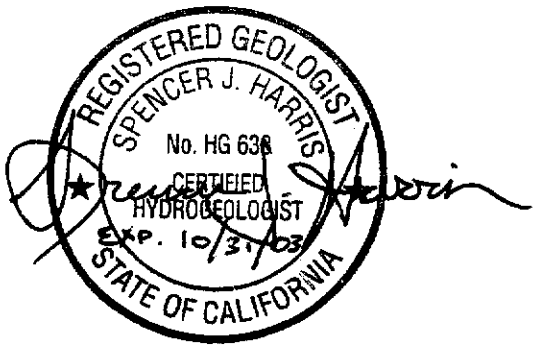
LOS OSOS
NITRATE MONITORING PROGRAM

JUNE-JULY 2002 GROUND WATER MONITORING

Prepared for the

LOS OSOS COMMUNITY SERVICES DISTRICT



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INTRODUCTION

Cleath & Associates has completed the June-July 2002 monitoring event for the Los Osos Nitrate Monitoring Program. The purpose of monitoring is to assess upper aquifer salt loading, to identify trends in ground water flow and quality over time, and to assist the Los Osos Community Services District (LOCSD) in complying with future waste discharge requirements associated with the proposed wastewater project.

Prior to ground water sampling, older monitoring wells that had been part of a former monitoring program were replaced with new well constructions. This report presents the monitoring event results and also includes documentation of monitoring well replacement activities.

BACKGROUND

Water quality monitoring in Los Osos has historically been performed by water purveyors, by permitted waste dischargers, and by various consultants and public agencies. In the early 1980's, Brown & Caldwell Consulting Engineers reviewed historical water quality data for the Los Osos Valley ground water basin and determined that the existing data was inadequate for effective identification and documentation of water quality problems. A comprehensive ground water, surface water, and wastewater field sampling program was implemented, with the collection and analysis of 40 groundwater samples, two surface water samples, and six wastewater samples. Results of the basin-wide sampling event were interpreted and published in April 1983 (B&C, Phase I Water Quality Management Study).

Following the Brown & Caldwell study, the San Luis Obispo County Engineering Department began to monitor water quality at 18 ground water wells and four surface water locations. Sampling intervals were typically quarterly or semi-annual, although no samples were collected in1985 or 1986. Eleven of the 18 sampling locations were monitored by the County through the fourth quarter of 1998. Water quality analyses included general mineral and general physical parameters, including nitrate. The June-July 2002 monitoring event is the first basin-wide monitoring event conducted since 1998. A total of 25 wells were sampled in late June and early July 2002.

WELL REPLACEMENTS

Cleath & Associates supervised the construction of 12 monitoring wells and the destruction of two wells. Eleven of the twelve new wells were constructed at former monitoring well locations after removing the original well casings and annular fill materials. The twelfth well was constructed approximately 160 feet west of a former monitoring well location due to conflict with fiber optic lines (the older well was destroyed). Drilling services were provided by S/G Drilling Company (Lompoc). The work was conducted between May 16 and May 28, 2002. All new wells were completed with 2-inch diameter PVC and replaced older 1.5-inch diameter PVC wells. Construction of the new wells complies with State and

local regulations. A summary of the wells replaced and destroyed is shown below in Table 1, including differences in perforated intervals between the old and new wells. Details of each well construction are included in Appendix A.

Table 1
Well Replacements and Destructions
May 2002

Original Well ID* (constructed in 1982)	Location	Original (1982) well perforated interval (depths in feet)	New (2002) well perforated interval (depths in feet)
30S/10E-13L5	Howard/Del Norte	32-35	26-36
30S/10E-13Q1	Woodland	97-100	95-105
30S/11E-7K2	Santa Ysabel/12th	62-65	destroyed
30S/1E-7K (new)	12th/Santa Ysabel	(new well)	55-65
30S/11E-7L3	Santa Ysabel/5th	42-45	40-50
30S/11E-7R1	El Moro/12th	27-30	25-35
30S/11E-8N2	El Moro/So. Bay Blvd.	42-45	40-50
30S/11E-8N3	El Moro/So. Bay Blvd.	87-90	destroyed
30S/11E-18B1	Ramona/10th	29-32	25-35
30S/11E-18C1	Pismo/5th	27-30	25-35
30S/11E-18J6	Los Olivos/Fairchild	22-25	25-35
30S/11E-18L3	Palisades	52-55	43-53
30S/11E-18L4	Ferrell	22-25	25-35
30S/11E-18N1	Manzanita/Ravenna	87-90	85-95

*NOTE: SLO County and the DWR are in the process of assigning new Well ID's for the replacement wells. These new ID's will be incorporated into future monitoring reports.

WATER LEVELS

Depth to ground water was measured in 19 wells across the basin during the June-July 2002 monitoring event. The depths to water are summarized in Table 2. Well locations and ground water elevation contours are presented in Figure 1. Reference points at the wellheads with depth to water measurements were surveyed by John L. Wallace & Associates. (Appendix B).

Table 2
June-July 2002 Ground Water Elevations

Well ID	Location	Type	Depth (ft)	Perforated interval (ft)	Well diam. (in)	R.P. Elev. (ft)	Water Depth (ft)	Water Elevation (ft)
30S/10E								
13A7	Pine St.	Private	40	30-40	8	14.15	5.14	9.1
13F1	Solano/ Skyline	CCW	195	90-195	14		na	na
13G	South Court	CSD mon	52	47-52	2	50.95	39.17	11.8
13H	Broderson/Skyline	CSD mon	34	29-34	2	49.33	28.84	24.5
13L5r	Howard/ Del Norte	CSD mon	37	26-36	2	32.63	21.78	10.9
13Q1r	Woodland Dr.	CSD mon	105	95-105	2	101.27	82.48	18.8
24A	Highland/ Alexander	CSD mon	164	154-164	2	193.04	149.20	43.8
30S/11E								
7Kr	12th/ Santa Ysabel	CSD mon	70	55-65	2	90.71	51.00	39.7
7L3r	Santa Ysabel/ 5th	CSD mon	50	40-50	2	45.76	36.50	9.3
7N1	3rd St.	CSD prod	83	61-71, 73-83	8		na	na
7Q1	El Moro/ 8th St.	CSD mon	75	29-43, 54-75	8	25.29	6.52	18.8
7R1r	El Moro/ 12th St.	CSD mon	35	25-35	2	61.93	21.31	40.6
8N2r	South Bay Blvd.	CSD mon	50	40-50	2	95.99	34.77	61.2
17D	Pismo / 18th	Private	120	na	10		na	na
17F4	Hollister Ln.	Private	72	48-72	8		na	na
17N4	Willow Dr.	Private	60	40-60	6	162.61	30.07	132.5
18B1r	Ramona Ave./10th St.	CSD mon	35	25-35	2	79.89	17.98	61.9
18C1r	Pismo Ave./ 5th St.	CSD mon	35	25-35	2	34.55	15.54	19.0
18E1	Ramona/private road	Private	60	40-60	6	39.61	25.42	14.2
18H3	Nipomo Ave.	Private	110	50-100	6		na	na
18J6r	Los Olivos/ Fairchild	CSD mon	35	25-35	2	125.74	23.57	102.2
18K3	Los Olivos/11th St.	CCW prod	232	148-202/222-232	8		na	na
18L3r	Palisades Ave.	CSD mon	55	43-53	2	88.02	37.78	50.2
18L4r	Ferrell Ave.	CSD mon	35	25-35	2	103.85	19.40	84.5
18N1r	Manzanita/ Ravenna	CSD mon	95	85-95	2	125.53	67.57	58.0
18R1	Los Osos Valley Rd.	Private	50	40-50	8		na	na
20B	Eto Lane	Private	na	"Shallow"	4		na	na

Notes: Well ID's ending with "r" are replacement wells that will receive new names from County.
Elevations in feet above mean sea level
R.P. = reference point
CCW = California Cities Water
CSD = Los Osos CSD
na = not available for this event

Estimated ground water flow directions and hydraulic gradients in the shallow aquifer are shown in Figure 1. Ground water beneath the West side basin compartment is inferred to flow to the northwest at an estimated average hydraulic gradient of up to 0.017 vertical feet of head loss per horizontal foot of distance (ft/ft) beneath Redfield Woods; 0.009 ft/ft beneath Cuesta-by-the-Sea, and as low as 0.005 ft/ft beneath Sunset Terrace.

On the East side, ground water is inferred to flow to the northwest from downtown Los Osos, shifting to a westerly flow direction across most of Baywood Park (flows are generally towards downtown Baywood). The hydraulic gradients on the East side range from a low of 0.009 ft/ft in downtown Baywood to a high of 0.030 ft/ft between Ramona and Pismo Avenues. The average hydraulic gradient beneath downtown Los Osos is 0.013 vertical feet of head loss per horizontal foot of distance. Ground water elevations on the east side of the inferred Los Osos fault splay are up to 35 feet higher than adjacent elevations to the west.

The June-July 2002 shallow ground water flow directions and hydraulic gradients are similar to those presented in ground water contour maps for 1990 and 1997 (CFS Geotechnical Consultants, Appendix C). The 1990 and 1997 maps include Cone Penetrometer Testing and hand-auger water levels, which add some detail but do not significantly change the overall flow regime. The main difference between the current and historical ground water contour maps is that water levels east of South Bay Boulevard are not shown on the 2002 contour map. It is assumed that if additional water levels had been obtained, they would have show an easterly flow direction toward Los Osos Creek, as inferred in the CFS Geotechnical contour maps for 1990 and 1997.

GROUND WATER QUALITY

A total of 25 ground water samples were collected from wells across the basin. These wells represent the upper aquifer and first water zones. First water is the interface where percolating waters, including precipitation and return flows from irrigation and wastewater, mix with basin waters. The upper aquifer includes all (non-perched) water bearing zones between first water and the regional AT2 Clay aquitard. Most of the wells currently in the nitrate monitoring program tap first water, although additional upper aquifer monitoring locations would be added as harvest wells during construction of the proposed wastewater project.

Not all of the wells identified in the Nitrate Monitoring Program Design (Cleath & Associates, February 2002) were available for sampling during the current sampling event. Some of the areas to be included in future sampling events are south of Sunset Terrace, Ramona Avenue near 15th Street, east of Los Osos Creek, and harvest well locations. In addition to the sampled wells, water quality information from Los Osos CSD and California Cities Water system wells is included herein.

Sampling Procedures

Water sampling procedures for general mineral and nitrogen sampling are presented below. Ground water monitoring field logs are in Appendix D. The purpose of the sampling procedures are to ensure that communication is established with the aquifer prior to sample collection. Cleath & Associates was assisted by District staff for non-equipped monitoring well sampling activities.

Non-equipped monitoring wells:

1) Calibrate field monitoring instruments each day prior to sampling.
2) Inspect wellhead condition and note any maintenance required (perform at earliest convenience).
3) Measure depth to static water (record to 0.01 inches) from surveyed reference point.
4) Install temporary pump to at least three feet below the water surface (deeper setting may be needed if water level draw down is too great).
5) Begin well purge, record flow rate.
6) Measure discharge water EC (measured to 10 µmhos/cm), pH (measured to 0.01 units), and temperature (measured to 0.1 degrees C) at regular intervals during well purging. Record time and gallons purged. Note discharge water color, odor, and turbidity (visual).
7) A minimum of three casing volumes of water should be removed during purging, or one borehole volume for small diameter monitoring wells. In addition, a set of at least three consecutive field monitoring measurements with stable values should be recorded. For EC, stability within 5 percent of the first value in the set is sufficient (typically within 20-30 µmhos/cm). For pH, stability within 1 percent of the first value is sufficient (typically within 0.07 units). For temperature, stability within 1 percent of the first value is sufficient (typically within 0.2 degrees).
8) Collect sample directly from discharge tube, note sample color, odor, turbidity (visual). Use only laboratory-provided containers.
9) Place samples on-ice for transport to the laboratory.
10) Remove temporary pump and rinse with clean water.
11) Close well and secure well box lid.

Equipped wells:

The sampling port for an equipped well must be upstream of any water filtration or chemical feeds. Sample from the discharge line as close to the wellhead as possible. Sampling procedures for equipped wells will vary, based on whether the well is active or inactive. For active wells (i.e. wells used daily), the need for purging three casing volumes is unnecessary. The well should be turned on for a nominal 5 minutes, and one set of EC, pH, and temperature readings collected prior to sampling. For inactive wells, a field monitoring procedure similar to that described above for unequipped wells would be appropriate. Static water level measurements should also be taken before sampling, if a sounder access port is available. Water samples should always be transported on-ice to the laboratory.

Sampling Equipment

The sampling equipment used for non-equipped wells included a Grundfos Redi-Flow portable submersible pump, reel-mounted and transportable from well to well. Purge rates of up to 10 gallons per minute (gpm) are attainable, although the typical purge rate was 1-2 gpm. Water levels were measured using a graduated sounder, and discharge rates and volumes were recorded using a 5-gallon bucket and stopwatch. Field water quality monitoring was performed with an Oakton pH/con Model 10 meter and calibrated with laboratory-grade pH buffers and EC standard.

Water Quality Results

The water samples were analyzed by Zymax Envirotechnology of San Luis Obispo. The analyses included general mineral constituents, including all forms of nitrogen. Table 3 presents a summary of the analytical results of water samples for the June-July 2002 sampling event. Figure 2 presents an isoconcentration map of nitrate as nitrogen (NO_3-N) for first water and upper aquifer wells. Figure 3 presents an isoconcentration map of total dissolved solids (TDS) for first and upper aquifer wells. Laboratory reports are in Appendix E. Chemical hydrographs of NO_3-N and TDS for wells with a historical record are included in Appendix F.

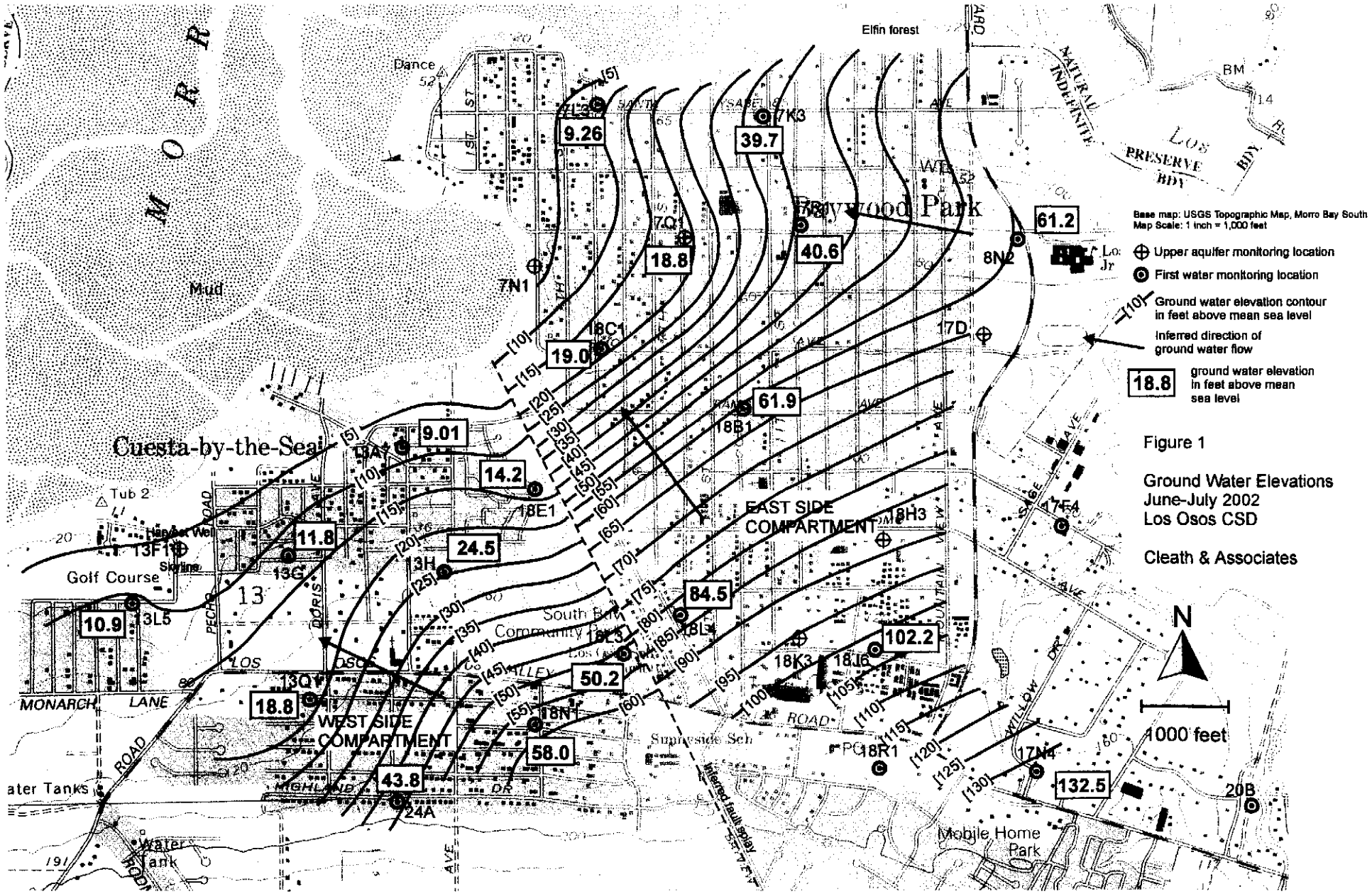
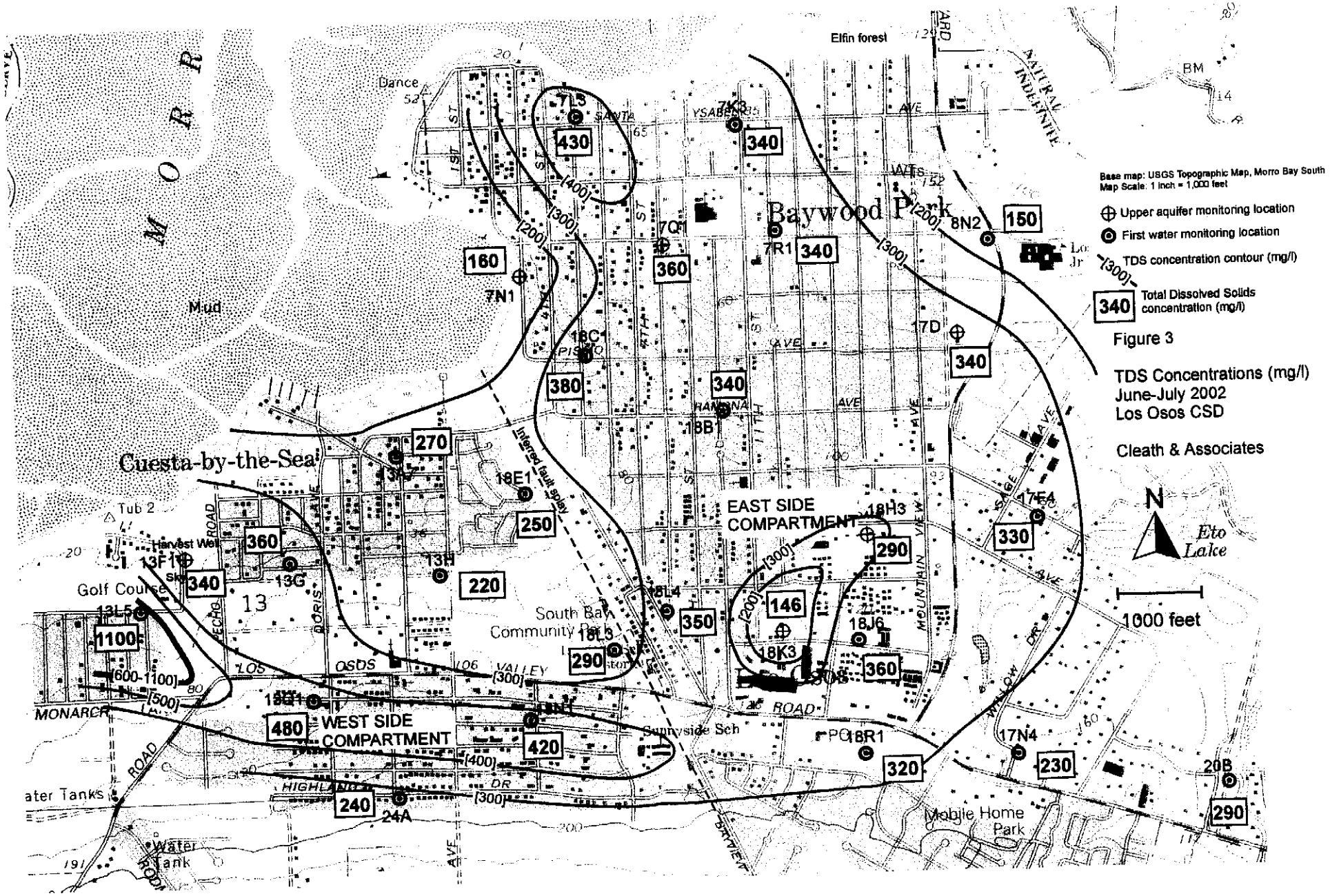


Figure 1

Ground Water Elevations
June-July 2002
Los Osos CSD

Cleath & Associates


Base map: USGS Topographic Map, Morro Bay South
Map Scale: 1 inch = 1,000 feet
Upper aquifer monitoring location
First water monitoring location
TDS concentration contour (mg/l)
Total Dissolved Solids concentration (mg/l)
Figure 3
TDS Concentrations (mg/l)
June-July 2002
Los Osos CSD
Cleath & Associates
N
1000 feet
Eto Lake
Elfin forest
Baywood Park
Cuesta-by-the-Sea
EAST SIDE COMPARTMENT
WEST SIDE COMPARTMENT
Inferred fault splay
South Bay Community Park
Golf Course
Mobile Home Park
Sunnyside Sch
Harvest Well
Tub 2
Dance
Mud
MORRO
MONARCH
LOS OSOS VALLEY ROAD
HIGHLAND DR
Water Tank
Water Tanks
7L3
7K3
7Q1
7R1
8N2
7N1
18C1
18B1
18E1
13A7
13F1
13G
13H
13L5
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18L3
18H3
18J6
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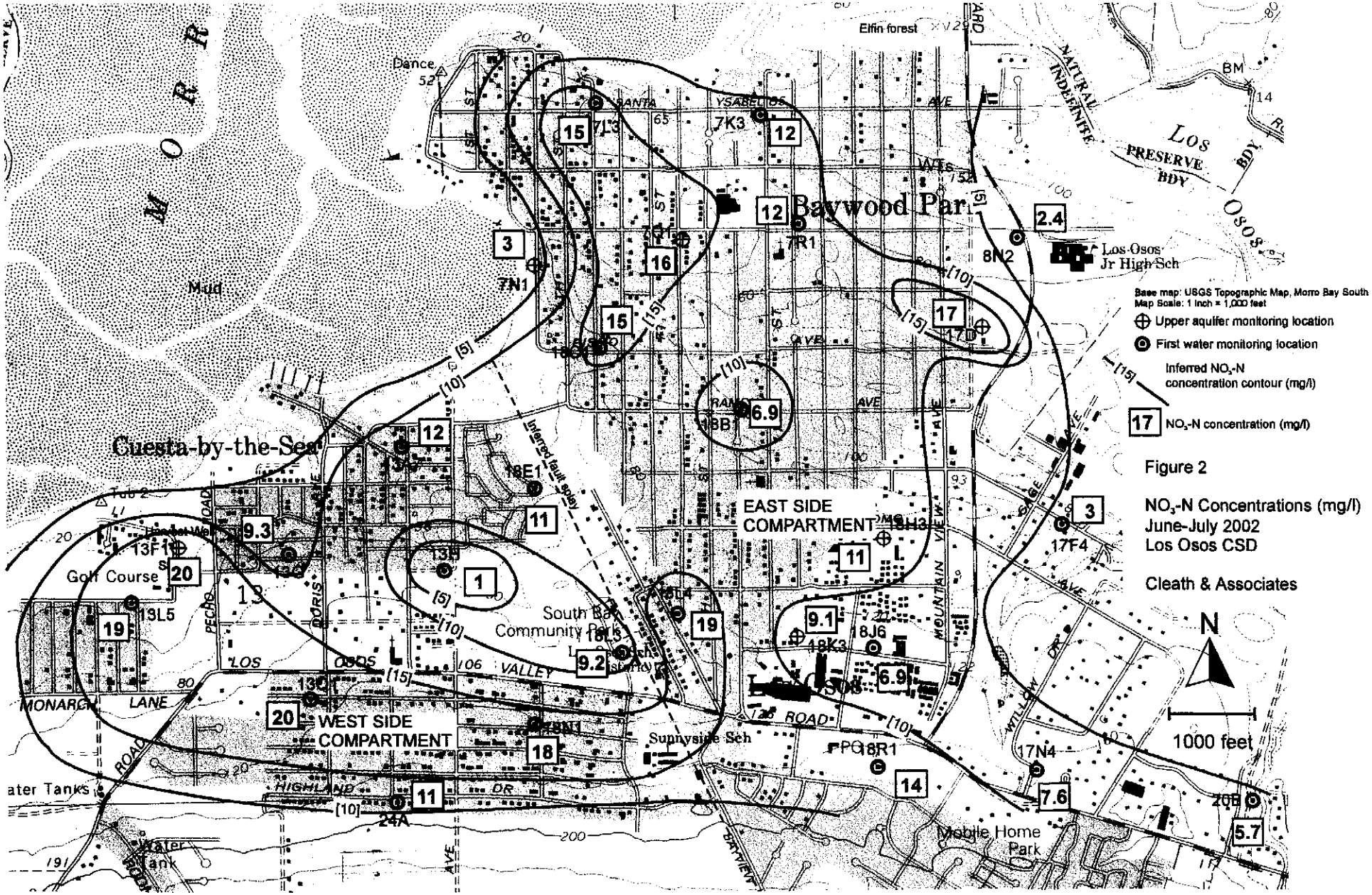


Figure 2

NO_3-N Concentrations (mg/l)
June-July 2002
Los Osos CSD

Cleath & Associates

Table 3
June-July 2002 Water Quality Results

Well ID	Temp ° C	pH-field units	TDS mg/l	EC µmhos/cm	Ca mg/l	Mg mg/l	K mg/l	Na mg/l	HCO3 mg/l	SO4 mg/l	Cl mg/l	NO3-N mg/l	B mg/l	DTW feet	
30S/10E-13A7	18.3	6.68	270	450	15	14	1.2	44	55	16	73	12	0.07	5.14	
30S/10E-13G	18.4	6.4	360	520	17	17	1.1	56	51	14	110	9.3	0.08	39.17	
30S/10E-13H	20.2	6.74	220	160	12	7.2	<1	9.9	49	9.6	20	1	0.05	24.84	Shallow
30S/10E-13L5	19.3	6.24	1100	1400	80	63	2.2	110	140	21	350	19	0.12	21.78	Shallow
30S/10E-13Q1	18.6	6.72	480	580	33	24	2.8	96	95	33	110	20	0.09	82.48	
30S/10E-24A	18.6	6.72	240	270	10	9.8	1.1	58	47	6.2	48	11	<0.05	149.20	
30S/11E-7K3	19.8	6.89	340	480	25	25	1.2	48	100	31	67	12	0.14	51.00	
30S/11E-7L3	19.1	7.06	430	800	24	18	2.4	100	130	45	81	15	0.12	36.50	
30S/11E-7N1	18.1	6.51	160	220	13	9.4	<1	32	60	6.9	37	3	<0.05	–	
30S/11E-7Q1	17.8	6.6	360	560	24	18	3.7	34	95	32	73	16	0.18	6.52	
30S/11E-7R1	18.1	6.42	340	490	34	22	3.1	60	120	28	57	12	0.13	21.31	
30S/11E-8N2	–	–	150	190	14	7.3	2.5	17	120	13	21	2.4	<0.05	34.77	
30S/11E-17D	18.6	6.52	340	520	20	14	1.3	45	57	27	76	17	0.09	–	
30S/11E-17F4	17.9	6.77	330	450	25	25	<1	61	120	21	86	3	0.05	–	
30S/11E-17N4	17.1	6.61	230	360	14	12	<1	46	40	15	61	7.6	0.06	30.07	
30S/11E-18B1	17.1	6.51	340	530	40	19	9	60	150	28	78	6.9	0.14	17.98	
30S/11E-18C1	17.9	6.46	380	550	31	23	2.3	59	99	45	81	15	0.08	15.54	
30S/11E-18E1	18.1	6.55	250	370	17	15	1	48	61	21	54	11	0.06	25.42	
30S/11E-18H3	18.5	6.59	290	420	24	13	1.6	35	65	17	64	11	0.06	–	
30S/11E-18J6	20.6	6.35	360	590	45	23	2	51	53	32	85	6.9	0.07	23.57	
30S/11E-18L3	19.1	6.8	290	450	22	14	3.3	46	59	22	62	9.2	0.11	37.78	
30S/11E-18L4	18	6.33	350	520	28	23	2.1	48	88	34	61	19	0.1	19.40	
30S/11E-18N1	18.9	6.42	420	510	25	20	1.9	94	48	37	100	18	0.18	67.57	
30S/11E-18R1	18	6.45	320	530	19	15	<1	65	48	19	85	14	0.14	–	
30S/11E-20B	18.8	6.75	290	490	24	28	<1	36	96	26	82	5.7	0.06	–	

Sample results in Table 3 and Figure 2 show NO_3-N levels in first water and the upper aquifer to be in excess of the State drinking water standard of 10 milligrams per liter (mg/l) beneath approximately 1,100 acres within the ground water basin (excluding Los Osos Creek valley; no data for this event). The areas of highest NO_3-N concentrations are generally beneath portions of Baywood Park, Redfield Woods, and Sunset Terrace. There is an NO_3-N concentration low inferred to extend across the open space west of the South Bay Community Library. This is an area where considerable surface runoff from up-slope percolates to ground water. The NO_3-N concentrations are inferred to decrease at the bay front, based on data from well 30S/11E-7N1 and ground water monitoring wells near the bay at Sea Pines golf course (not currently part of nitrate monitoring program). NO_3-N concentrations also decrease to the east, across South Bay Boulevard.

The distribution of total dissolved solids (TDS) in shallow ground water shown in Figure 3 indicates the highest concentrations are beneath portions of Baywood Park, Redfield Woods, and Sunset Terrace, roughly corresponding to some of the areas of higher NO_3-N concentration areas. The range of TDS is generally between 200 and 400 mg/l, with a low of 146 mg/l in the upper aquifer beneath downtown Los Osos and a high of 1,100 mg/l in first water beneath Sunset Terrace. The latter concentration exceeds the State maximum contaminant level of 1,000 mg/l (upper TDS limit of secondary standard).

Salt loading beneath Sunset Terrace is being accelerated by sea water intrusion. S&T Mutual, the local water purveyor, has experienced increased chloride and TDS concentrations at its lower aquifer supply wells due to sea water intrusion over the last few years. The higher TDS in delivered water has resulted in higher TDS in septic return flows and in underlying shallow ground water.

Other purveyor wells are also showing signs of sea water intrusion. In Table 4, the level of chlorides in two CCW wells have been close to 300 mg/l in at least one of the last two measurements (290 mg/l chloride at 13L4 in 2001 and 280 mg/l chloride in 13J1 in 2002). Given the hydrogeologic setting of the ground water basin (a coastal aquifer hydraulically connected to the ocean), the elevated chloride values in wells at the west end of the basin are indicators of sea water intrusion.

A comprehensive water quality evaluation of the ground water basin was conducted in 1982 by Brown & Caldwell. The following table compares the results of that 1982 sampling event with the recent 2002 ground water monitoring.

Table 4 presents a summary of the most recent available analytical results for water quality data from water purveyor wells in the basin. The monitoring requirements for general minerals is typically once every three years, so many of the sample dates are in 2000 and 2001.

