,  12.4, 0    36  10.7,   7.6, 0



SOURCE ID: COOLEN
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,  13.9, 0
17  10.7,  10.9, 0    18  10.7,   7.6, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,  37.1, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,  13.9, 0
35  10.7,  10.9, 0    36  10.7,   7.6, 0



SOURCE ID: COOLES
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  15.2,  12.4, 0     2  15.2,  18.2, 0     3  15.2,  23.6, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  10.7,  20.8, 0     9  10.7,  19.8, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,  13.9, 0
17  10.7,  10.9, 0    18  10.7,   7.6, 0
  19  15.2,  12.4, 0    20  15.2,  18.2, 0    21  15.2,  23.6, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  10.7,  20.8, 0    27  10.7,  19.8, 0    28  10.7,  20.8, 0
29  10.7,  21.2, 0    30  10.7,  21.0, 0
  31  10.7,  20.1, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,  13.9, 0
35  10.7,  10.9, 0    36  10.7,   7.6, 0

*** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                   *** FRESNO 1989
***        21:44:36
**MODELOPTs:
PAGE 287
CONC                   RURAL ELEV         DFAULT

                                          *** THE SUMMARY OF MAXIMUM PERIOD (  8760
HRS) RESULTS ***


                                       ** CONC OF OTHER    IN (HAZARD_INDEX_X_1_E6)
**


NETWORK
```

```
GROUP ID                      AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV,
ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS      49.61650 AT (  255247.00,  4063900.00,     89.92,
0.00)  DC      NA
         2ND HIGHEST VALUE IS      42.48556 AT (  255270.00,  4063890.00,     89.61,
0.00)  DC      NA
         3RD HIGHEST VALUE IS      33.49323 AT (  255300.00,  4063860.00,     89.61,
0.00)  DC      NA
         4TH HIGHEST VALUE IS      30.54205 AT (  255240.00,  4063890.00,     89.61,
0.00)  DC      NA
         5TH HIGHEST VALUE IS      29.87808 AT (  255261.00,  4063920.00,     89.92,
0.00)  DC      NA
         6TH HIGHEST VALUE IS      26.76295 AT (  255330.00,  4063830.00,     89.61,
0.00)  DC      NA
         7TH HIGHEST VALUE IS      26.30547 AT (  255300.00,  4063890.00,     89.61,
0.00)  DC      NA
         8TH HIGHEST VALUE IS      25.57664 AT (  255330.00,  4063860.00,     89.61,
0.00)  DC      NA
         9TH HIGHEST VALUE IS      25.19736 AT (  255270.00,  4063860.00,     89.61,
0.00)  DC      NA
        10TH HIGHEST VALUE IS      24.38718 AT (  255360.00,  4063830.00,     89.92,
0.00)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

 *** ISCST3 - VERSION 02035 ***    *** KRCD  COOLING TOWER, NORMALIZED CONCENTRATION
***        10/30/03
                                   *** FRESNO 1989
***        21:44:36
**MODELOPTs:
PAGE 288
CONC                    RURAL ELEV         DFAULT

                                                *** THE SUMMARY OF HIGHEST  1-HR
RESULTS ***


                                       ** CONC OF OTHER    IN (HAZARD_INDEX_X_1_E6)
**

                                                      DATE
NETWORK
GROUP ID                         AVERAGE CONC     (YYMMDDHH)             RECEPTOR
(XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS     902.37000  ON 89012411: AT (  255261.00,
4063920.00,     89.92,      0.00)  DC      NA
```

```
        HIGH  2ND HIGH VALUE IS     899.60193  ON 89051102: AT (  255261.00,
4063920.00,     89.92,      0.00)  DC      NA
```

ZLD, ACUTE AND CHRONIC HAZARD INDEX DISPERSION MODELING: 1-HOUR AND ANNUAL AVERAGE NORMALIZED CONCENTRATIONS – PARTIAL OUTPUT

```
 *** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE   1
CONC                    RURAL ELEV         DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY
***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Accepts Receptors on ELEV Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:   1-HR
    and Calculates PERIOD Averages

**This Run Includes:     1 Source(s);      1 Source Group(s); and    5733 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
```

```
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and
Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot.
Angle =     0.0
                 Emission Units = (GRAMS/SEC)                                ;  Emission
Rate Unit Factor =   0.10000E+07
                 Output Units   = (HAZARD_INDEX_X_1_E6)

**Approximate Storage Requirements of Model =     1.5 MB of RAM.

**Input Runstream File:          krcdzld.inp
**Output Print File:             krcdzld.out
**Detailed Error/Message File:   ERRORS.OUT

 *** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE   2
CONC                    RURAL ELEV         DFAULT



                                                  *** POINT SOURCE DATA ***


             NUMBER EMISSION RATE                    BASE     STACK   STACK    STACK
STACK    BUILDING EMISSION RATE
   SOURCE     PART. (USER UNITS)     X        Y      ELEV.    HEIGHT  TEMP.   EXIT
VEL. DIAMETER   EXISTS   SCALAR VARY
     ID       CATS.               (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)
(METERS)                BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - -

  ZLD           0   0.10000E+01  255135.8 4063993.8    89.9    21.34   463.72     8.02
0.30      YES

 *** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE   3
CONC                    RURAL ELEV         DFAULT


                                             *** SOURCE IDs DEFINING SOURCE GROUPS ***
```

```
GROUP ID                                                SOURCE IDs


 ALL       ZLD     ,

 *** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE   4
CONC                    RURAL ELEV         DFAULT

                                         *** DIRECTION SPECIFIC BUILDING DIMENSIONS
***


SOURCE ID: ZLD
 IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK  IFV   BH     BW
WAK  IFV   BH     BW  WAK  IFV   BH     BW  WAK
   1  10.7,  11.3, 0     2  10.7,  12.5, 0     3  10.7,  10.4, 0     4  15.2,  28.2, 0
5  15.2,  31.9, 0     6  15.2,  34.7, 0
   7  15.2,  36.5, 0     8  15.2,  37.1, 0     9  15.2,  36.6, 0    10  15.2,  37.1, 0
11  15.2,  36.5, 0    12  15.2,  34.7, 0
  13  15.2,  31.9, 0    14  15.2,  28.2, 0    15  15.2,  23.6, 0    16  10.7,  12.5, 0
17  10.7,   8.8, 0    18  10.7,   7.6, 0

  19  10.7,   8.8, 0    20  10.7,  12.5, 0    21  10.7,  10.4, 0    22  15.2,  28.2, 0
23  15.2,  31.9, 0    24  15.2,  34.7, 0
  25  15.2,  36.5, 0    26  15.2,  37.1, 0    27  15.2,  36.6, 0    28  15.2,  37.1, 0
29  15.2,  36.5, 0    30  15.2,  34.7, 0
  31  15.2,  31.9, 0    32  15.2,  28.2, 0    33  15.2,  23.6, 0    34  10.7,  12.5, 0
35  10.7,  11.3, 0    36  10.7,   9.8, 0

*** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE 287
CONC                    RURAL ELEV         DFAULT

                                         *** THE SUMMARY OF MAXIMUM PERIOD (  8760
HRS) RESULTS ***


                                       ** CONC OF OTHER    IN (HAZARD_INDEX_X_1_E6)
**


NETWORK
GROUP ID                      AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV,
ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - -
```

```
ALL      1ST HIGHEST VALUE IS      19.31670 AT (  255247.00,  4063900.00,     89.92,
0.00)  DC      NA
         2ND HIGHEST VALUE IS      18.09722 AT (  255270.00,  4063890.00,     89.61,
0.00)  DC      NA
         3RD HIGHEST VALUE IS      17.16093 AT (  255240.00,  4063890.00,     89.61,
0.00)  DC      NA
         4TH HIGHEST VALUE IS      16.83473 AT (  255237.69,  4063883.75,     89.92,
0.00)  DC      NA
         5TH HIGHEST VALUE IS      16.83473 AT (  255237.69,  4063883.75,     89.92,
0.00)  DC      NA
         6TH HIGHEST VALUE IS      15.90757 AT (  255300.00,  4063860.00,     89.61,
0.00)  DC      NA
         7TH HIGHEST VALUE IS      15.81569 AT (  255261.00,  4063920.00,     89.92,
0.00)  DC      NA
         8TH HIGHEST VALUE IS      15.71816 AT (  255270.00,  4063860.00,     89.61,
0.00)  DC      NA
         9TH HIGHEST VALUE IS      15.07260 AT (  255270.00,  4063920.00,     89.61,
0.00)  DC      NA
        10TH HIGHEST VALUE IS      14.43445 AT (  255300.00,  4063890.00,     89.61,
0.00)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

 *** ISCST3 - VERSION 02035 ***    *** KRCD ZLD  NORMALIZED CONCENTRATIONS
***        10/30/03
                                   *** FRESNO 1989
***        21:52:08
**MODELOPTs:
PAGE 288
CONC                    RURAL ELEV         DFAULT

                                              *** THE SUMMARY OF HIGHEST  1-HR
RESULTS ***


                                       ** CONC OF OTHER    IN (HAZARD_INDEX_X_1_E6)
**

                                                      DATE
NETWORK
GROUP ID                        AVERAGE CONC     (YYMMDDHH)             RECEPTOR
(XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS     309.31689  ON 89021807: AT (  254850.00,
4063980.00,     88.70,      0.00)  DC      NA
         HIGH  2ND HIGH VALUE IS     262.88245  ON 89070604: AT (  255210.00,
4063860.00,     89.61,      0.00)  DC      NA
```

Appendix 5.9-1

Draft Outline
Emergency Action Plan
KRCDPP

1.0 Purpose, Scope and Applicability of Plan

2.0 Facility Information

3.0 Roles and Responsibilities

4.0 Emergency Incident Response Training

5.0 Emergency Response Protocol

6.0 Evacuation Protocol

7.0 Post Emergency Response Protocol

8.0 Notification and Incident Reporting

Draft Outline
Personal Protective Equipment
KRCDPP

1.0 General Description of Protection and Protective Gear

2.0 Personal Protection Equipment Categories (i.e. head, eye, body, hand, foot, and skin protection)

3.0 Level Of Protection Requirements (i.e. hearing and respiratory protection)

4.0 Personnel Training

Draft Outline
Injury Illness Prevention Plan
KRCDPP

1.0 Purpose, Scope and Applicability

2.0 Facility Information

3.0 Implementing Authority and Responsibilities

4.0 Review and Approval Processes

5.0 Compliance Assurance

6.0 Employee Communication Protocols

7.0 Evaluation of Workplace Hazard

8.0 Investigation of Occupational Injuries and Illness

9.0 Compliance with Safe Work Practices

10.0 Training Procedures

Draft Outline
Fire Prevention Plan
KRCDPP

1.0 Scope, Purpose and Applicability

2.0 Potential Fire Hazards

3.0 Proper Handling and Storage of Potential Fire Hazards (i.e. housekeeping and material storage)

4.0 Potential Ignition Sources and Controls

5.0 Persons Responsible for Equipment and Systems Maintenance

6.0 Portable Fire Extinguishers

7.0 Automatic Sprinkler Fire Suppression System

8.0 Water-Spray Fire System

9.0 Local Fire Department

10.0 Training

11.0 Contact Information

Appendix 5.10-1

SLAB MODELING RESULTS: WORST-CASE SCENARIO, DISTANCE TO 75 PPM AMMONIA

```
                    SESSION INFORMATION

              INPUT DATA FILE NAME :  AMMSMALL.DTA
              OUTPUT LIST FILE NAME : AMMSMALL.LST


              GRAPHICS DATA FILE NAME : AMMSMALL.DAT
              GRAPHICS PLOT FILE NAME : AMMSMALL.XZ
```

```
problem input

  idspl =         1
  ncalc =         1
  wms   =   .017031
  cps   =   2170.00
  tbp   =    240.00
  cmed0 =       .00

  dhe   =  1370840.
  cpsl  =   4294.00
  rhosl =    682.80
  spb   =   2132.52
  spc   =    -32.98
  ts    =    239.00
  qs    =       .13
  as    =     40.78
  tsd   =     3600.
  qtis  =       .00
  hs    =       .00
  tav   =   3600.00
  xffm  =     15.03
  zp(1) =      1.50
  zp(2) =       .00
  zp(3) =       .00
  zp(4) =       .00
  z0    =   .010000
  za    =     10.00
  ua    =      1.50
  ta    =    300.37
  rh    =     50.00
  stab  =      6.00


release gas properties

 molecular weight of source gas (kg)              - wms  =  1.7031E-02
 vapor heat capacity, const. p.  (j/kg-k)         - cps  =  2.1700E+03
```

```
 temperature of source gas (k)                      - ts   =  2.4000E+02
 density of source gas (kg/m3)                      - rhos =  8.6481E-01
 boiling point temperature                          - tbp  =  2.4000E+02
 liquid mass fraction                               - cmed0=  0.0000E+00
 liquid heat capacity (j/kg-k)                      - cpsl =  4.2940E+03

 heat of vaporization (j/kg)                        - dhe  =  1.3708E+06
 liquid source density (kg/m3)                      - rhosl=  6.8280E+02
 saturation pressure constant                       - spa  =  1.0301E+01
 saturation pressure constant (k)                   - spb  =  2.1325E+03
 saturation pressure constant (k)                   - spc  = -3.2980E+01


spill characteristics

 spill type                                         - idspl=          1
 mass source rate (kg/s)                            - qs   =  1.2905E-01
 continuous source duration (s)                     - tsd  =  3.6000E+03
 continuous source mass (kg)                        - qtcs =  4.6458E+02
 instantaneous source mass (kg)                     - qtis =  0.0000E+00
 source area (m2)                                   - as   =  4.0783E+01
 vertical vapor velocity (m/s)                      - ws   =  3.6589E-03
 source half width (m)                              - bs   =  3.1931E+00
 source height (m)                                  - hs   =  0.0000E+00
 horizontal vapor velocity (m/s)                    - us   =  0.0000E+00


field parameters

 concentration averaging time (s)                   - tav  =  3.6000E+03
 mixing layer height (m)                            - hmx  =  2.6000E+02
 maximum downwind distrace (m)                      - xffm =  1.5028E+01
 concentration measurement height (m)               - zp(1)=  1.5000E+00
                                                    - zp(2)=  0.0000E+00
                                                    - zp(3)=  0.0000E+00
                                                    - zp(4)=  0.0000E+00


ambient meteorological properties

 molecular weight of ambient air (kg)             - wmae  =  2.8754E-02
 heat capacity of ambient air at const p. (j/kg-k)- cpaa  =  1.0158E+03
 density of ambient air (kg/m3)                   - rhoa  =  1.1666E+00
 ambient measurement height (m)                   - za    =  1.0000E+01
 ambient atmospheric pressure (pa=n/m2=j/m3)      - pa    =  1.0133E+05
 ambient wind speed (m/s)                         - ua    =  1.5000E+00
 ambient temperature (k)                          - ta    =  3.0037E+02
 relative humidity (percent)                      - rh    =  5.0000E+01
 ambient friction velocity (m/s)                  - uastr =  4.0547E-02
 atmospheric stability class value                - stab  =  6.0000E+00
 inverse monin-obukhov length (1/m)               - ala   =  8.4887E-02
 surface roughness height (m)                     - z0    =  1.0000E-02


additional parameters

 sub-step multiplier                              - ncalc =          1
```

```
 number of calculational sub-steps                    - nssm  =          3
 acceleration of gravity (m/s2)                       - grav  =  9.8067E+00
 gas constant (j/mol- k)                              - rr    =  8.3143E+00
 von karman constant                                  - xk    =  4.1000E-01
1
```

instantaneous spatially averaged cloud parameters

x	zc	h	bb	b	bbx	bx	cv	rho	t	u	ua
-3.19E+00	0.00E+00	0.00E+00	3.19E+00	2.87E+00	3.19E+00	3.19E+00	0.00E+00	1.17E+00	3.00E+02	0.00E+00	0.00E+00
-2.55E+00	0.00E+00	4.09E-01	3.22E+00	2.87E+00	3.51E+00	3.51E+00	2.40E-02	1.16E+00	2.99E+02	2.93E-01	3.03E-01
-1.92E+00	0.00E+00	5.41E-01	3.24E+00	2.87E+00	3.83E+00	3.83E+00	3.37E-02	1.16E+00	2.98E+02	3.13E-01	3.43E-01
-1.28E+00	0.00E+00	6.71E-01	3.27E+00	2.87E+00	4.15E+00	4.15E+00	4.01E-02	1.16E+00	2.97E+02	3.15E-01	3.76E-01
-6.39E-01	0.00E+00	8.18E-01	3.31E+00	2.88E+00	4.47E+00	4.47E+00	4.50E-02	1.16E+00	2.97E+02	3.03E-01	4.09E-01
5.07E-07	0.00E+00	1.01E+00	3.37E+00	2.88E+00	4.79E+00	4.79E+00	4.89E-02	1.16E+00	2.97E+02	2.76E-01	4.46E-01
6.39E-01	0.00E+00	1.34E+00	3.48E+00	2.88E+00	5.11E+00	5.11E+00	5.13E-02	1.16E+00	2.97E+02	2.32E-01	4.99E-01
1.28E+00	0.00E+00	2.07E+00	3.68E+00	2.88E+00	5.43E+00	5.43E+00	5.08E-02	1.16E+00	2.97E+02	1.66E-01	5.96E-01
1.92E+00	0.00E+00	5.63E+00	4.83E+00	2.87E+00	5.75E+00	5.75E+00	3.89E-02	1.16E+00	2.97E+02	6.98E-02	8.84E-01
2.55E+00	0.00E+00	6.88E-01	4.97E+00	2.89E+00	6.07E+00	6.07E+00	3.13E-02	1.16E+00	2.98E+02	7.79E-01	4.17E-01
3.19E+00	6.62E-04	8.66E-01	5.03E+00	2.90E+00	6.39E+00	6.39E+00	2.92E-02	1.16E+00	2.98E+02	7.29E-01	4.48E-01
3.22E+00	1.15E-03	8.78E-01	5.03E+00	2.90E+00	6.41E+00	6.41E+00	2.91E-02	1.16E+00	2.98E+02	7.22E-01	4.50E-01
3.24E+00	1.73E-03	8.84E-01	5.03E+00	2.90E+00	6.44E+00	6.44E+00	2.89E-02	1.16E+00	2.98E+02	7.21E-01	4.51E-01
3.27E+00	2.43E-03	8.90E-01	5.03E+00	2.90E+00	6.47E+00	6.46E+00	2.87E-02	1.16E+00	2.98E+02	7.21E-01	4.52E-01
3.30E+00	3.25E-03	8.96E-01	5.04E+00	2.90E+00	6.50E+00	6.50E+00	2.85E-02	1.16E+00	2.98E+02	7.20E-01	4.53E-01
3.34E+00	4.22E-03	9.03E-01	5.04E+00	2.90E+00	6.53E+00	6.53E+00	2.84E-02	1.16E+00	2.98E+02	7.19E-01	4.54E-01
3.37E+00	5.37E-03	9.10E-01	5.04E+00	2.90E+00	6.56E+00	6.56E+00	2.81E-02	1.16E+00	2.98E+02	7.18E-01	4.55E-01
3.41E+00	6.72E-03	9.18E-01	5.04E+00	2.90E+00	6.60E+00	6.60E+00	2.79E-02	1.16E+00	2.98E+02	7.18E-01	4.56E-01
3.45E+00	8.30E-03	9.26E-01	5.04E+00	2.90E+00	6.64E+00	6.64E+00	2.77E-02	1.16E+00	2.98E+02	7.17E-01	4.58E-01
3.49E+00	1.01E-02	9.35E-01	5.05E+00	2.90E+00	6.69E+00	6.69E+00	2.75E-02	1.16E+00	2.98E+02	7.16E-01	4.59E-01
3.54E+00	1.23E-02	9.44E-01	5.05E+00	2.90E+00	6.73E+00	6.73E+00	2.72E-02	1.16E+00	2.98E+02	7.15E-01	4.60E-01
3.59E+00	1.48E-02	9.54E-01	5.05E+00	2.90E+00	6.78E+00	6.78E+00	2.70E-02	1.16E+00	2.98E+02	7.14E-01	4.62E-01
3.65E+00	1.78E-02	9.64E-01	5.06E+00	2.90E+00	6.84E+00	6.84E+00	2.67E-02	1.16E+00	2.98E+02	7.13E-01	4.64E-01
3.70E+00	2.12E-02	9.75E-01	5.06E+00	2.90E+00	6.90E+00	6.90E+00	2.64E-02	1.16E+00	2.98E+02	7.12E-01	4.65E-01
3.77E+00	2.51E-02	9.86E-01	5.06E+00	2.90E+00	6.96E+00	6.96E+00	2.61E-02	1.16E+00	2.98E+02	7.11E-01	4.67E-01
3.83E+00	2.97E-02	9.99E-01	5.07E+00	2.90E+00	7.03E+00	7.03E+00	2.58E-02	1.16E+00	2.98E+02	7.10E-01	4.69E-01
3.91E+00	3.50E-02	1.01E+00	5.07E+00	2.90E+00	7.10E+00	7.10E+00	2.55E-02	1.16E+00	2.99E+02	7.09E-01	4.71E-01
3.99E+00	4.11E-02	1.02E+00	5.07E+00	2.90E+00	7.18E+00	7.18E+00	2.52E-02	1.16E+00	2.99E+02	7.08E-01	4.73E-01
4.07E+00	4.81E-02	1.04E+00	5.08E+00	2.90E+00	7.26E+00	7.26E+00	2.49E-02	1.16E+00	2.99E+02	7.07E-01	4.75E-01
4.16E+00	5.62E-02	1.05E+00	5.08E+00	2.90E+00	7.35E+00	7.35E+00	2.45E-02	1.16E+00	2.99E+02	7.06E-01	4.78E-01
4.26E+00	6.56E-02	1.07E+00	5.09E+00	2.90E+00	7.45E+00	7.45E+00	2.42E-02	1.16E+00	2.99E+02	7.05E-01	4.80E-01
4.36E+00	7.64E-02	1.09E+00	5.09E+00	2.90E+00	7.55E+00	7.55E+00	2.38E-02	1.16E+00	2.99E+02	7.04E-01	4.82E-01
4.47E+00	8.87E-02	1.10E+00	5.10E+00	2.90E+00	7.67E+00	7.67E+00	2.35E-02	1.16E+00	2.99E+02	7.03E-01	4.85E-01
4.59E+00	1.03E-01	1.12E+00	5.11E+00	2.90E+00	7.79E+00	7.79E+00	2.31E-02	1.16E+00	2.99E+02	7.02E-01	4.87E-01
4.72E+00	1.19E-01	1.14E+00	5.11E+00	2.90E+00	7.92E+00	7.92E+00	2.28E-02	1.16E+00	2.99E+02	7.01E-01	4.90E-01
4.86E+00	1.38E-01	1.16E+00	5.12E+00	2.90E+00	8.06E+00	8.06E+00	2.24E-02	1.16E+00	2.99E+02	7.00E-01	4.93E-01
5.01E+00	1.59E-01	1.18E+00	5.13E+00	2.90E+00	8.21E+00	8.20E+00	2.20E-02	1.16E+00	2.99E+02	6.99E-01	4.96E-01
5.17E+00	1.84E-01	1.20E+00	5.14E+00	2.90E+00	8.37E+00	8.37E+00	2.16E-02	1.16E+00	2.99E+02	6.98E-01	4.99E-01
5.35E+00	2.12E-01	1.22E+00	5.14E+00	2.90E+00	8.54E+00	8.54E+00	2.12E-02	1.16E+00	2.99E+02	6.97E-01	5.02E-01
5.53E+00	2.43E-01	1.24E+00	5.15E+00	2.90E+00	8.73E+00	8.72E+00	2.08E-02	1.16E+00	2.99E+02	6.96E-01	5.05E-01
5.73E+00	2.80E-01	1.27E+00	5.16E+00	2.90E+00	8.93E+00	8.92E+00	2.04E-02	1.16E+00	2.99E+02	6.96E-01	5.09E-01
5.95E+00	3.21E-01	1.29E+00	5.17E+00	2.90E+00	9.14E+00	9.14E+00	2.00E-02	1.16E+00	2.99E+02	6.95E-01	5.12E-01
6.18E+00	3.68E-01	1.32E+00	5.18E+00	2.90E+00	9.37E+00	9.37E+00	1.96E-02	1.16E+00	2.99E+02	6.94E-01	5.15E-01
6.43E+00	4.22E-01	1.34E+00	5.20E+00	2.90E+00	9.62E+00	9.62E+00	1.92E-02	1.16E+00	2.99E+02	6.94E-01	5.19E-01
6.69E+00	4.83E-01	1.37E+00	5.21E+00	2.90E+00	9.89E+00	9.89E+00	1.88E-02	1.16E+00	2.99E+02	6.93E-01	5.23E-01
6.98E+00	5.53E-01	1.40E+00	5.22E+00	2.90E+00	1.02E+01	1.02E+01	1.84E-02	1.16E+00	2.99E+02	6.93E-01	5.26E-01
7.29E+00	6.32E-01	1.43E+00	5.23E+00	2.90E+00	1.05E+01	1.05E+01	1.80E-02	1.16E+00	2.99E+02	6.92E-01	5.30E-01
7.62E+00	7.21E-01	1.46E+00	5.25E+00	2.90E+00	1.08E+01	1.08E+01	1.76E-02	1.16E+00	2.99E+02	6.92E-01	5.34E-01
7.98E+00	8.21E-01	1.49E+00	5.26E+00	2.90E+00	1.12E+01	1.12E+01	1.69E-02	1.16E+00	2.99E+02	6.99E-01	5.49E-01
8.36E+00	9.31E-01	1.53E+00	5.27E+00	2.89E+00	1.16E+01	1.16E+01	1.62E-02	1.16E+00	2.99E+02	7.08E-01	5.65E-01
8.77E+00	1.05E+00	1.57E+00	5.29E+00	2.89E+00	1.20E+01	1.20E+01	1.56E-02	1.16E+00	2.99E+02	7.18E-01	5.81E-01
9.21E+00	1.18E+00	1.60E+00	5.30E+00	2.89E+00	1.24E+01	1.24E+01	1.51E-02	1.16E+00	2.99E+02	7.29E-01	5.98E-01
9.69E+00	1.33E+00	1.62E+00	5.31E+00	2.88E+00	1.29E+01	1.29E+01	1.46E-02	1.16E+00	2.99E+02	7.41E-01	6.15E-01
1.02E+01	1.49E+00	1.64E+00	5.32E+00	2.88E+00	1.34E+01	1.34E+01	1.41E-02	1.16E+00	2.99E+02	7.54E-01	6.33E-01
1.07E+01	1.67E+00	1.65E+00	5.33E+00	2.87E+00	1.39E+01	1.39E+01	1.37E-02	1.16E+00	2.99E+02	7.68E-01	6.51E-01
1.13E+01	1.86E+00	1.67E+00	5.34E+00	2.87E+00	1.45E+01	1.45E+01	1.33E-02	1.16E+00	2.99E+02	7.83E-01	6.70E-01
1.20E+01	2.07E+00	1.67E+00	5.35E+00	2.86E+00	1.52E+01	1.52E+01	1.30E-02	1.16E+00	2.99E+02	7.99E-01	6.90E-01
1.27E+01	2.30E+00	1.68E+00	5.37E+00	2.86E+00	1.59E+01	1.58E+01	1.26E-02	1.16E+00	2.99E+02	8.16E-01	7.11E-01
1.34E+01	2.55E+00	1.68E+00	5.38E+00	2.85E+00	1.66E+01	1.66E+01	1.23E-02	1.16E+00	2.99E+02	8.34E-01	7.32E-01
1.42E+01	2.83E+00	1.68E+00	5.40E+00	2.85E+00	1.74E+01	1.74E+01	1.20E-02	1.16E+00	3.00E+02	8.53E-01	7.54E-01
1.50E+01	3.13E+00	1.68E+00	5.42E+00	2.84E+00	1.82E+01	1.82E+01	1.17E-02	1.16E+00	3.00E+02	8.73E-01	7.77E-01

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x	cm	cmv	cmda	cmw	cmwv	wc	vg	ug	w	v	vx
-3.19E+00	0.00E+00	0.00E+00	9.88E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	8.95E-01	2.97E-02	0.00E+00
-2.55E+00	1.44E-02	1.44E-02	9.74E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	4.70E-02	5.96E-03	6.76E-02
-1.92E+00	2.03E-02	2.03E-02	9.68E-01	1.16E-02	1.16E-02	0.00E+00	0.00E+00	0.00E+00	3.98E-02	7.18E-03	7.29E-02
-1.28E+00	2.41E-02	2.41E-02	9.64E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	3.39E-02	9.09E-03	7.77E-02
-6.39E-01	2.72E-02	2.72E-02	9.61E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.92E-02	1.22E-02	8.26E-02

5.07E-07	2.95E-02	2.95E-02	9.59E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.62E-02	1.73E-02	8.88E-02
6.39E-01	3.10E-02	3.10E-02	9.58E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.64E-02	2.53E-02	9.81E-02
1.28E+00	3.07E-02	3.07E-02	9.58E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	3.19E-02	3.94E-02	1.17E-01
1.92E+00	2.34E-02	2.34E-02	9.65E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	4.59E-02	7.33E-02	1.80E-01
2.55E+00	1.88E-02	1.88E-02	9.70E-01	1.16E-02	1.16E-02	0.00E+00	0.00E+00	0.00E+00	1.03E-01	3.27E-02	7.83E-02
3.19E+00	1.75E-02	1.75E-02	9.71E-01	1.16E-02	1.16E-02	1.36E-02	0.00E+00	0.00E+00	7.71E-02	2.60E-02	8.43E-02
3.22E+00	1.74E-02	1.74E-02	9.71E-01	1.16E-02	1.16E-02	1.51E-02	0.00E+00	0.00E+00	7.58E-02	2.53E-02	8.47E-02
3.24E+00	1.73E-02	1.73E-02	9.71E-01	1.16E-02	1.16E-02	1.67E-02	0.00E+00	0.00E+00	7.54E-02	2.52E-02	8.49E-02
3.27E+00	1.72E-02	1.72E-02	9.71E-01	1.16E-02	1.16E-02	1.85E-02	0.00E+00	0.00E+00	7.49E-02	2.51E-02	8.51E-02
3.30E+00	1.71E-02	1.71E-02	9.71E-01	1.16E-02	1.16E-02	2.03E-02	0.00E+00	0.00E+00	7.44E-02	2.49E-02	8.54E-02
3.34E+00	1.70E-02	1.70E-02	9.71E-01	1.16E-02	1.16E-02	2.23E-02	0.00E+00	0.00E+00	7.38E-02	2.48E-02	8.57E-02
3.37E+00	1.69E-02	1.69E-02	9.72E-01	1.16E-02	1.16E-02	2.44E-02	0.00E+00	0.00E+00	7.32E-02	2.46E-02	8.60E-02
3.41E+00	1.67E-02	1.67E-02	9.72E-01	1.16E-02	1.16E-02	2.66E-02	0.00E+00	0.00E+00	7.25E-02	2.45E-02	8.64E-02
3.45E+00	1.66E-02	1.66E-02	9.72E-01	1.16E-02	1.16E-02	2.90E-02	0.00E+00	0.00E+00	7.17E-02	2.43E-02	8.67E-02
3.49E+00	1.65E-02	1.65E-02	9.72E-01	1.16E-02	1.16E-02	3.15E-02	0.00E+00	0.00E+00	7.09E-02	2.41E-02	8.71E-02
3.54E+00	1.63E-02	1.63E-02	9.72E-01	1.16E-02	1.16E-02	3.41E-02	0.00E+00	0.00E+00	7.00E-02	2.39E-02	8.76E-02
3.59E+00	1.61E-02	1.61E-02	9.72E-01	1.16E-02	1.16E-02	3.69E-02	0.00E+00	0.00E+00	6.91E-02	2.37E-02	8.81E-02
3.65E+00	1.60E-02	1.60E-02	9.72E-01	1.16E-02	1.16E-02	3.99E-02	0.00E+00	0.00E+00	6.81E-02	2.36E-02	8.86E-02
3.70E+00	1.58E-02	1.58E-02	9.73E-01	1.16E-02	1.16E-02	4.30E-02	0.00E+00	0.00E+00	6.70E-02	2.33E-02	8.92E-02
3.77E+00	1.56E-02	1.56E-02	9.73E-01	1.16E-02	1.16E-02	4.63E-02	0.00E+00	0.00E+00	6.59E-02	2.31E-02	8.98E-02
3.83E+00	1.55E-02	1.55E-02	9.73E-01	1.16E-02	1.16E-02	4.98E-02	0.00E+00	0.00E+00	6.47E-02	2.29E-02	9.05E-02
3.91E+00	1.53E-02	1.53E-02	9.73E-01	1.16E-02	1.16E-02	5.35E-02	0.00E+00	0.00E+00	6.34E-02	2.27E-02	9.13E-02
3.99E+00	1.51E-02	1.51E-02	9.73E-01	1.16E-02	1.16E-02	5.73E-02	0.00E+00	0.00E+00	6.21E-02	2.25E-02	9.21E-02
4.07E+00	1.49E-02	1.49E-02	9.73E-01	1.16E-02	1.16E-02	6.14E-02	0.00E+00	0.00E+00	6.08E-02	2.22E-02	9.31E-02
4.16E+00	1.47E-02	1.47E-02	9.74E-01	1.17E-02	1.17E-02	6.57E-02	0.00E+00	0.00E+00	5.94E-02	2.20E-02	9.41E-02
4.26E+00	1.45E-02	1.45E-02	9.74E-01	1.17E-02	1.17E-02	7.03E-02	0.00E+00	0.00E+00	5.80E-02	2.17E-02	9.52E-02
4.36E+00	1.43E-02	1.43E-02	9.74E-01	1.17E-02	1.17E-02	7.50E-02	0.00E+00	0.00E+00	5.65E-02	2.15E-02	9.64E-02
4.47E+00	1.40E-02	1.40E-02	9.74E-01	1.17E-02	1.17E-02	8.01E-02	0.00E+00	0.00E+00	5.51E-02	2.12E-02	9.77E-02
4.59E+00	1.38E-02	1.38E-02	9.75E-01	1.17E-02	1.17E-02	8.53E-02	0.00E+00	0.00E+00	5.36E-02	2.09E-02	9.92E-02
4.72E+00	1.36E-02	1.36E-02	9.75E-01	1.17E-02	1.17E-02	9.09E-02	0.00E+00	0.00E+00	5.22E-02	2.07E-02	1.01E-01
4.86E+00	1.34E-02	1.34E-02	9.75E-01	1.17E-02	1.17E-02	9.67E-02	0.00E+00	0.00E+00	5.07E-02	2.04E-02	1.03E-01
5.01E+00	1.31E-02	1.31E-02	9.75E-01	1.17E-02	1.17E-02	1.03E-01	0.00E+00	0.00E+00	4.93E-02	2.01E-02	1.04E-01
5.17E+00	1.29E-02	1.29E-02	9.75E-01	1.17E-02	1.17E-02	1.09E-01	0.00E+00	0.00E+00	4.78E-02	1.99E-02	1.07E-01
5.35E+00	1.27E-02	1.27E-02	9.76E-01	1.17E-02	1.17E-02	1.16E-01	0.00E+00	0.00E+00	4.64E-02	1.96E-02	1.09E-01
5.53E+00	1.24E-02	1.24E-02	9.76E-01	1.17E-02	1.17E-02	1.23E-01	0.00E+00	0.00E+00	4.50E-02	1.93E-02	1.11E-01
5.73E+00	1.22E-02	1.22E-02	9.76E-01	1.17E-02	1.17E-02	1.30E-01	0.00E+00	0.00E+00	4.37E-02	1.90E-02	1.14E-01
5.95E+00	1.20E-02	1.20E-02	9.76E-01	1.17E-02	1.17E-02	1.38E-01	0.00E+00	0.00E+00	4.23E-02	1.88E-02	1.17E-01
6.18E+00	1.17E-02	1.17E-02	9.77E-01	1.17E-02	1.17E-02	1.46E-01	0.00E+00	0.00E+00	4.10E-02	1.85E-02	1.20E-01
6.43E+00	1.15E-02	1.15E-02	9.77E-01	1.17E-02	1.17E-02	1.54E-01	0.00E+00	0.00E+00	3.97E-02	1.82E-02	1.24E-01
6.69E+00	1.12E-02	1.12E-02	9.77E-01	1.17E-02	1.17E-02	1.63E-01	0.00E+00	0.00E+00	3.85E-02	1.79E-02	1.28E-01
6.98E+00	1.10E-02	1.10E-02	9.77E-01	1.17E-02	1.17E-02	1.72E-01	0.00E+00	0.00E+00	3.73E-02	1.77E-02	1.32E-01
7.29E+00	1.07E-02	1.07E-02	9.78E-01	1.17E-02	1.17E-02	1.82E-01	0.00E+00	0.00E+00	3.61E-02	1.74E-02	1.37E-01
7.62E+00	1.05E-02	1.05E-02	9.78E-01	1.17E-02	1.17E-02	1.92E-01	0.00E+00	0.00E+00	3.49E-02	1.72E-02	1.42E-01
7.98E+00	1.01E-02	1.01E-02	9.78E-01	1.17E-02	1.17E-02	1.99E-01	0.00E+00	0.00E+00	6.74E-02	1.68E-02	1.48E-01
8.36E+00	9.68E-03	9.68E-03	9.79E-01	1.17E-02	1.17E-02	2.06E-01	0.00E+00	0.00E+00	5.81E-02	1.66E-02	1.55E-01
8.77E+00	9.32E-03	9.32E-03	9.79E-01	1.17E-02	1.17E-02	2.13E-01	0.00E+00	0.00E+00	5.10E-02	1.63E-02	1.62E-01
9.21E+00	8.99E-03	8.99E-03	9.79E-01	1.17E-02	1.17E-02	2.21E-01	0.00E+00	0.00E+00	4.52E-02	1.62E-02	1.69E-01
9.69E+00	8.70E-03	8.70E-03	9.80E-01	1.17E-02	1.17E-02	2.29E-01	0.00E+00	0.00E+00	4.04E-02	1.61E-02	1.77E-01
1.02E+01	8.43E-03	8.43E-03	9.80E-01	1.17E-02	1.17E-02	2.38E-01	0.00E+00	0.00E+00	3.63E-02	1.61E-02	1.84E-01
1.07E+01	8.18E-03	8.18E-03	9.80E-01	1.17E-02	1.17E-02	2.48E-01	0.00E+00	0.00E+00	3.27E-02	1.62E-02	1.92E-01
1.13E+01	7.95E-03	7.95E-03	9.80E-01	1.17E-02	1.17E-02	2.57E-01	0.00E+00	0.00E+00	2.95E-02	1.62E-02	1.99E-01
1.20E+01	7.73E-03	7.73E-03	9.81E-01	1.17E-02	1.17E-02	2.68E-01	0.00E+00	0.00E+00	2.67E-02	1.63E-02	2.06E-01
1.27E+01	7.53E-03	7.53E-03	9.81E-01	1.17E-02	1.17E-02	2.78E-01	0.00E+00	0.00E+00	2.42E-02	1.65E-02	2.14E-01
1.34E+01	7.34E-03	7.34E-03	9.81E-01	1.17E-02	1.17E-02	2.89E-01	0.00E+00	0.00E+00	2.20E-02	1.66E-02	2.21E-01
1.42E+01	7.15E-03	7.15E-03	9.81E-01	1.17E-02	1.17E-02	3.00E-01	0.00E+00	0.00E+00	2.01E-02	1.68E-02	2.28E-01
1.50E+01	6.98E-03	6.98E-03	9.81E-01	1.17E-02	1.17E-02	3.12E-01	0.00E+00	0.00E+00	1.84E-02	1.71E-02	2.35E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

c(x,y,z,t) = cc(x) * (erf(xa)-erf(xb)) * (erf(ya)-erf(yb)) * (exp(-za*za)+exp(-zb*zb))

```
   c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)
            x = downwind distance (m)
            y = crosswind horizontal distance (m)
            z = height (m)
            t = time (s)