Table 4
Purveyor Water Quality Results

Well ID	Date sampled	Temp ° C	pH - Field units	TDS mg/l	EC µmhos/cm	Ca mg/l	Mg mg/l	K mg/l	Na mg/l	HCO3 mg/l	SO4 mg/l	Cl mg/l	NO3-N mg/l	Aquifer zone
LOCSD Wells														
30S/11E-7Q3	05/07/02	17.7	7.03	430	730	45	41	na	51	280				lower
	05/21/02										40	67	<0.4	
30S/11E-7N1	05/07/02	17.2	6.74	170	260	14	8.7	na	22	88				upper
	05/21/02										7	31	<0.1	
30S/11E-17E11	05/07/02	20.3	6.8	310	520	33	32	na	32	240				mixed
	05/21/02										16	35	1.6	
30S/11E-18K9	05/07/02	19.5	6.86	320	550	31	32	na	39	250				mixed
	05/21/02										26	37	0.94	
30S/11E-18L2	05/07/02	18.8	6.83	390	680	47	40	na	40	260				lower
	05/21/02										33	61	0.4	
CCW Wells			pH - Lab											
30S/10E-13F1*	08/20/02	19.9	6.9	340	590	33	18	1.7	53	110	26	64	20	upper
30S/10E-24C1	01/25/00	20	7.18	297	595	31.1	20.8	1.6	52.8	97.5	18.4	112	2.7	lower
30S/10E-13J1	08/09/01	19.4	7.4	310	570	47	23	1.5	31	130	14	110	1.4	lower
	05/07/02			650								280		
30S/10E-13L4	08/09/01	18.8	7.2	590	1200	89	55	1.6	51	130	18	290	1.7	lower
	06/13/02			420								170		
30S/11E-18K3	01/18/00		7.1	146	275	12.5	10.6	1	25.9	76.1	6.8	30.3	5.0	upper
	07/31/02												9.1	
30S/11E-17N	02/12/01	16.7	7.1	290	510	41	25	1.3	35	250	21	37	0.79	mixed

*Well 13F1 is inactive

Table 5
Changes in Shallow Water Quality
1982 to 2002

Well ID	NO_3-N			TDS		
	Feb-Jun '82	Jun-Jul '02	Change	Feb-Jun-'82	Jun-Jul '02	Change
30S/10E-13A7	8.76	12	3.24	240.5	270	29.5
30S/10E-13L5	8.02	19	10.98	397	1100	703
30S/10E-13Q1	10.6	20	9.4	396	480	84
30S/11E-7L3	4.27	15	10.73	189	430	241
30S/11E-7Q1	12.27	16	3.73	266	360	94
30S/11E-7R1	19.7	12	-7.7	306	340	34
30S/11E-8N2	2.61	2.4	-0.21	137	150	13
30S/11E-17F4	0.06	3	2.94	336	330	-6
30S/11E-17N4	5.73	7.6	1.87	267	230	-37
30S/11E-18B1	12.9	6.9	-6	310	340	30
30S/11E-18C1	9.53	15	5.47	242	380	138
30S/11E-18E1	3.47	11	7.53	190	250	60
30S/11E-18H3	15.9	11	-4.9	309	290	-19
30S/11E-18J6	0.03	6.9	6.87	374	360	-14
30S/11E-18L3	11.3	9.2	-2.1	215	290	75
30S/11E-18L4	10.5	19	8.5	406	350	-56
30S/11E-18N1	21.8	18	-3.8	456	420	-36
30S/11E-18R1	8.44	14	5.56	195	320	125

Twelve of the 18 first water/upper aquifer wells in Table 5 have greater NO_3-N and TDS concentrations in 2002 compared to 1982, and six have lower concentrations. The greatest increases between 1982 and 2002 are at Well 30S/10E-13L5 (Howard Avenue at Del Norte) and Well 30S/11E-7L3 (Santa Ysabel Avenue at 5th Street). The dramatic increase in TDS (+703 mg/l) at well 13L5 is attributable to the location of the well within the S&T Mutual water company service area. As mentioned above, the domestic supply to homes near well 13L5 has increased in TDS, resulting in higher TDS in septic return flows and in underlying ground water.

Approximately 1,100 acres in the West side and East side basin compartments are underlain by ground water with NO_3-N concentrations in excess of the State drinking water standard. By comparison, approximately 800 acres within these areas of the basin were interpreted by Brown & Caldwell to be underlain by elevated NO_3-N concentrations in 1982.

Water Quality Trends

Trends in water quality have been evaluated by plotting NO_3-N and TDS concentrations over time at wells with an existing data history. Most of the wells used for the 1982-1998 County monitoring

program were replaced by new wells with similar construction, and the replacement well data has been included in the chemical hydrographs (Appendix F). For well to well comparisons, the graph axes scales are generally held constant. A linear regression trend line is plotted on the graphs, with the associated regression coefficient shown as R^2. These trend lines do not necessarily imply a real trend, but are included to assist in data interpretation. Graphs 1 through 24 are LOCSD monitoring program wells, and Graphs 25 through 30 are selected local purveyor wells.

Most of the chemical hydrographs show a relatively large fluctuation in NO_3-N and TDS concentrations over time (300% fluctuation not uncommon). There are a few established trends of increasing concentrations of these constituents, however. A summary of the observed trends are as follows:

Well 30S/10E-13F1. Increasing NO_3-N and TDS over the last 14 years, primarily between 1994 and 1999 (Graphs 25 and 26). NO_3-N concentrations were between 5 mg/l and 8 mg/l through 1994, then rose sharply to 20 mg/l by late 1998 (currently at 20 mg/l). TDS concentrations have risen from less than 150 mg/l to almost 350 mg/l.

Well 30S/10E-13L5. Increasing TDS beginning at close to 200 mg/l in 1993 and rising to 1,100 mg/l in 2002 (Graph 4). As mentioned previously, the increase is attributed to a rise in the overall TDS of the domestic supply, and associated septic return flows, for S&T Mutual customers. The rise in TDS is from sea water intrusion into the lower aquifer. NO_3-N concentrations fluctuate between 5 and 40 mg/l, with no overall trend (currently 19 mg/l).

Well 30S/10E-13Q1. Increasing NO_3-N and TDS over the last 20 years, although the June-July 2002 NO_3-N concentration is significantly below the trend line (Graphs 5 and 6). NO_3-N concentrations had been rising at an average rate of 0.8 mg/l per year from close to 10 mg/l in 1982 to 27 mg/l in 1998, before dropping to 20 mg/l in 2002. TDS concentration have been rising at an average rate of 9 mg/l per year through 2002 (currently 480 mg/l).

Well 30S/10E-24A1. Increasing NO_3-N over the last 30 years at an average rate of 0.28 mg/l per year (Graph 27). The NO_3-N concentration was close to 2 mg/l in 1970 and had exceeded 10 mg/l by the late 1990's (currently 11 mg/l at nearby LOCSD monitoring well 24A). TDS concentrations also appear to be rising slightly over time (currently 240 mg/l at nearby LOCSD monitoring well 24A).

Well 30S/11E-7N1. Slightly increasing NO_3-N over the last 16 years at an average rate of 0.13 mg/l per year (Graph 29). The NO_3-N concentrations were close to 2 mg/l through the mid- to late-1980's, and have recently been closer to 3-4 mg/l. TDS concentrations are stable.

Four out of the five trends noted above are from the West side basin compartment. Overall, it appears that the deeper wells show trends of increasing NO_3-N and/or TDS, while shallow (first water) wells are less likely to show a trend. This is attributable to the greater time and dilution factor a solute must overcome to influence deeper wells.

CONCLUSIONS

Shallow ground water beneath East side and West side basin compartments generally flows to the northwest at hydraulic gradients ranging from 0.006 to 0.030 vertical feet of head loss for each horizontal foot of distance in the flow direction. There is between 15 and 35 feet of vertical drop in water levels, from east to west, inferred across the Los Osos Strand B fault splay. The ground water flow patterns for in June-July 2002 are similar to historical flow patterns.

Water quality measurements at first water/upper aquifer wells for June-July 2002 indicate that there are NO_3-N concentrations in excess of the State maximum contaminant level of 10 mg/l for drinking water beneath approximately 1,100 acres of the East side and West side basin compartments. TDS concentrations generally range between 200 and 400 mg/l over the same area, with one location in excess of the State maximum contaminant level of 1,000 mg/l TDS (upper limit). An elevated TDS and chloride concentration in shallow ground water beneath Sunset Terrace is indirectly attributable to sea water intrusion into the lower aquifer, which is drawn into the local supply wells and returns to shallow ground water through septic systems. Elevated TDS and chloride concentrations in lower aquifer wells on the West side confirm that sea water intrusion exists.

A review of first water and upper aquifer historical data shows at least five trends of increasing NO_3-N and/or TDS over time. The deeper wells representing the upper aquifer are more likely to show a trend of increasing NO_3-N and/or TDS, while shallower (first water) wells are less likely to show a trend but more likely to show wide fluctuations in constituent concentrations. This is attributable to the greater time and dilution factors a solute must overcome to influence the deeper wells.

MONITORING PROGRAM RECOMMENDATIONS

The analysis of historical data indicates a potential for wide fluctuations in water quality parameters. To better assess water quality trends, these fluctuations should be examined for seasonal variations. A quarterly sampling interval for two years (eight sampling events) is recommended to provide the seasonal data for evaluating the nature of water quality fluctuations.

APPENDIX A

Monitoring Well Construction/Destruction Details (Replacement Wells)

30S/10E-13L5 (replacement well)
South side of Howard Avenue west of Del Norte Street, Los Osos

Co. Health Pemit No. 2002-MW-141

All depths in feet below grade

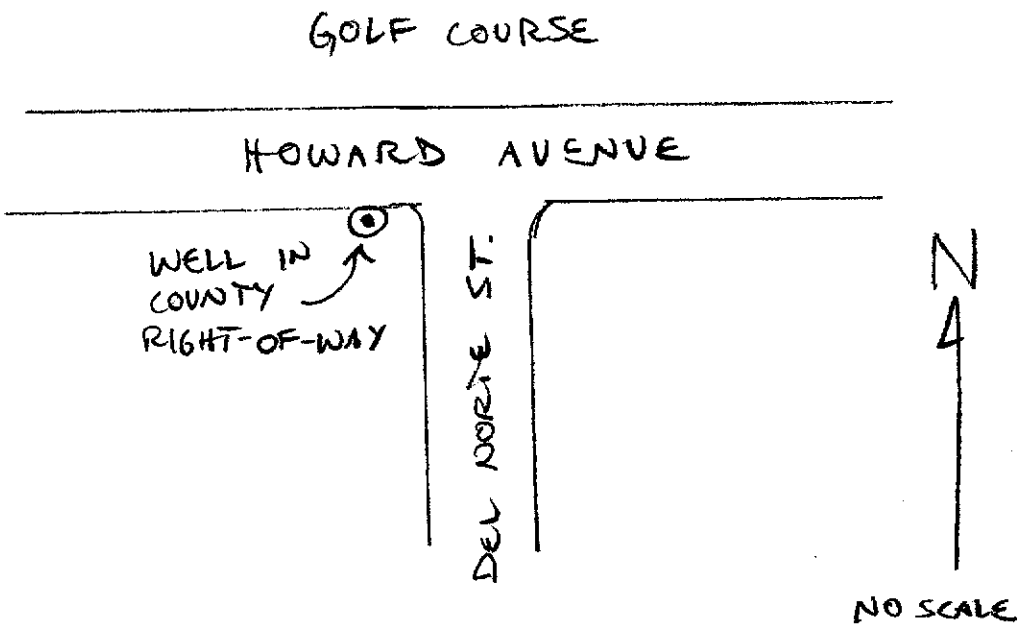
Lithologic Log from 1982: 0 - 35 feet Tan brown sands, very fine to medium gravel, firm.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 32-35 feet deep.

2002 Replacement Well Construction (same borehole)

Well:	0 - 36 feet	2-inch PVC schedule 40 casing with threaded couplings
	26-36 feet	0.020 perforations with end cap
Annular Space:		
	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 21 feet	cement/bentonite grout sanitary seal
	21 - 23 feet	bentonite transition seal
	23 - 36 feet	RMC Lapis luster #3 filter pack

Static water level 22 feet deep.



30S/10E-13Q1 (replacement well)
South side of Woodland Drive west of Doris Avenue, Los Osos

Co. Health Pemit No. 2002-MW-142

All depths in feet below grade

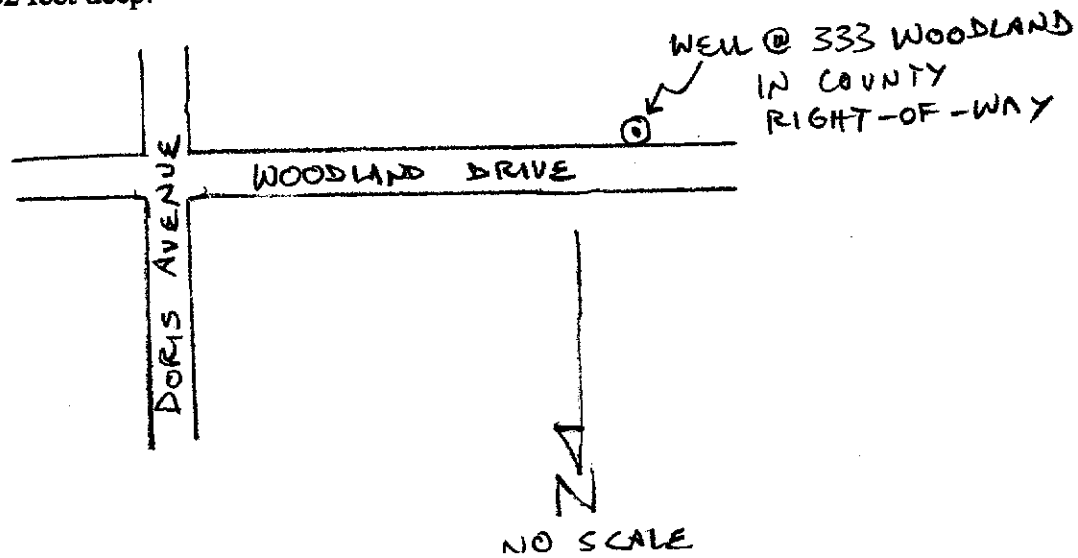
Lithologic Log from 1982:	0 - 3 feet	Dark brown silty sand, firm.
	3 - 4 feet	Reddish brown clay sand, firm.
	4 - 10 feet	Reddish brown sand, very fine to medium grained.
	10 - 14 feet	Tan clay sand, very fine to fine grained, firm.
	14 - 20 feet	Tan brown sand with 30-40% angular gravels to 1" diam.
	20 - 80 feet	Tan sand, fine to medium grained, firm.
	80 - 90 feet	Tan clay sand, very fine to medium grained, firm.
	90 - 99 feet	Tan sand, very fine to medium grained, very firm.
	99 - 100 feet	Tan clay sand.
New 2002 footage:	100 - 105 feet	Sand with silt (SP-SM); yellowish brown (10YR 5/6), 90% sand, fine grained, lesser medium grained, subangular to subrounded, 10% silt.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 97-100 feet deep.

2002 Replacement Well Construction (same borehole)

Well:	0 - 105 feet	2-inch PVC schedule 40 casing with threaded couplings
	95 -105 feet	0.020 perforations with end cap
Annular Space:		
	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 80 feet	cement/bentonite grout sanitary seal
	80 - 86 feet	bentonite transition seal
	86 - 105 feet	RMC Lapis luster #3 filter pack

Static water level 82 feet deep.



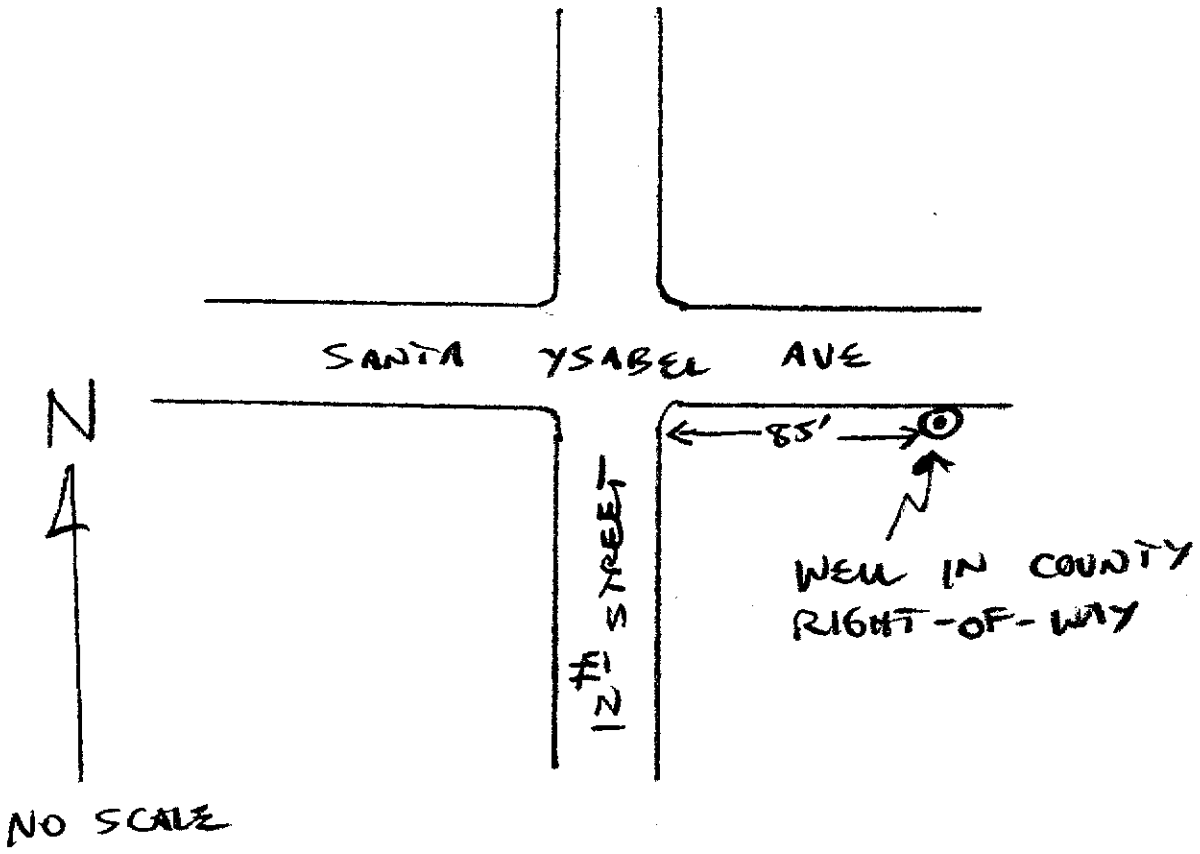
30S/11E-7K2 (well destroyed)
South side of Woodland Drive west of Doris Avenue, Los Osos

Co. Health Pemit No. 2002-MW-143 (Permit changed from repair to destruct. Unable to repair well due to conflict with horizontally bored, international service fiber-optic lines.)

Original well set to a depth of 65 feet (perforated 62-65 feet).
Well sounded at 64 feet deep prior to destruction.
Water level measured 54 feet deep prior to destruction.

Well destruction

Cemented casing from total depth to five feet below grade. Remove well box and top five feet of casing material. Set cement plug below grade and covered with native material.



30S/11E-7K (new well)

West side of 12th Street south of Santa Ysabel Avenue, Los Osos

Co. Health Pemit No. 2002-MW-160

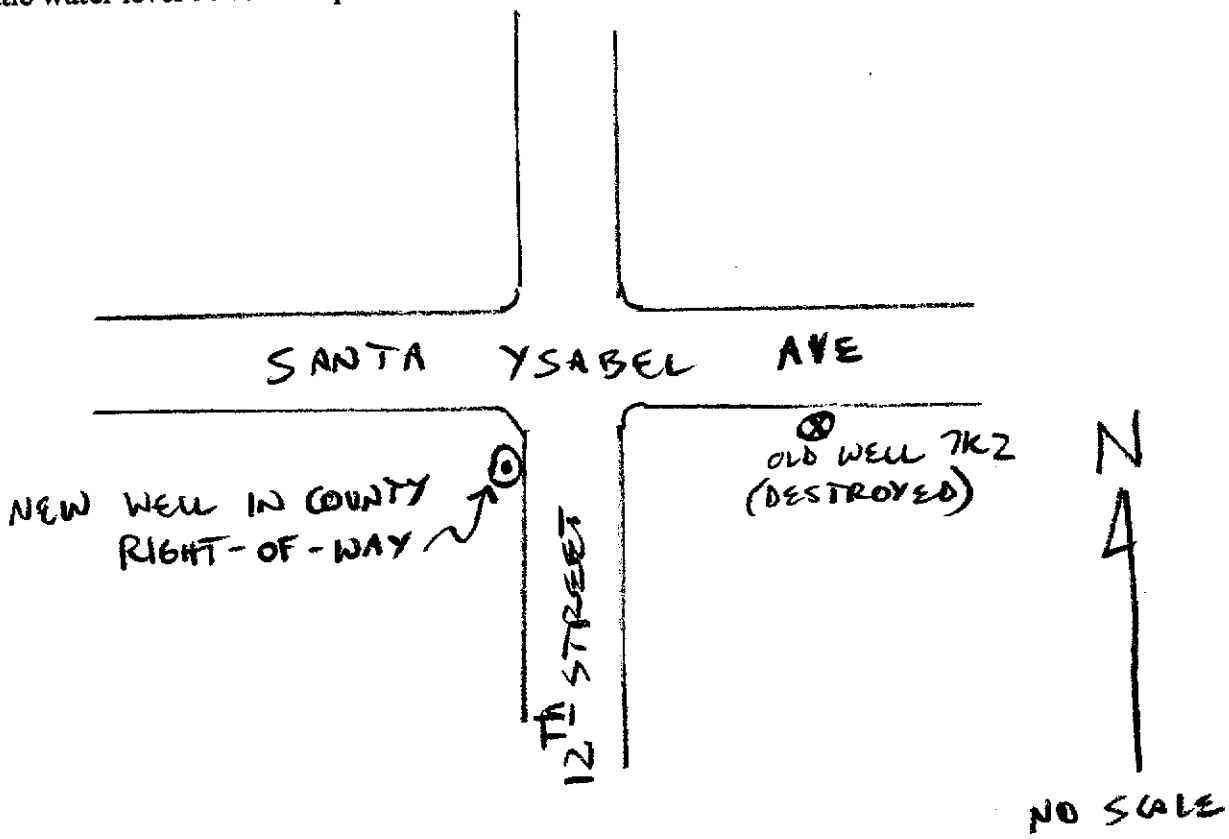
All depths in feet below grade

Lithologic Log:	0 - 19 feet	Sand with trace silt (SP); yellowish brown (10YR 5/6); fine grained, lesser medium grained, subangular to subrounded; moist.
	19 - 60 feet	Sand (SP); yellowish brown (10YR 5/4); fine grained, lesser medium, subangular to subrounded, becomes saturated at 50 feet.
	60 - 65 feet	Sand with silt (SP-SM); mottled brown (10YR 5/3) and dark yellowish brown (10YR 4/6), 90% sand, fine grained, lesser medium grained, subangular to subrounded, 10% silt.

2002 Construction (new borehole location)

Well:	0 - 65 feet	2-inch PVC schedule 40 casing with threaded couplings
	55 -65 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 48 feet	cement/bentonite grout sanitary seal
	48 - 51 feet	bentonite transition seal
	51 - 65 feet	RMC Lapis luster #3 filter pack

Static water level 50 feet deep.



30S/11E-7L3 (replacement well)
West side of 5th Street north of Santa Ysabel Avenue, Los Osos

Co. Health Permit No. 2002-MW-144

All depths in feet below grade

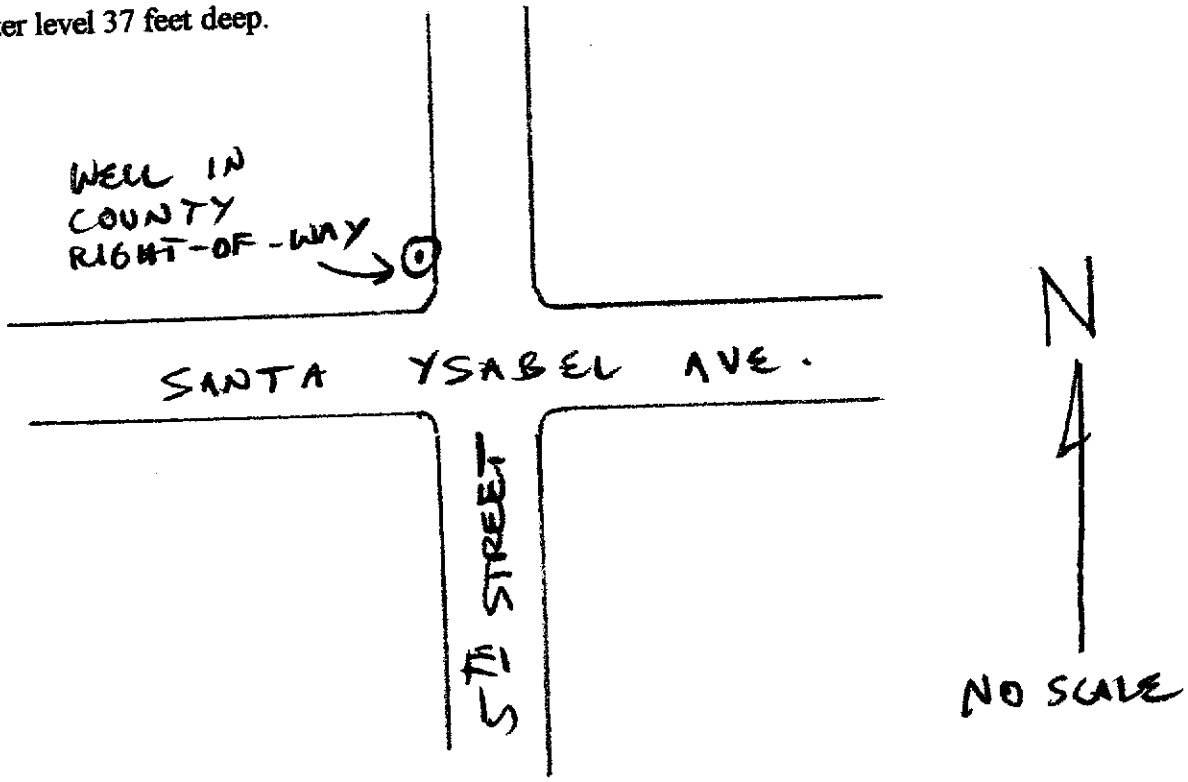
Lithologic Log from 1982:	0 - 45 feet	Tan brown sand, very fine to medium grained, firm.
New 2002 footage:	45 - 50 feet	(heaving sands, unable to retrieve sample)

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 42-45 feet deep.

2002 Replacement Well Construction (same borehole)

Well:	0 - 50 feet	2-inch PVC schedule 40 casing with threaded couplings
	40 - 50 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 33 feet	cement/bentonite grout sanitary seal
	33 - 34 feet	bentonite transition seal
	34 - 50 feet	RMC Lapis luster #3 filter pack

Static water level 37 feet deep.



30S/11E-7R1 (replacement well)
East side of 12th Street north of El Moro Avenue, Los Osos

Co. Health Pemit No. 2002-MW-145

All depth in feet below grade.

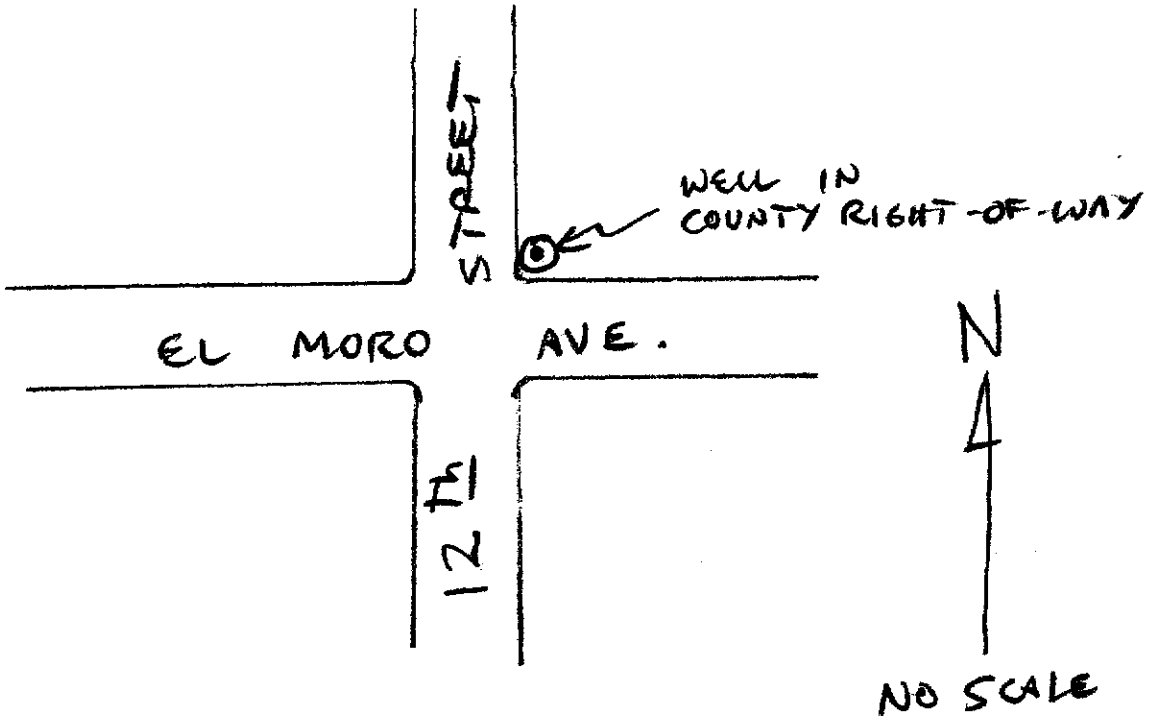
Lithologic Log from 1982:	0 - 27 feet	Tan brown sand, very fine to medium grained, firm.
	0 - 30 feet	Tan brown clay sand, firm.
New 2002 footage:	30 - 35 feet	Sand with trace silt (SP-SM); dark yellowish brown (10YR 4/4), sand fine grained, lesser medium grained, subangular to subrounded, 90% sand, 10% silt.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 27-30 feet deep.

2002 Replacement Well Construction (same borehole)

Well:	0 - 35 feet	2-inch PVC schedule 40 casing with threaded couplings
	25 - 35 feet	0.020 perforations with end cap
Annular Space:		
	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 19 feet	cement/bentonite grout sanitary seal
	19 - 21 feet	bentonite transition seal
	21 - 35 feet	RMC Lapis luster #3 filter pack

Water level measured 21 feet deep.



30S/11E-8N2 (replacement well)
West side of South Bay Boulevard south of El Moro Avenue, Los Osos

Co. Health Pemit No. 2002-MW-146

All depth in feet below grade.

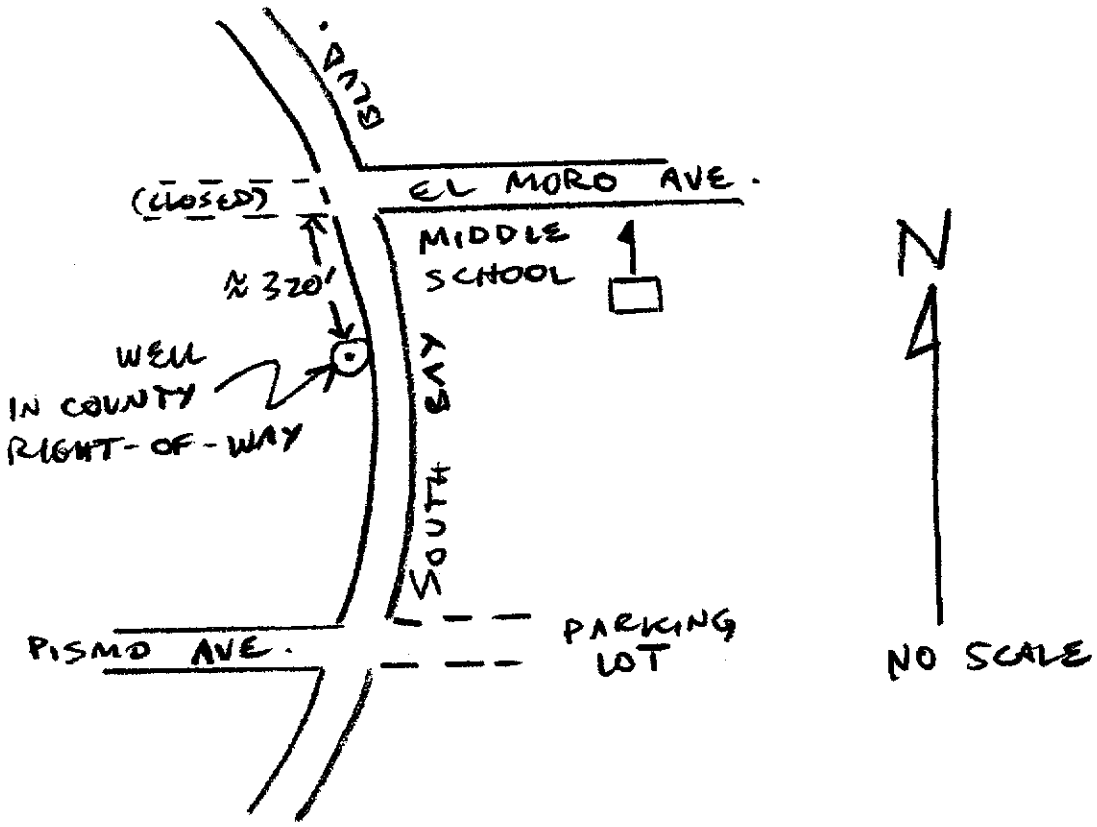
Lithologic Log from 1982:	0 - 45 feet	Tan brown to reddish brown sand, very fine to medium grained, firm.
New 2002 footage:	45 - 50 feet	(heaving sands, unable to retrieve sample)

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval 42-45 feet deep.

2002 Replacement Well Construction (same borehole)

Well:	0 - 50 feet	2-inch PVC schedule 40 casing with threaded couplings
	40 - 50 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 32 feet	cement/bentonite grout sanitary seal
	32 - 35 feet	bentonite transition seal
	35 - 50 feet	RMC Lapis luster #3 filter pack

Static water level 35 feet deep.



30S/11E-8N3 (well destroyed)

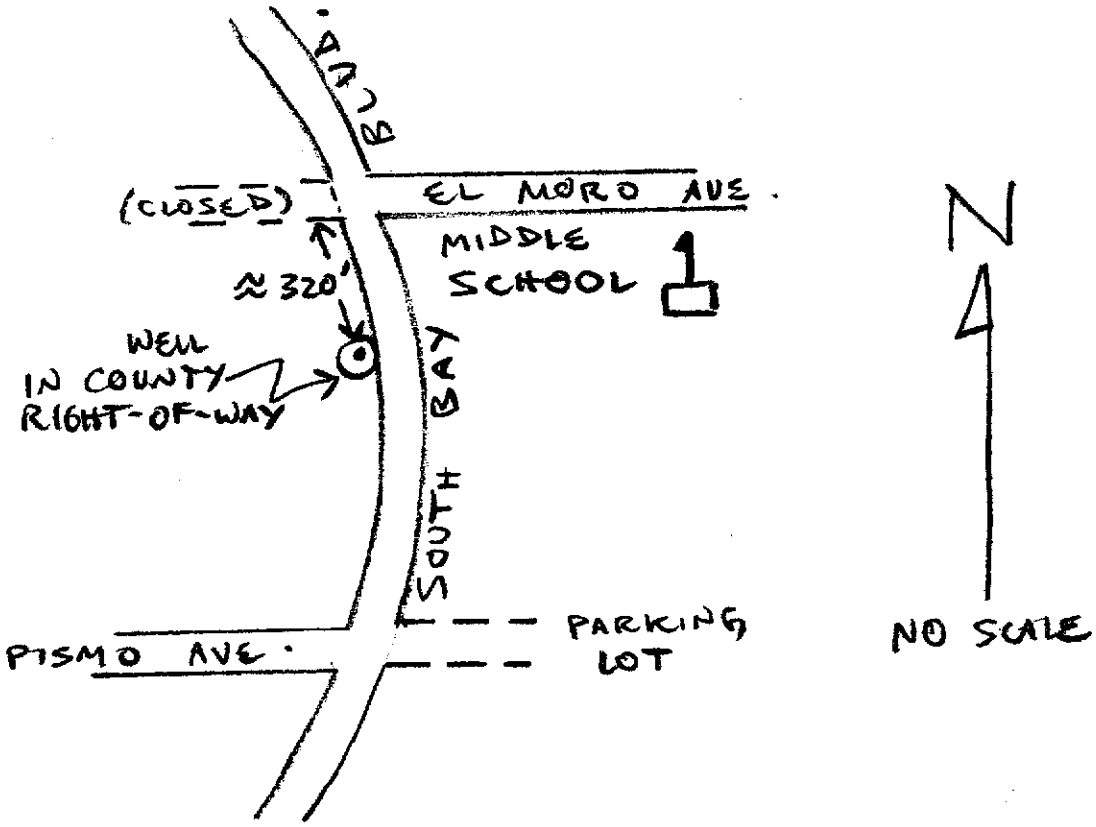
West side of South Bay Boulevard south of El Moro Avenue, Los Osos

Co. Health Pemit No. 2002-MWA-011 (Well destroyed due to deep completion in clay lense; not representative of an aquifer zone.)

Original well set to a depth of 90 feet.
Well sounded at 86 feet deep prior to destruction
Water level measured 68.2 feet deep prior to destruction

Well Destruction

Cemented casing from total depth to 27 feet below grade. Drilled out and removed well box and top 27 feet of casing material. Backfill with cement grout to 4 feet below grade. Fill top 4 feet with native material.



30S/11E-18B1 (replacement well)
East side of 10th Street north of Ramona Avenue, Los Osos

Co. Health Pemit No. 2002-MW-149

All depths in feet below grade.

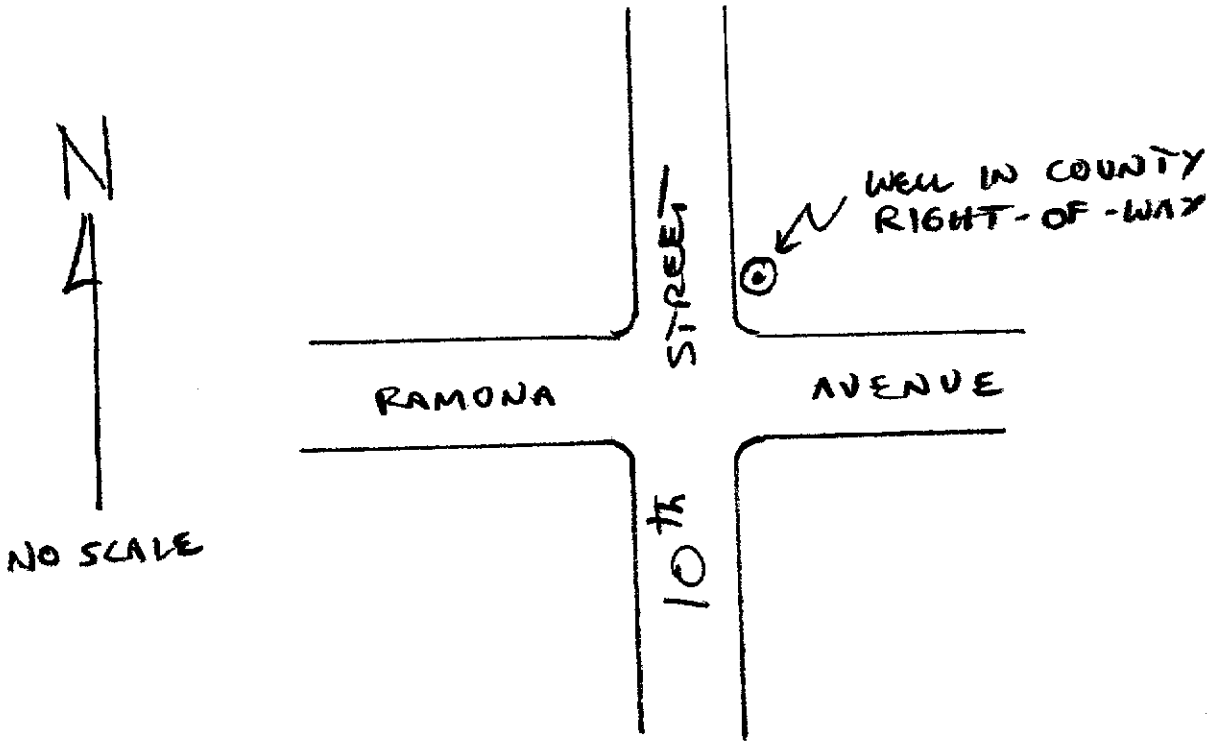
Lithologic Log from 1982:	0 - 25 feet	Tan brown to reddish brown sand, fine to medium grained, firm.
New 2002 footage:	25 - 35 feet	Sand with silt (SP-SM); yellowish brown (10YR 5/4), sand fine to medium grained, subangular to subrounded, 95% sand, 5% silt.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval 29-32 feet deep.

2002 Replacement Well Construction (same borehole):

Well:	0 - 35 feet	2-inch PVC schedule 40 casing with threaded couplings
	25 - 35 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 16 feet	cement/bentonite grout sanitary seal
	16 - 21 feet	bentonite transition seal
	21 - 35 feet	RMC Lapis luster #3 filter pack

Static water level 18 feet deep.



30S/11E-18C1 (replacement well)
East side of 5th Street north of Pismo Avenue, Los Osos

Co. Health Pemit No. 2002-MW-150

All depths in feet below grade.

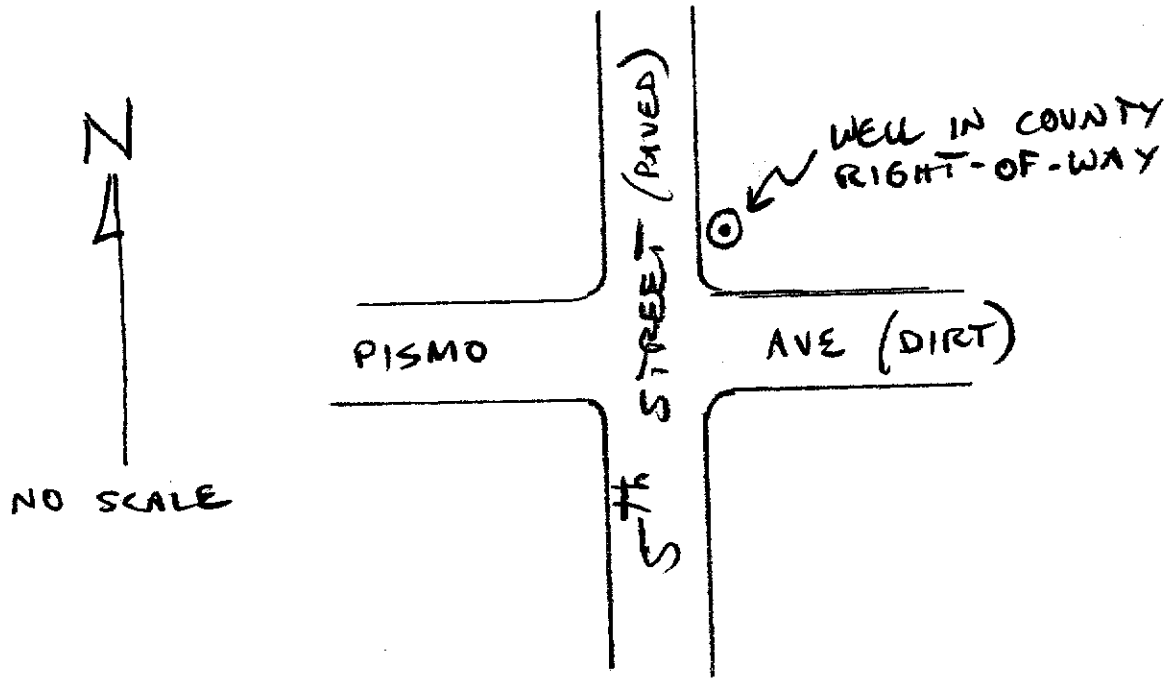
Lithologic Log from 1982:	0 - 20 feet	Tan brown sand, very fine to medium grained.
	20 - 25 feet	Tan brown clay sand with gravels to 1" diam., very firm.
	25 - 31.5 feet	Tan brown sand, very fine to medium grained, very firm.
New 2002 footage:	31.5 - 35 feet	(heaving sands, unable to retrieve sample)

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 27-30 feet deep.

2002 Replacement Well Construction (same borehole):

Well:	0 - 35 feet	2-inch PVC schedule 40 casing with threaded couplings
	25 - 35 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 21 feet	cement/bentonite grout sanitary seal
	21 - 23 feet	bentonite transition seal
	23 - 35 feet	RMC Lapis luster #3 filter pack

Static water level 15 feet deep.



30S/11E-18J6 (replacement well)
North side of Los Olivos Avenue east of Fairchild Way, Los Osos

Co. Health Pemit No. 2002-MW-151

All depths in feet below grade.

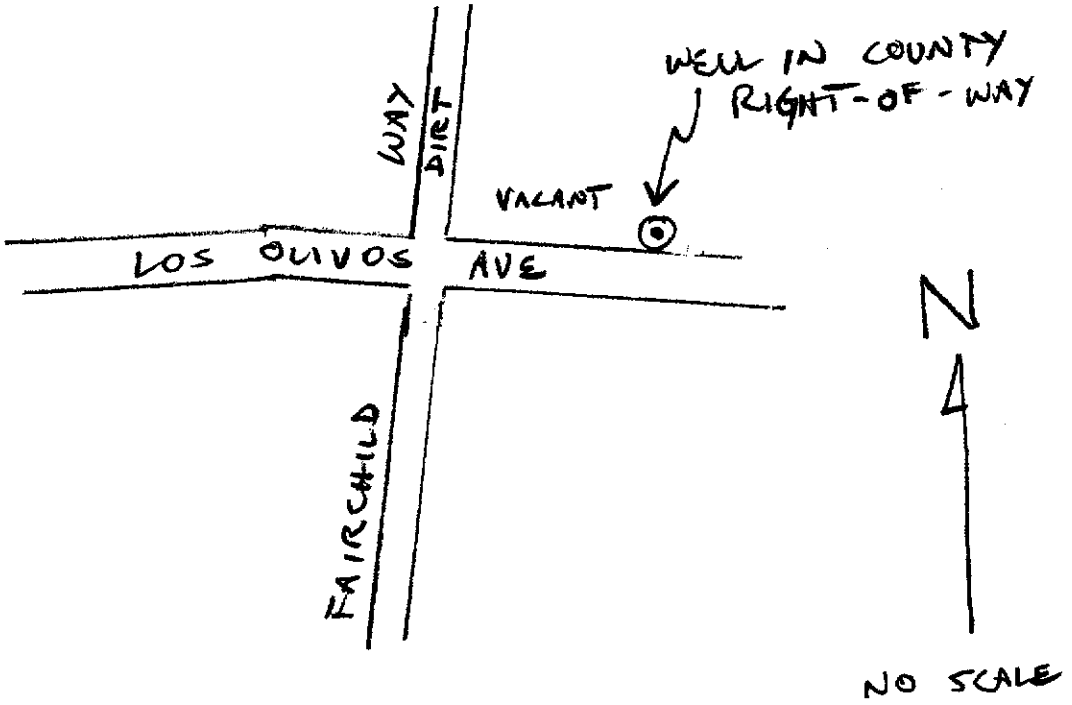
Lithologic Log from 1982:	0 - 10 feet	Brown silty sand, firm.
	10 - 15 feet	Reddish brown sandy clay, stiff.
	15 - 25 feet	Reddish brown sand, medium to coarse grained, firm.
New 2002 footage:	25 - 35 feet	Sand with Silt (SW-SM); brownish yellow (10YR 6/6); 95% sand, fine to medium grained, subangular to subrounded; 5 % silt.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 22-25 feet deep.

2002 Replacement Well Construction (same borehole):

Well:	0 - 35 feet	2-inch PVC schedule 40 casing with threaded couplings
	25 - 35 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 20 feet	cement/bentonite grout sanitary seal
	20 - 22 feet	bentonite transition seal
	22 - 35 feet	RMC Lapis luster #3 filter pack

Static water level was 23 feet deep.



30S/11E-18L3 (replacement well)

East side of Palisades Avenue north of Los Osos Valley Road, Los Osos

Co. Health Pemit No. 2002-MWA-012 (changed permit from destruct to repair). Not destroyed to serve as piezometer for future waterwater plant site.

All depths in feet below grade.

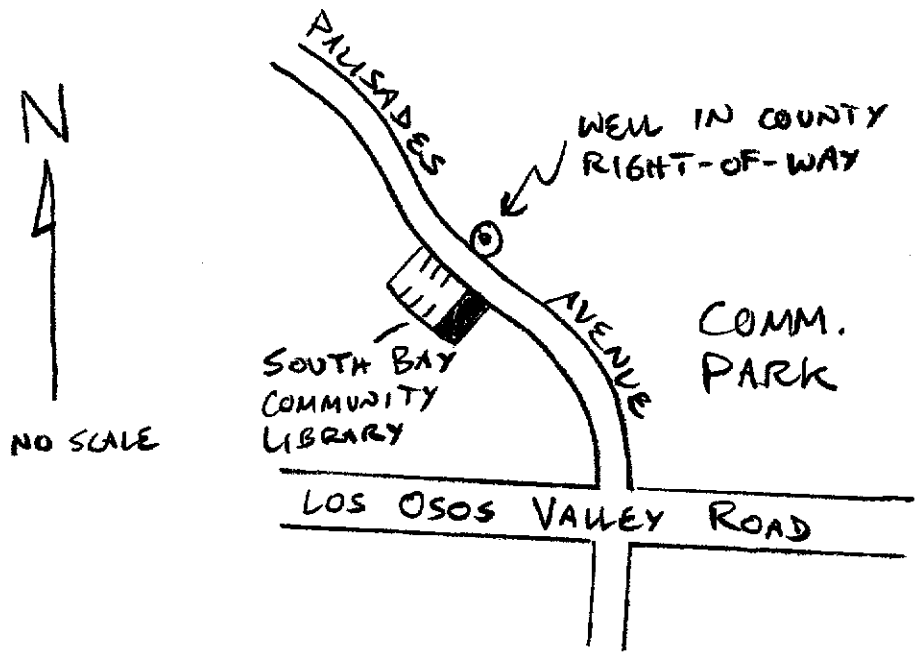
Lithologic Log from 1982: 0 - 55 feet Reddish tan to tan sand with 10% fines, firm.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval 53-55 feet depth.

2002 Replacement Well Construction (same borehole):

Well:	0 - 53 feet	2-inch PVC schedule 40 casing with threaded couplings
	43 - 53 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 31 feet	cement/bentonite grout sanitary seal
	31 - 43 feet	bentonite transition seal
	43 - 53 feet	RMC Lapis luster #3 filter pack

Static water level 37 feet deep.



30S/11E-18L4 (replacement well)
In front of 2060 Ferrell Street, Los Osos

Co. Health Pemit No. 2002-MW-151

All depths in feet below grade.

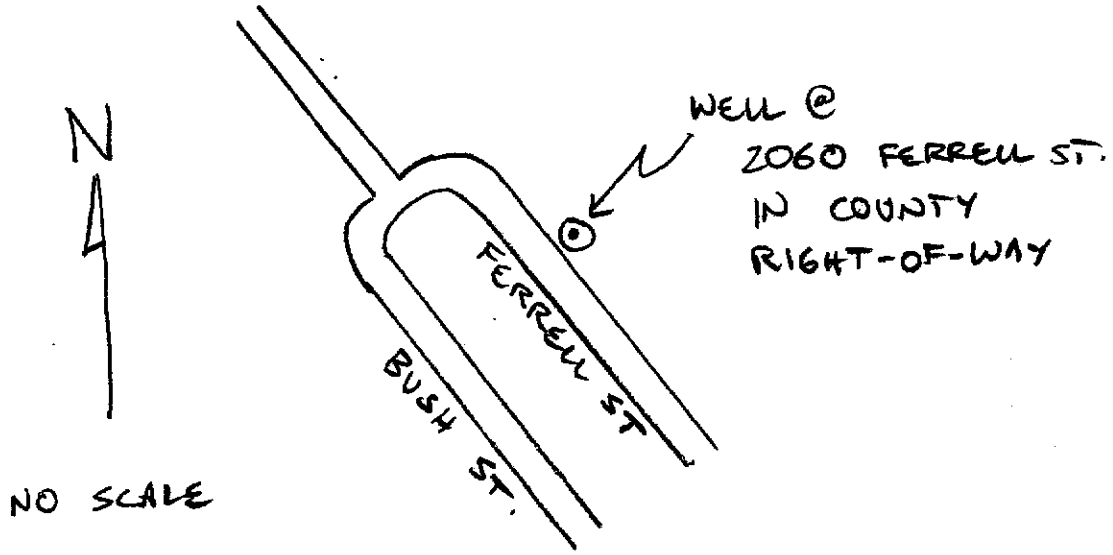
Lithologic Log from 1982:	0 - 25 feet	Dark brown to tan brown sand, very fine to medium grained, firm.
New 2002 footage:	25 - 35 feet	Sand with Silt (SW-SM); dark brownish yellow (10YR 4/4); 90% sand, fine to medium grained, subangular to subrounded; 10 % silt, with sandy clay (SC) lenses 30-33 feet.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 22-25 feet deep.

2002 Replacement Well Construction (same borehole):

Well:	0 - 35 feet	2-inch PVC schedule 40 casing with threaded couplings
	25 - 35 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 17 feet	cement/bentonite grout sanitary seal
	17 - 20 feet	bentonite transition seal
	20 - 35 feet	RMC Lapis luster #3 filter pack

Static water level 19 feet deep.



30S/11E-18N1 (replacement well)

Northwest corner of Manzanita drive and Ravenna Avenue, Los Osos

Co. Health Pemit No. 2002-MW-148

All depths in feet below grade.

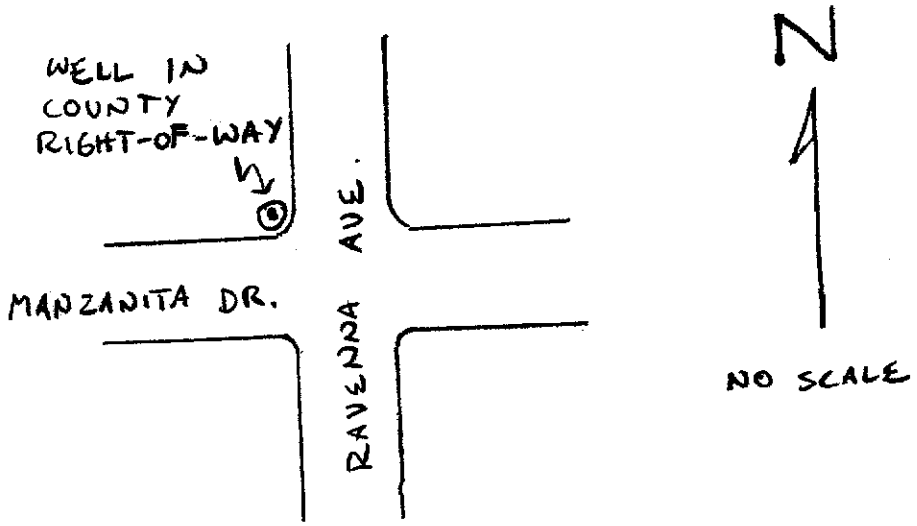
Lithologic Log from 1982:	0 - 50 feet	Dark brown to tan sand, very fine to medium grained, firm.
	50 - 55 feet	White sand, 100% quartz interstratified w/ rust brown clay sand.
	55 - 60 feet	White/gray quartz sand, medium grained.
	60 - 75 feet	Tan sand, very fine to fine grained, firm.
	75 - 78 feet	Tan-rust clay sand, medium to coarse grained, firm.
	78 - 90 feet	Rust brown to tan sand, very fine to medium grained, very firm w/ trace of clay.
New 2002 footage:	90 - 95 feet	Sand with silt (SP-SM); yellowish brown (10YR 5/6), 90% sand, fine grained, lesser medium grained, subangular to subrounded, 10% silt.

Drilled out and removed borehole materials from 1982 well construction. Original perforated interval was 87-90 feet deep.

2002 Replacement Well Construction (same borehole):

Well:	0 - 95 feet	2-inch PVC schedule 40 casing with threaded couplings
	85 - 95 feet	0.020 perforations with end cap
Annular Space:	0 - 2 feet	new traffic rated well box/wellhead set in concrete
	2 - 72 feet	cement/bentonite grout sanitary seal
	72 - 75 feet	bentonite transition seal
	75- 95 feet	RMC Lapis luster #3 filter pack

Static water level 68 feet deep.



APPENDIX B

Wellhead Survey Data (John L. Wallace & Associates)

SURVEY REPORT

Of the

Monitor Well Location Survey

For

Los Osos Community Service District

Proj: 0384.0032

PROJECT OVERVIEW

Seven monitoring wells were to be located horizontally and vertically over the Los Osos Area. The wells were to be related to the existing control over the area that was developed for the Wastewater Project.

DATA COLLECTION

Two methods were used to collect the data. Conventional Total Station was used for most of the data collection and GPS RTK was used for one location. The process for collecting data conventionally involved either setting directly over an existing control and backsighting another known control point or establishing the instrument position by a two point resection method. In all cases, the relative position between the two control points were under 0.10' horizontally and vertically. The monitoring wells were located by doubling the measurements to the well. Also, a third point with a known position was located to verify the quality of the measurement.

The RTK located monitoring well was established by localizing on two control points, checking two other control points then collecting the data on the monitoring well.

All the monitoring wells were located on the top of the 2" PVC pipe, with the cover taken off. A lime green paint mark was put at the point located, which were all on the north side of the pipe, except for 24-A which was located on the south side, due to constraints caused by the cover. All the lids were marked with the Well name.

DATUM

The horizontal and vertical datums were those established by the Aerial Control Survey performed by John L. Wallace and Associates in December of 1995 for Airborne Surveys.

The Horizontal datum is based on the North American Datum of 1983 using the 1991.35 epoch adjustment of the HPGN.

The vertical datum is based on the North American Vertical Datum of 1988. However because of the distance of first order vertical control from the area of Los Osos, the elevations are approximate relative to the datum. Relative elevations within the project of Los Osos have been verified using spot checking by conventional means.

RESULTS

The table below shows the positions of the wells located.

Point No.	Well No.	Northing	Easting	Elevation	County Elevation*
101	13 G	2,313,431.40	5,711,591.14	50.95	
102	13 H	2,313,239.77	5,713,529.87	49.33	
104	18 C 1	2,315,694.38	5,715,292.69	34.55	31.01
107	7 K 3	2,318,240.26	5,717,639.03	90.71	
109	18 L 3	2,312,471.43	5,715,266.40	88.02	
113	24 A	2,310,531.88	5,712,831.63	193.04	
116	8 N 2	2,316,508.48	5,720,191.18	95.99	97.80

* The County Elevations were provided to this office and noted as T.O.C. elevation based on old survey. The datum is unknown. The NVGD29 datum would tend to show values 2.5 to 3.0 feet less then the NAVD88 datum.

Tom Mastin LS 4819 exp 9/04

Attachments: Site Location Sketches
Raw Data

SURVEY REPORT

Of the

Monitor Well & Water Well Location Survey

For

Los Osos Community Service District

Proj: 0384.0037

PROJECT OVERVIEW

A combination of twelve monitoring and water wells were to be located horizontally and vertically over the Los Osos Area. The wells were to be related to the existing control over the area that was developed for the Wastewater Project.

DATA COLLECTION

Three methods were used to collect the data: Conventional Total Station, GPS RTK and a combination of the two. The process for collecting data conventionally involved either setting directly over an existing control and backsighting another known control point method. The wells were located by doubling the measurements to the well. Also, a third point with a known position was located to verify the quality of the measurement.

The RTK located monitoring well was established by localizing on two or more control points, checking other control points then collecting the data on the wells.

In most cases, the relative position between the two control points were under 0.20' horizontally and vertically.

All the wells were located as instructed and marked with a lime green paint at the point located. The monitoring wells which had locking caps over the pipes were marked on the top of these caps. We estimate the distance from the top of the cap to the top of the pipe to be .02'. All of the lids were also marked with the well designation number.

DATUM

The horizontal and vertical datums were those established by the Aerial Control Survey performed by John L. Wallace and Associates in December of 1995 for Airborne Surveys.

The Horizontal datum is based on the North American Datum of 1983 using the 1991.35 epoch adjustment of the HPGN.

The vertical datum is based on the North American Vertical Datum of 1988. However because of the distance of first order vertical control from the area of Los Osos, the elevations are

approximate relative to the datum. Relative elevations within the project of Los Osos have been verified using spot checking by conventional means.

RESULTS

The table below shows the positions of the paint marks at or near the wells located.

Point No.	Well No.	Northing	Easting	Elevation
119	18 N 1	2,311,445.40	5,714,430.23	125.53
123	7 L 3	2,318,421.29	5,715,330.81	45.76
126	7 R 1	2,316,953.65	5,717,649.74	61.93
128	18 B 1	2,314,966.96	5,716,930.10	79.89
131	18 J 6	2,312,106.65	5,718,306.66	125.74
133	18 L 4	2,312,452.95	5,716,095.96	103.85
134	13 Q 1	2,311,867.68	5,711,636.67	101.27
138	13 L 5	2,313,009.38	5,709,965.14	32.63
139	7 Q 1	2,316,872.52	5,716,361.90	25.29
141	17 N 4	2,310,645.24	5,720,047.16	162.61
145	13 A 7	2,314,758.92	5,712,951.65	14.15
148	18 E 1	2,314,100.77	5,714,408.09	39.61

LICENSED LAND SURVEYOR
JOSEPH THOMAS MORRIS
EXP. 3/06
No. 6192
STATE OF CALIFORNIA

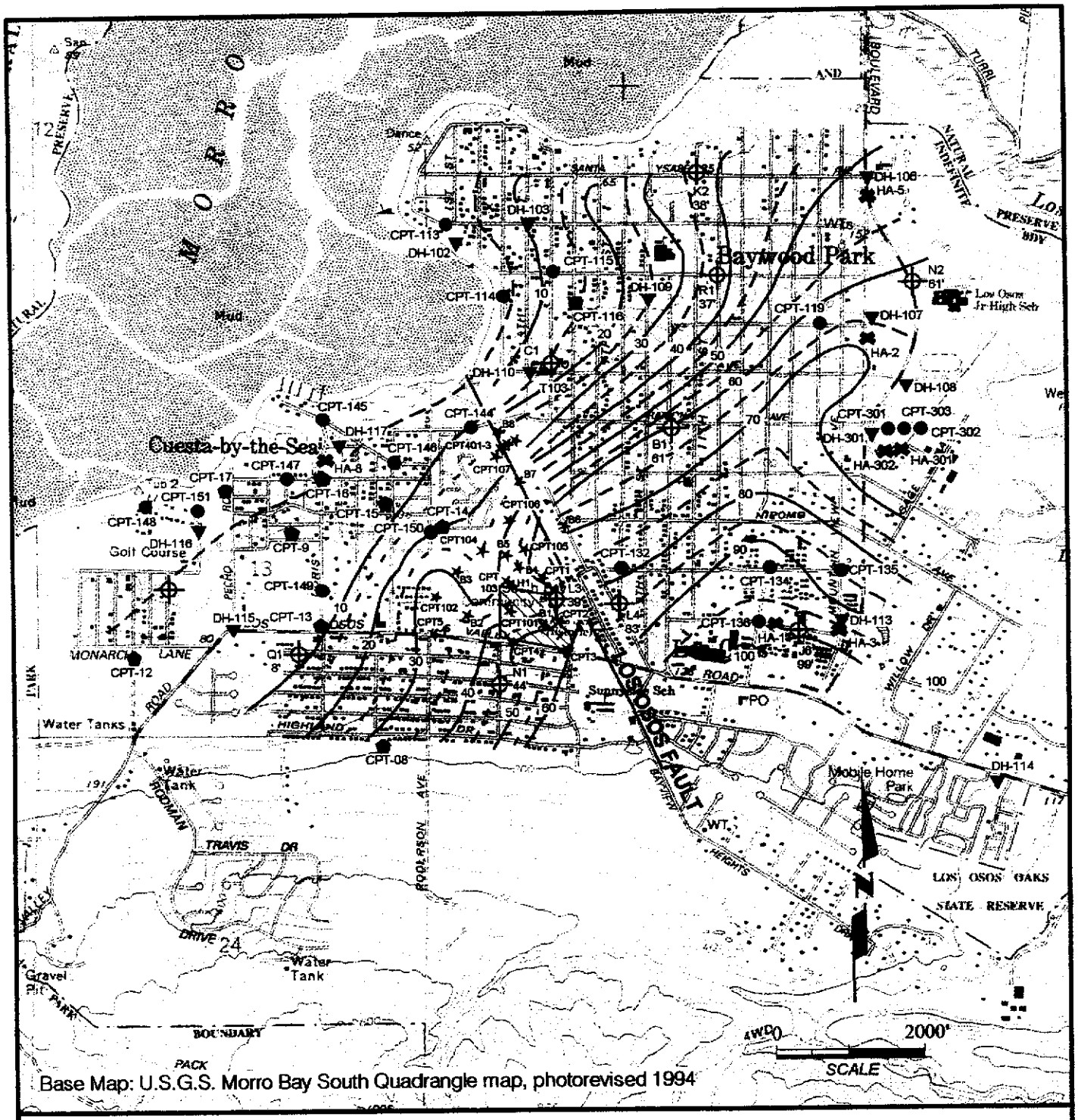
Joseph T. Morris
10/22/02

Joseph T. Morris LS 6192 exp 3/06

Attachments: Site Location Sketches

APPENDIX C

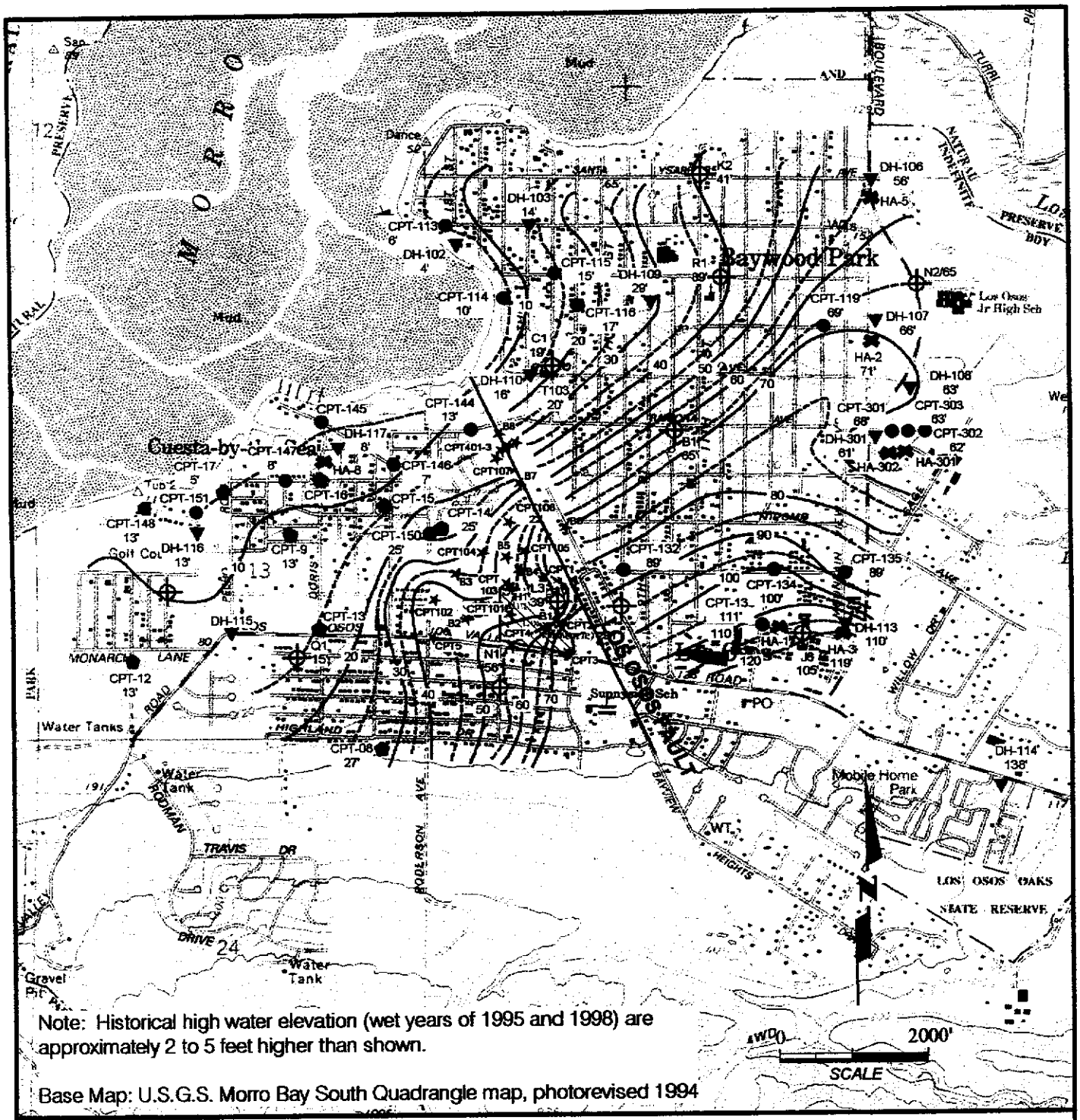
1990, 1997 Water Level Contour Maps (CFS Geotechnical)



Legend

- ● CPT Site (Fugro 1997)
- ▮ Trench
- ✱ Approximate Boring/CPT Site (CFS 1999)
- ✖ Hand Auger Site
- ⬟ CPT Site (Fugro 1996)
- ▼ Hollow Stem Auger Boring Site (Fugro 1997)
- Estimated groundwater elevation contour
- Approximate County Engineering monitoring well

CFS Geotechnical Consultants	**GROUNDWATER CONTOUR MAP 1990 Groundwater Elevations**	Los Osos Wastewater Project Los Osos, California Project No. 991001
		Figure



Note: Historical high water elevation (wet years of 1995 and 1998) are approximately 2 to 5 feet higher than shown.