          erf = error functon
           xa = (x-xc+bx)/(sr2*betax)
           xb = (x-xc-bx)/(sr2*betax)
           ya = (y+b)/(sr2*betac)
           yb = (y-b)/(sr2*betac)
          exp = exponential function
           za = (z-zc)/(sr2*sig)
           zb = (z+zc)/(sr2*sig)
          sr2 = sqrt(2.0)
```

x	cc(x)	b(x)	betac(x)	zc(x)	sig(x)	t	xc(t)	bx(t)	betax(t)
-3.19E+00	0.00E+00	2.87E+00	8.04E-01	0.00E+00	0.00E+00	5.39E+00	0.00E+00	3.19E+00	2.61E-02
-2.55E+00	4.65E-03	2.87E+00	8.38E-01	0.00E+00	2.36E-01	6.81E+00	3.19E-01	3.51E+00	2.87E-02

-1.92E+00	6.58E-03	2.87E+00	8.71E-01	0.00E+00	3.12E-01	8.24E+00	6.39E-01	3.83E+00	3.13E-02
-1.28E+00	7.90E-03	2.87E+00	9.12E-01	0.00E+00	3.87E-01	1.05E+01	9.58E-01	4.15E+00	3.39E-02
-6.39E-01	9.00E-03	2.88E+00	9.64E-01	0.00E+00	4.72E-01	1.27E+01	1.28E+00	4.47E+00	3.65E-02
5.07E-07	9.96E-03	2.88E+00	1.04E+00	0.00E+00	5.85E-01	1.94E+01	1.60E+00	4.79E+00	3.91E-02
6.39E-01	1.08E-02	2.88E+00	1.15E+00	0.00E+00	7.71E-01	2.60E+01	1.92E+00	5.11E+00	4.17E-02
1.28E+00	1.13E-02	2.88E+00	1.36E+00	0.00E+00	1.20E+00	2.70E+01	2.24E+00	5.43E+00	4.43E-02
1.92E+00	1.14E-02	2.87E+00	2.26E+00	0.00E+00	3.25E+00	2.81E+01	2.55E+00	5.75E+00	4.69E-02
2.55E+00	9.38E-03	2.89E+00	2.36E+00	0.00E+00	3.97E-01	2.89E+01	2.87E+00	6.07E+00	4.95E-02
3.19E+00	8.85E-03	2.90E+00	2.40E+00	6.62E-04	5.00E-01	2.97E+01	3.19E+00	6.39E+00	5.21E-02
3.22E+00	8.81E-03	2.90E+00	2.41E+00	1.15E-03	5.06E-01	2.97E+01	3.22E+00	6.41E+00	5.24E-02
3.24E+00	8.77E-03	2.90E+00	2.41E+00	1.73E-03	5.09E-01	2.98E+01	3.24E+00	6.44E+00	5.26E-02
3.27E+00	8.73E-03	2.90E+00	2.41E+00	2.43E-03	5.12E-01	2.99E+01	3.27E+00	6.46E+00	5.28E-02
3.30E+00	8.68E-03	2.90E+00	2.41E+00	3.25E-03	5.15E-01	3.00E+01	3.30E+00	6.50E+00	5.31E-02
3.34E+00	8.64E-03	2.90E+00	2.41E+00	4.22E-03	5.19E-01	3.01E+01	3.34E+00	6.53E+00	5.33E-02
3.37E+00	8.59E-03	2.90E+00	2.41E+00	5.37E-03	5.22E-01	3.02E+01	3.37E+00	6.56E+00	5.36E-02
3.41E+00	8.54E-03	2.90E+00	2.42E+00	6.72E-03	5.26E-01	3.03E+01	3.41E+00	6.60E+00	5.39E-02
3.45E+00	8.49E-03	2.90E+00	2.42E+00	8.30E-03	5.30E-01	3.04E+01	3.45E+00	6.64E+00	5.42E-02
3.49E+00	8.44E-03	2.90E+00	2.42E+00	1.01E-02	5.34E-01	3.05E+01	3.49E+00	6.69E+00	5.46E-02
3.54E+00	8.39E-03	2.90E+00	2.42E+00	1.23E-02	5.38E-01	3.06E+01	3.54E+00	6.73E+00	5.50E-02
3.59E+00	8.33E-03	2.90E+00	2.43E+00	1.48E-02	5.42E-01	3.08E+01	3.59E+00	6.78E+00	5.54E-02
3.65E+00	8.28E-03	2.90E+00	2.43E+00	1.78E-02	5.46E-01	3.09E+01	3.65E+00	6.84E+00	5.58E-02
3.70E+00	8.23E-03	2.90E+00	2.43E+00	2.12E-02	5.51E-01	3.11E+01	3.70E+00	6.90E+00	5.63E-02
3.77E+00	8.18E-03	2.90E+00	2.43E+00	2.51E-02	5.55E-01	3.13E+01	3.77E+00	6.96E+00	5.68E-02
3.83E+00	8.13E-03	2.90E+00	2.44E+00	2.97E-02	5.59E-01	3.15E+01	3.83E+00	7.03E+00	5.74E-02
3.91E+00	8.08E-03	2.90E+00	2.44E+00	3.50E-02	5.64E-01	3.17E+01	3.91E+00	7.10E+00	5.80E-02
3.99E+00	8.03E-03	2.90E+00	2.45E+00	4.11E-02	5.68E-01	3.19E+01	3.99E+00	7.18E+00	5.86E-02
4.07E+00	7.99E-03	2.90E+00	2.45E+00	4.81E-02	5.72E-01	3.21E+01	4.07E+00	7.26E+00	5.93E-02
4.16E+00	7.95E-03	2.90E+00	2.45E+00	5.62E-02	5.76E-01	3.24E+01	4.16E+00	7.35E+00	6.00E-02
4.26E+00	7.92E-03	2.90E+00	2.46E+00	6.56E-02	5.79E-01	3.27E+01	4.26E+00	7.45E+00	6.08E-02
4.36E+00	7.89E-03	2.90E+00	2.46E+00	7.64E-02	5.83E-01	3.30E+01	4.36E+00	7.55E+00	6.17E-02
4.47E+00	7.87E-03	2.90E+00	2.47E+00	8.87E-02	5.85E-01	3.33E+01	4.47E+00	7.67E+00	6.26E-02
4.59E+00	7.85E-03	2.90E+00	2.47E+00	1.03E-01	5.87E-01	3.36E+01	4.59E+00	7.79E+00	6.36E-02
4.72E+00	7.85E-03	2.90E+00	2.48E+00	1.19E-01	5.89E-01	3.40E+01	4.72E+00	7.92E+00	6.47E-02
4.86E+00	7.86E-03	2.90E+00	2.49E+00	1.38E-01	5.89E-01	3.44E+01	4.86E+00	8.06E+00	6.58E-02
5.01E+00	7.89E-03	2.90E+00	2.49E+00	1.59E-01	5.88E-01	3.48E+01	5.01E+00	8.20E+00	6.70E-02
5.17E+00	7.93E-03	2.90E+00	2.50E+00	1.84E-01	5.86E-01	3.53E+01	5.17E+00	8.37E+00	6.83E-02
5.35E+00	7.99E-03	2.90E+00	2.51E+00	2.12E-01	5.83E-01	3.58E+01	5.35E+00	8.54E+00	6.97E-02
5.53E+00	8.08E-03	2.90E+00	2.52E+00	2.43E-01	5.77E-01	3.63E+01	5.53E+00	8.72E+00	7.12E-02
5.73E+00	8.21E-03	2.90E+00	2.53E+00	2.80E-01	5.70E-01	3.69E+01	5.73E+00	8.92E+00	7.29E-02
5.95E+00	8.37E-03	2.90E+00	2.54E+00	3.21E-01	5.60E-01	3.75E+01	5.95E+00	9.14E+00	7.46E-02
6.18E+00	8.58E-03	2.90E+00	2.55E+00	3.68E-01	5.47E-01	3.82E+01	6.18E+00	9.37E+00	7.65E-02
6.43E+00	8.85E-03	2.90E+00	2.56E+00	4.22E-01	5.31E-01	3.89E+01	6.43E+00	9.62E+00	7.86E-02
6.69E+00	9.21E-03	2.90E+00	2.57E+00	4.83E-01	5.12E-01	3.96E+01	6.69E+00	9.89E+00	8.07E-02
6.98E+00	9.67E-03	2.90E+00	2.58E+00	5.53E-01	4.88E-01	4.05E+01	6.98E+00	1.02E+01	8.31E-02
7.29E+00	1.03E-02	2.90E+00	2.60E+00	6.32E-01	4.59E-01	4.14E+01	7.29E+00	1.05E+01	8.56E-02
7.62E+00	1.12E-02	2.90E+00	2.61E+00	7.21E-01	4.25E-01	4.23E+01	7.62E+00	1.08E+01	8.83E-02
7.98E+00	1.09E-02	2.90E+00	2.63E+00	8.21E-01	4.31E-01	4.33E+01	7.98E+00	1.12E+01	9.12E-02
8.36E+00	1.05E-02	2.89E+00	2.64E+00	9.31E-01	4.43E-01	4.44E+01	8.36E+00	1.16E+01	9.43E-02
8.77E+00	1.01E-02	2.89E+00	2.66E+00	1.05E+00	4.53E-01	4.56E+01	8.77E+00	1.20E+01	9.77E-02
9.21E+00	9.85E-03	2.89E+00	2.67E+00	1.18E+00	4.61E-01	4.68E+01	9.21E+00	1.24E+01	1.01E-01
9.69E+00	9.58E-03	2.88E+00	2.69E+00	1.33E+00	4.68E-01	4.81E+01	9.69E+00	1.29E+01	1.05E-01
1.02E+01	9.34E-03	2.88E+00	2.71E+00	1.49E+00	4.73E-01	4.95E+01	1.02E+01	1.34E+01	1.09E-01
1.07E+01	9.13E-03	2.87E+00	2.73E+00	1.67E+00	4.78E-01	5.09E+01	1.07E+01	1.39E+01	1.14E-01
1.13E+01	8.93E-03	2.87E+00	2.75E+00	1.86E+00	4.81E-01	5.24E+01	1.13E+01	1.45E+01	1.19E-01
1.20E+01	8.76E-03	2.86E+00	2.77E+00	2.07E+00	4.83E-01	5.40E+01	1.20E+01	1.52E+01	1.24E-01
1.27E+01	8.60E-03	2.86E+00	2.80E+00	2.30E+00	4.85E-01	5.57E+01	1.27E+01	1.58E+01	1.29E-01
1.34E+01	8.45E-03	2.85E+00	2.82E+00	2.55E+00	4.86E-01	5.75E+01	1.34E+01	1.66E+01	1.35E-01
1.42E+01	8.32E-03	2.85E+00	2.85E+00	2.83E+00	4.86E-01	5.94E+01	1.42E+01	1.74E+01	1.42E-01
1.50E+01	8.20E-03	2.84E+00	2.89E+00	3.13E+00	4.85E-01	6.14E+01	1.50E+01	1.82E+01	1.49E-01

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time averaged (tav = 3600. s) volume concentration: concentration in the z = 1.50 plane.

downwind distance x (m)	time of max conc (s)	cloud duration (s)	effective half width bbc (m)	average concentration (volume fraction) at (x,y,z) y/bbc= 0.0	y/bbc= 0.5	y/bbc= 1.0	y/bbc= 1.5	y/bbc= 2.0	y/bbc= 2.5
-3.19E+00	1.81E+03	3.60E+03	3.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-2.55E+00	1.80E+03	3.60E+03	3.22E+00	6.44E-11	6.02E-11	2.19E-11	6.31E-13	6.72E-16	0.00E+00
-1.92E+00	1.80E+03	3.60E+03	3.25E+00	5.17E-07	4.78E-07	1.73E-07	5.69E-09	8.46E-12	0.00E+00
-1.28E+00	1.80E+03	3.60E+03	3.28E+00	3.51E-05	3.21E-05	1.15E-05	4.37E-07	9.29E-10	0.00E+00
-6.39E-01	1.80E+03	3.60E+03	3.33E+00	4.61E-04	4.15E-04	1.48E-04	6.59E-06	2.09E-08	0.00E+00
5.07E-07	1.80E+03	3.60E+03	3.39E+00	2.95E-03	2.59E-03	9.19E-04	4.92E-05	2.49E-07	8.84E-11
6.39E-01	1.80E+03	3.60E+03	3.50E+00	1.28E-02	1.08E-02	3.80E-03	2.54E-04	2.21E-06	2.31E-09
1.28E+00	1.80E+03	3.60E+03	3.71E+00	3.96E-02	3.17E-02	1.10E-02	9.64E-04	1.63E-05	4.77E-08
1.92E+00	1.80E+03	3.60E+03	4.86E+00	6.47E-02	4.62E-02	1.54E-02	2.07E-03	1.01E-04	1.69E-06
2.55E+00	1.80E+03	3.60E+03	5.00E+00	4.63E-05	3.29E-05	1.10E-05	1.50E-06	7.58E-08	1.35E-09
3.19E+00	1.81E+03	3.60E+03	5.07E+00	5.98E-04	4.24E-04	1.41E-04	1.94E-05	9.95E-07	1.82E-08
3.22E+00	1.81E+03	3.60E+03	5.08E+00	6.69E-04	4.75E-04	1.58E-04	2.17E-05	1.11E-06	2.04E-08
3.24E+00	1.81E+03	3.60E+03	5.08E+00	6.99E-04	4.96E-04	1.65E-04	2.27E-05	1.17E-06	2.14E-08
3.27E+00	1.81E+03	3.60E+03	5.08E+00	7.32E-04	5.20E-04	1.73E-04	2.37E-05	1.22E-06	2.24E-08

3.30E+00	1.81E+03	3.60E+03	5.08E+00	7.68E-04	5.45E-04	1.81E-04	2.49E-05	1.28E-06	2.36E-08
3.34E+00	1.81E+03	3.60E+03	5.08E+00	8.07E-04	5.72E-04	1.90E-04	2.61E-05	1.35E-06	2.48E-08
3.37E+00	1.81E+03	3.60E+03	5.09E+00	8.48E-04	6.02E-04	2.00E-04	2.75E-05	1.42E-06	2.61E-08
3.41E+00	1.81E+03	3.60E+03	5.09E+00	8.93E-04	6.33E-04	2.11E-04	2.89E-05	1.49E-06	2.76E-08
3.45E+00	1.81E+03	3.60E+03	5.09E+00	9.40E-04	6.67E-04	2.22E-04	3.05E-05	1.58E-06	2.91E-08
3.49E+00	1.81E+03	3.60E+03	5.10E+00	9.91E-04	7.03E-04	2.34E-04	3.21E-05	1.66E-06	3.08E-08
3.54E+00	1.81E+03	3.60E+03	5.10E+00	1.05E-03	7.41E-04	2.47E-04	3.39E-05	1.76E-06	3.25E-08
3.59E+00	1.81E+03	3.60E+03	5.10E+00	1.10E-03	7.82E-04	2.60E-04	3.58E-05	1.86E-06	3.44E-08
3.65E+00	1.81E+03	3.60E+03	5.11E+00	1.16E-03	8.25E-04	2.74E-04	3.78E-05	1.96E-06	3.64E-08
3.70E+00	1.81E+03	3.60E+03	5.11E+00	1.23E-03	8.70E-04	2.89E-04	3.98E-05	2.07E-06	3.86E-08
3.77E+00	1.81E+03	3.60E+03	5.12E+00	1.29E-03	9.17E-04	3.05E-04	4.20E-05	2.19E-06	4.08E-08
3.83E+00	1.81E+03	3.60E+03	5.12E+00	1.36E-03	9.66E-04	3.21E-04	4.43E-05	2.31E-06	4.32E-08
3.91E+00	1.81E+03	3.60E+03	5.13E+00	1.43E-03	1.02E-03	3.38E-04	4.66E-05	2.43E-06	4.56E-08
3.99E+00	1.81E+03	3.60E+03	5.13E+00	1.51E-03	1.07E-03	3.55E-04	4.90E-05	2.56E-06	4.81E-08
4.07E+00	1.81E+03	3.60E+03	5.14E+00	1.58E-03	1.12E-03	3.72E-04	5.14E-05	2.69E-06	5.07E-08
4.16E+00	1.81E+03	3.60E+03	5.14E+00	1.66E-03	1.17E-03	3.90E-04	5.39E-05	2.82E-06	5.34E-08
4.26E+00	1.81E+03	3.60E+03	5.15E+00	1.73E-03	1.23E-03	4.08E-04	5.63E-05	2.96E-06	5.61E-08
4.36E+00	1.81E+03	3.60E+03	5.16E+00	1.81E-03	1.28E-03	4.25E-04	5.88E-05	3.09E-06	5.89E-08
4.47E+00	1.81E+03	3.60E+03	5.16E+00	1.88E-03	1.33E-03	4.43E-04	6.13E-05	3.23E-06	6.16E-08
4.59E+00	1.81E+03	3.60E+03	5.17E+00	1.96E-03	1.38E-03	4.60E-04	6.37E-05	3.36E-06	6.44E-08
4.72E+00	1.81E+03	3.60E+03	5.18E+00	2.03E-03	1.44E-03	4.77E-04	6.62E-05	3.50E-06	6.73E-08
4.86E+00	1.81E+03	3.60E+03	5.19E+00	2.11E-03	1.49E-03	4.95E-04	6.87E-05	3.64E-06	7.04E-08
5.01E+00	1.81E+03	3.60E+03	5.20E+00	2.19E-03	1.55E-03	5.13E-04	7.13E-05	3.79E-06	7.35E-08
5.17E+00	1.81E+03	3.60E+03	5.21E+00	2.27E-03	1.61E-03	5.33E-04	7.41E-05	3.95E-06	7.69E-08
5.35E+00	1.81E+03	3.60E+03	5.22E+00	2.37E-03	1.67E-03	5.55E-04	7.73E-05	4.13E-06	8.09E-08
5.53E+00	1.81E+03	3.60E+03	5.24E+00	2.48E-03	1.75E-03	5.82E-04	8.10E-05	4.35E-06	8.55E-08
5.73E+00	1.81E+03	3.60E+03	5.25E+00	2.62E-03	1.85E-03	6.14E-04	8.57E-05	4.61E-06	9.11E-08
5.95E+00	1.81E+03	3.60E+03	5.26E+00	2.80E-03	1.98E-03	6.56E-04	9.15E-05	4.94E-06	9.82E-08
6.18E+00	1.81E+03	3.60E+03	5.28E+00	3.03E-03	2.14E-03	7.09E-04	9.91E-05	5.37E-06	1.07E-07
6.43E+00	1.81E+03	3.60E+03	5.29E+00	3.33E-03	2.35E-03	7.79E-04	1.09E-04	5.93E-06	1.19E-07
6.69E+00	1.81E+03	3.60E+03	5.31E+00	3.72E-03	2.63E-03	8.70E-04	1.22E-04	6.66E-06	1.35E-07
6.98E+00	1.81E+03	3.60E+03	5.33E+00	4.24E-03	2.99E-03	9.92E-04	1.39E-04	7.63E-06	1.56E-07
7.29E+00	1.81E+03	3.60E+03	5.35E+00	4.95E-03	3.49E-03	1.15E-03	1.62E-04	8.94E-06	1.84E-07
7.62E+00	1.81E+03	3.60E+03	5.37E+00	5.94E-03	4.18E-03	1.38E-03	1.95E-04	1.08E-05	2.23E-07
7.98E+00	1.81E+03	3.60E+03	5.39E+00	8.99E-03	6.33E-03	2.10E-03	2.96E-04	1.64E-05	3.43E-07
8.36E+00	1.81E+03	3.60E+03	5.41E+00	1.30E-02	9.17E-03	3.04E-03	4.29E-04	2.40E-05	5.04E-07
8.77E+00	1.81E+03	3.60E+03	5.43E+00	1.75E-02	1.23E-02	4.08E-03	5.77E-04	3.24E-05	6.88E-07
9.21E+00	1.82E+03	3.60E+03	5.46E+00	2.18E-02	1.53E-02	5.07E-03	7.19E-04	4.05E-05	8.70E-07
9.69E+00	1.82E+03	3.60E+03	5.48E+00	2.49E-02	1.75E-02	5.78E-03	8.22E-04	4.66E-05	1.01E-06
1.02E+01	1.82E+03	3.60E+03	5.50E+00	2.57E-02	1.81E-02	5.97E-03	8.50E-04	4.85E-05	1.06E-06
1.07E+01	1.82E+03	3.60E+03	5.53E+00	2.35E-02	1.65E-02	5.44E-03	7.76E-04	4.46E-05	9.86E-07
1.13E+01	1.82E+03	3.60E+03	5.56E+00	1.83E-02	1.28E-02	4.24E-03	6.07E-04	3.51E-05	7.84E-07
1.20E+01	1.82E+03	3.60E+03	5.59E+00	1.17E-02	8.23E-03	2.72E-03	3.89E-04	2.27E-05	5.13E-07
1.27E+01	1.82E+03	3.60E+03	5.62E+00	5.86E-03	4.10E-03	1.35E-03	1.95E-04	1.14E-05	2.61E-07
1.34E+01	1.82E+03	3.60E+03	5.66E+00	2.13E-03	1.49E-03	4.90E-04	7.06E-05	4.17E-06	9.67E-08
1.42E+01	1.82E+03	3.60E+03	5.70E+00	5.15E-04	3.60E-04	1.19E-04	1.71E-05	1.02E-06	2.40E-08
1.50E+01	1.83E+03	3.60E+03	5.75E+00	7.48E-05	5.23E-05	1.72E-05	2.49E-06	1.50E-07	3.56E-09

1

time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

downwind distance x (m)	height z (m)	maximum concentration c(x,0,z)	time of max conc (s)	cloud duration (s)
-3.19E+00	0.00E+00	0.00E+00	1.81E+03	3.60E+03
-2.55E+00	0.00E+00	3.72E-02	1.80E+03	3.60E+03
-1.92E+00	0.00E+00	5.25E-02	1.80E+03	3.60E+03
-1.28E+00	0.00E+00	6.30E-02	1.80E+03	3.60E+03
-6.39E-01	0.00E+00	7.15E-02	1.80E+03	3.60E+03
5.07E-07	0.00E+00	7.88E-02	1.80E+03	3.60E+03
6.39E-01	0.00E+00	8.46E-02	1.80E+03	3.60E+03
1.28E+00	0.00E+00	8.68E-02	1.80E+03	3.60E+03
1.92E+00	0.00E+00	7.20E-02	1.80E+03	3.60E+03
2.55E+00	0.00E+00	5.80E-02	1.80E+03	3.60E+03
3.19E+00	0.00E+00	5.41E-02	1.81E+03	3.60E+03
3.22E+00	0.00E+00	5.39E-02	1.81E+03	3.60E+03
3.24E+00	0.00E+00	5.36E-02	1.81E+03	3.60E+03
3.27E+00	0.00E+00	5.33E-02	1.81E+03	3.60E+03
3.30E+00	0.00E+00	5.30E-02	1.81E+03	3.60E+03
3.34E+00	0.00E+00	5.27E-02	1.81E+03	3.60E+03
3.37E+00	0.00E+00	5.24E-02	1.81E+03	3.60E+03
3.41E+00	0.00E+00	5.21E-02	1.81E+03	3.60E+03
3.45E+00	0.00E+00	5.17E-02	1.81E+03	3.60E+03
3.49E+00	0.00E+00	5.14E-02	1.81E+03	3.60E+03
3.54E+00	0.00E+00	5.10E-02	1.81E+03	3.60E+03
3.59E+00	0.00E+00	5.07E-02	1.81E+03	3.60E+03
3.65E+00	0.00E+00	5.03E-02	1.81E+03	3.60E+03
3.70E+00	0.00E+00	4.99E-02	1.81E+03	3.60E+03
3.77E+00	0.00E+00	4.95E-02	1.81E+03	3.60E+03
3.83E+00	0.00E+00	4.92E-02	1.81E+03	3.60E+03

3.91E+00	0.00E+00	4.88E-02	1.81E+03	3.60E+03
3.99E+00	0.00E+00	4.84E-02	1.81E+03	3.60E+03
4.07E+00	0.00E+00	4.81E-02	1.81E+03	3.60E+03
4.16E+00	0.00E+00	4.77E-02	1.81E+03	3.60E+03
4.26E+00	0.00E+00	4.73E-02	1.81E+03	3.60E+03
4.36E+00	0.00E+00	4.70E-02	1.81E+03	3.60E+03
4.47E+00	0.00E+00	4.67E-02	1.81E+03	3.60E+03
4.59E+00	0.00E+00	4.63E-02	1.81E+03	3.60E+03
4.72E+00	0.00E+00	4.60E-02	1.81E+03	3.60E+03
4.86E+00	0.00E+00	4.56E-02	1.81E+03	3.60E+03
5.01E+00	0.00E+00	4.53E-02	1.81E+03	3.60E+03
5.17E+00	0.00E+00	4.48E-02	1.81E+03	3.60E+03
5.35E+00	0.00E+00	4.43E-02	1.81E+03	3.60E+03
5.53E+00	0.00E+00	4.37E-02	1.81E+03	3.60E+03
5.73E+00	0.00E+00	4.28E-02	1.81E+03	3.60E+03
5.95E+00	0.00E+00	4.17E-02	1.81E+03	3.60E+03
6.18E+00	0.00E+00	4.00E-02	1.81E+03	3.60E+03
6.43E+00	0.00E+00	3.76E-02	1.81E+03	3.60E+03
6.69E+00	0.00E+00	3.42E-02	1.81E+03	3.60E+03
6.98E+00	4.09E-01	3.08E-02	1.81E+03	3.60E+03
7.29E+00	5.97E-01	3.04E-02	1.81E+03	3.60E+03
7.62E+00	7.16E-01	3.20E-02	1.81E+03	3.60E+03
7.98E+00	8.20E-01	3.10E-02	1.81E+03	3.60E+03
8.36E+00	9.31E-01	2.97E-02	1.81E+03	3.60E+03
8.77E+00	1.05E+00	2.86E-02	1.81E+03	3.60E+03
9.21E+00	1.18E+00	2.75E-02	1.82E+03	3.60E+03
9.69E+00	1.33E+00	2.66E-02	1.82E+03	3.60E+03
1.02E+01	1.49E+00	2.57E-02	1.82E+03	3.60E+03
1.07E+01	1.67E+00	2.49E-02	1.82E+03	3.60E+03
1.13E+01	1.86E+00	2.42E-02	1.82E+03	3.60E+03
1.20E+01	2.07E+00	2.34E-02	1.82E+03	3.60E+03
1.27E+01	2.30E+00	2.28E-02	1.82E+03	3.60E+03
1.34E+01	2.55E+00	2.21E-02	1.82E+03	3.60E+03
1.42E+01	2.83E+00	2.15E-02	1.82E+03	3.60E+03
1.50E+01	3.13E+00	2.09E-02	1.83E+03	3.60E+03

SLAB MODELING RESULTS: WORST-CASE SCENARIO, DISTANCE TO 200 PPM AMMONIA

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                    SESSION INFORMATION

          INPUT DATA FILE NAME :  AMMSM1.DTA
          OUTPUT LIST FILE NAME : AMMSM1.LST


          GRAPHICS DATA FILE NAME : AMMSM1.DAT
          GRAPHICS PLOT FILE NAME : AMMSM1.XZ


problem input

  idspl =         1
  ncalc =         1
  wms   =   .017031
  cps   =   2170.00
  tbp   =    240.00
  cmed0 =       .00

  dhe   =  1370840.
  cpsl  =   4294.00
  rhosl =    682.80
  spb   =   2132.52
  spc   =    -32.98
  ts    =    239.00
  qs    =       .13
  as    =     40.78
  tsd   =     3600.
  qtis  =       .00
  hs    =       .00
  tav   =   3600.00
  xffm  =     14.62
  zp(1) =      1.50
  zp(2) =       .00
  zp(3) =       .00
  zp(4) =       .00
  z0    =   .010000
  za    =     10.00
  ua    =      1.50
  ta    =    300.37
  rh    =     50.00
  stab  =      6.00


release gas properties

 molecular weight of source gas (kg)               - wms  =  1.7031E-02
```

```
 vapor heat capacity, const. p.  (j/kg-k)          - cps  =  2.1700E+03
 temperature of source gas (k)                     - ts   =  2.4000E+02
 density of source gas (kg/m3)                     - rhos =  8.6481E-01
 boiling point temperature                         - tbp  =  2.4000E+02
 liquid mass fraction                              - cmed0=  0.0000E+00
 liquid heat capacity (j/kg-k)                     - cpsl =  4.2940E+03

 heat of vaporization (j/kg)                       - dhe  =  1.3708E+06
 liquid source density (kg/m3)                     - rhosl=  6.8280E+02
 saturation pressure constant                      - spa  =  1.0301E+01
 saturation pressure constant (k)                  - spb  =  2.1325E+03
 saturation pressure constant (k)                  - spc  = -3.2980E+01


spill characteristics

 spill type                                        - idspl=          1
 mass source rate (kg/s)                           - qs   =  1.2905E-01
 continuous source duration (s)                    - tsd  =  3.6000E+03
 continuous source mass (kg)                       - qtcs =  4.6458E+02
 instantaneous source mass (kg)                    - qtis =  0.0000E+00
 source area (m2)                                  - as   =  4.0783E+01
 vertical vapor velocity (m/s)                     - ws   =  3.6589E-03
 source half width (m)                             - bs   =  3.1931E+00
 source height (m)                                 - hs   =  0.0000E+00
 horizontal vapor velocity (m/s)                   - us   =  0.0000E+00


field parameters

 concentration averaging time (s)                  - tav  =  3.6000E+03
 mixing layer height (m)                           - hmx  =  2.6000E+02
 maximum downwind distrace (m)                     - xffm =  1.4620E+01
 concentration measurement height (m)              - zp(1)=  1.5000E+00
                                                   - zp(2)=  0.0000E+00
                                                   - zp(3)=  0.0000E+00
                                                   - zp(4)=  0.0000E+00


ambient meteorological properties

 molecular weight of ambient air (kg)             - wmae  =  2.8754E-02
 heat capacity of ambient air at const p. (j/kg-k)- cpaa  =  1.0158E+03
 density of ambient air (kg/m3)                   - rhoa  =  1.1666E+00
 ambient measurement height (m)                   - za    =  1.0000E+01
 ambient atmospheric pressure (pa=n/m2=j/m3)      - pa    =  1.0133E+05
 ambient wind speed (m/s)                         - ua    =  1.5000E+00
 ambient temperature (k)                          - ta    =  3.0037E+02
 relative humidity (percent)                      - rh    =  5.0000E+01
 ambient friction velocity (m/s)                  - uastr =  4.0547E-02
 atmospheric stability class value                - stab  =  6.0000E+00
 inverse monin-obukhov length (1/m)               - ala   =  8.4887E-02
 surface roughness height (m)                     - z0    =  1.0000E-02


additional parameters
```

```
 sub-step multiplier                                  - ncalc =          1
 number of calculational sub-steps                    - nssm  =          3
 acceleration of gravity (m/s2)                       - grav  =  9.8067E+00
 gas constant (j/mol- k)                              - rr    =  8.3143E+00
 von karman constant                                  - xk    =  4.1000E-01
1
```

instantaneous spatially averaged cloud parameters

x	zc	h	bb	b	bbx	bx	cv	rho	t	u	ua
-3.19E+00	0.00E+00	0.00E+00	3.19E+00	2.87E+00	3.19E+00	3.19E+00	0.00E+00	1.17E+00	3.00E+02	0.00E+00	0.00E+00
-2.55E+00	0.00E+00	4.09E-01	3.22E+00	2.87E+00	3.51E+00	3.51E+00	2.40E-02	1.16E+00	2.99E+02	2.93E-01	3.03E-01
-1.92E+00	0.00E+00	5.41E-01	3.24E+00	2.87E+00	3.83E+00	3.83E+00	3.37E-02	1.16E+00	2.98E+02	3.13E-01	3.43E-01
-1.28E+00	0.00E+00	6.71E-01	3.27E+00	2.87E+00	4.15E+00	4.15E+00	4.01E-02	1.16E+00	2.97E+02	3.15E-01	3.76E-01
-6.39E-01	0.00E+00	8.18E-01	3.31E+00	2.88E+00	4.47E+00	4.47E+00	4.50E-02	1.16E+00	2.97E+02	3.03E-01	4.09E-01
5.07E-07	0.00E+00	1.01E+00	3.37E+00	2.88E+00	4.79E+00	4.79E+00	4.89E-02	1.16E+00	2.97E+02	2.76E-01	4.46E-01
6.39E-01	0.00E+00	1.34E+00	3.48E+00	2.88E+00	5.11E+00	5.11E+00	5.13E-02	1.16E+00	2.97E+02	2.32E-01	4.99E-01
1.28E+00	0.00E+00	2.07E+00	3.68E+00	2.88E+00	5.43E+00	5.43E+00	5.08E-02	1.16E+00	2.97E+02	1.66E-01	5.96E-01
1.92E+00	0.00E+00	5.63E+00	4.83E+00	2.87E+00	5.75E+00	5.75E+00	3.89E-02	1.16E+00	2.97E+02	6.98E-02	8.84E-01
2.55E+00	0.00E+00	6.88E-01	4.97E+00	2.89E+00	6.07E+00	6.07E+00	3.13E-02	1.16E+00	2.98E+02	7.79E-01	4.17E-01
3.19E+00	6.62E-04	8.66E-01	5.03E+00	2.90E+00	6.39E+00	6.39E+00	2.92E-02	1.16E+00	2.98E+02	7.29E-01	4.48E-01
3.22E+00	1.15E-03	8.78E-01	5.03E+00	2.90E+00	6.41E+00	6.41E+00	2.91E-02	1.16E+00	2.98E+02	7.22E-01	4.50E-01
3.24E+00	1.72E-03	8.84E-01	5.03E+00	2.90E+00	6.44E+00	6.44E+00	2.89E-02	1.16E+00	2.98E+02	7.21E-01	4.51E-01
3.27E+00	2.41E-03	8.89E-01	5.03E+00	2.90E+00	6.46E+00	6.46E+00	2.87E-02	1.16E+00	2.98E+02	7.21E-01	4.52E-01
3.30E+00	3.22E-03	8.96E-01	5.04E+00	2.90E+00	6.50E+00	6.49E+00	2.86E-02	1.16E+00	2.98E+02	7.20E-01	4.53E-01
3.33E+00	4.18E-03	9.02E-01	5.04E+00	2.90E+00	6.53E+00	6.53E+00	2.84E-02	1.16E+00	2.98E+02	7.19E-01	4.54E-01
3.37E+00	5.30E-03	9.10E-01	5.04E+00	2.90E+00	6.56E+00	6.56E+00	2.82E-02	1.16E+00	2.98E+02	7.18E-01	4.55E-01
3.41E+00	6.63E-03	9.17E-01	5.04E+00	2.90E+00	6.60E+00	6.60E+00	2.79E-02	1.16E+00	2.98E+02	7.18E-01	4.56E-01
3.45E+00	8.18E-03	9.25E-01	5.04E+00	2.90E+00	6.64E+00	6.64E+00	2.77E-02	1.16E+00	2.98E+02	7.17E-01	4.57E-01
3.49E+00	9.99E-03	9.34E-01	5.05E+00	2.90E+00	6.68E+00	6.68E+00	2.75E-02	1.16E+00	2.98E+02	7.16E-01	4.59E-01
3.54E+00	1.21E-02	9.43E-01	5.05E+00	2.90E+00	6.73E+00	6.73E+00	2.72E-02	1.16E+00	2.98E+02	7.15E-01	4.60E-01
3.59E+00	1.46E-02	9.53E-01	5.05E+00	2.90E+00	6.78E+00	6.78E+00	2.70E-02	1.16E+00	2.98E+02	7.14E-01	4.62E-01
3.64E+00	1.74E-02	9.63E-01	5.06E+00	2.90E+00	6.83E+00	6.83E+00	2.67E-02	1.16E+00	2.98E+02	7.13E-01	4.63E-01
3.70E+00	2.07E-02	9.74E-01	5.06E+00	2.90E+00	6.89E+00	6.89E+00	2.65E-02	1.16E+00	2.98E+02	7.12E-01	4.65E-01
3.76E+00	2.46E-02	9.85E-01	5.06E+00	2.90E+00	6.95E+00	6.95E+00	2.62E-02	1.16E+00	2.98E+02	7.11E-01	4.67E-01
3.83E+00	2.90E-02	9.97E-01	5.07E+00	2.90E+00	7.02E+00	7.02E+00	2.59E-02	1.16E+00	2.98E+02	7.10E-01	4.69E-01
3.90E+00	3.41E-02	1.01E+00	5.07E+00	2.90E+00	7.09E+00	7.09E+00	2.56E-02	1.16E+00	2.99E+02	7.09E-01	4.71E-01
3.97E+00	4.01E-02	1.02E+00	5.07E+00	2.90E+00	7.17E+00	7.17E+00	2.53E-02	1.16E+00	2.99E+02	7.08E-01	4.73E-01
4.06E+00	4.69E-02	1.04E+00	5.08E+00	2.90E+00	7.25E+00	7.25E+00	2.49E-02	1.16E+00	2.99E+02	7.07E-01	4.75E-01
4.14E+00	5.47E-02	1.05E+00	5.08E+00	2.90E+00	7.34E+00	7.34E+00	2.46E-02	1.16E+00	2.99E+02	7.06E-01	4.77E-01
4.24E+00	6.38E-02	1.07E+00	5.09E+00	2.90E+00	7.43E+00	7.43E+00	2.43E-02	1.16E+00	2.99E+02	7.05E-01	4.79E-01
4.34E+00	7.42E-02	1.08E+00	5.09E+00	2.90E+00	7.53E+00	7.53E+00	2.39E-02	1.16E+00	2.99E+02	7.04E-01	4.82E-01
4.45E+00	8.61E-02	1.10E+00	5.10E+00	2.90E+00	7.64E+00	7.64E+00	2.36E-02	1.16E+00	2.99E+02	7.03E-01	4.84E-01
4.57E+00	9.97E-02	1.12E+00	5.11E+00	2.90E+00	7.76E+00	7.76E+00	2.32E-02	1.16E+00	2.99E+02	7.02E-01	4.87E-01
4.69E+00	1.15E-01	1.13E+00	5.11E+00	2.90E+00	7.89E+00	7.89E+00	2.28E-02	1.16E+00	2.99E+02	7.01E-01	4.90E-01
4.83E+00	1.33E-01	1.15E+00	5.12E+00	2.90E+00	8.02E+00	8.02E+00	2.25E-02	1.16E+00	2.99E+02	7.00E-01	4.92E-01
4.98E+00	1.54E-01	1.17E+00	5.13E+00	2.90E+00	8.17E+00	8.17E+00	2.21E-02	1.16E+00	2.99E+02	6.99E-01	4.95E-01
5.13E+00	1.77E-01	1.19E+00	5.13E+00	2.90E+00	8.33E+00	8.32E+00	2.17E-02	1.16E+00	2.99E+02	6.98E-01	4.98E-01
5.30E+00	2.04E-01	1.21E+00	5.14E+00	2.90E+00	8.49E+00	8.49E+00	2.13E-02	1.16E+00	2.99E+02	6.98E-01	5.01E-01
5.48E+00	2.34E-01	1.24E+00	5.15E+00	2.90E+00	8.67E+00	8.67E+00	2.09E-02	1.16E+00	2.99E+02	6.97E-01	5.04E-01
5.67E+00	2.69E-01	1.26E+00	5.16E+00	2.90E+00	8.87E+00	8.87E+00	2.05E-02	1.16E+00	2.99E+02	6.96E-01	5.08E-01
5.88E+00	3.09E-01	1.28E+00	5.17E+00	2.90E+00	9.08E+00	9.08E+00	2.01E-02	1.16E+00	2.99E+02	6.95E-01	5.11E-01
6.11E+00	3.54E-01	1.31E+00	5.18E+00	2.90E+00	9.30E+00	9.30E+00	1.97E-02	1.16E+00	2.99E+02	6.94E-01	5.14E-01
6.35E+00	4.05E-01	1.33E+00	5.19E+00	2.90E+00	9.54E+00	9.54E+00	1.93E-02	1.16E+00	2.99E+02	6.94E-01	5.18E-01
6.61E+00	4.63E-01	1.36E+00	5.20E+00	2.90E+00	9.80E+00	9.80E+00	1.89E-02	1.16E+00	2.99E+02	6.93E-01	5.21E-01
6.88E+00	5.29E-01	1.39E+00	5.22E+00	2.90E+00	1.01E+01	1.01E+01	1.85E-02	1.16E+00	2.99E+02	6.93E-01	5.25E-01
7.18E+00	6.04E-01	1.42E+00	5.23E+00	2.90E+00	1.04E+01	1.04E+01	1.81E-02	1.16E+00	2.99E+02	6.92E-01	5.29E-01
7.50E+00	6.89E-01	1.45E+00	5.24E+00	2.90E+00	1.07E+01	1.07E+01	1.77E-02	1.16E+00	2.99E+02	6.92E-01	5.33E-01
7.85E+00	7.85E-01	1.48E+00	5.26E+00	2.90E+00	1.10E+01	1.10E+01	1.72E-02	1.16E+00	2.99E+02	6.96E-01	5.43E-01
8.22E+00	8.90E-01	1.52E+00	5.27E+00	2.89E+00	1.14E+01	1.14E+01	1.65E-02	1.16E+00	2.99E+02	7.05E-01	5.59E-01
8.61E+00	1.01E+00	1.56E+00	5.28E+00	2.89E+00	1.18E+01	1.18E+01	1.58E-02	1.16E+00	2.99E+02	7.14E-01	5.75E-01
9.04E+00	1.13E+00	1.59E+00	5.29E+00	2.89E+00	1.22E+01	1.22E+01	1.53E-02	1.16E+00	2.99E+02	7.24E-01	5.91E-01
9.50E+00	1.27E+00	1.61E+00	5.30E+00	2.89E+00	1.27E+01	1.27E+01	1.48E-02	1.16E+00	2.99E+02	7.36E-01	6.08E-01
9.99E+00	1.42E+00	1.63E+00	5.31E+00	2.88E+00	1.32E+01	1.32E+01	1.43E-02	1.16E+00	2.99E+02	7.49E-01	6.25E-01
1.05E+01	1.59E+00	1.65E+00	5.33E+00	2.88E+00	1.37E+01	1.37E+01	1.39E-02	1.16E+00	2.99E+02	7.62E-01	6.43E-01
1.11E+01	1.77E+00	1.66E+00	5.34E+00	2.87E+00	1.43E+01	1.43E+01	1.35E-02	1.16E+00	2.99E+02	7.77E-01	6.62E-01
1.17E+01	1.97E+00	1.67E+00	5.35E+00	2.87E+00	1.49E+01	1.49E+01	1.31E-02	1.16E+00	2.99E+02	7.92E-01	6.81E-01
1.23E+01	2.19E+00	1.68E+00	5.36E+00	2.86E+00	1.55E+01	1.55E+01	1.28E-02	1.16E+00	2.99E+02	8.09E-01	7.01E-01
1.31E+01	2.43E+00	1.68E+00	5.38E+00	2.86E+00	1.62E+01	1.62E+01	1.25E-02	1.16E+00	2.99E+02	8.26E-01	7.22E-01
1.38E+01	2.70E+00	1.68E+00	5.39E+00	2.85E+00	1.70E+01	1.70E+01	1.22E-02	1.16E+00	3.00E+02	8.44E-01	7.44E-01
1.46E+01	2.98E+00	1.68E+00	5.41E+00	2.85E+00	1.78E+01	1.78E+01	1.19E-02	1.16E+00	3.00E+02	8.63E-01	7.66E-01

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x	cm	cmv	cmda	cmw	cmwv	wc	vg	ug	w	v	vx
-3.19E+00	0.00E+00	0.00E+00	9.88E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	8.95E-01	2.97E-02	0.00E+00
-2.55E+00	1.44E-02	1.44E-02	9.74E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	4.70E-02	5.96E-03	6.76E-02
-1.92E+00	2.03E-02	2.03E-02	9.68E-01	1.16E-02	1.16E-02	0.00E+00	0.00E+00	0.00E+00	3.98E-02	7.18E-03	7.29E-02

-1.28E+00	2.41E-02	2.41E-02	9.64E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	3.39E-02	9.09E-03	7.77E-02
-6.39E-01	2.72E-02	2.72E-02	9.61E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.92E-02	1.22E-02	8.26E-02
5.07E-07	2.95E-02	2.95E-02	9.59E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.62E-02	1.73E-02	8.88E-02
6.39E-01	3.10E-02	3.10E-02	9.58E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	2.64E-02	2.53E-02	9.81E-02
1.28E+00	3.07E-02	3.07E-02	9.58E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	3.19E-02	3.94E-02	1.17E-01
1.92E+00	2.34E-02	2.34E-02	9.65E-01	1.15E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	4.59E-02	7.33E-02	1.80E-01
2.55E+00	1.88E-02	1.88E-02	9.70E-01	1.16E-02	1.16E-02	0.00E+00	0.00E+00	0.00E+00	1.03E-01	3.27E-02	7.83E-02
3.19E+00	1.75E-02	1.75E-02	9.71E-01	1.16E-02	1.16E-02	1.36E-02	0.00E+00	0.00E+00	7.71E-02	2.60E-02	8.43E-02
3.22E+00	1.74E-02	1.74E-02	9.71E-01	1.16E-02	1.16E-02	1.51E-02	0.00E+00	0.00E+00	7.58E-02	2.53E-02	8.47E-02
3.24E+00	1.73E-02	1.73E-02	9.71E-01	1.16E-02	1.16E-02	1.67E-02	0.00E+00	0.00E+00	7.54E-02	2.52E-02	8.49E-02
3.27E+00	1.72E-02	1.72E-02	9.71E-01	1.16E-02	1.16E-02	1.84E-02	0.00E+00	0.00E+00	7.49E-02	2.51E-02	8.51E-02
3.30E+00	1.71E-02	1.71E-02	9.71E-01	1.16E-02	1.16E-02	2.03E-02	0.00E+00	0.00E+00	7.44E-02	2.49E-02	8.54E-02
3.33E+00	1.70E-02	1.70E-02	9.71E-01	1.16E-02	1.16E-02	2.22E-02	0.00E+00	0.00E+00	7.38E-02	2.48E-02	8.57E-02
3.37E+00	1.69E-02	1.69E-02	9.72E-01	1.16E-02	1.16E-02	2.43E-02	0.00E+00	0.00E+00	7.32E-02	2.46E-02	8.60E-02
3.41E+00	1.67E-02	1.67E-02	9.72E-01	1.16E-02	1.16E-02	2.65E-02	0.00E+00	0.00E+00	7.25E-02	2.45E-02	8.63E-02
3.45E+00	1.66E-02	1.66E-02	9.72E-01	1.16E-02	1.16E-02	2.88E-02	0.00E+00	0.00E+00	7.18E-02	2.43E-02	8.67E-02
3.49E+00	1.65E-02	1.65E-02	9.72E-01	1.16E-02	1.16E-02	3.13E-02	0.00E+00	0.00E+00	7.10E-02	2.41E-02	8.71E-02
3.54E+00	1.63E-02	1.63E-02	9.72E-01	1.16E-02	1.16E-02	3.39E-02	0.00E+00	0.00E+00	7.01E-02	2.40E-02	8.75E-02
3.59E+00	1.62E-02	1.62E-02	9.72E-01	1.16E-02	1.16E-02	3.66E-02	0.00E+00	0.00E+00	6.92E-02	2.38E-02	8.80E-02
3.64E+00	1.60E-02	1.60E-02	9.72E-01	1.16E-02	1.16E-02	3.95E-02	0.00E+00	0.00E+00	6.82E-02	2.36E-02	8.86E-02
3.70E+00	1.58E-02	1.58E-02	9.73E-01	1.16E-02	1.16E-02	4.26E-02	0.00E+00	0.00E+00	6.71E-02	2.34E-02	8.91E-02
3.76E+00	1.57E-02	1.57E-02	9.73E-01	1.16E-02	1.16E-02	4.59E-02	0.00E+00	0.00E+00	6.60E-02	2.32E-02	8.98E-02
3.83E+00	1.55E-02	1.55E-02	9.73E-01	1.16E-02	1.16E-02	4.93E-02	0.00E+00	0.00E+00	6.48E-02	2.29E-02	9.04E-02
3.90E+00	1.53E-02	1.53E-02	9.73E-01	1.16E-02	1.16E-02	5.29E-02	0.00E+00	0.00E+00	6.36E-02	2.27E-02	9.12E-02
3.97E+00	1.51E-02	1.51E-02	9.73E-01	1.16E-02	1.16E-02	5.67E-02	0.00E+00	0.00E+00	6.23E-02	2.25E-02	9.20E-02
4.06E+00	1.49E-02	1.49E-02	9.73E-01	1.16E-02	1.16E-02	6.07E-02	0.00E+00	0.00E+00	6.10E-02	2.23E-02	9.29E-02
4.14E+00	1.47E-02	1.47E-02	9.74E-01	1.16E-02	1.16E-02	6.50E-02	0.00E+00	0.00E+00	5.96E-02	2.20E-02	9.39E-02
4.24E+00	1.45E-02	1.45E-02	9.74E-01	1.17E-02	1.17E-02	6.94E-02	0.00E+00	0.00E+00	5.82E-02	2.18E-02	9.50E-02
4.34E+00	1.43E-02	1.43E-02	9.74E-01	1.17E-02	1.17E-02	7.41E-02	0.00E+00	0.00E+00	5.68E-02	2.15E-02	9.61E-02
4.45E+00	1.41E-02	1.41E-02	9.74E-01	1.17E-02	1.17E-02	7.90E-02	0.00E+00	0.00E+00	5.53E-02	2.13E-02	9.74E-02
4.57E+00	1.39E-02	1.39E-02	9.74E-01	1.17E-02	1.17E-02	8.42E-02	0.00E+00	0.00E+00	5.39E-02	2.10E-02	9.88E-02
4.69E+00	1.37E-02	1.37E-02	9.75E-01	1.17E-02	1.17E-02	8.96E-02	0.00E+00	0.00E+00	5.24E-02	2.07E-02	1.00E-01
4.83E+00	1.34E-02	1.34E-02	9.75E-01	1.17E-02	1.17E-02	9.53E-02	0.00E+00	0.00E+00	5.10E-02	2.05E-02	1.02E-01
4.98E+00	1.32E-02	1.32E-02	9.75E-01	1.17E-02	1.17E-02	1.01E-01	0.00E+00	0.00E+00	4.96E-02	2.02E-02	1.04E-01
5.13E+00	1.30E-02	1.30E-02	9.75E-01	1.17E-02	1.17E-02	1.08E-01	0.00E+00	0.00E+00	4.82E-02	1.99E-02	1.06E-01
5.30E+00	1.27E-02	1.27E-02	9.76E-01	1.17E-02	1.17E-02	1.14E-01	0.00E+00	0.00E+00	4.68E-02	1.97E-02	1.08E-01
5.48E+00	1.25E-02	1.25E-02	9.76E-01	1.17E-02	1.17E-02	1.21E-01	0.00E+00	0.00E+00	4.54E-02	1.94E-02	1.11E-01
5.67E+00	1.23E-02	1.23E-02	9.76E-01	1.17E-02	1.17E-02	1.28E-01	0.00E+00	0.00E+00	4.40E-02	1.91E-02	1.13E-01
5.88E+00	1.20E-02	1.20E-02	9.76E-01	1.17E-02	1.17E-02	1.36E-01	0.00E+00	0.00E+00	4.27E-02	1.88E-02	1.16E-01
6.11E+00	1.18E-02	1.18E-02	9.77E-01	1.17E-02	1.17E-02	1.44E-01	0.00E+00	0.00E+00	4.14E-02	1.86E-02	1.19E-01
6.35E+00	1.15E-02	1.15E-02	9.77E-01	1.17E-02	1.17E-02	1.52E-01	0.00E+00	0.00E+00	4.01E-02	1.83E-02	1.23E-01
6.61E+00	1.13E-02	1.13E-02	9.77E-01	1.17E-02	1.17E-02	1.60E-01	0.00E+00	0.00E+00	3.89E-02	1.80E-02	1.27E-01
6.88E+00	1.11E-02	1.11E-02	9.77E-01	1.17E-02	1.17E-02	1.69E-01	0.00E+00	0.00E+00	3.77E-02	1.78E-02	1.31E-01
7.18E+00	1.08E-02	1.08E-02	9.77E-01	1.17E-02	1.17E-02	1.79E-01	0.00E+00	0.00E+00	3.65E-02	1.75E-02	1.35E-01
7.50E+00	1.06E-02	1.06E-02	9.78E-01	1.17E-02	1.17E-02	1.88E-01	0.00E+00	0.00E+00	3.53E-02	1.73E-02	1.40E-01
7.85E+00	1.03E-02	1.03E-02	9.78E-01	1.17E-02	1.17E-02	1.97E-01	0.00E+00	0.00E+00	7.14E-02	1.70E-02	1.46E-01
8.22E+00	9.82E-03	9.82E-03	9.78E-01	1.17E-02	1.17E-02	2.03E-01	0.00E+00	0.00E+00	6.11E-02	1.67E-02	1.53E-01
8.61E+00	9.44E-03	9.44E-03	9.79E-01	1.17E-02	1.17E-02	2.10E-01	0.00E+00	0.00E+00	5.34E-02	1.64E-02	1.60E-01
9.04E+00	9.11E-03	9.11E-03	9.79E-01	1.17E-02	1.17E-02	2.18E-01	0.00E+00	0.00E+00	4.73E-02	1.62E-02	1.67E-01
9.50E+00	8.81E-03	8.81E-03	9.79E-01	1.17E-02	1.17E-02	2.26E-01	0.00E+00	0.00E+00	4.22E-02	1.62E-02	1.74E-01
9.99E+00	8.53E-03	8.53E-03	9.80E-01	1.17E-02	1.17E-02	2.34E-01	0.00E+00	0.00E+00	3.78E-02	1.61E-02	1.81E-01
1.05E+01	8.28E-03	8.28E-03	9.80E-01	1.17E-02	1.17E-02	2.44E-01	0.00E+00	0.00E+00	3.41E-02	1.61E-02	1.88E-01
1.11E+01	8.04E-03	8.04E-03	9.80E-01	1.17E-02	1.17E-02	2.53E-01	0.00E+00	0.00E+00	3.08E-02	1.62E-02	1.96E-01
1.17E+01	7.82E-03	7.82E-03	9.80E-01	1.17E-02	1.17E-02	2.63E-01	0.00E+00	0.00E+00	2.78E-02	1.63E-02	2.03E-01
1.23E+01	7.62E-03	7.62E-03	9.81E-01	1.17E-02	1.17E-02	2.73E-01	0.00E+00	0.00E+00	2.53E-02	1.64E-02	2.10E-01
1.31E+01	7.42E-03	7.42E-03	9.81E-01	1.17E-02	1.17E-02	2.84E-01	0.00E+00	0.00E+00	2.30E-02	1.65E-02	2.18E-01
1.38E+01	7.24E-03	7.24E-03	9.81E-01	1.17E-02	1.17E-02	2.95E-01	0.00E+00	0.00E+00	2.09E-02	1.67E-02	2.25E-01
1.46E+01	7.06E-03	7.06E-03	9.81E-01	1.17E-02	1.17E-02	3.06E-01	0.00E+00	0.00E+00	1.92E-02	1.70E-02	2.32E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

c(x,y,z,t) = cc(x) * (erf(xa)-erf(xb)) * (erf(ya)-erf(yb)) * (exp(-za*za)+exp(-zb*zb))

```
   c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)
            x = downwind distance (m)
            y = crosswind horizontal distance (m)
            z = height (m)
            t = time (s)

          erf = error functon
           xa = (x-xc+bx)/(sr2*betax)
           xb = (x-xc-bx)/(sr2*betax)
           ya = (y+b)/(sr2*betac)
           yb = (y-b)/(sr2*betac)
          exp = exponential function
           za = (z-zc)/(sr2*sig)
           zb = (z+zc)/(sr2*sig)
          sr2 = sqrt(2.0)
```

x	cc(x)	b(x)	betac(x)	zc(x)	sig(x)	t	xc(t)	bx(t)	betax(t)

-3.19E+00	0.00E+00	2.87E+00	8.04E-01	0.00E+00	0.00E+00	5.39E+00	0.00E+00	3.19E+00	2.61E-02
-2.55E+00	4.65E-03	2.87E+00	8.38E-01	0.00E+00	2.36E-01	6.81E+00	3.19E-01	3.51E+00	2.87E-02
-1.92E+00	6.58E-03	2.87E+00	8.71E-01	0.00E+00	3.12E-01	8.24E+00	6.39E-01	3.83E+00	3.13E-02
-1.28E+00	7.90E-03	2.87E+00	9.12E-01	0.00E+00	3.87E-01	1.05E+01	9.58E-01	4.15E+00	3.39E-02
-6.39E-01	9.00E-03	2.88E+00	9.64E-01	0.00E+00	4.72E-01	1.27E+01	1.28E+00	4.47E+00	3.65E-02
5.07E-07	9.96E-03	2.88E+00	1.04E+00	0.00E+00	5.85E-01	1.94E+01	1.60E+00	4.79E+00	3.91E-02
6.39E-01	1.08E-02	2.88E+00	1.15E+00	0.00E+00	7.71E-01	2.60E+01	1.92E+00	5.11E+00	4.17E-02
1.28E+00	1.13E-02	2.88E+00	1.36E+00	0.00E+00	1.20E+00	2.70E+01	2.24E+00	5.43E+00	4.43E-02
1.92E+00	1.14E-02	2.87E+00	2.26E+00	0.00E+00	3.25E+00	2.81E+01	2.55E+00	5.75E+00	4.69E-02
2.55E+00	9.38E-03	2.89E+00	2.36E+00	0.00E+00	3.97E-01	2.89E+01	2.87E+00	6.07E+00	4.95E-02
3.19E+00	8.85E-03	2.90E+00	2.40E+00	6.62E-04	5.00E-01	2.97E+01	3.19E+00	6.39E+00	5.21E-02
3.22E+00	8.81E-03	2.90E+00	2.41E+00	1.15E-03	5.06E-01	2.97E+01	3.22E+00	6.41E+00	5.24E-02
3.24E+00	8.77E-03	2.90E+00	2.41E+00	1.72E-03	5.09E-01	2.98E+01	3.24E+00	6.44E+00	5.26E-02
3.27E+00	8.73E-03	2.90E+00	2.41E+00	2.41E-03	5.12E-01	2.99E+01	3.27E+00	6.46E+00	5.28E-02
3.30E+00	8.68E-03	2.90E+00	2.41E+00	3.22E-03	5.15E-01	3.00E+01	3.30E+00	6.49E+00	5.30E-02
3.33E+00	8.64E-03	2.90E+00	2.41E+00	4.18E-03	5.19E-01	3.01E+01	3.33E+00	6.53E+00	5.33E-02
3.37E+00	8.59E-03	2.90E+00	2.41E+00	5.30E-03	5.22E-01	3.02E+01	3.37E+00	6.56E+00	5.36E-02
3.41E+00	8.54E-03	2.90E+00	2.42E+00	6.63E-03	5.26E-01	3.03E+01	3.41E+00	6.60E+00	5.39E-02
3.45E+00	8.49E-03	2.90E+00	2.42E+00	8.18E-03	5.29E-01	3.04E+01	3.45E+00	6.64E+00	5.42E-02
3.49E+00	8.44E-03	2.90E+00	2.42E+00	9.99E-03	5.33E-01	3.05E+01	3.49E+00	6.68E+00	5.46E-02
3.54E+00	8.39E-03	2.90E+00	2.42E+00	1.21E-02	5.37E-01	3.06E+01	3.54E+00	6.73E+00	5.50E-02
3.59E+00	8.34E-03	2.90E+00	2.43E+00	1.46E-02	5.42E-01	3.08E+01	3.59E+00	6.78E+00	5.54E-02
3.64E+00	8.29E-03	2.90E+00	2.43E+00	1.74E-02	5.46E-01	3.09E+01	3.64E+00	6.83E+00	5.58E-02
3.70E+00	8.24E-03	2.90E+00	2.43E+00	2.07E-02	5.50E-01	3.11E+01	3.70E+00	6.89E+00	5.63E-02
3.76E+00	8.19E-03	2.90E+00	2.43E+00	2.46E-02	5.54E-01	3.13E+01	3.76E+00	6.95E+00	5.68E-02
3.83E+00	8.14E-03	2.90E+00	2.44E+00	2.90E-02	5.59E-01	3.14E+01	3.83E+00	7.02E+00	5.73E-02
3.90E+00	8.09E-03	2.90E+00	2.44E+00	3.41E-02	5.63E-01	3.16E+01	3.90E+00	7.09E+00	5.79E-02
3.97E+00	8.04E-03	2.90E+00	2.44E+00	4.01E-02	5.67E-01	3.19E+01	3.97E+00	7.17E+00	5.85E-02
4.06E+00	8.00E-03	2.90E+00	2.45E+00	4.69E-02	5.71E-01	3.21E+01	4.06E+00	7.25E+00	5.92E-02
4.14E+00	7.96E-03	2.90E+00	2.45E+00	5.47E-02	5.75E-01	3.23E+01	4.14E+00	7.34E+00	5.99E-02
4.24E+00	7.92E-03	2.90E+00	2.46E+00	6.38E-02	5.79E-01	3.26E+01	4.24E+00	7.43E+00	6.07E-02
4.34E+00	7.89E-03	2.90E+00	2.46E+00	7.42E-02	5.82E-01	3.29E+01	4.34E+00	7.53E+00	6.15E-02
4.45E+00	7.87E-03	2.90E+00	2.47E+00	8.61E-02	5.85E-01	3.32E+01	4.45E+00	7.64E+00	6.24E-02
4.57E+00	7.86E-03	2.90E+00	2.47E+00	9.97E-02	5.87E-01	3.35E+01	4.57E+00	7.76E+00	6.34E-02
4.69E+00	7.85E-03	2.90E+00	2.48E+00	1.15E-01	5.88E-01	3.39E+01	4.69E+00	7.89E+00	6.44E-02
4.83E+00	7.86E-03	2.90E+00	2.49E+00	1.33E-01	5.89E-01	3.43E+01	4.83E+00	8.02E+00	6.55E-02
4.98E+00	7.88E-03	2.90E+00	2.49E+00	1.54E-01	5.88E-01	3.47E+01	4.98E+00	8.17E+00	6.67E-02
5.13E+00	7.92E-03	2.90E+00	2.50E+00	1.77E-01	5.87E-01	3.52E+01	5.13E+00	8.32E+00	6.80E-02
5.30E+00	7.98E-03	2.90E+00	2.51E+00	2.04E-01	5.84E-01	3.56E+01	5.30E+00	8.49E+00	6.94E-02
5.48E+00	8.06E-03	2.90E+00	2.52E+00	2.34E-01	5.79E-01	3.62E+01	5.48E+00	8.67E+00	7.08E-02
5.67E+00	8.17E-03	2.90E+00	2.52E+00	2.69E-01	5.72E-01	3.67E+01	5.67E+00	8.87E+00	7.24E-02
5.88E+00	8.32E-03	2.90E+00	2.53E+00	3.09E-01	5.63E-01	3.73E+01	5.88E+00	9.08E+00	7.41E-02
6.11E+00	8.51E-03	2.90E+00	2.54E+00	3.54E-01	5.51E-01	3.80E+01	6.11E+00	9.30E+00	7.59E-02
6.35E+00	8.76E-03	2.90E+00	2.55E+00	4.05E-01	5.36E-01	3.87E+01	6.35E+00	9.54E+00	7.79E-02
6.61E+00	9.08E-03	2.90E+00	2.57E+00	4.63E-01	5.18E-01	3.94E+01	6.61E+00	9.80E+00	8.00E-02
6.88E+00	9.51E-03	2.90E+00	2.58E+00	5.29E-01	4.96E-01	4.02E+01	6.88E+00	1.01E+01	8.23E-02
7.18E+00	1.01E-02	2.90E+00	2.59E+00	6.04E-01	4.69E-01	4.11E+01	7.18E+00	1.04E+01	8.47E-02
7.50E+00	1.08E-02	2.90E+00	2.61E+00	6.89E-01	4.37E-01	4.20E+01	7.50E+00	1.07E+01	8.73E-02
7.85E+00	1.10E-02	2.90E+00	2.62E+00	7.85E-01	4.27E-01	4.30E+01	7.85E+00	1.10E+01	9.01E-02
8.22E+00	1.06E-02	2.89E+00	2.64E+00	8.90E-01	4.39E-01	4.40E+01	8.22E+00	1.14E+01	9.31E-02
8.61E+00	1.03E-02	2.89E+00	2.65E+00	1.01E+00	4.50E-01	4.51E+01	8.61E+00	1.18E+01	9.64E-02
9.04E+00	9.96E-03	2.89E+00	2.67E+00	1.13E+00	4.58E-01	4.63E+01	9.04E+00	1.22E+01	9.99E-02
9.50E+00	9.68E-03	2.89E+00	2.68E+00	1.27E+00	4.65E-01	4.76E+01	9.50E+00	1.27E+01	1.04E-01
9.99E+00	9.44E-03	2.88E+00	2.70E+00	1.42E+00	4.71E-01	4.89E+01	9.99E+00	1.32E+01	1.08E-01
1.05E+01	9.21E-03	2.88E+00	2.72E+00	1.59E+00	4.76E-01	5.03E+01	1.05E+01	1.37E+01	1.12E-01
1.11E+01	9.01E-03	2.87E+00	2.74E+00	1.77E+00	4.80E-01	5.18E+01	1.11E+01	1.43E+01	1.17E-01
1.17E+01	8.83E-03	2.87E+00	2.76E+00	1.97E+00	4.83E-01	5.33E+01	1.17E+01	1.49E+01	1.22E-01
1.23E+01	8.66E-03	2.86E+00	2.79E+00	2.19E+00	4.84E-01	5.50E+01	1.23E+01	1.55E+01	1.27E-01
1.31E+01	8.51E-03	2.86E+00	2.81E+00	2.43E+00	4.85E-01	5.67E+01	1.31E+01	1.62E+01	1.33E-01
1.38E+01	8.38E-03	2.85E+00	2.84E+00	2.70E+00	4.86E-01	5.85E+01	1.38E+01	1.70E+01	1.39E-01
1.46E+01	8.25E-03	2.85E+00	2.87E+00	2.98E+00	4.85E-01	6.04E+01	1.46E+01	1.78E+01	1.45E-01

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time averaged (tav = 3600. s) volume concentration: concentration in the z = 1.50 plane.

downwind distance x (m)	time of max conc (s)	cloud duration (s)	effective half width bbc (m)	average concentration (volume fraction) at (x,y,z) y/bbc= 0.0	y/bbc= 0.5	y/bbc= 1.0	y/bbc= 1.5	y/bbc= 2.0	y/bbc= 2.5
-3.19E+00	1.81E+03	3.60E+03	3.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-2.55E+00	1.80E+03	3.60E+03	3.22E+00	6.44E-11	6.02E-11	2.19E-11	6.31E-13	6.72E-16	0.00E+00
-1.92E+00	1.80E+03	3.60E+03	3.25E+00	5.17E-07	4.78E-07	1.73E-07	5.69E-09	8.46E-12	0.00E+00
-1.28E+00	1.80E+03	3.60E+03	3.28E+00	3.51E-05	3.21E-05	1.15E-05	4.37E-07	9.29E-10	0.00E+00
-6.39E-01	1.80E+03	3.60E+03	3.33E+00	4.61E-04	4.15E-04	1.48E-04	6.59E-06	2.09E-08	0.00E+00
5.07E-07	1.80E+03	3.60E+03	3.39E+00	2.95E-03	2.59E-03	9.19E-04	4.92E-05	2.49E-07	8.84E-11
6.39E-01	1.80E+03	3.60E+03	3.50E+00	1.28E-02	1.08E-02	3.80E-03	2.54E-04	2.21E-06	2.31E-09
1.28E+00	1.80E+03	3.60E+03	3.71E+00	3.96E-02	3.17E-02	1.10E-02	9.64E-04	1.63E-05	4.77E-08
1.92E+00	1.80E+03	3.60E+03	4.86E+00	6.47E-02	4.62E-02	1.54E-02	2.07E-03	1.01E-04	1.69E-06
2.55E+00	1.80E+03	3.60E+03	5.00E+00	4.63E-05	3.29E-05	1.10E-05	1.50E-06	7.58E-08	1.35E-09
3.19E+00	1.81E+03	3.60E+03	5.07E+00	5.98E-04	4.24E-04	1.41E-04	1.94E-05	9.95E-07	1.82E-08
3.22E+00	1.81E+03	3.60E+03	5.08E+00	6.69E-04	4.74E-04	1.58E-04	2.17E-05	1.11E-06	2.04E-08