Base Map: U.S.G.S. Morro Bay South Quadrangle map, photorevised 1994

Legend

- ● CPT Site (Fugro 1997) ▮ Trench
- ✱ Approximate Boring/CPT Site (CFS 1999)
- ✖ Hand Auger Site
- ⬟ CPT Site (Fugro 1996) ▼ Hollow Stem Auger Boring Site (Fugro 1997)
- Estimated groundwater elevation contour
- Q1 County Engineering Monitoring Well

CFS Geotechnical Consultants	**CONTOUR GROUNDWATER MAP 1997 Groundwater Elevations**	Los Osos Wastewater Project Los Osos, California Project No. 991001
		Figure

APPENDIX D

Ground Water Monitoring Field Logs

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 7/02/02
Operator: S. Harris
Well number and location: **30S/10E-13A7** Pine Avenue
Site and wellhead conditions: Sunny, warm, dry. Equipped private well - not currently used. Sample from spigot on east side of garage approx. 6 feet from wellhead.

Static water depth (feet): 5.14
Well depth (feet): 40
Water column (feet): 35
Casing diameter (inches): 8
Three casing volumes (gal): 270
Pump rate (gpm): 8
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 34
Time begin purge: 3:20 PM

Time	Gallons	EC	pH	Temp.	Comments*
1532	96	473	6.65	19.2	Clear, colorless, odorless
1544	192	465	6.68	18.9	Clear, colorless, odorless
1546	208	465	6.70	18.5	Clear, colorless, odorless
1550	240	464	6.71	17.9	Clear, colorless, odorless
1552	256	475	6.68	18.3	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/26/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-13G** South Court
Site and wellhead conditions: Sunny, breezy, dry. Casing below grade inside well box vault. Watertight rubber gasket intact. Slip cap in place.

Static water depth (feet): 39.17
Well depth (feet): 52
Water column (feet): 13
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 14
Pump rate (gpm): 1.3 gpm @ 172 Hz
Pumping water level: 41
Pump setting (feet): 48
Minimum purge time (min): 11
Time begin purge: 1:30 PM

Time	Gallons	EC	pH	Temp.	Comments*
1330	<1	501	6.50	21.8	Very turbid, brown, odorless
1334	5	536	6.46	19.7	Turbid, brown, odorless
1339	10	542	6.44	18.9	Turbid, brown, odorless
1342	15	544	6.42	18.7	Slightly turbid, brown, odorless
1346	20	548	6.40	18.5	Slightly turbid, brown, odorless
1350	25	550	6.39	18.6	Slightly turbid, brown, odorless
1354	30	553	6.39	18.4	Slightly turbid, colorless, odorless
1358	35	553	6.39	18.3	Very slightly turbid, colorless, odorless
1403	40	554	6.40	18.4	Very slightly turbid, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/26/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-13H** Skyline / Broderson
Site and wellhead conditions: Sunny, warm, dry. Casing below grade inside well box vault. Watertight rubber gasket intact. Slip cap in place.

Static water depth (feet): 24.84
Well depth (feet): 34
Water column (feet): 9
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 10
Pump rate (gpm): 0.25 gpm @ 134 Hz
Pumping water level: 30.5
Pump setting (feet): 32
Minimum purge time (min): 40
Time begin purge: 11:52 AM

Time	Gallons	EC	pH	Temp.	Comments*
1152	<1	184	6.71	21.0	Very turbid, brown, odorless
1210	5	194	6.65	21.0	Turbid, brown, odorless
1220	8	196	6.69	20.3	Slightly turbid, brown, odorless
1228	10	195	6.67	20.1	Slightly turbid, brown, odorless
1239	13	197	6.73	20.0	Slightly turbid, brown, odorless
1246	15	196	6.74	19.8	Slightly turbid, brown, odorless
1251	17	196	6.69	20.1	Slightly turbid, light brown, odorless
1301	20	195	6.74	20.2	Slightly turbid, light brown, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/26/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-13L5** Howard / Del Norte
Site and wellhead conditions: Sunny, warm, dry. Casing below grade inside well box vault. Watertight rubber gasket intact/new. Slip cap in place.

Static water depth (feet): 21.78
Well depth (feet): 36
Water column (feet): 14
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 15
Pump rate (gpm): 1.5 gpm @ 148 Hz
Pumping water level: 23
Pump setting (feet): 31.5
Minimum purge time (min): 8
Time begin purge: 2:28 PM

Time	Gallons	EC	pH	Temp.	Comments*
1428	<1	1663	6.21	21.4	Turbid, brown, odorless
1431	5	1594	6.40	20.1	Turbid, brown, odorless
1434	10	1562	6.30	19.7	Slightly turbid, light brown, odorless
1438	15	1542	6.30	19.5	Slightly turbid, colorless, odorless
1442	20	1524	6.25	19.4	Slightly turbid, colorless, odorless
1444	25	1518	6.31	19.4	Clear, colorless, odorless
1448	30	1503	6.21	19.3	Clear, colorless, odorless
1451	35	1497	6.24	19.4	Clear, colorless, odorless
1455	40	1493	6.18	19.3	Clear, colorless, odorless
1458	45	1493	6.24	19.3	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/27/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-13Q1** Woodland Drive west of Doris Avenue.
Site and wellhead conditions: Partly sunny, breezy, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 82.48
Well depth (feet): 104.5
Water column (feet): 22
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 23
Pump rate (gpm): 2.8 @ 264 Hz
Pumping water level: 85
Pump setting (feet): 96
Minimum purge time (min): 8
Time begin purge: 2:27 PM

Time	Gallons	EC	pH	Temp.	Comments*
1427	<1	816	6.57	21.5	Brown, turbid, odorless
1429	6	824	6.89	20.2	Brown, turbid, odorless
1431	11	757	7.08	19.4	Brown, turbid, odorless
1433	17	750	6.96	19.1	Light brown, slightly turbid, odorless
1435	22	747	6.91	18.9	Light brown, slightly turbid, odorless
1437	28	742	6.85	18.8	Colorless, very slightly turbid, odorless
1439	34	741	6.81	18.5	Colorless, very slightly turbid, odorless
1441	39	737	6.79	18.6	Colorless, very slightly turbid, odorless
1443	45	735	6.76	18.5	Colorless, very slightly turbid, odorless
1445	50	732	6.73	18.6	Colorless, very slightly turbid, odorless
1447	56	732	6.72	18.6	Colorless, very slightly turbid, odorless
1449	61	732	6.72	18.6	Colorless, very slightly turbid, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/27/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/10E-24A** Alexander / Highland
Site and wellhead conditions: Partly cloudy, calm. Casing above grade inside steel monument (lid needs lubrication). Slip cap in place.

Static water depth (feet): 149.20
Well depth (feet): 164
Water column (feet): 14.8
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 16
Pump rate (gpm): 1.2 @ 280 Hz
Pumping water level: at pump
Pump setting (feet): 158
Minimum purge time (min): 13
Time begin purge: 3:23 PM

Time	Gallons	EC	pH	Temp.	Comments*
1523	<1	332	7.57	20.4	Brown, turbid, odorless
1525	5	330	7.24	19.2	Brown, turbid, odorless
1529	10	338	6.98	18.3	Brown, turbid, odorless
1542	15	342	6.75	19.0	Yellow brown, slightly turbid, odorless
1546	20	340	6.75	18.7	Clear, colorless, odorless
1551	25	340	6.72	18.6	Clear, colorless, odorless
1559	30	341	6.73	18.3	Clear, colorless, odorless
1610	35	341	6.72	18.6	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/24/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-7K** Santa Ysabel Avenue / 12th Street.
Site and wellhead conditions: Sunny, breezy, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 51
Well depth (feet): 65
Water column (feet): 14
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 15
Pump rate (gpm): 1 @ 177 Hz
Pumping water level: 54
Pump setting (feet): 59
Minimum purge time (min): 15
Time begin purge: 11:45 AM

Time	Gallons	EC	pH	Temp.	Comments*
1145	<1	537	6.67	21.2	Slightly turbid, brown, odorless
1150	5	5448	6.81	20.3	Slightly turbid, brown, odorless
1155	10	552	6.87	20.1	Very slightly turbid, colorless, odorless
1200	15	555	6.89	19.9	Very slightly turbid, colorless, odorless
1205	20	556	6.89	19.9	Clear, colorless, odorless
1210	25	558	6.91	19.8	Clear, colorless, odorless
1215	30	558	6.89	19.8	Clear, colorless, odorless
1220	35	559	6.89	19.8	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/24/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-7L3** Santa Ysabel Avenue / 5th Street.
Site and wellhead conditions: Overcast, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 36.50
Well depth (feet): 50
Water column (feet): 14
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 15
Pump rate (gpm): 1.6 @ 173 Hz
Pumping water level: 36.5
Pump setting (feet): 45
Minimum purge time (min): 10
Time begin purge: 12:50 PM

Time	Gallons	EC	pH	Temp.	Comments*
1250	<1	781	7.53	21.0	Turbid, brown, odorless
1254	5	765	7.32	20.2	Turbid, brown, odorless
1257	10	773	7.23	19.6	Slightly turbid, brown, odorless
1300	15	771	7.16	19.4	Sightly turbid, colorless, odorless
1303	20	777	7.13	19.3	Very slightly turbid, colorless, odorless
1306	25	773	7.11	19.3	Very slightly turbid, colorless, odorless
1309	30	775	7.11	19.3	Very slightly turbid, colorless, odorless
1312	35	773	7.09	19.2	Very slightly turbid, colorless, odorless
1315	40	776	7.08	19.1	Clear, colorless, odorless
1318	45	774	7.06	19.1	Clear, colorless, odorless
1321	50	773	7.07	19.1	Clear, colorless, odorless
1324	55	774	7.06	19.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/28/02
Operator: S. Harris / M. Gutormson
Well number and location: **30S/11E-7N1** 3rd Street
Site and wellhead conditions: Sunny, dry. Equipped LOCSD well - operated daily. Sample from spigot at wellhead.

Static water depth (feet): (well operating)
Well depth (feet): 83
Water column (feet):
Casing diameter (inches): 8
Three casing volumes (gal):
Pump rate (gpm):
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge:

Time	Gallons	EC	pH	Temp.	Comments*
1104		266	6.51	18.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/26/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-7Q1** 8th Street / El Moro Avenue
Site and wellhead conditions: Overcast, cool, dry. Casing below grade inside older well box vault. Not watertight (vault). Slip cap in place.

Static water depth (feet): 6.52
Well depth (feet): 75
Water column (feet): 69
Casing diameter (inches): 6
Three casing volumes (gal): 315
Pump rate (gpm): 10 gpm @ 152 Hz through 180 gal, then 4 gpm @ 180 Hz
Pumping water level: na
Pump setting (feet): 40
Minimum purge time (min): 52
Time begin purge: 9:20 AM

Time	Gallons	EC	pH	Temp.	Comments*
920	<1	561	7.28	15.9	Slightly turbid, rusty, odorless
927	20	567	7.46	17.2	Slightly turbid, light brown, odorless
929	40	569	7.29	17.4	Very slightly turbid, colorless, odorless
931	60	573	7.14	17.5	Slightly turbid, light brown, odorless
933	80	577	7.12	17.6	Slightly turbid, light brown, odorless
935	100	578	6.96	17.7	Slightly turbid, light brown, odorless
942	180	557	7.19	18.0	Slightly turbid, light brown, odorless
951	220	578	7.25	17.9	Slightly turbid, light brown, odorless
1001	260	592	6.94	17.9	Slightly turbid, light brown, odorless
1011	300	609	6.77	17.9	Very slightly turbid, colorless, odorless
1021	340	620	6.63	17.8	Very slightly turbid, colorless, odorless
1026	360	613	6.58	17.9	Clear, colorless, odorless
1031	380	628	6.60	17.8	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/24/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-7R1** El Moro Avenue / 12th Street.
Site and wellhead conditions: Partly sunny, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 21.31
Well depth (feet): 35
Water column (feet): 14
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 15
Pump rate (gpm): 1.25 @ 130 Hz
Pumping water level: 24.5
Pump setting (feet): 31
Minimum purge time (min): 12
Time begin purge: 10:45 AM

Time	Gallons	EC	pH	Temp.	Comments*
1045	<1	559	6.37	20.0	Turbid, brown, odorless
1050	7	568	6.46	18.9	Turbid, brown, odorless
1055	13	566	6.47	18.3	Slightly turbid, colorless, odorless
1100	19	568	6.44	18.1	Clear, colorless, odorless
1105	25	567	6.43	18.2	Clear, colorless, odorless
1110	31	567	6.43	18.1	Clear, colorless, odorless
1115	37	567	6.43	18.1	Clear, colorless, odorless
1120	43	568	6.42	18.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/25/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-8N2** South Bay Boulevard
Site and wellhead conditions: Sunny, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 34.77 (measured 6/20/02)
Well depth (feet): 50
Water column (feet): 15
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 17
Pump rate (gpm): na
Pumping water level: na
Pump setting (feet): na
Minimum purge time (min): na
Time begin purge: na

Time	Gallons	EC	pH	Temp.	Comments*
1038					Field log for this well missing. Well was purged and sampled in accordance with standard protocol.

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 7/10/02
Operator: S. Harris
Well number and location: **30S/11E-17D** Pismo Avenue / 18th Street
Site and wellhead conditions: Partly cloudy, dry. Equipped private well - operated daily. Sample from spigot at wellhead.

Static water depth (feet): (no access port)
Well depth (feet): 120
Water column (feet):
Casing diameter (inches): 10
Three casing volumes (gal):
Pump rate (gpm):
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 10:25 AM

Time	Gallons	EC	pH	Temp.	Comments*
1039		522	6.52	18.6	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/28/02
Operator: S. Harris
Well number and location: **30S/11E-17F4** Hollister Lane
Site and wellhead conditions: Sunny, warm, dry. Equipped private well, operated daily. Sample from spigot at wellhead.

Static water depth (feet): (access plug stuck)
Well depth (feet): 72
Water column (feet):
Casing diameter (inches): 6
Three casing volumes (gal):
Pump rate (gpm): 8 gpm
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 11:35 AM

Time	Gallons	EC	pH	Temp.	Comments*
1145	80	552	6.77	17.9	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/28/02
Operator: S. Harris
Well number and location: **30S/11E-17N4** Willow Road
Site and wellhead conditions: Sunny, warm, dry. Equipped private well, operated daily. Sample from spigot at wellhead.

Static water depth (feet): 30.07
Well depth (feet): 60
Water column (feet): 30
Casing diameter (inches): 8
Three casing volumes (gal):
Pump rate (gpm): 8 gpm
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 10:30 AM

Time	Gallons	EC	pH	Temp.	Comments*
1044	112	364	6.61	17.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/24/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18B1** Ramona Avenue / 10th Street.
Site and wellhead conditions: Overcast, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 17.98
Well depth (feet): 35
Water column (feet): 17
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 18
Pump rate (gpm): 1.7 @ 154 Hz
Pumping water level: 19.5
Pump setting (feet): 31
Minimum purge time (min): 11
Time begin purge: 2:47 PM

Time	Gallons	EC	pH	Temp.	Comments*
1447	<1	611	7.14	18.7	Slightly turbid, grayish brown, odorless
1450	5	626	6.82	17.8	Slightly turbid, grayish brown, odorless
1453	10	630	6.62	17.5	Slightly turbid, colorless, odorless
1456	15	632	6.56	17.3	Slightly turbid, colorless, odorless
1459	20	635	6.51	17.2	Clear, colorless, odorless
1501	25	636	6.52	17.1	Clear, colorless, odorless
1504	30	635	6.51	17.1	Clear, colorless, odorless
1507	35	636	6.51	17.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/24/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18C1** Pismo Avenue / 5th Street.
Site and wellhead conditions: Overcast, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 15.54
Well depth (feet): 34.5
Water column (feet): 19
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 20
Pump rate (gpm): 1.7 @ 160 Hz
Pumping water level: 17.9
Pump setting (feet): 31.5
Minimum purge time (min): 10
Time begin purge: 1:47 PM

Time	Gallons	EC	pH	Temp.	Comments*
1347	<1	626	7.09	20.2	Turbid, brown, odorless
1351	5	650	6.69	18.9	Turbid, brown, odorless
1354	10	656	6.60	18.4	Slightly turbid, light brown, odorless
1357	15	656	6.52	18.2	Slightly turbid, light brown, odorless
1400	20	658	6.49	18.1	Slightly turbid, light brown, odorless
1403	25	657	6.49	18.0	Very slightly turbid, colorless, odorless
1406	30	658	6.46	17.9	Very slightly turbid, colorless, odorless
1409	35	658	6.46	17.9	Clear, colorless, odorless
1411	40	658	6.46	17.9	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/27/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18E1** Private property off Ramona Avenue near Sweet Springs
Site and wellhead conditions: Partly sunny, dry. Well is 6-inch PVC with slip cap, sits inside wishing well housing. Protected from surface runoff.

Static water depth (feet): 25.42
Well depth (feet): 100
Water column (feet): 75
Casing diameter (inches): 6
Three casing volumes (gal): 330
Pump rate (gpm): 8 @ 377 Hz
Pumping water level: 28
Pump setting (feet): 50
Minimum purge time (min): 41
Time begin purge: 12:10

Time	Gallons	EC	pH	Temp.	Comments*
1210	<1	436	7.45	21.8	Clear, colorless, odorless
1214	10	451	6.78	19.6	Clear, colorless, odorless
1219	40	456	6.60	18.9	Clear, colorless, odorless
1224	70	444	6.58	18.5	Clear, colorless, odorless
1228	100	432	6.57	18.6	Clear, colorless, odorless
1232	130	426	6.58	18.5	Clear, colorless, odorless
1236	160	426	6.53	18.4	Clear, colorless, odorless
1240	190	423	6.52	18.2	Clear, colorless, odorless
1244	220	422	6.52	18.1	Clear, colorless, odorless
1248	250	419	6.52	18.1	Clear, colorless, odorless
1252	280	418	6.51	18.0	Clear, colorless, odorless
1256	210	418	6.55	18.1	Clear, colorless, odorless
1300	330	418	6.55	18.1	Clear, colorless, odorless

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 7/09/02
Operator: S. Harris
Well number and location: **30S/11E-18H3** Nipomo Avenue
Site and wellhead conditions: Partly cloudy, dry. Equipped private well - operated daily. Sample from spigot at wellhead.

Static water depth (feet): (well operating)
Well depth (feet): 110
Water column (feet):
Casing diameter (inches): 6
Three casing volumes (gal):
Pump rate (gpm):
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 10:10 AM

Time	Gallons	EC	pH	Temp.	Comments*
1018		435	6.59	18.5	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/25/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18J6** Los Olivos / Fairchild
Site and wellhead conditions: Sunny, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 23.57
Well depth (feet): 35
Water column (feet): 12
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 12
Pump rate (gpm): 0.33 @ 130 Hz
Pumping water level: 31.5
Pump setting (feet): 34
Minimum purge time (min): 36
Time begin purge: 11:40 AM

Time	Gallons	EC	pH	Temp.	Comments*
1140	2	645	6.90	20.4	Turbid, brown, odorless
1158	5	687	6.67	18.8	Turbid, brown, odorless
1221	10	674	6.70	19.1	Slightly turbid, brown, odorless
1234.	12	668	6.67	19.2	Slightly turbid, brown, odorless
1246	14	664	6.70	19.2	Pull pump, bail out well (sanded)
1322	16	641	6.60	20.6	Reset pump, start purging again
1327	18	631	6.51	20.4	Very slightly turbid, colorless, odorless
1331	20	635	6.42	20.5	Clear, colorless, odorless
1341	22	635	6.47	20.5	Clear, colorless, odorless
1351	25	630	6.37	20.6	Clear, colorless, odorless
1355	27	635	6.36	20.6	Clear, colorless, odorless
1407	30	626	6.35	20.8	Clear, colorless, odorless
1419	35	626	6.33	20.7	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/25/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18L3** Palisade Avenue across from library
Site and wellhead conditions: Partly sunny, warm, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 37.78
Well depth (feet): 53
Water column (feet): 15
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 17
Pump rate (gpm): 1.33 @ 167 Hz
Pumping water level: 40
Pump setting (feet): 49.5
Minimum purge time (min): 13
Time begin purge: 3:08 PM

Time	Gallons	EC	pH	Temp.	Comments*
1508	<1	404	7.08	20.7	Turbid, brown, odorless
1511	5	386	7.28	19.7	Slightly turbid, brown, odorless
1515	10	406	7.00	19.4	Slightly turbid, light brown, odorless
1518	15	424	6.94	19.3	Slightly turbid, colorless, odorless
1522	20	436	6.89	19.2	Clear, colorless, odorless
1526	25	445	6.87	19.1	Clear, colorless, odorless
1530	30	448	6.83	19.1	Clear, colorless, odorless
1533	35	453	6.80	19.1	Clear, colorless, odorless
1537	40	453	6.80	19.1	Clear, colorless, odorless
1541	45	454	6.80	19.1	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/26/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18L4** Ferrell Avenue
Site and wellhead conditions: Overcast, cool, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 19.40
Well depth (feet): 35
Water column (feet): 16
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 17
Pump rate (gpm): 1.6 @ 152 Hz
Pumping water level: 22
Pump setting (feet): 32
Minimum purge time (min): 9
Time begin purge: 11:05 AM

Time	Gallons	EC	pH	Temp.	Comments*
1105	<1	609	6.51	17.8	Slightly turbid, light brown, odorless
1108	5	578	6.38	17.9	Slightly turbid, light brown, odorless
1111	10	581	6.34	17.9	Very slightly turbid, colorless, odorless
1114	15	582	6.32	17.9	Very slightly turbid, colorless, odorless
1117	20	585	6.32	17.9	Clear, colorless, odorless
1120	25	585	6.33	17.9	Clear, colorless, odorless
1123	30	585	6.33	17.9	Clear, colorless, odorless
1127	35	585	6.33	18.0	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 6/27/02
Operator: S. Harris / M.. Gutormson
Well number and location: **30S/11E-18N1** Manzanita / Ravenna
Site and wellhead conditions: Sunny, warm, dry. Casing below grade inside well box vault. Watertight rubber gasket new/intact. Slip cap in place.

Static water depth (feet): 67.57
Well depth (feet): 94.5
Water column (feet): 27
Casing diameter (inches): 2
Borehole vol. w/pack (gal): 28
Pump rate (gpm): 2.5 @ 237 Hz
Pumping water level: 79
Pump setting (feet): 92
Minimum purge time (min): 11
Time begin purge: 1:35 PM

Time	Gallons	EC	pH	Temp.	Comments*
1335	<1	572	6.80	22.3	Brown, turbid, odorless
1338	5	600	6.60	20.6	Brown, turbid, odorless
1340	10	615	6.52	20.0	Brown, turbid, odorless
1343	15	622	6.43	19.6	Light brown, slightly turbid, odorless
1345	20	624	6.43	19.3	Very light gray, slightly turbid, odorless
1358	25	627	6.41	19.1	Very light gray, slightly turbid, odorless
1350	30	627	6.41	19.0	Very light gray, slightly turbid, odorless
1352	35	629	6.42	19.0	Very light gray, slightly turbid, odorless
1355	40	629	6.43	19.0	Very light gray, slightly turbid, odorless
1357	45	629	6.43	19.0	Very light gray, slightly turbid, odorless
1359	50	630	6.42	18.9	Very light gray, slightly turbid, odorless
1401	55	630	6.42	18.9	Clear, colorless, odorless
1403	60	630	6.42	18.9	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 7/02/02
Operator: S. Harris
Well number and location: **30S/11E-18R1** Los Osos Valley Road /Chaparral
Site and wellhead conditions: Sunny, warm, dry. Equipped private well - operated daily. Sample from spigot on west side of garage approx. 5 feet from wellhead.

Static water depth (feet): (access plug stuck)
Well depth (feet): 50
Water column (feet):
Casing diameter (inches): 8
Three casing volumes (gal):
Pump rate (gpm):
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 1:12 PM

Time	Gallons	EC	pH	Temp.	Comments*
1317		504	6.45	18.0	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

GROUND WATER MONITORING FIELD LOG
LOS OSOS NITRATE MONITORING PROGRAM

Date: 7/02/02
Operator: S. Harris
Well number and location: **30S/11E-20B** Eto Lane
Site and wellhead conditions: Sunny, warm, dry. Equipped private well - operated daily. Sample from spigot at wellhead.

Static water depth (feet): (no access port)
Well depth (feet): "Very shallow" (per owner)
Water column (feet):
Casing diameter (inches): 4
Three casing volumes (gal):
Pump rate (gpm):
Pumping water level:
Pump setting (feet):
Minimum purge time (min): 5
Time begin purge: 4:15 PM

Time	Gallons	EC	pH	Temp.	Comments*
1620		508	6.75	18.8	Clear, colorless, odorless

* turbidity, color, odor, sheen, debris, etc.

APPENDIX E

Laboratory Reports

ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28118-2
Collected:	07/02/02
Received:	07/02/02
Matrix:	Aqueous
Sample Description:	30S/10E-13A7
Analyzed:	07/03/02 - 07/12/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	55.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	55.
Specific Conductance	EPA 120.1	umhos/cm	1.0	450.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	270.
Boron	EPA 200.7	mg/L	0.05	0.07
Chloride	EPA 300.0	mg/L	0.5	73.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	12.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	16.
Calcium	EPA 200.8	mg/L	0.5	15.
Magnesium	EPA 200.8	mg/L	0.5	14.
Potassium	EPA 200.8	mg/L	1.0	1.2
Sodium	EPA 200.8	mg/L	0.5	44.

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717

*POL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed POL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
ZymaX envirotechnology, inc.

Michael Ng
Assistant Lab Director

28118-2g.xls
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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28046-4
Collected:	06/26/02
Received:	06/26/02
Matrix:	Aqueous
Sample Description:	30S/10E-13G
Analyzed:	06/27/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	51.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	51.
Specific Conductance	EPA 120.1	umhos/cm	1.0	520.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	360.
Boron	EPA 200.7	mg/L	0.05	0.08
Chloride	EPA 300.0	mg/L	0.5	110.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	9.3
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	14.
Calcium	EPA 200.8	mg/L	0.5	17.
Magnesium	EPA 200.8	mg/L	0.5	17.
Potassium	EPA 200.8	mg/L	1.0	1.1
Sodium	EPA 200.8	mg/L	0.5	56.

ZymaX envirotechnology, Inc. is certified by CA Department of Health Services: Laboratory #1717

*POL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed POL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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Michael Ng
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28046-4g.xls
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28046-3
Collected:	06/26/02
Received:	06/26/02
Matrix:	Aqueous
Sample Description:	30S/10E-13H
Analyzed:	06/27/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	49.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	49.
Specific Conductance	EPA 120.1	umhos/cm	1.0	160.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	220.
Boron	EPA 200.7	mg/L	0.05	0.05
Chloride	EPA 300.0	mg/L	0.5	20.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	1.0
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	9.6
Calcium	EPA 200.8	mg/L	0.5	12.
Magnesium	EPA 200.8	mg/L	0.5	7.2
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	9.9

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*PQL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Lab Number:	28046-5
Collected:	06/26/02
Received:	06/26/02
Matrix:	Aqueous
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris
Sample Description:	30S/10E-13L5
Analyzed:	06/27/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	140.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	140.
Specific Conductance	EPA 120.1	umhos/cm	1.0	1400.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	1100.
Boron	EPA 200.7	mg/L	0.05	0.12
Chloride	EPA 300.0	mg/L	0.5	350.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	19.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	21.
Calcium	EPA 200.8	mg/L	0.5	80.
Magnesium	EPA 200.8	mg/L	0.5	63.
Potassium	EPA 200.8	mg/L	1.0	2.2
Sodium	EPA 200.8	mg/L	0.5	110.

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***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
ZymaX envirotechnology, inc.

Michael Ng
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28046-5g.xls
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REPORT OF ANALYTICAL RESULTS

Client:	**Bruce Buel** **Los Osos CSD** **P.O. Box 6064** **Los Osos, CA 93412**

Lab Number:	**28063-3**
Collected:	**06/27/02**
Received:	**06/27/02**
Matrix:	**Aqueous**

Project:	**Nitrate Monitoring Program**
Project Number:	
Collected by:	**S. Harris**

Sample Description:	**30S/10E-13Q1**
Analyzed:	**06/28/02 - 07/08/02**
Method:	**See Below**

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	95.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	95.
Specific Conductance	EPA 120.1	umhos/cm	1.0	580.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	480.
Boron	EPA 200.7	mg/L	0.05	0.09
Chloride	EPA 300.0	mg/L	0.5	110.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	20.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	33.
Calcium	EPA 200.8	mg/L	0.5	33.
Magnesium	EPA 200.8	mg/L	0.5	24.
Potassium	EPA 200.8	mg/L	1.0	2.8
Sodium	EPA 200.8	mg/L	0.5	96.

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***PQL - Practical Quantitation Limit**

****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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Michael Ng
Assistant Lab Director

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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28063-4
Collected:	06/27/02
Received:	06/27/02
Matrix:	Aqueous
Sample Description:	30S/10E-24A
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	47.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	47.
Specific Conductance	EPA 120.1	umhos/cm	1.0	270.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	240.
Boron	EPA 200.7	mg/L	0.05	ND
Chloride	EPA 300.0	mg/L	0.5	48.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	11.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	6.2
Calcium	EPA 200.8	mg/L	0.5	10.
Magnesium	EPA 200.8	mg/L	0.5	9.8
Potassium	EPA 200.8	mg/L	1.0	1.1
Sodium	EPA 200.8	mg/L	0.5	58.

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**Results listed as ND would have been reported if present at or above the listed POL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28020-2
Collected:	06/24/02
Received:	06/24/02
Matrix:	Aqueous
Sample Description:	30S/11E-7K3
Analyzed:	06/25/02 - 07/02/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	100.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	100.
Specific Conductance	EPA 120.1	umhos/cm	1.0	480.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	340.
Boron	EPA 200.7	mg/L	0.05	0.14
Chloride	EPA 300.0	mg/L	0.5	67.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	12.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	31.
Calcium	EPA 200.8	mg/L	0.5	25.
Magnesium	EPA 200.8	mg/L	0.5	25.
Potassium	EPA 200.8	mg/L	1.0	1.2
Sodium	EPA 200.8	mg/L	0.5	48.

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client: Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412	**Lab Number:** 28020-3 **Collected:** 06/24/02 **Received:** 06/24/02 **Matrix:** Aqueous
Project: Nitrate Monitoring Program **Project Number:** **Collected by:** S. Harris	**Sample Description:** 30S/11E-7L3 **Analyzed:** 06/25/02 - 07/03/02 **Method:** See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	130.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	130.
Specific Conductance	EPA 120.1	umhos/cm	1.0	800.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	430.
Boron	EPA 200.7	mg/L	0.05	0.12
Chloride	EPA 300.0	mg/L	0.5	81.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	15.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	0.7
Organic Nitrogen	Calculation	mg/L	0.5	0.7
Sulfate	EPA 300.0	mg/L	0.5	45.
Calcium	EPA 200.8	mg/L	0.5	24.
Magnesium	EPA 200.8	mg/L	0.5	18.
Potassium	EPA 200.8	mg/L	1.0	2.4
Sodium	EPA 200.8	mg/L	0.5	100.

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28079-2
Collected:	06/28/02
Received:	06/28/02
Matrix:	Aqueous
Sample Description:	30S/11E-7N1
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	60.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	60.
Specific Conductance	EPA 120.1	umhos/cm	1.0	220.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	160.
Boron	EPA 200.7	mg/L	0.05	ND
Chloride	EPA 300.0	mg/L	0.5	37.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	3.0
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	6.9
Calcium	EPA 200.8	mg/L	0.5	13.
Magnesium	EPA 200.8	mg/L	0.5	9.4
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	32.

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28046-1
Collected:	06/26/02
Received:	06/26/02
Matrix:	Aqueous
Sample Description:	30S/11E-7Q1
Analyzed:	06/27/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	95.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	95.
Specific Conductance	EPA 120.1	umhos/cm	1.0	560.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	360.
Boron	EPA 200.7	mg/L	0.05	0.18
Chloride	EPA 300.0	mg/L	0.5	73.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	16.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	1.1
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	32.
Calcium	EPA 200.8	mg/L	0.5	24.
Magnesium	EPA 200.8	mg/L	0.5	18.
Potassium	EPA 200.8	mg/L	1.0	3.7
Sodium	EPA 200.8	mg/L	0.5	34.

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Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Lab Number:	28020-1
Collected:	06/24/02
Received:	06/24/02
Matrix:	Aqueous
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris
Sample Description:	30S/11E-7R1
Analyzed:	06/25/02 - 07/02/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Specific Conductance	EPA 120.1	umhos/cm	1.0	490.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	340.
Boron	EPA 200.7	mg/L	0.05	0.13
Chloride	EPA 300.0	mg/L	0.5	57.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	12.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	28.
Calcium	EPA 200.8	mg/L	0.5	34.
Magnesium	EPA 200.8	mg/L	0.5	22.
Potassium	EPA 200.8	mg/L	1.0	3.1
Sodium	EPA 200.8	mg/L	0.5	60.

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Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28035-1
Collected:	06/25/02
Received:	06/25/02
Matrix:	Aqueous
Sample Description:	30S/11E-8N2
Analyzed:	06/25/02 - 07/03/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Specific Conductance	EPA 120.1	umhos/cm	1.0	190.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	150.
Boron	EPA 200.7	mg/L	0.05	ND
Chloride	EPA 300.0	mg/L	0.5	21.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	2.4
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	0.5
Organic Nitrogen	Calculation	mg/L	0.5	0.5
Sulfate	EPA 300.0	mg/L	0.5	13.
Calcium	EPA 200.8	mg/L	0.5	14.
Magnesium	EPA 200.8	mg/L	0.5	7.3
Potassium	EPA 200.8	mg/L	1.0	2.5
Sodium	EPA 200.8	mg/L	0.5	17.

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Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28161-2
Collected:	07/09/02
Received:	07/09/02
Matrix:	Aqueous
Sample Description:	30S/11E-17D
Analyzed:	07/10/02 - 07/17/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	57.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	57.
Specific Conductance	EPA 120.1	umhos/cm	1.0	520.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	340.
Boron	EPA 200.7	mg/L	0.05	0.09
Chloride	EPA 300.0	mg/L	0.5	76.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	17.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	27.
Calcium	EPA 200.8	mg/L	0.5	20.
Magnesium	EPA 200.8	mg/L	0.5	14.
Potassium	EPA 200.8	mg/L	1.0	1.3
Sodium	EPA 200.8	mg/L	0.5	45.

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**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Lab Number:	28079-3
Collected:	06/28/02
Received:	06/28/02
Matrix:	Aqueous
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris
Sample Description:	30S/11E-17F4
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	120.
Specific Conductance	EPA 120.1	umhos/cm	1.0	450.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	330.
Boron	EPA 200.7	mg/L	0.05	0.05
Chloride	EPA 300.0	mg/L	0.5	86.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	3.0
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	21.
Calcium	EPA 200.8	mg/L	0.5	25.
Magnesium	EPA 200.8	mg/L	0.5	25.
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	61.

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Lab Number:	28079-1
Collected:	06/28/02
Received:	06/28/02
Matrix:	Aqueous
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris
Sample Description:	306/11E-17N4
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	40.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	40.
Specific Conductance	EPA 120.1	umhos/cm	1.0	360.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	230.
Boron	EPA 200.7	mg/L	0.05	0.06
Chloride	EPA 300.0	mg/L	0.5	61.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	7.6
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	15.
Calcium	EPA 200.8	mg/L	0.5	14.
Magnesium	EPA 200.8	mg/L	0.5	12.
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	46.

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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28020-5
Collected:	06/24/02
Received:	06/24/02
Matrix:	Aqueous
Sample Description:	30S/11E-18B1
Analyzed:	06/25/02 - 07/03/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	150.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	150.
Specific Conductance	EPA 120.1	umhos/cm	1.0	530.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	340.
Boron	EPA 200.7	mg/L	0.05	0.14
Chloride	EPA 300.0	mg/L	0.5	78.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	6.9
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	0.2
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	0.6
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	28.
Calcium	EPA 200.8	mg/L	0.5	40.
Magnesium	EPA 200.8	mg/L	0.5	19.
Potassium	EPA 200.8	mg/L	1.0	9.0
Sodium	EPA 200.8	mg/L	0.5	60.

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28020-4
Collected:	06/24/02
Received:	06/24/02
Matrix:	Aqueous
Sample Description:	30S/11E-18C1
Analyzed:	06/25/02 - 07/03/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	99.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	99.
Specific Conductance	EPA 120.1	umhos/cm	1.0	550.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	380.
Boron	EPA 200.7	mg/L	0.05	0.08
Chloride	EPA 300.0	mg/L	0.5	81.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	15.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	0.6
Organic Nitrogen	Calculation	mg/L	0.5	0.6
Sulfate	EPA 300.0	mg/L	0.5	45.
Calcium	EPA 200.8	mg/L	0.5	31.
Magnesium	EPA 200.8	mg/L	0.5	23.
Potassium	EPA 200.8	mg/L	1.0	2.3
Sodium	EPA 200.8	mg/L	0.5	59.

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*PQL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28063-1
Collected:	06/27/02
Received:	06/27/02
Matrix:	Aqueous
Sample Description:	30S/11E-18E1
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	61.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	61.
Specific Conductance	EPA 120.1	umhos/cm	1.0	370.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	250.
Boron	EPA 200.7	mg/L	0.05	0.06
Chloride	EPA 300.0	mg/L	0.5	54.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	11.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	21.
Calcium	EPA 200.8	mg/L	0.5	17.
Magnesium	EPA 200.8	mg/L	0.5	15.
Potassium	EPA 200.8	mg/L	1.0	1.0
Sodium	EPA 200.8	mg/L	0.5	48.

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28161-1
Collected:	07/09/02
Received:	07/09/02
Matrix:	Aqueous
Sample Description:	30S/11E-18H3
Analyzed:	07/10/02 - 07/17/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	65.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	65.
Specific Conductance	EPA 120.1	umhos/cm	1.0	420.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	290.
Boron	EPA 200.7	mg/L	0.05	0.06
Chloride	EPA 300.0	mg/L	0.5	64.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	11.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	17.
Calcium	EPA 200.8	mg/L	0.5	24.
Magnesium	EPA 200.8	mg/L	0.5	13.
Potassium	EPA 200.8	mg/L	1.0	1.6
Sodium	EPA 200.8	mg/L	0.5	35.

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**Results listed as ND would have been reported if present at or above the listed POL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Lab Number:	28035-2
Collected:	06/25/02
Received:	06/25/02
Matrix:	Aqueous
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris
Sample Description:	30S/11E-18J6
Analyzed:	06/25/02 - 07/03/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	53.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	53.
Specific Conductance	EPA 120.1	umhos/cm	1.0	590.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	360.
Boron	EPA 200.7	mg/L	0.05	0.07
Chloride	EPA 300.0	mg/L	0.5	85.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	6.9
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	0.3
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	0.7
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	32.
Calcium	EPA 200.8	mg/L	0.5	45.
Magnesium	EPA 200.8	mg/L	0.5	23.
Potassium	EPA 200.8	mg/L	1.0	2.0
Sodium	EPA 200.8	mg/L	0.5	51.

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**Results listed as ND would have been reported if present at or above the listed POL.

Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28035-3
Collected:	06/25/02
Received:	06/25/02
Matrix:	Aqueous
Sample Description:	30S/11E-18L3
Analyzed:	06/25/02 - 07/03/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	59.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	59.
Specific Conductance	EPA 120.1	umhos/cm	1.0	450.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	290.
Boron	EPA 200.7	mg/L	0.05	0.11
Chloride	EPA 300.0	mg/L	0.5	62.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	9.2
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	22.
Calcium	EPA 200.8	mg/L	0.5	22.
Magnesium	EPA 200.8	mg/L	0.5	14.
Potassium	EPA 200.8	mg/L	1.0	3.3
Sodium	EPA 200.8	mg/L	0.5	46.

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28046-2
Collected:	06/26/02
Received:	06/26/02
Matrix:	Aqueous
Sample Description:	30S/11E-18L4
Analyzed:	06/27/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	POL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	88.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	88.
Specific Conductance	EPA 120.1	umhos/cm	1.0	520.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	350.
Boron	EPA 200.7	mg/L	0.05	0.10
Chloride	EPA 300.0	mg/L	0.5	61.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	19.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	34.
Calcium	EPA 200.8	mg/L	0.5	28.
Magnesium	EPA 200.8	mg/L	0.5	23.
Potassium	EPA 200.8	mg/L	1.0	2.1
Sodium	EPA 200.8	mg/L	0.5	48.

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28063-2
Collected:	06/27/02
Received:	06/27/02
Matrix:	Aqueous
Sample Description:	30S/11E-18N1
Analyzed:	06/28/02 - 07/08/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	48.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	48.
Specific Conductance	EPA 120.1	umhos/cm	1.0	510.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	420.
Boron	EPA 200.7	mg/L	0.05	0.18
Chloride	EPA 300.0	mg/L	0.5	100.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	18.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	37.
Calcium	EPA 200.8	mg/L	0.5	25.
Magnesium	EPA 200.8	mg/L	0.5	20.
Potassium	EPA 200.8	mg/L	1.0	1.9
Sodium	EPA 200.8	mg/L	0.5	94.

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Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28118-1
Collected:	07/02/02
Received:	07/02/02
Matrix:	Aqueous
Sample Description:	30S/11E-18R1
Analyzed:	07/03/02 - 07/12/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	48.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	48.
Specific Conductance	EPA 120.1	umhos/cm	1.0	530.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	320.
Boron	EPA 200.7	mg/L	0.05	0.14
Chloride	EPA 300.0	mg/L	0.5	85.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	14.
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	19.
Calcium	EPA 200.8	mg/L	0.5	19.
Magnesium	EPA 200.8	mg/L	0.5	15.
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	65.

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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REPORT OF ANALYTICAL RESULTS

Client:	Bruce Buel Los Osos CSD P.O. Box 6064 Los Osos, CA 93412
Project:	Nitrate Monitoring Program
Project Number:	
Collected by:	S. Harris

Lab Number:	28118-3
Collected:	07/02/02
Received:	07/02/02
Matrix:	Aqueous
Sample Description:	30S/11E-20B
Analyzed:	07/03/02 - 07/12/02
Method:	See Below

GENERAL MINERALS

CONSTITUENT	METHOD	UNITS	PQL*	RESULT**
Total Alkalinity	SM 2320B	mg/L CaCO3	5.0	96.
Hydroxide Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Carbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	ND
Bicarbonate Alkalinity	SM 2320B	mg/L CaCO3	5.0	96.
Specific Conductance	EPA 120.1	umhos/cm	1.0	490.
Total Dissolved Solids	EPA 160.1	mg/L	5.0	290.
Boron	EPA 200.7	mg/L	0.05	0.06
Chloride	EPA 300.0	mg/L	0.5	82.
Nitrate as Nitrogen (NO3-N)	EPA 300.0	mg/L	0.4	5.7
Nitrite as Nitrogen (NO2-N)	EPA 300.0	mg/L	0.4	ND
Ammonia - Nitrogen	EPA 350.3	mg/L	0.1	ND
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.5	ND
Organic Nitrogen	Calculation	mg/L	0.5	ND
Sulfate	EPA 300.0	mg/L	0.5	26.
Calcium	EPA 200.8	mg/L	0.5	24.
Magnesium	EPA 200.8	mg/L	0.5	28.
Potassium	EPA 200.8	mg/L	1.0	ND
Sodium	EPA 200.8	mg/L	0.5	38.

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*PQL - Practical Quantitation Limit

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Note: Analyses performed by CA Department of Health Services certified laboratories #1717, and #1958

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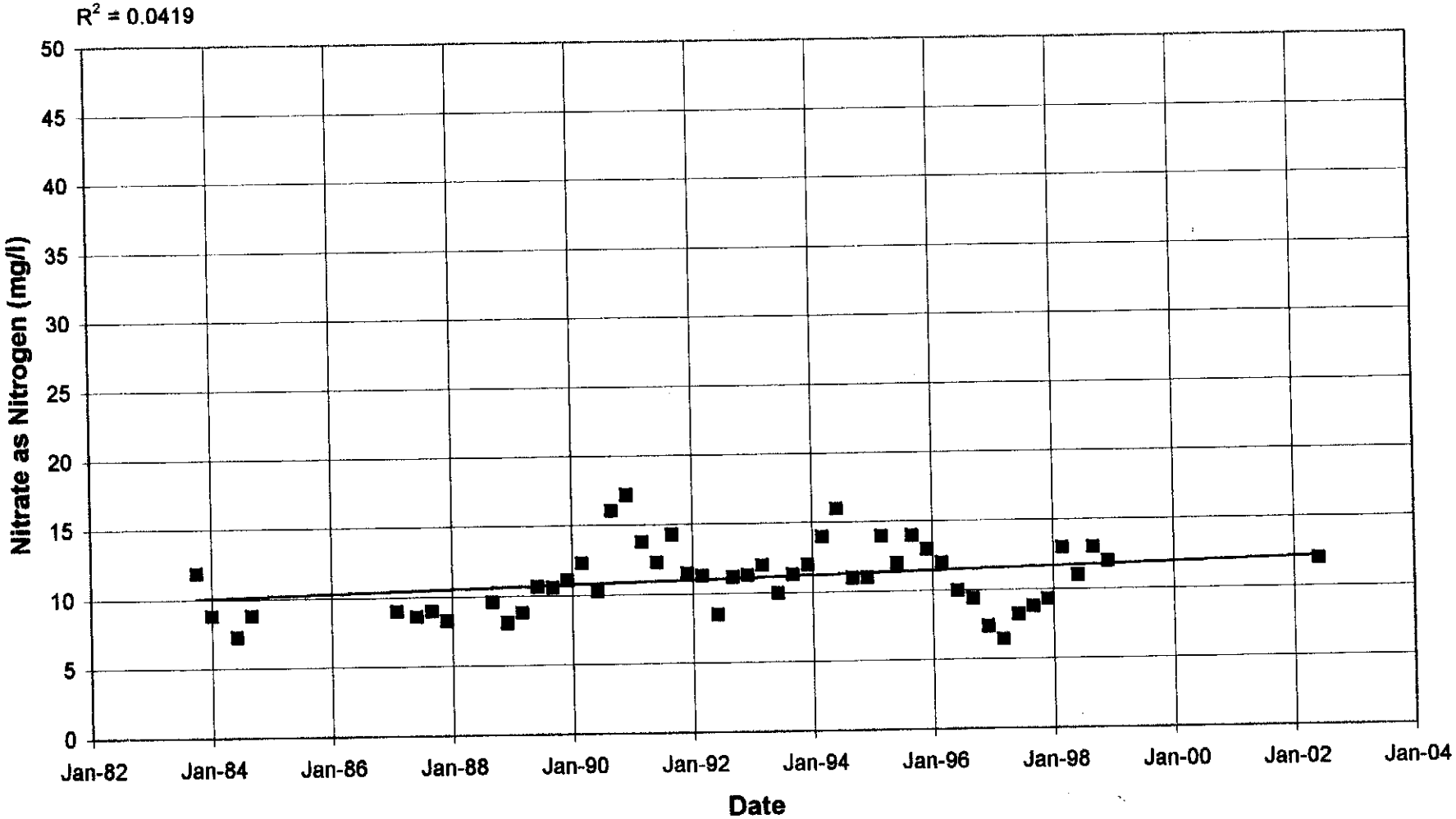
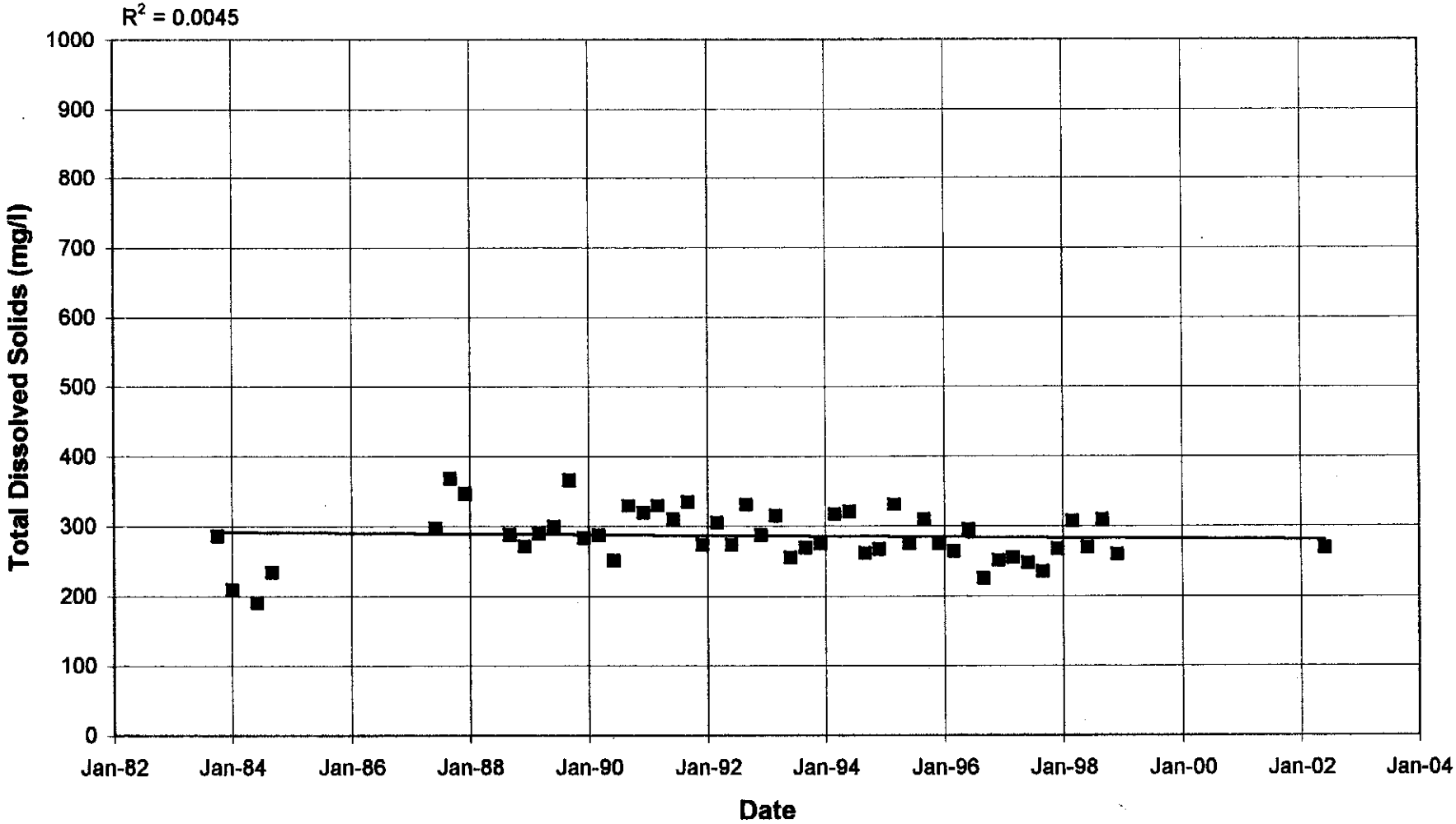
APPENDIX F

Chemical Hydrographs

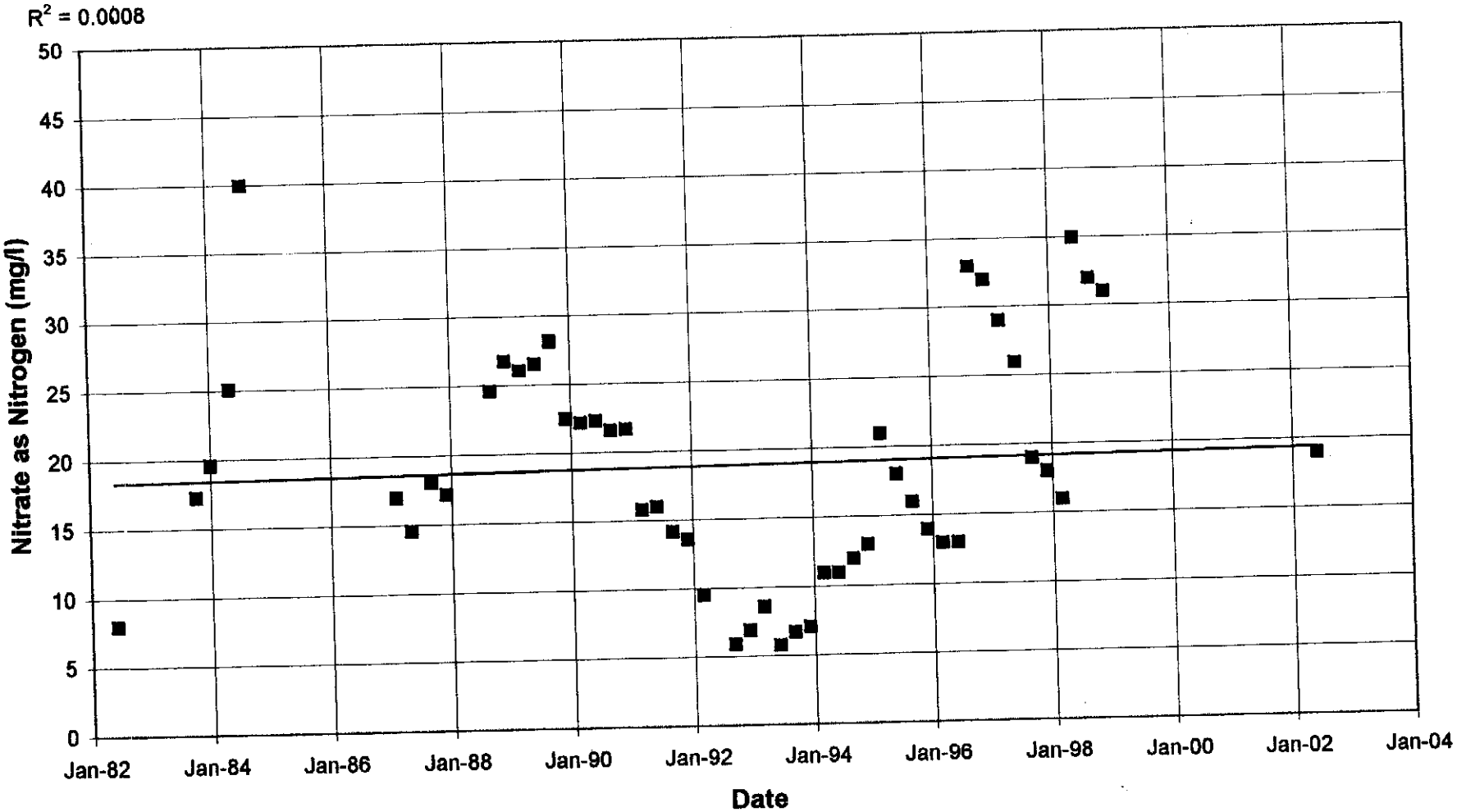
Graph 1
Well 30S/10E-13A7
NO_3-N vs Time



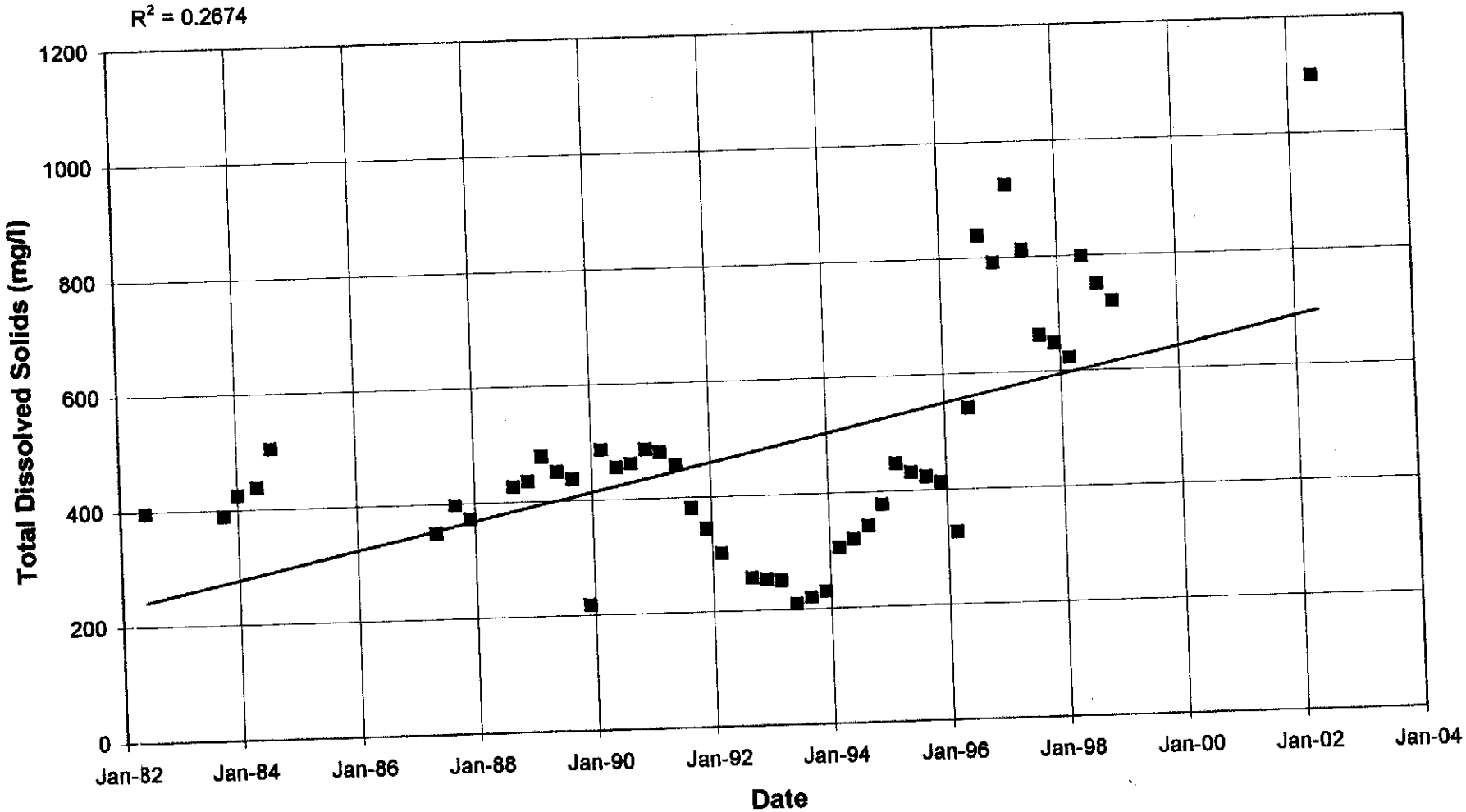
Graph 2
Well 30S/10E-13A7
TDS vs Time



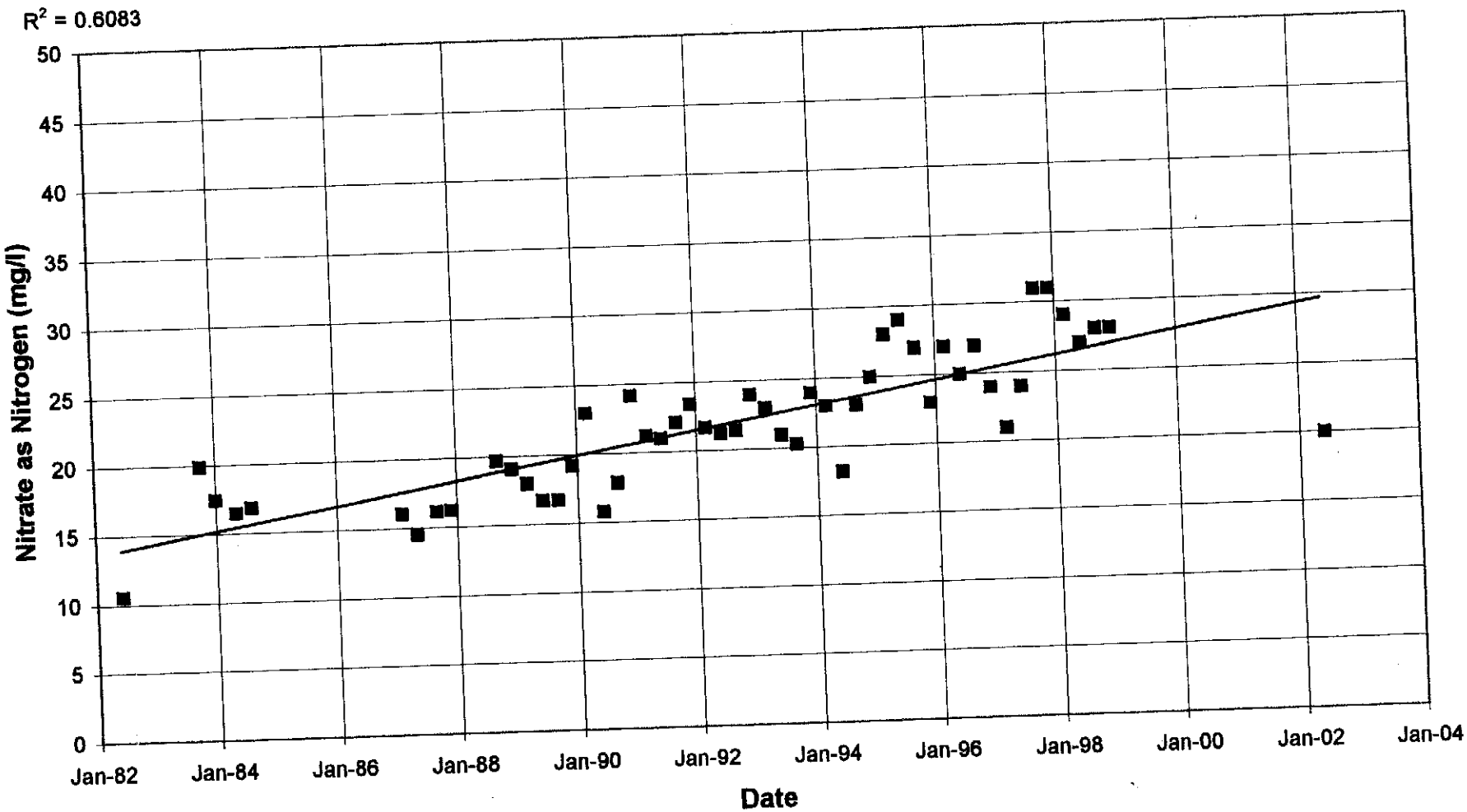
Graph 3
Well 30S/10E-13L5
NO_3-N vs Time