3.24E+00	1.81E+03	3.60E+03	5.08E+00	6.99E-04	4.96E-04	1.65E-04	2.26E-05	1.17E-06	2.14E-08
3.27E+00	1.81E+03	3.60E+03	5.08E+00	7.32E-04	5.19E-04	1.73E-04	2.37E-05	1.22E-06	2.24E-08
3.30E+00	1.81E+03	3.60E+03	5.08E+00	7.67E-04	5.44E-04	1.81E-04	2.48E-05	1.28E-06	2.35E-08
3.33E+00	1.81E+03	3.60E+03	5.08E+00	8.05E-04	5.71E-04	1.90E-04	2.61E-05	1.35E-06	2.48E-08
3.37E+00	1.81E+03	3.60E+03	5.09E+00	8.46E-04	6.00E-04	2.00E-04	2.74E-05	1.41E-06	2.61E-08
3.41E+00	1.81E+03	3.60E+03	5.09E+00	8.90E-04	6.31E-04	2.10E-04	2.88E-05	1.49E-06	2.75E-08
3.45E+00	1.81E+03	3.60E+03	5.09E+00	9.37E-04	6.65E-04	2.21E-04	3.04E-05	1.57E-06	2.90E-08
3.49E+00	1.81E+03	3.60E+03	5.10E+00	9.87E-04	7.00E-04	2.33E-04	3.20E-05	1.66E-06	3.06E-08
3.54E+00	1.81E+03	3.60E+03	5.10E+00	1.04E-03	7.38E-04	2.45E-04	3.37E-05	1.75E-06	3.24E-08
3.59E+00	1.81E+03	3.60E+03	5.10E+00	1.10E-03	7.78E-04	2.59E-04	3.56E-05	1.85E-06	3.42E-08
3.64E+00	1.81E+03	3.60E+03	5.11E+00	1.16E-03	8.20E-04	2.73E-04	3.75E-05	1.95E-06	3.62E-08
3.70E+00	1.81E+03	3.60E+03	5.11E+00	1.22E-03	8.65E-04	2.88E-04	3.96E-05	2.06E-06	3.83E-08
3.76E+00	1.81E+03	3.60E+03	5.12E+00	1.29E-03	9.11E-04	3.03E-04	4.17E-05	2.17E-06	4.05E-08
3.83E+00	1.81E+03	3.60E+03	5.12E+00	1.35E-03	9.59E-04	3.19E-04	4.39E-05	2.29E-06	4.28E-08
3.90E+00	1.81E+03	3.60E+03	5.13E+00	1.42E-03	1.01E-03	3.35E-04	4.62E-05	2.41E-06	4.52E-08
3.97E+00	1.81E+03	3.60E+03	5.13E+00	1.50E-03	1.06E-03	3.52E-04	4.86E-05	2.54E-06	4.77E-08
4.06E+00	1.81E+03	3.60E+03	5.14E+00	1.57E-03	1.11E-03	3.70E-04	5.10E-05	2.67E-06	5.02E-08
4.14E+00	1.81E+03	3.60E+03	5.14E+00	1.64E-03	1.16E-03	3.87E-04	5.34E-05	2.80E-06	5.29E-08
4.24E+00	1.81E+03	3.60E+03	5.15E+00	1.72E-03	1.22E-03	4.04E-04	5.59E-05	2.93E-06	5.55E-08
4.34E+00	1.81E+03	3.60E+03	5.16E+00	1.79E-03	1.27E-03	4.22E-04	5.83E-05	3.07E-06	5.83E-08
4.45E+00	1.81E+03	3.60E+03	5.16E+00	1.87E-03	1.32E-03	4.39E-04	6.07E-05	3.20E-06	6.10E-08
4.57E+00	1.81E+03	3.60E+03	5.17E+00	1.94E-03	1.37E-03	4.56E-04	6.32E-05	3.33E-06	6.38E-08
4.69E+00	1.81E+03	3.60E+03	5.18E+00	2.01E-03	1.42E-03	4.73E-04	6.56E-05	3.47E-06	6.66E-08
4.83E+00	1.81E+03	3.60E+03	5.19E+00	2.09E-03	1.48E-03	4.91E-04	6.81E-05	3.61E-06	6.96E-08
4.98E+00	1.81E+03	3.60E+03	5.20E+00	2.17E-03	1.53E-03	5.09E-04	7.06E-05	3.75E-06	7.27E-08
5.13E+00	1.81E+03	3.60E+03	5.21E+00	2.25E-03	1.59E-03	5.28E-04	7.33E-05	3.91E-06	7.60E-08
5.30E+00	1.81E+03	3.60E+03	5.22E+00	2.34E-03	1.65E-03	5.49E-04	7.64E-05	4.08E-06	7.97E-08
5.48E+00	1.81E+03	3.60E+03	5.23E+00	2.45E-03	1.73E-03	5.74E-04	7.99E-05	4.28E-06	8.42E-08
5.67E+00	1.81E+03	3.60E+03	5.25E+00	2.58E-03	1.82E-03	6.04E-04	8.42E-05	4.53E-06	8.94E-08
5.88E+00	1.81E+03	3.60E+03	5.26E+00	2.74E-03	1.94E-03	6.42E-04	8.96E-05	4.83E-06	9.59E-08
6.11E+00	1.81E+03	3.60E+03	5.27E+00	2.95E-03	2.08E-03	6.91E-04	9.66E-05	5.23E-06	1.04E-07
6.35E+00	1.81E+03	3.60E+03	5.29E+00	3.23E-03	2.28E-03	7.55E-04	1.06E-04	5.74E-06	1.15E-07
6.61E+00	1.81E+03	3.60E+03	5.31E+00	3.58E-03	2.53E-03	8.38E-04	1.17E-04	6.40E-06	1.29E-07
6.88E+00	1.81E+03	3.60E+03	5.32E+00	4.06E-03	2.86E-03	9.48E-04	1.33E-04	7.28E-06	1.48E-07
7.18E+00	1.81E+03	3.60E+03	5.34E+00	4.68E-03	3.30E-03	1.09E-03	1.54E-04	8.44E-06	1.73E-07
7.50E+00	1.81E+03	3.60E+03	5.36E+00	5.55E-03	3.91E-03	1.29E-03	1.82E-04	1.01E-05	2.08E-07
7.85E+00	1.81E+03	3.60E+03	5.38E+00	7.73E-03	5.44E-03	1.80E-03	2.54E-04	1.41E-05	2.93E-07
8.22E+00	1.81E+03	3.60E+03	5.40E+00	1.15E-02	8.09E-03	2.68E-03	3.78E-04	2.11E-05	4.42E-07
8.61E+00	1.81E+03	3.60E+03	5.43E+00	1.58E-02	1.11E-02	3.68E-03	5.21E-04	2.92E-05	6.18E-07
9.04E+00	1.82E+03	3.60E+03	5.45E+00	2.02E-02	1.42E-02	4.70E-03	6.67E-04	3.75E-05	8.02E-07
9.50E+00	1.82E+03	3.60E+03	5.47E+00	2.39E-02	1.68E-02	5.55E-03	7.88E-04	4.46E-05	9.62E-07
9.99E+00	1.82E+03	3.60E+03	5.49E+00	2.57E-02	1.81E-02	5.97E-03	8.50E-04	4.84E-05	1.05E-06
1.05E+01	1.82E+03	3.60E+03	5.52E+00	2.48E-02	1.74E-02	5.75E-03	8.20E-04	4.69E-05	1.03E-06
1.11E+01	1.82E+03	3.60E+03	5.55E+00	2.08E-02	1.46E-02	4.82E-03	6.88E-04	3.97E-05	8.83E-07
1.17E+01	1.82E+03	3.60E+03	5.58E+00	1.46E-02	1.03E-02	3.39E-03	4.85E-04	2.81E-05	6.34E-07
1.23E+01	1.82E+03	3.60E+03	5.61E+00	8.26E-03	5.79E-03	1.91E-03	2.74E-04	1.60E-05	3.65E-07
1.31E+01	1.82E+03	3.60E+03	5.65E+00	3.52E-03	2.46E-03	8.12E-04	1.17E-04	6.88E-06	1.59E-07
1.38E+01	1.82E+03	3.60E+03	5.68E+00	1.05E-03	7.34E-04	2.42E-04	3.49E-05	2.07E-06	4.84E-08
1.46E+01	1.82E+03	3.60E+03	5.73E+00	2.00E-04	1.40E-04	4.60E-05	6.66E-06	3.98E-07	9.42E-09

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time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

downwind distance x (m)	height z (m)	maximum concentration c(x,0,z)	time of max conc (s)	cloud duration (s)
-3.19E+00	0.00E+00	0.00E+00	1.81E+03	3.60E+03
-2.55E+00	0.00E+00	3.72E-02	1.80E+03	3.60E+03
-1.92E+00	0.00E+00	5.25E-02	1.80E+03	3.60E+03
-1.28E+00	0.00E+00	6.30E-02	1.80E+03	3.60E+03
-6.39E-01	0.00E+00	7.15E-02	1.80E+03	3.60E+03
5.07E-07	0.00E+00	7.88E-02	1.80E+03	3.60E+03
6.39E-01	0.00E+00	8.46E-02	1.80E+03	3.60E+03
1.28E+00	0.00E+00	8.68E-02	1.80E+03	3.60E+03
1.92E+00	0.00E+00	7.20E-02	1.80E+03	3.60E+03
2.55E+00	0.00E+00	5.80E-02	1.80E+03	3.60E+03
3.19E+00	0.00E+00	5.41E-02	1.81E+03	3.60E+03
3.22E+00	0.00E+00	5.39E-02	1.81E+03	3.60E+03
3.24E+00	0.00E+00	5.36E-02	1.81E+03	3.60E+03
3.27E+00	0.00E+00	5.33E-02	1.81E+03	3.60E+03
3.30E+00	0.00E+00	5.30E-02	1.81E+03	3.60E+03
3.33E+00	0.00E+00	5.27E-02	1.81E+03	3.60E+03
3.37E+00	0.00E+00	5.24E-02	1.81E+03	3.60E+03
3.41E+00	0.00E+00	5.21E-02	1.81E+03	3.60E+03
3.45E+00	0.00E+00	5.18E-02	1.81E+03	3.60E+03
3.49E+00	0.00E+00	5.14E-02	1.81E+03	3.60E+03
3.54E+00	0.00E+00	5.11E-02	1.81E+03	3.60E+03
3.59E+00	0.00E+00	5.07E-02	1.81E+03	3.60E+03
3.64E+00	0.00E+00	5.03E-02	1.81E+03	3.60E+03
3.70E+00	0.00E+00	5.00E-02	1.81E+03	3.60E+03

3.76E+00	0.00E+00	4.96E-02	1.81E+03	3.60E+03
3.83E+00	0.00E+00	4.92E-02	1.81E+03	3.60E+03
3.90E+00	0.00E+00	4.89E-02	1.81E+03	3.60E+03
3.97E+00	0.00E+00	4.85E-02	1.81E+03	3.60E+03
4.06E+00	0.00E+00	4.81E-02	1.81E+03	3.60E+03
4.14E+00	0.00E+00	4.78E-02	1.81E+03	3.60E+03
4.24E+00	0.00E+00	4.74E-02	1.81E+03	3.60E+03
4.34E+00	0.00E+00	4.71E-02	1.81E+03	3.60E+03
4.45E+00	0.00E+00	4.67E-02	1.81E+03	3.60E+03
4.57E+00	0.00E+00	4.64E-02	1.81E+03	3.60E+03
4.69E+00	0.00E+00	4.61E-02	1.81E+03	3.60E+03
4.83E+00	0.00E+00	4.57E-02	1.81E+03	3.60E+03
4.98E+00	0.00E+00	4.54E-02	1.81E+03	3.60E+03
5.13E+00	0.00E+00	4.50E-02	1.81E+03	3.60E+03
5.30E+00	0.00E+00	4.45E-02	1.81E+03	3.60E+03
5.48E+00	0.00E+00	4.39E-02	1.81E+03	3.60E+03
5.67E+00	0.00E+00	4.31E-02	1.81E+03	3.60E+03
5.88E+00	0.00E+00	4.20E-02	1.81E+03	3.60E+03
6.11E+00	0.00E+00	4.06E-02	1.81E+03	3.60E+03
6.35E+00	0.00E+00	3.84E-02	1.81E+03	3.60E+03
6.61E+00	0.00E+00	3.54E-02	1.81E+03	3.60E+03
6.88E+00	3.03E-01	3.15E-02	1.81E+03	3.60E+03
7.18E+00	5.47E-01	3.02E-02	1.81E+03	3.60E+03
7.50E+00	6.79E-01	3.13E-02	1.81E+03	3.60E+03
7.85E+00	7.83E-01	3.15E-02	1.81E+03	3.60E+03
8.22E+00	8.89E-01	3.02E-02	1.81E+03	3.60E+03
8.61E+00	1.01E+00	2.90E-02	1.81E+03	3.60E+03
9.04E+00	1.13E+00	2.79E-02	1.82E+03	3.60E+03
9.50E+00	1.27E+00	2.70E-02	1.82E+03	3.60E+03
9.99E+00	1.42E+00	2.61E-02	1.82E+03	3.60E+03
1.05E+01	1.59E+00	2.52E-02	1.82E+03	3.60E+03
1.11E+01	1.77E+00	2.45E-02	1.82E+03	3.60E+03
1.17E+01	1.97E+00	2.37E-02	1.82E+03	3.60E+03
1.23E+01	2.19E+00	2.31E-02	1.82E+03	3.60E+03
1.31E+01	2.43E+00	2.24E-02	1.82E+03	3.60E+03
1.38E+01	2.70E+00	2.18E-02	1.82E+03	3.60E+03
1.46E+01	2.98E+00	2.11E-02	1.82E+03	3.60E+03

SLAB MODELING RESULTS: ALTERNATIVE SCENARIO, DISTANCE TO 75 PPM AMMONIA

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                    SESSION INFORMATION

          INPUT DATA FILE NAME :  ALTSMALL.DTA
          OUTPUT LIST FILE NAME : ALTSMALL.LST


          GRAPHICS DATA FILE NAME : ALTSMALL.DAT
          GRAPHICS PLOT FILE NAME : ALTSMALL.XZ




problem input

  idspl =         1
  ncalc =         1
  wms   =   .017031
  cps   =   2170.00
  tbp   =    240.00
  cmed0 =       .00

  dhe   =  1370840.
  cpsl  =   4294.00
  rhosl =    682.80
  spb   =   2132.52
  spc   =    -32.98
  ts    =    239.00
  qs    =       .01
  as    =      1.55
  tsd   =     3600.
  qtis  =       .00
  hs    =       .00
  tav   =   3600.00
  xffm  =     53.66
  zp(1) =      1.50
  zp(2) =       .00
  zp(3) =       .00
  zp(4) =       .00
  z0    =   .010000
  za    =     10.00
  ua    =      3.00
  ta    =    300.37
  rh    =     50.00
  stab  =      4.00


release gas properties

 molecular weight of source gas (kg)               - wms  =  1.7031E-02
```

```
 vapor heat capacity, const. p.  (j/kg-k)          - cps  =  2.1700E+03
 temperature of source gas (k)                     - ts   =  2.4000E+02
 density of source gas (kg/m3)                     - rhos =  8.6481E-01
 boiling point temperature                         - tbp  =  2.4000E+02
 liquid mass fraction                              - cmed0=  0.0000E+00
 liquid heat capacity (j/kg-k)                     - cpsl =  4.2940E+03

 heat of vaporization (j/kg)                       - dhe  =  1.3708E+06
 liquid source density (kg/m3)                     - rhosl=  6.8280E+02
 saturation pressure constant                      - spa  =  1.0301E+01
 saturation pressure constant (k)                  - spb  =  2.1325E+03
 saturation pressure constant (k)                  - spc  = -3.2980E+01


spill characteristics

 spill type                                        - idspl=          1
 mass source rate (kg/s)                           - qs   =  6.8494E-03
 continuous source duration (s)                    - tsd  =  3.6000E+03
 continuous source mass (kg)                       - qtcs =  2.4658E+01
 instantaneous source mass (kg)                    - qtis =  0.0000E+00
 source area (m2)                                  - as   =  1.5520E+00
 vertical vapor velocity (m/s)                     - ws   =  5.1031E-03
 source half width (m)                             - bs   =  6.2290E-01
 source height (m)                                 - hs   =  0.0000E+00
 horizontal vapor velocity (m/s)                   - us   =  0.0000E+00


field parameters

 concentration averaging time (s)                  - tav  =  3.6000E+03
 mixing layer height (m)                           - hmx  =  1.0400E+03
 maximum downwind distrace (m)                     - xffm =  5.3660E+01
 concentration measurement height (m)              - zp(1)=  1.5000E+00
                                                   - zp(2)=  0.0000E+00
                                                   - zp(3)=  0.0000E+00
                                                   - zp(4)=  0.0000E+00


ambient meteorological properties

 molecular weight of ambient air (kg)             - wmae  =  2.8754E-02
 heat capacity of ambient air at const p. (j/kg-k)- cpaa  =  1.0158E+03
 density of ambient air (kg/m3)                   - rhoa  =  1.1666E+00
 ambient measurement height (m)                   - za    =  1.0000E+01
 ambient atmospheric pressure (pa=n/m2=j/m3)      - pa    =  1.0133E+05
 ambient wind speed (m/s)                         - ua    =  3.0000E+00
 ambient temperature (k)                          - ta    =  3.0037E+02
 relative humidity (percent)                      - rh    =  5.0000E+01
 ambient friction velocity (m/s)                  - uastr =  1.7831E-01
 atmospheric stability class value                - stab  =  4.0000E+00
 inverse monin-obukhov length (1/m)               - ala   =  0.0000E+00
 surface roughness height (m)                     - z0    =  1.0000E-02


additional parameters
```

```
 sub-step multiplier                                  - ncalc =          1
 number of calculational sub-steps                    - nssm  =          3
 acceleration of gravity (m/s2)                       - grav  =  9.8067E+00
 gas constant (j/mol- k)                              - rr    =  8.3143E+00
 von karman constant                                  - xk    =  4.1000E-01
1
```

instantaneous spatially averaged cloud parameters

x	zc	h	bb	b	bbx	bx	cv	rho	t	u	ua
-6.23E-01	0.00E+00	0.00E+00	6.23E-01	5.61E-01	6.23E-01	6.23E-01	0.00E+00	1.17E+00	3.00E+02	0.00E+00	0.00E+00
-4.98E-01	0.00E+00	1.14E-01	6.32E-01	5.61E-01	6.85E-01	6.85E-01	1.02E-02	1.16E+00	3.00E+02	6.75E-01	6.79E-01
-3.74E-01	0.00E+00	1.62E-01	6.39E-01	5.61E-01	7.47E-01	7.47E-01	1.18E-02	1.16E+00	3.00E+02	8.11E-01	8.17E-01
-2.49E-01	0.00E+00	2.02E-01	6.46E-01	5.61E-01	8.10E-01	8.10E-01	1.26E-02	1.16E+00	2.99E+02	8.97E-01	9.05E-01
-1.25E-01	0.00E+00	2.38E-01	6.53E-01	5.61E-01	8.72E-01	8.72E-01	1.33E-02	1.16E+00	2.99E+02	9.60E-01	9.70E-01
-5.22E-08	0.00E+00	2.70E-01	6.60E-01	5.61E-01	9.34E-01	9.34E-01	1.37E-02	1.16E+00	2.99E+02	1.01E+00	1.02E+00
1.25E-01	0.00E+00	3.01E-01	6.67E-01	5.61E-01	9.97E-01	9.97E-01	1.40E-02	1.16E+00	2.99E+02	1.05E+00	1.07E+00
2.49E-01	0.00E+00	3.29E-01	6.74E-01	5.61E-01	1.06E+00	1.06E+00	1.43E-02	1.16E+00	2.99E+02	1.09E+00	1.10E+00
3.74E-01	0.00E+00	3.57E-01	6.81E-01	5.61E-01	1.12E+00	1.12E+00	1.45E-02	1.16E+00	2.99E+02	1.12E+00	1.14E+00
4.98E-01	0.00E+00	3.83E-01	6.89E-01	5.61E-01	1.18E+00	1.18E+00	1.47E-02	1.16E+00	2.99E+02	1.15E+00	1.17E+00
6.23E-01	0.00E+00	4.09E-01	6.96E-01	5.61E-01	1.25E+00	1.25E+00	1.48E-02	1.16E+00	2.99E+02	1.17E+00	1.19E+00
6.32E-01	7.35E-07	4.11E-01	6.96E-01	5.61E-01	1.25E+00	1.25E+00	1.47E-02	1.16E+00	2.99E+02	1.17E+00	1.20E+00
6.42E-01	3.36E-06	4.13E-01	6.97E-01	5.61E-01	1.27E+00	1.26E+00	1.46E-02	1.16E+00	2.99E+02	1.17E+00	1.20E+00
6.54E-01	8.65E-06	4.15E-01	6.98E-01	5.61E-01	1.28E+00	1.28E+00	1.45E-02	1.16E+00	2.99E+02	1.18E+00	1.20E+00
6.68E-01	1.76E-05	4.18E-01	6.98E-01	5.61E-01	1.29E+00	1.29E+00	1.44E-02	1.16E+00	2.99E+02	1.18E+00	1.20E+00
6.83E-01	3.17E-05	4.21E-01	6.99E-01	5.61E-01	1.31E+00	1.31E+00	1.42E-02	1.16E+00	2.99E+02	1.18E+00	1.21E+00
7.01E-01	5.25E-05	4.24E-01	7.00E-01	5.61E-01	1.32E+00	1.32E+00	1.40E-02	1.16E+00	2.99E+02	1.19E+00	1.21E+00
7.21E-01	8.24E-05	4.28E-01	7.01E-01	5.61E-01	1.34E+00	1.34E+00	1.38E-02	1.16E+00	2.99E+02	1.19E+00	1.21E+00
7.44E-01	1.24E-04	4.32E-01	7.03E-01	5.61E-01	1.37E+00	1.37E+00	1.36E-02	1.16E+00	2.99E+02	1.19E+00	1.22E+00
7.71E-01	1.82E-04	4.37E-01	7.04E-01	5.61E-01	1.39E+00	1.39E+00	1.34E-02	1.16E+00	2.99E+02	1.20E+00	1.22E+00
8.01E-01	2.60E-04	4.43E-01	7.06E-01	5.61E-01	1.42E+00	1.42E+00	1.31E-02	1.16E+00	2.99E+02	1.20E+00	1.23E+00
8.36E-01	3.63E-04	4.49E-01	7.08E-01	5.61E-01	1.46E+00	1.46E+00	1.28E-02	1.16E+00	2.99E+02	1.21E+00	1.23E+00
8.75E-01	5.01E-04	4.56E-01	7.10E-01	5.61E-01	1.50E+00	1.50E+00	1.25E-02	1.16E+00	2.99E+02	1.22E+00	1.24E+00
9.21E-01	6.80E-04	4.64E-01	7.13E-01	5.61E-01	1.54E+00	1.54E+00	1.22E-02	1.16E+00	3.00E+02	1.23E+00	1.25E+00
9.73E-01	9.13E-04	4.73E-01	7.16E-01	5.61E-01	1.60E+00	1.60E+00	1.18E-02	1.16E+00	3.00E+02	1.23E+00	1.26E+00
1.03E+00	1.21E-03	4.84E-01	7.19E-01	5.61E-01	1.66E+00	1.66E+00	1.14E-02	1.16E+00	3.00E+02	1.24E+00	1.27E+00
1.10E+00	1.59E-03	4.96E-01	7.23E-01	5.61E-01	1.72E+00	1.72E+00	1.10E-02	1.16E+00	3.00E+02	1.26E+00	1.28E+00
1.18E+00	2.08E-03	5.09E-01	7.28E-01	5.61E-01	1.80E+00	1.80E+00	1.05E-02	1.16E+00	3.00E+02	1.27E+00	1.29E+00
1.27E+00	2.68E-03	5.24E-01	7.33E-01	5.61E-01	1.89E+00	1.89E+00	1.01E-02	1.16E+00	3.00E+02	1.28E+00	1.30E+00
1.37E+00	3.44E-03	5.41E-01	7.38E-01	5.61E-01	1.99E+00	1.99E+00	9.57E-03	1.16E+00	3.00E+02	1.29E+00	1.31E+00
1.49E+00	4.37E-03	5.60E-01	7.45E-01	5.61E-01	2.11E+00	2.11E+00	9.05E-03	1.16E+00	3.00E+02	1.31E+00	1.33E+00
1.62E+00	5.52E-03	5.81E-01	7.53E-01	5.61E-01	2.24E+00	2.24E+00	8.52E-03	1.16E+00	3.00E+02	1.33E+00	1.34E+00
1.77E+00	6.91E-03	6.05E-01	7.61E-01	5.61E-01	2.40E+00	2.40E+00	7.98E-03	1.16E+00	3.00E+02	1.34E+00	1.36E+00
1.95E+00	8.60E-03	6.32E-01	7.71E-01	5.61E-01	2.57E+00	2.57E+00	7.44E-03	1.17E+00	3.00E+02	1.36E+00	1.38E+00
2.15E+00	1.06E-02	6.63E-01	7.83E-01	5.61E-01	2.77E+00	2.77E+00	6.89E-03	1.17E+00	3.00E+02	1.38E+00	1.40E+00
2.38E+00	1.30E-02	6.97E-01	7.96E-01	5.61E-01	3.00E+00	3.00E+00	6.35E-03	1.17E+00	3.00E+02	1.41E+00	1.42E+00
2.64E+00	1.59E-02	7.35E-01	8.11E-01	5.61E-01	3.27E+00	3.27E+00	5.82E-03	1.17E+00	3.00E+02	1.43E+00	1.44E+00
2.94E+00	1.92E-02	7.77E-01	8.28E-01	5.60E-01	3.57E+00	3.57E+00	5.30E-03	1.17E+00	3.00E+02	1.45E+00	1.47E+00
3.29E+00	2.31E-02	8.24E-01	8.47E-01	5.60E-01	3.91E+00	3.91E+00	4.79E-03	1.17E+00	3.00E+02	1.48E+00	1.49E+00
3.68E+00	2.76E-02	8.77E-01	8.70E-01	5.60E-01	4.31E+00	4.30E+00	4.31E-03	1.17E+00	3.00E+02	1.51E+00	1.52E+00
4.13E+00	3.28E-02	9.35E-01	8.95E-01	5.60E-01	4.76E+00	4.76E+00	3.86E-03	1.17E+00	3.00E+02	1.53E+00	1.55E+00
4.65E+00	3.87E-02	1.00E+00	9.24E-01	5.60E-01	5.27E+00	5.27E+00	3.43E-03	1.17E+00	3.00E+02	1.56E+00	1.57E+00
5.24E+00	4.53E-02	1.07E+00	9.58E-01	5.60E-01	5.86E+00	5.86E+00	3.03E-03	1.17E+00	3.00E+02	1.59E+00	1.60E+00
5.92E+00	5.28E-02	1.15E+00	9.96E-01	5.60E-01	6.54E+00	6.54E+00	2.66E-03	1.17E+00	3.00E+02	1.63E+00	1.63E+00
6.69E+00	6.11E-02	1.24E+00	1.04E+00	5.60E-01	7.31E+00	7.31E+00	2.32E-03	1.17E+00	3.00E+02	1.66E+00	1.67E+00
7.58E+00	7.03E-02	1.34E+00	1.09E+00	5.60E-01	8.20E+00	8.20E+00	2.01E-03	1.17E+00	3.00E+02	1.69E+00	1.70E+00
8.59E+00	8.05E-02	1.45E+00	1.15E+00	5.60E-01	9.21E+00	9.21E+00	1.73E-03	1.17E+00	3.00E+02	1.72E+00	1.73E+00
9.75E+00	9.16E-02	1.57E+00	1.21E+00	5.60E-01	1.04E+01	1.04E+01	1.48E-03	1.17E+00	3.00E+02	1.76E+00	1.77E+00
1.11E+01	1.04E-01	1.70E+00	1.29E+00	5.60E-01	1.17E+01	1.17E+01	1.26E-03	1.17E+00	3.00E+02	1.79E+00	1.80E+00
1.26E+01	1.17E-01	1.85E+00	1.37E+00	5.60E-01	1.32E+01	1.32E+01	1.06E-03	1.17E+00	3.00E+02	1.83E+00	1.84E+00
1.43E+01	1.30E-01	2.02E+00	1.47E+00	5.60E-01	1.50E+01	1.50E+01	8.94E-04	1.17E+00	3.00E+02	1.87E+00	1.88E+00
1.63E+01	1.45E-01	2.20E+00	1.58E+00	5.60E-01	1.69E+01	1.69E+01	7.47E-04	1.17E+00	3.00E+02	1.91E+00	1.91E+00
1.86E+01	1.61E-01	2.40E+00	1.71E+00	5.60E-01	1.92E+01	1.92E+01	6.20E-04	1.17E+00	3.00E+02	1.95E+00	1.95E+00
2.12E+01	1.77E-01	2.62E+00	1.86E+00	5.60E-01	2.18E+01	2.18E+01	5.13E-04	1.17E+00	3.00E+02	1.98E+00	1.99E+00
2.42E+01	1.95E-01	2.87E+00	2.02E+00	5.60E-01	2.48E+01	2.48E+01	4.21E-04	1.17E+00	3.00E+02	2.02E+00	2.03E+00
2.76E+01	2.13E-01	3.15E+00	2.22E+00	5.60E-01	2.82E+01	2.82E+01	3.45E-04	1.17E+00	3.00E+02	2.06E+00	2.07E+00
3.15E+01	2.31E-01	3.45E+00	2.43E+00	5.60E-01	3.21E+01	3.21E+01	2.81E-04	1.17E+00	3.00E+02	2.10E+00	2.11E+00
3.60E+01	2.51E-01	3.79E+00	2.68E+00	5.60E-01	3.66E+01	3.66E+01	2.27E-04	1.17E+00	3.00E+02	2.14E+00	2.15E+00
4.11E+01	2.70E-01	4.16E+00	2.97E+00	5.60E-01	4.17E+01	4.17E+01	1.84E-04	1.17E+00	3.00E+02	2.19E+00	2.19E+00
4.70E+01	2.91E-01	4.57E+00	3.30E+00	5.60E-01	4.76E+01	4.76E+01	1.48E-04	1.17E+00	3.00E+02	2.23E+00	2.23E+00
5.37E+01	3.11E-01	5.03E+00	3.67E+00	5.60E-01	5.43E+01	5.43E+01	1.18E-04	1.17E+00	3.00E+02	2.27E+00	2.27E+00

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x	cm	cmv	cmda	cmw	cmwv	wc	vg	ug	w	v	vx
-6.23E-01	0.00E+00	0.00E+00	9.88E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	7.34E-01	9.76E-02	0.00E+00
-4.98E-01	6.08E-03	6.08E-03	9.82E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	2.72E-01	2.20E-02	2.01E-01
-3.74E-01	7.00E-03	7.00E-03	9.81E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.38E-01	2.65E-02	2.17E-01

-2.49E-01	7.53E-03	7.53E-03	9.81E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.20E-01	2.94E-02	2.25E-01
-1.25E-01	7.89E-03	7.89E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.09E-01	3.15E-02	2.30E-01
-5.22E-08	8.16E-03	8.16E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.01E-01	3.32E-02	2.34E-01
1.25E-01	8.37E-03	8.37E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.95E-01	3.46E-02	2.37E-01
2.49E-01	8.53E-03	8.53E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.90E-01	3.59E-02	2.39E-01
3.74E-01	8.65E-03	8.65E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.85E-01	3.70E-02	2.41E-01
4.98E-01	8.75E-03	8.75E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.82E-01	3.79E-02	2.42E-01
6.23E-01	8.84E-03	8.84E-03	9.79E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.78E-01	3.88E-02	2.44E-01
6.32E-01	8.78E-03	8.78E-03	9.80E-01	1.17E-02	1.17E-02	1.91E-04	0.00E+00	0.00E+00	1.78E-01	3.89E-02	2.44E-01
6.42E-01	8.71E-03	8.71E-03	9.80E-01	1.17E-02	1.17E-02	4.06E-04	0.00E+00	0.00E+00	1.78E-01	3.89E-02	2.44E-01
6.54E-01	8.64E-03	8.64E-03	9.80E-01	1.17E-02	1.17E-02	6.48E-04	0.00E+00	0.00E+00	1.77E-01	3.90E-02	2.44E-01
6.68E-01	8.56E-03	8.56E-03	9.80E-01	1.17E-02	1.17E-02	9.19E-04	0.00E+00	0.00E+00	1.77E-01	3.91E-02	2.44E-01
6.83E-01	8.47E-03	8.47E-03	9.80E-01	1.17E-02	1.17E-02	1.22E-03	0.00E+00	0.00E+00	1.77E-01	3.92E-02	2.44E-01
7.01E-01	8.36E-03	8.36E-03	9.80E-01	1.17E-02	1.17E-02	1.56E-03	0.00E+00	0.00E+00	1.76E-01	3.93E-02	2.44E-01
7.21E-01	8.25E-03	8.25E-03	9.80E-01	1.17E-02	1.17E-02	1.94E-03	0.00E+00	0.00E+00	1.76E-01	3.94E-02	2.45E-01
7.44E-01	8.12E-03	8.12E-03	9.80E-01	1.17E-02	1.17E-02	2.36E-03	0.00E+00	0.00E+00	1.75E-01	3.96E-02	2.45E-01
7.71E-01	7.98E-03	7.98E-03	9.80E-01	1.17E-02	1.17E-02	2.82E-03	0.00E+00	0.00E+00	1.75E-01	3.97E-02	2.45E-01
8.01E-01	7.82E-03	7.82E-03	9.80E-01	1.17E-02	1.17E-02	3.33E-03	0.00E+00	0.00E+00	1.74E-01	3.99E-02	2.45E-01
8.36E-01	7.65E-03	7.65E-03	9.81E-01	1.17E-02	1.17E-02	3.89E-03	0.00E+00	0.00E+00	1.73E-01	4.01E-02	2.46E-01
8.75E-01	7.46E-03	7.46E-03	9.81E-01	1.17E-02	1.17E-02	4.49E-03	0.00E+00	0.00E+00	1.72E-01	4.03E-02	2.46E-01
9.21E-01	7.25E-03	7.25E-03	9.81E-01	1.17E-02	1.17E-02	5.15E-03	0.00E+00	0.00E+00	1.72E-01	4.05E-02	2.46E-01
9.73E-01	7.03E-03	7.03E-03	9.81E-01	1.17E-02	1.17E-02	5.85E-03	0.00E+00	0.00E+00	1.71E-01	4.08E-02	2.47E-01
1.03E+00	6.79E-03	6.79E-03	9.81E-01	1.17E-02	1.17E-02	6.59E-03	0.00E+00	0.00E+00	1.70E-01	4.11E-02	2.47E-01
1.10E+00	6.54E-03	6.54E-03	9.82E-01	1.17E-02	1.17E-02	7.38E-03	0.00E+00	0.00E+00	1.69E-01	4.14E-02	2.47E-01
1.18E+00	6.27E-03	6.27E-03	9.82E-01	1.17E-02	1.17E-02	8.21E-03	0.00E+00	0.00E+00	1.67E-01	4.18E-02	2.48E-01
1.27E+00	5.99E-03	5.99E-03	9.82E-01	1.18E-02	1.18E-02	9.06E-03	0.00E+00	0.00E+00	1.66E-01	4.22E-02	2.49E-01
1.37E+00	5.69E-03	5.69E-03	9.83E-01	1.18E-02	1.18E-02	9.94E-03	0.00E+00	0.00E+00	1.65E-01	4.26E-02	2.49E-01
1.49E+00	5.38E-03	5.38E-03	9.83E-01	1.18E-02	1.18E-02	1.08E-02	0.00E+00	0.00E+00	1.64E-01	4.31E-02	2.50E-01
1.62E+00	5.07E-03	5.07E-03	9.83E-01	1.18E-02	1.18E-02	1.17E-02	0.00E+00	0.00E+00	1.62E-01	4.36E-02	2.50E-01
1.77E+00	4.74E-03	4.74E-03	9.83E-01	1.18E-02	1.18E-02	1.26E-02	0.00E+00	0.00E+00	1.61E-01	4.41E-02	2.51E-01
1.95E+00	4.42E-03	4.42E-03	9.84E-01	1.18E-02	1.18E-02	1.34E-02	0.00E+00	0.00E+00	1.59E-01	4.47E-02	2.52E-01
2.15E+00	4.09E-03	4.09E-03	9.84E-01	1.18E-02	1.18E-02	1.43E-02	0.00E+00	0.00E+00	1.57E-01	4.54E-02	2.53E-01
2.38E+00	3.77E-03	3.77E-03	9.84E-01	1.18E-02	1.18E-02	1.50E-02	0.00E+00	0.00E+00	1.55E-01	4.61E-02	2.53E-01
2.64E+00	3.45E-03	3.45E-03	9.85E-01	1.18E-02	1.18E-02	1.57E-02	0.00E+00	0.00E+00	1.54E-01	4.68E-02	2.54E-01
2.94E+00	3.14E-03	3.14E-03	9.85E-01	1.18E-02	1.18E-02	1.63E-02	0.00E+00	0.00E+00	1.52E-01	4.76E-02	2.55E-01
3.29E+00	2.84E-03	2.84E-03	9.85E-01	1.18E-02	1.18E-02	1.68E-02	0.00E+00	0.00E+00	1.50E-01	4.84E-02	2.56E-01
3.68E+00	2.56E-03	2.56E-03	9.86E-01	1.18E-02	1.18E-02	1.72E-02	0.00E+00	0.00E+00	1.47E-01	4.92E-02	2.56E-01
4.13E+00	2.29E-03	2.29E-03	9.86E-01	1.18E-02	1.18E-02	1.76E-02	0.00E+00	0.00E+00	1.45E-01	5.01E-02	2.57E-01
4.65E+00	2.03E-03	2.03E-03	9.86E-01	1.18E-02	1.18E-02	1.77E-02	0.00E+00	0.00E+00	1.43E-01	5.10E-02	2.58E-01
5.24E+00	1.79E-03	1.79E-03	9.86E-01	1.18E-02	1.18E-02	1.78E-02	0.00E+00	0.00E+00	1.41E-01	5.20E-02	2.59E-01
5.92E+00	1.57E-03	1.57E-03	9.87E-01	1.18E-02	1.18E-02	1.78E-02	0.00E+00	0.00E+00	1.39E-01	5.30E-02	2.59E-01
6.69E+00	1.37E-03	1.37E-03	9.87E-01	1.18E-02	1.18E-02	1.76E-02	0.00E+00	0.00E+00	1.37E-01	5.40E-02	2.60E-01
7.58E+00	1.19E-03	1.19E-03	9.87E-01	1.18E-02	1.18E-02	1.73E-02	0.00E+00	0.00E+00	1.34E-01	5.51E-02	2.61E-01
8.59E+00	1.02E-03	1.02E-03	9.87E-01	1.18E-02	1.18E-02	1.69E-02	0.00E+00	0.00E+00	1.32E-01	5.62E-02	2.62E-01
9.75E+00	8.77E-04	8.77E-04	9.87E-01	1.18E-02	1.18E-02	1.64E-02	0.00E+00	0.00E+00	1.30E-01	5.73E-02	2.62E-01
1.11E+01	7.46E-04	7.46E-04	9.87E-01	1.18E-02	1.18E-02	1.58E-02	0.00E+00	0.00E+00	1.28E-01	5.84E-02	2.63E-01
1.26E+01	6.30E-04	6.30E-04	9.88E-01	1.18E-02	1.18E-02	1.52E-02	0.00E+00	0.00E+00	1.26E-01	5.95E-02	2.64E-01
1.43E+01	5.30E-04	5.30E-04	9.88E-01	1.18E-02	1.18E-02	1.44E-02	0.00E+00	0.00E+00	1.24E-01	6.07E-02	2.64E-01
1.63E+01	4.43E-04	4.43E-04	9.88E-01	1.18E-02	1.18E-02	1.37E-02	0.00E+00	0.00E+00	1.22E-01	6.19E-02	2.65E-01
1.86E+01	3.68E-04	3.68E-04	9.88E-01	1.18E-02	1.18E-02	1.29E-02	0.00E+00	0.00E+00	1.20E-01	6.31E-02	2.65E-01
2.12E+01	3.04E-04	3.04E-04	9.88E-01	1.18E-02	1.18E-02	1.20E-02	0.00E+00	0.00E+00	1.18E-01	6.43E-02	2.66E-01
2.42E+01	2.50E-04	2.50E-04	9.88E-01	1.18E-02	1.18E-02	1.12E-02	0.00E+00	0.00E+00	1.16E-01	6.55E-02	2.66E-01
2.76E+01	2.04E-04	2.04E-04	9.88E-01	1.18E-02	1.18E-02	1.04E-02	0.00E+00	0.00E+00	1.14E-01	6.67E-02	2.67E-01
3.15E+01	1.66E-04	1.66E-04	9.88E-01	1.18E-02	1.18E-02	9.55E-03	0.00E+00	0.00E+00	1.12E-01	6.80E-02	2.67E-01
3.60E+01	1.35E-04	1.35E-04	9.88E-01	1.18E-02	1.18E-02	8.76E-03	0.00E+00	0.00E+00	1.11E-01	6.92E-02	2.68E-01
4.11E+01	1.09E-04	1.09E-04	9.88E-01	1.18E-02	1.18E-02	8.01E-03	0.00E+00	0.00E+00	1.09E-01	7.04E-02	2.68E-01
4.70E+01	8.74E-05	8.74E-05	9.88E-01	1.18E-02	1.18E-02	7.29E-03	0.00E+00	0.00E+00	1.07E-01	7.17E-02	2.69E-01
5.37E+01	7.01E-05	7.01E-05	9.88E-01	1.18E-02	1.18E-02	6.61E-03	0.00E+00	0.00E+00	1.05E-01	7.29E-02	2.69E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

c(x,y,z,t) = cc(x) * (erf(xa)-erf(xb)) * (erf(ya)-erf(yb)) * (exp(-za*za)+exp(-zb*zb))

```
   c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)
            x = downwind distance (m)
            y = crosswind horizontal distance (m)
            z = height (m)
            t = time (s)