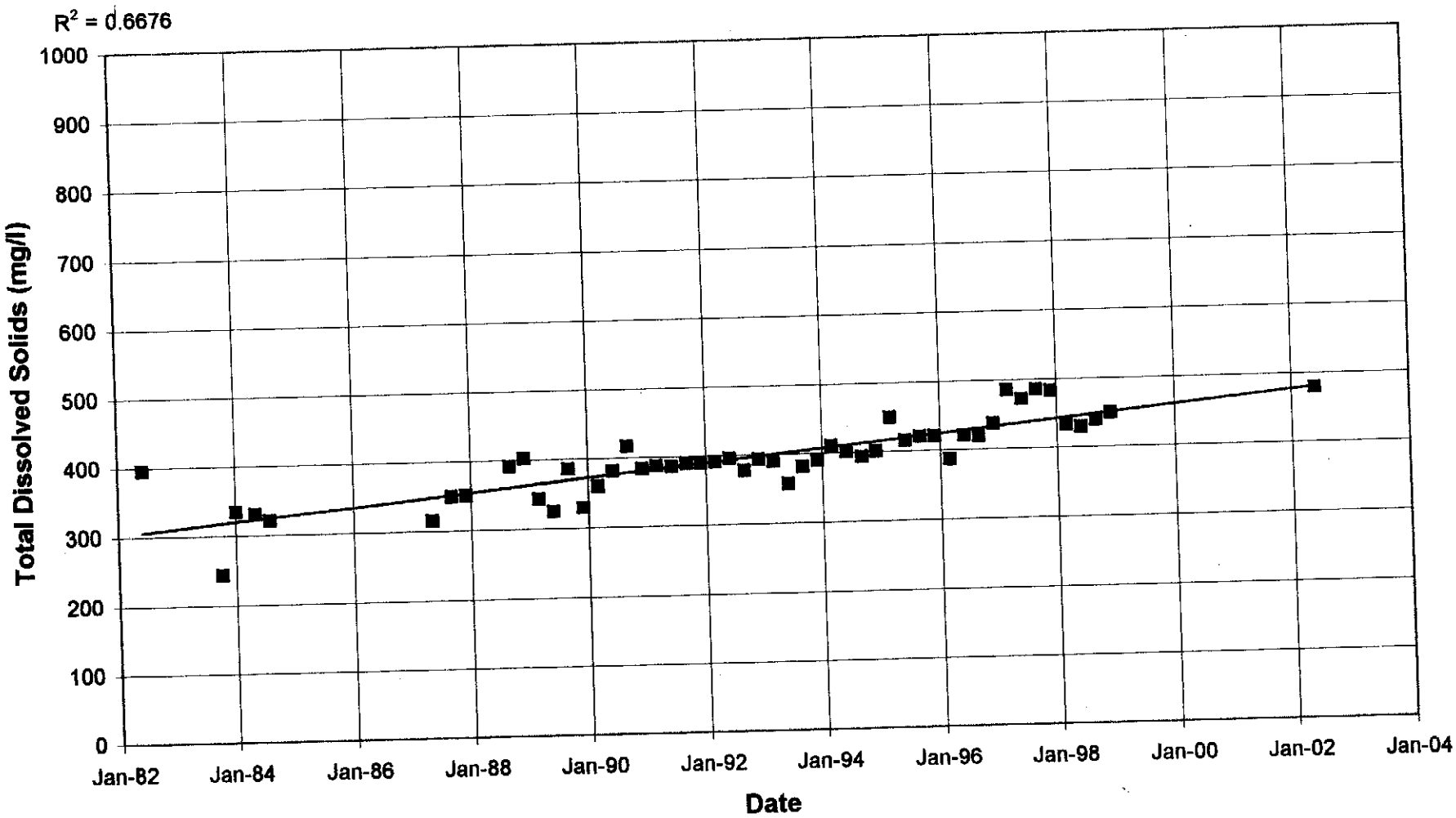
Graph 4
Well 30S/10E-13L5
TDS vs Time



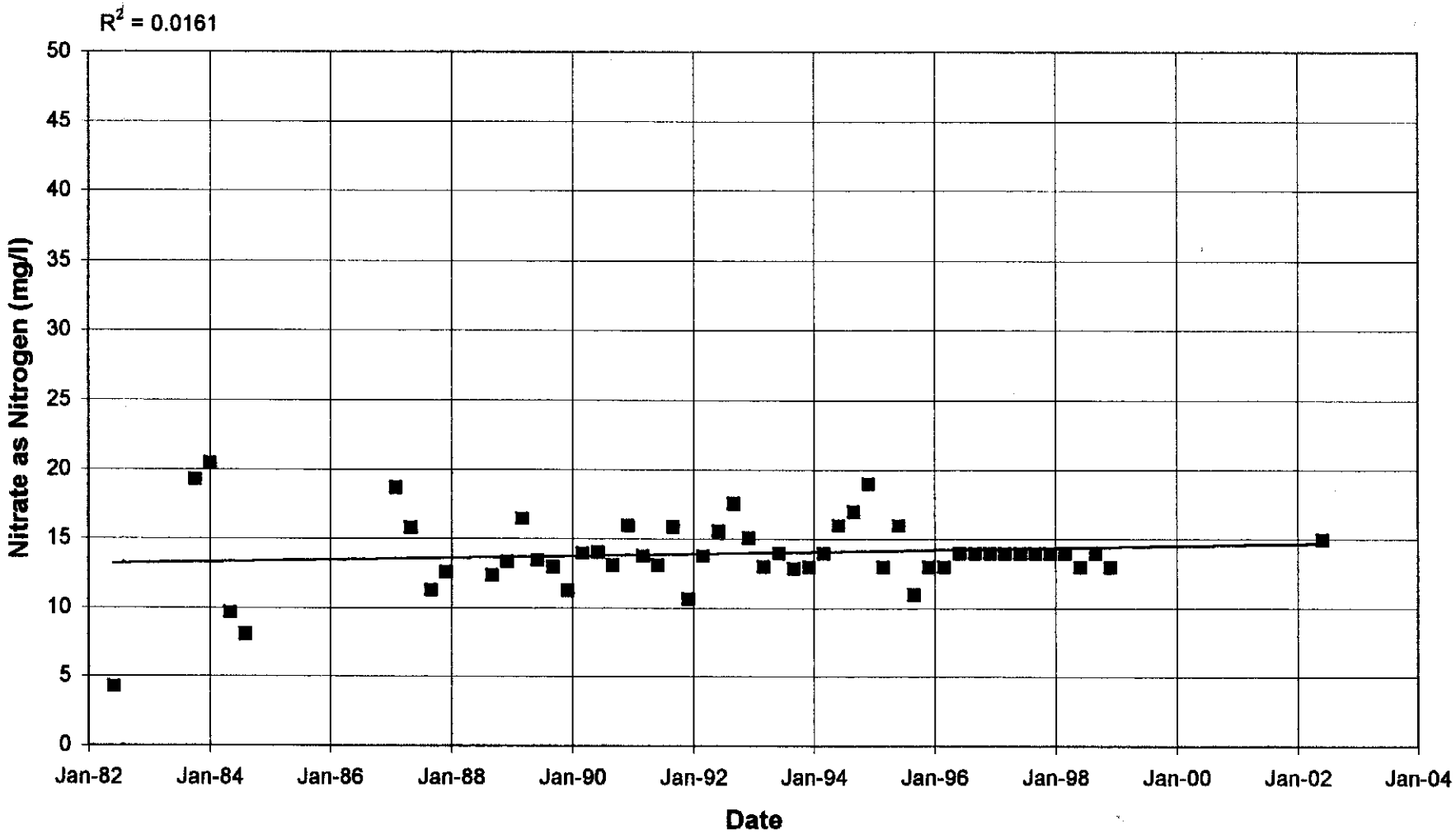
Graph 5
Well 30S/10E-13Q1
NO_3-N vs Time



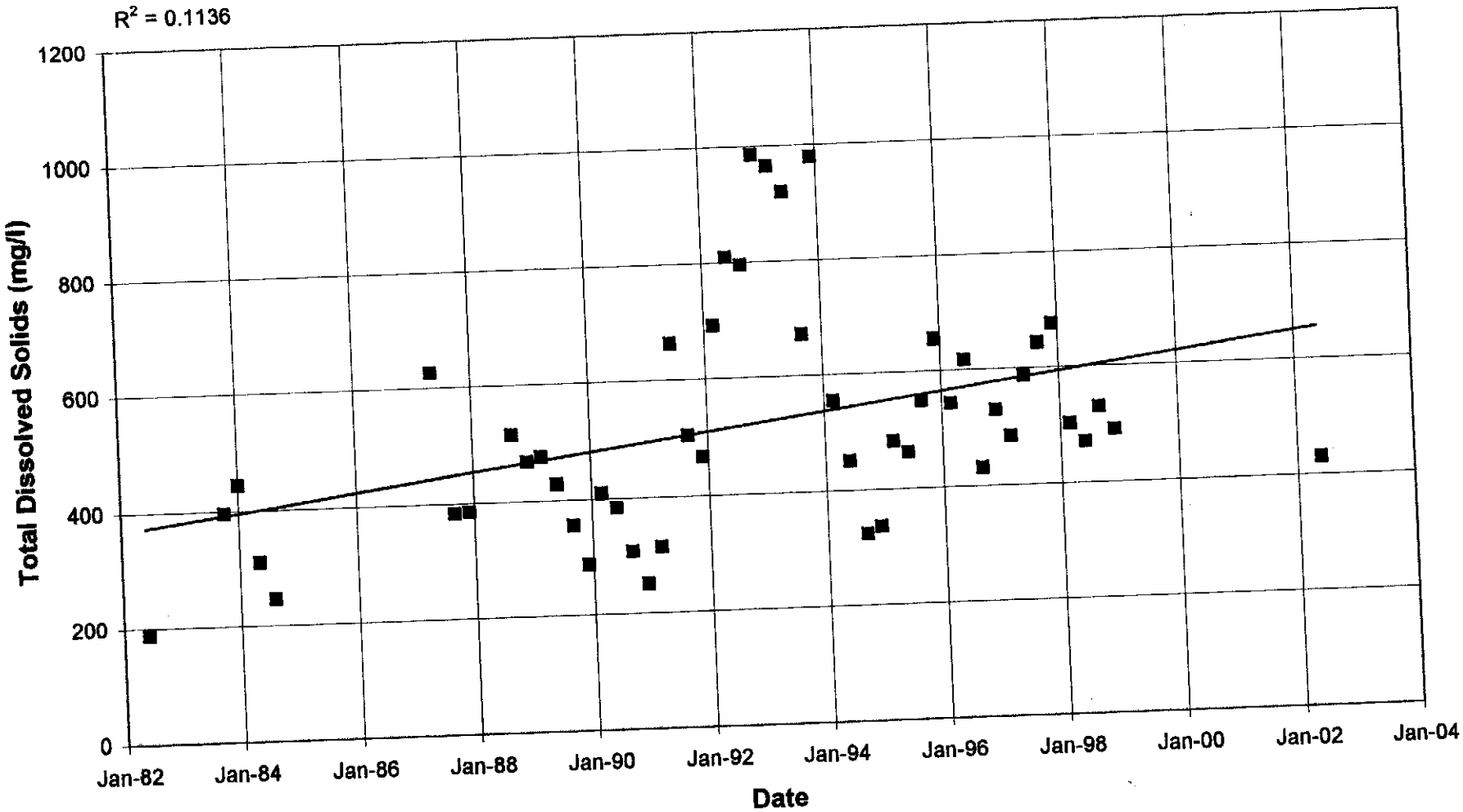
Graph 6
Well 30S/10E-13Q1
TDS vs Time



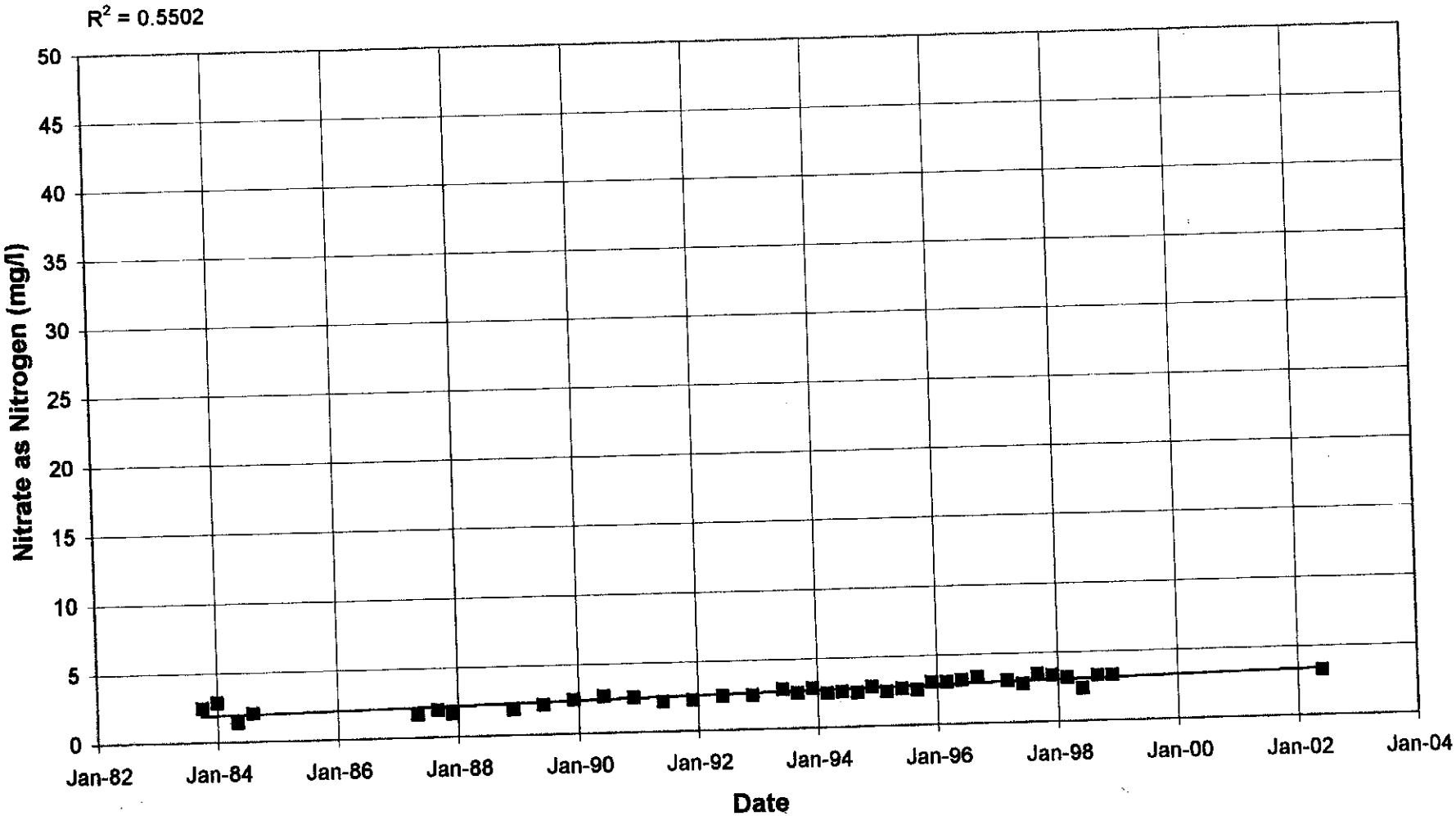
Graph 7
Well 30S/11E-7L3
NO_3-N vs Time



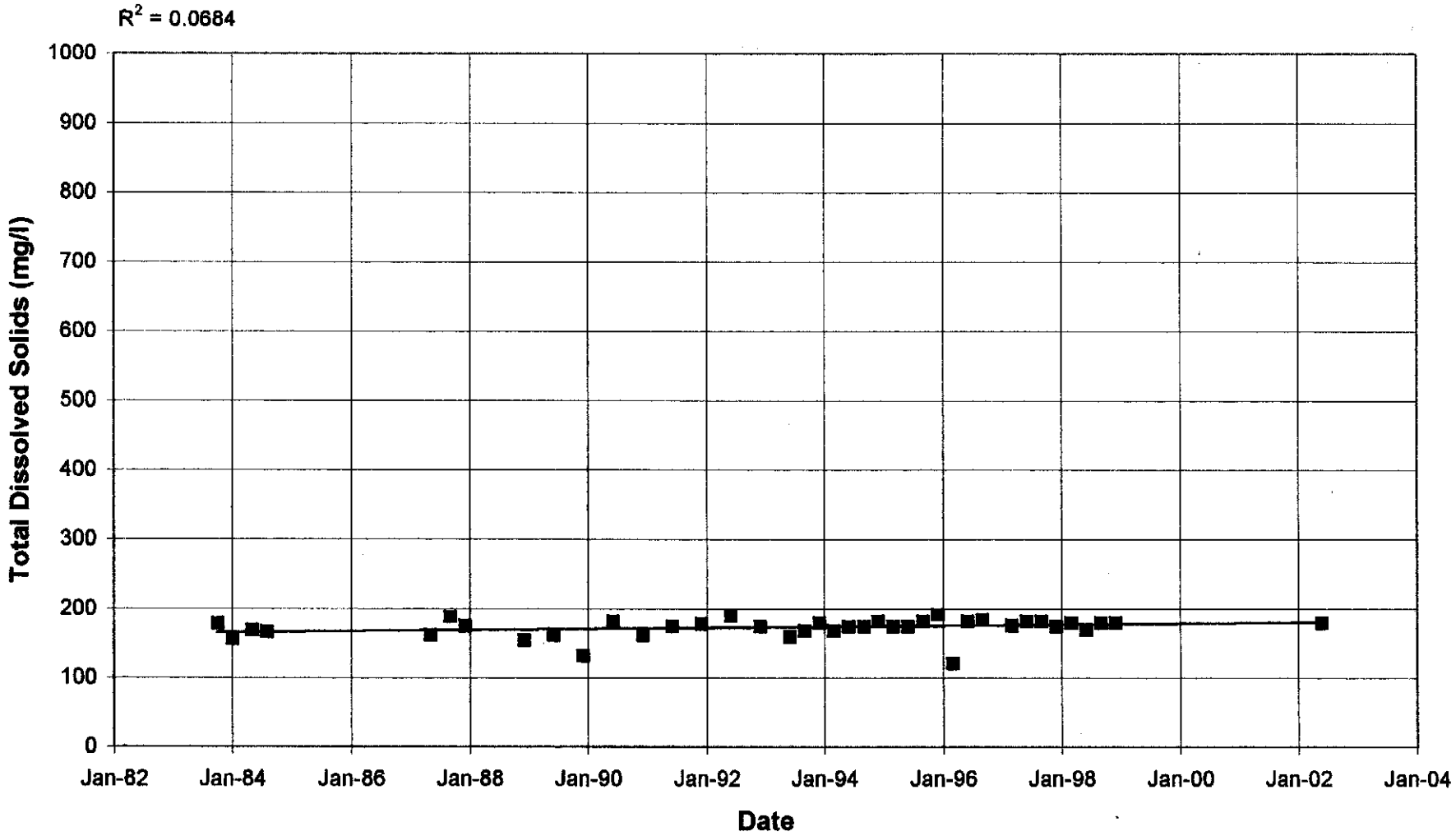
Graph 8
Well 30S/11E-7L3
TDS vs Time



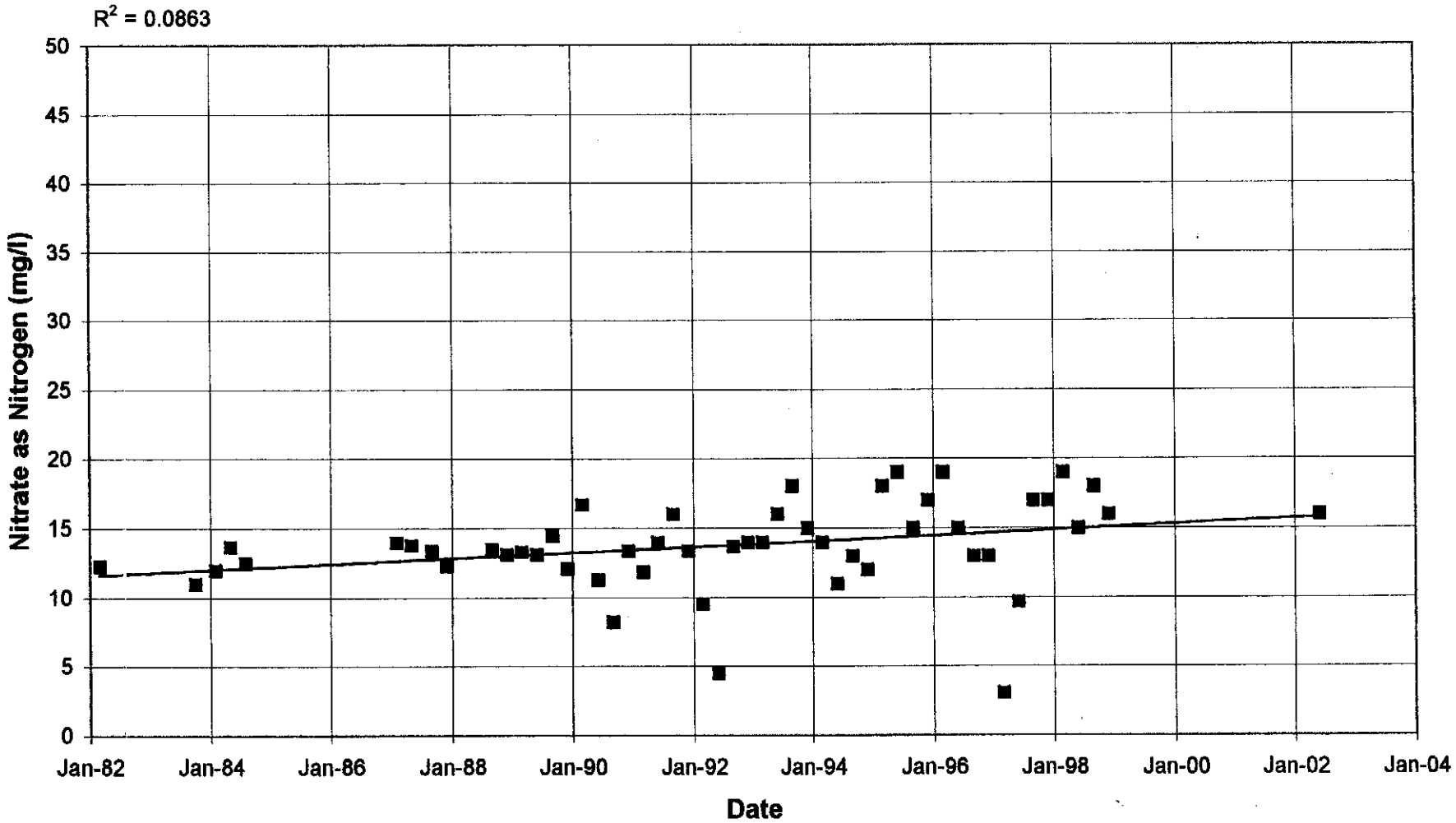
Graph 9
Well 30S/11E-7N1
NO_3-N vs Time



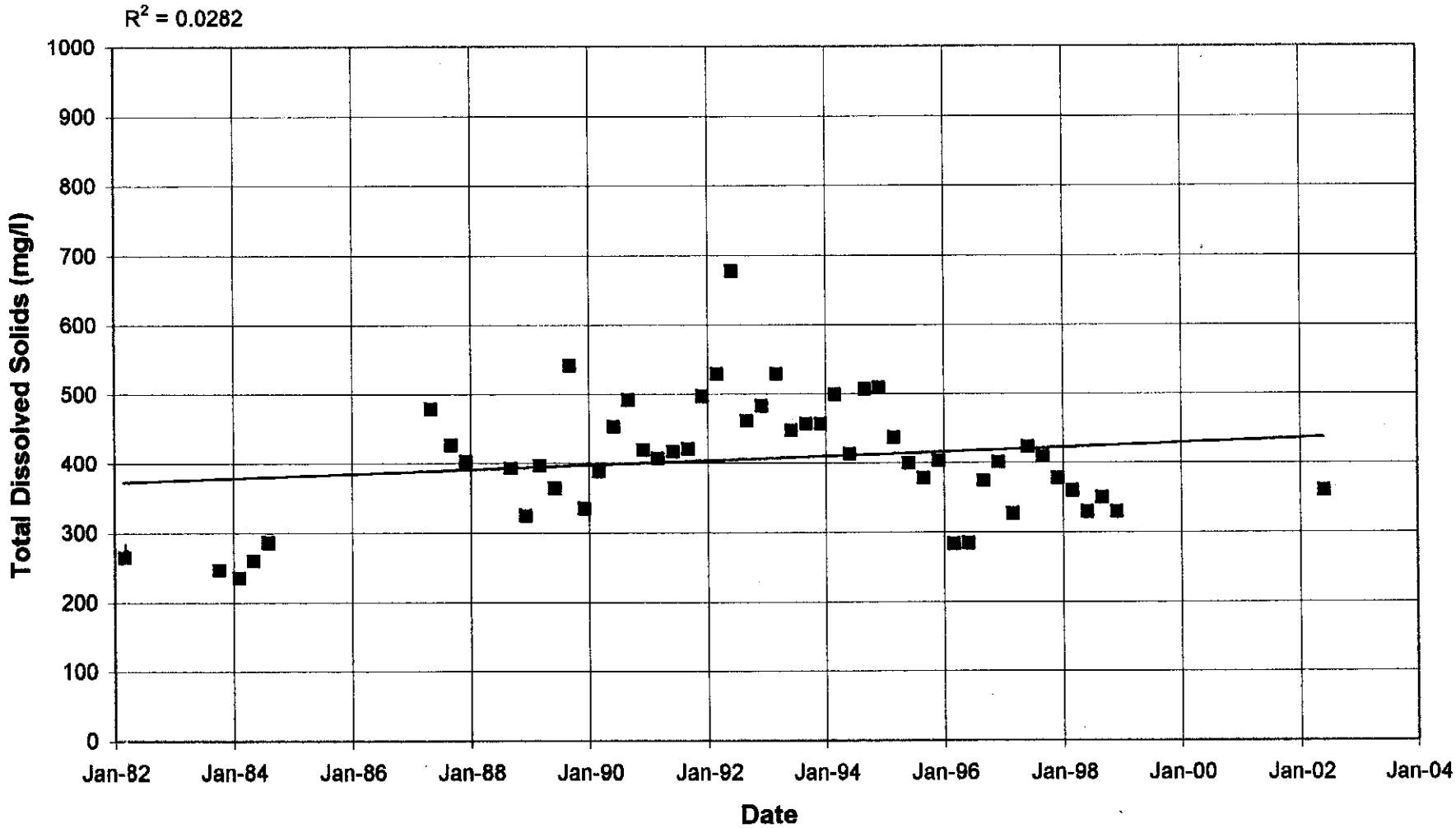
Graph 10
Well 30S/11E-7N1
TDS vs Time

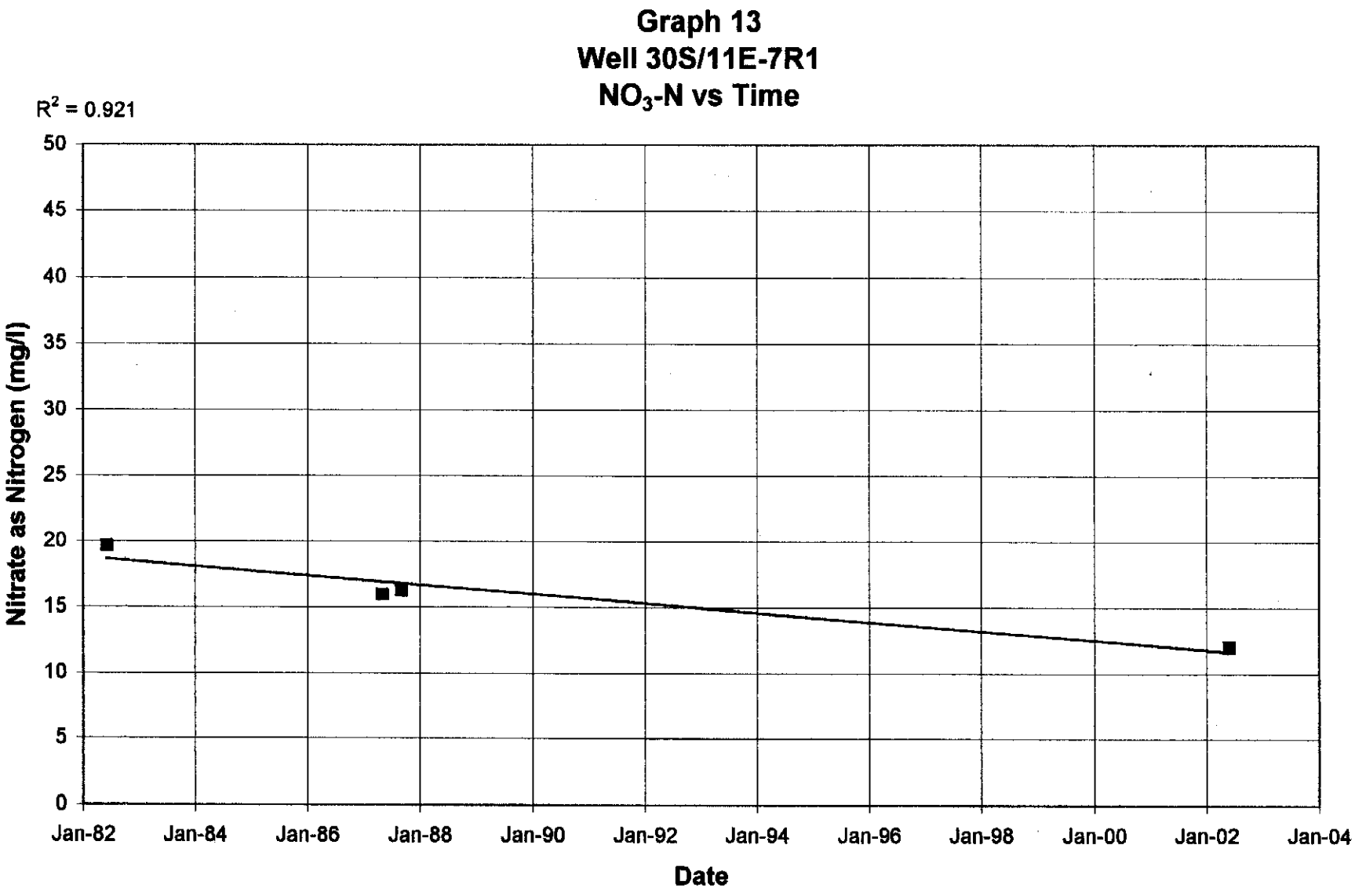


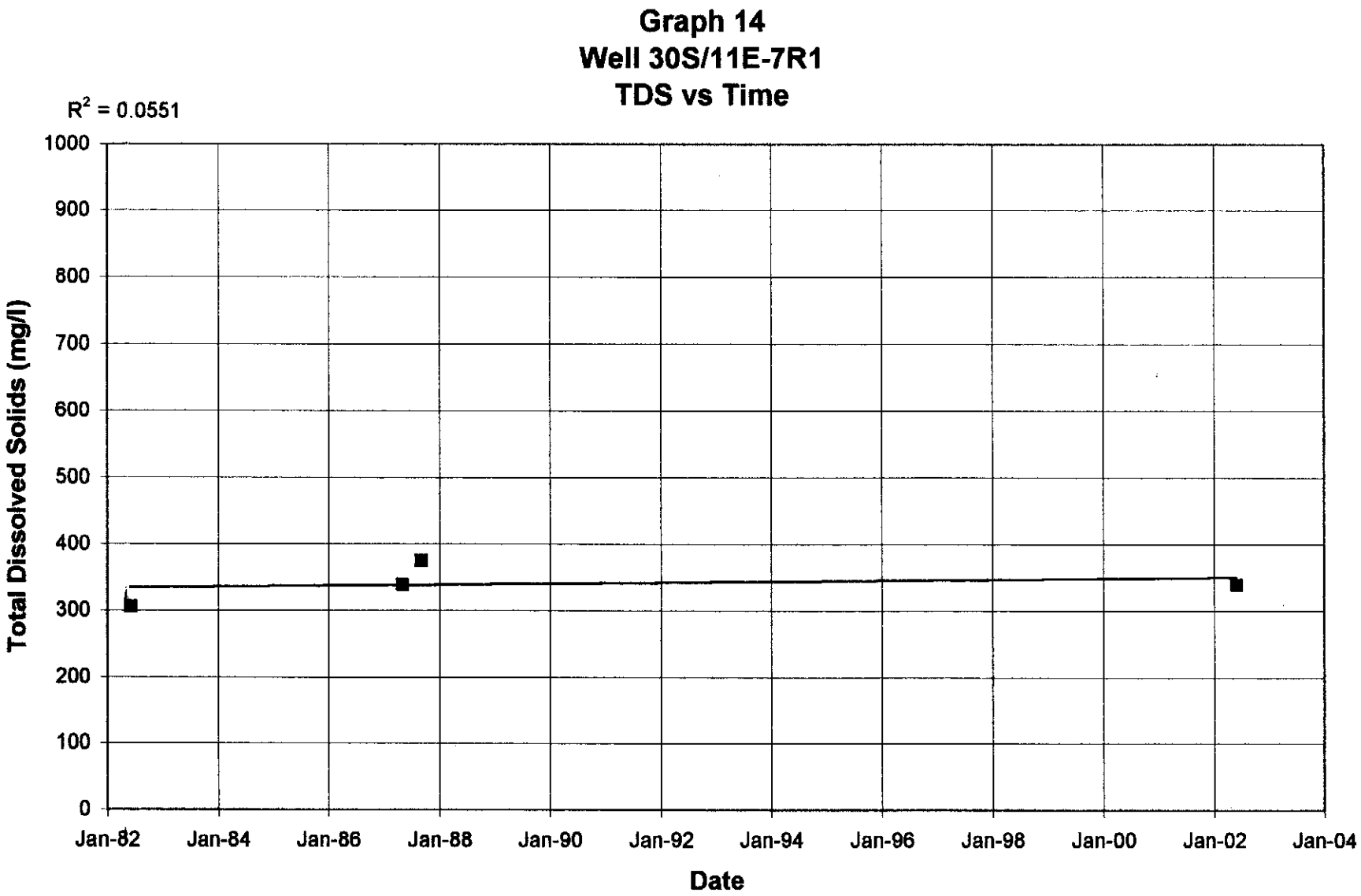
Graph 11
Well 30S/11E-7Q1
NO_3-N vs Time