          erf = error functon
           xa = (x-xc+bx)/(sr2*betax)
           xb = (x-xc-bx)/(sr2*betax)
           ya = (y+b)/(sr2*betac)
           yb = (y-b)/(sr2*betac)
          exp = exponential function
           za = (z-zc)/(sr2*sig)
           zb = (z+zc)/(sr2*sig)
          sr2 = sqrt(2.0)
```

x	cc(x)	b(x)	betac(x)	zc(x)	sig(x)	t	xc(t)	bx(t)	betax(t)

-6.23E-01	0.00E+00	5.61E-01	1.57E-01	0.00E+00	0.00E+00	3.51E-01	0.00E+00	6.23E-01	5.09E-03
-4.98E-01	1.99E-03	5.61E-01	1.68E-01	0.00E+00	6.56E-02	4.17E-01	6.23E-02	6.85E-01	5.60E-03
-3.74E-01	2.32E-03	5.61E-01	1.78E-01	0.00E+00	9.37E-02	4.84E-01	1.25E-01	7.47E-01	6.10E-03
-2.49E-01	2.53E-03	5.61E-01	1.89E-01	0.00E+00	1.17E-01	5.59E-01	1.87E-01	8.10E-01	6.61E-03
-1.25E-01	2.69E-03	5.61E-01	1.99E-01	0.00E+00	1.37E-01	6.35E-01	2.49E-01	8.72E-01	7.12E-03
-5.22E-08	2.82E-03	5.61E-01	2.11E-01	0.00E+00	1.56E-01	7.20E-01	3.11E-01	9.34E-01	7.63E-03
1.25E-01	2.94E-03	5.61E-01	2.22E-01	0.00E+00	1.74E-01	8.04E-01	3.74E-01	9.97E-01	8.14E-03
2.49E-01	3.05E-03	5.61E-01	2.33E-01	0.00E+00	1.90E-01	8.98E-01	4.36E-01	1.06E+00	8.64E-03
3.74E-01	3.15E-03	5.61E-01	2.45E-01	0.00E+00	2.06E-01	9.91E-01	4.98E-01	1.12E+00	9.16E-03
4.98E-01	3.24E-03	5.61E-01	2.57E-01	0.00E+00	2.21E-01	1.09E+00	5.61E-01	1.18E+00	9.66E-03
6.23E-01	3.33E-03	5.61E-01	2.69E-01	0.00E+00	2.36E-01	1.20E+00	6.23E-01	1.25E+00	1.02E-02
6.32E-01	3.31E-03	5.61E-01	2.70E-01	7.35E-07	2.37E-01	1.21E+00	6.32E-01	1.25E+00	1.02E-02
6.42E-01	3.29E-03	5.61E-01	2.71E-01	3.36E-06	2.38E-01	1.23E+00	6.42E-01	1.26E+00	1.03E-02
6.54E-01	3.27E-03	5.61E-01	2.72E-01	8.65E-06	2.40E-01	1.25E+00	6.54E-01	1.28E+00	1.04E-02
6.68E-01	3.25E-03	5.61E-01	2.73E-01	1.76E-05	2.41E-01	1.27E+00	6.68E-01	1.29E+00	1.05E-02
6.83E-01	3.22E-03	5.61E-01	2.74E-01	3.17E-05	2.43E-01	1.30E+00	6.83E-01	1.31E+00	1.07E-02
7.01E-01	3.19E-03	5.61E-01	2.76E-01	5.25E-05	2.45E-01	1.33E+00	7.01E-01	1.32E+00	1.08E-02
7.21E-01	3.15E-03	5.61E-01	2.78E-01	8.24E-05	2.47E-01	1.36E+00	7.21E-01	1.34E+00	1.10E-02
7.44E-01	3.12E-03	5.61E-01	2.80E-01	1.24E-04	2.49E-01	1.40E+00	7.44E-01	1.37E+00	1.12E-02
7.71E-01	3.07E-03	5.61E-01	2.83E-01	1.82E-04	2.52E-01	1.44E+00	7.71E-01	1.39E+00	1.14E-02
8.01E-01	3.03E-03	5.61E-01	2.86E-01	2.60E-04	2.55E-01	1.50E+00	8.01E-01	1.42E+00	1.16E-02
8.36E-01	2.98E-03	5.61E-01	2.89E-01	3.63E-04	2.59E-01	1.55E+00	8.36E-01	1.46E+00	1.19E-02
8.75E-01	2.92E-03	5.61E-01	2.93E-01	5.01E-04	2.63E-01	1.62E+00	8.75E-01	1.50E+00	1.22E-02
9.21E-01	2.86E-03	5.61E-01	2.98E-01	6.80E-04	2.68E-01	1.69E+00	9.21E-01	1.54E+00	1.26E-02
9.73E-01	2.80E-03	5.61E-01	3.03E-01	9.13E-04	2.73E-01	1.78E+00	9.73E-01	1.60E+00	1.30E-02
1.03E+00	2.73E-03	5.61E-01	3.09E-01	1.21E-03	2.79E-01	1.87E+00	1.03E+00	1.66E+00	1.35E-02
1.10E+00	2.66E-03	5.61E-01	3.15E-01	1.59E-03	2.85E-01	1.98E+00	1.10E+00	1.72E+00	1.41E-02
1.18E+00	2.58E-03	5.61E-01	3.23E-01	2.08E-03	2.93E-01	2.11E+00	1.18E+00	1.80E+00	1.47E-02
1.27E+00	2.50E-03	5.61E-01	3.32E-01	2.68E-03	3.01E-01	2.25E+00	1.27E+00	1.89E+00	1.54E-02
1.37E+00	2.42E-03	5.61E-01	3.42E-01	3.44E-03	3.10E-01	2.41E+00	1.37E+00	1.99E+00	1.63E-02
1.49E+00	2.34E-03	5.61E-01	3.54E-01	4.37E-03	3.21E-01	2.59E+00	1.49E+00	2.11E+00	1.72E-02
1.62E+00	2.25E-03	5.61E-01	3.67E-01	5.52E-03	3.32E-01	2.79E+00	1.62E+00	2.24E+00	1.83E-02
1.77E+00	2.16E-03	5.61E-01	3.83E-01	6.91E-03	3.46E-01	3.02E+00	1.77E+00	2.40E+00	1.96E-02
1.95E+00	2.07E-03	5.61E-01	4.00E-01	8.60E-03	3.60E-01	3.28E+00	1.95E+00	2.57E+00	2.10E-02
2.15E+00	1.98E-03	5.61E-01	4.21E-01	1.06E-02	3.76E-01	3.57E+00	2.15E+00	2.77E+00	2.26E-02
2.38E+00	1.90E-03	5.61E-01	4.44E-01	1.30E-02	3.95E-01	3.90E+00	2.38E+00	3.00E+00	2.45E-02
2.64E+00	1.81E-03	5.61E-01	4.71E-01	1.59E-02	4.15E-01	4.27E+00	2.64E+00	3.27E+00	2.67E-02
2.94E+00	1.73E-03	5.60E-01	5.02E-01	1.92E-02	4.37E-01	4.69E+00	2.94E+00	3.57E+00	2.91E-02
3.29E+00	1.65E-03	5.60E-01	5.37E-01	2.31E-02	4.62E-01	5.16E+00	3.29E+00	3.91E+00	3.19E-02
3.68E+00	1.57E-03	5.60E-01	5.78E-01	2.76E-02	4.90E-01	5.68E+00	3.68E+00	4.30E+00	3.52E-02
4.13E+00	1.50E-03	5.60E-01	6.25E-01	3.28E-02	5.21E-01	6.28E+00	4.13E+00	4.76E+00	3.88E-02
4.65E+00	1.43E-03	5.60E-01	6.78E-01	3.87E-02	5.55E-01	6.94E+00	4.65E+00	5.27E+00	4.31E-02
5.24E+00	1.36E-03	5.60E-01	7.40E-01	4.53E-02	5.93E-01	7.69E+00	5.24E+00	5.86E+00	4.79E-02
5.92E+00	1.30E-03	5.60E-01	8.10E-01	5.28E-02	6.35E-01	8.53E+00	5.92E+00	6.54E+00	5.34E-02
6.69E+00	1.23E-03	5.60E-01	8.91E-01	6.11E-02	6.81E-01	9.47E+00	6.69E+00	7.31E+00	5.97E-02
7.58E+00	1.17E-03	5.60E-01	9.84E-01	7.03E-02	7.33E-01	1.05E+01	7.58E+00	8.20E+00	6.70E-02
8.59E+00	1.11E-03	5.60E-01	1.09E+00	8.05E-02	7.90E-01	1.17E+01	8.59E+00	9.21E+00	7.52E-02
9.75E+00	1.05E-03	5.60E-01	1.21E+00	9.16E-02	8.54E-01	1.31E+01	9.75E+00	1.04E+01	8.47E-02
1.11E+01	9.94E-04	5.60E-01	1.35E+00	1.04E-01	9.25E-01	1.45E+01	1.11E+01	1.17E+01	9.55E-02
1.26E+01	9.36E-04	5.60E-01	1.51E+00	1.17E-01	1.00E+00	1.62E+01	1.26E+01	1.32E+01	1.08E-01
1.43E+01	8.80E-04	5.60E-01	1.69E+00	1.30E-01	1.09E+00	1.81E+01	1.43E+01	1.50E+01	1.22E-01
1.63E+01	8.24E-04	5.60E-01	1.90E+00	1.45E-01	1.19E+00	2.02E+01	1.63E+01	1.69E+01	1.38E-01
1.86E+01	7.69E-04	5.60E-01	2.14E+00	1.61E-01	1.29E+00	2.26E+01	1.86E+01	1.92E+01	1.57E-01
2.12E+01	7.15E-04	5.60E-01	2.41E+00	1.77E-01	1.41E+00	2.52E+01	2.12E+01	2.18E+01	1.78E-01
2.42E+01	6.63E-04	5.60E-01	2.73E+00	1.95E-01	1.55E+00	2.82E+01	2.42E+01	2.48E+01	2.03E-01
2.76E+01	6.13E-04	5.60E-01	3.09E+00	2.13E-01	1.69E+00	3.15E+01	2.76E+01	2.82E+01	2.30E-01
3.15E+01	5.64E-04	5.60E-01	3.50E+00	2.31E-01	1.86E+00	3.53E+01	3.15E+01	3.21E+01	2.62E-01
3.60E+01	5.17E-04	5.60E-01	3.96E+00	2.51E-01	2.04E+00	3.95E+01	3.60E+01	3.66E+01	2.99E-01
4.11E+01	4.73E-04	5.60E-01	4.50E+00	2.70E-01	2.25E+00	4.42E+01	4.11E+01	4.17E+01	3.41E-01
4.70E+01	4.31E-04	5.60E-01	5.11E+00	2.91E-01	2.47E+00	4.95E+01	4.70E+01	4.76E+01	3.88E-01
5.37E+01	3.92E-04	5.60E-01	5.81E+00	3.11E-01	2.73E+00	5.55E+01	5.37E+01	5.43E+01	4.43E-01

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time averaged (tav = 3600. s) volume concentration: concentration in the z = 1.50 plane.

downwind distance x (m)	time of max conc (s)	cloud duration (s)	effective half width bbc (m)	average concentration (volume fraction) at (x,y,z) y/bbc= 0.0	y/bbc= 0.5	y/bbc= 1.0	y/bbc= 1.5	y/bbc= 2.0	y/bbc= 2.5
-6.23E-01	1.80E+03	3.60E+03	6.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-4.98E-01	1.80E+03	3.60E+03	6.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-3.74E-01	1.80E+03	3.60E+03	6.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-2.49E-01	1.80E+03	3.60E+03	6.49E-01	3.25E-38	2.92E-38	1.04E-38	4.69E-40	1.53E-42	0.00E+00
-1.25E-01	1.80E+03	3.60E+03	6.59E-01	2.51E-28	2.22E-28	7.88E-29	4.07E-30	1.89E-32	7.53E-36
-5.22E-08	1.80E+03	3.60E+03	6.69E-01	1.88E-22	1.63E-22	5.76E-23	3.37E-24	2.12E-26	1.13E-29
1.25E-01	1.80E+03	3.60E+03	6.80E-01	1.37E-18	1.17E-18	4.11E-19	2.68E-20	2.20E-22	2.07E-25
2.49E-01	1.80E+03	3.60E+03	6.91E-01	7.19E-16	6.00E-16	2.10E-16	1.51E-17	1.56E-19	1.96E-22
3.74E-01	1.80E+03	3.60E+03	7.03E-01	7.32E-14	6.01E-14	2.10E-14	1.64E-15	2.08E-17	3.79E-20
4.98E-01	1.80E+03	3.60E+03	7.16E-01	2.53E-12	2.04E-12	7.11E-13	5.96E-14	9.06E-16	2.25E-18
6.23E-01	1.80E+03	3.60E+03	7.29E-01	4.12E-11	3.28E-11	1.14E-11	1.02E-12	1.81E-14	5.73E-17
6.32E-01	1.80E+03	3.60E+03	7.30E-01	4.99E-11	3.97E-11	1.38E-11	1.24E-12	2.22E-14	7.11E-17

6.42E-01	1.80E+03	3.60E+03	7.31E-01	6.02E-11	4.79E-11	1.66E-11	1.50E-12	2.72E-14	8.96E-17
6.54E-01	1.80E+03	3.60E+03	7.32E-01	7.44E-11	5.90E-11	2.04E-11	1.86E-12	3.42E-14	1.15E-16
6.68E-01	1.80E+03	3.60E+03	7.33E-01	9.41E-11	7.46E-11	2.58E-11	2.36E-12	4.42E-14	1.52E-16
6.83E-01	1.80E+03	3.60E+03	7.35E-01	1.22E-10	9.69E-11	3.35E-11	3.08E-12	5.88E-14	2.09E-16
7.01E-01	1.80E+03	3.60E+03	7.37E-01	1.64E-10	1.30E-10	4.48E-11	4.15E-12	8.07E-14	2.96E-16
7.21E-01	1.80E+03	3.60E+03	7.39E-01	2.25E-10	1.77E-10	6.13E-11	5.73E-12	1.14E-13	4.35E-16
7.44E-01	1.80E+03	3.60E+03	7.42E-01	3.17E-10	2.50E-10	8.62E-11	8.15E-12	1.66E-13	6.54E-16
7.71E-01	1.80E+03	3.60E+03	7.45E-01	4.64E-10	3.64E-10	1.25E-10	1.20E-11	2.51E-13	1.04E-15
8.01E-01	1.80E+03	3.60E+03	7.48E-01	7.02E-10	5.48E-10	1.89E-10	1.83E-11	3.95E-13	1.72E-15
8.36E-01	1.80E+03	3.60E+03	7.52E-01	1.10E-09	8.58E-10	2.96E-10	2.90E-11	6.47E-13	2.98E-15
8.75E-01	1.80E+03	3.60E+03	7.56E-01	1.79E-09	1.39E-09	4.79E-10	4.77E-11	1.10E-12	5.38E-15
9.21E-01	1.80E+03	3.60E+03	7.62E-01	3.03E-09	2.34E-09	8.04E-10	8.15E-11	1.96E-12	1.03E-14
9.73E-01	1.80E+03	3.60E+03	7.68E-01	5.30E-09	4.07E-09	1.40E-09	1.44E-10	3.64E-12	2.04E-14
1.03E+00	1.80E+03	3.60E+03	7.75E-01	9.57E-09	7.32E-09	2.51E-09	2.64E-10	6.99E-12	4.26E-14
1.10E+00	1.80E+03	3.60E+03	7.83E-01	1.78E-08	1.36E-08	4.64E-09	4.99E-10	1.39E-11	9.20E-14
1.18E+00	1.80E+03	3.60E+03	7.92E-01	3.41E-08	2.58E-08	8.81E-09	9.69E-10	2.85E-11	2.07E-13
1.27E+00	1.80E+03	3.60E+03	8.03E-01	6.66E-08	5.00E-08	1.71E-08	1.92E-09	6.00E-11	4.79E-13
1.37E+00	1.80E+03	3.60E+03	8.16E-01	1.32E-07	9.85E-08	3.35E-08	3.87E-09	1.29E-10	1.14E-12
1.49E+00	1.80E+03	3.60E+03	8.31E-01	2.64E-07	1.96E-07	6.64E-08	7.87E-09	2.78E-10	2.74E-12
1.62E+00	1.80E+03	3.60E+03	8.48E-01	5.29E-07	3.89E-07	1.32E-07	1.60E-08	6.05E-10	6.61E-12
1.77E+00	1.80E+03	3.60E+03	8.68E-01	1.05E-06	7.68E-07	2.59E-07	3.24E-08	1.31E-09	1.60E-11
1.95E+00	1.80E+03	3.60E+03	8.92E-01	2.07E-06	1.50E-06	5.03E-07	6.45E-08	2.78E-09	3.79E-11
2.15E+00	1.80E+03	3.60E+03	9.19E-01	3.97E-06	2.85E-06	9.55E-07	1.26E-07	5.78E-09	8.78E-11
2.38E+00	1.80E+03	3.60E+03	9.52E-01	7.40E-06	5.28E-06	1.76E-06	2.37E-07	1.16E-08	1.96E-10
2.64E+00	1.80E+03	3.60E+03	9.90E-01	1.33E-05	9.44E-06	3.14E-06	4.32E-07	2.25E-08	4.20E-10
2.94E+00	1.80E+03	3.60E+03	1.03E+00	2.30E-05	1.62E-05	5.37E-06	7.55E-07	4.15E-08	8.53E-10
3.29E+00	1.80E+03	3.60E+03	1.09E+00	3.80E-05	2.66E-05	8.80E-06	1.26E-06	7.28E-08	1.63E-09
3.68E+00	1.80E+03	3.60E+03	1.15E+00	5.97E-05	4.17E-05	1.37E-05	1.99E-06	1.21E-07	2.92E-09
4.13E+00	1.80E+03	3.60E+03	1.22E+00	8.92E-05	6.20E-05	2.04E-05	3.00E-06	1.88E-07	4.89E-09
4.65E+00	1.80E+03	3.60E+03	1.30E+00	1.27E-04	8.77E-05	2.87E-05	4.27E-06	2.77E-07	7.65E-09
5.24E+00	1.80E+03	3.60E+03	1.40E+00	1.70E-04	1.18E-04	3.85E-05	5.77E-06	3.85E-07	1.12E-08
5.92E+00	1.80E+03	3.60E+03	1.51E+00	2.18E-04	1.50E-04	4.90E-05	7.40E-06	5.04E-07	1.52E-08
6.69E+00	1.80E+03	3.60E+03	1.64E+00	2.65E-04	1.82E-04	5.94E-05	9.01E-06	6.25E-07	1.95E-08
7.58E+00	1.80E+03	3.60E+03	1.79E+00	3.07E-04	2.11E-04	6.88E-05	1.05E-05	7.35E-07	2.35E-08
8.59E+00	1.80E+03	3.60E+03	1.97E+00	3.40E-04	2.34E-04	7.62E-05	1.16E-05	8.24E-07	2.69E-08
9.75E+00	1.80E+03	3.60E+03	2.17E+00	3.62E-04	2.49E-04	8.09E-05	1.24E-05	8.83E-07	2.92E-08
1.11E+01	1.81E+03	3.60E+03	2.41E+00	3.71E-04	2.55E-04	8.28E-05	1.27E-05	9.09E-07	3.04E-08
1.26E+01	1.81E+03	3.60E+03	2.68E+00	3.66E-04	2.52E-04	8.18E-05	1.25E-05	9.02E-07	3.04E-08
1.43E+01	1.81E+03	3.60E+03	2.99E+00	3.51E-04	2.41E-04	7.83E-05	1.20E-05	8.65E-07	2.93E-08
1.63E+01	1.81E+03	3.60E+03	3.34E+00	3.26E-04	2.24E-04	7.28E-05	1.12E-05	8.07E-07	2.74E-08
1.86E+01	1.81E+03	3.60E+03	3.75E+00	2.96E-04	2.04E-04	6.61E-05	1.01E-05	7.33E-07	2.50E-08
2.12E+01	1.81E+03	3.60E+03	4.22E+00	2.63E-04	1.81E-04	5.87E-05	9.00E-06	6.52E-07	2.22E-08
2.42E+01	1.81E+03	3.60E+03	4.76E+00	2.29E-04	1.58E-04	5.11E-05	7.84E-06	5.68E-07	1.94E-08
2.76E+01	1.81E+03	3.60E+03	5.37E+00	1.96E-04	1.35E-04	4.38E-05	6.71E-06	4.86E-07	1.66E-08
3.15E+01	1.82E+03	3.60E+03	6.08E+00	1.66E-04	1.14E-04	3.69E-05	5.66E-06	4.10E-07	1.40E-08
3.60E+01	1.82E+03	3.60E+03	6.89E+00	1.38E-04	9.47E-05	3.08E-05	4.72E-06	3.42E-07	1.17E-08
4.11E+01	1.82E+03	3.60E+03	7.81E+00	1.14E-04	7.80E-05	2.53E-05	3.89E-06	2.81E-07	9.63E-09
4.70E+01	1.82E+03	3.60E+03	8.87E+00	9.27E-05	6.37E-05	2.07E-05	3.17E-06	2.30E-07	7.85E-09
5.37E+01	1.83E+03	3.60E+03	1.01E+01	7.50E-05	5.15E-05	1.67E-05	2.57E-06	1.86E-07	6.34E-09

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time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

downwind distance x (m)	height z (m)	maximum concentration c(x,0,z)	time of max conc (s)	cloud duration (s)
-6.23E-01	0.00E+00	0.00E+00	1.80E+03	3.60E+03
-4.98E-01	0.00E+00	1.59E-02	1.80E+03	3.60E+03
-3.74E-01	0.00E+00	1.85E-02	1.80E+03	3.60E+03
-2.49E-01	0.00E+00	2.01E-02	1.80E+03	3.60E+03
-1.25E-01	0.00E+00	2.12E-02	1.80E+03	3.60E+03
-5.22E-08	0.00E+00	2.21E-02	1.80E+03	3.60E+03
1.25E-01	0.00E+00	2.28E-02	1.80E+03	3.60E+03
2.49E-01	0.00E+00	2.34E-02	1.80E+03	3.60E+03
3.74E-01	0.00E+00	2.39E-02	1.80E+03	3.60E+03
4.98E-01	0.00E+00	2.42E-02	1.80E+03	3.60E+03
6.23E-01	0.00E+00	2.45E-02	1.80E+03	3.60E+03
6.32E-01	0.00E+00	2.43E-02	1.80E+03	3.60E+03
6.42E-01	0.00E+00	2.42E-02	1.80E+03	3.60E+03
6.54E-01	0.00E+00	2.40E-02	1.80E+03	3.60E+03
6.68E-01	0.00E+00	2.37E-02	1.80E+03	3.60E+03
6.83E-01	0.00E+00	2.35E-02	1.80E+03	3.60E+03
7.01E-01	0.00E+00	2.32E-02	1.80E+03	3.60E+03
7.21E-01	0.00E+00	2.29E-02	1.80E+03	3.60E+03
7.44E-01	0.00E+00	2.25E-02	1.80E+03	3.60E+03
7.71E-01	0.00E+00	2.21E-02	1.80E+03	3.60E+03
8.01E-01	0.00E+00	2.17E-02	1.80E+03	3.60E+03
8.36E-01	0.00E+00	2.12E-02	1.80E+03	3.60E+03
8.75E-01	0.00E+00	2.07E-02	1.80E+03	3.60E+03
9.21E-01	0.00E+00	2.02E-02	1.80E+03	3.60E+03

9.73E-01	0.00E+00	1.95E-02	1.80E+03	3.60E+03
1.03E+00	0.00E+00	1.89E-02	1.80E+03	3.60E+03
1.10E+00	0.00E+00	1.82E-02	1.80E+03	3.60E+03
1.18E+00	0.00E+00	1.74E-02	1.80E+03	3.60E+03
1.27E+00	0.00E+00	1.66E-02	1.80E+03	3.60E+03
1.37E+00	0.00E+00	1.58E-02	1.80E+03	3.60E+03
1.49E+00	0.00E+00	1.49E-02	1.80E+03	3.60E+03
1.62E+00	0.00E+00	1.39E-02	1.80E+03	3.60E+03
1.77E+00	0.00E+00	1.30E-02	1.80E+03	3.60E+03
1.95E+00	0.00E+00	1.20E-02	1.80E+03	3.60E+03
2.15E+00	0.00E+00	1.10E-02	1.80E+03	3.60E+03
2.38E+00	0.00E+00	1.01E-02	1.80E+03	3.60E+03
2.64E+00	0.00E+00	9.09E-03	1.80E+03	3.60E+03
2.94E+00	0.00E+00	8.15E-03	1.80E+03	3.60E+03
3.29E+00	0.00E+00	7.23E-03	1.80E+03	3.60E+03
3.68E+00	0.00E+00	6.36E-03	1.80E+03	3.60E+03
4.13E+00	0.00E+00	5.55E-03	1.80E+03	3.60E+03
4.65E+00	0.00E+00	4.79E-03	1.80E+03	3.60E+03
5.24E+00	0.00E+00	4.10E-03	1.80E+03	3.60E+03
5.92E+00	0.00E+00	3.48E-03	1.80E+03	3.60E+03
6.69E+00	0.00E+00	2.93E-03	1.80E+03	3.60E+03
7.58E+00	0.00E+00	2.44E-03	1.80E+03	3.60E+03
8.59E+00	0.00E+00	2.02E-03	1.80E+03	3.60E+03
9.75E+00	0.00E+00	1.66E-03	1.80E+03	3.60E+03
1.11E+01	0.00E+00	1.36E-03	1.81E+03	3.60E+03
1.26E+01	0.00E+00	1.10E-03	1.81E+03	3.60E+03
1.43E+01	0.00E+00	8.93E-04	1.81E+03	3.60E+03
1.63E+01	0.00E+00	7.18E-04	1.81E+03	3.60E+03
1.86E+01	0.00E+00	5.75E-04	1.81E+03	3.60E+03
2.12E+01	0.00E+00	4.58E-04	1.81E+03	3.60E+03
2.42E+01	0.00E+00	3.64E-04	1.81E+03	3.60E+03
2.76E+01	0.00E+00	2.89E-04	1.81E+03	3.60E+03
3.15E+01	0.00E+00	2.28E-04	1.82E+03	3.60E+03
3.60E+01	0.00E+00	1.80E-04	1.82E+03	3.60E+03
4.11E+01	0.00E+00	1.41E-04	1.82E+03	3.60E+03
4.70E+01	0.00E+00	1.11E-04	1.82E+03	3.60E+03
5.37E+01	0.00E+00	8.71E-05	1.83E+03	3.60E+03

SLAB MODELING RESULTS: ALTERNATIVE SCENARIO, DISTANCE TO 200 PPM AMMONIA

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                    SESSION INFORMATION

          INPUT DATA FILE NAME :  ALTSM1.DTA
          OUTPUT LIST FILE NAME : ALTSM1.LST


          GRAPHICS DATA FILE NAME : ALTSM1.DAT
          GRAPHICS PLOT FILE NAME : ALTSM1.XZ




problem input

  idspl =         1
  ncalc =         1
  wms   =   .017031
  cps   =   2170.00
  tbp   =    240.00
  cmed0 =       .00

  dhe   =  1370840.
  cpsl  =   4294.00
  rhosl =    682.80
  spb   =   2132.52
  spc   =    -32.98
  ts    =    239.00
  qs    =       .01
  as    =      1.55
  tsd   =     3600.
  qtis  =       .00
  hs    =       .00
  tav   =   3600.00
  xffm  =     27.22
  zp(1) =      1.50
  zp(2) =       .00
  zp(3) =       .00
  zp(4) =       .00
  z0    =   .010000
  za    =     10.00
  ua    =      3.00
  ta    =    300.37
  rh    =     50.00
  stab  =      4.00


release gas properties

 molecular weight of source gas (kg)              - wms  =  1.7031E-02
 vapor heat capacity, const. p.  (j/kg-k)         - cps  =  2.1700E+03
```

```
 temperature of source gas (k)                      - ts   =  2.4000E+02
 density of source gas (kg/m3)                      - rhos =  8.6481E-01
 boiling point temperature                          - tbp  =  2.4000E+02
 liquid mass fraction                               - cmed0=  0.0000E+00
 liquid heat capacity (j/kg-k)                      - cpsl =  4.2940E+03

 heat of vaporization (j/kg)                        - dhe  =  1.3708E+06
 liquid source density (kg/m3)                      - rhosl=  6.8280E+02
 saturation pressure constant                       - spa  =  1.0301E+01
 saturation pressure constant (k)                   - spb  =  2.1325E+03
 saturation pressure constant (k)                   - spc  = -3.2980E+01


spill characteristics

 spill type                                         - idspl=          1
 mass source rate (kg/s)                            - qs   =  6.8494E-03
 continuous source duration (s)                     - tsd  =  3.6000E+03
 continuous source mass (kg)                        - qtcs =  2.4658E+01
 instantaneous source mass (kg)                     - qtis =  0.0000E+00
 source area (m2)                                   - as   =  1.5520E+00
 vertical vapor velocity (m/s)                      - ws   =  5.1031E-03
 source half width (m)                              - bs   =  6.2290E-01
 source height (m)                                  - hs   =  0.0000E+00
 horizontal vapor velocity (m/s)                    - us   =  0.0000E+00


field parameters

 concentration averaging time (s)                   - tav  =  3.6000E+03
 mixing layer height (m)                            - hmx  =  1.0400E+03
 maximum downwind distrace (m)                      - xffm =  2.7220E+01
 concentration measurement height (m)               - zp(1)=  1.5000E+00
                                                    - zp(2)=  0.0000E+00
                                                    - zp(3)=  0.0000E+00
                                                    - zp(4)=  0.0000E+00


ambient meteorological properties

 molecular weight of ambient air (kg)             - wmae  =  2.8754E-02
 heat capacity of ambient air at const p. (j/kg-k)- cpaa  =  1.0158E+03
 density of ambient air (kg/m3)                   - rhoa  =  1.1666E+00
 ambient measurement height (m)                   - za    =  1.0000E+01
 ambient atmospheric pressure (pa=n/m2=j/m3)      - pa    =  1.0133E+05
 ambient wind speed (m/s)                         - ua    =  3.0000E+00
 ambient temperature (k)                          - ta    =  3.0037E+02
 relative humidity (percent)                      - rh    =  5.0000E+01
 ambient friction velocity (m/s)                  - uastr =  1.7831E-01
 atmospheric stability class value                - stab  =  4.0000E+00
 inverse monin-obukhov length (1/m)               - ala   =  0.0000E+00
 surface roughness height (m)                     - z0    =  1.0000E-02


additional parameters

 sub-step multiplier                              - ncalc =          1
```

```
 number of calculational sub-steps                    - nssm  =          3
 acceleration of gravity (m/s2)                       - grav  =  9.8067E+00
 gas constant (j/mol- k)                              - rr    =  8.3143E+00
 von karman constant                                  - xk    =  4.1000E-01
1
```

instantaneous spatially averaged cloud parameters

x	zc	h	bb	b	bbx	bx	cv	rho	t	u	ua
-6.23E-01	0.00E+00	0.00E+00	6.23E-01	5.61E-01	6.23E-01	6.23E-01	0.00E+00	1.17E+00	3.00E+02	0.00E+00	0.00E+00
-4.98E-01	0.00E+00	1.14E-01	6.32E-01	5.61E-01	6.85E-01	6.85E-01	1.02E-02	1.16E+00	3.00E+02	6.75E-01	6.79E-01
-3.74E-01	0.00E+00	1.62E-01	6.39E-01	5.61E-01	7.47E-01	7.47E-01	1.18E-02	1.16E+00	3.00E+02	8.11E-01	8.17E-01
-2.49E-01	0.00E+00	2.02E-01	6.46E-01	5.61E-01	8.10E-01	8.10E-01	1.26E-02	1.16E+00	2.99E+02	8.97E-01	9.05E-01
-1.25E-01	0.00E+00	2.38E-01	6.53E-01	5.61E-01	8.72E-01	8.72E-01	1.33E-02	1.16E+00	2.99E+02	9.60E-01	9.70E-01
-5.22E-08	0.00E+00	2.70E-01	6.60E-01	5.61E-01	9.34E-01	9.34E-01	1.37E-02	1.16E+00	2.99E+02	1.01E+00	1.02E+00
1.25E-01	0.00E+00	3.01E-01	6.67E-01	5.61E-01	9.97E-01	9.97E-01	1.40E-02	1.16E+00	2.99E+02	1.05E+00	1.07E+00
2.49E-01	0.00E+00	3.29E-01	6.74E-01	5.61E-01	1.06E+00	1.06E+00	1.43E-02	1.16E+00	2.99E+02	1.09E+00	1.10E+00
3.74E-01	0.00E+00	3.57E-01	6.81E-01	5.61E-01	1.12E+00	1.12E+00	1.45E-02	1.16E+00	2.99E+02	1.12E+00	1.14E+00
4.98E-01	0.00E+00	3.83E-01	6.89E-01	5.61E-01	1.18E+00	1.18E+00	1.47E-02	1.16E+00	2.99E+02	1.15E+00	1.17E+00
6.23E-01	0.00E+00	4.09E-01	6.96E-01	5.61E-01	1.25E+00	1.25E+00	1.48E-02	1.16E+00	2.99E+02	1.17E+00	1.19E+00
6.31E-01	5.86E-07	4.11E-01	6.96E-01	5.61E-01	1.25E+00	1.25E+00	1.47E-02	1.16E+00	2.99E+02	1.17E+00	1.20E+00
6.40E-01	2.64E-06	4.12E-01	6.97E-01	5.61E-01	1.26E+00	1.26E+00	1.46E-02	1.16E+00	2.99E+02	1.17E+00	1.20E+00
6.50E-01	6.70E-06	4.14E-01	6.97E-01	5.61E-01	1.27E+00	1.27E+00	1.45E-02	1.16E+00	2.99E+02	1.18E+00	1.20E+00
6.62E-01	1.35E-05	4.17E-01	6.98E-01	5.61E-01	1.28E+00	1.28E+00	1.44E-02	1.16E+00	2.99E+02	1.18E+00	1.20E+00
6.75E-01	2.38E-05	4.19E-01	6.99E-01	5.61E-01	1.30E+00	1.30E+00	1.43E-02	1.16E+00	2.99E+02	1.18E+00	1.21E+00
6.90E-01	3.89E-05	4.22E-01	7.00E-01	5.61E-01	1.31E+00	1.31E+00	1.41E-02	1.16E+00	2.99E+02	1.18E+00	1.21E+00
7.06E-01	6.01E-05	4.25E-01	7.01E-01	5.61E-01	1.33E+00	1.33E+00	1.40E-02	1.16E+00	2.99E+02	1.19E+00	1.21E+00
7.25E-01	8.93E-05	4.29E-01	7.02E-01	5.61E-01	1.35E+00	1.35E+00	1.38E-02	1.16E+00	2.99E+02	1.19E+00	1.21E+00
7.46E-01	1.29E-04	4.33E-01	7.03E-01	5.61E-01	1.37E+00	1.37E+00	1.36E-02	1.16E+00	2.99E+02	1.19E+00	1.22E+00
7.70E-01	1.81E-04	4.37E-01	7.04E-01	5.61E-01	1.39E+00	1.39E+00	1.34E-02	1.16E+00	2.99E+02	1.20E+00	1.22E+00
7.97E-01	2.49E-04	4.42E-01	7.06E-01	5.61E-01	1.42E+00	1.42E+00	1.32E-02	1.16E+00	2.99E+02	1.20E+00	1.23E+00
8.28E-01	3.38E-04	4.48E-01	7.07E-01	5.61E-01	1.45E+00	1.45E+00	1.29E-02	1.16E+00	2.99E+02	1.21E+00	1.23E+00
8.62E-01	4.52E-04	4.54E-01	7.09E-01	5.61E-01	1.48E+00	1.48E+00	1.26E-02	1.16E+00	2.99E+02	1.22E+00	1.24E+00
9.01E-01	5.98E-04	4.61E-01	7.12E-01	5.61E-01	1.52E+00	1.52E+00	1.23E-02	1.16E+00	3.00E+02	1.22E+00	1.24E+00
9.45E-01	7.83E-04	4.68E-01	7.14E-01	5.61E-01	1.57E+00	1.57E+00	1.20E-02	1.16E+00	3.00E+02	1.23E+00	1.25E+00
9.94E-01	1.02E-03	4.77E-01	7.17E-01	5.61E-01	1.62E+00	1.62E+00	1.17E-02	1.16E+00	3.00E+02	1.24E+00	1.26E+00
1.05E+00	1.31E-03	4.87E-01	7.20E-01	5.61E-01	1.67E+00	1.67E+00	1.13E-02	1.16E+00	3.00E+02	1.25E+00	1.27E+00
1.11E+00	1.67E-03	4.98E-01	7.24E-01	5.61E-01	1.74E+00	1.74E+00	1.09E-02	1.16E+00	3.00E+02	1.26E+00	1.28E+00
1.18E+00	2.11E-03	5.10E-01	7.28E-01	5.61E-01	1.81E+00	1.81E+00	1.05E-02	1.16E+00	3.00E+02	1.27E+00	1.29E+00
1.26E+00	2.66E-03	5.23E-01	7.32E-01	5.61E-01	1.89E+00	1.89E+00	1.01E-02	1.16E+00	3.00E+02	1.28E+00	1.30E+00
1.36E+00	3.32E-03	5.38E-01	7.38E-01	5.61E-01	1.98E+00	1.98E+00	9.64E-03	1.16E+00	3.00E+02	1.29E+00	1.31E+00
1.46E+00	4.13E-03	5.55E-01	7.43E-01	5.61E-01	2.08E+00	2.08E+00	9.18E-03	1.16E+00	3.00E+02	1.31E+00	1.32E+00
1.57E+00	5.10E-03	5.74E-01	7.50E-01	5.61E-01	2.20E+00	2.20E+00	8.71E-03	1.16E+00	3.00E+02	1.32E+00	1.34E+00
1.70E+00	6.26E-03	5.94E-01	7.57E-01	5.61E-01	2.33E+00	2.33E+00	8.23E-03	1.16E+00	3.00E+02	1.34E+00	1.35E+00
1.85E+00	7.64E-03	6.17E-01	7.66E-01	5.61E-01	2.47E+00	2.47E+00	7.74E-03	1.16E+00	3.00E+02	1.35E+00	1.37E+00
2.02E+00	9.27E-03	6.43E-01	7.75E-01	5.61E-01	2.64E+00	2.64E+00	7.25E-03	1.17E+00	3.00E+02	1.37E+00	1.39E+00
2.20E+00	1.12E-02	6.71E-01	7.86E-01	5.61E-01	2.83E+00	2.83E+00	6.76E-03	1.17E+00	3.00E+02	1.39E+00	1.40E+00
2.42E+00	1.34E-02	7.02E-01	7.98E-01	5.61E-01	3.04E+00	3.04E+00	6.27E-03	1.17E+00	3.00E+02	1.41E+00	1.42E+00
2.65E+00	1.60E-02	7.36E-01	8.11E-01	5.61E-01	3.28E+00	3.28E+00	5.79E-03	1.17E+00	3.00E+02	1.43E+00	1.44E+00
2.92E+00	1.90E-02	7.74E-01	8.27E-01	5.60E-01	3.55E+00	3.55E+00	5.33E-03	1.17E+00	3.00E+02	1.45E+00	1.46E+00
3.23E+00	2.25E-02	8.16E-01	8.44E-01	5.60E-01	3.85E+00	3.85E+00	4.87E-03	1.17E+00	3.00E+02	1.48E+00	1.49E+00
3.57E+00	2.64E-02	8.62E-01	8.63E-01	5.60E-01	4.20E+00	4.20E+00	4.44E-03	1.17E+00	3.00E+02	1.50E+00	1.51E+00
3.96E+00	3.08E-02	9.13E-01	8.85E-01	5.60E-01	4.58E+00	4.58E+00	4.02E-03	1.17E+00	3.00E+02	1.52E+00	1.54E+00
4.40E+00	3.58E-02	9.69E-01	9.10E-01	5.60E-01	5.02E+00	5.02E+00	3.62E-03	1.17E+00	3.00E+02	1.55E+00	1.56E+00
4.89E+00	4.14E-02	1.03E+00	9.38E-01	5.60E-01	5.52E+00	5.52E+00	3.25E-03	1.17E+00	3.00E+02	1.58E+00	1.59E+00
5.45E+00	4.77E-02	1.10E+00	9.70E-01	5.60E-01	6.07E+00	6.07E+00	2.90E-03	1.17E+00	3.00E+02	1.60E+00	1.61E+00
6.08E+00	5.46E-02	1.17E+00	1.01E+00	5.60E-01	6.70E+00	6.70E+00	2.58E-03	1.17E+00	3.00E+02	1.63E+00	1.64E+00
6.79E+00	6.22E-02	1.25E+00	1.05E+00	5.60E-01	7.41E+00	7.41E+00	2.28E-03	1.17E+00	3.00E+02	1.66E+00	1.67E+00
7.59E+00	7.06E-02	1.34E+00	1.09E+00	5.60E-01	8.22E+00	8.22E+00	2.00E-03	1.17E+00	3.00E+02	1.69E+00	1.70E+00
8.50E+00	7.96E-02	1.44E+00	1.14E+00	5.60E-01	9.12E+00	9.12E+00	1.75E-03	1.17E+00	3.00E+02	1.72E+00	1.73E+00
9.52E+00	8.95E-02	1.55E+00	1.20E+00	5.60E-01	1.01E+01	1.01E+01	1.52E-03	1.17E+00	3.00E+02	1.75E+00	1.76E+00
1.07E+01	1.00E-01	1.66E+00	1.26E+00	5.60E-01	1.13E+01	1.13E+01	1.32E-03	1.17E+00	3.00E+02	1.78E+00	1.79E+00
1.20E+01	1.11E-01	1.79E+00	1.34E+00	5.60E-01	1.26E+01	1.26E+01	1.14E-03	1.17E+00	3.00E+02	1.82E+00	1.83E+00
1.34E+01	1.24E-01	1.94E+00	1.42E+00	5.60E-01	1.41E+01	1.41E+01	9.75E-04	1.17E+00	3.00E+02	1.85E+00	1.86E+00
1.51E+01	1.36E-01	2.09E+00	1.51E+00	5.60E-01	1.57E+01	1.57E+01	8.32E-04	1.17E+00	3.00E+02	1.88E+00	1.89E+00
1.70E+01	1.50E-01	2.26E+00	1.62E+00	5.60E-01	1.76E+01	1.76E+01	7.07E-04	1.17E+00	3.00E+02	1.92E+00	1.92E+00
1.91E+01	1.64E-01	2.45E+00	1.74E+00	5.60E-01	1.97E+01	1.97E+01	5.97E-04	1.17E+00	3.00E+02	1.95E+00	1.96E+00
2.15E+01	1.79E-01	2.65E+00	1.87E+00	5.60E-01	2.21E+01	2.21E+01	5.03E-04	1.17E+00	3.00E+02	1.99E+00	1.99E+00
2.42E+01	1.95E-01	2.87E+00	2.02E+00	5.60E-01	2.48E+01	2.48E+01	4.22E-04	1.17E+00	3.00E+02	2.02E+00	2.03E+00
2.72E+01	2.11E-01	3.12E+00	2.19E+00	5.60E-01	2.78E+01	2.78E+01	3.52E-04	1.17E+00	3.00E+02	2.06E+00	2.06E+00

1

x	cm	cmv	cmda	cmw	cmwv	wc	vg	ug	w	v	vx
-6.23E-01	0.00E+00	0.00E+00	9.88E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	7.34E-01	9.76E-02	0.00E+00
-4.98E-01	6.08E-03	6.08E-03	9.82E-01	1.18E-02	1.18E-02	0.00E+00	0.00E+00	0.00E+00	2.72E-01	2.20E-02	2.01E-01
-3.74E-01	7.00E-03	7.00E-03	9.81E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.38E-01	2.65E-02	2.17E-01
-2.49E-01	7.53E-03	7.53E-03	9.81E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.20E-01	2.94E-02	2.25E-01
-1.25E-01	7.89E-03	7.89E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.09E-01	3.15E-02	2.30E-01

-5.22E-08	8.16E-03	8.16E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.01E-01	3.32E-02	2.34E-01
1.25E-01	8.37E-03	8.37E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.95E-01	3.46E-02	2.37E-01
2.49E-01	8.53E-03	8.53E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.90E-01	3.59E-02	2.39E-01
3.74E-01	8.65E-03	8.65E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.85E-01	3.70E-02	2.41E-01
4.98E-01	8.75E-03	8.75E-03	9.80E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.82E-01	3.79E-02	2.42E-01
6.23E-01	8.84E-03	8.84E-03	9.79E-01	1.17E-02	1.17E-02	0.00E+00	0.00E+00	0.00E+00	1.78E-01	3.88E-02	2.44E-01
6.31E-01	8.79E-03	8.79E-03	9.79E-01	1.17E-02	1.17E-02	1.70E-04	0.00E+00	0.00E+00	1.78E-01	3.89E-02	2.44E-01
6.40E-01	8.73E-03	8.73E-03	9.80E-01	1.17E-02	1.17E-02	3.60E-04	0.00E+00	0.00E+00	1.78E-01	3.89E-02	2.44E-01
6.50E-01	8.66E-03	8.66E-03	9.80E-01	1.17E-02	1.17E-02	5.71E-04	0.00E+00	0.00E+00	1.78E-01	3.90E-02	2.44E-01
6.62E-01	8.59E-03	8.59E-03	9.80E-01	1.17E-02	1.17E-02	8.06E-04	0.00E+00	0.00E+00	1.77E-01	3.91E-02	2.44E-01
6.75E-01	8.51E-03	8.51E-03	9.80E-01	1.17E-02	1.17E-02	1.07E-03	0.00E+00	0.00E+00	1.77E-01	3.92E-02	2.44E-01
6.90E-01	8.43E-03	8.43E-03	9.80E-01	1.17E-02	1.17E-02	1.35E-03	0.00E+00	0.00E+00	1.77E-01	3.92E-02	2.44E-01
7.06E-01	8.33E-03	8.33E-03	9.80E-01	1.17E-02	1.17E-02	1.67E-03	0.00E+00	0.00E+00	1.76E-01	3.94E-02	2.44E-01
7.25E-01	8.22E-03	8.22E-03	9.80E-01	1.17E-02	1.17E-02	2.02E-03	0.00E+00	0.00E+00	1.76E-01	3.95E-02	2.45E-01
7.46E-01	8.11E-03	8.11E-03	9.80E-01	1.17E-02	1.17E-02	2.40E-03	0.00E+00	0.00E+00	1.75E-01	3.96E-02	2.45E-01
7.70E-01	7.98E-03	7.98E-03	9.80E-01	1.17E-02	1.17E-02	2.82E-03	0.00E+00	0.00E+00	1.75E-01	3.97E-02	2.45E-01
7.97E-01	7.84E-03	7.84E-03	9.80E-01	1.17E-02	1.17E-02	3.27E-03	0.00E+00	0.00E+00	1.74E-01	3.99E-02	2.45E-01
8.28E-01	7.69E-03	7.69E-03	9.81E-01	1.17E-02	1.17E-02	3.76E-03	0.00E+00	0.00E+00	1.73E-01	4.00E-02	2.45E-01
8.62E-01	7.52E-03	7.52E-03	9.81E-01	1.17E-02	1.17E-02	4.29E-03	0.00E+00	0.00E+00	1.73E-01	4.02E-02	2.46E-01
9.01E-01	7.34E-03	7.34E-03	9.81E-01	1.17E-02	1.17E-02	4.86E-03	0.00E+00	0.00E+00	1.72E-01	4.04E-02	2.46E-01
9.45E-01	7.15E-03	7.15E-03	9.81E-01	1.17E-02	1.17E-02	5.47E-03	0.00E+00	0.00E+00	1.71E-01	4.07E-02	2.46E-01
9.94E-01	6.95E-03	6.95E-03	9.81E-01	1.17E-02	1.17E-02	6.12E-03	0.00E+00	0.00E+00	1.70E-01	4.09E-02	2.47E-01
1.05E+00	6.73E-03	6.73E-03	9.82E-01	1.17E-02	1.17E-02	6.80E-03	0.00E+00	0.00E+00	1.69E-01	4.12E-02	2.47E-01
1.11E+00	6.50E-03	6.50E-03	9.82E-01	1.17E-02	1.17E-02	7.52E-03	0.00E+00	0.00E+00	1.68E-01	4.15E-02	2.48E-01
1.18E+00	6.25E-03	6.25E-03	9.82E-01	1.17E-02	1.17E-02	8.26E-03	0.00E+00	0.00E+00	1.67E-01	4.18E-02	2.48E-01
1.26E+00	6.00E-03	6.00E-03	9.82E-01	1.18E-02	1.18E-02	9.03E-03	0.00E+00	0.00E+00	1.66E-01	4.22E-02	2.49E-01
1.36E+00	5.73E-03	5.73E-03	9.83E-01	1.18E-02	1.18E-02	9.82E-03	0.00E+00	0.00E+00	1.65E-01	4.25E-02	2.49E-01
1.46E+00	5.46E-03	5.46E-03	9.83E-01	1.18E-02	1.18E-02	1.06E-02	0.00E+00	0.00E+00	1.64E-01	4.30E-02	2.50E-01
1.57E+00	5.18E-03	5.18E-03	9.83E-01	1.18E-02	1.18E-02	1.14E-02	0.00E+00	0.00E+00	1.63E-01	4.34E-02	2.50E-01
1.70E+00	4.89E-03	4.89E-03	9.83E-01	1.18E-02	1.18E-02	1.22E-02	0.00E+00	0.00E+00	1.61E-01	4.39E-02	2.51E-01
1.85E+00	4.60E-03	4.60E-03	9.84E-01	1.18E-02	1.18E-02	1.30E-02	0.00E+00	0.00E+00	1.60E-01	4.44E-02	2.51E-01
2.02E+00	4.31E-03	4.31E-03	9.84E-01	1.18E-02	1.18E-02	1.37E-02	0.00E+00	0.00E+00	1.58E-01	4.50E-02	2.52E-01
2.20E+00	4.01E-03	4.01E-03	9.84E-01	1.18E-02	1.18E-02	1.45E-02	0.00E+00	0.00E+00	1.57E-01	4.55E-02	2.53E-01
2.42E+00	3.72E-03	3.72E-03	9.84E-01	1.18E-02	1.18E-02	1.51E-02	0.00E+00	0.00E+00	1.55E-01	4.62E-02	2.53E-01
2.65E+00	3.44E-03	3.44E-03	9.85E-01	1.18E-02	1.18E-02	1.57E-02	0.00E+00	0.00E+00	1.53E-01	4.68E-02	2.54E-01
2.92E+00	3.16E-03	3.16E-03	9.85E-01	1.18E-02	1.18E-02	1.63E-02	0.00E+00	0.00E+00	1.52E-01	4.75E-02	2.55E-01
3.23E+00	2.89E-03	2.89E-03	9.85E-01	1.18E-02	1.18E-02	1.68E-02	0.00E+00	0.00E+00	1.50E-01	4.82E-02	2.56E-01
3.57E+00	2.63E-03	2.63E-03	9.86E-01	1.18E-02	1.18E-02	1.72E-02	0.00E+00	0.00E+00	1.48E-01	4.90E-02	2.56E-01
3.96E+00	2.39E-03	2.39E-03	9.86E-01	1.18E-02	1.18E-02	1.75E-02	0.00E+00	0.00E+00	1.46E-01	4.98E-02	2.57E-01
4.40E+00	2.15E-03	2.15E-03	9.86E-01	1.18E-02	1.18E-02	1.77E-02	0.00E+00	0.00E+00	1.44E-01	5.06E-02	2.58E-01
4.89E+00	1.93E-03	1.93E-03	9.86E-01	1.18E-02	1.18E-02	1.78E-02	0.00E+00	0.00E+00	1.42E-01	5.14E-02	2.58E-01
5.45E+00	1.72E-03	1.72E-03	9.86E-01	1.18E-02	1.18E-02	1.78E-02	0.00E+00	0.00E+00	1.40E-01	5.23E-02	2.59E-01
6.08E+00	1.53E-03	1.53E-03	9.87E-01	1.18E-02	1.18E-02	1.77E-02	0.00E+00	0.00E+00	1.38E-01	5.32E-02	2.60E-01
6.79E+00	1.35E-03	1.35E-03	9.87E-01	1.18E-02	1.18E-02	1.76E-02	0.00E+00	0.00E+00	1.36E-01	5.42E-02	2.60E-01
7.59E+00	1.19E-03	1.19E-03	9.87E-01	1.18E-02	1.18E-02	1.73E-02	0.00E+00	0.00E+00	1.34E-01	5.51E-02	2.61E-01
8.50E+00	1.04E-03	1.04E-03	9.87E-01	1.18E-02	1.18E-02	1.69E-02	0.00E+00	0.00E+00	1.32E-01	5.61E-02	2.62E-01
9.52E+00	9.03E-04	9.03E-04	9.87E-01	1.18E-02	1.18E-02	1.65E-02	0.00E+00	0.00E+00	1.31E-01	5.71E-02	2.62E-01
1.07E+01	7.82E-04	7.82E-04	9.87E-01	1.18E-02	1.18E-02	1.60E-02	0.00E+00	0.00E+00	1.29E-01	5.81E-02	2.63E-01
1.20E+01	6.74E-04	6.74E-04	9.88E-01	1.18E-02	1.18E-02	1.54E-02	0.00E+00	0.00E+00	1.27E-01	5.91E-02	2.63E-01
1.34E+01	5.78E-04	5.78E-04	9.88E-01	1.18E-02	1.18E-02	1.48E-02	0.00E+00	0.00E+00	1.25E-01	6.01E-02	2.64E-01
1.51E+01	4.93E-04	4.93E-04	9.88E-01	1.18E-02	1.18E-02	1.41E-02	0.00E+00	0.00E+00	1.23E-01	6.12E-02	2.64E-01
1.70E+01	4.19E-04	4.19E-04	9.88E-01	1.18E-02	1.18E-02	1.34E-02	0.00E+00	0.00E+00	1.21E-01	6.23E-02	2.65E-01
1.91E+01	3.54E-04	3.54E-04	9.88E-01	1.18E-02	1.18E-02	1.27E-02	0.00E+00	0.00E+00	1.19E-01	6.33E-02	2.65E-01
2.15E+01	2.98E-04	2.98E-04	9.88E-01	1.18E-02	1.18E-02	1.19E-02	0.00E+00	0.00E+00	1.18E-01	6.44E-02	2.66E-01
2.42E+01	2.50E-04	2.50E-04	9.88E-01	1.18E-02	1.18E-02	1.12E-02	0.00E+00	0.00E+00	1.16E-01	6.55E-02	2.66E-01
2.72E+01	2.09E-04	2.09E-04	9.88E-01	1.18E-02	1.18E-02	1.05E-02	0.00E+00	0.00E+00	1.14E-01	6.66E-02	2.67E-01

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time averaged (tav = 3600. s) volume concentration: concentration contour parameters

c(x,y,z,t) = cc(x) * (erf(xa)-erf(xb)) * (erf(ya)-erf(yb)) * (exp(-za*za)+exp(-zb*zb))

```
   c(x,y,z,t) = concentration (volume fraction) at (x,y,z,t)
            x = downwind distance (m)
            y = crosswind horizontal distance (m)
            z = height (m)
            t = time (s)

          erf = error functon
           xa = (x-xc+bx)/(sr2*betax)
           xb = (x-xc-bx)/(sr2*betax)
           ya = (y+b)/(sr2*betac)
           yb = (y-b)/(sr2*betac)
          exp = exponential function
           za = (z-zc)/(sr2*sig)
           zb = (z+zc)/(sr2*sig)
          sr2 = sqrt(2.0)
```

x	cc(x)	b(x)	betac(x)	zc(x)	sig(x)	t	xc(t)	bx(t)	betax(t)
-6.23E-01	0.00E+00	5.61E-01	1.57E-01	0.00E+00	0.00E+00	3.51E-01	0.00E+00	6.23E-01	5.09E-03
-4.98E-01	1.99E-03	5.61E-01	1.68E-01	0.00E+00	6.56E-02	4.17E-01	6.23E-02	6.85E-01	5.60E-03

-3.74E-01	2.32E-03	5.61E-01	1.78E-01	0.00E+00	9.37E-02	4.84E-01	1.25E-01	7.47E-01	6.10E-03
-2.49E-01	2.53E-03	5.61E-01	1.89E-01	0.00E+00	1.17E-01	5.59E-01	1.87E-01	8.10E-01	6.61E-03
-1.25E-01	2.69E-03	5.61E-01	1.99E-01	0.00E+00	1.37E-01	6.35E-01	2.49E-01	8.72E-01	7.12E-03
-5.22E-08	2.82E-03	5.61E-01	2.11E-01	0.00E+00	1.56E-01	7.20E-01	3.11E-01	9.34E-01	7.63E-03
1.25E-01	2.94E-03	5.61E-01	2.22E-01	0.00E+00	1.74E-01	8.04E-01	3.74E-01	9.97E-01	8.14E-03
2.49E-01	3.05E-03	5.61E-01	2.33E-01	0.00E+00	1.90E-01	8.98E-01	4.36E-01	1.06E+00	8.64E-03
3.74E-01	3.15E-03	5.61E-01	2.45E-01	0.00E+00	2.06E-01	9.91E-01	4.98E-01	1.12E+00	9.16E-03
4.98E-01	3.24E-03	5.61E-01	2.57E-01	0.00E+00	2.21E-01	1.09E+00	5.61E-01	1.18E+00	9.66E-03
6.23E-01	3.33E-03	5.61E-01	2.69E-01	0.00E+00	2.36E-01	1.20E+00	6.23E-01	1.25E+00	1.02E-02
6.31E-01	3.31E-03	5.61E-01	2.69E-01	5.86E-07	2.37E-01	1.21E+00	6.31E-01	1.25E+00	1.02E-02
6.40E-01	3.30E-03	5.61E-01	2.70E-01	2.64E-06	2.38E-01	1.22E+00	6.40E-01	1.26E+00	1.03E-02
6.50E-01	3.28E-03	5.61E-01	2.71E-01	6.70E-06	2.39E-01	1.24E+00	6.50E-01	1.27E+00	1.04E-02
6.62E-01	3.26E-03	5.61E-01	2.72E-01	1.35E-05	2.41E-01	1.26E+00	6.62E-01	1.28E+00	1.05E-02
6.75E-01	3.23E-03	5.61E-01	2.74E-01	2.38E-05	2.42E-01	1.28E+00	6.75E-01	1.30E+00	1.06E-02
6.90E-01	3.21E-03	5.61E-01	2.75E-01	3.89E-05	2.44E-01	1.31E+00	6.90E-01	1.31E+00	1.07E-02
7.06E-01	3.18E-03	5.61E-01	2.77E-01	6.01E-05	2.45E-01	1.34E+00	7.06E-01	1.33E+00	1.09E-02
7.25E-01	3.15E-03	5.61E-01	2.79E-01	8.93E-05	2.48E-01	1.37E+00	7.25E-01	1.35E+00	1.10E-02
7.46E-01	3.11E-03	5.61E-01	2.81E-01	1.29E-04	2.50E-01	1.40E+00	7.46E-01	1.37E+00	1.12E-02
7.70E-01	3.08E-03	5.61E-01	2.83E-01	1.81E-04	2.52E-01	1.44E+00	7.70E-01	1.39E+00	1.14E-02
7.97E-01	3.03E-03	5.61E-01	2.86E-01	2.49E-04	2.55E-01	1.49E+00	7.97E-01	1.42E+00	1.16E-02
8.28E-01	2.99E-03	5.61E-01	2.89E-01	3.38E-04	2.58E-01	1.54E+00	8.28E-01	1.45E+00	1.18E-02
8.62E-01	2.94E-03	5.61E-01	2.92E-01	4.52E-04	2.62E-01	1.60E+00	8.62E-01	1.48E+00	1.21E-02
9.01E-01	2.89E-03	5.61E-01	2.96E-01	5.98E-04	2.66E-01	1.66E+00	9.01E-01	1.52E+00	1.24E-02
9.45E-01	2.83E-03	5.61E-01	3.00E-01	7.83E-04	2.70E-01	1.73E+00	9.45E-01	1.57E+00	1.28E-02
9.94E-01	2.78E-03	5.61E-01	3.05E-01	1.02E-03	2.75E-01	1.81E+00	9.94E-01	1.62E+00	1.32E-02
1.05E+00	2.71E-03	5.61E-01	3.10E-01	1.31E-03	2.80E-01	1.90E+00	1.05E+00	1.67E+00	1.37E-02
1.11E+00	2.65E-03	5.61E-01	3.17E-01	1.67E-03	2.86E-01	2.00E+00	1.11E+00	1.74E+00	1.42E-02
1.18E+00	2.58E-03	5.61E-01	3.24E-01	2.11E-03	2.93E-01	2.12E+00	1.18E+00	1.81E+00	1.48E-02
1.26E+00	2.51E-03	5.61E-01	3.32E-01	2.66E-03	3.01E-01	2.24E+00	1.26E+00	1.89E+00	1.54E-02
1.36E+00	2.43E-03	5.61E-01	3.41E-01	3.32E-03	3.09E-01	2.38E+00	1.36E+00	1.98E+00	1.62E-02
1.46E+00	2.36E-03	5.61E-01	3.51E-01	4.13E-03	3.18E-01	2.54E+00	1.46E+00	2.08E+00	1.70E-02
1.57E+00	2.28E-03	5.61E-01	3.62E-01	5.10E-03	3.28E-01	2.72E+00	1.57E+00	2.20E+00	1.79E-02
1.70E+00	2.20E-03	5.61E-01	3.76E-01	6.26E-03	3.39E-01	2.91E+00	1.70E+00	2.33E+00	1.90E-02
1.85E+00	2.12E-03	5.61E-01	3.90E-01	7.64E-03	3.52E-01	3.13E+00	1.85E+00	2.47E+00	2.02E-02
2.02E+00	2.04E-03	5.61E-01	4.07E-01	9.27E-03	3.66E-01	3.38E+00	2.02E+00	2.64E+00	2.16E-02
2.20E+00	1.96E-03	5.61E-01	4.26E-01	1.12E-02	3.81E-01	3.65E+00	2.20E+00	2.83E+00	2.31E-02
2.42E+00	1.89E-03	5.61E-01	4.48E-01	1.34E-02	3.97E-01	3.95E+00	2.42E+00	3.04E+00	2.48E-02
2.65E+00	1.81E-03	5.61E-01	4.72E-01	1.60E-02	4.16E-01	4.29E+00	2.65E+00	3.28E+00	2.68E-02
2.92E+00	1.74E-03	5.60E-01	5.00E-01	1.90E-02	4.36E-01	4.66E+00	2.92E+00	3.55E+00	2.90E-02
3.23E+00	1.66E-03	5.60E-01	5.31E-01	2.25E-02	4.58E-01	5.08E+00	3.23E+00	3.85E+00	3.15E-02
3.57E+00	1.59E-03	5.60E-01	5.67E-01	2.64E-02	4.82E-01	5.54E+00	3.57E+00	4.20E+00	3.43E-02
3.96E+00	1.53E-03	5.60E-01	6.07E-01	3.08E-02	5.09E-01	6.05E+00	3.96E+00	4.58E+00	3.74E-02
4.40E+00	1.46E-03	5.60E-01	6.52E-01	3.58E-02	5.39E-01	6.62E+00	4.40E+00	5.02E+00	4.10E-02
4.89E+00	1.40E-03	5.60E-01	7.04E-01	4.14E-02	5.71E-01	7.25E+00	4.89E+00	5.52E+00	4.50E-02
5.45E+00	1.34E-03	5.60E-01	7.62E-01	4.77E-02	6.06E-01	7.96E+00	5.45E+00	6.07E+00	4.96E-02
6.08E+00	1.28E-03	5.60E-01	8.27E-01	5.46E-02	6.45E-01	8.73E+00	6.08E+00	6.70E+00	5.47E-02
6.79E+00	1.23E-03	5.60E-01	9.02E-01	6.22E-02	6.87E-01	9.60E+00	6.79E+00	7.41E+00	6.05E-02
7.59E+00	1.17E-03	5.60E-01	9.86E-01	7.06E-02	7.34E-01	1.06E+01	7.59E+00	8.22E+00	6.71E-02
8.50E+00	1.12E-03	5.60E-01	1.08E+00	7.96E-02	7.85E-01	1.16E+01	8.50E+00	9.12E+00	7.45E-02
9.52E+00	1.06E-03	5.60E-01	1.19E+00	8.95E-02	8.42E-01	1.28E+01	9.52E+00	1.01E+01	8.28E-02
1.07E+01	1.01E-03	5.60E-01	1.31E+00	1.00E-01	9.03E-01	1.41E+01	1.07E+01	1.13E+01	9.23E-02
1.20E+01	9.59E-04	5.60E-01	1.45E+00	1.11E-01	9.71E-01	1.55E+01	1.20E+01	1.26E+01	1.03E-01
1.34E+01	9.07E-04	5.60E-01	1.60E+00	1.24E-01	1.05E+00	1.71E+01	1.34E+01	1.41E+01	1.15E-01
1.51E+01	8.57E-04	5.60E-01	1.77E+00	1.36E-01	1.13E+00	1.89E+01	1.51E+01	1.57E+01	1.28E-01
1.70E+01	8.07E-04	5.60E-01	1.97E+00	1.50E-01	1.22E+00	2.09E+01	1.70E+01	1.76E+01	1.44E-01
1.91E+01	7.58E-04	5.60E-01	2.19E+00	1.64E-01	1.32E+00	2.31E+01	1.91E+01	1.97E+01	1.61E-01
2.15E+01	7.10E-04	5.60E-01	2.44E+00	1.79E-01	1.43E+00	2.55E+01	2.15E+01	2.21E+01	1.80E-01
2.42E+01	6.63E-04	5.60E-01	2.73E+00	1.95E-01	1.55E+00	2.82E+01	2.42E+01	2.48E+01	2.03E-01
2.72E+01	6.18E-04	5.60E-01	3.05E+00	2.11E-01	1.68E+00	3.12E+01	2.72E+01	2.78E+01	2.27E-01

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time averaged (tav = 3600. s) volume concentration: concentration in the z = 1.50 plane.

downwind distance x (m)	time of max conc (s)	cloud duration (s)	effective half width bbc (m)	average concentration (volume fraction) at (x,y,z) y/bbc= 0.0	y/bbc= 0.5	y/bbc= 1.0	y/bbc= 1.5	y/bbc= 2.0	y/bbc= 2.5
-6.23E-01	1.80E+03	3.60E+03	6.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-4.98E-01	1.80E+03	3.60E+03	6.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-3.74E-01	1.80E+03	3.60E+03	6.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-2.49E-01	1.80E+03	3.60E+03	6.49E-01	3.25E-38	2.92E-38	1.04E-38	4.69E-40	1.53E-42	0.00E+00
-1.25E-01	1.80E+03	3.60E+03	6.59E-01	2.51E-28	2.22E-28	7.88E-29	4.07E-30	1.89E-32	7.53E-36
-5.22E-08	1.80E+03	3.60E+03	6.69E-01	1.88E-22	1.63E-22	5.76E-23	3.37E-24	2.12E-26	1.13E-29
1.25E-01	1.80E+03	3.60E+03	6.80E-01	1.37E-18	1.17E-18	4.11E-19	2.68E-20	2.20E-22	2.07E-25
2.49E-01	1.80E+03	3.60E+03	6.91E-01	7.19E-16	6.00E-16	2.10E-16	1.51E-17	1.56E-19	1.96E-22
3.74E-01	1.80E+03	3.60E+03	7.03E-01	7.32E-14	6.01E-14	2.10E-14	1.64E-15	2.08E-17	3.79E-20
4.98E-01	1.80E+03	3.60E+03	7.16E-01	2.53E-12	2.04E-12	7.11E-13	5.96E-14	9.06E-16	2.25E-18
6.23E-01	1.80E+03	3.60E+03	7.29E-01	4.12E-11	3.28E-11	1.14E-11	1.02E-12	1.81E-14	5.73E-17
6.31E-01	1.80E+03	3.60E+03	7.30E-01	4.90E-11	3.90E-11	1.35E-11	1.21E-12	2.18E-14	6.98E-17
6.40E-01	1.80E+03	3.60E+03	7.31E-01	5.79E-11	4.60E-11	1.59E-11	1.44E-12	2.61E-14	8.61E-17
6.50E-01	1.80E+03	3.60E+03	7.32E-01	6.96E-11	5.52E-11	1.91E-11	1.73E-12	3.18E-14	1.06E-16

6.62E-01	1.80E+03	3.60E+03	7.33E-01	8.53E-11	6.76E-11	2.34E-11	2.13E-12	3.97E-14	1.35E-16
6.75E-01	1.80E+03	3.60E+03	7.34E-01	1.07E-10	8.46E-11	2.93E-11	2.68E-12	5.06E-14	1.79E-16
6.90E-01	1.80E+03	3.60E+03	7.36E-01	1.37E-10	1.08E-10	3.74E-11	3.45E-12	6.63E-14	2.38E-16
7.06E-01	1.80E+03	3.60E+03	7.38E-01	1.79E-10	1.42E-10	4.90E-11	4.55E-12	8.90E-14	3.30E-16
7.25E-01	1.80E+03	3.60E+03	7.40E-01	2.42E-10	1.90E-10	6.58E-11	6.17E-12	1.23E-13	4.75E-16
7.46E-01	1.80E+03	3.60E+03	7.42E-01	3.31E-10	2.60E-10	8.97E-11	8.49E-12	1.73E-13	6.92E-16
7.70E-01	1.80E+03	3.60E+03	7.45E-01	4.65E-10	3.64E-10	1.26E-10	1.20E-11	2.51E-13	1.05E-15
7.97E-01	1.80E+03	3.60E+03	7.48E-01	6.72E-10	5.26E-10	1.81E-10	1.75E-11	3.76E-13	1.62E-15
8.28E-01	1.80E+03	3.60E+03	7.51E-01	1.00E-09	7.81E-10	2.69E-10	2.63E-11	5.83E-13	2.65E-15
8.62E-01	1.80E+03	3.60E+03	7.55E-01	1.54E-09	1.19E-09	4.11E-10	4.08E-11	9.32E-13	4.46E-15
9.01E-01	1.80E+03	3.60E+03	7.59E-01	2.43E-09	1.88E-09	6.47E-10	6.51E-11	1.54E-12	7.84E-15
9.45E-01	1.80E+03	3.60E+03	7.64E-01	3.95E-09	3.05E-09	1.05E-09	1.07E-10	2.63E-12	1.42E-14
9.94E-01	1.80E+03	3.60E+03	7.70E-01	6.61E-09	5.07E-09	1.74E-09	1.81E-10	4.64E-12	2.68E-14
1.05E+00	1.80E+03	3.60E+03	7.77E-01	1.13E-08	8.66E-09	2.97E-09	3.14E-10	8.42E-12	5.24E-14
1.11E+00	1.80E+03	3.60E+03	7.84E-01	1.99E-08	1.51E-08	5.18E-09	5.59E-10	1.57E-11	1.05E-13
1.18E+00	1.80E+03	3.60E+03	7.93E-01	3.57E-08	2.70E-08	9.22E-09	1.02E-09	3.00E-11	2.19E-13
1.26E+00	1.80E+03	3.60E+03	8.03E-01	6.51E-08	4.89E-08	1.67E-08	1.88E-09	5.85E-11	4.65E-13
1.36E+00	1.80E+03	3.60E+03	8.14E-01	1.20E-07	8.98E-08	3.05E-08	3.51E-09	1.16E-10	1.01E-12
1.46E+00	1.80E+03	3.60E+03	8.27E-01	2.24E-07	1.66E-07	5.63E-08	6.63E-09	2.31E-10	2.21E-12
1.57E+00	1.80E+03	3.60E+03	8.42E-01	4.18E-07	3.08E-07	1.04E-07	1.26E-08	4.64E-10	4.89E-12
1.70E+00	1.80E+03	3.60E+03	8.59E-01	7.77E-07	5.68E-07	1.92E-07	2.37E-08	9.29E-10	1.08E-11
1.85E+00	1.80E+03	3.60E+03	8.78E-01	1.43E-06	1.04E-06	3.50E-07	4.43E-08	1.84E-09	2.37E-11
2.02E+00	1.80E+03	3.60E+03	9.01E-01	2.60E-06	1.88E-06	6.31E-07	8.16E-08	3.60E-09	5.11E-11
2.20E+00	1.80E+03	3.60E+03	9.27E-01	4.64E-06	3.33E-06	1.11E-06	1.47E-07	6.90E-09	1.08E-10
2.42E+00	1.80E+03	3.60E+03	9.57E-01	8.08E-06	5.76E-06	1.92E-06	2.59E-07	1.28E-08	2.20E-10
2.65E+00	1.80E+03	3.60E+03	9.92E-01	1.36E-05	9.67E-06	3.21E-06	4.43E-07	2.31E-08	4.33E-10
2.92E+00	1.80E+03	3.60E+03	1.03E+00	2.23E-05	1.57E-05	5.21E-06	7.31E-07	4.01E-08	8.18E-10
3.23E+00	1.80E+03	3.60E+03	1.08E+00	3.51E-05	2.47E-05	8.14E-06	1.16E-06	6.67E-08	1.47E-09
3.57E+00	1.80E+03	3.60E+03	1.13E+00	5.33E-05	3.72E-05	1.23E-05	1.77E-06	1.06E-07	2.52E-09
3.96E+00	1.80E+03	3.60E+03	1.19E+00	7.75E-05	5.39E-05	1.77E-05	2.60E-06	1.61E-07	4.08E-09
4.40E+00	1.80E+03	3.60E+03	1.26E+00	1.08E-04	7.50E-05	2.46E-05	3.64E-06	2.33E-07	6.25E-09
4.89E+00	1.80E+03	3.60E+03	1.34E+00	1.45E-04	1.00E-04	3.27E-05	4.89E-06	3.22E-07	9.06E-09
5.45E+00	1.80E+03	3.60E+03	1.43E+00	1.85E-04	1.28E-04	4.18E-05	6.29E-06	4.23E-07	1.24E-08
6.08E+00	1.80E+03	3.60E+03	1.54E+00	2.28E-04	1.58E-04	5.14E-05	7.76E-06	5.32E-07	1.62E-08
6.79E+00	1.80E+03	3.60E+03	1.66E+00	2.70E-04	1.86E-04	6.06E-05	9.20E-06	6.39E-07	2.00E-08
7.59E+00	1.80E+03	3.60E+03	1.80E+00	3.08E-04	2.12E-04	6.89E-05	1.05E-05	7.37E-07	2.36E-08
8.50E+00	1.80E+03	3.60E+03	1.95E+00	3.38E-04	2.33E-04	7.56E-05	1.15E-05	8.18E-07	2.66E-08
9.52E+00	1.81E+03	3.60E+03	2.13E+00	3.59E-04	2.47E-04	8.03E-05	1.23E-05	8.75E-07	2.89E-08
1.07E+01	1.81E+03	3.60E+03	2.34E+00	3.69E-04	2.54E-04	8.26E-05	1.26E-05	9.05E-07	3.02E-08
1.20E+01	1.81E+03	3.60E+03	2.57E+00	3.69E-04	2.54E-04	8.25E-05	1.26E-05	9.08E-07	3.06E-08
1.34E+01	1.81E+03	3.60E+03	2.83E+00	3.60E-04	2.47E-04	8.03E-05	1.23E-05	8.87E-07	3.00E-08
1.51E+01	1.81E+03	3.60E+03	3.12E+00	3.42E-04	2.35E-04	7.64E-05	1.17E-05	8.45E-07	2.87E-08
1.70E+01	1.81E+03	3.60E+03	3.46E+00	3.18E-04	2.19E-04	7.10E-05	1.09E-05	7.87E-07	2.68E-08
1.91E+01	1.81E+03	3.60E+03	3.84E+00	2.90E-04	2.00E-04	6.48E-05	9.93E-06	7.18E-07	2.45E-08
2.15E+01	1.81E+03	3.60E+03	4.27E+00	2.60E-04	1.79E-04	5.81E-05	8.90E-06	6.44E-07	2.20E-08
2.42E+01	1.81E+03	3.60E+03	4.76E+00	2.30E-04	1.58E-04	5.13E-05	7.86E-06	5.69E-07	1.95E-08
2.72E+01	1.82E+03	3.60E+03	5.30E+00	2.00E-04	1.37E-04	4.46E-05	6.84E-06	4.95E-07	1.69E-08

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time averaged (tav = 3600. s) volume concentration: maximum concentration (volume fraction) along centerline.

downwind distance x (m)	height z (m)	maximum concentration c(x,0,z)	time of max conc (s)	cloud duration (s)
-6.23E-01	0.00E+00	0.00E+00	1.80E+03	3.60E+03
-4.98E-01	0.00E+00	1.59E-02	1.80E+03	3.60E+03
-3.74E-01	0.00E+00	1.85E-02	1.80E+03	3.60E+03
-2.49E-01	0.00E+00	2.01E-02	1.80E+03	3.60E+03
-1.25E-01	0.00E+00	2.12E-02	1.80E+03	3.60E+03
-5.22E-08	0.00E+00	2.21E-02	1.80E+03	3.60E+03
1.25E-01	0.00E+00	2.28E-02	1.80E+03	3.60E+03
2.49E-01	0.00E+00	2.34E-02	1.80E+03	3.60E+03
3.74E-01	0.00E+00	2.39E-02	1.80E+03	3.60E+03
4.98E-01	0.00E+00	2.42E-02	1.80E+03	3.60E+03
6.23E-01	0.00E+00	2.45E-02	1.80E+03	3.60E+03
6.31E-01	0.00E+00	2.43E-02	1.80E+03	3.60E+03
6.40E-01	0.00E+00	2.42E-02	1.80E+03	3.60E+03
6.50E-01	0.00E+00	2.40E-02	1.80E+03	3.60E+03
6.62E-01	0.00E+00	2.38E-02	1.80E+03	3.60E+03
6.75E-01	0.00E+00	2.36E-02	1.80E+03	3.60E+03
6.90E-01	0.00E+00	2.34E-02	1.80E+03	3.60E+03
7.06E-01	0.00E+00	2.31E-02	1.80E+03	3.60E+03
7.25E-01	0.00E+00	2.28E-02	1.80E+03	3.60E+03
7.46E-01	0.00E+00	2.25E-02	1.80E+03	3.60E+03
7.70E-01	0.00E+00	2.22E-02	1.80E+03	3.60E+03
7.97E-01	0.00E+00	2.18E-02	1.80E+03	3.60E+03
8.28E-01	0.00E+00	2.14E-02	1.80E+03	3.60E+03
8.62E-01	0.00E+00	2.09E-02	1.80E+03	3.60E+03
9.01E-01	0.00E+00	2.04E-02	1.80E+03	3.60E+03
9.45E-01	0.00E+00	1.99E-02	1.80E+03	3.60E+03

9.94E-01	0.00E+00	1.93E-02	1.80E+03	3.60E+03
1.05E+00	0.00E+00	1.87E-02	1.80E+03	3.60E+03
1.11E+00	0.00E+00	1.81E-02	1.80E+03	3.60E+03
1.18E+00	0.00E+00	1.74E-02	1.80E+03	3.60E+03
1.26E+00	0.00E+00	1.66E-02	1.80E+03	3.60E+03
1.36E+00	0.00E+00	1.59E-02	1.80E+03	3.60E+03
1.46E+00	0.00E+00	1.51E-02	1.80E+03	3.60E+03
1.57E+00	0.00E+00	1.43E-02	1.80E+03	3.60E+03
1.70E+00	0.00E+00	1.34E-02	1.80E+03	3.60E+03
1.85E+00	0.00E+00	1.26E-02	1.80E+03	3.60E+03
2.02E+00	0.00E+00	1.17E-02	1.80E+03	3.60E+03
2.20E+00	0.00E+00	1.08E-02	1.80E+03	3.60E+03
2.42E+00	0.00E+00	9.92E-03	1.80E+03	3.60E+03
2.65E+00	0.00E+00	9.05E-03	1.80E+03	3.60E+03
2.92E+00	0.00E+00	8.20E-03	1.80E+03	3.60E+03
3.23E+00	0.00E+00	7.38E-03	1.80E+03	3.60E+03
3.57E+00	0.00E+00	6.59E-03	1.80E+03	3.60E+03
3.96E+00	0.00E+00	5.84E-03	1.80E+03	3.60E+03
4.40E+00	0.00E+00	5.14E-03	1.80E+03	3.60E+03
4.89E+00	0.00E+00	4.49E-03	1.80E+03	3.60E+03
5.45E+00	0.00E+00	3.89E-03	1.80E+03	3.60E+03
6.08E+00	0.00E+00	3.35E-03	1.80E+03	3.60E+03
6.79E+00	0.00E+00	2.86E-03	1.80E+03	3.60E+03
7.59E+00	0.00E+00	2.43E-03	1.80E+03	3.60E+03
8.50E+00	0.00E+00	2.06E-03	1.80E+03	3.60E+03
9.52E+00	0.00E+00	1.73E-03	1.81E+03	3.60E+03
1.07E+01	0.00E+00	1.44E-03	1.81E+03	3.60E+03
1.20E+01	0.00E+00	1.20E-03	1.81E+03	3.60E+03
1.34E+01	0.00E+00	9.92E-04	1.81E+03	3.60E+03
1.51E+01	0.00E+00	8.18E-04	1.81E+03	3.60E+03
1.70E+01	0.00E+00	6.71E-04	1.81E+03	3.60E+03
1.91E+01	0.00E+00	5.50E-04	1.81E+03	3.60E+03
2.15E+01	0.00E+00	4.48E-04	1.81E+03	3.60E+03
2.42E+01	0.00E+00	3.65E-04	1.81E+03	3.60E+03
2.72E+01	0.00E+00	2.96E-04	1.82E+03	3.60E+03

Appendix 5.12-1

Ca DOF 2003a

E-1: City/County Population Estimates with Annual Percent Change
January 1, 2002 and 2003

City/County/State	Total Populat 1-1-02	1-1-03	Percent Change
FRESNO	827,300	841,400	1.7
CLOVIS	72,900	76,000	4.3
COALINGA	16,450	16,400	-0.3
FIREBAUGH	5,950	6,175	3.8
FOWLER	4,170	4,270	2.4
FRESNO	442,300	448,500	1.4
HURON	6,625	6,900	4.2
KERMAN	9,575	10,000	4.4
KINGSBURG	10,050	10,500	4.5
MENDOTA	8,075	8,175	1.2
ORANGE COVE	8,525	8,750	2.6
PARLIER	12,050	12,150	0.8
REEDLEY	21,200	21,350	0.7
SANGER	19,550	19,900	1.8
SAN JOAQUIN	3,400	3,490	2.6
SELMA	20,350	20,900	2.7
UNINCORPORATED	166,200	168,100	1.1

Source: California Department of Finance -

http://www.dof.ca.gov/HTML/DEMOGRAP/E-1table.xls
E-1 Report 2003

U.S. Census Bureau American FactFinder

DP-3. **Profile of Selected Economic Characteristics: 2000**
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
Geographic Area: **Census Tract 12.01, Fresno County, California**

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**3,450**	**100.0**
In labor force	1,717	49.8
Civilian labor force	1,717	49.8
Employed	1,394	40.4
Unemployed	323	9.4
Percent of civilian labor force	18.8	(X)
Armed Forces	0	0.0
Not in labor force	1,733	50.2
Females 16 years and over	**1,604**	**100.0**
In labor force	604	37.7
Civilian labor force	604	37.7
Employed	491	30.6
Own children under 6 years	**591**	**100.0**
All parents in family in labor force	232	39.3
COMMUTING TO WORK		
Workers 16 years and over	**1,271**	**100.0**
Car, truck, or van -- drove alone	699	55.0
Car, truck, or van -- carpooled	433	34.1
Public transportation (including taxicab)	110	8.7
Walked	6	0.5
Other means	15	1.2
Worked at home	8	0.6
Mean travel time to work (minutes)	25.2	(X)
Employed civilian population 16 years and over	**1,394**	**100.0**
OCCUPATION		
Management, professional, and related occupations	156	11.2
Service occupations	245	17.6
Sales and office occupations	277	19.9
Farming, fishing, and forestry occupations	165	11.8
Construction, extraction, and maintenance occupations	135	9.7
Production, transportation, and material moving occupations	416	29.8
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	226	16.2
Construction	73	5.2
Manufacturing	228	16.4
Wholesale trade	176	12.6
Retail trade	133	9.5
Transportation and warehousing, and utilities	49	3.5
Information	21	1.5
Finance, insurance, real estate, and rental and leasing	21	1.5
Professional, scientific, management, administrative, and waste management services	136	9.8
Educational, health and social services	163	11.7
Arts, entertainment, recreation, accommodation and food services	41	2.9
Other services (except public administration)	57	4.1
Public administration	70	5.0

Subject	Number	Percent
CLASS OF WORKER		
Private wage and salary workers	1,145	82.1
Government workers	179	12.8
Self-employed workers in own not incorporated business	70	5.0
Unpaid family workers	0	0.0
INCOME IN 1999		
Households	**1,264**	**100.0**
Less than $10,000	226	17.9
$10,000 to $14,999	201	15.9
$15,000 to $24,999	360	28.5
$25,000 to $34,999	160	12.7
$35,000 to $49,999	138	10.9
$50,000 to $74,999	150	11.9
$75,000 to $99,999	6	0.5
$100,000 to $149,999	23	1.8
$150,000 to $199,999	0	0.0
$200,000 or more	0	0.0
Median household income (dollars)	20,353	(X)
With earnings	1,064	84.2
Mean earnings (dollars)	25,625	(X)
With Social Security income	237	18.8
Mean Social Security income (dollars)	6,882	(X)
With Supplemental Security Income	178	14.1
Mean Supplemental Security Income (dollars)	7,174	(X)
With public assistance income	226	17.9
Mean public assistance income (dollars)	4,448	(X)
With retirement income	140	11.1
Mean retirement income (dollars)	7,465	(X)
Families	**1,038**	**100.0**
Less than $10,000	153	14.7
$10,000 to $14,999	184	17.7
$15,000 to $24,999	298	28.7
$25,000 to $34,999	124	11.9
$35,000 to $49,999	117	11.3
$50,000 to $74,999	133	12.8
$75,000 to $99,999	15	1.4
$100,000 to $149,999	14	1.3
$150,000 to $199,999	0	0.0
$200,000 or more	0	0.0
Median family income (dollars)	20,592	(X)
Per capita income (dollars)	6,683	(X)
Median earnings (dollars):		
Male full-time, year-round workers	21,845	(X)
Female full-time, year-round workers	20,362	(X)
POVERTY STATUS IN 1999 (below poverty level)		
Families	**384**	**(X)**
Percent below poverty level	(X)	37.0
With related children under 18 years	352	(X)
Percent below poverty level	(X)	50.2
With related children under 5 years	169	(X)
Percent below poverty level	(X)	44.6
Families with female householder, no husband present	**90**	**(X)**
Percent below poverty level	(X)	43.7
With related children under 18 years	80	(X)
Percent below poverty level	(X)	61.1
With related children under 5 years	20	(X)

Subject	Number	Percent
Percent below poverty level	(X)	48.8
Individuals	**2,257**	**(X)**
Percent below poverty level	(X)	43.7
18 years and over	1,194	(X)
Percent below poverty level	(X)	37.2
65 years and over	39	(X)
Percent below poverty level	(X)	12.5
Related children under 18 years	1,031	(X)
Percent below poverty level	(X)	53.5
Related children 5 to 17 years	738	(X)
Percent below poverty level	(X)	53.4
Unrelated individuals 15 years and over	343	(X)
Percent below poverty level	(X)	54.4

(X) Not applicable.
Detailed Occupation Code List (PDF 42KB)
Detailed Industry Code List (PDF 44KB)
User note on employment status data
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

U.S. Census Bureau American FactFinder

DP-3. **Profile of Selected Economic Characteristics: 2000**
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
Geographic Area: **Census Tract 12.02, Fresno County, California**

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**2,664**	**100.0**
In labor force	1,383	51.9
Civilian labor force	1,383	51.9
Employed	1,197	44.9
Unemployed	186	7.0
Percent of civilian labor force	13.4	(X)
Armed Forces	0	0.0
Not in labor force	1,281	48.1
Females 16 years and over	**1,399**	**100.0**
In labor force	642	45.9
Civilian labor force	642	45.9
Employed	546	39.0
Own children under 6 years	**368**	**100.0**
All parents in family in labor force	177	48.1
COMMUTING TO WORK		
Workers 16 years and over	**1,104**	**100.0**
Car, truck, or van -- drove alone	623	56.4
Car, truck, or van -- carpooled	430	38.9
Public transportation (including taxicab)	13	1.2
Walked	0	0.0
Other means	16	1.4
Worked at home	22	2.0
Mean travel time to work (minutes)	22.3	(X)
Employed civilian population 16 years and over	**1,197**	**100.0**
OCCUPATION		
Management, professional, and related occupations	211	17.6
Service occupations	268	22.4
Sales and office occupations	241	20.1
Farming, fishing, and forestry occupations	74	6.2
Construction, extraction, and maintenance occupations	114	9.5
Production, transportation, and material moving occupations	289	24.1
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	83	6.9
Construction	52	4.3
Manufacturing	151	12.6
Wholesale trade	107	8.9
Retail trade	106	8.9
Transportation and warehousing, and utilities	48	4.0
Information	16	1.3
Finance, insurance, real estate, and rental and leasing	30	2.5
Professional, scientific, management, administrative, and waste management services	75	6.3
Educational, health and social services	269	22.5
Arts, entertainment, recreation, accommodation and food services	78	6.5
Other services (except public administration)	87	7.3
Public administration	95	7.9

Subject	Number	Percent
CLASS OF WORKER		
Private wage and salary workers	844	70.5
Government workers	277	23.1
Self-employed workers in own not incorporated business	64	5.3
Unpaid family workers	12	1.0
INCOME IN 1999		
Households	**1,000**	**100.0**
Less than $10,000	168	16.8
$10,000 to $14,999	84	8.4
$15,000 to $24,999	250	25.0
$25,000 to $34,999	163	16.3
$35,000 to $49,999	134	13.4
$50,000 to $74,999	107	10.7
$75,000 to $99,999	48	4.8
$100,000 to $149,999	18	1.8
$150,000 to $199,999	12	1.2
$200,000 or more	16	1.6
Median household income (dollars)	24,904	(X)
With earnings	825	82.5
Mean earnings (dollars)	41,540	(X)
With Social Security income	178	17.8
Mean Social Security income (dollars)	10,426	(X)
With Supplemental Security Income	190	19.0
Mean Supplemental Security Income (dollars)	7,829	(X)
With public assistance income	184	18.4
Mean public assistance income (dollars)	4,920	(X)
With retirement income	60	6.0
Mean retirement income (dollars)	6,852	(X)
Families	**891**	**100.0**
Less than $10,000	134	15.0
$10,000 to $14,999	84	9.4
$15,000 to $24,999	232	26.0
$25,000 to $34,999	162	18.2
$35,000 to $49,999	141	15.8
$50,000 to $74,999	84	9.4
$75,000 to $99,999	22	2.5
$100,000 to $149,999	23	2.6
$150,000 to $199,999	0	0.0
$200,000 or more	9	1.0
Median family income (dollars)	24,809	(X)
Per capita income (dollars)	10,107	(X)
Median earnings (dollars):		
Male full-time, year-round workers	23,696	(X)
Female full-time, year-round workers	19,792	(X)
POVERTY STATUS IN 1999 (below poverty level)		
Families	**254**	**(X)**
Percent below poverty level	(X)	28.5
With related children under 18 years	218	(X)
Percent below poverty level	(X)	36.3
With related children under 5 years	80	(X)
Percent below poverty level	(X)	30.5
Families with female householder, no husband present	**114**	**(X)**
Percent below poverty level	(X)	42.1
With related children under 18 years	114	(X)
Percent below poverty level	(X)	51.8
With related children under 5 years	37	(X)

Subject	Number	Percent
Percent below poverty level	(X)	63.8
Individuals	**1,442**	**(X)**
Percent below poverty level	(X)	35.0
18 years and over	649	(X)
Percent below poverty level	(X)	25.7
65 years and over	54	(X)
Percent below poverty level	(X)	19.6
Related children under 18 years	773	(X)
Percent below poverty level	(X)	49.0
Related children 5 to 17 years	604	(X)
Percent below poverty level	(X)	50.8
Unrelated individuals 15 years and over	127	(X)
Percent below poverty level	(X)	36.7

(X) Not applicable.
Detailed Occupation Code List (PDF 42KB)
Detailed Industry Code List (PDF 44KB)
User note on employment status data
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

U.S. Census Bureau American FactFinder

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DP-3. **Profile of Selected Economic Characteristics: 2000**
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
Geographic Area: **Census Tract 14.06, Fresno County, California**

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**4,285**	**100.0**
In labor force	2,522	58.9
Civilian labor force	2,515	58.7
Employed	2,307	53.8
Unemployed	208	4.9
Percent of civilian labor force	8.3	(X)
Armed Forces	7	0.2
Not in labor force	1,763	41.1
Females 16 years and over	**2,225**	**100.0**
In labor force	1,151	51.7
Civilian labor force	1,151	51.7
Employed	1,094	49.2
Own children under 6 years	**623**	**100.0**
All parents in family in labor force	317	50.9
COMMUTING TO WORK		
Workers 16 years and over	**2,284**	**100.0**
Car, truck, or van -- drove alone	1,735	76.0
Car, truck, or van -- carpooled	423	18.5
Public transportation (including taxicab)	17	0.7
Walked	43	1.9
Other means	37	1.6
Worked at home	29	1.3
Mean travel time to work (minutes)	19.5	(X)
Employed civilian population 16 years and over	**2,307**	**100.0**
OCCUPATION		
Management, professional, and related occupations	785	34.0
Service occupations	323	14.0
Sales and office occupations	617	26.7
Farming, fishing, and forestry occupations	66	2.9
Construction, extraction, and maintenance occupations	191	8.3
Production, transportation, and material moving occupations	325	14.1
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	91	3.9
Construction	174	7.5
Manufacturing	196	8.5
Wholesale trade	107	4.6
Retail trade	213	9.2
Transportation and warehousing, and utilities	110	4.8
Information	21	0.9
Finance, insurance, real estate, and rental and leasing	130	5.6
Professional, scientific, management, administrative, and waste management services	179	7.8
Educational, health and social services	613	26.6
Arts, entertainment, recreation, accommodation and food services	148	6.4
Other services (except public administration)	99	4.3
Public administration	226	9.8

Subject	Number	Percent
CLASS OF WORKER		
Private wage and salary workers	1,612	69.9
Government workers	523	22.7
Self-employed workers in own not incorporated business	158	6.8
Unpaid family workers	14	0.6
INCOME IN 1999		
Households	**1,814**	**100.0**
Less than $10,000	135	7.4
$10,000 to $14,999	155	8.5
$15,000 to $24,999	203	11.2
$25,000 to $34,999	244	13.5
$35,000 to $49,999	349	19.2
$50,000 to $74,999	317	17.5
$75,000 to $99,999	180	9.9
$100,000 to $149,999	129	7.1
$150,000 to $199,999	45	2.5
$200,000 or more	57	3.1
Median household income (dollars)	41,642	(X)
With earnings	1,475	81.3
Mean earnings (dollars)	58,400	(X)
With Social Security income	569	31.4
Mean Social Security income (dollars)	10,968	(X)
With Supplemental Security Income	180	9.9
Mean Supplemental Security Income (dollars)	6,247	(X)
With public assistance income	106	5.8
Mean public assistance income (dollars)	2,850	(X)
With retirement income	290	16.0
Mean retirement income (dollars)	19,320	(X)
Families	**1,456**	**100.0**
Less than $10,000	75	5.2
$10,000 to $14,999	100	6.9
$15,000 to $24,999	168	11.5
$25,000 to $34,999	210	14.4
$35,000 to $49,999	270	18.5
$50,000 to $74,999	267	18.3
$75,000 to $99,999	161	11.1
$100,000 to $149,999	117	8.0
$150,000 to $199,999	38	2.6
$200,000 or more	50	3.4
Median family income (dollars)	43,936	(X)
Per capita income (dollars)	18,143	(X)
Median earnings (dollars):		
Male full-time, year-round workers	33,182	(X)
Female full-time, year-round workers	24,850	(X)
POVERTY STATUS IN 1999 (below poverty level)		
Families	**192**	**(X)**
Percent below poverty level	(X)	13.2
With related children under 18 years	166	(X)
Percent below poverty level	(X)	19.2
With related children under 5 years	73	(X)
Percent below poverty level	(X)	18.4
Families with female householder, no husband present	**83**	**(X)**
Percent below poverty level	(X)	39.2
With related children under 18 years	78	(X)
Percent below poverty level	(X)	51.0
With related children under 5 years	36	(X)

Subject	Number	Percent
Percent below poverty level	(X)	61.0
Individuals	**1,060**	**(X)**
Percent below poverty level	(X)	17.6
18 years and over	472	(X)
Percent below poverty level	(X)	11.7
65 years and over	33	(X)
Percent below poverty level	(X)	4.8
Related children under 18 years	565	(X)
Percent below poverty level	(X)	28.8
Related children 5 to 17 years	473	(X)
Percent below poverty level	(X)	31.8
Unrelated individuals 15 years and over	145	(X)
Percent below poverty level	(X)	25.0

(X) Not applicable.
Detailed Occupation Code List (PDF 42KB)
Detailed Industry Code List (PDF 44KB)
User note on employment status data
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

U.S. Census Bureau American FactFinder

DP-3. **Profile of Selected Economic Characteristics: 2000**
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
Geographic Area: **Census Tract 15, Fresno County, California**

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**1,766**	**100.0**
In labor force	915	51.8
Civilian labor force	915	51.8
Employed	728	41.2
Unemployed	187	10.6
Percent of civilian labor force	20.4	(X)
Armed Forces	0	0.0
Not in labor force	851	48.2
Females 16 years and over	**850**	**100.0**
In labor force	400	47.1
Civilian labor force	400	47.1
Employed	303	35.6
Own children under 6 years	**239**	**100.0**
All parents in family in labor force	114	47.7
COMMUTING TO WORK		
Workers 16 years and over	**711**	**100.0**
Car, truck, or van -- drove alone	498	70.0
Car, truck, or van -- carpooled	105	14.8
Public transportation (including taxicab)	0	0.0
Walked	27	3.8
Other means	62	8.7
Worked at home	19	2.7
Mean travel time to work (minutes)	23.4	(X)
Employed civilian population 16 years and over	**728**	**100.0**
OCCUPATION		
Management, professional, and related occupations	170	23.4
Service occupations	125	17.2
Sales and office occupations	136	18.7
Farming, fishing, and forestry occupations	94	12.9
Construction, extraction, and maintenance occupations	58	8.0
Production, transportation, and material moving occupations	145	19.9
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	130	17.9
Construction	31	4.3
Manufacturing	98	13.5
Wholesale trade	29	4.0
Retail trade	72	9.9
Transportation and warehousing, and utilities	44	6.0
Information	0	0.0
Finance, insurance, real estate, and rental and leasing	51	7.0
Professional, scientific, management, administrative, and waste management services	32	4.4
Educational, health and social services	101	13.9
Arts, entertainment, recreation, accommodation and food services	41	5.6
Other services (except public administration)	53	7.3
Public administration	46	6.3

Subject	Number	Percent
CLASS OF WORKER		
Private wage and salary workers	542	74.5
Government workers	115	15.8
Self-employed workers in own not incorporated business	66	9.1
Unpaid family workers	5	0.7
INCOME IN 1999		
Households	**686**	**100.0**
Less than $10,000	120	17.5
$10,000 to $14,999	82	12.0
$15,000 to $24,999	96	14.0
$25,000 to $34,999	133	19.4
$35,000 to $49,999	126	18.4
$50,000 to $74,999	71	10.3
$75,000 to $99,999	30	4.4
$100,000 to $149,999	23	3.4
$150,000 to $199,999	5	0.7
$200,000 or more	0	0.0
Median household income (dollars)	28,304	(X)
With earnings	580	84.5
Mean earnings (dollars)	30,653	(X)
With Social Security income	174	25.4
Mean Social Security income (dollars)	7,964	(X)
With Supplemental Security Income	96	14.0
Mean Supplemental Security Income (dollars)	4,549	(X)
With public assistance income	78	11.4
Mean public assistance income (dollars)	3,855	(X)
With retirement income	76	11.1
Mean retirement income (dollars)	9,516	(X)
Families	**523**	**100.0**
Less than $10,000	95	18.2
$10,000 to $14,999	31	5.9
$15,000 to $24,999	67	12.8
$25,000 to $34,999	143	27.3
$35,000 to $49,999	110	21.0
$50,000 to $74,999	36	6.9
$75,000 to $99,999	18	3.4
$100,000 to $149,999	23	4.4
$150,000 to $199,999	0	0.0
$200,000 or more	0	0.0
Median family income (dollars)	29,353	(X)
Per capita income (dollars)	9,771	(X)
Median earnings (dollars):		
Male full-time, year-round workers	27,315	(X)
Female full-time, year-round workers	22,652	(X)
POVERTY STATUS IN 1999 (below poverty level)		
Families	**140**	**(X)**
Percent below poverty level	(X)	26.8
With related children under 18 years	95	(X)
Percent below poverty level	(X)	30.6
With related children under 5 years	57	(X)
Percent below poverty level	(X)	50.4
Families with female householder, no husband present	**82**	**(X)**
Percent below poverty level	(X)	45.3
With related children under 18 years	71	(X)
Percent below poverty level	(X)	60.7
With related children under 5 years	44	(X)

Subject	Number	Percent
Percent below poverty level	(X)	97.8
Individuals	**679**	**(X)**
Percent below poverty level	(X)	29.4
18 years and over	444	(X)
Percent below poverty level	(X)	28.4
65 years and over	49	(X)
Percent below poverty level	(X)	19.3
Related children under 18 years	228	(X)
Percent below poverty level	(X)	30.9
Related children 5 to 17 years	138	(X)
Percent below poverty level	(X)	24.7
Unrelated individuals 15 years and over	135	(X)
Percent below poverty level	(X)	40.4

(X) Not applicable.
Detailed Occupation Code List (PDF 42KB)
Detailed Industry Code List (PDF 44KB)
User note on employment status data
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

U.S. Census Bureau American FactFinder

DP-3. **Profile of Selected Economic Characteristics: 2000**
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
Geographic Area: **Fresno County, California**

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**571,317**	**100.0**
In labor force	341,944	59.9
Civilian labor force	341,640	59.8
Employed	301,306	52.7
Unemployed	40,334	7.1
Percent of civilian labor force	11.8	(X)
Armed Forces	304	0.1
Not in labor force	229,373	40.1
Females 16 years and over	**288,817**	**100.0**
In labor force	152,876	52.9
Civilian labor force	152,814	52.9
Employed	134,430	46.5
Own children under 6 years	**75,351**	**100.0**
All parents in family in labor force	38,603	51.2
COMMUTING TO WORK		
Workers 16 years and over	**294,942**	**100.0**
Car, truck, or van -- drove alone	218,785	74.2
Car, truck, or van -- carpooled	49,265	16.7
Public transportation (including taxicab)	5,116	1.7
Walked	7,028	2.4
Other means	5,699	1.9
Worked at home	9,049	3.1
Mean travel time to work (minutes)	22.2	(X)
Employed civilian population 16 years and over	**301,306**	**100.0**
OCCUPATION		
Management, professional, and related occupations	88,796	29.5
Service occupations	48,665	16.2
Sales and office occupations	78,299	26.0
Farming, fishing, and forestry occupations	19,780	6.6
Construction, extraction, and maintenance occupations	25,698	8.5
Production, transportation, and material moving occupations	40,068	13.3
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	25,207	8.4
Construction	17,054	5.7
Manufacturing	24,998	8.3
Wholesale trade	15,154	5.0
Retail trade	33,771	11.2
Transportation and warehousing, and utilities	13,706	4.5
Information	6,450	2.1
Finance, insurance, real estate, and rental and leasing	16,626	5.5
Professional, scientific, management, administrative, and waste management services	22,016	7.3
Educational, health and social services	68,710	22.8
Arts, entertainment, recreation, accommodation and food services	21,786	7.2
Other services (except public administration)	15,317	5.1
Public administration	20,511	6.8

Subject	Number	Percent
CLASS OF WORKER		
Private wage and salary workers	218,136	72.4
Government workers	59,313	19.7
Self-employed workers in own not incorporated business	22,345	7.4
Unpaid family workers	1,512	0.5
INCOME IN 1999		
Households	**253,304**	**100.0**
Less than $10,000	30,920	12.2
$10,000 to $14,999	19,681	7.8
$15,000 to $24,999	40,493	16.0
$25,000 to $34,999	36,433	14.4
$35,000 to $49,999	40,697	16.1
$50,000 to $74,999	42,878	16.9
$75,000 to $99,999	20,411	8.1
$100,000 to $149,999	14,320	5.7
$150,000 to $199,999	3,517	1.4
$200,000 or more	3,954	1.6
Median household income (dollars)	34,725	(X)
With earnings	204,174	80.6
Mean earnings (dollars)	47,375	(X)
With Social Security income	59,845	23.6
Mean Social Security income (dollars)	10,801	(X)
With Supplemental Security Income	19,755	7.8
Mean Supplemental Security Income (dollars)	6,792	(X)
With public assistance income	21,581	8.5
Mean public assistance income (dollars)	4,969	(X)
With retirement income	36,095	14.2
Mean retirement income (dollars)	15,414	(X)
Families	**188,489**	**100.0**
Less than $10,000	17,909	9.5
$10,000 to $14,999	13,076	6.9
$15,000 to $24,999	28,284	15.0
$25,000 to $34,999	26,980	14.3
$35,000 to $49,999	30,951	16.4
$50,000 to $74,999	34,465	18.3
$75,000 to $99,999	17,623	9.3
$100,000 to $149,999	12,557	6.7
$150,000 to $199,999	3,113	1.7
$200,000 or more	3,531	1.9
Median family income (dollars)	38,455	(X)
Per capita income (dollars)	15,495	(X)
Median earnings (dollars):		
Male full-time, year-round workers	33,375	(X)
Female full-time, year-round workers	26,501	(X)
POVERTY STATUS IN 1999 (below poverty level)		
Families	**33,175**	**(X)**
Percent below poverty level	(X)	17.6
With related children under 18 years	28,652	(X)
Percent below poverty level	(X)	24.8
With related children under 5 years	16,098	(X)
Percent below poverty level	(X)	31.7
Families with female householder, no husband present	**13,226**	**(X)**
Percent below poverty level	(X)	35.3
With related children under 18 years	11,930	(X)
Percent below poverty level	(X)	43.4
With related children under 5 years	6,317	(X)

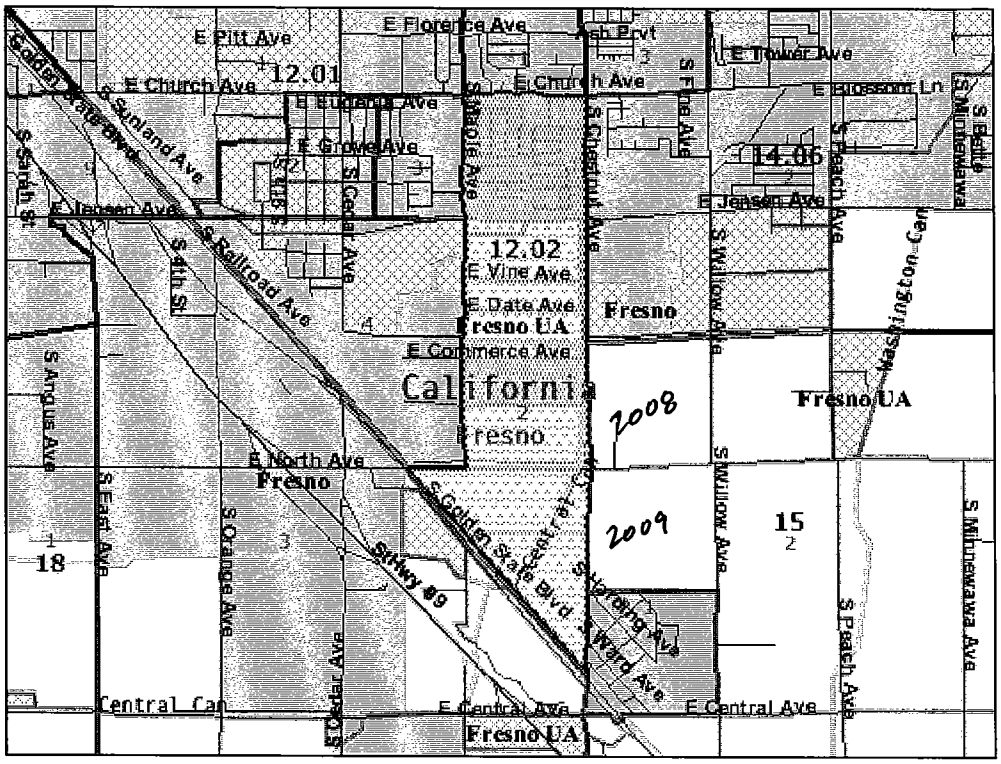
Subject	Number	Percent
Percent below poverty level	(X)	56.9
Individuals	**179,085**	**(X)**
Percent below poverty level	(X)	22.9
18 years and over	98,581	(X)
Percent below poverty level	(X)	18.5
65 years and over	7,526	(X)
Percent below poverty level	(X)	9.9
Related children under 18 years	79,031	(X)
Percent below poverty level	(X)	31.7
Related children 5 to 17 years	56,512	(X)
Percent below poverty level	(X)	30.8
Unrelated individuals 15 years and over	33,900	(X)
Percent below poverty level	(X)	31.6

(X) Not applicable.
Detailed Occupation Code List (PDF 42KB)
Detailed Industry Code List (PDF 44KB)
User note on employment status data
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

Block Group 2, Census Tract 12.02, Fresno County, California

Boundaries
- State
- '00 County
- '00 Census Tract
- '00 Block Group
- '00 Block
- '00 Place
- '00 Place
- '00 Urban Area
- '00 Urban Area

Features
- Major Road
- Street
- Stream/Waterbody
- Stream/Waterbody



4 miles across

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SCHOOL DIST = FRESNO UNIFIED

ZIP = 93725

U.S. Census Bureau American FactFinder

DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Fresno County, California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

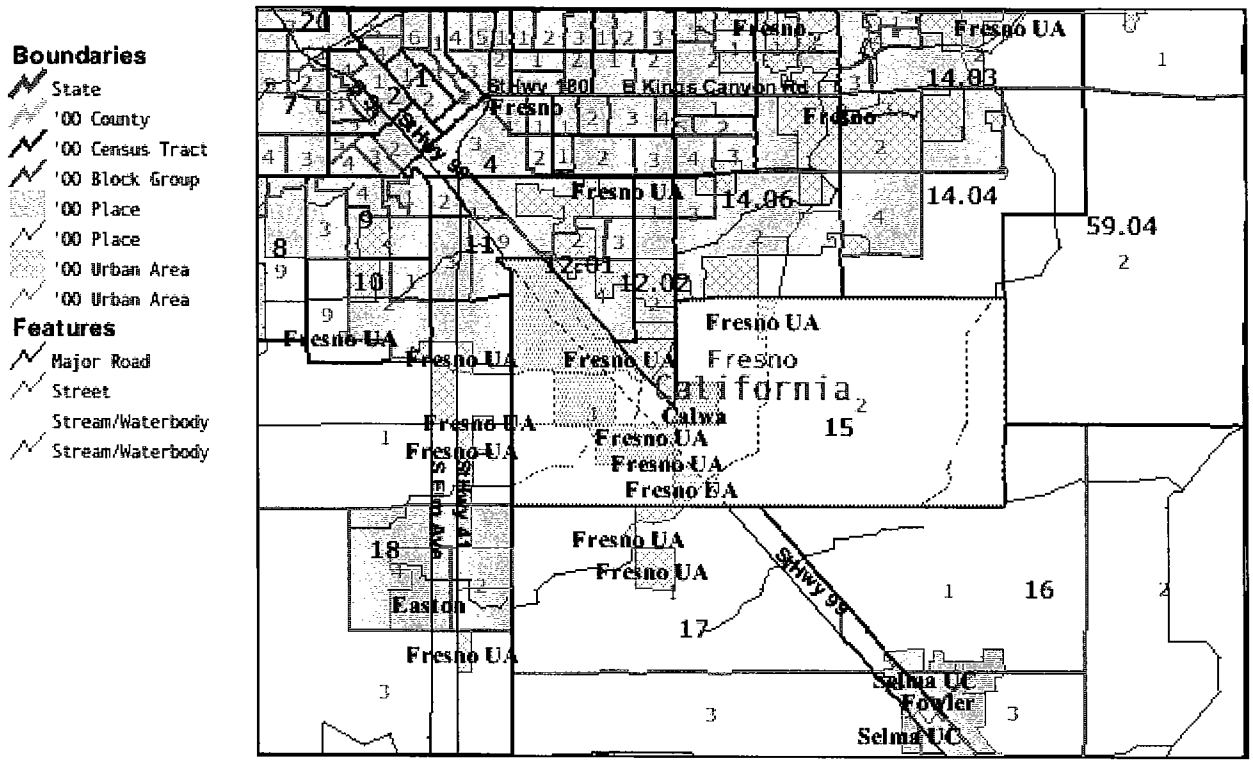
Subject	Number	Percent
Total population	**799,407**	**100.0**
SEX AND AGE		
Male	400,476	50.1
Female	398,931	49.9
Under 5 years	67,827	8.5
5 to 9 years	74,581	9.3
10 to 14 years	71,847	9.0
15 to 19 years	69,648	8.7
20 to 24 years	61,109	7.6
25 to 34 years	111,804	14.0
35 to 44 years	115,858	14.5
45 to 54 years	92,209	11.5
55 to 59 years	30,907	3.9
60 to 64 years	24,408	3.1
65 to 74 years	41,171	5.2
75 to 84 years	28,331	3.5
85 years and over	9,707	1.2
Median age (years)	29.9	(X)
18 years and over	542,982	67.9
Male	269,087	33.7
Female	273,895	34.3
21 years and over	502,542	62.9
62 years and over	93,287	11.7
65 years and over	79,209	9.9
Male	33,203	4.2
Female	46,006	5.8
RACE		
One race	761,595	95.3
White	434,045	54.3
Black or African American	42,337	5.3
American Indian and Alaska Native	12,790	1.6
Asian	64,362	8.1
Asian Indian	7,963	1.0
Chinese	4,894	0.6
Filipino	5,629	0.7
Japanese	5,721	0.7
Korean	1,326	0.2
Vietnamese	2,471	0.3
Other Asian [1]	36,358	4.5
Native Hawaiian and Other Pacific Islander	1,000	0.1
Native Hawaiian	283	0.0
Guamanian or Chamorro	176	0.0
Samoan	260	0.0
Other Pacific Islander [2]	281	0.0
Some other race	207,061	25.9
Two or more races	37,812	4.7

Subject	Number	Percent
Race alone or in combination with one or more other races [3]		
White	463,687	58.0
Black or African American	47,153	5.9
American Indian and Alaska Native	20,449	2.6
Asian	73,403	9.2
Native Hawaiian and Other Pacific Islander	2,539	0.3
Some other race	231,758	29.0
HISPANIC OR LATINO AND RACE		
Total population	**799,407**	**100.0**
Hispanic or Latino (of any race)	351,636	44.0
Mexican	302,120	37.8
Puerto Rican	1,711	0.2
Cuban	441	0.1
Other Hispanic or Latino	47,364	5.9
Not Hispanic or Latino	447,771	56.0
White alone	317,522	39.7
RELATIONSHIP		
Total population	**799,407**	**100.0**
In households	781,740	97.8
Householder	252,940	31.6
Spouse	132,874	16.6
Child	284,418	35.6
Own child under 18 years	223,362	27.9
Other relatives	65,475	8.2
Under 18 years	26,110	3.3
Nonrelatives	46,033	5.8
Unmarried partner	16,205	2.0
In group quarters	17,667	2.2
Institutionalized population	11,230	1.4
Noninstitutionalized population	6,437	0.8
HOUSEHOLDS BY TYPE		
Total households	**252,940**	**100.0**
Family households (families)	186,736	73.8
With own children under 18 years	104,234	41.2
Married-couple family	132,874	52.5
With own children under 18 years	71,371	28.2
Female householder, no husband present	38,569	15.2
With own children under 18 years	24,351	9.6
Nonfamily households	66,204	26.2
Householder living alone	52,100	20.6
Householder 65 years and over	19,805	7.8
Households with individuals under 18 years	115,871	45.8
Households with individuals 65 years and over	56,331	22.3
Average household size	3.09	(X)
Average family size	3.59	(X)
HOUSING OCCUPANCY		
Total housing units	**270,767**	**100.0**
Occupied housing units	252,940	93.4
Vacant housing units	17,827	6.6
For seasonal, recreational, or occasional use	3,643	1.3
Homeowner vacancy rate (percent)	1.6	(X)
Rental vacancy rate (percent)	5.5	(X)
HOUSING TENURE		
Occupied housing units	**252,940**	**100.0**

Subject	Number	Percent
Owner-occupied housing units	142,795	56.5
Renter-occupied housing units	110,145	43.5
Average household size of owner-occupied unit	3.02	(X)
Average household size of renter-occupied unit	3.18	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

Census Tract 15, Fresno County, California



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U.S. Census Bureau American FactFinder

DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Census Tract 15, Fresno County, California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

Subject	Number	Percent
Total population	**2,426**	**100.0**
SEX AND AGE		
Male	1,246	51.4
Female	1,180	48.6
Under 5 years	181	7.5
5 to 9 years	216	8.9
10 to 14 years	232	9.6
15 to 19 years	204	8.4
20 to 24 years	189	7.8
25 to 34 years	321	13.2
35 to 44 years	314	12.9
45 to 54 years	289	11.9
55 to 59 years	97	4.0
60 to 64 years	90	3.7
65 to 74 years	153	6.3
75 to 84 years	113	4.7
85 years and over	27	1.1
Median age (years)	30.7	(X)
18 years and over	1,667	68.7
Male	867	35.7
Female	800	33.0
21 years and over	1,546	63.7
62 years and over	351	14.5
65 years and over	293	12.1
Male	133	5.5
Female	160	6.6
RACE		
One race	2,300	94.8
White	924	38.1
Black or African American	47	1.9
American Indian and Alaska Native	130	5.4
Asian	81	3.3
Asian Indian	25	1.0
Chinese	2	0.1
Filipino	3	0.1
Japanese	15	0.6
Korean	0	0.0
Vietnamese	1	0.0
Other Asian [1]	35	1.4
Native Hawaiian and Other Pacific Islander	1	0.0
Native Hawaiian	0	0.0
Guamanian or Chamorro	0	0.0
Samoan	1	0.0
Other Pacific Islander [2]	0	0.0
Some other race	1,117	46.0
Two or more races	126	5.2

Subject	Number	Percent
Race alone or in combination with one or more other races [3]		
White	1,018	42.0
Black or African American	65	2.7
American Indian and Alaska Native	150	6.2
Asian	94	3.9
Native Hawaiian and Other Pacific Islander	4	0.2
Some other race	1,221	50.3
HISPANIC OR LATINO AND RACE		
Total population	**2,426**	**100.0**
Hispanic or Latino (of any race)	1,629	67.1
Mexican	1,438	59.3
Puerto Rican	6	0.2
Cuban	0	0.0
Other Hispanic or Latino	185	7.6
Not Hispanic or Latino	797	32.9
White alone	615	25.4
RELATIONSHIP		
Total population	**2,426**	**100.0**
In households	2,316	95.5
Householder	681	28.1
Spouse	359	14.8
Child	881	36.3
Own child under 18 years	630	26.0
Other relatives	250	10.3
Under 18 years	109	4.5
Nonrelatives	145	6.0
Unmarried partner	61	2.5
In group quarters	110	4.5
Institutionalized population	110	4.5
Noninstitutionalized population	0	0.0
HOUSEHOLDS BY TYPE		
Total households	**681**	**100.0**
Family households (families)	522	76.7
With own children under 18 years	275	40.4
Married-couple family	359	52.7
With own children under 18 years	191	28.0
Female householder, no husband present	99	14.5
With own children under 18 years	52	7.6
Nonfamily households	159	23.3
Householder living alone	124	18.2
Householder 65 years and over	53	7.8
Households with individuals under 18 years	321	47.1
Households with individuals 65 years and over	202	29.7
Average household size	3.40	(X)
Average family size	3.85	(X)
HOUSING OCCUPANCY		
Total housing units	**740**	**100.0**
Occupied housing units	681	92.0
Vacant housing units	59	8.0
For seasonal, recreational, or occasional use	2	0.3
Homeowner vacancy rate (percent)	0.8	(X)
Rental vacancy rate (percent)	5.4	(X)
HOUSING TENURE		
Occupied housing units	**681**	**100.0**

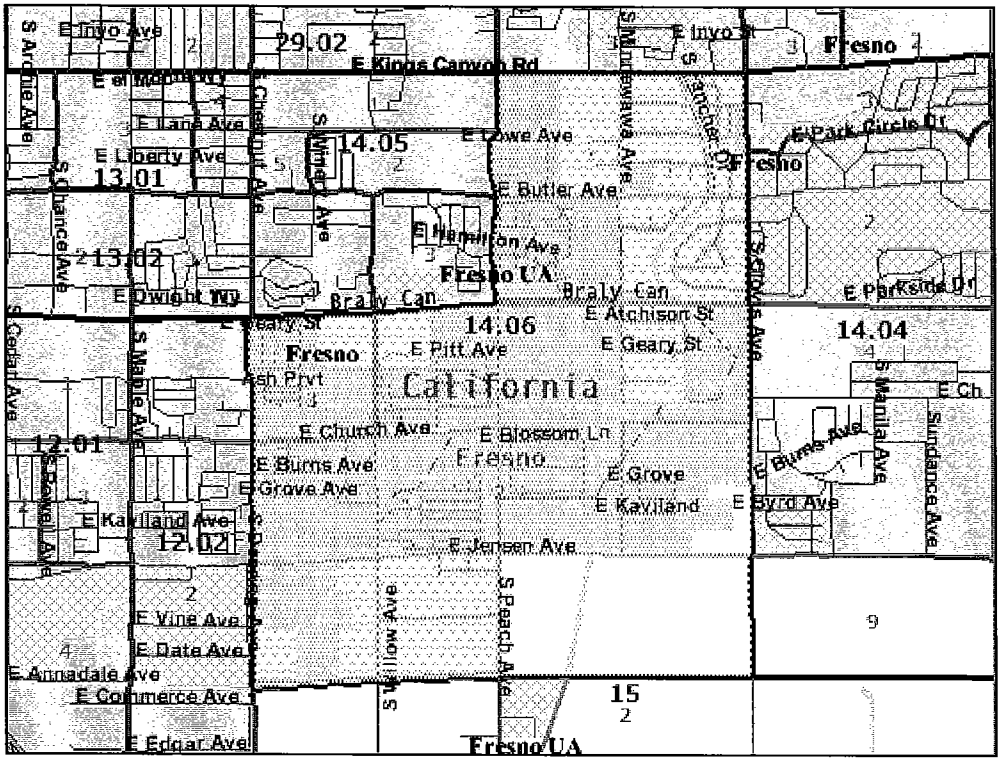
Subject	Number	Percent
Owner-occupied housing units	364	53.5
Renter-occupied housing units	317	46.5
Average household size of owner-occupied unit	2.99	(X)
Average household size of renter-occupied unit	3.87	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