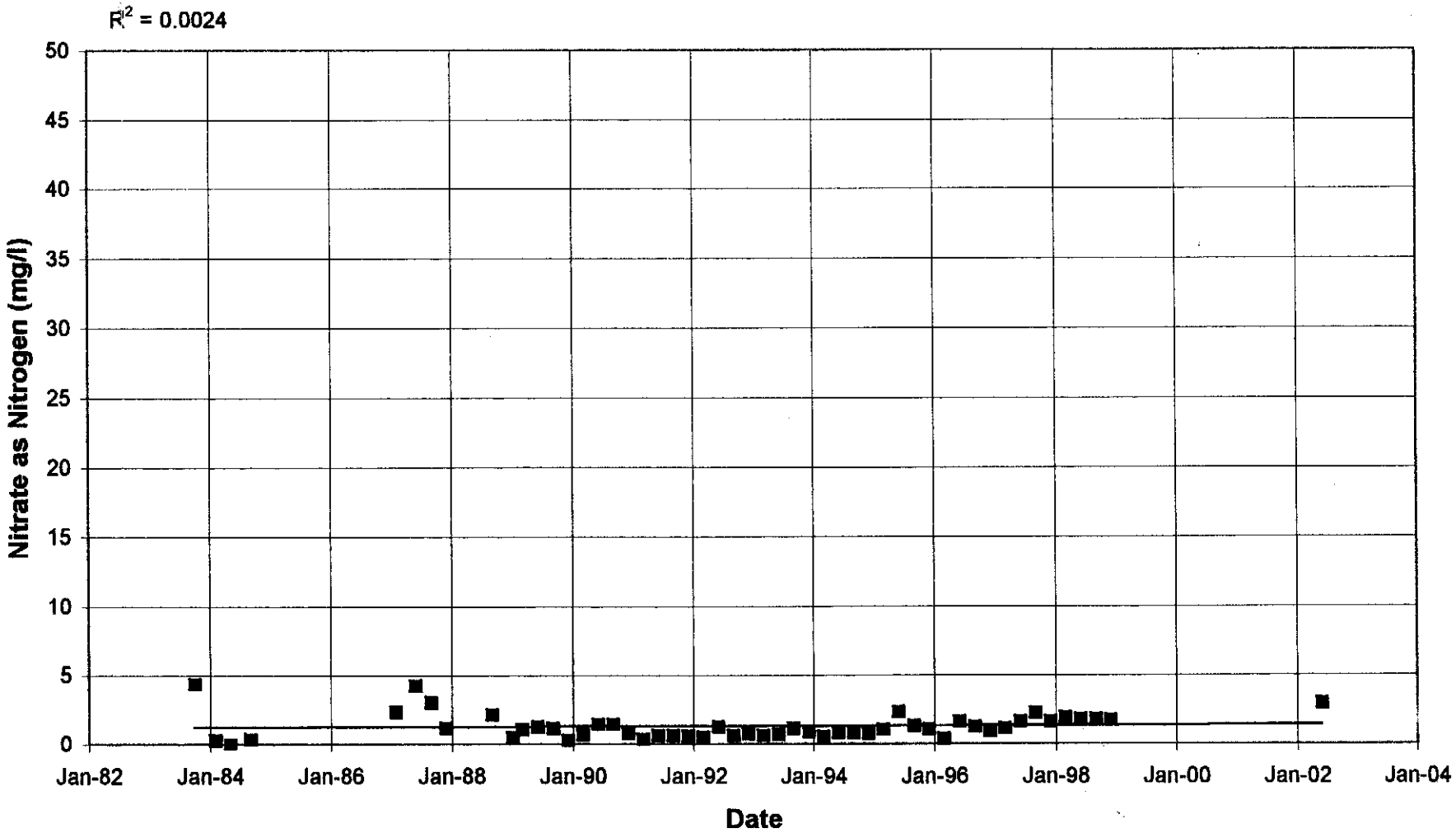
Graph 12
Well 30S/11E-7Q1
TDS vs Time



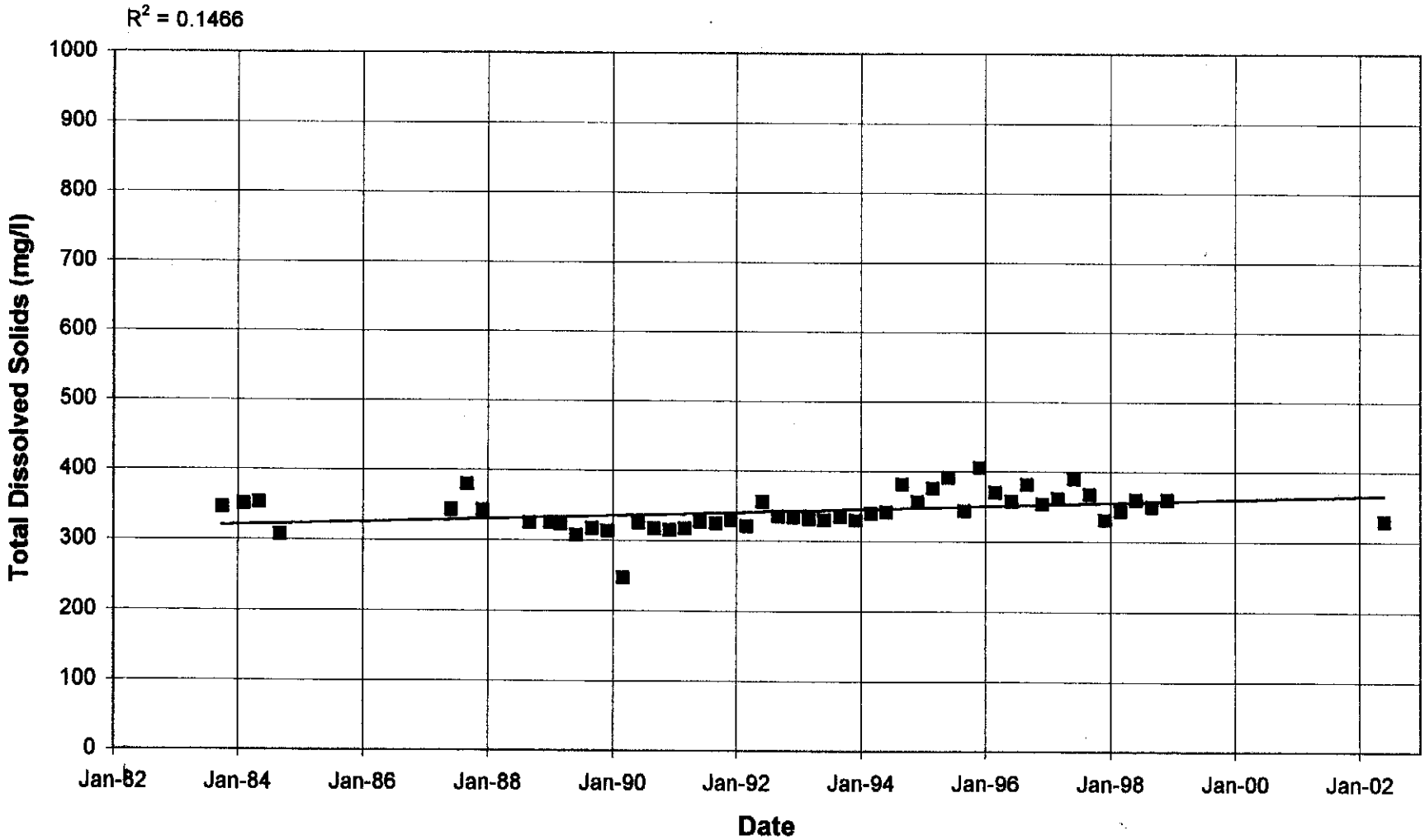

Graph 13
Well 30S/11E-7R1
NO3-N vs Time
R2 = 0.921
Nitrate as Nitrogen (mg/l)
50
45
40
35
30
25
20
15
10
5
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date

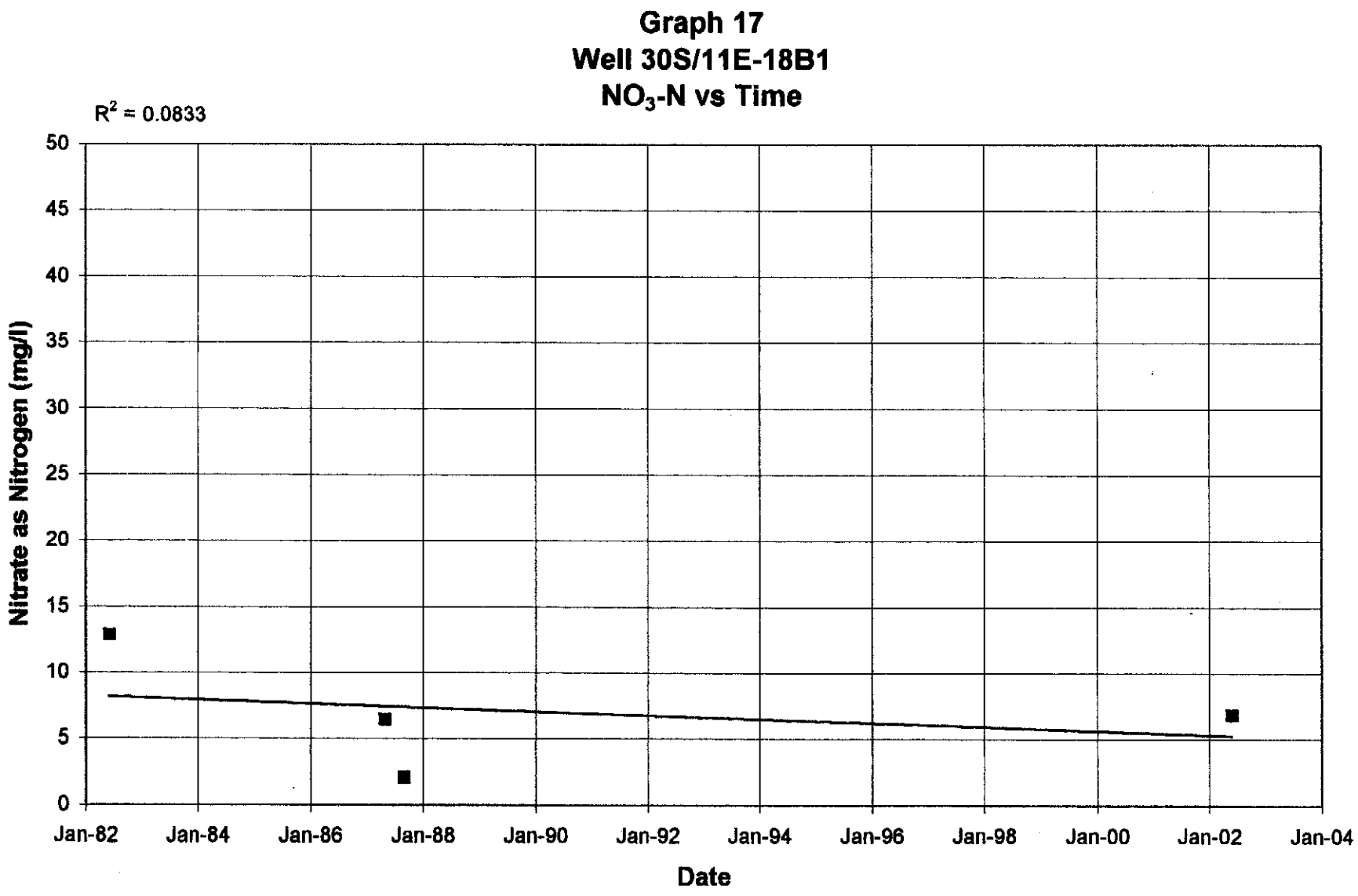

Graph 14
Well 30S/11E-7R1
TDS vs Time
R^2 = 0.0551
Total Dissolved Solids (mg/l)
1000
900
800
700
600
500
400
300
200
100
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date

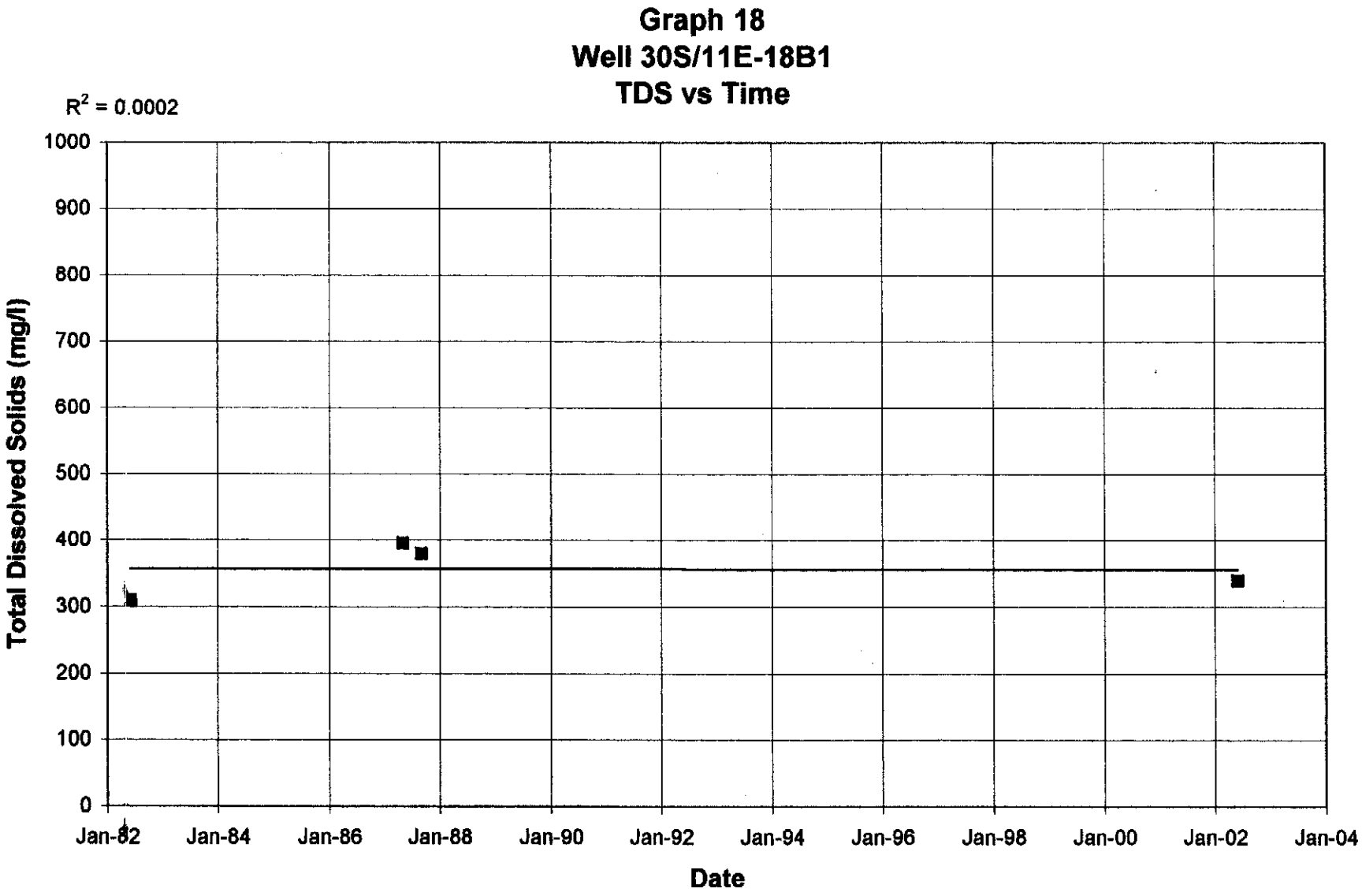
Graph 15
Well 30S/11E-17F4
NO_3-N vs Time



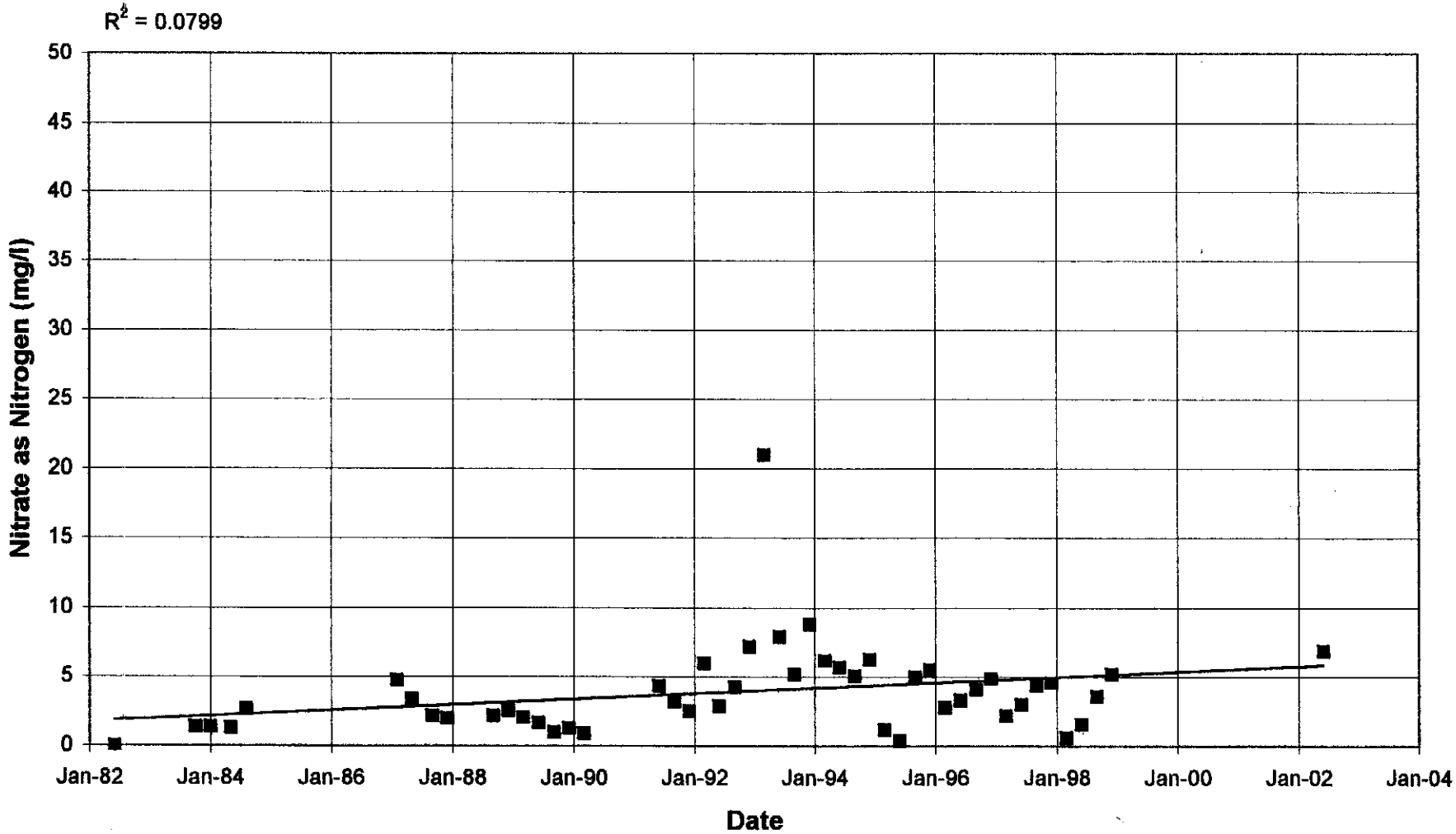
Graph 16
Well 30S/11E-17F4
TDS vs Time



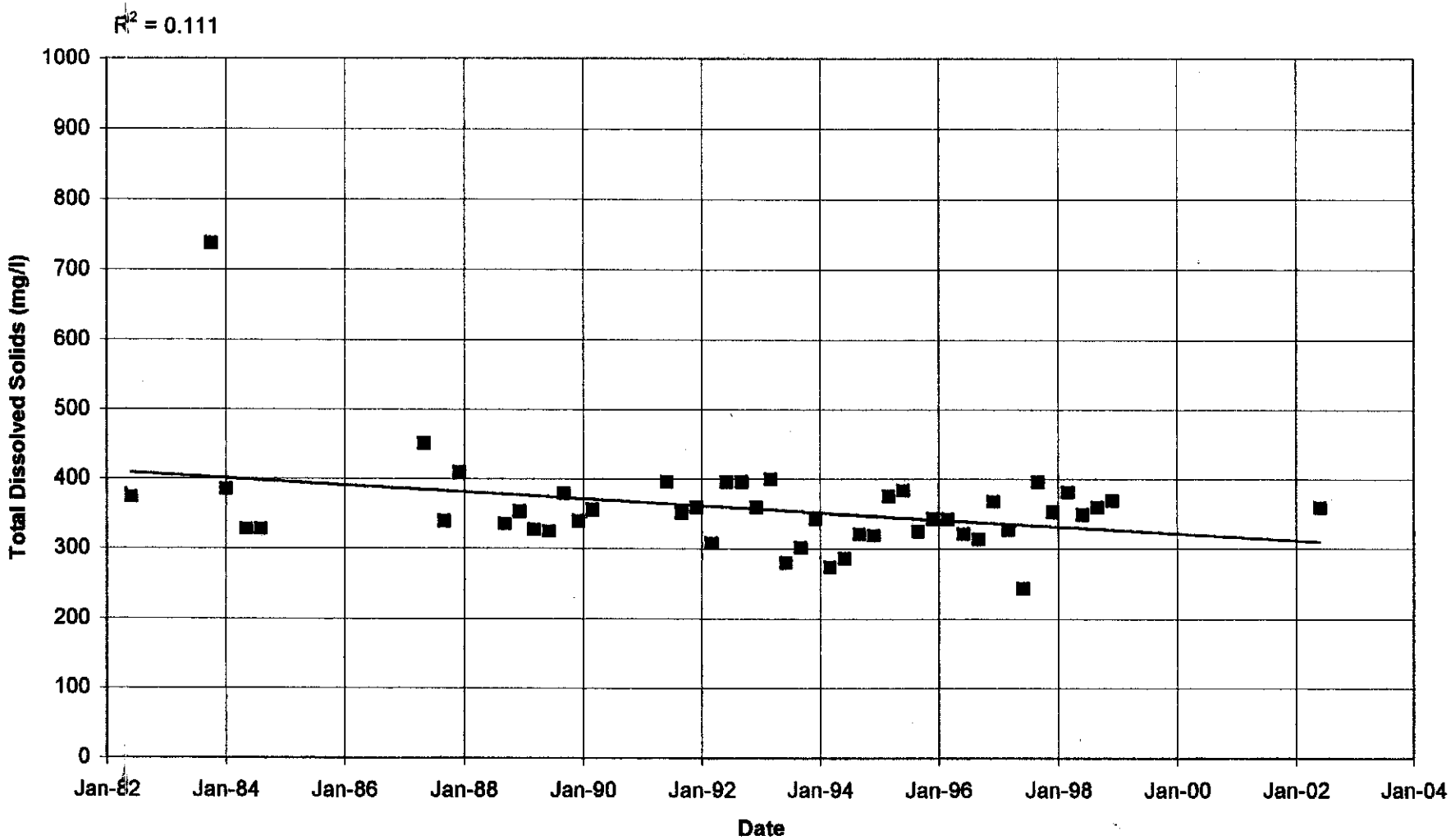

Graph 17
Well 30S/11E-18B1
NO3-N vs Time
R2 = 0.0833
Nitrate as Nitrogen (mg/l)
50
45
40
35
30
25
20
15
10
5
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date

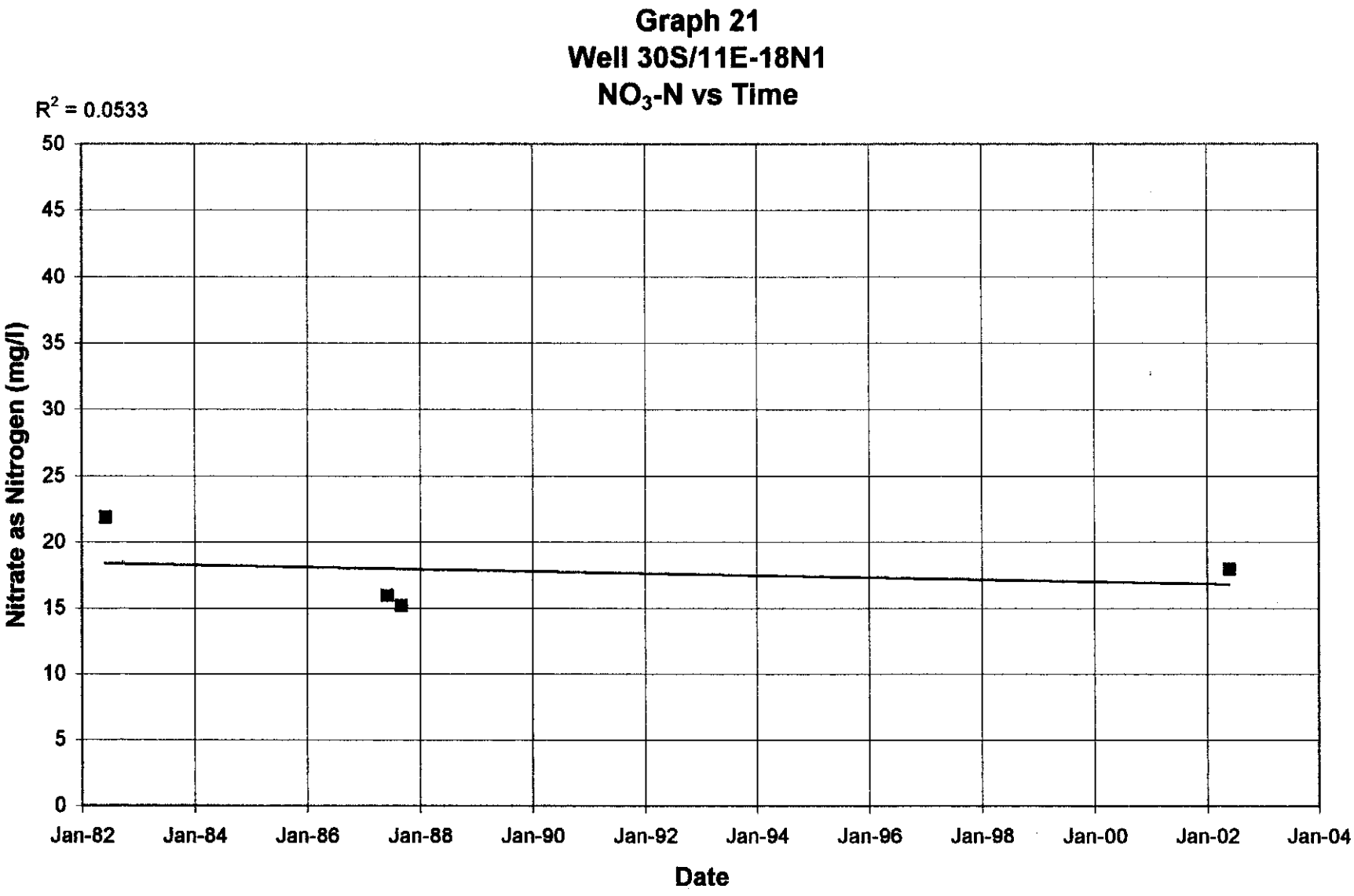

Graph 18
Well 30S/11E-18B1
TDS vs Time
R^2 = 0.0002
Total Dissolved Solids (mg/l)
1000
900
800
700
600
500
400
300
200
100
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date

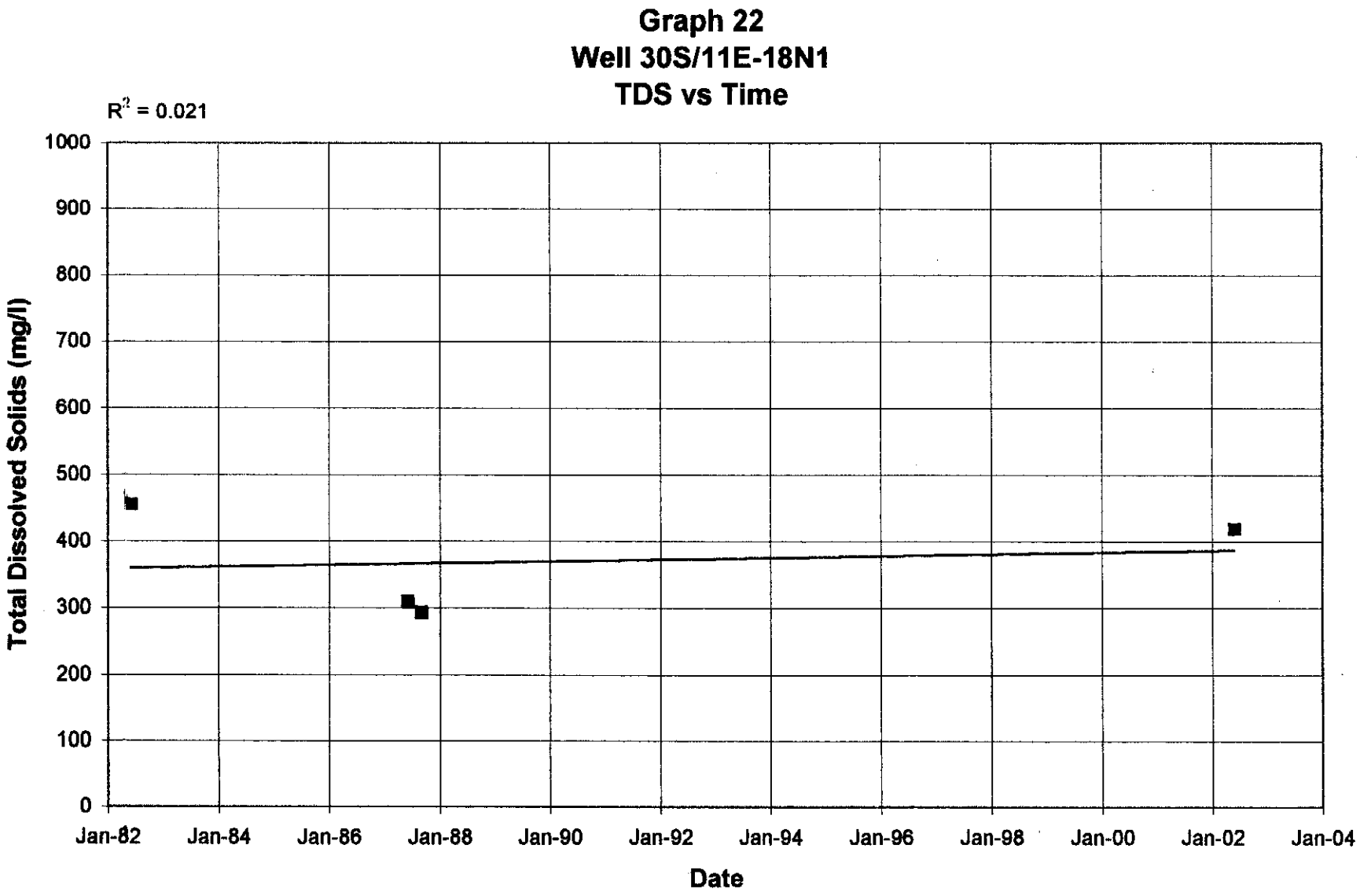
Graph 19
Well 30S/11E-18J6
NO_3-N vs Time