Census Tract 14.06, Fresno County, California

Boundaries
- State
- '00 County
- '00 Census Tract
- '00 Block Group
- '00 Block
- '00 Place
- '00 Place
- '00 Urban Area
- '00 Urban Area

Features
- Major Road
- Street
- Stream/Waterbody
- Stream/Waterbody



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American FactFinder

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DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Census Tract 14.06, Fresno County, California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

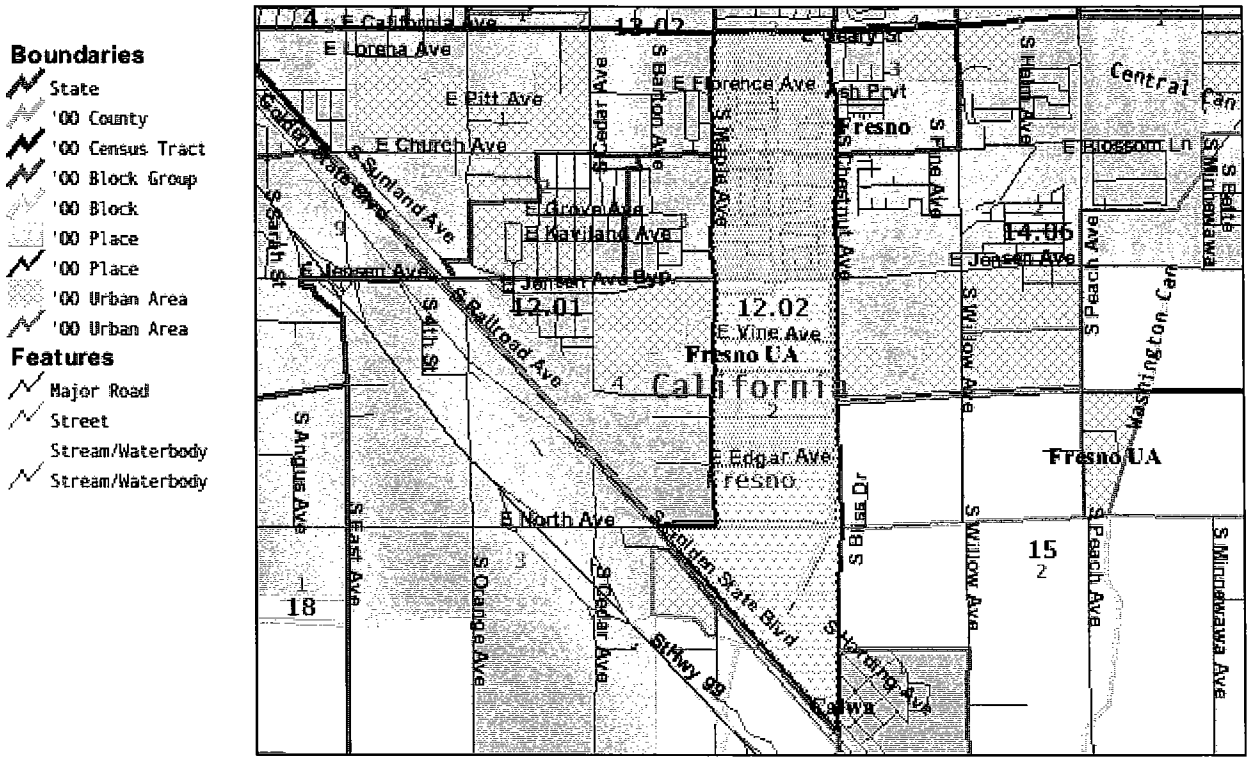
Subject	Number	Percent
Total population	**6,061**	**100.0**
SEX AND AGE		
Male	2,982	49.2
Female	3,079	50.8
Under 5 years	476	7.9
5 to 9 years	556	9.2
10 to 14 years	627	10.3
15 to 19 years	530	8.7
20 to 24 years	363	6.0
25 to 34 years	838	13.8
35 to 44 years	823	13.6
45 to 54 years	745	12.3
55 to 59 years	240	4.0
60 to 64 years	197	3.3
65 to 74 years	339	5.6
75 to 84 years	259	4.3
85 years and over	68	1.1
Median age (years)	31.1	(X)
18 years and over	4,050	66.8
Male	1,955	32.3
Female	2,095	34.6
21 years and over	3,788	62.5
62 years and over	771	12.7
65 years and over	666	11.0
Male	289	4.8
Female	377	6.2
RACE		
One race	5,823	96.1
White	2,624	43.3
Black or African American	587	9.7
American Indian and Alaska Native	111	1.8
Asian	850	14.0
Asian Indian	150	2.5
Chinese	35	0.6
Filipino	116	1.9
Japanese	32	0.5
Korean	1	0.0
Vietnamese	61	1.0
Other Asian [1]	455	7.5
Native Hawaiian and Other Pacific Islander	16	0.3
Native Hawaiian	4	0.1
Guamanian or Chamorro	1	0.0
Samoan	11	0.2
Other Pacific Islander [2]	0	0.0
Some other race	1,635	27.0
Two or more races	238	3.9

Subject	Number	Percent
Race alone or in combination with one or more other races [3]		
White	2,782	45.9
Black or African American	615	10.1
American Indian and Alaska Native	159	2.6
Asian	934	15.4
Native Hawaiian and Other Pacific Islander	32	0.5
Some other race	1,779	29.4
HISPANIC OR LATINO AND RACE		
Total population	**6,061**	**100.0**
Hispanic or Latino (of any race)	2,722	44.9
Mexican	2,274	37.5
Puerto Rican	11	0.2
Cuban	1	0.0
Other Hispanic or Latino	436	7.2
Not Hispanic or Latino	3,339	55.1
White alone	1,762	29.1
RELATIONSHIP		
Total population	**6,061**	**100.0**
In households	6,044	99.7
Householder	1,824	30.1
Spouse	1,099	18.1
Child	2,281	37.6
Own child under 18 years	1,754	28.9
Other relatives	603	9.9
Under 18 years	220	3.6
Nonrelatives	237	3.9
Unmarried partner	112	1.8
In group quarters	17	0.3
Institutionalized population	0	0.0
Noninstitutionalized population	17	0.3
HOUSEHOLDS BY TYPE		
Total households	**1,824**	**100.0**
Family households (families)	1,461	80.1
With own children under 18 years	800	43.9
Married-couple family	1,099	60.3
With own children under 18 years	605	33.2
Female householder, no husband present	254	13.9
With own children under 18 years	138	7.6
Nonfamily households	363	19.9
Householder living alone	304	16.7
Householder 65 years and over	141	7.7
Households with individuals under 18 years	882	48.4
Households with individuals 65 years and over	482	26.4
Average household size	3.31	(X)
Average family size	3.73	(X)
HOUSING OCCUPANCY		
Total housing units	**1,930**	**100.0**
Occupied housing units	1,824	94.5
Vacant housing units	106	5.5
For seasonal, recreational, or occasional use	2	0.1
Homeowner vacancy rate (percent)	2.3	(X)
Rental vacancy rate (percent)	9.2	(X)
HOUSING TENURE		
Occupied housing units	**1,824**	**100.0**

Subject	Number	Percent
Owner-occupied housing units	1,518	83.2
Renter-occupied housing units	306	16.8
Average household size of owner-occupied unit	3.25	(X)
Average household size of renter-occupied unit	3.65	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

Census Tract 12.02, Fresno County, California



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U.S. Census Bureau American FactFinder

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DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

Subject	Number	Percent
Total population	**33,871,648**	**100.0**
SEX AND AGE		
Male	16,874,892	49.8
Female	16,996,756	50.2
Under 5 years	2,486,981	7.3
5 to 9 years	2,725,880	8.0
10 to 14 years	2,570,822	7.6
15 to 19 years	2,450,888	7.2
20 to 24 years	2,381,288	7.0
25 to 34 years	5,229,062	15.4
35 to 44 years	5,485,341	16.2
45 to 54 years	4,331,635	12.8
55 to 59 years	1,467,252	4.3
60 to 64 years	1,146,841	3.4
65 to 74 years	1,887,823	5.6
75 to 84 years	1,282,178	3.8
85 years and over	425,657	1.3
Median age (years)	33.3	(X)
18 years and over	24,621,819	72.7
Male	12,130,354	35.8
Female	12,491,465	36.9
21 years and over	23,146,248	68.3
62 years and over	4,253,854	12.6
65 years and over	3,595,658	10.6
Male	1,513,874	4.5
Female	2,081,784	6.1
RACE		
One race	32,264,002	95.3
White	20,170,059	59.5
Black or African American	2,263,882	6.7
American Indian and Alaska Native	333,346	1.0
Asian	3,697,513	10.9
Asian Indian	314,819	0.9
Chinese	980,642	2.9
Filipino	918,678	2.7
Japanese	288,854	0.9
Korean	345,882	1.0
Vietnamese	447,032	1.3
Other Asian [1]	401,606	1.2
Native Hawaiian and Other Pacific Islander	116,961	0.3
Native Hawaiian	20,571	0.1
Guamanian or Chamorro	20,918	0.1
Samoan	37,498	0.1
Other Pacific Islander [2]	37,974	0.1
Some other race	5,682,241	16.8
Two or more races	1,607,646	4.7

Subject	Number	Percent
Race alone or in combination with one or more other races [3]		
White	21,490,973	63.4
Black or African American	2,513,041	7.4
American Indian and Alaska Native	627,562	1.9
Asian	4,155,685	12.3
Native Hawaiian and Other Pacific Islander	221,458	0.7
Some other race	6,575,625	19.4
HISPANIC OR LATINO AND RACE		
Total population	**33,871,648**	**100.0**
Hispanic or Latino (of any race)	10,966,556	32.4
Mexican	8,455,926	25.0
Puerto Rican	140,570	0.4
Cuban	72,286	0.2
Other Hispanic or Latino	2,297,774	6.8
Not Hispanic or Latino	22,905,092	67.6
White alone	15,816,790	46.7
RELATIONSHIP		
Total population	**33,871,648**	**100.0**
In households	33,051,894	97.6
Householder	11,502,870	34.0
Spouse	5,877,084	17.4
Child	10,519,953	31.1
Own child under 18 years	8,035,222	23.7
Other relatives	2,848,893	8.4
Under 18 years	953,557	2.8
Nonrelatives	2,303,094	6.8
Unmarried partner	683,516	2.0
In group quarters	819,754	2.4
Institutionalized population	413,656	1.2
Noninstitutionalized population	406,098	1.2
HOUSEHOLDS BY TYPE		
Total households	**11,502,870**	**100.0**
Family households (families)	7,920,049	68.9
With own children under 18 years	4,117,036	35.8
Married-couple family	5,877,084	51.1
With own children under 18 years	2,989,974	26.0
Female householder, no husband present	1,448,510	12.6
With own children under 18 years	834,716	7.3
Nonfamily households	3,582,821	31.1
Householder living alone	2,708,308	23.5
Householder 65 years and over	892,207	7.8
Households with individuals under 18 years	4,569,910	39.7
Households with individuals 65 years and over	2,570,170	22.3
Average household size	2.87	(X)
Average family size	3.43	(X)
HOUSING OCCUPANCY		
Total housing units	**12,214,549**	**100.0**
Occupied housing units	11,502,870	94.2
Vacant housing units	711,679	5.8
For seasonal, recreational, or occasional use	236,857	1.9
Homeowner vacancy rate (percent)	1.4	(X)
Rental vacancy rate (percent)	3.7	(X)
HOUSING TENURE		
Occupied housing units	**11,502,870**	**100.0**

Subject	Number	Percent
Owner-occupied housing units	6,546,334	56.9
Renter-occupied housing units	4,956,536	43.1
Average household size of owner-occupied unit	2.93	(X)
Average household size of renter-occupied unit	2.79	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Block 2030, Block Group 2, Census Tract 12.02, Fresno County, California**

NOTE: Quick Tables that contain data sourced from PCT series tables are not available for blocks or block groups. Change your geographic selection(s) to other than block or block group, and/or change to a table not sourced from the PCT series (i.e., QT-P4, QT-P5, QT-P6, QT-P10, QT-H1, QT-H2, QT-H3, QT-H4).

DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Census Tract 12.02, Fresno County, California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

Subject	Number	Percent
Total population	**4,213**	**100.0**
SEX AND AGE		
Male	2,093	49.7
Female	2,120	50.3
Under 5 years	382	9.1
5 to 9 years	512	12.2
10 to 14 years	522	12.4
15 to 19 years	443	10.5
20 to 24 years	288	6.8
25 to 34 years	609	14.5
35 to 44 years	544	12.9
45 to 54 years	407	9.7
55 to 59 years	138	3.3
60 to 64 years	92	2.2
65 to 74 years	152	3.6
75 to 84 years	99	2.3
85 years and over	25	0.6
Median age (years)	24.4	(X)
18 years and over	2,526	60.0
Male	1,254	29.8
Female	1,272	30.2
21 years and over	2,289	54.3
62 years and over	325	7.7

Subject	Number	Percent
65 years and over	276	6.6
Male	127	3.0
Female	149	3.5
RACE		
One race	3,958	93.9
White	969	23.0
Black or African American	620	14.7
American Indian and Alaska Native	65	1.5
Asian	456	10.8
Asian Indian	74	1.8
Chinese	3	0.1
Filipino	64	1.5
Japanese	4	0.1
Korean	1	0.0
Vietnamese	32	0.8
Other Asian [1]	278	6.6
Native Hawaiian and Other Pacific Islander	6	0.1
Native Hawaiian	4	0.1
Guamanian or Chamorro	0	0.0
Samoan	2	0.0
Other Pacific Islander [2]	0	0.0
Some other race	1,842	43.7
Two or more races	255	6.1
Race alone or in combination with one or more other races [3]		
White	1,161	27.6
Black or African American	646	15.3
American Indian and Alaska Native	116	2.8
Asian	504	12.0
Native Hawaiian and Other Pacific Islander	12	0.3
Some other race	2,050	48.7
HISPANIC OR LATINO AND RACE		
Total population	**4,213**	**100.0**
Hispanic or Latino (of any race)	2,854	67.7
Mexican	2,469	58.6
Puerto Rican	3	0.1
Cuban	1	0.0
Other Hispanic or Latino	381	9.0
Not Hispanic or Latino	1,359	32.3
White alone	207	4.9
RELATIONSHIP		
Total population	**4,213**	**100.0**
In households	4,191	99.5
Householder	1,009	23.9
Spouse	548	13.0
Child	1,853	44.0
Own child under 18 years	1,405	33.3
Other relatives	555	13.2
Under 18 years	235	5.6
Nonrelatives	226	5.4
Unmarried partner	77	1.8
In group quarters	22	0.5
Institutionalized population	0	0.0
Noninstitutionalized population	22	0.5
HOUSEHOLDS BY TYPE		
Total households	**1,009**	**100.0**
Family households (families)	889	88.1
With own children under 18 years	561	55.6
Married-couple family	548	54.3

Subject	Number	Percent
With own children under 18 years	350	34.7
Female householder, no husband present	261	25.9
With own children under 18 years	165	16.4
Nonfamily households	120	11.9
Householder living alone	92	9.1
Householder 65 years and over	35	3.5
Households with individuals under 18 years	654	64.8
Households with individuals 65 years and over	203	20.1
Average household size	4.15	(X)
Average family size	4.33	(X)
HOUSING OCCUPANCY		
Total housing units	**1,071**	**100.0**
Occupied housing units	1,009	94.2
Vacant housing units	62	5.8
For seasonal, recreational, or occasional use	2	0.2
Homeowner vacancy rate (percent)	1.3	(X)
Rental vacancy rate (percent)	5.5	(X)
HOUSING TENURE		
Occupied housing units	**1,009**	**100.0**
Owner-occupied housing units	528	52.3
Renter-occupied housing units	481	47.7
Average household size of owner-occupied unit	4.07	(X)
Average household size of renter-occupied unit	4.25	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

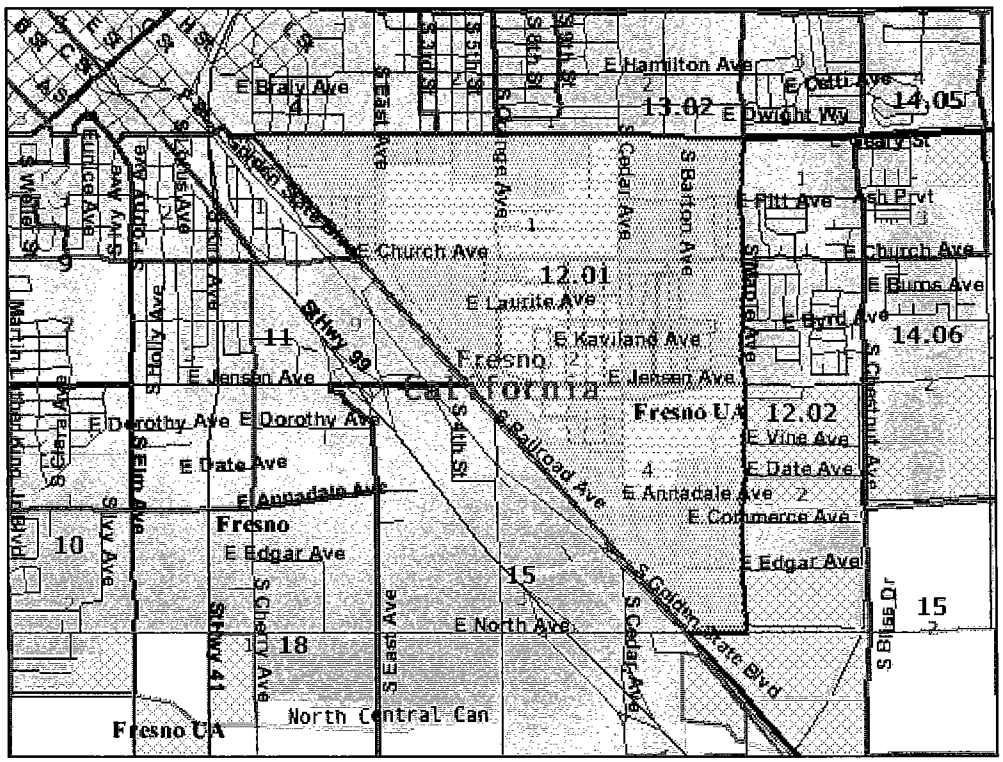
DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Block Group 2, Census Tract 12.02, Fresno County, California**

NOTE: Quick Tables that contain data sourced from PCT series tables are not available for blocks or block groups. Change your geographic selection(s) to other than block or block group, and/or change to a table not sourced from the PCT series (i.e., QT-P4, QT-P5, QT-P6, QT-P10, QT-H1, QT-H2, QT-H3, QT-H4).

Census Tract 12.01, Fresno County, California

Boundaries
- State
- '00 County
- '00 Census Tract
- '00 Block Group
- '00 Block
- '00 Place
- '00 Place
- '00 Urban Area
- '00 Urban Area

Features
- Major Road
- Street
- Stream/Waterbody
- Stream/Waterbody



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U.S. Census Bureau American FactFinder

DP-1. **Profile of General Demographic Characteristics: 2000**
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Geographic Area: **Census Tract 12.01, Fresno County, California**

NOTE: For information on confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

Subject	Number	Percent
Total population	**5,207**	**100.0**
SEX AND AGE		
Male	2,737	52.6
Female	2,470	47.4
Under 5 years	532	10.2
5 to 9 years	623	12.0
10 to 14 years	532	10.2
15 to 19 years	510	9.8
20 to 24 years	400	7.7
25 to 34 years	774	14.9
35 to 44 years	711	13.7
45 to 54 years	504	9.7
55 to 59 years	162	3.1
60 to 64 years	133	2.6
65 to 74 years	200	3.8
75 to 84 years	103	2.0
85 years and over	23	0.4
Median age (years)	25.1	(X)
18 years and over	3,213	61.7
Male	1,719	33.0
Female	1,494	28.7
21 years and over	2,927	56.2
62 years and over	404	7.8
65 years and over	326	6.3
Male	144	2.8
Female	182	3.5
RACE		
One race	4,921	94.5
White	1,501	28.8
Black or African American	288	5.5
American Indian and Alaska Native	141	2.7
Asian	188	3.6
Asian Indian	19	0.4
Chinese	0	0.0
Filipino	2	0.0
Japanese	0	0.0
Korean	0	0.0
Vietnamese	0	0.0
Other Asian [1]	167	3.2
Native Hawaiian and Other Pacific Islander	2	0.0
Native Hawaiian	2	0.0
Guamanian or Chamorro	0	0.0
Samoan	0	0.0
Other Pacific Islander [2]	0	0.0
Some other race	2,801	53.8
Two or more races	286	5.5

Subject	Number	Percent
Race alone or in combination with one or more other races [3]		
White	1,729	33.2
Black or African American	304	5.8
American Indian and Alaska Native	199	3.8
Asian	227	4.4
Native Hawaiian and Other Pacific Islander	5	0.1
Some other race	3,034	58.3
HISPANIC OR LATINO AND RACE		
Total population	**5,207**	**100.0**
Hispanic or Latino (of any race)	4,230	81.2
Mexican	3,641	69.9
Puerto Rican	13	0.2
Cuban	4	0.1
Other Hispanic or Latino	572	11.0
Not Hispanic or Latino	977	18.8
White alone	415	8.0
RELATIONSHIP		
Total population	**5,207**	**100.0**
In households	5,165	99.2
Householder	1,257	24.1
Spouse	633	12.2
Child	2,143	41.2
Own child under 18 years	1,590	30.5
Other relatives	792	15.2
Under 18 years	363	7.0
Nonrelatives	340	6.5
Unmarried partner	123	2.4
In group quarters	42	0.8
Institutionalized population	0	0.0
Noninstitutionalized population	42	0.8
HOUSEHOLDS BY TYPE		
Total households	**1,257**	**100.0**
Family households (families)	1,048	83.4
With own children under 18 years	631	50.2
Married-couple family	633	50.4
With own children under 18 years	416	33.1
Female householder, no husband present	262	20.8
With own children under 18 years	137	10.9
Nonfamily households	209	16.6
Householder living alone	159	12.6
Householder 65 years and over	66	5.3
Households with individuals under 18 years	747	59.4
Households with individuals 65 years and over	255	20.3
Average household size	4.11	(X)
Average family size	4.40	(X)
HOUSING OCCUPANCY		
Total housing units	**1,363**	**100.0**
Occupied housing units	1,257	92.2
Vacant housing units	106	7.8
For seasonal, recreational, or occasional use	6	0.4
Homeowner vacancy rate (percent)	2.6	(X)
Rental vacancy rate (percent)	8.9	(X)
HOUSING TENURE		
Occupied housing units	**1,257**	**100.0**

Subject	Number	Percent
Owner-occupied housing units	643	51.2
Renter-occupied housing units	614	48.8
Average household size of owner-occupied unit	4.03	(X)
Average household size of renter-occupied unit	4.19	(X)

(X) Not applicable
[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

Appendix 5.12-2

Socioeconomics
Description of Minority Status

The analysis of potentially affected minorities is based on data from the 2000 census as published by the U.S. Department of Commerce (DOC, 2001). In order to interpret the analysis correctly, the information provided in Table 5.12-6 requires clarification. The federal government considers race and Hispanic origin to be two separate and distinct concepts (DOC, 2001). Hispanics may be of any race; the term refers primarily to culture, and secondarily to race. Specifically, the Federal Office of Management and Budget (OMB) defines an Hispanic or Latino as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race (DOC, 2001)." In data collection and presentation, federal agencies are required to use a minimum of two ethnicities: "Hispanic or Latino" and "Not Hispanic or Latino."

During the Census of 2000, respondents were given the option of selecting one or more race categories to indicate their racial identities. Starting with Census 2000, the OMB requires federal agencies to use a minimum of five race categories, as follows (DOC, 2001):

1. **White:** people having origins in any of the original peoples of Europe, the Middle East, or North Africa. It includes people who indicated their race or races as "white" or wrote in entries such as Irish, German, Italian, Lebanese, Near Easterner, Arab, or Polish.

2. **Black or African American:** people having origins in any of the Black racial groups of Africa. It includes people who indicated their race or races as "Black, African American, or Negro," or wrote in entries such as African American, Afro American, Nigerian or Haitian.

3. **American Indian and Alaska Native**: people having origins in any of the original peoples of North and South America (including Central America), and who maintain a tribal affiliation or community attachment. It includes people who indicated their race or races by marking this category or writing in their principal or enrolled tribe, such as Rosebud Sioux, Chippewa, or Navajo.

4. **Asian**: people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent. It includes people who indicated their race or races as "Asian Indian," "Chinese,"

"Filipino," "Korean," "Japanese," "Vietnamese," or "Other Asian," or wrote in entries such as Burmese, Hmong, Pakistani, or Thai.

5. **Native Hawaiian and Other Pacific Islander:** people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. It includes people who indicated their race or races as Navive Hawaiian, Guamanian, or Chamoor, Samoan, or Other Pacific Islander, or wrote in entries such as Thaitian, Mariana Islander, or Chuukese.

Respondents who were unable to identify with these five OMB race categories completed the form with the "Some other race" response. For example, respondents who provided write-in entries such as Moroccan, South African, Belizean, or a Hispanic origin (for example, Mexican, Puerto Rican, or Cuban) are included in the Some other race category.

In Census 2000, nearly 98 percent of all respondents reported only one race. The largest group reported White alone, accounting for 75 percent of all people living in the United States. The Black or African American alone population represented 12 percent of the total. Slightly less than 1 percent of all respondents indicated only American Indian and Alaska Native. Approximately 4 percent of all respondents indicated only Asian. The smallest race group was the native Hawaiian and Other Pacific Islander alone population, representing 0.1 percent of the total population. The remainder of the "one race" respondents - 5.5 percent of all respondents – indicated "Some other race." The Some other race alone category consists predominantly (97.0 percent) of people of Hispanic origin, and is not a standard OMB race category. Across the US, the overwhelming majority (97 percent) of the 15.4 million people who reported "Some other race" alone were Hispanic or Latino, while the remaining were not Hispanic or Latino (DOC 2001).

References:

U.S. Department of Commerce (DOC). 2001. Overview of Race and Hispanic Origin. Census 2000 Brief. Issued March 2001.

Appendix 5.13-1

Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814
(916) 653-4082; Fax (916) 657-5390

September 8, 2003

RE: CULTURAL RESOURCES INVENTORY OF PROPOSED 18-ACRE ELECTRICAL PEAKER FACILITY PROJECT LOCATED ON NORTH AVENUE, COMMUNITY OF MALAGA, FRESNO, FRESNO COUNTY, CALIFORNIA

Dear Native American Heritage Commission:

William Self Associates has recently been contracted to conduct a record search and archaeological survey of a proposed electrical Peaker facility an 18-acre parcel located on North Avenue, ½-mile west of the intersection with Willow Avenue, Malaga, Fresno, Fresno County (see attached maps). The project area is located in Township 14 South, Range 20 East, Section 25 of the Malaga (1964 PR 1981), USGS topographic quadrangle.

We bring this project to the attention of the Native American Heritage Commission with the desire to obtain, from your office, pertinent information regarding prehistoric, historic and/or ethnographic land use and sites of Native American traditional or cultural value that might be known to exist within the project vicinity, ash depicted in the Sacred Lands database or other files. We would also appreciate obtaining a list of interested Native American tribal entities or individuals for the project area. We have contacted the Northwest Information Center at Sonoma State University to review their files as part of the background research on the project.

We would appreciate a response, at your earliest convenience, should you have information relative to this request. Should you have any questions, I can be reached at (925) 253-9070.

Thanks again for your assistance.

Sincerely,

WILLIAM SELF ASSOCIATES

Leigh Martin
Senior Archaeologist

Attachment

STATE OF CALIFORNIA Gray Davis, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

September 24, 2003

Leigh Martin
WSA Inc
PO Box 2192
61d Avendia de Orinda
Orinda CA 94563

Sent By Fax: 925-254-3553
No. of Pages: 2

RE: Proposed 18-acre Electrical Peaker Facility Project on North Avenue, Community of Malaga, Fresno County.

Dear Mr. Martin:

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend other with specific knowledge. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4040.

Sincerely,

Rob Wood
Environmental Specialist III

NATIVE AMERICAN CONTACTS
Fresno County
September 24, 2003

Santa Rosa Rancheria
Clarence Atwell, Chairperson
P.O. Box 8 Tache
Lemoore , CA 93245 Tachi
Yokut
(559) 924-1278
(559) 924-3583 Fax

Table Mountain Rancheria
Lee Ann Walker Grant, Chairperson
P.O. Box 410 Yokut
Friant , CA 93626-0
(559) 822-2587
(559) 822-2693 FAX

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to the cultural assessmet for the proposed 18-acre Electrical Peaker Facility Project on North Avenue, Community of Malaga, Fresno County.

WSA

Consultants in Archaeology and Historic Preservation

October 2, 2003

To All Addressees on Attached List

Re: Proposed 18-acre Kings River Conservation District (KRCD) Electrical Peaking Plant on North Avenue, community of Malaga, Fresno County

Dear NAHC Fresno County Native American Contacts:

William Self Associates, Inc. (WSA) has been contracted by the KRCD to assess potential impacts to cultural resources as part of their proposed 18-acre electrical peaking plant located on North Avenue between south Maple Avenue and Chestnut Avenue. The project area is located in Township 14 South, Range 20 East, Section 25 of the Malaga (1964 PR 1981), USGS topographic quadrangle.

In accordance with CEC Guidelines, each Native American contact on the Heritage Commission list will be notified and their comments sought as part of the project environmental review process. A record search at the Northwest Information Center and a field survey of the project location did not indicate the presence of recorded or observable Native American sites or resources in the immediate project area, or within a ¼-mile radius. The attached map illustrates the location of the project area.

WSA, on behalf of the County of Fresno, would appreciate receiving any comments you may have regarding cultural resources or sacred sites issues within the immediate project area. If you could provide your comments in writing to the address below, or call me, we will make sure the comments are provided to the City of Fresno as part of the environmental assessment of the project.

We look forward to your response before October 17, 2003, if possible. Thank you for your assistance.

Sincerely,

Leigh A. Martin
Senior Archaeologist

Attachment

Table 1. KRCD Peaking Plant Project,
Record of Native American Contacts and Comments

Addresses withheld to protect privacy

Fresno County Yokut/Tache/Tachi Native American Contacts	***Date of Notification Letter***	***Response to Letter (Date)***	***Date of Phone Contact***	***Comments***
Santa Rosa Rancheria Clarence Atwell Tribal Chairperson	10/02/03	None to Date	10/17/03 10/30/03	Left message on answering machine No answer.
Table Mountain Rancheria Lee Ann Walker Grant Tribal Chairperson	10/02/03	None to Date	10/17/03 10/30/03	Left message. Left message.

Appendix 5.13-2

WSA

WILLIAM D. SELF — Principal

EDUCATION:

B.A. Anthropology, 1973, University of California, Los Angeles
M.A. Anthropology, 1980, University of Nevada, Reno

EXPERIENCE:

1988 - Present: *President/Principal, William Self Associates, Inc.*

Principal Archeologist supervising technical staff in cultural resource management studies including: prehistoric, historic, and maritime archeological field survey, archival research, testing and data recovery, artifact cataloging and lab analysis, architectural history and architectural documentation, and state and federal historic preservation consultation. Recent Principal Investigator experience includes:

- Conducted intensive archeological surveys in more than 20 separate project areas totaling more than 45,000 acres in Solano and Contra Costa Counties.
- Conducted data recovery on numerous sites in Contra Costa and Alameda Counties, including the Emeryville Shellmound site, excavating more than 200 m^3 of cultural deposit and removing more than 300 prehistoric Native American burials in conjunction with local Ohlone tribal members. Detailed analysis and reporting followed excavations.
- Archival/record search and preparation of Class I Overview; survey and site recording (130 sites) along 220 miles of pipeline corridor for Santa Fe Pacific Concord-to-Colton Pipeline. State and Federal Agency interaction and coordination.
- Twenty six-mile pipeline project crossing Marine Corps Base Camp Pendleton, San Diego
- Mid-Embarcadero Roadway and F-Line Extension Project, San Francisco, CA
- Conducted literature and record search and field survey of proposed power plant location in Mojave Desert town of Victorville

  Pipeline replacement project from Reno to Fallon, Nevada
- As part of FHWA/Caltrans MOA with the California SHPO, implemented Treatment Plan for historic properties along San Francisco waterfront on the Mid-Embarcadero Roadway and F-Line Extension Project
- Conducted intensive archaeological survey of ca. 4,000 acres of BLM land to document mining resources on the Spokane (WA.) district
- Conducted construction monitoring, test excavation and data recovery on Muni Metro Turnback Project in San Francisco
- Conducted extensive archeological test excavation at prehistoric shell midden/burial site in Santa Clara County, CA as part of federal Programmatic Agreements for transit project.
- Developed Historic and Archeological Resource Protection Plans for Naval Weapons Station Concord (CA), and Port Hueneme Construction Battalion Center, Ventura County
- Assessed potential impact of construction of proposed building adjacent to known prehistoric village site (CA-Scl-20) at NAS Moffett Field, Mountain View, CA.
- Conducted archeological and/or architectural survey and assessment on more than 100 additional projects in California, Arizona, Nevada, Oregon, Washington, Illinois and Montana.

1970 - 1988: *Environmental Planner, City of San Francisco Clean Water Program; Senior Scientist, Bechtel Group, San Francisco; Nevada State Archeologist, State Historic Preservation Office, Carson City, NV; Staff Archeologist; Nevada Dept. of Transportation, Carson City, NV; Forest Archeologist; U.S. Forest Service, Lee Vining, CA; Various Archeological Assignments: California, England, France.*

PROFESSIONAL REGISTRATION:

Register of Professional Archaeologists (RPA) Certification since 1980.

WSA

LEIGH ANNE MARTIN **Senior Archaeologist**

EDUCATION:

M.A., 1999, Cultural Resources Management, Sonoma State University
B.A., 1992, Anthropology and Psychology, University of California Berkeley

EXPERIENCE:

1998 - Present: Senior Archaeologist, *William Self Associates*

- Conducted intensive surveys and report preparation in more than 40 separate project areas totaling more than 20,000 acres in Solano, Yolo, Alameda, and Contra Costa Counties.
- Conducted archival research, survey, structural documentation, and preparation of final assessment report for Concord to Sacramento Pipeline.
- Assisted with intensive surveys of more than 5,000 acres at Cowell Ranch, Contra Costa County
- Conducted archival research, survey, structural documentation, and technical reporting at private development project in Castro Valley, Ca.
- Conducted archival research, survey, structural documentation, and technical reporting at private development project in San Ramon, Ca.
- Conducted numerous studies for Kinder Morgan Pipeline, Concord to Sacramento corridor, including archival research, survey, and technical reporting
- Conducted archival research, survey, structural documentation, and technical reporting at private development project in Pacheco, Ca.
- Prepared technical reports on cultural resources sites associated with the Level (3) Fiber Optic Project throughout No. Cal.
- Assisted with technical analysis and reporting on the 1045 Mission Street Apartment Project, SF
- Conducted archival research, survey, structural documentation, and technical reporting for YMCXA Project, San Ramon, Ca..
- Assisted with technical reporting on the Santa Fe Pipeline Camp Pendleton Replacement Project, San Diego, Ca.
- Assisted with technical reporting on the Mid-Embarcadero Roadway Project, San Francisco.
- Assisted with Abandoned Mine Inventory Project, Spokane Washington, including survey, recording mine features, mapping, report preparation.
- Assisted with manual excavation of 20 cubic meters at site CA-SCL-12 for the Tasman Light Rail Data Recovery Project , Sunnyvale, Ca.
- Assisted with data recovery of historic properties at Avalon Project, Fremont, Ca.

1994-1998: Staff Archaeologist, Woodward-Clyde Consultants, Oakland, Ca.

- Mirabel Heights Project, Forestville: research, survey, final report
- Sugarloaf State Park Ethnohistory Project, Sonoma: research, interviews, report

- Cultural Resources Inventory of Los Posadas State Forest Napa County: project manager, research, mapping, survey, site records, and final report in 2 vols. prepared for the California Department of Forestry
- Glen Ellen Historic House, Arnold Drive, Glen Ellen: survey, architectural record, mapping and report
- Russian American Company ship *Il'men* Project: remote sensing survey
- Olompali State Historic Park Adobe: research, mapping, report
- San Francisco Presidio Archaeological Project: excavation

1994-1996: Project Coordinator, Anthropological Studies Center, Sonoma State University,

- Conducted excavation at Fort Ross Archaeological Project, Mendocino

Field Schools:

University of California, Davis at Pompeii, Italy (12 weeks). June – August 1990
University of California, Berkeley at Flowerdew Hundred, Virginia (8 weeks). June – July 1992
University of California, Berkeley at Fort Ross, California. June 1991

Professional Societies:

Register of Professional Archaeologists (RPA) Certification since 2003

Society for California Archaeology
Society for American Archaeology
Society for Historical Archaeology

Appendix 5.14-1

SWCA
ENVIRONMENTAL CONSULTANTS

PAUL C. MURPHEY
Principal Investigator
Paleontological Resources

Education

Ph.D. Geological Sciences (Paleontology), University of Colorado (May, 2001).

M.S. Geological Sciences, University of Colorado (May, 1995)

B.A. Anthropology/Biology, University of Colorado (May, 1991)
Undergraduate education: Colorado State University, University of San Diego, University of Colorado

Background Summary

Dr. Paul Murphey is currently the Paleontological Principal Investigator for the Los Angeles Area Office of SWCA. Dr. Murphey has over eight years of experience as Principal Investigator for numerous paleontological resource management projects throughout the western United States, and has worked in museum collections for over eleven years. His general research interests include mammalian biodiversity, biostratigraphy, biogeography and evolution, and the geologic and climatic history of North America. His recent research has utilized vertebrate and invertebrate fossils, taphonomy, sedimentology, and high resolution stratigraphy in order to interpret paleoecology, paleoenvironments, paleoclimates, and geologic history including rates of sedimentation and basin subsidence. He holds Graduate Faculty and Research Faculty appointments at the University of Colorado, where he has advised and mentored numerous students and taught classes including Cenozoic history of North America, taphonomic processes, field paleontology, field techniques for museum scientists, and paleontological curation. In his former position as a museum Collections Manager, Dr. Murphey gained experience in all aspects of collections curation and administration, paleontological field and laboratory techniques; proposal writing, and exhibit development and design. He has led numerous field expeditions in and outside of the United States, and has published on a wide variety of paleontological and geological research projects. Currently permitted in a number of western states by various land management agencies, his range of experience in paleontological resource management includes directing paleontological resource assessments, developing paleontological mitigation treatment plans; performing field reconnaissance and paleontological surveys; conducting paleontological monitoring and salvages with an emphasis on rapid removal and thorough data capture; laboratory analysis and database management, conducting literature review and research; technical report writing; designing interpretive displays, and training, supervising and coordinating paleontological personnel.

Professional Experience

Principle Investigator, Paleontology, SWCA Environmental Consultants, Los Angeles (June, 2003-present). 1) Oversee and manage field operations, fossil preparation laboratory and curation activities; 2) train and coordinate paleontological personnel; 3) develop and implement research designs and paleontological analyses; 4) review proposals, technical documents and project reports; 5) develop and manage paleontological databases; 6) ensure that all operations are conducted according to museum standards and agency guidelines.

***Collections Manager*,** Paleobiology/Osteology/Geology, University of Colorado Museum (September 1, 1997-April 15, 2003). *Duties and Accomplishments*: 1) Implemented 3 year NSF-funded collections improvement project to curate and house backlogged collections and re-house and upgrade portions of the existing collections; 2) worked with architects to design new collections and research facilities for the new Bruce Curtis Museum Collections Building; 3) planned and oversaw collections packing, moving, and unpacking; 4) performed all aspects of collections curation, including biological and paleontological specimen preparation, identification, cataloguing, storage, conservation, databasing, collections policy development, maintenance of collections archives and library, and sectional administration; 5) managed budgets and accounts and prepared funding proposals; 6) participated in public programs and exhibit development and design, provided local community service; 7) trained and supervised up to 25 collections assistants and undergraduate and graduate students/semester, and developed and maintained volunteer program; 8) co-coordinated MaPSTeDI project (see description below); 9) collected specimens and conducted collections and field-based research; 10) taught classes in the Museum and Field Studies graduate program.

***Co-Coordinator*,** Mountain and Plains Spatio-Temporal Database-Informatics Initiative (MaPSTeDI) (September 1, 2001-present), University of Colorado Museum. *Project Goals:* To provide an online tool-kit for biodiversity research (for all audiences) based on museum biological/paleontological collections data at participating institutions using distributed databases and GIS software. *Duties and Accomplishments:* Hired, trained, and coordinated project personnel at the CU Museum (8 undergraduate, graduate students, and staff); developed and managed georeferencing procedures and protocols for participating museums; currently working with newly hired GIS specialist and database/web design specialist on database architecture, database re-engineering, development of GIS tools and web interface; Approximately 60,000 zoological (mammals, birds, herps, fish), botanical and paleontological records from the six state project area have been georeferenced in the first 14 months of the project.

***Instructor*,** University of Colorado Museum and Field Studies Masters Program, University of Colorado at Boulder (2001-present).

Graduate Faculty, University of Colorado at Boulder (2001-present).

Lecturer, Department of Geological Sciences, University of Colorado at Boulder (Spring semester, 2002).

Principle Investigator/Owner/Consultant – DBA Rocky Mountain Paleontology (1995-2003)

Graduate Curatorial Assistant, University of Colorado Museum Paleobiology/Osteology collections (1992-1996).
Responsibilities: Curation and collections management of fossil vertebrate, invertebrate, paleobotanical, osteological, rock and mineral, and teaching collections.

Publications

Murphey, P.C., (in press), Stratigraphy, fossil distribution and depositional environments of the upper Bridger Formation (middle Eocene), southwestern Wyoming: *Report of Investigation, Wyoming State Geological Survey*.

Murphey, P.C., Brand, L., Evanoff, E., Haessig, J.E., Smith, A.A., and Matthews, N., (in press), Bedrock geologic map of the southern Green River Basin, Uinta and Sweetwater Counties, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet and CD-Rom (scale 1:50,000).

Murphey, P.C., Brand, L., Haessig, J.E., and Smith, A.A., (in press), Bedrock geologic map of the Devils Playground 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Brand, L., and Haessig, J.E., (in press), Bedrock geologic map of the Black Spring Reservoir 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Haessig, J.E., and Brand, L., (in press), Bedrock geologic map of the Horse Ranch 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Haessig, J.E., Brand, L., and Matthews, N., (in press), Bedrock geologic map of the McKinnon 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Haessig, J.E., Brand, L., and Matthews, N., (in press), Bedrock geologic map of the Soap Holes Reservoir 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Evanoff, E., Haessig, J.E., Matthews, N., (in press), Bedrock geologic map of the Burntfork 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Murphey, P.C., Evanoff, E., Haessig, J.E., Matthews, N., (in press), Bedrock geologic map of the Lonetree 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Evanoff, E., **Murphey, P.C.**, Haessig, J.E., Smith, A.A., and Matthews, N., (in press), Bedrock geologic map of the Reed Reservoir 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Brand, L., **Murphey, P.C.**, Haessig, J.E., and Smith, A.A., (in press), Bedrock Geologic Map of the Linwood Canyon 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Brand, L., **Murphey, P.C.**, Haessig, J.E., and Smith, A.A., (in press), Bedrock Geologic Map of the Antelope Wash 7.5' Quadrangle, Sweetwater County, Wyoming: *Wyoming State Geological Survey Map*, 1 sheet (scale 1:24,000).

Evanoff, E., McIntosh, W.C., and **Murphey, P.C.**, 2001, Stratigraphic Summary and $^{40}Ar/^{39}Ar$ geochronology of the Florissant Formation, Colorado. *Proceedings of the Denver Museum of Nature and Science,* Series 4, no. 1, p. 1-16.

Murphey, P.C., Torick, L.T., Bray, E., Chandler, R., Evanoff, E., 2001, Taphonomy, fauna, and depositional setting of the *Omomys* Quarry, an unusual accumulation from the Bridger Formation (middle Eocene) of southwestern Wyoming, in: *Eocene Vertebrates: Unusual Occurrences and Rarely Sampled Habitats* (G. Gunnell and J. Alexander, eds.), Plenum Press, NY, p. 361-402.

Murphey, P.C., 2001, Stratigraphy, fossil distribution, and depositional environments of the upper Bridger Formation (middle Eocene) of southwestern Wyoming, and the taphonomy of an unusual Bridger microfossil assemblage: *University of Colorado Doctoral Dissertation,* 345 p.

Evanoff, E., Brand, L.R., and **Murphey, P.C.**, 1998, The lower Bridger Formation (middle Eocene) of southwest Wyoming: Widespread marker units and subdivisions of Bridger B: *Dakoterra,* vol. 5, pp. 115-122.

Murphey, P.C., 1995, Paleontology, distribution, and depositional history of a highly fossiliferous middle Eocene lacustrine deposit in the Bridger Formation (middle Eocene), southwestern Wyoming: *Master's thesis*, University of Colorado at Boulder, 121 pp.

Evanoff, E., and **Murphey, P.C.**, 1994, Rock units at Florissant Fossil Beds National Monument, In: *Late Paleogene Geology and Paleoenvironments of Central Colorado* (E. Evanoff, Ed.), Guidebook for the 1994 Rocky Mountain Section Meeting of the Geological Society of America, p. 40-43.

Murphey, P.C., 1992, Stratigraphy of Florissant Fossil Beds National Monument, in: The Stratigraphy and Paleontology of Florissant Fossil Beds National Monument, A Progress Report (E. Evanoff and K. Doi, Eds.): *Technical report for the USDI National Park Service,* p. 2-1 to 2-44.

Published Abstracts

Jaffri, A. R., **Murphey, P.C., 2002,** Sedimentology and stratigraphic paleontology of the Pleistocene Dhok Gangaal Hills, upper Siwaliks of Pakistan: A biostratigraphic revision: *Geological Society of America abstracts with Programs,* 2002 Annual Meeting Issue.

Murphey, P.C., Lester, A., Bohor, B., Robinson, P., Evanoff, E., and Larson, E., 1999, $^{40}Ar/^{39}Ar$ dating of volcanic ash deposits in the Bridger Formation (middle Eocene) of southwestern Wyoming: *Geological Society of America Abstracts with Programs,* 1999 Annual Meeting Issue.

Evanoff, P.C., and **Murphey, P.C.**, 1999, High-resolution stratigraphy of terrestrial sequences: Examples from the White River and Bridger Formations of Wyoming: *Geological Society of America Abstracts with Programs,* 1999 Annual Meeting Issue.

Evanoff, E., Brand, L.R., and **Murphey, P.C.**, 1998, The Bridger Formation (middle Eocene) of southwest Wyoming: Widespread marker units and subdivisions of Bridger B through D: *Society of Vertebrate Paleontology*, Supplement to No. 3, p. 40A.

Brand, L.R., **Murphey, P.C.**, Evanoff, E., Matthews, N., and Gregonis, S., 1998, Mapping of the widespread marker units in the middle Eocene Bridger Formation, southwestern Wyoming: *Fifth Annual Conference on Fossil Resources*, p. SP-01.

Murphey, P.C., Torick, L.T., Bray, E., Chandler, R., Evanoff, E., 1998, Taphonomy, fauna, and depositional setting of the *Omomys* Quarry, an unusual accumulation from the Bridger Formation (middle Eocene) of southwestern Wyoming: *Journal of Vertebrate Paleontology*, 1998 Abstracts with Programs.

Evanoff, E., **Murphey, P.C.**, and Brand, L.R., 1998, Widespread stratigraphic marker units and subdivisions of Bridger B through D (middle Eocene), southwest Wyoming: *Journal of Vertebrate Paleontology,* Abstracts with Programs.

Hasiotis, S.T., and **Murphey, P.C.,** 1997, Preliminary report of aquatic plant and invertebrate ichnofossils from the middle Eocene Bridger Formation, southwest Wyoming: *Geological Society of America Abstracts with Programs*, Vol. 29, no. 2.

Murphey, P.C., and Burger, B.J., 1996, Depositional setting and fauna of the *Omomys* Quarry, a possible owl site in the Bridger Formation (middle Eocene) of southwestern Wyoming: *Journal of Vertebrate Paleontology*, Vol. 16, Supplement to no. 3, p. 55A.

Evanoff, E., and **Murphey, P.C.**, 1996, The end of Laramide tectonism as recorded by middle Eocene basinal rocks of Wyoming and adjacent states: *Geological Society of America Abstracts with Programs*, Vol. 28, no. 7, p. A-373.

Murphey, P.C., 1996, The Henrys Fork white layer, a fossil bearing lacustrine deposit within the middle Eocene Bridger Formation, southwestern Wyoming: *Geological Society of America Abstracts with Programs*, Vol. 28, no. 4, p. 33.

Evanoff, E.E., **Murphey, P.C.**, and Robinson, P., 1996, The middle Eocene Bridger Formation of southwestern Wyoming: *Geological Society of America Abstracts with Programs*, Vol. 28, no. 4, p. 27.

Covert, H. H., **Murphey, P. C.**, 1994, New middle Eocene omomyine skeletal material: *American Journal of Physical Anthropology*, Supplement to no. 18, Annual Meeting Issue.

Evanoff, E., Robinson, P., **Murphey, P.,** Kron, D., and Engard, D., 1994, An early Uintan fauna from the Bridger "E": *Journal of Vertebrate Paleontology*, Supplement to Vol. 13, no. 3.

Murphey, P.C., Krumm, D., and Evanoff, E., 1994, Stratigraphy and depositional setting of the Florissant Formation, Teller County, Colorado: *Geological Society of America Abstracts with Programs*, Vol. 26, no. 6, p. 55.

Murphey, P. C., 1992, Ecomorphological analysis of the femora of *Antilocapra americana*, *Odocoileus hemionus,* and *Ovis canadensis* in relation to habitat. *Journal of Mammalogy Abstracts with Programs*, 1993.

Manuscripts in Preparation

Harris, J.A., and **Murphey, P.C.,** Terrestrial Paleoecology: Principles and Practices. Textbook contracted for publication with John Wiley and Sons, N.Y.

Murphey, P.C., Glaubitz, R., and Guralnick, R., Georeferencing of biological collections in natural history museums: New procedures developed for the Mountain and Plains Spatio-Temporal Database-Informatics Initiative.

Murphey, P.C., Jaffri, A., Boni, P., Temporal, taphonomic and paleoenvironmental factors in the distribution of fossils in the Twin Buttes Member of the Bridger Formation, southwestern Wyoming, USA.

Murphey, P.C., and Jaffri, A., A biostratigraphic revision of the Plio-Pleistocene Dhok Gangaal Hills, Upper Siwaliks of northern Pakistan.

Technical Reports and Consulting Experience

Consulting Paleontologist (PI). Paleontologic assessment for Red Rock Ministries, Morrison, Colorado. Contracted by SWCA Environmental Consultants, Denver, CO (2003).

Consulting Paleontologist (PI). Paleontological assessment for the Clear Creek Trail, Golden, olorado. Contracted by Jefferson County, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment of SH 9 between MP 76.0 and 82.0, Park and Summit counties, Colorado. Contracted by Centennial Archaeology, Fort Collins, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment for the I-25 Environmental Impact Study. Contracted by Entranco, Inc., Fort Collins, Colorado, and Felsburg, Holt and Ullewig, Denver, Colorado (2002-2003).

Consulting Paleontologist (PI). Paleontologic assessment for the proposed SH47/William White Boulevard Interchange, Pueblo, Colorado. Contracted by Smith Environmental Associates, Inc., Denver, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment for the I-70/E-470 Interchange, Aurora, Colorado. Contracted by Carter-Burgess, Inc., Denver, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic sensitivity review of rock units in CDOT Region 5, southwestern Colorado. Contracted by Smith Environmental Associates, Denver, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment for the Big Dry Creek Trail, Progress Park to Broadway, Colorado. Contracted by Smith Environmental Associates, Denver, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic of US Highway 285 between Clarkson Street and Old Hampden Avenue, Englewood, Colorado. Contracted by ERO Resources, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment of Colfax Avenue between Toll Gate Creek and Peoria Street, Aurora, Colorado. Contracted by ERO Resources, Denver, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment of US Highway 350 between MP 0.0 and 9.0, Las Animas County, Colorado. Contracted by Centennial Archaeology, Fort Collins, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment for the City Center Park Bridge, Aurora, Colorado. Contracted by the City of Aurora, Colorado (2003).

Consulting Paleontologist (PI). Paleontologic assessment of the SH72/Indiana Street Interchange, Jefferson County, Colorado. Contracted by ERO Resrouces, Denver, Colorado (2003).

Consulting Paleontologist (PI). Design, develop and install on-site interpretive display for selected Cretaceous and Pleistocene fossils found during construction of the Northwest Parkway. Contracted by Northwest Parkway Constructors, Denver, Colorado (2002-present).

Consulting Paleontologist (PI). Paleontologic survey for the White Eagle Transmission Company White River Pipeline, Rio Blanco County, Colorado. Contracted by Flow Production Co., Inc., Midland, Texas (2002).

Consulting Paleontologist (PI). Paleontologic monitoring and mitigation for the TREX Highway Project, Denver, Colorado (widening of Interstate 25 through Denver). Contracted by Southeast Corridor Constructors, Inc., Denver, Colorado (2002-present).

Consulting Paleontologist (PI). Paleontologic assessment of Union Boulevard between Alameda Avenue and Sixth Avenue, Lakewood, Colorado. Contracted by the City of Lakewood, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment for the Village at Conifer, Aspen Park, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic review of US Highway 160 between SH 159 and the Fort Garland Community Center, Costilla County, Colorado. Contracted by Smith Environmental, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of Interstate 25 between Widefield (MP 131.8) and Monument (MP 161.4), El Paso County, Colorado. Contracted by Centennial Archaeology, Inc., Fort Collins, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic monitoring and mitigation plan for the Kern River Pipeline Project. Contracted by Ecology and Environment, Inc., Portland, Oregon (2002).

Consulting Paleontologist (PI). Paleontologic assessment of the US Highway 26/Wadsworth Boulevard Interchange, Broomfield, Colorado. Contracted by Associated Cultural Resource Experts, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of SH 65 between MP 20.0 and 26.8, and MP 38.0 and 44.0, Delta and Mesa counties, Colorado. Contracted by Centennial Archaeology, Inc., Fort Collins, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic review of the intersection of US 287 and Midway Boulevard, City and County of Broomfield, Colorado. Contracted by Burns and McDonnell, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic sensitivity review of forty one intersections in downtown Denver, Colorado. Contracted by Associated Cultural Resource Experts, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic sensitivity review of eleven intersections along Hampden Avenue in the City of Englewood, Colorado. Contracted by Associated Cultural Resource Experts, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of the Interstate 225/Colfax Avenue Interchange, Aurora, Colorado. Contracted by ERO Resources, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of the 144th Avenue/Interstate 25 Interchange, Adams County, Colorado. Contracted by Metcalf Archaeological Consultants, Inc., Eagle, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment for the Williams Corporation Piceance Creek Basin Pipeline, Garfield and Mesa Counties, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of US Highway 40 between MP 399.9 and 422.9, Lincoln and Cheyenne Counties, Colorado. Contracted by Centennial Archaeology, Inc., Fort Collins, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of US 287 between MP 40.6 and 52.0, Prowers and Baca Counties, Colorado. Contracted by Centennial Archaeology, Inc., Fort Collins, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic assessment of the SH7/US85 Interchange, Brighton, Colorado. Contracted by Metcalf Archaeological Consultants, Eagle, Colorado (2002).

Consulting Paleontologist (PI). Paleontologic monitoring and mitigation for the Northwest Parkway Project, Adams and Boulder Counties, Colorado. Contracted by Washington Infrastructure Services, Inc., Denver, Colorado (2001-present).

Consulting Paleontologist (PI). Paleontologic Resources of the Powder River Basin: Summary of existing conditions for the Powder River Oil and Gas Environmental Impact Statement. Contracted by Greystone Environmental Consultants, Inc., Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontological Survey, monitoring, and mitigation plan for the Williams Corporation Rockies Displacement Expansion Project. Contracted by Williams Corporation, Houston, Texas (2001).

Consulting Paleontologist (PI). Paleontological Assessment for the Simms Street Extension, Jefferson County, Colorado. Contracted by ERO Resources, Inc., Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontological Assessment of the Alameda Avenue/Kipling Street Interchange, Lakewood, Colorado. Contracted by Metcalf Archeological Consultants, Inc., Eagle, Colorado.

Consulting Paleontologist (PI). Paleontological Assessment of Interstate 76 Between Mileposts 76.3 and 92.3, Morgan County, Colorado. Contracted by Centennial Archeology, Inc., Fort Collins, Colorado (2001).

Consulting Paleontologist (PI). Paleontological Review for the US 287 La Porte Bypass Project, Larimer County, Colorado. Contracted by Western Historical Inc., Lafayette, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment of SH 7 for the Vista Ridge Project, Weld County, Colorado. Contracted by Western Cultural Resource Management, Inc., Lafayette, Colorado (2001).

Consulting Paleontologist (PI). Preliminary Paleontological Assessment of SH 12 Between Mileposts 51.66 and 53.73, Las Animas County, Colorado. Contracted by Centennial Archeology, Inc., Fort Collins, Colorado (2001).

Consulting Paleontologist (PI). Paleontological Survey of the Williams Production Wheeler to Webster Geographic Area Proposal, Garfield County, Colorado. Contracted by Greystone Environmental Consultants, Inc., Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Survey for the Trace Ventures Cottonwood 3D Seismic Survey, Forest 1 Study Area, Uinta and Sweetwater Counties, Wyoming. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the West Gypsum Trail, Eagle County, Colorado. Contracted by Eagle County, Eagle, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment of Old Dillon Reservoir and Dillon Ditch, Summit County, Colorado. Contracted by Science Applications International Corporation, Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontological Assessment for SH 135 Between Mileposts 5.2 and 10.2, Gunnison County, Colorado. Contracted by Centennial Archeology, Inc., Fort Collins, Colorado.

Consulting Paleontologist (PI). Paleontological Assessment for the Proposed Honeywagon Trail, Eagle County, Colorado. Contracted by Eagle County, Eagle, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the Proposed Improvements to the Interstate 25/23rd Avenue Interchange, Denver City and County, Colorado. Contracted by Smith Environmental, Inc., Westminster, Colorado (2001).

Consulting Paleontologist (PI). Summary of Existing Conditions: Paleontological Resources, Barrett Resources., Inc., Wheeler to Webster Geographic Area Proposal, Garfield County, Colorado. Contracted by Greystone Environmental Consultants, Inc., Denver, Colorado (2001).

Consulting Paleontologist (Co-PI). Paleontological Survey for the Western Geophysical Inc. Rulison Extension 3D Seismic Survey, Garfield County, Colorado. Contracted by Uinta Paleontological Associates, Inc., Vernal, Utah (2001).

Consulting Paleontologist (PI). Paleontological Sensitivity Survey for the Northwest Pipeline Corporation Pagus Looping Project, Wyoming and Idaho. Technical Analysis of Existing Data and Preliminary Field Reconnaissance. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the proposed Dawson Creek Bridge Replacement Project, Gunnison County, Colorado. Contracted by Weiland-Sugnet, Inc., Boulder, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the proposed Weldon Creek Bridge Replacement Project, Chaffee County, Colorado. Contracted by Weiland-Sugnet, Inc., Boulder, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the proposed Interstate 25 Milepost 12 Interchange, Trinidad, Colorado. Contracted by Centennial Archeology, Inc., Fort Collins, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the proposed SH 58/Interstate 70 Interchange, Jefferson County, Colorado. Contracted by Weiland-Sugnet, Inc., Boulder, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment for the site of the proposed Table Rock Subdivision, Jefferson County, Colorado. Contracted by URS Corporation, Denver, Colorado (2001).

Consulting Paleontologist (PI). Paleontologic Assessment of US 285 Between the Proposed US 285/Simms Street Interchange and Kipling Street, Jefferson County, Colorado. Contracted by Science Applications International Corporation, Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of 5300 Colorado Boulevard, Commerce City, Adams County, Colorado. Contracted by SWCA Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the US 285 and Simms Street Interchange Project, Jefferson County, Colorado. Contracted by Science Applications International Corporation, Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Proposed Interstate 25 and 136th Street Interchange, Adams County, Colorado (Study Area Expansion South to Big Dry Creek). Contracted by Sugnet and Associates, Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Community Center Drive Extension Project, City of Northglenn, Adams County, Colorado. Contracted by Balloffet and Associates, Inc., Fort Collins, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Monitoring of Underpass Construction Adjacent to the US Highway 36/96th Street Interchange, City of Broomfield, Colorado. Contracted by Balloffet and Associates, Inc., Fort Collins, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Brennon and Table Rock Properties, Littleton and Golden, Colorado. Contracted by Advanced Land Technologies U.S. Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of State Highway 119 at the future site of the Jackpot Springs Casino, Gilpin County, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of the Proposed Reroute of State Highway 119 During Construction of the Jackpot Springs Casino, Gilpin County, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of the City of Longmont, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of Colfax Avenue Between Interstate 225 and Tower Road, Adams and Arapahoe Counties, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for US Highway 24 Between mileposts 311.7 and 339.0, between Peterson Air Force Base and the town of Calhan, El Paso County, Colorado. Contracted by Centennial Archeology, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Adesta Ring Closure Project, Denver County, Colorado. Contracted by SWCA Environmental Consultants, Inc., Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Adesta I-225 Cross Loop Project, Denver and Arapahoe Counties, Colorado. Contracted by SWCA Environmental Consultants, Inc., Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment of Five Alternative Transportation Corridors to the Town of Black Hawk from Interstate 70, Clear Creek and Gilpin Counties, Colorado. Contracted by Balloffet and Associates, Fort Collins, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Interstate 25 Corridor Through Trinidad, Las Animas County, Colorado. Contracted by Balloffet and Associates, Inc., and Centennial Archeology, Inc., Fort Collins, Colorado (1999, 2000).

Consulting Paleontologist (PI). Paleontologist Assessment for the Proposed Interstate 25 and 136th Avenue Interchange, Adams County, Colorado. Contracted by Sugnet and Associates, Denver, Colorado (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Interstate 70 West Fiber Optic Project, Dowds Junction (MP 170.5) to Copper Mountain (MP 195.0), Colorado. Contracted by Michael Baker Junior, Inc., Anchorage, Alaska (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the Cemetery Road Bridge Replacement Project, Eagle County, Colorado. Contracted by Sugnet and Associates, Denver, Colorado (2000).

Consulting Paleontologist. Paleontologic Monitoring for the American Soda, L.L.P. Yankee Gulch Sodium Minerals Project, Parachute to Piceance Creek, Garfield and Rio Blanco Counties, Colorado. Contracted by Uinta Paleontological Associates, Inc., Vernal, Utah (2000).

Consulting Paleontologist (PI). Paleontologic Assessment for the MFS I-70 West Fiber Optic Project, Denver to Grand Junction, Colorado. Contracted by Michael Baker Junior, Inc., Anchorage, Alaska (1999).

Consulting Paleontologist. Paleontologic Resource Survey of Interstate 76 from the Atwood exit to US 6 at Sterling, Colorado, Mileposts 114.8 – 124.3. Contracted by Centennial Archeology, Fort Collins, Colorado (1999).

Consulting Paleontologist (PI). Paleontologic Assessment for the Aquarius 3D Prospect Seismic Project, Fall River County, South Dakota. Contracted by Anschutz Exploration Inc., Denver, Colorado (1999).

Consulting Paleontologist (PI). Paleontologic Assessment for the Front Street Widening and Wilcox Street Bridge Replacement Project, Castle Rock, Colorado. Contracted by Sugnet and Associates, Denver, Colorado (1999).

Consulting Paleontologist (Co-PI). Paleontologic Sensitivity Survey of the Lost Creek Gathering System: Wamsutter to Lost Cabin Pipeline, Wyoming. Contracted by Uinta Paleontological Associates, Vernal, Utah (1999).

Consulting Paleontologist (PI). Paleontologic assessment of the Interstate 25 Corridor and Associated Interchanges Between Ninth and Florida Avenues, Denver, Colorado. Contracted by Balloffet and Associates, Fort Collins, Colorado (1999).

Consulting Paleontologist (PI). Paleontologic Monitoring of US 36 Between 88th Street and Wadsworth Boulevard, Broomfield, Colorado. Contracted by Balloffet and Associates, Fort Collins, Colorado (1999 - 2000).

Consulting Paleontologist (PI). Paleontologic Assessment of State Highway 2 at Vasquez Boulevard, Adams and Denver Counties, Colorado. Contracted by Sugnet and Associates, Denver, Colorado (1999).

Consulting Paleontologist. Paleontologic Monitoring and Mitigation for the Middle America Pipeline Company's Rocky Mountain Loop Project, New Mexico to Wyoming. Contracted by Uinta Paleontological Associates, Vernal, Utah (1998-1999).

Consulting Paleontologist (PI). Paleontologic Assessment of the Washingtion Street Widening and Bridge Replacement Project, Denver, Colorado. Contracted by HNTB Inc., Denver, Colorado (1998).

Consulting Paleontologist (PI). Paleontologic Assessment of the Future Site of Colorado Christian University, Morrison, Colorado. Contracted by Sugnet and Associates, Denver, Colorado (1998).

Consulting Paleontologist (PI). Paleontologic Resource Survey for the US 50 Taylor Gulch Reconstruction Project. Contracted by Sugnet and Associates, Denver, Colorado (1998).

Consulting Paleontologist. Paleontologic Resource Survey for the Mid-America Pipeline Company's Rocky Mountain Loop Project, New Mexico to Wyoming. Contracted by Uinta Paleontological Associates, Vernal, Utah (1998).

Consulting Paleontologist (PI). Paleontologic Resource Survey for Proposed Interchange Construction and Improvements to US 36 between 88th Street and Wadsworth Boulevard, Broomfield, Colorado. Contracted by Balloffet and Associates, Fort Collins, Colorado (1998-1999).

Consulting Paleontologist (PI). Paleontologic Resource Survey for the Improved US 36 and Sheridan Boulevard Interchange, Westminster, Colorado. Contracted by Balloffet and Associates, Fort Collins, Colorado (1998).

Consulting Paleontologist. Paleontologic Resource Survey for the Fraser-Mill Project, 115KV Transmission Line, Grand County, Colorado. Contracted by Emmett Evanoff (Boulder, Colorado) and Powers Elevation, Inc., Denver, Colorado (1998).

Consulting Paleontologist (PI). Paleontologic Resource Survey for the State Highway 115 Reconstruction Project, Big Turkey Creek North and South. Contracted by Sugnet and Associates, Denver, Colorado (1998).

Consulting Paleontologist (PI). Paleontologic Resource Survey for the Improved Alameda and I-225 Interchange, Denver. Contracted by Balloffet and Associates, Fort Collins, Colorado (1998).

Consulting Paleontologist. Paleontologic Assessment for the Jepson-Holler Draw Gas Field Project, Johnson County, Wyoming. Contracted by H & B Petroleum Consultants, Casper, Wyoming (1997).

Consulting Paleontologist (PI). Paleontologic Monitoring for the Rockport-Kimball Lateral, KN Energy Pony Express Pipeline Project. Contracted by ENSR Environmental Consulting, Fort Collins, Colorado (1997).

Consulting Paleontologist. Paleontologic Resource Survey of the Pinon Canyon Maneuver Site, Las Animas County, Colorado. Contracted by Emmett Evanoff (UCM) and the National Park Service (1977).

Consulting Paleontologist. Preliminary mapping and assistance with preparation of preliminary report on the surficial geology and paleontologic resources of the Pinon Canyon Maneuver Site, Las Animas County, Colorado. Contracted by Emmett Evanoff, University of Colorado Museum (1997).

Consulting Paleontologist (PI). Paleontologic Monitoring for the E-470 Public Highway Project, Denver, CO. Contracted by Centennial Construction Co., Denver, Colorado (1996).

Consulting Paleontologist (Co-PI). Paleontologic Resource survey for the E-470 Public Highway Project, Denver, CO. Contracted by Metcalf Archeological Consultants, Eagle, Colorado (1995).

Consulting Paleontologist. Paleontologic Monitoring for the Northwest Pipeline Granger Pipeline Project, Granger, WY. Contracted by Uinta Paleontological Consultants, Vernal, Utah (1995).

Miscellaneous Articles, Products and Services

- Voices of Nature, Audio Imaging Australia, Volume I, *audio CD*, released summer 2002, WTN Inc. (*www.wakethyneighbor.com*)
- Paleontology-related media interviews with local and national media, 1996-present
- Presentation on MaPSTeDI initiative for general public at Denver Museum of Nature and Science, Biodiversity Day, September, 2001
- A New Field School for the Museum and Field Studies Program. *Article for Museum Insights, Newsletter of the University of Colorado Museum of Natural History,* Fall, 2002
- MaPSteDi: A Bioinformatics Project Update. *Article for Museum Insights, Newsletter of the University of Colorado Museum of Natural History,* Fall, 2002
- Presentation on the MaPSTeDI initiative for general public at Denver Museum of Nature and Science, Biodiversity Day, May, 2002
- Florissant Fossils – A Legacy to Colorado's History. *Article for Museum Insights, Newsletter of the University of Colorado Museum of Natural History,* Spring, 2000
- Paleontology Begins To Go GIS: *Museum Insights, Newsletter of the University of Colorado Museum of Natural History* – Fall, 1999
- Museum Collections Building Pre-Design Report, *Root Rosenman Architects, Denver,* (co-author, 1999-present)

- Author of contributions to the Society of Vertebrate Paleontology News Bulletin submissions for the University of Colorado Museum (1997-present)
- Paleontology of the lower vertebrates. *Unpublished laboratory manual*, *University of Colorado,* 222 p.

Teaching Experience

- *Instructor,* Museum Practicum in Paleobiology/Geology, University of Colorado (Fall semester, 2002)
- *Instructor,* Field Research: Basic Methods and New Technologies. In addition to teaching this class, I proposed it and developed curriculum for it. It is a new multidisciplinary field school (archaeology, zoology, botany, paleontology, entomology) designed for Masters students in the Museum and Field Studies Program, University of Colorado (summer session, 2002)
- *Instructor,* Cenozoic History of North America, Denver Museum of Nature and Science (2002)
- *Lecturer,* Taphonomic Processes: The Post-Mortem Life of Fossils, University of Colorado Department of Geological Sciences (Spring semester, 2002)
- *Teaching Assistant*, taught laboratory section of Paleontology of Lower Vertebrates, University of Colorado (1998)
- *Co-Instructor*, University of Colorado Museum Paleontological/Geological Field School (summer, 1996)
- *Teaching Assistant*, taught laboratory section of Paleontology of Lower Vertebrates, University of Colorado (1996)
- *Developed new Curriculum* for laboratory section of Paleontology of Lower Vertebrates. Updated, inventoried, and conserved teaching collection, and wrote new laboratory manual for the course, University of Colorado (1995-1996)
- *Mentor*, Department of Geological Sciences Mentoring Program, University of Colorado. For undergraduate geology majors, providing training in fossil preparation, museum collections management, and participation in research (1995-present)
- *Community Experience Mentor,* New Vista High School, Boulder, Colorado. Trained and supervised high school students with an interest in paleontology in fossil preparation and curation (1994-present)
- *Teaching Assistant*, University of Colorado Museum Paleontological Field School (summer, 1994)
- *Teaching Assistant,* Paleobiology, University of Colorado at Boulder. Taught laboratory section, prepared and developed lab handouts, exercises, and re-organized teaching collection (1994)

Committee Work

- University of Colorado Museum Information Technology Committee (2002-2003)
- University of Colorado Museum Collections Committee (1993, 1995, 1997, 1998, 1999, 2000, 2001, 2002)

- University of Colorado Museum Exhibits Committee (1994, 1997, 1998, 1999, 2000, 2001)
- University of Colorado Museum Moving Task Force Committee (1995-2001)
- University of Colorado Museum Collection Managers Committee (1997-2003)
- University of Colorado Museum and Field Studies Curriculum Committee (1998, 1999, 2000, 2001)
- Society of Vertebrate Paleontology Host Committee for 1999 annual meeting (1998-1999)
- University of Colorado Museum "Y2K Liaison" to the University (1998-2000)
- University of Colorado Museum, Geology Section Committee (1999-2003)
- University of Colorado Museum Web Site Development Committee (1999, 2000)
- Various job search committees for museum faculty and staff (1997 to 2003)

Exhibits Experience

- *Paleontology of the late Cretaceous Kremmling Ammonite Site*, Grand County, Colorado. Travelling exhibit co-designer and builder (1992).
- Interpretive displays on the paleontology of the Boulder Valley, displays located on Flagstaff Mountain, Boulder, Colorado. Technical Advisor for Boulder Mountain Parks (1999).
- *Fossils In Our Backyard*, a new paleontology exhibit in the University of Colorado's Main Exhibit Gallery. Exhibit Curator (1999 – 2002).
- *One Hundred Years of Collecting and Research, University of Colorado Museum.* Worked with CU Museum's Exhibits Department to provide exhibit text and display objects for the Centennial Exhibition at the CU Museum (2001-2002).
- Interpretive display featuring Pleistocene and Cretaceous fossil vertebrates and plants found during the construction of the Northwest Parkway Highway Project, Adams and Boulder Counties, Colorado. Exhibit designer and builder (2002-present).

Professsional Affiliations

- American Society of Mammalogists, 1990-present
- Society of Vertebrate Paleontology, 1991-present
- Paleontological Society, 1993-2000
- Sigma Xi Scientific Society, 1992-present
- Geological Society of America, 1993-present
- Society for the Preservation of Natural History Collections, 1995-present
- Colorado Scientific Society, 1998-present
- American Society of Composers, Authors, and Publishers, 1985-present

Honors and Grants

- Colorado Songwriters Awards, 1987, 1988
- Golden Key National Honor Society, 1995

- Walker Van Riper Research Grant award, University of Colorado Museum, 1995
- Paleontological Society James R. Welch Scholarship award, 1994
- Paleontological Society Research Grant award, 1994
- Willam H. Burt Fund Research Grant awards, University of Colorado Museum, 1993, 1994, 1997, 1999
- Graduate School Deans Small Grant awards, University of Colorado, 1993, 1997
- Sigma Xi Scientific Society Research Grant awards, 1993, 1994
- Wyoming Geological Association David Love Field Geology fellowship, 1997
- Colorado Scientific Society Steven S. Oriel Memorial Research Funds award, 1997
- Co-Principal Investigator, Principle Author, National Science Foundation Grant# DEB 9709543: Collections Improvement for Paleobiology at the University of Colorado Museum, 1997-2000
- Co-Principal Investigator, USGS grant for geochronologic and biostratigraphic correlation of Eocene rocks in Wyoming, Colorado and Utah (2002-present)
- Co-Principal Investigator, National Science Foundation Bioinformatics Grant: Mountain and Plains Spatio-Temporal Database-Informatics Initiative (2001-2004)

Active Paleontological Permits

- BLM Paleontological Resources Use Permit, Rock Springs Field Office Wyoming, excavation permit (PA-WY-056)
- BLM Paleontological Resources Use Permit, Platte River, Lander, Kemmerer, and Green River Resource Areas, Wyoming, survey and limited surface collection (209-WY-PA94-extended)
- State of Colorado Paleontological Permits 99-24, 2000-18, 2000-22, 2001-22, 2002-19, 2003-33
- BLM Paleontological Resources Use Permit, Wyoming statewide (PA97-024)
- BLM Paleontological Resources Use Permit, Kemmerer Resource Area, Wyoming, excavation (283-WY-PA94-extended)
- Paleontological Resources Use Permit, Colorado, survey and limited surface collection (C-60180)
- BLM Paleontological Resources Use Permit, Wyoming Statewide, survey and limited surface collection (PA96-WY-022)

Appendix 5.15-1

APPENDIX XXX

California Natural Diversity Data Base Search

for

Special-Status Species and Habitats

(Malaga 7.5 Minute Quadrangle Map)

California Department of Fish and Game
Natural Diversity Data Base

List of Elements and Status by Common Name

Common/Scientific Name	Federal/ State Status	Global/ State Rank	CNPS/ R-E-D	CDFG Status
CALIFORNIA TIGER SALAMANDER *AMBYSTOMA CALIFORNIENSE*	Endangered/ None	G2G3/ S2S3		SC
WESTERN YELLOW-BILLED CUCKOO *COCCYZUS AMERICANUS OCCIDENTALIS*	None/ Endangered	G5T3/ S1		

Full Expanded Report – Malaga Quad Map

AMBYSTOMA CALIFORNIENSE
CALIFORNIA TIGER SALAMANDER — Element Code: AAAAA01147

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: FEDERAL LISTING REFERS TO POPULATIONS IN SANTA BARBARA AND SONOMA COUNTIES ONLY.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 583 — Map Index: 46277

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: JENNINGS, M. & M. HAYES 1994 (PERS)

Dates Last Seen
Element: 1936-05-16
Site: 1936-05-16

Quad Summary: FRESNO NORTH (3611977/379D)*, MALAGA (3611966/357B), FRESNO SOUTH (3611967/358A), CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:

Location: FRESNO

Lat/Long: 36°46'26" / 119°46'42"
UTM: Zone-11 N4073193 E252013
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 5 mile

Township: 13S
Range: 20E
Section: 27 Qtr XX
Meridian: M
Elevation: 300 ft

Comments

Distribution:
Ecological:
Threat:
General: 1879 RECORD FROM THE USNM (#11794), NO OTHER INFORMATION GIVEN. CORNELL UNIVERSITY MUSEUM OF VERTEBRATES # 3017 (2 SPECIMENS) COLLECTED 16 MAY 1936 BY L.F. HADSELL. JENNINGS CONSIDERS THIS SITE EXTIRPATED.
Owner/Manager: UNKNOWN

Source Codes

JEN94U01, JEN01U01, COR02S01

COCCYZUS AMERICANUS OCCIDENTALIS
WESTERN YELLOW-BILLED CUCKOO — Element Code: ABNRB02022

Status		NDDB Element Ranks		Other Lists	
Federal:	None	Global:	G5T3	CDFG Status:	
State:	Endangered	State:	S1		

Habitat Associations

General: (NESTINGS) RIPARIAN FOREST NESTER, ALONG THE BROAD, LOWER FLOOD-BOTTOMS OF LARGER RIVER SYSTEMS.

Micro: NESTS IN RIPARIAN JUNGLES OF WILLOW, OFTEN MIXED WITH COTTONWOODS, W/ LOWER STORY OF BLACKBERRY, NETTLES, OR WILD GRAPE.

Occurrence No. 87 — Map Index: 14944

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: GAINES, D. 1977 (LIT)

Dates Last Seen
Element: 1902-07-10
Site: 1902-07-10

Quad Summary: CLOVIS (3611976/378C)*, SANGER (3611965/357A), MALAGA (3611966/357B), ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:

Location: FANCHER CRK, 6 MI NE OF FRESNO.

Lat/Long: 36°45'10" / 119°38'20"
UTM: Zone-11 N4070492 E264414
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 13S
Range: 21E
Section: 36 Qtr SW
Meridian: M
Elevation: 345 ft

Comments

Distribution:
Ecological:
Threat:
General: REPORTED AS UNCOMMON BUT NESTING BY TYLER (1913).
Owner/Manager: PVT

Source Codes

GAI77R01

Appendix 5.15-2

APPENDIX XXX

California Natural Diversity Data Base Search

for

Special-Status Species and Habitats

(Eight Surrounding 7.5 Minute Quadrangle Maps)

List of Elements and Status by Common Name

Common/Scientific Name	Federal/ State Status	Global/ State Rank	CNPS/ R-E-D	CDFG Status
CALIFORNIA LINDERIELLA *LINDERIELLA OCCIDENTALIS*	Species of Concern/ None	G2G3/ S2S3		
CALIFORNIA TIGER SALAMANDER *AMBYSTOMA CALIFORNIENSE*	Endangered/ None	G2G3/ S2S3		SC
FRESNO KANGAROO RAT *DIPODOMYS NITRATOIDES EXILIS*	Endangered/ Endangered	G3T1/ S1		
GREENE'S TUCTORIA *TUCTORIA GREENEI*	Endangered/ Rare	G2/ S2.2	1B/ 2-3-3	
MOLESTAN BLISTER BEETLE *LYTTA MOLESTA*	Species of Concern/ None	G2/ S2		
NORTHERN CLAYPAN VERNAL POOL	None/ None	G1/ S1.1		
NORTHERN HARDPAN VERNAL POOL	None/ None	G3/ S3.1		
SAN JOAQUIN ADOBE SUNBURST *PSEUDOBAHIA PEIRSONII*	Threatened/ Endangered	G2/ S2.1	1B/ 2-3-3	
SAN JOAQUIN KIT FOX *VULPES MACROTIS MUTICA*	Endangered/ Threatened	G4T2T3 / S2S3		
SAN JOAQUIN POCKET MOUSE *PEROGNATHUS INORNATUS INORNATUS*	Species of Concern/ None	G4T2T3 / S2S3		
SAN JOAQUIN VALLEY ORCUTT GRASS *ORCUTTIA INAEQUALIS*	Threatened/ Endangered	G2/ S2.1	1B/ 2-3-3	
SANFORD'S ARROWHEAD *SAGITTARIA SANFORDII*	Species of Concern/ None	G3/ S3.2	1B/ 2-2-3	

List of Elements and Status by Common Name

Common/Scientific Name	Federal/ State Status	Global/ State Rank	CNPS/ R-E-D	CDFG Status
SPINY-SEPALED BUTTON-CELERY *ERYNGIUM SPINOSEPALUM*	Species of Concern/ None	G2/ S2.2	1B/ 3-2-3	
SUCCULENT OWL'S-CLOVER *CASTILLEJA CAMPESTRIS SSP SUCCULENTA*	Threatened/ Endangered	G4?T2/ S2.2	1B/ 2-2-3	
SWAINSON'S HAWK *BUTEO SWAINSONI*	Species of Concern/ Threatened	G4/ S2		
TRICOLORED BLACKBIRD *AGELAIUS TRICOLOR*	Species of Concern/ None	G2/ S2		SC
VALLEY ELDERBERRY LONGHORN BEETLE *DESMOCERUS CALIFORNICUS DIMORPHUS*	Threatened/ None	G3T2/ S2		
VERNAL POOL FAIRY SHRIMP *BRANCHINECTA LYNCHI*	Threatened/ None	G2G3/ S2S3		
WESTERN SPADEFOOT *SCAPHIOPUS HAMMONDII*	Species of Concern/ None	G3?/ S3?		SC
WESTERN YELLOW-BILLED CUCKOO *COCCYZUS AMERICANUS OCCIDENTALIS*	None/ Endangered	G5T3/ S1		

AMBYSTOMA CALIFORNIENSE
CALIFORNIA TIGER SALAMANDER
Element Code: AAAAA01147

List Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: FEDERAL LISTING REFERS TO POPULATIONS IN SANTA BARBARA AND SONOMA COUNTIES ONLY.
Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 305 Map Index:33052
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WESTPHAL, M. 1994 (MUS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: NORTH SIDE OF HERNDON AVENUE, 0.75 MILE WEST OF ACADEMY AVENUE, 6 MILES EAST OF CLOVIS.

Dates Last Seen
Element: 1994-03-29
Site: 1994-03-29

Lat/Long: 36°50'18" / 119°34'06"
UTM: Zone-11 N4079803 E270964
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 22E
Section: 33 Qtr SE
Meridian: M
Elevation: 420 ft

Comments
Distribution:
Ecological:
Threat:
General: COLLECTION #MW-94-08 AND #MW-94-09, DEPOSITED AT UCD. CAS# 199409, LARVA.
Owner/Manager: UNKNOWN

Occurrence No. 583 Map Index:46277
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: JENNINGS, M. & M. HAYES 1994 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)*, MALAGA (3611966/357B), FRESNO SOUTH (3611967/358A), CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: FRESNO

Dates Last Seen
Element: 1936-05-16
Site: 1936-05-16

Lat/Long: 36°46'26" / 119°46'42"
UTM: Zone-11 N4073193 E252013
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 5 mile

Township: 13S
Range: 20E
Section: 27 Qtr XX
Meridian: M
Elevation: 300 ft

Comments
Distribution:
Ecological:
Threat:
General: 1879 RECORD FROM THE USNM (#11794), NO OTHER INFORMATION GIVEN. CORNELL UNIVERSITY MUSEUM OF VERTEBRATES # 3017 (2 SPECIMENS) COLLECTED 16 MAY 1936 BY L.F. HADSELL. JENNINGS CONSIDERS THIS SITE EXTIRPATED.
Owner/Manager: UNKNOWN

Occurrence No. 613 Map Index:46427
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: JENNINGS, M. & M. HAYES 1994 (PERS)
Quad Summary: CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: WEST SIDE OF THE FRIANT-KERN CANAL, 1.5 MILES NORTHWEST OF HWY 168. NORTH OF CLOVIS.

Dates Last Seen
Element: 1974-05-03
Site: 1974-05-03

Lat/Long: 36°51'02" / 119°41'04"
UTM: Zone-11 N4081471 E260633
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 12S
Range: 21E
Section: 33 Qtr XX
Meridian: M
Elevation: 380 ft

Comments
Distribution:
Ecological: VERNAL POOL.
Threat:
General: OBSERVATION BY L.G. DUNN (CDFG) DURING 1-3 MAY 1974 SURVEY. JENNINGS CONSIDERS THIS SITE EXTIRPATED.
Owner/Manager: UNKNOWN

AMBYSTOMA CALIFORNIENSE (cont.)
CALIFORNIA TIGER SALAMANDER
Element Code: AAAAA01147

List Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Occurrence No. 629 Map Index:46630
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LSA ASSOCIATES 1994 (LIT)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:

Dates Last Seen
Element: 1993-XX-XX
Site: 1993-XX-XX

Lat/Long: 36°50'30" / 119°32'00"
UTM: Zone-11 N4080109 E274085
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 12S
Range: 22E
Section: 35 Qtr SE
Meridian: M
Elevation: 470 ft

Location: ABOUT 1.4 MILES SOUTHEAST OF INTERSECTION OF FRIANT-KERN CANAL AND ACADEMY AVE. EAST OF MADSEN AVE.

Comments

Distribution: CONFLICTING INFORMATION IN THE SOURCE DOCUMENT. MAPPED ACCORDING TO THE T-R-S GIVEN, WHICH IS IN QUAD 3611975 NOT 3611985.
Ecological:
Threat:
General: SURVEY DONE BY BIOSEARCH BUT REPORTED BY LSA. UNKNOWN NUMBER OF LARVAE OBSERVED.
Owner/Manager: UNKNOWN

SCAPHIOPUS HAMMONDII
WESTERN SPADEFOOT
Element Code: AAABF01030

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G3?	CDFG Status: SC
State: None	State: S3?	

Habitat Associations

General: OCCURS PRIMARILY IN GRASSLAND HABITATS, BUT CAN BE FOUND IN VALLEY-FOOTHILL HARDWOOD WOODLANDS.
Micro: VERNAL POOLS ARE ESSENTIAL FOR BREEDING AND EGG-LAYING.

Occurrence No. 161 Map Index:39295
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GRAY, G. 1995 (OBS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: BETWEEN BLACKSTONE ROAD AND FRIANT (RICE) ROAD, WOODWARD PARK.

Dates Last Seen
Element: 1995-03-03
Site: 1995-03-03

Lat/Long: 36°52'04" / 119°47'05"
UTM: Zone-11 N4083644 E251748
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 12S
Range: 20E
Section: 21 Qtr SE
Meridian: M
Elevation: 355 ft

Comments

Distribution: SITE CONSISTS OF AN OVERFLOW POOL ADJACENT TO THE ROAD.
Ecological: HABITAT SURROUNDING OVERFLOW POOL CONSISTS OF NON-NATIVE GRASSLAND; POOL SHADED BY TREES.
Threat: POSSIBLY THREATENED BY DEVELOPMENT.
General: HUNDREDS OF TADPOLES OBSERVED ON 3 MARCH 1995; ONE TADPOLE CAPTURED AND RAISED TO MATURITY.
Owner/Manager: UNKNOWN

BUTEO SWAINSONI
SWAINSON'S HAWK
Element Code: ABNKC19070

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G4	CDFG Status:
State: Threatened	State: S2	

Habitat Associations

General: (NESTING) BREEDS IN STANDS WITH FEW TREES IN JUNIPER-SAGE FLATS, RIPARIAN AREAS AND IN OAK SAVANNAH.
Micro: REQUIRES ADJACENT SUITABLE FORAGING AREAS SUCH AS GRASSLANDS, OR ALFALFA OR GRAIN FIELDS SUPPORTING RODENT POPULATIONS.

Occurrence No. 829 Map Index:43431
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BROWN, N. 2000 (OBS)
Quad Summary: CONEJO (3611956/357C)
County Summary: FRESNO
SNA Summary:
Location: NE CORNER OF CLARKSON AVENUE AND HIGHWAY 43 (HIGHLAND AVENUE), SOUTH OF SELMA.

Dates Last Seen
Element: 2000-07-10
Site: 2000-07-10

Lat/Long: 36°30'17" / 119°37'36"
UTM: Zone-11 N4042945 E264749
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/10 mile

Township: 16S
Range: 22E
Section: 30 Qtr SE
Meridian: M
Elevation: 300 ft

Comments

Distribution:
Ecological: HABITAT CONSISTS OF A EUCALYPTUS GROVE, WHICH WAS BEING CLEANED/TRIMMED AT THE TIME OF THE OBSERVATION. SOME ALFALFA FOUND GROWING BETWEEN THE ORCHARD ROWS.
Threat:
General: NESTING PRESUMED DUE TO THE ACTIONS OF THE ADULTS: THEY BOTH STAYED IN THE IMMEDIATE VICINITY DESPITE THE DISTURBANCE OF TRIMMING/CUTTING IN THE EUCALYPTUS GROVE.
Owner/Manager: PVT

COCCYZUS AMERICANUS OCCIDENTALIS
WESTERN YELLOW-BILLED CUCKOO
Element Code: ABNRB02022

List Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T3	CDFG Status:
State: Endangered	State: S1	

Habitat Associations

General: (NESTINGS) RIPARIAN FOREST NESTER, ALONG THE BROAD, LOWER FLOOD-BOTTOMS OF LARGER RIVER SYSTEMS.
Micro: NESTS IN RIPARIAN JUNGLES OF WILLOW, OFTEN MIXED WITH COTTONWOODS, W/ LOWER STORY OF BLACKBERRY, NETTLES, OR WILD GRAPE.

Occurrence No. 87 Map Index:14944
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: GAINES, D. 1977 (LIT)
Quad Summary: CLOVIS (3611976/378C)*, SANGER (3611965/357A), MALAGA (3611966/357B), ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: FANCHER CRK, 6 MI NE OF FRESNO.

Dates Last Seen
Element: 1902-07-10
Site: 1902-07-10

Lat/Long: 36°45'10" / 119°38'20"
UTM: Zone-11 N4070492 E264414
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 13S
Range: 21E
Section: 36 Qtr SW
Meridian: M
Elevation: 345 ft

Comments

Distribution:
Ecological:
Threat:
General: REPORTED AS UNCOMMON BUT NESTING BY TYLER (1913).
Owner/Manager: PVT

AGELAIUS TRICOLOR
TRICOLORED BLACKBIRD
Element Code: ABPBXB0020

List Status: Federal: Species of Concern; State: None
NDDB Element Ranks: Global: G2; State: S2
Other Lists: CDFG Status: SC

Habitat Associations
General: (NESTING COLONY) HIGHLY COLONIAL SPECIES, MOST NUMBEROUS IN CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.
Micro: REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, & FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

*** SENSITIVE ***
Occurrence No. 104 Map Index:15033
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOSEA, R. 1986 (OBS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)*, ACADEMY (3611985/378A)
County Summary: FRESNO
SNA Summary:
Location: DRY CREEK, NE OF THE INTERSECTION OF FRIANT-KERN CANAL AND TOLLHOUSE ROAD, 6.5 MILES NE OF CLOVIS.

Dates Last Seen: Element: 1982-XX-XX; Site: 1988-XX-XX
Lat/Long: 36°52'17" / 119°35'18"
UTM: Zone-11 N4083540 E269277
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile
Township: 12S
Range: 22E
Section: 20 Qtr XX
Meridian: M
Elevation: 460 ft

Comments
Distribution: SIZE OF COLONY IS LESS THAN 1 ACRE.
Ecological: HABITAT IS CATTAIL/TULE MARSH, POSSIBLY CREATED OR ENHANCED BY BARRIER EFFECT OF FRIANT-KERN CANAL ON UPSLOPE DRAINAGE.
Threat: POTENTIAL THREATS INCLUDE GRAZING AND PASTURE MANAGEMENT (ELIMINATION OF CATTAILS).
General: NESTING OBSERVED IN 1982. NO TICOLOREDS PRESENT IN 1988, ALTHOUGH HABITAT APPEARED EXTANT.
Owner/Manager: UNKNOWN

*** SENSITIVE ***
Occurrence No. 172 Map Index:17171
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: VALENTINE, B. 1990 (OBS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: JUST NORTH OF SHAW AVENUE, 0.6 MI WEST OF ACADEMY AVENUE, 7 MI NORTH OF SANGER.

Dates Last Seen: Element: 1990-05-14; Site: 1990-05-14
Lat/Long: 36°48'33" / 119°33'59"
UTM: Zone-11 N4076588 E271055
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 7.8 ac
Township: 13S
Range: 22E
Section: 10 Qtr SW
Meridian: M
Elevation: 400 ft

Comments
Distribution: COLONY NESTED IN A SMALL CATTAIL/TULE MARSH. MOST FORAGING OCCURRED IN AN IRRIGATED PASTURE TO THE WEST, UP TO THE LIMITS OF REDBANK CEMETERY; SOME FORAGING IN ANNUAL GRASSLANDS, INTERSPERSED WITH HOUSES, TO THE SOUTH.
Ecological: THE QUALITY AND INTEGRITY OF THE FORAGING AREAS MAY BE IMPORTANT TO THE CONTINUED USE OF THE MARSH AS NESTING HABITAT.
Threat: THREATS INCLUDE LIVESTOCK GRAZING AROUND THE MARSH AND THE W FORAGING AREA; CONVERSION OF S FORAGING AREA TO URBAN USES.
General: WATER AVAILABILITY AND FARM ECONOMICS COULD CAUSE A CHANGE IN IRRIGATED PASTURE, THE RUN-OFF FROM WHICH APPEARS TO MAINTAIN THE MARSH NESTING HABITAT.
Owner/Manager: UNKNOWN

*** SENSITIVE ***
Occurrence No. 269 Map Index:24424
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: BEEDY, E. ET AL 1991 (LIT)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: NW OF BULLARD AVENUE AND CEDAR AVENUE, FRESNO.

Dates Last Seen: Element: 1975-XX-XX; Site: 1975-XX-XX
Lat/Long: 36°49'29" / 119°45'16"
UTM: Zone-11 N4078774 E254316
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 13S
Range: 20E
Section: 02 Qtr SE
Meridian: M
Elevation: 330 ft

Comments
Distribution: SIZE OF COLONY IS 3-4 ACRES, AND IS LOCATED IN A FLOOD CONTROL BASIN.
Ecological: NESTING SUBSTRATE IS A CATTAIL MARSH.
Threat:
General: 3000 INDIVIDUALS OBSERVED; SEVERAL OBSERVATIONS IN JUNE-JULY 1975 INDICATED SUCCESSFUL NESTING. COLONY FORAGED ON CSUF GRAIN FIELDS TO THE EAST. COLONY WAS ABANDONED WHEN HABITAT WAS ELIMINATED AS PART OF FLOOD CONTROL BASIN MAINTENANCE.
Owner/Manager: UNKNOWN

PEROGNATHUS INORNATUS INORNATUS
SAN JOAQUIN POCKET MOUSE
Element Code: AMAFD01061

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G4T2T3	CDFG Status:
State: None	State: S2S3	

Habitat Associations
General: TYPICALLY FOUND IN GRASSLANDS AND BLUE OAK SAVANNAS.
Micro: NEEDS FRIABLE SOILS.

Occurrence No. 14 Map Index:14685
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CHANDLER, W. 1911 (MUS)
Quad Summary: LANES BRIDGE (3611987/379A)*, FRESNO NORTH (3611977/379D)
County Summary: FRESNO, MADERA
SNA Summary:
Location: LANES BRIDGE 10 MILES NORTH OF FRESNO.

Dates Last Seen
Element: 1911-04-07
Site: 1911-04-07

Lat/Long: 36°52'36" / 119°47'27"
UTM: Zone-11 N4084625 E251248
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 20E
Section: 21 Qtr NW
Meridian: M
Elevation:

Comments
Distribution:
Ecological:
Threat:
General: 2 SPECIMENS COLLECTED MVZ #14488 & 14489.
Owner/Manager: UNKNOWN

Occurrence No. 16 Map Index:14563
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WEAR, W. 1915 (MUS)
Quad Summary: FRESNO SOUTH (3611967/358A)*, FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: 4 MI W FRESNO.

Dates Last Seen
Element: 1915-11-20
Site: 1915-11-20

Lat/Long: 36°44'13" / 119°51'25"
UTM: Zone-11 N4069295 E244890
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 14S
Range: 19E
Section: 01 Qtr SW
Meridian: M
Elevation:

Comments
Distribution:
Ecological:
Threat:
General: MVZ #21989.
Owner/Manager: UNKNOWN

DIPODOMYS NITRATOIDES EXILIS
FRESNO KANGAROO RAT
Element Code: AMAFD03151

List Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G3T1	CDFG Status:
State: Endangered	State: S1	

Habitat Associations

General: ALKALI SINK-OPEN GRASSLAND HABITATS IN WESTERN FRESNO COUNTY.
Micro: BARE ALKALINE CLAY-BASED SOILS SUBJECT TO SEASONAL INUNDATION, WITH MORE FRIABLE SOIL MOUNDS AROUND SHRUBS & GRASSES.

Occurrence No. 15 Map Index:14593
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: BAILEY, V. 1891 (MUS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: FRESNO; 4 MI N OF RAILROAD STATION ALONG SOUTHERN PACIFIC RIGHT-OF-WAY.

Dates Last Seen
Element: 1898-04-22
Site: 1898-04-22

Lat/Long: 36°46'45" / 119°50'37"
UTM: Zone-11 N4073944 E246220
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 13S
Range: 20E
Section: 30 Qtr XX
Meridian: M
Elevation:

Comments

Distribution:
Ecological:
Threat:
General: TYPE LOCALITY. COLL BY BAILEY 9-23-1891; UNITED STATES BIOLOGICAL SURVEY COLLECTIONS (BSC) #34843/43823. ALSO COLL FROM "FRESNO" BY C.P. STREATOR 4/22/1898; MVZ #19064-19067. AREA COMPLETELY DEVELOPED.
Owner/Manager: PVT

VULPES MACROTIS MUTICA
SAN JOAQUIN KIT FOX
Element Code: AMAJA03041

List Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T2T3	CDFG Status:
State: Threatened	State: S2S3	

Habitat Associations

General: ANNUAL GRASSLANDS OR GRASSY OPEN STAGES WITH SCATTERED SHRUBBY VEGETATION.
Micro: NEED LOOSE-TEXTURED SANDY SOILS FOR BURROWING, AND SUITABLE PREY BASE.

Occurrence No. 10 Map Index:23593
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MORRELL, S. 1975 (MAP)
Quad Summary: LATON (3611946/335B)*, RIVERDALE (3611947/336A), CONEJO (3611956/357C)
County Summary: FRESNO, KINGS
SNA Summary:
Location: NORTHWEST OF LATON; 22 MILES WEST NORTHWEST OF VISALIA.

Dates Last Seen
Element: 1975-XX-XX
Site: 1975-XX-XX

Lat/Long: 36°27'37" / 119°43'06"
UTM: Zone-11 N4038248 E256412
Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 17,156.5 ac

Township: 17S
Range: 21E
Section: 05 Qtr XX
Meridian: M
Elevation: 255 ft

Comments

Distribution: ONE OBSERVATION BETWEEN 1972-1975.
Ecological:
Threat: UNKNOWN.
General: A FOX WAS OBSERVED IN THE VICINITY OF RR OVERPASS OVER CLOVIS AVE. APPROX. 3.0 MILES NORTHWEST OF LATON.
Owner/Manager: UNKNOWN

NORTHERN HARDPAN VERNAL POOL

Element Code: CTT44110CA

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G3
State: S3.1

Other Lists

Habitat Associations
General: None for this Element
Micro: None for this Element

Occurrence No. 13 Map Index:15260
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: GRIGGS, T. 1980 (OBS)
Quad Summary: PIEDRA (3611974/377C)*, ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: WATTS VALLEY RD. WHERE ASHLAN BECOMES WATTS V RD. E OF ACADEMY RD (VICINITY OF SANGER).

Dates Last Seen
Element: 1980-04-27
Site: 1980-04-27

Lat/Long: 36°47'46" / 119°29'56"
UTM: Zone-11 N4074965 E277040
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 13S
Range: 23E
Section: 17 Qtr SW
Meridian: M
Elevation: 450 ft

Comments
Distribution: ABOUT 150 ACRES. ALSO IN SECTION 18.
Ecological: HORDEUM GENICULATUM, ERYNGIUM, LASTHENIA FREMONTII. UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO.
Threat: SURROUNDING LAND SUBURBAN. HEAVILY GRAZED AT PRESENT AND HISTORICALLY.
General:
Owner/Manager: UNKNOWN

NORTHERN CLAYPAN VERNAL POOL

Element Code: CTT44120CA

List Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G1	
State: None	State: S1.1	

Habitat Associations

General: None for this Element
Micro: None for this Element

Occurrence No. 6 Map Index:14687
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOOD, L. 1977 (LIT) CNACC
Quad Summary: FRESNO NORTH (3611977/379D)*, LANES BRIDGE (3611987/379A)
County Summary: FRESNO, MADERA
SNA Summary: Lanes Bridge
Location: N OF PINEDALE. E SIDE BOUNDED BY FRIANT RD. W SIDE BOUNDED BY RIV BLUFF.

Dates Last Seen
Element: 1980-01-XX
Site: 1980-01-XX

Lat/Long: 36°51'44" / 119°47'26"
UTM: Zone-11 N4083032 E251220
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 12S
Range: 20E
Section: 28 Qtr SW
Meridian: M
Elevation: 350 ft

Comments

Distribution: ABOUT 700 ACRES.
Ecological: SERIES OF MIMA MOUNDS W/INTERSPERSED POOLS. ENDANGERED ORTHOCARPUS SUCCULENTUS, ORCUTTIA CALIFORNICA VAR INEQUALIS HERE. GRASSLAND W/ HIGH % EXOTICS.
Threat: AREA GRAZED. RESIDENTIAL DEVEL IS A THREAT.
General: UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO.
Owner/Manager: UNKNOWN

BRANCHINECTA LYNCHI
VERNAL POOL FAIRY SHRIMP
Element Code: ICBRA03030

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status:
State: None	State: S2S3	

Habitat Associations

General: ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MTNS, AND SOUTH COAST MTNS, IN ASTATIC RAIN-FILLED POOLS.
Micro: INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Occurrence No. 148 Map Index:33666
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SUGNET & ASSOC. 1993 (PERS)
Quad Summary: CLOVIS (3611976/378C)*, ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: EAST OF DE WOLF AVE & SOUTH OF BULLARD AVE. EAST OF CLOVIS.

Dates Last Seen
Element: 1993-03-12
Site: 1993-03-12

Lat/Long: 36°48'51" / 119°38'06"
UTM: Zone-11 N4077290 E264954
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile

Township: 13S
Range: 21E
Section: 12 Qtr XX
Meridian: M
Elevation: 385 ft

Comments

Distribution: 1 FEATURE INSPECTED SOMEWHERE IN SECTION 12. BRANCHINECTA LYNCHI OBSERVED. NO LEPIDURUS PACKARDI OBSERVED.
Ecological: NATURAL VERNAL POOL.
Threat:
General: SUGNET RECORD NUMBER 98.
Owner/Manager: UNKNOWN

LINDERIELLA OCCIDENTALIS
CALIFORNIA LINDERIELLA
Element Code: ICBRA06010

List Status: Federal: Species of Concern; State: None
NDDB Element Ranks: Global: G2G3; State: S2S3
Other Lists: CDFG Status:

Habitat Associations
General: SEASONAL POOLS IN UNPLOWED GRASSLANDS WITH OLD ALLUVIAL SOILS UNDERLAIN BY HARDPAN OR IN SANDSTONE DEPRESSIONS.
Micro: WATER IN THE POOLS HAS VERY LOW ALKALINITY, CONDUCTIVITY, AND TDS.

Occurrence No. 32 Map Index:33052
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WESTPHAL, M. 1994 (MUS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: NORTH SIDE OF HERNDON AVENUE, 0.75 MILE WEST OF ACADEMY AVENUE, 6 MILES EAST OF CLOVIS.

Dates Last Seen: Element: 1994-03-29; Site: 1994-03-29
Lat/Long: 36°50'18" / 119°34'06"
UTM: Zone-11 N4079803 E270964
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 12S
Range: 22E
Section: 33 Qtr SE
Meridian: M
Elevation: 420 ft

Comments
Distribution:
Ecological:
Threat:
General: COLLECTION #MW-94-07, DEPOSITED AT DFG-IFD.
Owner/Manager: UNKNOWN

Occurrence No. 33 Map Index:33053
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WESTPHAL, M. 1994 (MUS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: NORTH SIDE OF HERNDON AVENUE, 1.4 MILES WEST OF ACADEMY AVENUE, 5.5 MILES EAST OF CLOVIS.

Dates Last Seen: Element: 1994-03-29; Site: 1994-03-29
Lat/Long: 36°50'17" / 119°34'46"
UTM: Zone-11 N4079822 E269969
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 12S
Range: 22E
Section: 33 Qtr SW
Meridian: M
Elevation: 410 ft

Comments
Distribution:
Ecological:
Threat:
General: COLLECTION #MW-94-06, DEPOSITED AT DFG-IFD.
Owner/Manager: UNKNOWN

Occurrence No. 34 Map Index:33054
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WESTPHAL, M. 1994 (MUS)
Quad Summary: CLOVIS (3611976/378C)*, ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: JUST SOUTH OF THE INTERSECTION ON HERNDON AVENUE AND HIGHLAND AVENUE, 3 MILES ENE OF CLOVIS.

Dates Last Seen: Element: 1994-03-29; Site: 1994-03-29
Lat/Long: 36°50'08" / 119°37'38"
UTM: Zone-11 N4079661 E265718
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 13S
Range: 21E
Section: 01 Qtr NE
Meridian: M
Elevation: 400 ft

Comments
Distribution: #MW-94-04 COLLECTED AT THE SW CORNER OF HERNDON AVENUE AND HIGHLAND AVENUE; #MW-94-05 COLLECTED AT THE SE CORNER.
Ecological:
Threat:
General: COLLECTION #MW-94-04 AND #MW-94-05, DEPOSITED AT DFG-IFD.
Owner/Manager: UNKNOWN

DESMOCERUS CALIFORNICUS DIMORPHUS
VALLEY ELDERBERRY LONGHORN BEETLE
Element Code: IICOL48011

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G3T2	CDFG Status:
State: None	State: S2	

Habitat Associations

General: OCCURS ONLY IN THE CENTRAL VALLEY OF CALIFORNIA, IN ASSOCIATION WITH BLUE ELDERBERRY (SAMBUCUS MEXICANA).
Micro: PREFERS TO LAY EGGS IN ELDERBERRRIES 2-8 INCHES IN DIAMETER; SOME PREFERENCE SHOWN FOR "STRESSED" ELDERBERRIES.

Occurrence No. 70 Map Index:33007
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BARR, C. 1991 (OBS)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:
Location: COLLINS CREEK, TRIBUTARY TO KINGS RIVER, IN THE VICINITY OF CHANNEL ROAD, ~2 MILES SE OF SANGER.

Dates Last Seen
Element: 1991-05-01
Site: 1991-05-01

Lat/Long: 36°40'42" / 119°31'52"
UTM: Zone-11 N4061986 E273813
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 14S
Range: 22E
Section: 25 Qtr SW
Meridian: M
Elevation: 330 ft

Comments

Distribution: REPORT ON: TAXONOMY; DISTRIBUTION; LIFE HISTORY; HABITAT; FIELD TECHNIQUES & OBSERVATIONS; BEETLE RECOVERY.
Ecological: HABITAT CONSISTS OF DENSE RIPARIAN WOODLAND WITH OAKS, COTTONWOODS, AND ELDERBERRIES.
Threat:
General: BOTH OLD AND RECENT EXIT HOLES FOUND IN SEVERAL LARGE, OLD ELDERBERRIES.
Owner/Manager: PVT

Occurrence No. 167 Map Index:39533
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HALSTEAD, J. & J. OLDHAM 1990 (OBS)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:
Location: KINGS RIVER, 0.25 MILE NE OF ANNADALE AND RIVERBEND AVENUES, 2.8 MILES EAST OF SANGER.