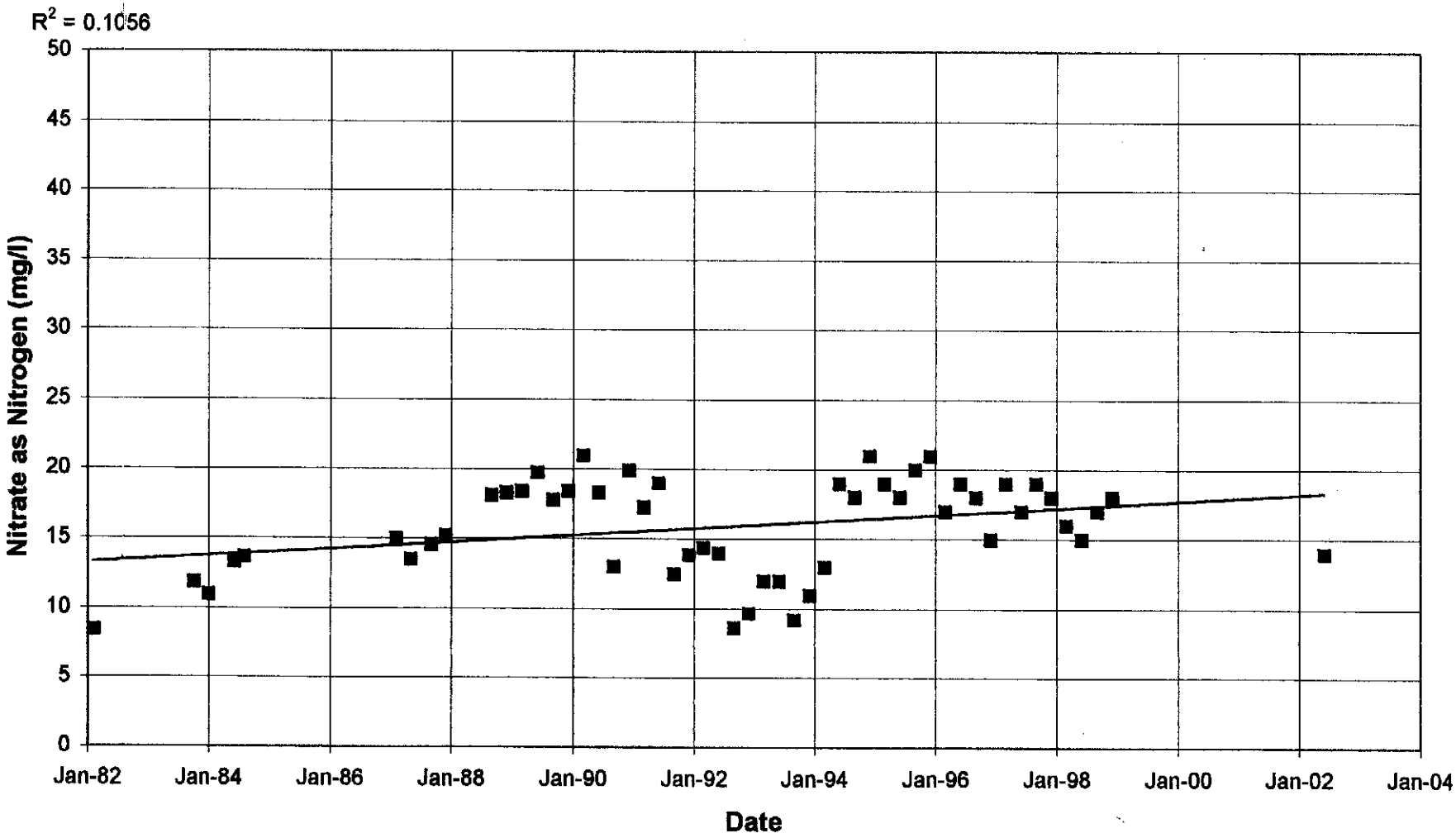
Graph 20
Well 30S/11E-18J6
TDS vs Time



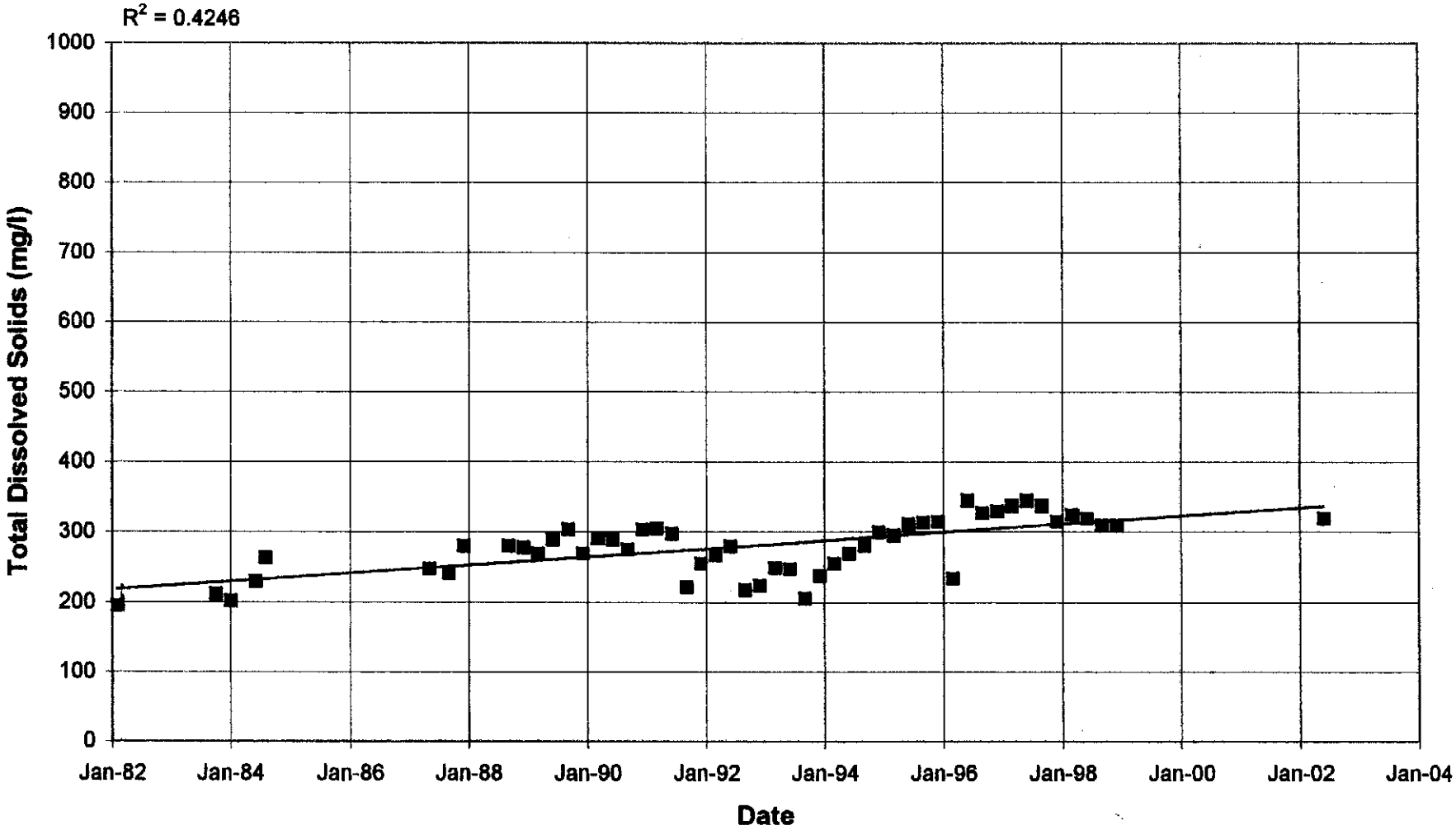

Graph 21
Well 30S/11E-18N1
NO3-N vs Time
R2 = 0.0533
Nitrate as Nitrogen (mg/l)
50
45
40
35
30
25
20
15
10
5
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date


Graph 22
Well 30S/11E-18N1
TDS vs Time
R^2 = 0.021
Total Dissolved Solids (mg/l)
1000
900
800
700
600
500
400
300
200
100
0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date

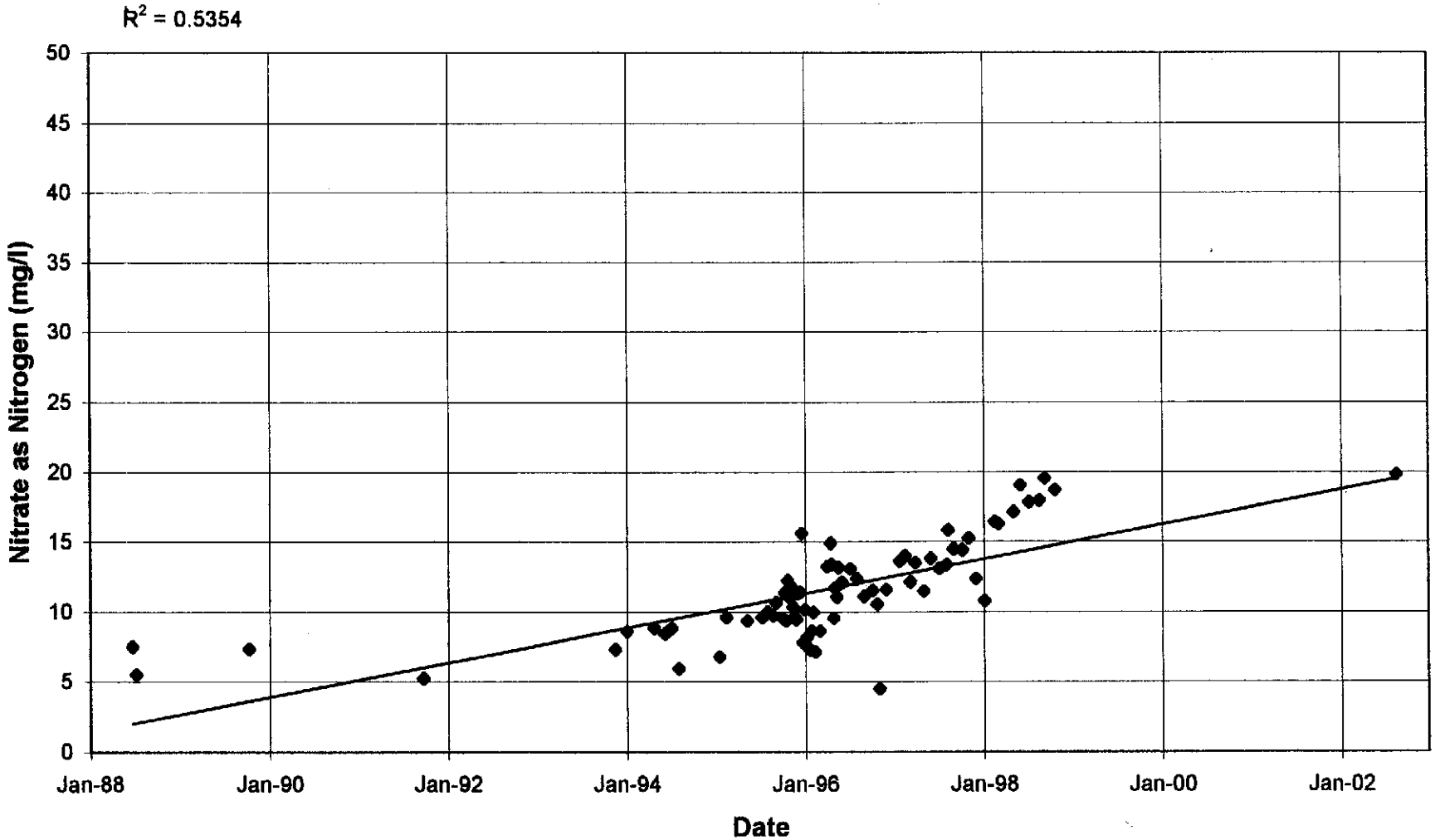
Graph 23
Well 30S/11E-18R1
NO_3-N vs Time



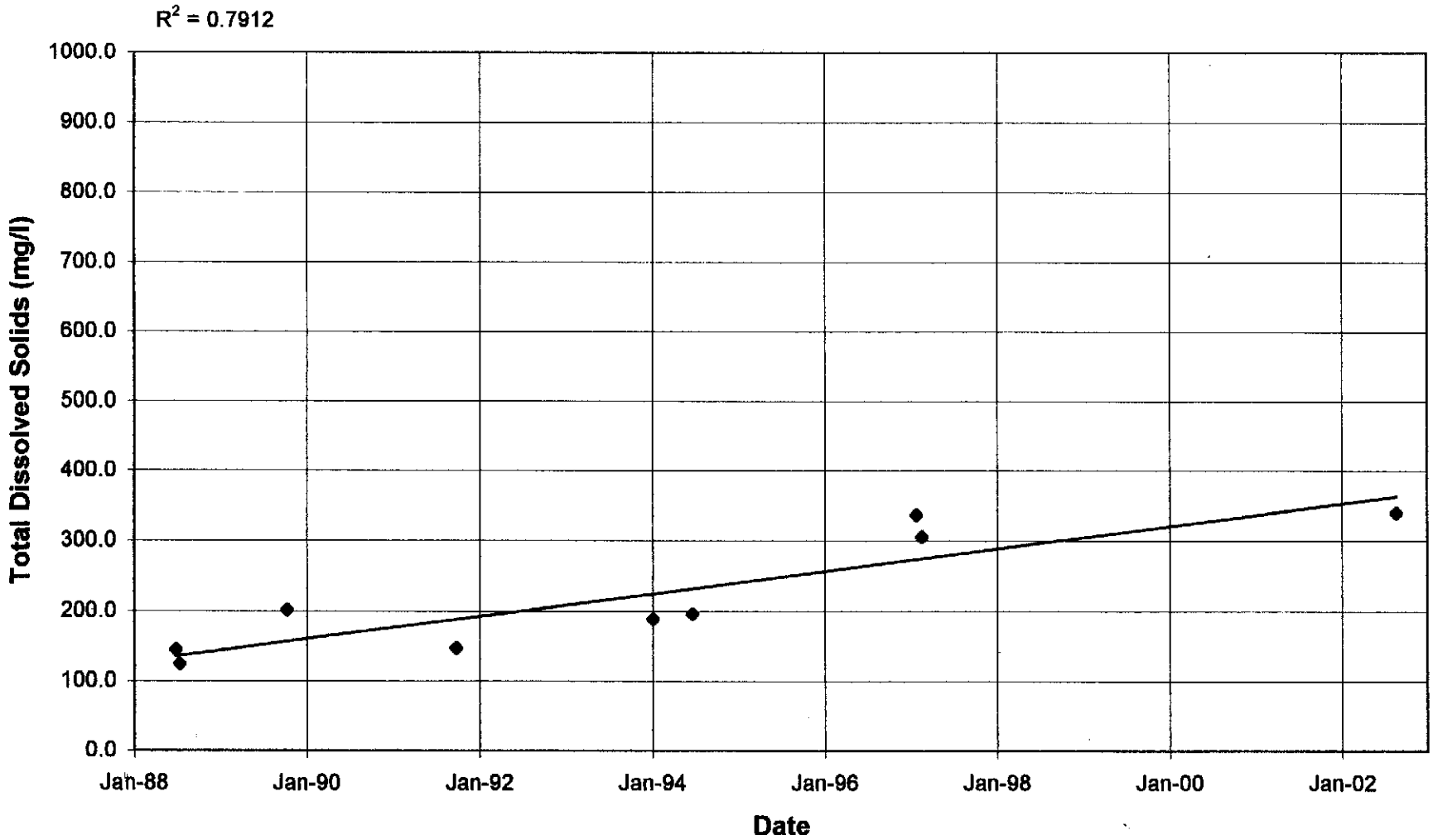
Graph 24
Well 30S/11E-18R1
TDS vs Time



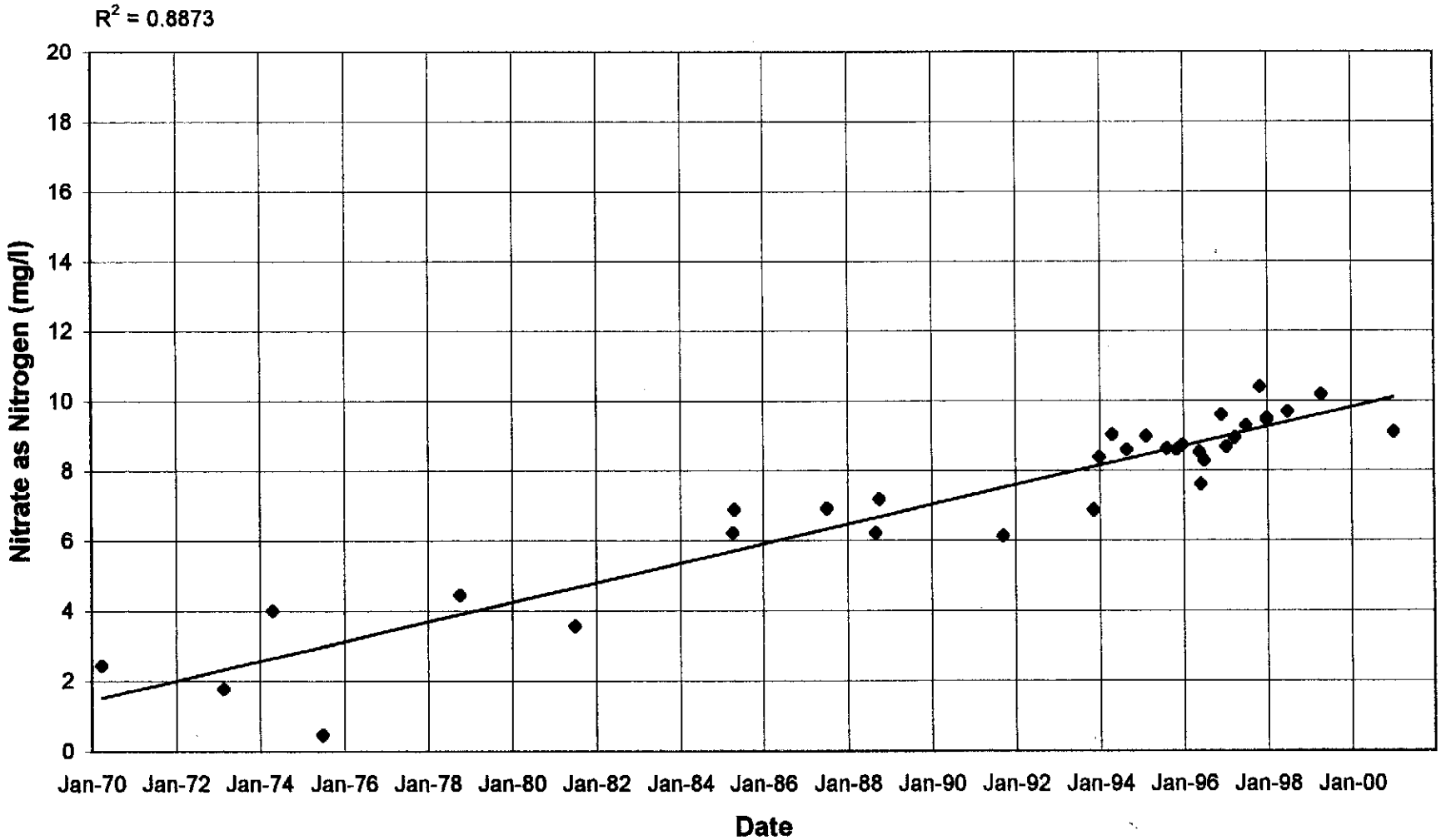
Graph 25
CCW Skyline Well (30S/10E-13F1)
NO_3-N vs Time



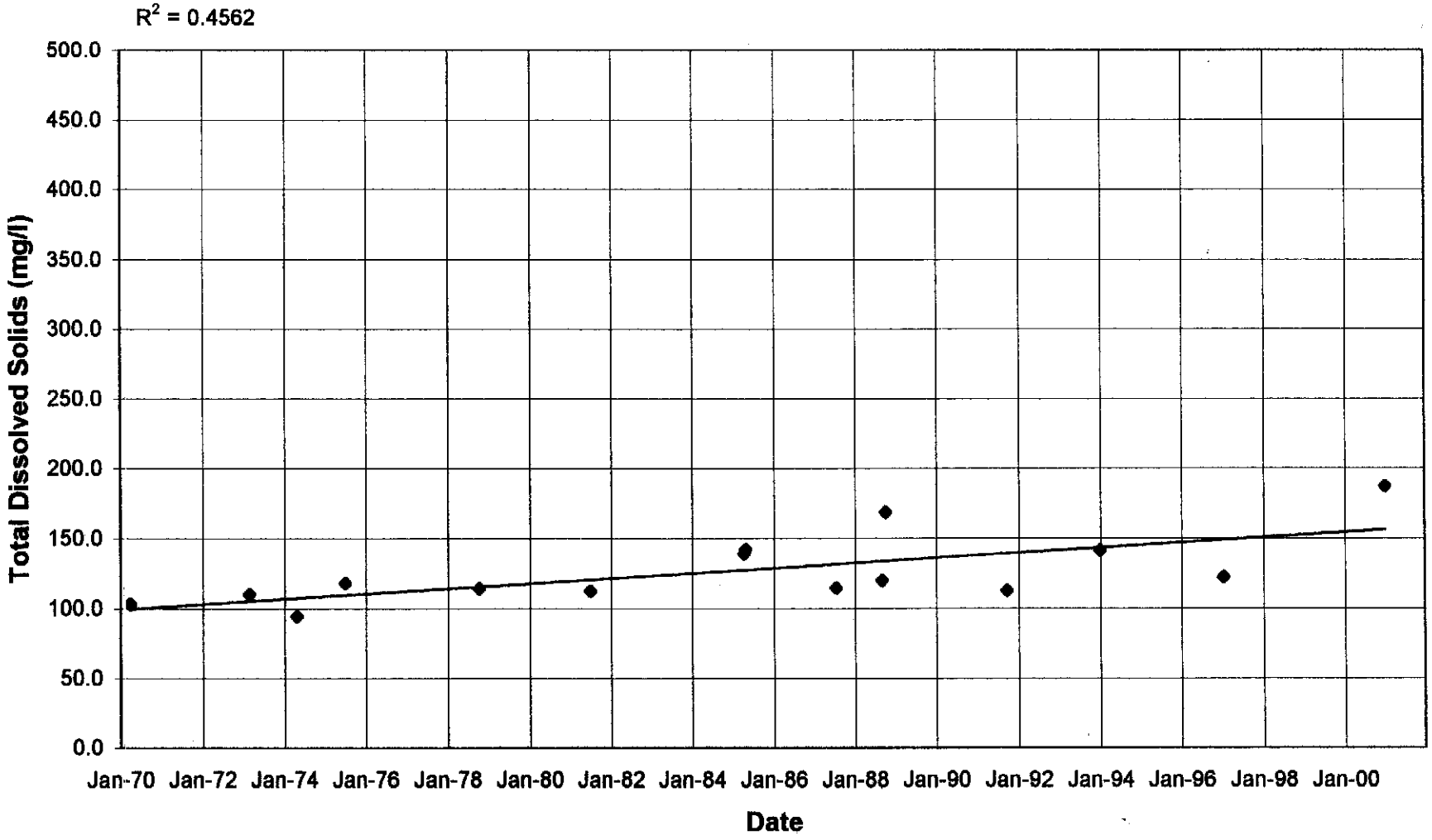
Graph 26
CCW Skyline Well (30S/10E-13F1)
TDS vs Time

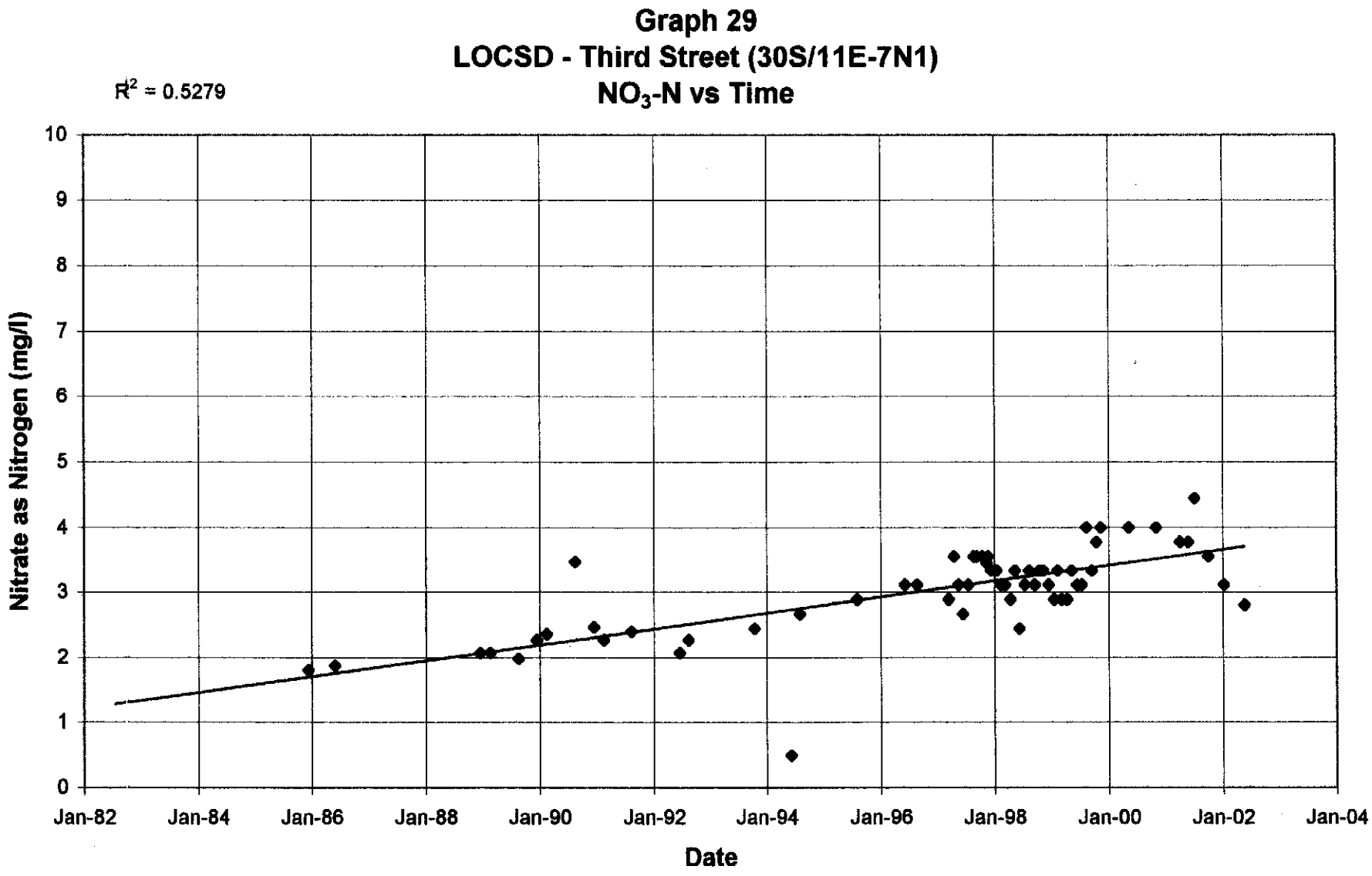


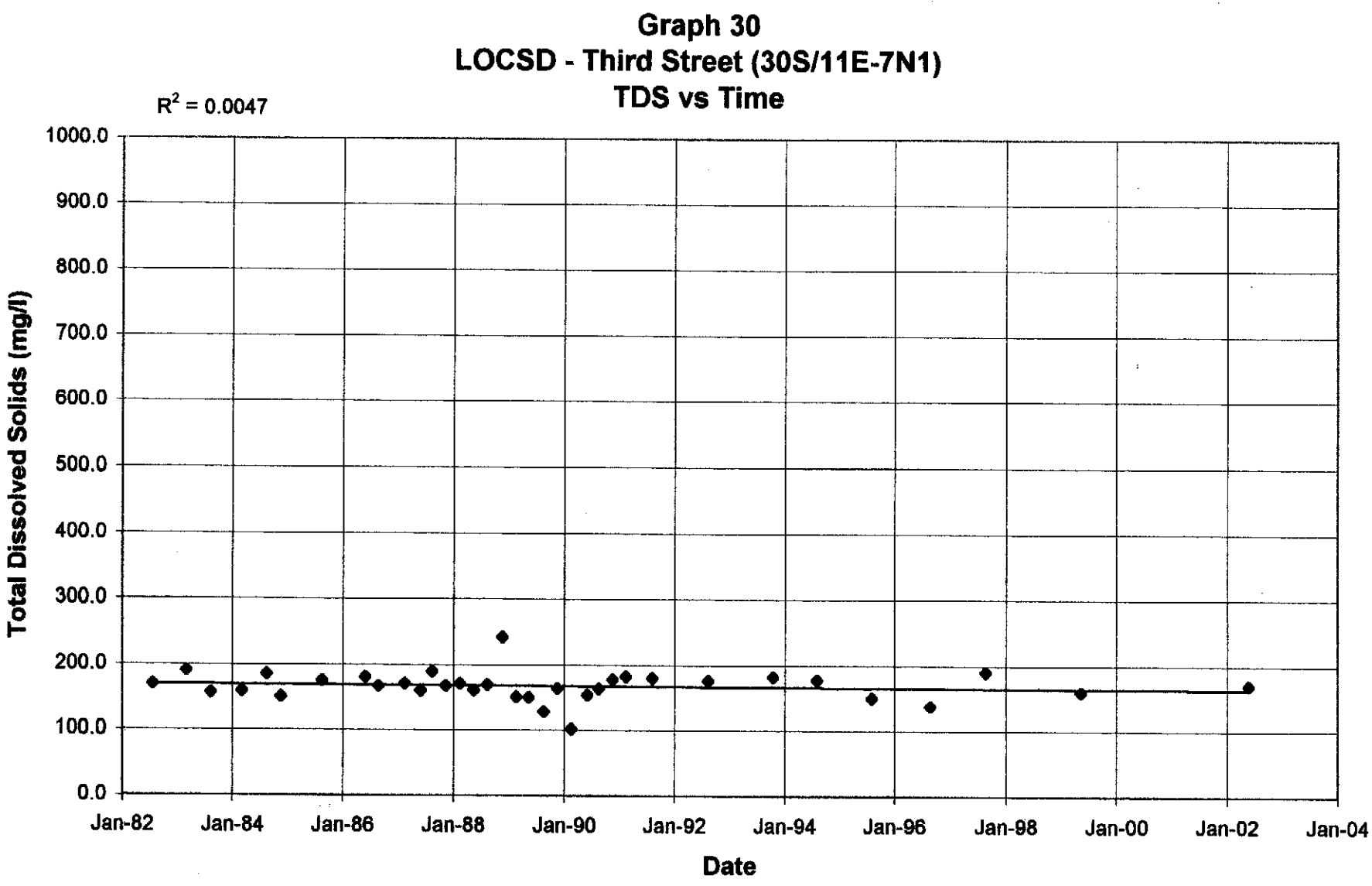
Graph 27
CCW Highland Well (30S/10E-24A1)
NO_3-N vs Time



Graph 28
CCW Highland Well (30S/10E-24A1)
TDS vs Time




Graph 29
LOCSD - Third Street (30S/11E-7N1)
NO3-N vs Time
R2 = 0.5279
Nitrate as Nitrogen (mg/l)
0
1
2
3
4
5
6
7
8
9
10
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date


Graph 30
LOCSD - Third Street (30S/11E-7N1)
TDS vs Time
$R^2 = 0.0047$
Total Dissolved Solids (mg/l)
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Date