Dates Last Seen
Element: 1989-04-18
Site: 1989-04-18

Lat/Long: 36°42'03" / 119°30'19"
UTM: Zone-11 N4064418 E276183
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 41.1 ac

Township: 14S
Range: 23E
Section: 19 Qtr NE
Meridian: M
Elevation: 345 ft

Comments

Distribution: RIPARIAN, GRAVEL MINING PITS/PONDS.
Ecological: RIPARIAN WITH ELDERBERRY HABITAT PRESENT.
Threat: MINING OPERATIONS
General: 1 FEMALE LAYING EGGS OBSERVED BUT NOT COLLECTED. EGGS AND EMERGENCE HOLES ON ONE ELDERBERRY NOTED.
Owner/Manager: UNKNOWN

Occurrence No. 168 Map Index:39534
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HALSTEAD, J. & J. OLDHAM 1990 (OBS)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:
Location: ALONG CHANNEL ROAD, 0,5 MILE SOUTH OF ANNADALE AVE INTERSECTION, 1.9 MILES SE OF SANGER.

Dates Last Seen
Element: 1990-06-01
Site: 1990-06-01

Lat/Long: 36°41'39" / 119°31'29"
UTM: Zone-11 N4063732 E274436
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 14S
Range: 22E
Section: 24 Qtr NE
Meridian: M
Elevation: 340 ft

Comments

Distribution:
Ecological: ELDERBERRY AND OAK FOREST ALONG ROAD.
Threat:
General: MANY ELDERBERRIES ALONG ROAD. A FEW ELDERBERRY TREES WITH EMERGENCE HOLES. NO ADULTS OBSERVED.
Owner/Manager: UNKNOWN

DESMOCERUS CALIFORNICUS DIMORPHUS (cont.)
VALLEY ELDERBERRY LONGHORN BEETLE
Element Code: IICOL48011

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G3T2	CDFG Status:
State: None	State: S2	

Occurrence No. 178 Map Index:40240
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PG&E 1998 (LIT)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:

Dates Last Seen
Element: 1998-04-16
Site: 1998-04-16

Lat/Long: 36°42'18" / 119°30'40"
UTM: Zone-11 N4064898 E275678
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 8.6 ac

Township: 14S
Range: 23E
Section: 19 Qtr NW
Meridian: M
Elevation: 256 ft

Location: TRANSMISSION LINES, 0.4 MILE N OF INTERSECTION OF RIVERBEND & ANNADALE AVES & KINGS RIVER, 2.5 MILES E OF SANGER.

Comments
Distribution: EXIT HOLE FOUND IN DEAD WOOD 650 FEET NORTHEAST OF TOWER 33/167. POTENTIAL HABITAT (OTHER AVAILABLE PLANTS) FROM 423 TO 650 FEET NE OF TOWER.
Ecological: RIPARIAN
Threat: ROAD MAINTENANCE, TRANSMISSION LINE MAINTENANCE (INCLUDES: HERBICIDE APPLICATION, VEG CLEARING AND/OR REMOVAL, ETC)
General: EXIT HOLES FOUND IN DEAD WOOD.
Owner/Manager: UNKNOWN

Occurrence No. 179 Map Index:40241
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PG&E 1998 (LIT)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:

Dates Last Seen
Element: 1998-04-16
Site: 1998-04-16

Lat/Long: 36°42'07" / 119°30'58"
UTM: Zone-11 N4064560 E275227
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 19.2 ac

Township: 14S
Range: 23E
Section: 19 Qtr NW
Meridian: M
Elevation: 350 ft

Location: TRANSMISSION LINES, 0.35 MILE NW OF INTERSECTION RIVERBEND & ANNADALE AVES, & KINGS RIVER, 2.5 MILES E OF SANGER.

Comments
Distribution: ELDERBERRIESS WITH EXIT HOLES FOUND 289 FT & 180 FT NE; & 112 FT & 52 FT WEST OF TOWER 33/168. POTENTIAL HABITAT (OTHER ELDERBERRY BUSHES) FOUND 102 FT SW; 174, 151 & 62 FT WEST & 30 FT SE OF THE TOWER.
Ecological: AGRICULTURE (ORCHARDS, ROW CROPS, VINEYARD) UNCERTAIN WHICH OF THESE IS AT THIS SITE.
Threat: POTENTAIL THREATS; ROAD MAINTENANCE, TRANSMISSION LINE MAINTENANCE, AGRICULTURAL ACTIVITY.
General: EXIT HOLES FOUND IN BOTH LIVE AND DEAD WOOD.
Owner/Manager: UNKNOWN

Occurrence No. 180 Map Index:40242
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PG&E 1998 (LIT)
Quad Summary: SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:

Dates Last Seen
Element: 1998-04-16
Site: 1998-04-16

Lat/Long: 36°40'48" / 119°32'13"
UTM: Zone-11 N4062193 E273287
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 14S
Range: 22E
Section: 25 Qtr SW
Meridian: M
Elevation: 332 ft

Location: ~1 MILE ENE OF JCT CENTRAL & ACADEMY AVES, AND 0.4 MILE N OF JCT GOODFELLOW AVE & CHANNEL RD, 2 MILES SE OF SANGER.

Comments
Distribution: 43 FEET NORTHWEST OF TOWER 35/177.
Ecological: AGRICULTURE (ORCHARDS, ROW CROPS, VINEYARD), UNCERTAIN WHICH OF THESE IS AT THIS SITE.
Threat: POTENTAIL THREATS; ROAD MAINTENANCE, TRANSMISSION LINE MAINTENANCE, AGRICULTURAL ACTIVITY.
General: EXIT HOLES FOUND IN LIVE WOOD.
Owner/Manager: UNKNOWN

LYTTA MOLESTA
MOLESTAN BLISTER BEETLE
Element Code: IICOL4C030

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G2	CDFG Status:
State: None	State: S2	

Habitat Associations

General: INHABITS THE CENTRAL VALLEY OF CALIFORNIA, FROM CONTRA COSTA TO KERN AND TULARE COUNTIES.
Micro: None for this Element

Occurrence No. 7 Map Index:14685
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SELANDER, R. 1960 (LIT)
Quad Summary: LANES BRIDGE (3611987/379A)*, FRESNO NORTH (3611977/379D)
County Summary: FRESNO, MADERA
SNA Summary:
Location: LANES BRIDGE, 10 MILES NORTH OF FRESNO.

Dates Last Seen
Element: 19XX-XX-XX
Site: 19XX-XX-XX

Lat/Long: 36°52'36" / 119°47'27"
UTM: Zone-11 N4084625 E251248
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 20E
Section: 21 Qtr NW
Meridian: M
Elevation:

Comments

Distribution:
Ecological:
Threat:
General: SEASONAL DISTRIBUTION: APRIL 3 TO JULY 1. 3 COLLECTED IN APRIL; YEAR OF COLLECTION UNKNOWN.
Owner/Manager: UNKNOWN

ERYNGIUM SPINOSEPALUM
SPINY-SEPALED BUTTON-CELERY
Element Code: PDAPI0Z0Y0

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G2	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 3-2-3

Habitat Associations

General: VERNAL POOLS, VALLEY AND FOOTHILL GRASSLAND.
Micro: SOME SITES ON CLAY SOIL OF GRANITIC ORIGIN; VERNAL POOLS, WITHIN GRASSLAND. 100-420M.

Occurrence No. 9 Map Index:40381
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: HOOVER, R. #1260 UC (HERB)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: 4 MILES NORTH OF SANGER.

Dates Last Seen
Element: 1936-06-04
Site: 1987-XX-XX

Lat/Long: 36°45'56" / 119°32'35"
UTM: Zone-11 N4071703 E273006
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 13S
Range: 22E
Section: 26 Qtr XX
Meridian: M
Elevation: 400 ft

Comments

Distribution: EXACT LOCATION NOT KNOWN; MAPPED ABOUT 4 MILES NORTH OF SANGER ALONG ROAD HEADING TOWARDS ACADEMY.
Ecological:
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1936 COLLECTION BY HOOVER. AREA SEARCHED BY J. STEBBINS IN 1987, HABITAT IN THIS AREA APPARENTLY EXTIRPATED BY AGRICULTURE.
Owner/Manager: UNKNOWN

ERYNGIUM SPINOSEPALUM
SPINY-SEPALED BUTTON-CELERY
Element Code: PDAPI0Z0Y0

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G2	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 3-2-3

Habitat Associations

General: VERNAL POOLS, VALLEY AND FOOTHILL GRASSLAND.
Micro: SOME SITES ON CLAY SOIL OF GRANITIC ORIGIN; VERNAL POOLS, WITHIN GRASSLAND. 100-420M.

Occurrence No. 9 Map Index:40381
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: HOOVER, R. #1260 UC (HERB)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: 4 MILES NORTH OF SANGER.

Dates Last Seen
Element: 1936-06-04
Site: 1987-XX-XX

Lat/Long: 36°45'56" / 119°32'35"
UTM: Zone-11 N4071703 E273006
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 13S
Range: 22E
Section: 26 Qtr XX
Meridian: M
Elevation: 400 ft

Comments

Distribution: EXACT LOCATION NOT KNOWN; MAPPED ABOUT 4 MILES NORTH OF SANGER ALONG ROAD HEADING TOWARDS ACADEMY.
Ecological:
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1936 COLLECTION BY HOOVER. AREA SEARCHED BY J. STEBBINS IN 1987, HABITAT IN THIS AREA APPARENTLY EXTIRPATED BY AGRICULTURE.
Owner/Manager: UNKNOWN

PSEUDOBAHIA PEIRSONII
SAN JOAQUIN ADOBE SUNBURST
Element Code: PDAST7P030

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND.
Micro: GRASSY VALLEY FLOORS AND ROLLING FOOTHILLS IN HEAVY CLAY SOIL. 85-800M.

Occurrence No. 15 Map Index:15138
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEBBINS, J. 1994 (OBS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: E SIDE OF ACADEMY AVE. 0.9 MI S OF JCT W/SHEPHERD AVE, 3.4 MI N OF SHAW. JUST N OF FRIANT-KERN CANAL.

Dates Last Seen
Element: 1994-04-09
Site: 1994-04-09

Lat/Long: 36°51'11" / 119°33'20"
UTM: Zone-11 N4081417 E272158
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 12S
Range: 22E
Section: 27 Qtr SE
Meridian: M
Elevation: 470 ft

Comments
Distribution: LOCATED IN SW 1/4 OF SE 1/4 OF SECTION 27, JUST EAST OF ACADEMY AVE AND NORTH OF ROAD TOWARDS WELL.
Ecological: IN WET HEAVY CENTERVILLE CLAY SOIL. ASSOCIATES INCLUDE AVENA FATUA, BRASSICA KABER, LUPINUS BICOLOR, ACHYRACHAENA MOLLIS, AMSINCKIA INTERMEDIA, AND ERODIUM CICUTARIUM.
Threat: AGRICULTURE, GRAZING, RANCHETTE DEVELOPMENT, ROAD WIDENING, WEEDY EXOTICS, AND WELL MAINTENANCE ACTIVITIES THREATEN.
General: LARGEST POPULATION SEEN IN 1974. POPULATION NOT RELOCATED IN 1985 SURVEY. 350 PLANTS SEEN IN 1990, 100 IN 1994. SITE LIKELY RELICTUAL REMNANT OF HISTORICALLY LARGE POPULATION ON CLAY SOILS EXTENDING NORTH TO HWY 168.
Owner/Manager: PVT

Occurrence No. 16 Map Index:15216
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Increasing
Main Source: STEBBINS, J. 1991 (LIT)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary: Fresno Round Mountain
Location: APPROX ONE MI WEST OF ROUND MTN & 0.5 MI EAST OF FRIANT-KERN CANAL, SOUTH OF HOG CREEK.

Dates Last Seen
Element: 1990-04-04
Site: 1990-04-04

Lat/Long: 36°49'26" / 119°31'18"
UTM: Zone-11 N4078111 E275084
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 25.8 ac

Township: 13S
Range: 22E
Section: 01 Qtr SE
Meridian: M
Elevation: 475 ft

Comments
Distribution: WITHIN THE SE 1/4 OF THE SE 1/4 OF SECTION 1.
Ecological: IN NON-NATIVE GRASSLAND SURROUNDED BY AGRICULTURE ON HEAVY PORTERVILLE CLAY SOILS. ASSOCIATED WITH ACHYRACHAENA MOLLIS, BRASSICA KABER, HORDEUM GENICULATUM, LEPIDIUM NITIDUM, BROMUS RUBENS, AND AMSINCKIA INTERMEDIA.
Threat: THREATENED BY WEEDY EXOTIC PLANTS, GRAZING, POTENTIAL DEVELOPMENT, NEARBY VINEYARD. PROPOSED FLOOD CONTROL PROJECT.
General: 1200 PLANTS SEEN IN 1986, 1000 SEEN IN 1987, 3000 SEEN IN 1989, 4500 SEEN IN 1990. BEST QUALITY OCCURRENCE ACCORDING TO STEBBINS (1986). 40% OF THIS 42 ACRE POPULATION WOULD BE IMPACTED BY PROPOSED FANCHER CREEK RESERVOIR PROJECT.
Owner/Manager: FRESNO FLOOD CONTROL DIST

Occurrence No. 30 Map Index:22186
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEBBINS, J. 1991 (LIT)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: ROUND MOUNTAIN, 1 KM (0.7 MI) NORTH OF SUMMIT (ELEVATION 869).

Dates Last Seen
Element: 1990-04-04
Site: 1990-04-04

Lat/Long: 36°49'43" / 119°30'32"
UTM: Zone-11 N4078581 E276247
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 13S
Range: 23E
Section: 06 Qtr SE
Meridian: M
Elevation: 495 ft

Comments
Distribution: WITHIN THE NW 1/4 OF THE SE 1/4 OF SECTION 6.
Ecological: GROWING ON PORTERVILLE CLAY SOILS IN ASSOCIATION WITH HORDEUM LEPORINUM, AMSINCKIA INTERMEDIA, ERODIUM CICUTARIUM, LAMIUM AMPLEXICAULE, EVAX CAULESCENS, BROMUS RUBENS, AND SENECIO VULGARIS.
Threat: GRAZING, AND TRAMPLING; POTENTIAL LAND USE CHANGES ASSOC. WITH FANCHER CREEK FLOOD CONTROL PROJECT OR DEVELOMENT.
General: 50 PLANTS SEEN IN 1987, 26 SEEN IN 1990. STEBBINS REPORTS THAT PLANTS SEEN IN 1990 WERE SMALLER THAN PRIOR VISIT, POSSIBLY DUE TO DRY CONDIDTIONS. AREA HEAVILY GRAZED AT TIME OF BOTH FIELD VISITS.
Owner/Manager: PVT

PSEUDOBAHIA PEIRSONII (cont.)
SAN JOAQUIN ADOBE SUNBURST
Element Code: PDAST7P030

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 2-3-3

Occurrence No. 31 Map Index:22189
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEBBINS, J. 1991 (LIT)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: 5 KM (3 MI) NORTHWEST OF FAIRVIEW, 0.6 KM (0.4 MI) NORTH OF ASHLAN AVE AT REDBANK SLOUGH CROSSING.

Dates Last Seen
Element: 1990-07-07
Site: 1990-07-07

Lat/Long: 36°47'59" / 119°35'38"
UTM: Zone-11 N4075588 E268580
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 13S
Range: 22E
Section: 17 Qtr SE
Meridian: M
Elevation: 390 ft

Comments
Distribution: WITHIN THE NE 1/4 OF THE SE 1/4 OF SECTION 17.
Ecological: GROWING ON CENTERVILLE CLAY SOILS IN ASSOCIATION WITH BROMUS MOLLIS, VULPIA MYUROS, HYPOCHAERIS GLABRA, EVAX CAULESCENS, CENTAUREA MELITENSIS, AND SCANDEX PECTEN-VENERIS.
Threat: WITHIN PROPOSED 300 ACRE QUAIL LAKES DEVELOPMENT; AGRICULTURE, DEVELOPMENT, GRAZING, AND RECREATION ALSO THREATEN.
General: ESTIMATED 5000 PLANTS OVER 3 ACRES IN 1990. PROPOSED DEVELOPMENT INCLUDES 400 HOUSING UNITS, GOLF COURSE, AND LAKES. MITIGATION PLAN FOR THIS POPULATION IS PENDING. SITE IS SURROUNDED BY AGRICULTURE, RECREATIONAL WATER PARK, AND HOUSING.
Owner/Manager: PVT

Occurrence No. 36 Map Index:30079
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCFALL, M. 1994 (OBS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: W SIDE OF FRIANT-KERN CANAL, 0.3-0.6 MI S OF HERNDON AVE. 0.7-1.0 MI E OF ACADEMY AVE.

Dates Last Seen
Element: 1994-03-24
Site: 1994-03-24

Lat/Long: 36°49'53" / 119°32'30"
UTM: Zone-11 N4078975 E273330
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 7.9 ac

Township: 13S
Range: 22E
Section: 02 Qtr NE
Meridian: M
Elevation: 450 ft

Comments
Distribution:
Ecological:
Threat: SITE DOMINATED BY MUSTARD. OWNER HAD MADE A CUT IN THE SOIL FOR DRAINAGE. CATTLE GRAZING COULD ALSO THREATEN.
General: 46 PLANTS IN 1994.
Owner/Manager: PVT

CASTILLEJA CAMPESTRIS SSP SUCCULENTA
SUCCULENT OWL'S-CLOVER
Element Code: PDSCR0D3Z1

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G4?T2	CNPS List: 1B
State: Endangered	State: S2.2	R-E-D Code: 2-2-3

Habitat Associations
General: VERNAL POOLS, VALLEY AND FOOTHILL GRASSLAND.
Micro: MOIST PLACES, OFTEN IN ACIDIC SOILS. 25-750M.

Occurrence No. 7 Map Index:14708
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: HARRISON & FERREIRA 1981 (OBS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: FRIANT RD N OF SP RR TRACKS, APPROX 1.2 MI N OF JCT FRIANT RD & BLACKSTONE, HWY 41.

Dates Last Seen
Element: XXXX-XX-XX
Site: 1981-06-02

Lat/Long: 36°51'57" / 119°46'47"
UTM: Zone-11 N4083393 E252203
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 20E
Section: 27 Qtr NW
Meridian: M
Elevation: 350 ft

Comments
Distribution:
Ecological:
Threat:
General: VARIETY KNOWN TO OCCUR HERE BEFORE 1981. SITE COMPLETELY DISCED IN 1981.
Owner/Manager: UNKNOWN

Occurrence No. 31 Map Index:25123
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEBBINS, J. 1991 (OBS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: HARLAN RANCH, 0.5 MILE NORTHEAST OF HIGHWAY 168/SHEPARD AVENUE INTERSECTION, WEST OF KERN-FRIANT CANAL.

Dates Last Seen
Element: 1991-04-30
Site: 1991-04-30

Lat/Long: 36°52'24" / 119°36'38"
UTM: Zone-11 N4083802 E267319
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 12S
Range: 22E
Section: 19 Qtr SW
Meridian: M
Elevation: 440 ft

Comments
Distribution:
Ecological: HARDPAN VERNAL POOL WITHIN VALLEY GRASSLAND. ASSOCIATED WITH ERYNGIUM, MIMULUS TRICOLOR, PSILOCARPHUS TENELLUS, AND DOWNINGIA.
Threat: SITE IS CURRENTLY GRAZED; CITRUS GROVES ARE NEARBY AND FUTURE HIGHWAY PROJECT MAY THREATEN.
General: 150 PLANTS OBSERVED IN 1992. SEVERAL GOOD VERNAL POOLS/MIMA MOUNDS IN THE VICINITY.
Owner/Manager: PVT

Occurrence No. 43 Map Index:40368
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEBBINS, J. 1991 (PERS)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: SOUTH OF HARLAN RANCH, EAST OF THOMPSON AVE BEWTEEN TOLLHOUSE ROAD AND DOG CREEK, EAST OF CLOVIS.

Dates Last Seen
Element: 1991-XX-XX
Site: 1991-XX-XX

Lat/Long: 36°51'24" / 119°36'36"
UTM: Zone-11 N4081953 E267302
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 12S
Range: 22E
Section: 30 Qtr XX
Meridian: M
Elevation: 440 ft

Comments
Distribution: SITE BASED UPON 1991 PHONE CONVERSTATION WITH J. STEBBINS REGARDING PLANTS "FOUND ABOUT 1 MILE SOUTH OF HARLAN RANCH POPULATION" (OCCURRENCE #31). SITE MAPPED NEAR THE CENTER OF SECTION 30.
Ecological:
Threat:
General: NEEDS FIELDWORK AND MORE DETAIL.
Owner/Manager: UNKNOWN

SAGITTARIA SANFORDII
SANFORD'S ARROWHEAD
Element Code: PMALI040Q0

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: MARSHES AND SWAMPS.
Micro: IN STANDING OR SLOW-MOVING FRESHWATER PONDS, MARSHES, AND DITCHES. 0-610M.

Occurrence No. 3 Map Index:24423
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CLARK, W. 1986 (PERS)
Quad Summary: CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: HELM CANAL NEAR BULLARD AVE, CLOVIS.

Dates Last Seen
Element: 1986-XX-XX
Site: 1986-XX-XX

Lat/Long: 36°49'23" / 119°43'44"
UTM: Zone-11 N4078503 E256596
Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 39.7 ac

Township: 13S
Range: 21E
Section: 06 Qtr SW
Meridian: M
Elevation: 345 ft

Comments
Distribution: NORTHEAST OF CSU FRESNO RODEO GROUNDS.
Ecological: GROWING IN A CANAL.
Threat: PROPOSED BULLARD AVE. WIDENING PROJECT MAY HAVE IMPACTED THIS POPULATION.
General: MORE INFORMATION NEEDED ON THE CONDITION AND HABITAT OF THIS POPULATION.
Owner/Manager: UNKNOWN

Occurrence No. 4 Map Index:24425
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: FRIANT ROAD SOUTH OF SHEPHERD AVE, NORTHWEST OF PINEDALE.

Dates Last Seen
Element: 1954-05-23
Site: 1980-XX-XX

Lat/Long: 36°51'39" / 119°46'54"
UTM: Zone-11 N4082833 E252011
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 13S
Range: 20E
Section: 27 Qtr NW
Meridian: M
Elevation: 360 ft

Comments
Distribution: EXACT LOCATION UNKNOWN, COLLECTION LABEL GIVES "RD TO FRIANT DAM AND FORT WASHINGTON BEFORE CURVE AT SHEPHERD AVE".
Ecological:
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN FROM THREE COLLECTIONS; C. QUIBELL IN 1953 (FSC 7725), S. SIMONIAU ON MAY 16, 1953 (FSC 15910), AND S. SIMONIAU ON MAY 23, 1954 (FSC 13720).
Owner/Manager: UNKNOWN

Occurrence No. 5 Map Index:24426
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: CANAL NORTH OF ASHLAN AVE AND EAST OF MAROA, FRESNO.

Dates Last Seen
Element: 1958-10-09
Site: 1980-XX-XX

Lat/Long: 36°47'39" / 119°47'51"
UTM: Zone-11 N4075481 E250394
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 13S
Range: 20E
Section: 16 Qtr SE
Meridian: M
Elevation: 310 ft

Comments
Distribution: ALONG NORTH SIDE OF ASHLAN AND 100 YARDS EAST OF MAROA.
Ecological: GROWING IN A CANAL.
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN ONLY FROM SINGLE COLLECTION BY B. BROCK ON OCT. 9, 1958 (FSC 17769).
Owner/Manager: UNKNOWN

SAGITTARIA SANFORDII
SANFORD'S ARROWHEAD
Element Code: PMALI040Q0

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: MARSHES AND SWAMPS.
Micro: IN STANDING OR SLOW-MOVING FRESHWATER PONDS, MARSHES, AND DITCHES. 0-610M.

Occurrence No. 3 Map Index:24423
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CLARK, W. 1986 (PERS)
Quad Summary: CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: HELM CANAL NEAR BULLARD AVE, CLOVIS.

Dates Last Seen
Element: 1986-XX-XX
Site: 1986-XX-XX

Lat/Long: 36°49'23" / 119°43'44"
UTM: Zone-11 N4078503 E256596
Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 39.7 ac

Township: 13S
Range: 21E
Section: 06 Qtr SW
Meridian: M
Elevation: 345 ft

Comments
Distribution: NORTHEAST OF CSU FRESNO RODEO GROUNDS.
Ecological: GROWING IN A CANAL.
Threat: PROPOSED BULLARD AVE. WIDENING PROJECT MAY HAVE IMPACTED THIS POPULATION.
General: MORE INFORMATION NEEDED ON THE CONDITION AND HABITAT OF THIS POPULATION.
Owner/Manager: UNKNOWN

Occurrence No. 4 Map Index:24425
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: FRIANT ROAD SOUTH OF SHEPHERD AVE, NORTHWEST OF PINEDALE.

Dates Last Seen
Element: 1954-05-23
Site: 1980-XX-XX

Lat/Long: 36°51'39" / 119°46'54"
UTM: Zone-11 N4082833 E252011
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 13S
Range: 20E
Section: 27 Qtr NW
Meridian: M
Elevation: 360 ft

Comments
Distribution: EXACT LOCATION UNKNOWN, COLLECTION LABEL GIVES "RD TO FRIANT DAM AND FORT WASHINGTON BEFORE CURVE AT SHEPHERD AVE".
Ecological:
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN FROM THREE COLLECTIONS; C. QUIBELL IN 1953 (FSC 7725), S. SIMONIAU ON MAY 16, 1953 (FSC 15910), AND S. SIMONIAU ON MAY 23, 1954 (FSC 13720).
Owner/Manager: UNKNOWN

Occurrence No. 5 Map Index:24426
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: CANAL NORTH OF ASHLAN AVE AND EAST OF MAROA, FRESNO.

Dates Last Seen
Element: 1958-10-09
Site: 1980-XX-XX

Lat/Long: 36°47'39" / 119°47'51"
UTM: Zone-11 N4075481 E250394
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 13S
Range: 20E
Section: 16 Qtr SE
Meridian: M
Elevation: 310 ft

Comments
Distribution: ALONG NORTH SIDE OF ASHLAN AND 100 YARDS EAST OF MAROA.
Ecological: GROWING IN A CANAL.
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN ONLY FROM SINGLE COLLECTION BY B. BROCK ON OCT. 9, 1958 (FSC 17769).
Owner/Manager: UNKNOWN

SAGITTARIA SANFORDII (cont.)
SANFORD'S ARROWHEAD
Element Code: PMALI040Q0

List Status	NDDB Element Ranks	Other Lists
Federal: Species of Concern	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Occurrence No. 6 Map Index:24428
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: HERNDON AVE. AT BRAWLEY AVE., APPROX. 3 MILES WEST OF PINECREST.

Dates Last Seen
Element: 1953-09-09
Site: 1980-XX-XX

Lat/Long: 36°50'14" / 119°51'41"
UTM: Zone-11 N4080427 E244822
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 19E
Section: 35 Qtr SE
Meridian: M
Elevation: 320 ft

Comments
Distribution: EXACT SITE UNKNOWN, SEVERAL CANALS IN AREA MAY PROVIDE APPROPRIATE HABITAT.
Ecological:
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN FROM SINGLE COLLECTION BY S. SIMONIAU ON SEPT. 9, 1953 (FSC 15911).
Owner/Manager: UNKNOWN

Occurrence No. 7 Map Index:24427
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOWARD, A. 1980 (PERS)
Quad Summary: FRESNO NORTH (3611977/379D)
County Summary: FRESNO
SNA Summary:
Location: DITCH UNDER SANTA FE RAILROAD AT SHAW AVE, FRESNO.

Dates Last Seen
Element: 1953-06-02
Site: 1980-XX-XX

Lat/Long: 36°48'30" / 119°50'25"
UTM: Zone-11 N4077162 E246621
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 13S
Range: 20E
Section: 07 Qtr SW
Meridian: M
Elevation: 310 ft

Comments
Distribution: LOCATED IN DITCH SIPHON.
Ecological: GROWING IN A DITCH.
Threat:
General: AREA SEARCHED BY C.E. TURNER IN 1980 BUT NO PLANTS WERE FOUND. SITE KNOWN FROM SINGLE COLLECTION BY C. QUIBELL ON JUNE 2, 1953 (FSC 8117).
Owner/Manager: UNKNOWN

Occurrence No. 38 Map Index:30074
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: YORK, D. 1993 (OBS)
Quad Summary: CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: LEAKY ACRES GROUNDWATER RECHARGE BASIN, SOUTH OF ASHLAN AVE AND WEST OF SIERRA VISTA AVE, FRESNO.

Dates Last Seen
Element: 1993-09-23
Site: 1993-09-23

Lat/Long: 36°47'36" / 119°44'35"
UTM: Zone-11 N4075257 E255238
Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 13S
Range: 20E
Section: 24 Qtr NE
Meridian: M
Elevation: 325 ft

Comments
Distribution: BASIN IS ABOUT 2 MILES NORTHWEST OF THE FRESNO AIR TERMINAL BUILDING. PLANTS FOUND IN NW CORNER OF PONDING BASIN 5A. WITHIN THE NW 1/4 OF THE NE 1/4 OF SECTION 24.
Ecological: GROWING IN A LARGE, SHALLOW FRESHWATER POND IN ABOUT 6" OF WATER. SAGITTARIA LATIFOLIA OCCURS NEARBY.
Threat: POND MAINTENANCE ACTIVITIES MAY AFFECT THIS SITE.
General: MORE THAN 100 PLANTS OBSERVED IN 1993. EMERGENT VEGETATION IS SCARCE AT THIS SITE.
Owner/Manager: CITY OF FRESNO

ORCUTTIA INAEQUALIS
SAN JOAQUIN VALLEY ORCUTT GRASS
Element Code: PMPOA4G060

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VERNAL POOLS. ENDEMIC TO THE SAN JOAQUIN VALLEY.
Micro: 30-755M.

Occurrence No. 21 Map Index:14687
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: KLYVER, F. #1006 DS (HERB)
Quad Summary: FRESNO NORTH (3611977/379D)*, LANES BRIDGE (3611987/379A)
County Summary: FRESNO, MADERA
SNA Summary: Lanes Bridge
Location: NEAR LANE'S BRIDGE NEAR FRIANT.

Dates Last Seen
Element: 1927-05-27
Site: 1987-06-01

Lat/Long: 36°51'44" / 119°47'26"
UTM: Zone-11 N4083032 E251220
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 12S
Range: 20E
Section: 28 Qtr SW
Meridian: M
Elevation: 350 ft

Comments
Distribution:
Ecological:
Threat:
General: THIS REGION HAS BEEN LEVELED AND IS NOW BEING DEVELOPED FOR RESIDENTIAL AND COMMERCIAL USES AS WELL AS RECREATION ACCORDING TO STEBBINS (1987).
Owner/Manager: UNKNOWN

TUCTORIA GREENEI
GREENE'S TUCTORIA
Element Code: PMPOA6N010

List Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CNPS List: 1B
State: Rare	State: S2.2	R-E-D Code: 2-3-3

Habitat Associations
General: VERNAL POOLS, VALLEY AND FOOTHILL GRASSLAND.
Micro: DRY BOTTOMS OF VERNAL POOLS IN OPEN GRASSLANDS. 30-1065M.

Occurrence No. 16 Map Index:15132
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: HOOVER, R. #1261 UC (HERB)
Quad Summary: ROUND MOUNTAIN (3611975/378D)
County Summary: FRESNO
SNA Summary:
Location: 4 MILES NORTH OF SANGER.

Dates Last Seen
Element: 1936-06-04
Site: 1987-06-01

Lat/Long: 36°45'52" / 119°33'18"
UTM: Zone-11 N4071583 E271939
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 13S
Range: 22E
Section: 34 Qtr NE
Meridian: M
Elevation: 390 ft

Comments
Distribution:
Ecological:
Threat: AREA DEVOTED ENTIRELY TO INTENSIVE AGRICULTURE, PRIMARILY IRRIGARED PASTURE, ORCHARDS, AND VINEYARDS.
General: SITE KNOWN ONLY FROM 1936 COLLECTION BY HOOVER. POPULATION EXTIRPATED PER GRIGGS, 1983, AND PER STEBBINS (BIOSYSTEMS ANALYSIS, 1988).
Owner/Manager: PVT

Occurrence No. 17 Map Index:15131
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: HOWELL & BARNEBY #29319 RSA (HERB)
Quad Summary: ROUND MOUNTAIN (3611975/378D)*, SANGER (3611965/357A)
County Summary: FRESNO
SNA Summary:
Location: 3 MILES NORTH OF SANGER.

Dates Last Seen
Element: 1956-XX-XX
Site: 1987-06-01

Lat/Long: 36°45'01" / 119°33'18"
UTM: Zone-11 N4070012 E271897
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 13S
Range: 22E
Section: 34 Qtr SE
Meridian: M
Elevation: 385 ft

Comments
Distribution: MAPPED NEAR INTERSECTION OF BELMONT ROAD AND ACADEMY AVENUE.
Ecological: BED OF DRIED POOL.
Threat: AREA IS NOW ORANGE ORCHARDS AND VINEYRDS.
General: SITE ONLY KNOWN FROM 1956 COLLECTION BY HOWELL AND BARNEBY.
Owner/Manager: UNKNOWN

Occurrence No. 22 Map Index:14941
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: HARRISON, S. 1981 (OBS)
Quad Summary: CLOVIS (3611976/378C)
County Summary: FRESNO
SNA Summary:
Location: 5 MILES NORTHEAST OF CLOVIS.

Dates Last Seen
Element: 1937-05-27
Site: 1987-06-01

Lat/Long: 36°51'11" / 119°38'30"
UTM: Zone-11 N4081626 E264473
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 12S
Range: 21E
Section: 26 Qtr SE
Meridian: M
Elevation: 405 ft

Comments
Distribution: MAPPED IN THE VICINITY OF TOLLHOUSE ROAD AND NEES AVENUE.
Ecological:
Threat: RUMEX AND SWAMP TIMOTHY IN POOL.
General: SITE KNOWN FROM 1937 COLLECTION BY HOOVER (#2317, DS, RM). AREA SEARCHED IN 1981, 1987 BUT NO PLANTS SEEN. POPULATION PROBABLY EXTIRPATED PER STEBBINS, 1987 (BIOSYSTEMS ANALYSIS, 1988).
Owner/Manager: PVT

Appendix 5.15-3

APPENDIX XXX

U. S. Fish and Wildlife Service Data Base Search

for

Federally Endangered and Threatened Species

(Malaga 7.5 Minute Quadrangle Map)

Federal Endangered and Threatened Species that may be Affected by Projects in the MALAGA 7 1/2 Minute Quad

Database Last Updated: September 24, 2003

Today's Date is: October 13, 2003

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Reptiles

Gambelia (=Crotaphytus) sila - blunt-nosed leopard lizard (E)

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Mammals

Dipodomys nitratoides exilis - Fresno kangaroo rat (E)

Vulpes macrotis mutica - San Joaquin kit fox (E)

Proposed Species

Amphibians

Ambystoma californiense - California tiger salamander (PT)

Species of Concern

Invertebrates

Branchinecta mesovallensis - Midvalley fairy shrimp (SC)

Linderiella occidentalis - California linderiella fairy shrimp (SC)

Lytta molesta - molestan blister beetle (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)

Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)

Clemmys marmorata pallida - southwestern pond turtle (SC)

Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)

Athene cunicularia hypugaea - western burrowing owl (SC)

Branta canadensis leucopareia - Aleutian Canada goose (D)

Buteo regalis - ferruginous hawk (SC)

Buteo Swainsoni - Swainson's hawk (CA)

Calypte costae - Costa's hummingbird (SC)

Carduelis lawrencei - Lawrence's goldfinch (SC)

Chaetura vauxi - Vaux's swift (SC)

Charadrius montanus - mountain plover (SC)

Elanus leucurus - white-tailed (=black shouldered) kite (SC)

Empidonax traillii brewsteri - little willow flycatcher (CA)

Falco peregrinus anatum - American peregrine falcon (D)

Grus canadensis tabida - greater sandhill crane (CA)

Lanius ludovicianus - loggerhead shrike (SC)

Melanerpes lewis - Lewis' woodpecker (SC)

Numenius americanus - long-billed curlew (SC)

Picoides nuttallii - Nuttall's woodpecker (SLC)

Plegadis chihi - white-faced ibis (SC)

Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)

Eumops perotis californicus - greater western mastiff-bat (SC)

Myotis ciliolabrum - small-footed myotis bat (SC)

Myotis evotis - long-eared myotis bat (SC)

Myotis thysanodes - fringed myotis bat (SC)

Myotis volans - long-legged myotis bat (SC)

Myotis yumanensis - Yuma myotis bat (SC)

Perognathus inornatus - San Joaquin pocket mouse (SC)

Species with Critical Habitat Proposed or Designated in this Quad
None

Key:

(E) Endangered - Listed (in the Federal Register) as being in danger of extinction.

(T) Threatened - Listed as likely to become endangered within the foreseeable future.

(P) Proposed - Officially proposed (in the Federal Register) for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Marine Fisheries Service. Consult with them directly a these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.

(C) Candidate - Candidate to become a proposed species.

(CA) Listed by the State of California but not by the Fish & Wildlife Service.

(D) Delisted - Species will be monitored for 5 years.

(SC) Species of Concern/(SLC) Species of Local Concern - Other species of concern to the Sacramento Fis Wildlife Office.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our include all of the sensitive species that have been found in a certain area *and also ones that may be affectec projects in the area.* For example, a fish may be on the list for a quad if it lives somewhere downstream from quad. Birds are included even if they only migrate through an area. In other words, we include all of the speci we want people to consider when they do something that affects the environment.

This is *not* an official list for formal consultation under the Endangered Species Act. *However, it may be usec update official lists.*

If you have a project that may affect endangered species, please contact the Endangered Species Division, Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service.

Appendix 5.15-4

Table 1
Special-Status Plant Species in the Project Area
KRCDPP

Species	Status			Habitat Description	Bloom Period	Elevational Range	Affected by KRCDPP
	Federal	State	CNPS				
Greene's tuctoria (=Orcutt grass) *Tuctoria greenei*	FE	Rare	1B	Vernal pools.	May-September	30-1,070 m	No
San Joaquin adobe sunburst *Pseudobahia peirsonii*	FT	SE	1B	Cismontane woodland, valley and foothill grassland/adobe clay.	March-April	90-800 m	No
San Joaquin Valley Ocutt grass *Orcuttia inaequalis*	FT	SE	1B	Vernal pools.	April-September	30-755m	No
Sanford's arrowhead *Sagittaria sanfordii*	--	--	1B	Marshes and swamps (assorted shallow freshwater).	May-October	<610 m	No
Spiny-sepaled coyote-thistle (=button-celery) *Eryngium spinosepalum*	FSC	--	1B	Valley and foothill grassland, vernal pools.	April-May	100-255 m	No
Succulent owl's-clover *Castilleja campestris* ssp. *succulenta*	FT	SE	1B	Vernal pools (often acidic).	April-May	50-750 m	No

Source: CNDDB 2003 and CNPS 2003 (Burris Park, Laton, Riverdale, Burrel, Fiver Points, Helm, Lemoore, Vanguard, and Stratford Quads), and USFWS 2003 (Fresno and Kings County searches).

Federal status:

FE	Listed as endangered under the Federal Endangered Species Act
FT	Listed as threatened under the Federal Endangered Species Act
PE	Proposed for listing as endangered under the Federal Endangered Species Act
PT	Proposed for listing as threatened under the Federal Endangered Species Act
FC	Candidate species for listing under the Federal Endangered Species Act
FSC	Species of concern as identified by the U.S. Fish and Wildlife Service

State Status:

SE	Listed as endangered under the California Endangered Species Act
ST	Listed as threatened under the California Endangered Species Act
CSC	Species of concern as identified by the California Department of Fish and Game
Rare	Species identified as rare by the California Department of Fish and Game

California Native Plant Society Status (CNPS 2003):

1A	Plant species that are presumed extinct in California
1B	Plant species that are rare, threatened, or endangered in California and elsewhere.
2	Plant species that are rare, threatened, or endangered in California, but are more common elsewhere
3	Plant species that lack the necessary information to assign them to a listing status
4	Plant species that have a limited distribution or that are infrequent throughout a broader area in California

Table 2
Special-Status Wildlife Species in the Project Area
KRCDPP

Species	Status		Habitat Association	Affected by KRCDPP
	Federal	State		
Invertebrates				
California linderiella *Linderiella occidentalis*	FE	--	Seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions. Water in pools has very low alkalinity, conductivity and total dissolved solids.	No
Molestan blister beetle *Lytta molesta*	FSC	--	Inhabits the Central Valley of California from Contra Costa to Kern and Tulare counties. Flowers and foliage of various plants in grasslands.	No
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	--	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*). Prefers to lay eggs in elderberry stems 2 to 8 inches in diameter; some preference shown for "stressed" elderberries.	No
Vernal pool fairy shrimp *Branchinecta lynchi*	FT	--	Endemic to the grasslands of the Central Valley, Central Coast Mountains, and South Coast Mountains of California, in static rain-filled pools. Inhabits small, clear-water sandstone-depression pools and grassed swales, earth slumps or basalt-flow depression pools.	No
Mammals				
Fresno kangaroo rat *Dipodomys nitratoides exilis*	FE	SE	An inhabitant of alkali-sink open grassland environments in western Fresno County. Bare alkaline clay-based soils subject to seasonal inundation with more friable soil mounds around shrubs and grasses.	No
San Joaquin kit fox *Vulpes macrotis mutica*	FE	ST	Open, level areas with loose-textured soils are preferred. Inhabits a variety of communities including sagebrush scrub, alkali meadows, creosote bush scrub and valley grasslands.	No
San Joaquin pocket mouse *Perognathus inornatus inornatus*	FSC	--	Inhabits grasslands and blue oak savannas. Requires friable soils.	No

Birds				
Swainson's hawk *Buteo swainsoni* (nesting)	--	ST	Breeds in stands of sparse juniper-sage flats, riparian areas and in oak savannahs. Requires adjacent suitable foraging habit such as grasslands, alfalfa or grain fields supporting rodent populations.	No
Tricolored blackbird *Agelaius tricolor*	FSC	CSC	Inhabits dense cattail marshes, marshy meadows and rangeland. A highly colonial species, it is most numerous in the Central Valley and the vicinity of California.	No
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FSC	CSC	An inhabitant of riparian forests in broad, lower flood-bottoms of larger river systems. Possibly extirpated from the area.	No
Amphibians				
Western spadefoot toad *Spea* (=*Scaphoipus*) *hammondii*	FSC	CSC	Occurs primarily in grassland environments, but can also be found in valley-foothill hardwood woodlands. Shallow, temporary ponds are used for breeding and egg-laying.	No
California tiger salamander *Ambystoma californiense*	FSC	CSC	Annual grasslands and grassy understory of valley-foothill hardwood habitats in central and northern California. Requires underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	No

Source: CNDDB 2003 and CNPS 2003 (Burris Park, Laton, Riverdale, Burrel, Five Points, Helm, Lemoore, Vanguard and Stratford Quads), and USFWS 2003 (Fresno and Kings County searches).

Federal status:

FE	Listed as endangered under the Federal Endangered Species Act
FT	Listed as threatened under the Federal Endangered Species Act
FPT	Proposed for listing as threatened under the Federal Endangered Species Act
FC	Candidate species for listing under the Federal Endangered Species Act
FSC	Species of concern as identified by the U.S. Fish and Wildlife Service
FD	Delisted in accordance with the Federal Endangered Species Act
MNBMC	Migaratory Nongame Birds of Management Concern

State Status:

SE	Listed as endangered under the California Endangered Species Act
ST	Listed as threatened under the California Endangered Species Act
CSC	Species of concern as identified by the California Department of Fish and Game
CFP	Listed as fully protected by the California Fish and Game Code
Rare	Species identified as rare by the California Department of Fish and Game

SENSITIVE PLANT COMMUNITIES:
Valley Sink Scrub

Appendix 5.15-5

JEFFREY A. HALSTEAD
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EDUCATION

California State University Fresno (CSUF), Fresno, CA, 1981-83, **M. A. (Biology)**; 1979-81, **B. A. (Zoology)**.
Fresno City Community College, Fresno, CA, 1977-79, **A. A. (General Education)**.

EXPERIENCE

Chief-Environmental Division. Supervisor, Wildlife, Fisheries, Water Quality Biologist. May 1984 to Present. **Kings River Conservation District**, Fresno, CA.

Consultant/Owner. **HALSTEAD & ASSOCIATES, Endangered Species/ Environmental Consultants**. 1991 to present. Clovis, CA.

Consultant/Partner. **VELBOLOGY-Environmental Consultants**. Endangered and threatened species surveys and studies of wildlife and insects. 1988-1991. Fresno, CA.

Entomological Consultant. 1985 to 1987. **Consultants in Wildlife and Environmental Services Agency (CWESA)**, Fresno, CA.

Entomological Consultant. 1985 (Summer). **Pacific Agricultural Services, Inc.**, Fresno, CA.

Agricultural Inspector/Entomologist. February to May 1984. Biological Control Services Program, **California Department of Food and Agriculture**, Sacramento, CA.

Entomology Museum Curator. April 1983 to February 1984. **California State University Fresno (CSUF)**, Fresno, CA.

Teaching Assistant. 1981-1983 (3 semesters). **CSUF**.

Insect Collection Manager. February to May 1983. Plant Science Department, **CSUF**.

Agricultural Inspector/Entomologist. May to November, 1980 to 83. **California Department of Food and Agriculture**, Fresno, CA.

Biology-Zoology Tutor and Payroll Manager. March to May 1980. **Fresno City Community College**, Fresno, CA.

PROFESSIONAL ORGANIZATIONS

Entomological Society of America (ESA). Pacific Branch of the ESA. Entomological Society of Washington. The Brooklyn Entomological Society. American Entomological Society. American Society of Hymenopterists. R.M. Bohart Museum Society (UC Davis). Kansas Entomological Society. San Joaquin Valley Chapter of the Wildlife Society.

INSTITUTIONAL ORGANIZATIONS

The American Ornithologist Union. Cooper Ornithological Society. Wilson Ornithological Society. Raptor Research Foundation. Association of Field Ornithologists. The Wildlife Society. American Society of Mammalogists. Ecological Society. American Fisheries Society. Cal-Trout.

OTHER GROUPS

Wildlife Representative of Bakersfield District Advisory Council, U. S. Bureau of Land Management(1992-1996). President of Quail Unlimited, Fresno Chapter (1991, 1996). Habitat Chairman, as above (1991-1993, 1996-1998). Wildlife Habitat Improvement Program (WHIP) Coordinator, Quail Unlimited, Northern California State Committee

(1991-1993). Fresno County Sportsmen's Club (1992-present, various positions, President 1996). Member of Outdoor Sportsmen's Coalition of California.

TRAINING COURSES

X Sampling Techniques/Statistics Workshop - American Fisheries Society (1989)
X Endangered Wildlife Technical Workshop - The Wildlife Soc. (1990)
X An Introduction to CEQA - U.C. Davis (1991)
X Resolving Endangered Species Conflicts - U.C. Davis (1991)
X Dispute Resolution: Negotiating Land Use Conflicts - U.C. Davis (1992)
X EIR / EIS Preparation, Management, and Review - U.C. Davis (1992)
X CEQA: An Advanced Seminar - U.C. Davis (1992)
X EIR/EIS Processing - U.C. Davis (1993)
X EIR Project Management - U.C. Davis (1993)
X Instream Flow Incremental Methodology - American Fisheries Soc. (1994)
X Wetland Impacts and Mitigation - U.C. Davis (1994)
X Natural Resources Negotiation and Decision Making - Sacramento (1995)
X Wildlife and Fisheries Society Conferences (1995)
X Ecology, Conservation, and Management of Vernal Pool Ecosystems (1996)
X Land-Use Planning in Oak Woodlands - U.C. Davis Extension (1996)
X Wetland Mitigation Banking - CDFG (1996)
X Vernal Pool Conference - USFWS etc. (1996)
X Sensitive Frog Sampling - Coarsegold RCD (1997)
X Farming for Wildlife - TWS (1998)
X Fish Passage and Bypass Facilities (1999)
X Wetland Delineation and Permitting - USACOE (2000)
X Fairy Shrimp Identification and Ecology - Denton Belk (2000)
X Sensitive Amphibian Identification, Surveys, and Ecology - TWS (2001)
X Section 7 Consultation Process for the Endangered Species Act - TWS (2002)
X Working at a Watershed Level - Tetra Tech (2002)

ENDANGERED SPECIES PERMITS

Tipton Kangaroo Rat, Fresno Kangaroo Rat, Valley Elderberry Longhorn Beetle, Vernal Pool Fairy and Tadpole Shrimps, Willow Flycatcher, Bird Banding Permit, Collecting/Salvage Permit.

PUBLICATIONS

Entomology:

Halstead, J.A. 2000. A new species of Hockeria Walker from Mexico (Hymenoptera: Chalcididae). Pan-Pacific Entomol. 76:52-54.

Halstead, J.A. & J.A. Oldham. 2000. New distributional records for the elderberry longhorn beetle Desmocerus californicus Horn (Coleoptera: Cerambycidae). Pan-Pacific Entomol. 76:74-76.

Halstead, J.A. and Z. Boucek. 1993. Family Chalcididae. In Genera of Nearctic Chalcidoidea (Insecta: Hymenoptera). Agriculture Canada, Biosystematic Research Center, Ottawa.

Halstead, J.A. & R.D. Haines. 1991. New distributional records for some candidate species of Lytta in California (Coleoptera: Meloidae). Pan-Pacific Entomol. 68:68-69.

Halstead, J.A. 1991. Thaumatelia Kirby: A generic synonym of Brachymeria Westwood (Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 93:951-952.

Halstead, J.A. 1991. New species of Notaspidium Dalla Torre from the Nearctic and Neotropical Regions (Hymenoptera: Chalcididae). Pan-Pacific Entomol. 67:229-242.

Halstead, J.A. 1991. New species of Aspirhina Kirby from the Neotropical Region (Hymenoptera: Chalcididae). Pan-Pacific Entomol. 67:65-71.

Halstead, J.A. 1990. Revision of Hockeria Walker in the Nearctic Region with descriptions of males and five new species (Hymenoptera: Chalcididae). Proc. Ent. Soc. Wash. 92: 619-640.

Halstead, J.A. 1990. Revision of the genus Haltichella Spinola in the Nearctic region (Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 92:153-159.

Halstead, J.A. 1990. Redescription of males, bioligical notes, and identification of American Acanthochalcis (Hymenoptera: Chalcididae). Ent. News 101:75-80.

Halstead, J.A. 1989. Hymenoptera associated with a California population of the Russian Thistle biological control agent Coleophora Klimeschiella (Lepidoptera: Coleophoridae). Proc. Entomol. Soc. Wash. 91:635-636.

Halstead, J.A. 1990. New hosts for Cephalonomia utahensis Brues in California (Hymenoptera: Bethylidae). Pan-Pac. Entomol. 66:170-171.

Halstead, J.A. 1989. On the biology and rarity of the owlfly Ululodes arizonicus in California (Neuroptera: Ascalaphidae). Pan-Pacific Entomol. 65:418-419.

Halstead, J.A. 1988. The first records of Platychalcis in North America and new host records for Ceratosmicra spp. and Brachymeria ovata (Hymenoptera: Chalcididae). Ent. News. 99:193-198.

Halstead, J.A. 1988. A gynandromorph of Hockeria rubra (Ashmead) (Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 90:258-259.

Halstead, J.A. 1988. Belaspidia longicauda, new species, the first Nearctic Belaspidia(Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 88:87-90.

Halstead, J.A. and R.D. Haines. 1987. New distribution records for some Nearctic dryinid wasps, with a species list from a flume in Tulare County California (Hymenoptera: Dryinidae). Pan-Pac. Entomol. 63:389-393.

Halstead, J.A. and R.D. Haines. 1987. Flume collecting: A rediscoverd insect collecting method, with notes on insect extracting techniques. Pan-Pac. Entomol. 63:383-389.

Halstead, J.A. 1987. Brachymeria discretoidea, a new junior synonym of Brachymeria discreta (Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 89:131.

Halstead, J.A. and C.G. Niwa. 1987. Rhyacionia zozana (Lepidoptera: Tortricidae), Host of Hockeria tenuicornis (Hymenoptera: Chalcididae) in Oregon. Pan-Pac. Entomol. 63:276-277.

Halstead, J.A. 1987. On the rearing and association of Microchridium minutum and its probable host Ammoplanellus umatilla (Hymenoptera: Chrysididae, Sphecidae). Pan-Pac. Entomol. 63:256-257.

Halstead, J.A. 1987. Acanthochalcis nigricans Cameron--New distribution information, including Central America. Pan-Pacific Entomol. 63:236.

Halstead, J.A. 1987. A new host for Brachymeria ovata (Hymenoptera: Chalcididae): Harrisina brillians (Lepidoptera: Zygaenidae). Ent. News 98:51-52.

Halstead, J.A. 1986. Ceratosmicra campoplegicus Burks, Male description and new distribution records (Hymenoptera: Chalcididae). Pan-Pac. Entomol. 62:323-325.

Halstead, J.A. 1986. New distribution records for some Nearctic chalcidid wasps (Hymenoptera: Chalcididae). Proc. Entomol. Soc. Wash. 88:786.

Halstead, J.A. 1986. On the distribution of Ceratosmicra meteori and C. paya (Hymenoptera: Chalcididae) in North America. Ent. News 97:99-100.

Halstead, J.A. 1986. Distribution and seasonality of Megischus spp. (Hymenoptera: Stephanidae) in California. Ent.

News 97:101-103.

Halstead, J.A. and R.D. Haines. 1985. On the biology of Acanthochalcis nigricans Cameron and Acanthochalcis unispinosa Girault (Hymenoptera: Chalcididae). Pan-Pac. Entomol. 61:227-228.

Halstead, J.A. 1984. Checklist of some wasps and bees collected from the Southern California Edison Powerhouse No. 3 flume located 1 mile south of Ash Mountain Park Headquarters, Sequoia National Park (Arthropoda: Insecta: Hymenoptera). 15 pp. For Sequoia National Park biologists, Report-not published.

Wildlife:

Halstead, J.A. Kings River Conservation District. Various reports in wildlife, fisheries, and water quality.

Halstead, J.A. Various Halstead and Associates, Environmental/Biological Consultants. Various reports in endangered species, wetlands, and wildlife.

Boland, S.P., J.A. Halstead, and B.E. Valentine. 1989. Willow Flycathcer nestling parasitized by larval fly, Protocalliphora cuprina. Wilson Bull. 101:127.

Halstead, J.A. 1988. American Dipper nestlings parasitized by blowfly larvae (Protocalliphora aenea and P. braueri) and the northern fowl mite (Ornithonyssus sylviarum). Wilson Bull. 100:507-508.

Single, J.R., J.A. Oldham, and J.A. Halstead. 1989. Comparison of spotlight and track counts of Mule Deer in the Sierra Nevada Foothills. Tran. Western Section Wildl. Soc. 25:85-88.

Single, J.R., J.A. Halstead, and J.A. Oldham. 1987. Relative efficiency and bias of three methods of censusing carnivores. Proc. Cent. Calif. Res. Symp. 8:45-abstract.

Hosler, T.E., J.R. Single, and J.A. Halstead. 1987. Patterns of microsympatry and microallopatry in four specis of deermice (Peromyscus) in the central Sierra Foothills. Proc. Cent. Calif. Res. Symp. 8:23-abstract.